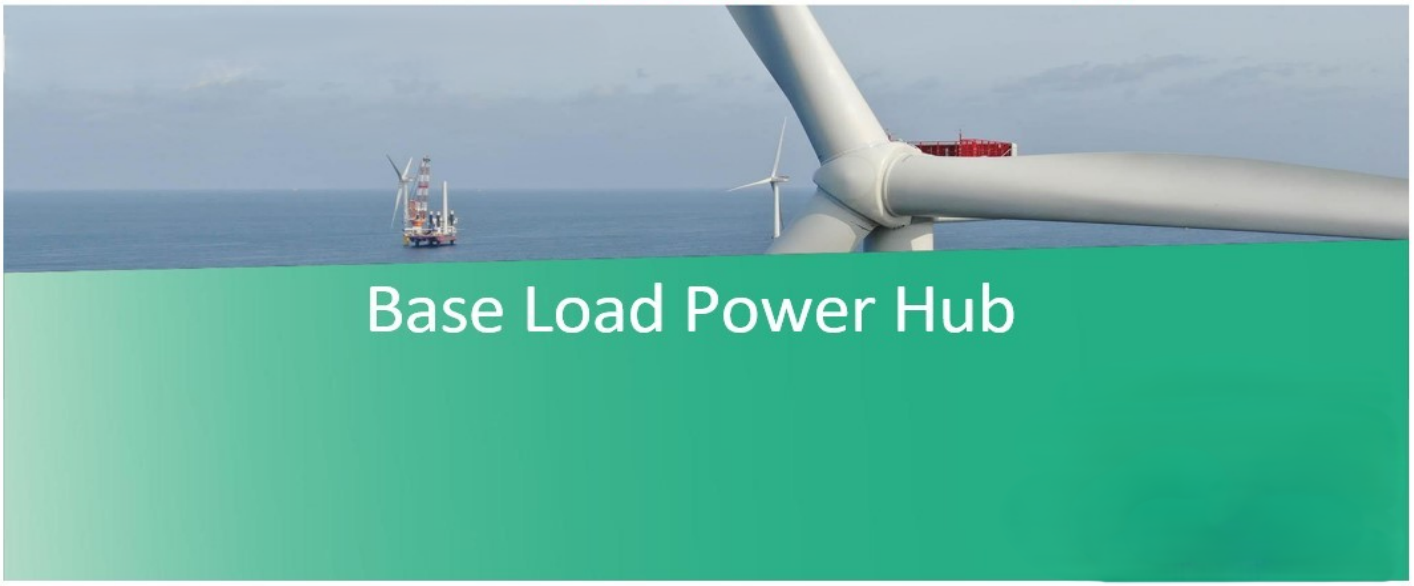
CROSSWIND

ROSETTI MARINO

PROVERLIS

PROJECT **123A90 - HOLLANDSE KUST NOORD WIND PARK**
BLPH Project



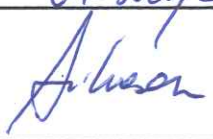
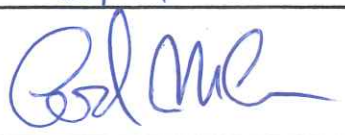
COMMISSIONING DOSSIER (ONSHORE)

SYSTEM	20 Electrolyser package
SUBSYSTEM	20-00 Electrolyser Package (A-20000)

CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

Sub System N°:	20-00	Tick as appropriate	ONSHORE	OK
Description:	Electrolyser Package (A-20000)		OFFSHORE	

1. *SUB-SYSTEM DEFINITION*	OK
1.1 Sub-System Description / Boundary Limit Drawings	
2. *READY FOR OPERATION CERTIFICATE*	OK
2.1 Achievement Of Ready for Operation Certificate (RFO)	
2.2 Exception Punch Lists (per discipline)	
2.3 "As-Commissioned" P&ID's / SLD's / D&ID's / C&E's	
3. *CONSOLIDATED PUNCH LISTS*	OK
3.1 Cleared and Residual Items (sorted by discipline)	
4. *FUNCTIONAL TESTS SHEETS*	OK
4.1 Electrical functional test sheets index	
4.2 Electrical "As-Commissioned" interconnection diagrams	
4.3 Instrumentation Functional Test Sheets Index	
4.4 Instrumentation "As-Commissioned" interconnection diagrams	
4.5 Telecommunication Functional Test Sheets Index	
4.6 Telecommunication "As-Commissioned" I.C.D. / TSLD's	
5. *SITE / OPERATIONAL:*	OK
5.1 Operational Test Procedure	
5.2 Operational Test Certificates	
6. *PIPING AND VESSEL PREPARATION*	OK
6.1 Final Mechanical / Vessel Inspection Checks Index	
6.2 Leak Test / Drying / Inerting Test Sheets Index	
6.3 Chemical Loading & First Fill records Index	
6.4 Chemical Cleaning Reports and Records Index	
6.5 Lubrication Schedule	
7. *VENDORS*	OK
7.1 Vendor Package Summary Index	
7.2 SAT Procedure with associated punch list and reference (Front Page)	
7.3 Vendor Spares & Special Tools lists references	
7.4 Vendor Data / Operations / Maintenance Manuals References	
8. *LIST OF MODIFICATIONS*	OK
8.1 List of changes initiated during the WORKSITE Commissioning phase pertaining to the relevant Sub-System will be incorporated in this section with relevant references (with location and position of blinds/spades, isolation LO & LC valves, list of electrical isolation status, and remaining inhibits and overrides)	
9. *SUPPORTING DOCUMENTS*	OK
9.1 Other supporting documents (as applicable)	

	Contractor Commissioning Site Leader	Company Commissioning Site Leader
Name	Anthony Ivison	Gerry McCann
Date	09-July-2025	10/7/2025
Signature		

Section 1 SUB-SYSTEM DEFINITION

Section 2 READY FOR OPERATION

Section 2.1 Achievement Of Ready for Operation Certificate (RFO)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1.5
HEAD (m)	122.7
MATERIAL	1.4401

FROM CS-610
PID-005

607B - 1/2" - PWO2 - TK22

ZONE BREAK
X00 | C01

HR-607B

CA VENT

ZONE BREAK
C01 | X00

982 - 1/2" - CA - TK22

981 - 1/2" - CA - TK22

FROM BTK-980
PID-009

3/8" BSPP F

3A

1/2" NPT

3E

FROM LIC-600
PID-003

TO ST-600
PID-003

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

AQA-1003

1ROP1.1 | 2ROP1.1 | YP-70 | 1PSP1.1 | 1RFP1

PI 1RO5	PI 1RO7	PI 2RO5	PI 2RO7	PI 2RO8	PI 1F1	PI 1ME2	PI 1ED1	PI 1ED2	PI 1ED4	PI 1ED6	PI 2F1	PI 2F2	PI 1PS3	PISA+ 1PS1
TI 1C1	TI 1RO7	TI 1ED7	TI 2RO7	TI 1B4	FSA- 1ED3	FSA 1ED3	QE 1Z1	QIA 1Z1	QISA+ 2RO4	PSA- 1RO2	QISA+ 1RO4	PSA- 1F2	UI 1ED11	LISA 1RF1
FI 1ME3	FI 1RO6	FI 2RO6	FI 1ED3	FI 1ED4	FI 1ED5	FIR 1RO8	FIR 2RO5	FIR 1ED1	FIR 2RO3	FIR 2RO6	FIR 1RO3	FIR 1PS4	QIA 1B4	

DEMIN TANK
LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 LALL

PAHH PAH PAL PALL PI 300

PT 300

HV-300
CV-300
50 15
1E
HV-300D

WTP-300

300 - 15 - RW - PA22S

4A

5A

CAHH 300 CAHH

15 20 PA22S TK22

FROM FCU-401
PID-012

ZONE BREAK
X00 | C01

505 - 15 - RW - TK22

504 - 15 - RW - TK22

FROM FCU-400
PID-012

C01 | X00
ZONE BREAK

FROM AHU-400
PID-013

503 - 15 - RW - TK22

ZONE BREAK
E01 | X00

NOTE 9

ZONE BREAK
X00 | C01

HR-503

SPH-404

FROM H2 VENT
PID-007

501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S

302A - 25 - PW - PA22S

302B - 25 - PW - PA22S

LO HV-301A

LO HV-301B

HV-300DA

HV-300DB

LP-300A

LP-300B

JGA ACA

NOTE 5

NOTE 1 NOTE 4 NOTE 3

NOTE 3

CV-301A

CV-301B

NOTE 9

CV-302A

CV-302B

LO HV-302A

LO HV-302B

HV-303DA

HV-303DB

303A - 25 - PW - PA22S

303B - 25 - PW - PA22S

306 - 25 - PW - PA22S

#300

PA22S PB22S

3WV-320

HV-307V

307 - 25 - PW - PB22S

NNF

CV-320

NOTE 2

TO ST-620
PID-006

FROM LIC-600
PID-003

FOR START-UP ONLY

SLO-15
IS 12

VAR-300A ACA

VAR-300B ACA

509 - 50 - RW - PA22S

506 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU 402
PID-012

507 - 15 - RW - TK22

FROM FCU 403
PID-012

ELO GEN
CLIENT
25 15
C01 | X00
ZONE BREAK

TP A

WATER SUPPLY

ELO GEN
CLIENT
X00 | A10
ZONE BREAK

TP F

WATER DRAINAGE

TP E

ELO GEN
CLIENT
C01 | X00
ZONE BREAK

PURE WATER DRAINAGE

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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Client

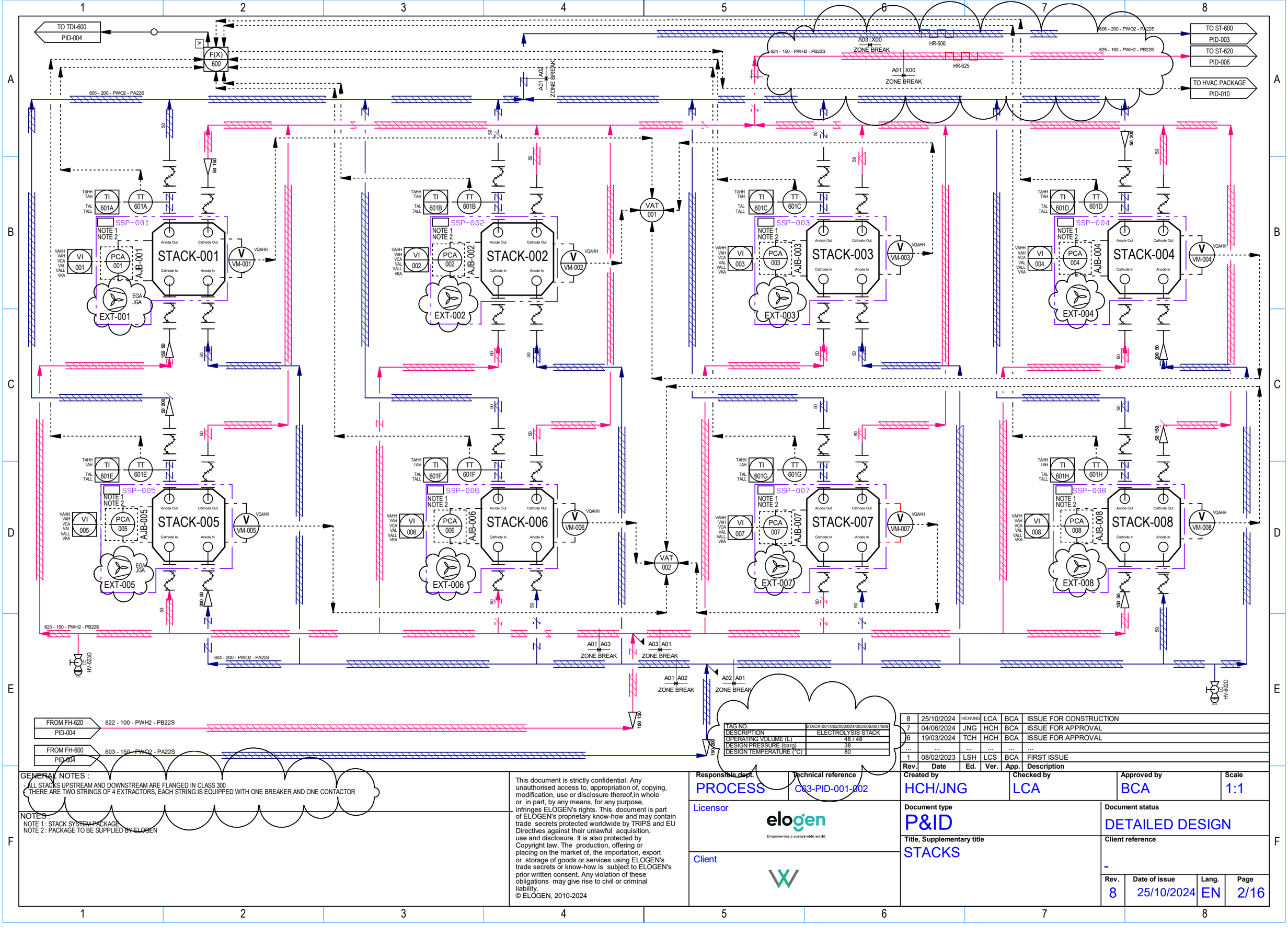
Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	1/16



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

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PROCESS	C63-PID-001-002	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	2/16

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005
421 - 1/2" - CW - TK22
FROM PT-630 PID-006
FROM HE-630/631 PID-007
420 - 1/2" - CW - TK22
TO RDPC-002 PID-006
TO PV-631 PID-007
TO MPV-611 PID-005
TO O2 VENT PID-005
TO FX-642 PID-007
616A - 80 - O2 - PA22S
TO O2 VENT PID-005
614 - 1/4" - O2 - TK22
615C - 1/4" - O2 - TK22
615B - 1/4" - O2 - TK22
615A - 1/4" - O2 - TK22
614B - 1/4" - O2 - TK22
TO O2 VENT PID-005
FROM N2 PANEL
900 - 15 - N2 - PA22S
N2 PID-009
900A - 40 - N2 - PA22S
901 - 15 - N2 - PA22S
TO PV-300 PID-001
MIN.
ACO-610
FROM STACKS PID-002
606 - 200 - PWO2 - PA22S
610 - 20 - PWO2 - PA22S
TO HE-610 PID-005
PIPE HEATED
PIPE NOT HEATED
FROM DG-640 PID-007
641A - 25 - PWH2 - PB22S
FROM LP-300 A/B PID-001
306 - 25 - PW - PA22S
HR-306
TO VAR-300A/B PID-001
616 - 1" - PWO2 - TK22
600B - 150 - PWO2 - PA22S
600A - 150 - PWO2 - PA22S
601B - 150 - PWO2 - PA22S
601A - 150 - PWO2 - PA22S
TO HE-600 PID-004
FOR START-UP ONLY
Auto-start
Shutdown
2 OUT OF 3
Analysis System Package

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5"D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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PROCESS	C63-PID-001-003	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

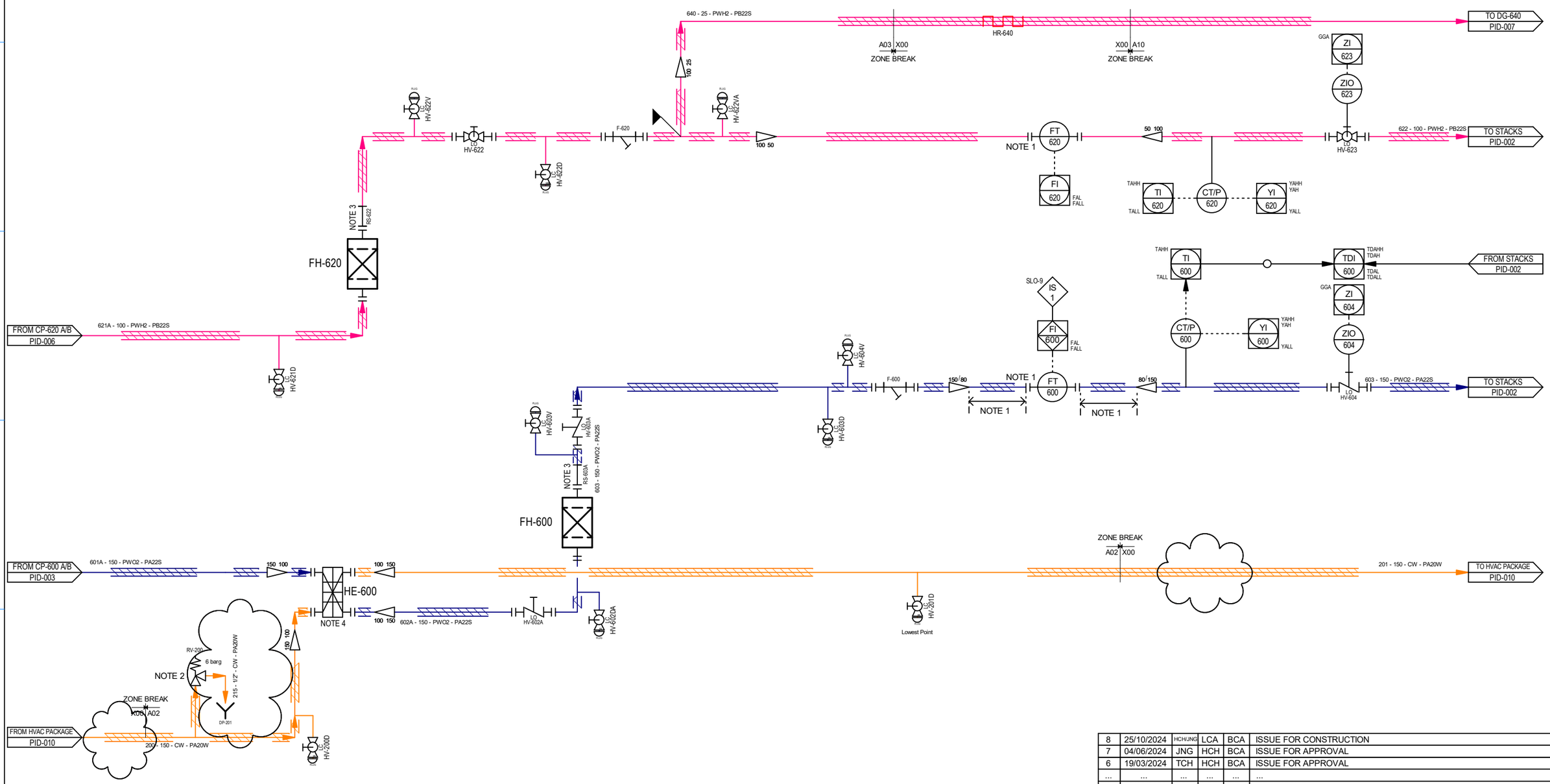
Title, Supplementary title: OXYGEN SEPARATION
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	3/16

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2.85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0

SAFE LOCATION - SEE DOC. PTN-002

O2 VENT

A10 X00 ZONE BREAK

PAH PI 612 PT 612 BBV-612

FROM PSV-610 PID-003 — 616A - 80 - O2 - PA22S

FROM HIOD-610A/B/C PID-003 — 615A - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 614 - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 421 - 1/2" - CW - TK22

FROM ST-600 PID-003 — 610 - 20 - PWO2 - PA22S

FROM HE-630/631 PID-007 — 405 - 50 - CW - PA20W

HE-610

NOTE 1
NOTE 2
NOTE 3

611 - 20 - PWO2 - PA22S

DEM-610

CS-610

NOTE 1

LSH 610 LIC 610 LAH LAL LSL 610 LSL 611 LSLL 611 LALL SLO-29 IS 13

LS HV-606D

607 - 1/2" - PWO2 - TK22

FC PV-600 FC PV-601

RO-600 0.4mm 607B - 1/2" - PWO2 - TK22 CV-600

PIPE NOT HEATED PIPE HEATED

A10 X00 ZONE BREAK

TO LP-300 A/B PID-001

AV-402 Highest Point Free Floating Lever Air/Gas Vents

406 - 50 - CW - PA20W TO HPP-700 PID-011

FROM PIC-610 PID-003

906A - 50 - N2 - PA22S N2 FROM N2 PANEL PID-009

902A - 25 - N2 - PA22S N2 FROM N2 PANEL PID-003

GDA AQA FC MPV-611

612 - 50 - O2 - PA22S

613 - 50 - O2 - PA22S

IS 1 IS 4 IS 19

RO-610 0.6mm

617 - 40 - O2 - PA22S

FO PV-610

618 - 40 - O2 - PA22S NNF

610 - 80 - O2 - PA22S

LS HV-619D

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

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PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

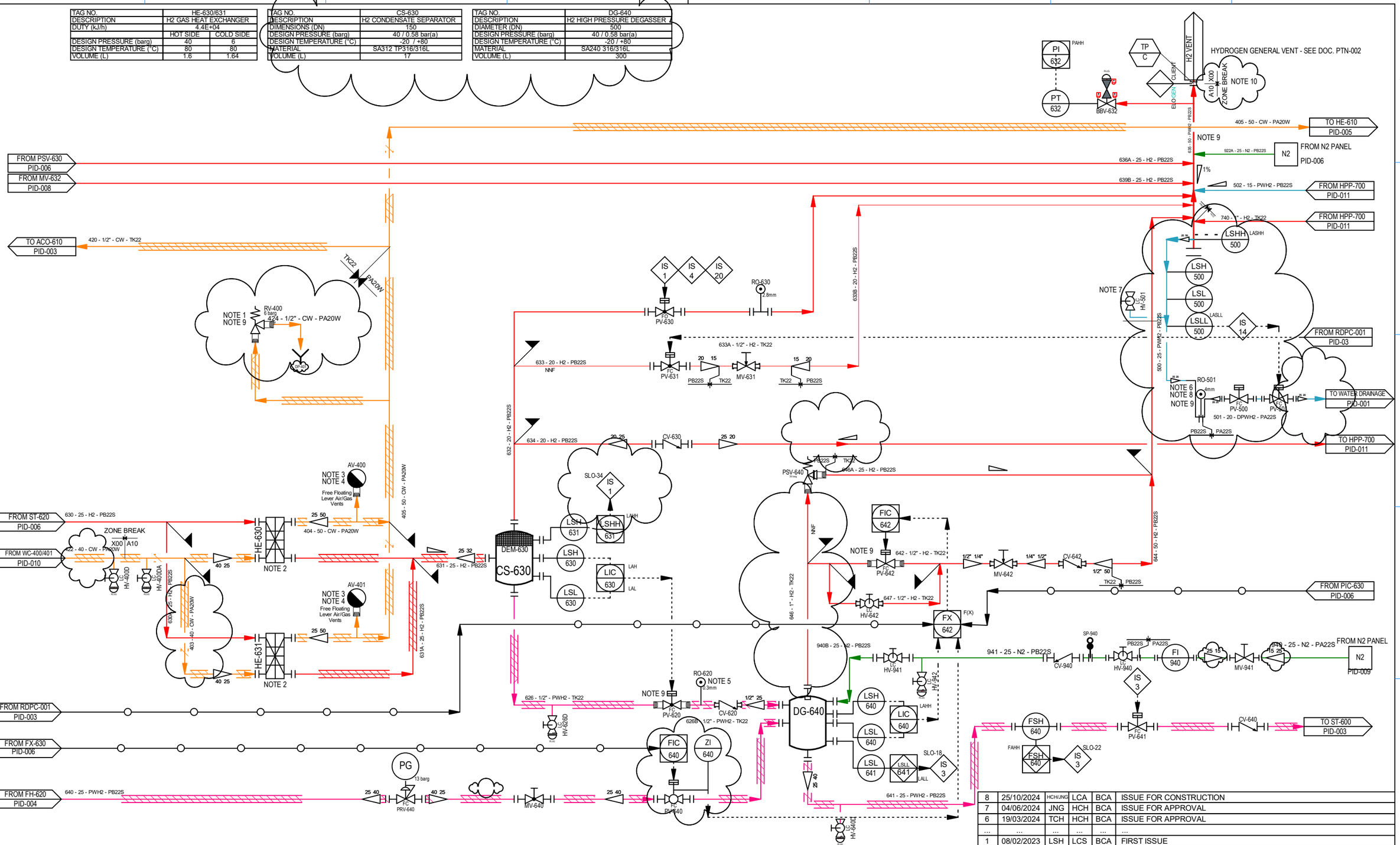
TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33.6
RATED POWER (kW)	5.5
HEAD (m)	35.2
MATERIAL	1.4404

TO RDPC-001 PID-003
TO MPV-630 PID-008
TO FX-642 PID-007
TO FIC-640 PID-007
FROM N2 PANEL
N2 PID-009
FROM STACKS PID-002
625 - 150 - PWH2 - PB22S
PIPE HEATED
PIPE NOT HEATED
ZONE BREAK
FROM LP-300 A/B PID-001
307 - 25 - PW - PB22S
NNF
HR-307
TO H2 VENT PID-007
TO H2 VENT PID-007
FROM PT-611 PID-003
TO HE630/631 PID-007
TO FH-620 PID-004
636 - 1" - PWH2 - TK22
636A - 25 - H2 - PB22S
920A - 40 - N2 - PB22S
922 - 25 - N2 - PB22S
922A - 25 - N2 - PB22S
921 - 15 - N2 - PA22S
620A - 100 - PWH2 - PB22S
620B - 100 - PWH2 - PB22S
621A - 100 - PWH2 - PB22S
621B - 100 - PWH2 - PB22S
MIN.
PSV-630 36 barg
TK22 1/2" GF
PB22S 15 25
1/2" GM
PIC 630
PT 630
FX 630
IP 15
BBV-630
HV-630
PT 631
PSHH 631
PAHH PAH PALL
IS 1
SLO-7
IS 11
SLO-33
IS 20
RDPC 002
PDAHH PDALL
SLO-19
PDSHH 002
PDSLL 002
IS 1 IS 4 IS 11
NOTE 4
FI 920
FT 920
#300
PT 920
PI 920
PAHH
RD-920 10 BARG
SP-920
BBV-920
CV-920
CV-921
NOTE 2
NOTE 3
NOTE 3
HV-920
HV-921
HV-922
MV-920
MV-921
PV-920
PV-921
FT 921
FI 921
FAL
SLO-17
HV-625V
GGA
ZI 624
ZIO 624
HV-624
ST-620
DEM-620
LT 620
LI 620
LAHH LAH LAL LALL
LSL 620
LSLL 620
LASLL
SLO-32
IS 5
HR-620A
HV-620D
HV-620
ZONE BREAK1
NOTE 5
PLUG 1/2" NPT F
HV-620A
HV-620B
TSAHH
TSHH 621A
TSHH 621B
TT 621A
TT 621B
NOTE 1
RS-620A
RS-620B
RS-621A
RS-621B
CP-620A
CP-620B
Auto-start
Shutdown
VAR-620A
VAR-620B
IS 17
SLO-32
IS 18
PT 620A
PT 620B
PI 620A
PI 620B
CV-621A
CV-621B
HV-621A
HV-621B
PI 620
PT 620
BBV-620
C01 X00
X00 A10
X00 A22
A10 X00
A10 A22
A22 X00
A22 A10
X00 A10
X00 A10
X00

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4.4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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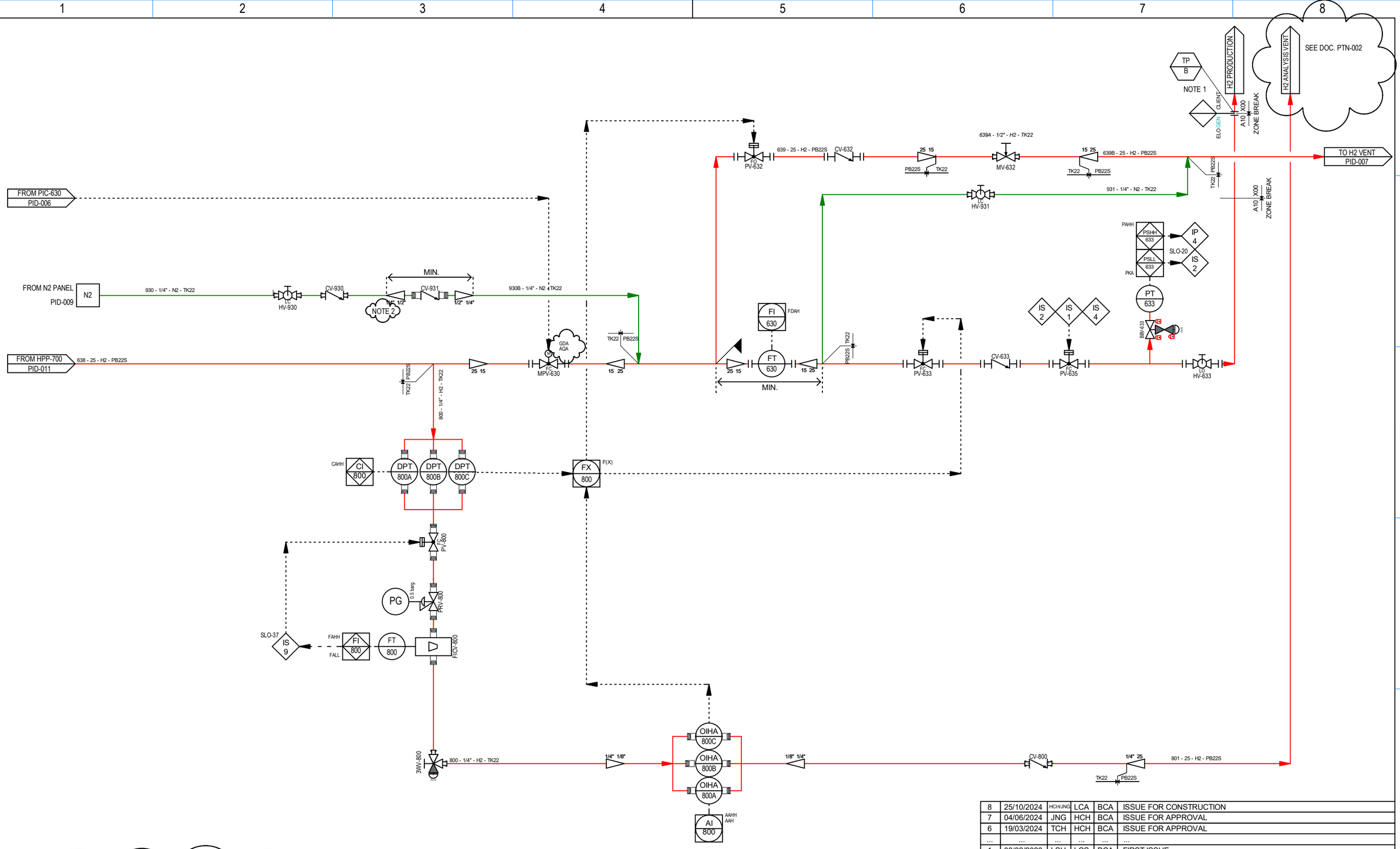
Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16



Rev.	Date	Ed.	Ver.	App.	Description
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

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PROCESS	C63-PID-001-008	HCH/JNG	LCA	BCA	1:1

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Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 PANEL

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	8/16

TAG NO.	BTK-980
DESCRIPTION	COMPRESSED AIR BUFFER TANK
DESIGN PRESSURE (barg)	124
DESIGN TEMPERATURE (°C)	45
VOLUME (L)	1

IA SUPPLY
NITROGEN SUPPLY
CLIENT
ELOGEN
A10 X00
ZONE BREAK
TP I
TP D
PSV-900
10 barg
1 GM
1 1/2 GF
906 - 25 - N2 - PA22S
N2 PANEL
PT 910
PI 910
PAHH PAH
PAL PALL
BBV-910
HV-910
910 - 25 - N2 - PA22S
HV-911
NOTE 2
906A - 50 - N2 - PA22S
N2
TO O2 VENT PID-005
900 - 15 - N2 - PA22S
TO ST-600 PID-003
920 - 15 - N2 - PA22S
TO ST-620 PID-006
940 - 25 - N2 - PA22S
TO DG-640 PID-007
TK22
PA22S
930 - 1/4" - N2 - TK22
TO H2 PANEL PID-008
PSV-150
10 Barg
PI 150
PT 150
BBV-150
HV-150
HV-151
NOTE 1
980 - 1/2" - CA - TK22
CV-980
BTK-980
980B - 1/2" - CA - TK22
APC-980
PVI-980
MANIFOLD
CA
TO PV-631 PID-007
TO PV-632 PID-008
TO PV-600 PID-005
TO PV-300 PID-001
TO PV-901 PID-003
TO PV-921 PID-006
TO PV-620 PID-007
TO PV-642 PID-007
TO PV-633 PID-008
TO PV-640 PID-007
TO PV-500 PID-007
APC-900
PVI-900
980C - 1/2" - CA - TK22
PV-900
SV-900
PV-920
SV-920
PV-601
SV-601
PV-610
SV-610
PV-630
SV-630
PV-635
SV-635
PV-641
SV-641
PV-800
SV-800
PV-501
SV-501
TO PV-900 PID-003
TO PV-920 PID-006
TO PV-601 PID-005
TO PV-610 PID-005
TO PV-630 PID-007
TO PV-635 PID-008
TO PV-641 PFD-007
TO PV-800 PFD-008
TO PV-501 PFD-007
PVI-901
980D - 1/2" - CA - TK22
981 - 1/2" - CA - TK22
TO WTP-300 PID-001
970 - 1/2" - CA - TK22
TO HPP-700 PID-011

NOTES :
NOTE 1 : IA CONNECTION FOR MAINTENANCE PURPOSE IN CASE OF NEED OF COMPRESSED AIR IN A SPECIFIC POINT ON ELECTROLYSER
NOTE 2 : NITROGEN CONNECTION FOR MAINTENANCE/COMISSIONING PURPOSE IN CASE OF NEED OF NITROGEN IN A SPECIFIC POINT ON THE ELECTROLYSER

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
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Title, Supplementary title: NITROGEN & INSTRUMENT AIR PANEL
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	9/16

TAG NO.	WC-400/401
DESCRIPTION	WATER CHILLER
COOLING POWER (kW)	95
CONDENSING CAPACITY (kW)	128
OP. TEMPERATURE (°C)	+1°C / +50°C

TAG NO.	THS-200
DESCRIPTION	CONDENSATION WATER SKID
POWER CONSUMPTION (kW)	7.5
NOMINAL FLOW (M3/H)	128
OP. TEMPERATURE (°C)	35/45

TAG NO.	THS-400
DESCRIPTION	CHILLER WATER SKID
POWER CONSUMPTION (kW)	5
NOMINAL FLOW (M3/H)	31
OP. TEMPERATURE (°C)	5/11

TAG NO.	DC-200/201	
DESCRIPTION	DRY COOLER	
PUISSANCE (kW)	95	
	HOT SIDE	COLD SIDE
INLET/OUTLET TEMP. (°C)	40	25/39
FLOWRATE	68500 kg/h	152000 m3/h

TO HE-600 PID-004
FROM HE-600 PID-004
FROM FX-600 PID-002
200 - 150 - CW - PA20W
201 - 150 - CW - PA20W
202 - 80 - CW - PA20W
204 - 150 - CW - PA20W
211 - 80 - CW - PA20W
210 - 150 - CW - PA20W
209 - 150 - CW - PA20W
205 - 100 - CW - PA20W
207 - 100 - CW - PA20W
206 - 100 - CW - PA20W
208 - 100 - CW - PA20W
231 - 50 - CW - PA20W
232 - 50 - CW - PA20W
427 - 50 - CW - PA20W
428 - 50 - CW - PA20W
429 - 50 - CW - PA20W
402 - 80 - CW - PA20W
409 - 50 - CW - PA20W
408 - 80 - CW - PA20W
426 - 80 - CW - PA20W
431 - 25 - CW - PA20W
410 - 25 - CW - PA20W
411 - 25 - CW - PA20W
422 - 40 - CW - PA20W
407 - 40 - CW - PA20W
412 - 25 - CW - PA20W
414 - 20 - CW - PA20W
415 - 20 - CW - PA20W
416 - 20 - CW - PA20W
417 - 20 - CW - PA20W
418 - 20 - CW - PA20W
419 - 20 - CW - PA20W
433 - 20 - CW - PA20W
434 - 20 - CW - PA20W
430 - 50 - CW - PA20W
413 - 50 - CW - PA20W
TO AHU PID-013
FROM AHU PID-013
TO HE-630/631 PID-007
FROM HPP-700 PID-011
TO FCU-400 PID-012
FROM FCU-400 PID-012
TO FCU-401 PID-012
FROM FCU-401 PID-012
TO FCU-402 PID-012
FROM FCU-402 PID-012
TO FCU-403 PID-012
FROM FCU-403 PID-012
TO HCU-400 PID-012
FROM HCU-400 PID-012
AQA
WC-400
WC-401
DC-200
DC-201
SKID PUMP CONDENSATION
SKID PUMP DISTRIBUTION
CP-200A
CP-200B
CP-400A
CP-400B
THS-200
THS-400
ZONE BREAK
NOTE 1
NOTE 3
NOTE 4
NOTE 5
NOTE 6
NOTE 7

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GENERAL NOTES :
- REFER TO HVAC PACKAGE DOCUMENTATION FROM PAUMIER FOR COMPLETE P&ID - P&ID N° (HOLD)
-IS ON THE THERMAL SKID WILL BE ADDED FOR THE NEXT REVISION

NOTES :
NOTE 1: Drip pan will be provided by Paumier and installed on skid pump

NOTE 3 : 2xD MINIMUM DISTANCE
NOTE 4 : 5xD MINIMUM DISTANCE
NOTE 5 : 10xD MINIMUM DISTANCE
NOTE 6 : THESE EQUIPMENTS WILL BE SUPPLIED ASSEMBLED.
NOTE 7 : FROM B TO AB: PROCESS LINE 100% OPEN. FROM A TO AB: BYPASS LINE 100% OPEN.

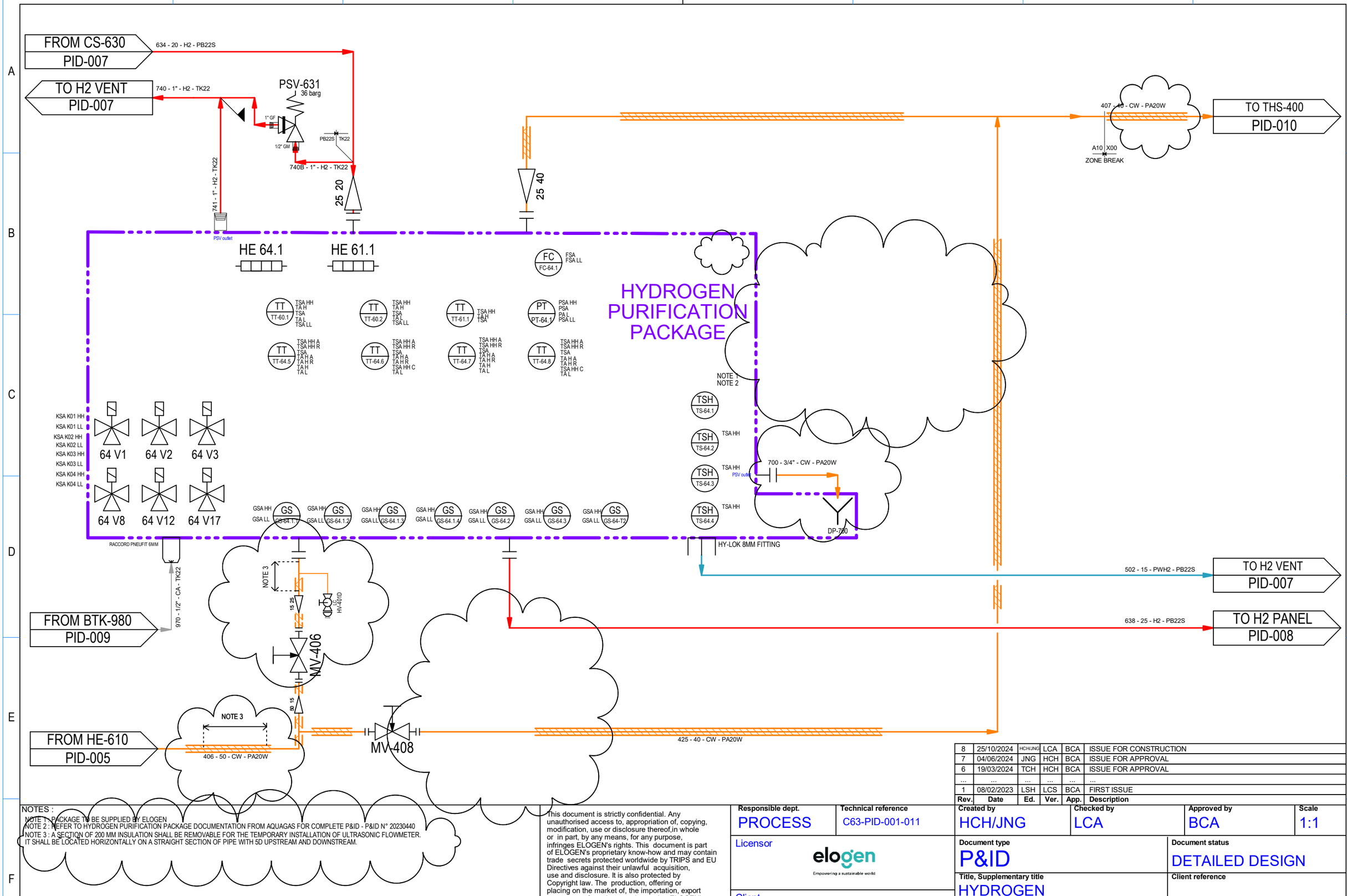
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PROCESS	C63-PID-001-010	HCH/JNG	LCA	BCA	1:1

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P&ID	DETAILED DESIGN
Title, Supplementary title	**Client reference**
HVAC UNIT	-

Rev.	Date of issue	Lang.	Page
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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

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PROCESS	C63-PID-001-011	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
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Title, Supplementary title: HYDROGEN PURIFICATION PACKAGE

Client reference: -

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RECTIFIERS & WATER TREATMENT & I&C CABINETS CONTAINER & STACKS

LEVEL 0
NOTE 4

TAHH-1002 TI 1002 TALL-1002 PI 1002 PALL-1002
PI 1003 PALL-1003 TI 1003 TAHH-1003 TALL-1003
PI 1001 PALL-1001 TI 1001 TAHH-1001 TALL-1001
TI 1004 TAHH-1004 TALL-1004

TT-HY 1002 PT 1002 DS DS-003 OAS PT 1003 TT-HY 1003
EH-1001 EH-1002 EH-1003 EH-1004 JGA EGA
PT 1001 TT-HY 1001 F SSI-1000 IS 4 SLO-6 AQA TT-HY 1004

SD-001A SD-001B SD-001C 2 OUT OF 3 IS 6
DS DS-004 OAS DS DS-001 OAS DS DS-002 OAS
ESD-004 OAZ
SD-003A SD-003B SD-003C 2 OUT OF 3 IS 4
SD-004A SD-004B SD-004C 2 OUT OF 3 IS 4
SD-005A SD-005B SD-005C 2 OUT OF 3 IS 4
AHD 1004 CI 1004 CAHH CAH
AHD 1001 CI 1001 CAHH CAH
PT 1004 PI 1004 PALL-1004
AL/S BUZ-1001

HCU-400
IS 1 SLO-4
DS DS-011 DS DS-012
NOTE 3 WLD-001 LAHH
NOTE 3 WLD-002 LAHH
NOTE 3 WLD-004 LAHH
SLO-21 IS 4
SLO-2 IS 4
ESD-003 OAZ IS 1 SLO-4

TO THS-400 PID-010 413 - 50 - CW - PA20W
FROM WC-400/401 PID-010 430 - 50 - CW - PA20W
X00 B01 ZONE BREAK
HYDRAULIC COOLING UNIT

VE-001
VE-002
VE-003
VE-004

RECTIFIER PACKAGE
NOTE 1
NOTE 2
RSP-001
ACA AQA V VM-101 VAHH VAH VAL VALL VKA VCA
A IM-001 IAHH IDAHH
REC-001
V VM-102 ACA AQA VAHH VAH VAL VALL VKA VCA
A IM-002 IAHH IDAHH
REC-002

CONTROL CABINET + RECTIFIER ROOM
SD-008A SD-008B SD-008C 2 OUT OF 3 IS 4
SD-002A SD-002B SD-002C 2 OUT OF 3 IS 4
OAR JGA AQA-052
F FB-001 IS 4
OAZ ESD-001 IS 1 SLO-4
kWh PQ-003 EJAHH EJALL
PLC AQA AQA AQA BZ
kWh PQ-001 EJAHH EJALL
kWh PQ-002 EJAHH EJALL
WLD-003 LAHH
kWh PQ-004 EJAHH EJALL NOTE 3

FCU-400 SPH-400 504 - 15 - RW - TK22 FROM WC-400/401 PID-010 TO AHU DRAIN PID-001
FCU-401 SPH-401 505 - 15 - RW - TK22 416 - 20 - CW - PA20W 417 - 20 - CW - PA20W FROM WC-400/401 PID-010 TO THS-400 PID-010 TO AHU DRAIN PID-001
FCU-402 SPH-402 506 - 15 - RW - TK22 418 - 20 - CW - PA20W 419 - 20 - CW - PA20W FROM WC-400/401 PID-10 TO THS-400 PID-010 TO PURE WATER DRAIN PID-001
FCU-403 SPH-403 507 - 15 - RW - TK22 433 - 20 - CW - PA20W 434 - 20 - CW - PA20W FROM WC-400/401 PID-010 TO THS-400 PID-010 TO PURE WATER DRAIN PID-001
ZONE BREAK 414 - 20 - CW - PA20W FROM WC-400/401 PID-010 415 - 20 - CW - PA20W TO THS-400 PID-010

OAZ ESD-002 IS 4 IS 1 SLO-4 FB-002 F
TSF-001

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO RECTFIER SYSTEM PACKAGE DOCUMENTATION FOR FURTHER DETAILS
NOTE 3 : INSTALL AT THE LOWEST POINT
NOTE 4 : THE LOCATION OF AMBIENT INSTRUMENTS IS DESCRIBED ON C63-EAD-001_04

DRAFT

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...	...	...	...	...	...
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Title, Supplementary title: CONTAINER - LEVEL 0
Client reference: -

Rev.	Date of issue	Lang.	Page
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AHU-400
AIR HANDLING UNIT

LEVEL 1
NOTE 3

PI 1006
PI 1005
TAHH-1005
TALL-1005
PALL-1005
TI 1005
TI 1006
TAHH-1006
TALL-1006
PALL-1006
AHD 1000 NOTE 2
PT 1006
PT 1005
TT-HY 1005
TT-HY 1006
AHD 1002
EH-1007 JGA EGA
EH-1006 JGA EGA
CI 1000
CAHH CAH
SLO-1
IS 4
CI 1002
CAHH CAH
SLO-13
IS 4
ESD-006
OAZ
SLO-4
IS 1
FB-004
F
IS 4
2 OUT OF 3
SD-006A
SD-006B
SD-006C
SD-007A
SD-007B
SD-007C
IS 4
IS 4
DS DS-010 OAS
DS DS-008 OAS
DS DS-005 OAS
DS DS-006 OAS
DS DS-007 OAS
DS DS-009 OAS
NOTE 1
WLD-006 LAHH
NOTE 1
WLD-005 LAHH
AHD 1003
CI 1003
CAHH CAH
SLO-5
IS 4
ESD-005
OAZ
IS 1
SLO-4
IS 4
FB-003
F
AHU-400
AIR HANDLING UNIT
410 - 25 - CW - PA20W
FROM WC-400/401 PID-010
411 - 25 - CW - PA20W
TO THS-400 PID-010
503 - 15 - RW - TK22
TO WATER DRAINAGE PID-001

Rev.	Date	Ed.	Ver.	App.	Description
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : INSTALL AT THE LOWEST POINT
NOTE 2 : CLOSE TO HPP-700
NOTE 3 : The location of ambient instruments is described on C63-EAD-001_04

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LEVEL 2

VE-005
VE-006
VE-007
VE-008
AL/S
BUZ-1002

VE-009
VE-010
VE-011
VE-012
AL/S
BUZ-1003

ESD-007
IS 1
SLO-4
OA2
IS 4
FB-005
F

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-014	HCH/JNG	LCA	BCA	1:1

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Client:

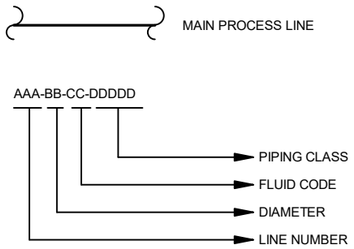
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PROCESS CONTAINER LEVEL 2

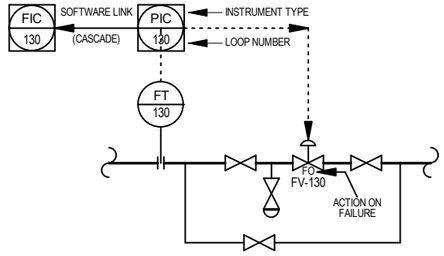
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	14/16

LINE IDENTIFICATION



INSTRUMENT IDENTIFICATION



FLUID CODE

O2	OXYGEN
H2	HYDROGEN
PWH2	PURE WATER + DISSOLVED HYDROGEN
OWH2	PURE WATER + DISSOLVED OXYGEN
DPWH2	DRAIN PURE WATER + DISSOLVED HYDROGEN
PW	PURE WATER
RW	RAW WATER
N2	NITROGEN
CA	COMPRESSED AIR
AA	AMBIENT AIR
CW	COOLING WATER

ZONE DEFINITION

STACK ROOM	A01
PROCESS ROOM O2	A02
PROCESS ROOM H2	A03
WATER TREATMENT PACKAGE ROOM	C01
RECTIFIER + CONTROL CABINET ROOM	B01
HYDROGEN PROCESS CONTAINER	A10
HVAC ROOM	E01
INTERCONNECTION AREA	X00

PIPING CLASS

A B CC D
(1) (2) (3) (4)

(1) TYPE

P : PIPING (MM)
T : TUBING (INCH)
X : PFA

(2) PRESSURE RATING

A : CLASS 150
B : CLASS 300
D : CLASS 600
K : 3000 PSIG
R : MANUFACTURE'S STANDARD

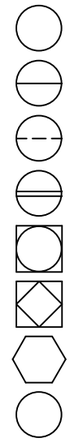
(3) MAIN MATERIAL

10 : CARBON STEEL 0.0MM CORROSION ALLOWANCE
11 : CARBON STEEL 1.5MM CORROSION ALLOWANCE
13 : CARBON STEEL 3.0MM CORROSION ALLOWANCE
20 : STAINLESS STEEL 304
21 : STAINLESS STEEL 304L
22 : STAINLESS STEEL 316
23 : STAINLESS STEEL 316L
30 : CPVC SCH40
31 : CPVC SCH80
40 : PFA

(4) SPECIAL REQUIREMENT

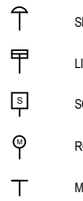
S : SEAMLESS PIPING COMPONENTS
W : WELDED PIPING COMPONENTS

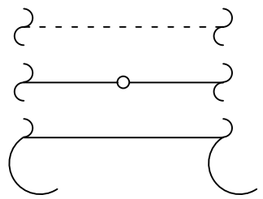
INSTRUMENT SYMBOLS



F	CHARACTERIZE	AVG	AVERAGE
REV	REVERSE	%	GAIN OR ATTENUATE
X	MULTIPLICATION	x^n	EXPONENTIAL
÷	DIVISION	∫	INTEGRATE
√	ROOT EXTRACTION	>	HIGH SIGNAL SELECT
+	POSITIVE BIAS	<	LOW SIGNAL SELECT
±	BIAS	△	DIFFERENCE
∑	SUMMATION		

FO	FAIL TO OPEN POSITION
FC	FAIL TO CLOSED POSITION
FL	FAIL LOCK AT LAST POSITION





INSTRUMENT TYPES

AE	ANALYZER ELEMENT
AI	ANALYZER INDICATOR
AIC	ANALYZER INDICATING CONTROLLER
AT	ANALYZER TRANSMITTER
CI	CONDUCTIVITY INDICATOR
CIT	CONDUCTIVITY INDICATING TRANSMITTER
CT	CONDUCTIVITY TRANSMITTER
CV	CONTROL VALVE
EI	VOLTAGE INDICATOR (VOLTMETER)
EIS	VOLTAGE INDICATOR SWITCH
ES	VOLTAGE SWITCH
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIC	FLOW INDICATING CONTROLLER
FIT	FLOW INDICATING TRANSMITTER
FT	FLOW TRANSMITTER
FV	FLOW CONTROL VALVE
HS	HAND SWITCH
HV	HAND OPERATED CONTROL VALVE
II	CURRENT INDICATOR
LC	LEVEL CONTROLLER
LI	LEVEL INDICATOR
LIC	LEVEL INDICATING CONTROLLER
LIT	LEVEL INDICATING TRANSMITTER
LS	LEVEL SWITCH
LT	LEVEL TRASNMITTER
LV	LEVEL CONTROL VALVE
PRV	PRESSURE REGULATED VALVE (INTERNAL SELF CONTROLLED)
PDI	DIFFERENTIAL PRESSURE INDICATOR
PDIT	DIFFERENTIAL PRESSURE INDICATING TRANSMITTER
PDT	DIFFERENTIAL PRESSURE TRANSMITTER
PI	PRESSURE INDICATOR
PIC	PRESSURE INDICATING CONTROLLER
PIT	PRESSURE INDICATING TRANSMITTER
PSV	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
PV	PRESSURE CONTROL VALVE
PVRV	PRESSURE VACUUM RELIEF VALVE
RO	RESTRICTION ORIFICE
SCR	SILICON CONTROLLER RECTIFIER
SI	SPEED INDICATOR
SIC	SPEED INDICATING CONTROLLER
SS	SPEED SWITCH
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATING CONTROLLER
TIT	TEMPERATURE INDICATING TRANSMITTER
TT	TEMPERATURE TRANSMITTER
TV	TEMPERATURE CONTROL VALVE
TY	TEMPERATURE RELAY
VM	VIBRATION MONITOR
ZI	POSITION INDICATOR
ZS	POSITION SWITCH
ZSC	POSITION SWITCH CLOSED
ZSO	POSITION SWITCH OPEN
ZT	POSITION TRANSMITTER
TT-HY	TEMPERATURE & HUMIDITY TRANSMITTER

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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-015	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN
Title, Supplementary title	Client reference
LEGEND SHEET 1	-

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	15/16

PIPING SYMBOLS

- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- NEEDLE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- HAND-OPERATED GLOBE VALVE
- THREE WAY VALVE
- PRESSURE SAFETY VALVE
- PRESSURE REGULATOR VALVE
- BLOCK AND BLEED VALVE
- MOTORIZED TWO WAY VALVE
- ECCENTRIC REDUCER
- CONCENTRIC REDUCER
- REMOVABLE SPOOL
- EXPANSION JOINT
- Y FILTER
- CLASS BREAK
- SPEC BREAK
- BATTERY LIMIT
- LINE BREAK
- COMPRESSION FITTING
- FLANGED CONNECTION
- THREADED CONNECTION
- PLUG
- SLOPE
- STEAM TRAP
- FLEXIBLE HOSE

- INTEGRAL VALVE ROTAMETER
- RUPTURE DISC
- SPECTACLE BLIND
- HEAT RIBBON
- INSULATION
- ORIFICE PLATE
- DRIP PAN
- THERMOMETER
- EXPANSION JOINT

EQUIPMENT SYMBOLS

- HORIZONTAL SEPARATOR
- CONDENSATE SEPARATOR
- PLATE HEAT EXCHANGER
- FIXED BED FILTER
- HIGH PRESSURE DEGASSER
- PUMP
- STACK
- METALLIC MESH

- RECTIFIER
- AIR EXTRACTOR
- AIR CONDITIONER (A/C)
- TRANSFORMER
- WATER CHILLER (WC)
- SMOKE DETECTOR
- DRY COOLER
- VISUAL ELEMENT
- BUZZER (AL/S)
- PNEUMATIC VALVE ISLAND (1–8)

- SPEED VARIATOR (VAR-XXX)
- ELECTRICAL HEATER
- GAZ CYLINDER
- DUCTED PIPE
- HAND SWITCH
- FLOATING - HEAD TUBE - BUNDLE HEAT EXCHANGER
- BUFFER TANK
- BALL SIPHON

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Rev.	Date of issue	Lang.	Page
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C0063-FOR-DGM-EL-001

LV Single Line Diagram

C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
02	*Issue for Review*	*22-NOV-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
01	*Issue for Review*	*11-OCT-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
00	*Issue for Revision*	*22-MAY-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	**C0063-FOR-DGM-EL-001**
Elogen Project Document Title	**Overall Single Line Diagram**
Crosswind Project Document Number	**FORES-INN-BPH-DWG-00028**
Vendor Document Number	**224J10-DDL-EL-DG-00001_2**

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Revision*
01	*Issue for Review*
02	*Issue for Review*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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Switchboard Tag No. is SG-100D1
Drawings reference 1723002197-EL-DG-00010
Sheet 04 – Electrical SLD - Column A1 Electrolyser Package

6,6kV network
From Customer

CLIENT

Limit of Scope

ELOGEN

Transformer
TR-01

Transformer Dy11y11 KNAN
6,6kV+/-2x2,5% off load
2x 360V / 2x270V
2x 1,6MVA / 2 x 1,2MVA
UCC 7%

P1

S1

S2

DGPT2

6.6 kV Open Command (Note 13)

From 20-UCP-001

I/O to PLC

230Vac UPS

230Vac Aux.

400Vac Aux.

To rectifier Safety relay (Note 12)

HCU-400

REC-01
Rectifier Cabinet 01

REC-02
Rectifier Cabinet 02

3x(6x300) (Note 11)

3x(6x300) (Note 11)

Internal wiring between HCU and Rectifiers not shown in this document. Please refer to C63-NID-ELO-SLD01

E500
1478A
610-1027V
Stack 01 to 04
Series connection
(Note 12)

E500
1478A
610-1027V
Stack 05 to 08
Series connection
(Note 12)

1. All circuit breakers equipped with auxiliary status contact.

2. All inverters equipped with STO function and Profinet.

3. MN coil powered by UPS

4. The main busbars will be protected by a plexiglass.

5. Main incomers CB (MCCB/ACB) shall be provided with adjustable overcurrent protection.

6. PQ-001 and PQ-002 hardwired to PLC, as per document C0063-FOR-DGM-EL-003

7. For details refer to document C0063-FOR-DGM-EL-003

8. Control Cabinet with form "2b"

9. PTC for motor CP-620A/B hardwired to its own VFD inside Control Cabinet

11. Cables supplied by Fores, sized by Elogen

12. Cable supplied and sized by Fores

13. Cable out of Fores scope

LEGEND:

F	FUSE
K	CONTACTOR
	THREE CONDUCTORS
	THREE PHASE &NEUTRAL CONDUCTOR
PE	PROTECTION CONDUCTOR
	3 PHASE WINDING, DELTA/STAR WITH NEUTRAL BROUGHT OUT
	POWER TRANSFORMER
CT	CURRENT TRANSFORMER
DM	DIGITAL POWER METERING UNIT
	CIRCUIT BREAKER
	GROUNDING CONNECTION
M	AC MOTOR
	TERMINATION
	LIGHTING ARRESTER OR SURGE ARRESTER
DGPT2	GAS, PRESSURE, TEMPERATURE DETECTION RELAY
PLC	PROGRAMMABLE LOGIC CONTROLLER
	MOTOR TEMPERATURE MONITORING DEVICE
	TEMPERATURE SENTOR (PT-100 RTD)
LCS	MOTOR LOCAL CONTROL STATION
	EARTHING SWITCH
	VARIABLE SPEED DRIVER
	LIGHT INDICATOR
	Skid Panel
OF/SD	CB AXILIARIE CONTACTS (ON/OFF/Trip)
	EMERGENCY PUSH BUTTON
	RELAY
	ELECTRICAL JUNCTION BOX
230VAC 24VDC	CONVERTER FROM 230Vac TO 24Vdc
	REDUNDANCY MODULE
	MANUAL SWITCH
	RECTIFIER

REFERENCE DOCUMENTS:

1. TS Control Cabinet & Electrical wiring C0063-ELE-004

2. Bill Off Material (BOM) C0063-BOM-001

3. Balance of Power C0063-ELE-003

4. NIDEC SLD C63-ELO-SLD01 (Transformer Rectifier for E500 Electrolyzer)

REV	DATE	DESCRIPTION	DRFT	CHKD	APPR
02	22/11/2024	Issue For Review	AM	AM	MC
01	11/10/2024	Issue For Review	AM	AM	MC
00	20/09/2024	Issue For Revision	AM	AM	MC

elogen

JOB	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
OBJECT	LV SINGLE LINE DIAGRAM
Fores No.	22AJ10-DDL-EL-DG-00001_2
Elogen No.	C0063-FOR-DGM-EL-001
Crosswind No.	FORES-INN-BPH-DWG-00028
FORMAT	A2
SHEET	03 of 04

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CLIENT

Limit of Scope

ELOGEN

Main Power supply
400Vac 50Hz TN-S 3P+N+PE
from Low Voltage Switchboard
Tag No. SG-200N1
Reference dwg No.
123A90-DDL-EL-DG-20159 Sheet 01
Icc,rms = 30kA

Control Cabinet
TAG: 20-UCP-001
Pn = 250kW
In = 400A
Icc,max = 36kA
Voltage: 400Vac

L1 L2 L3 Voltage presence lamps

1U1
Phase monitoring relay

1QF3
4P
630A

MN

2SA4
EM Push Button
Front Panel, wired in safety loop within ESD-001 loop

Lenght < 500mm

Red Yellow Green Front panel light indicator for process status

Surge arrestor 1RF8

PQ-002
5U1
Digital Power Meter
(Note 6)

F

ETH cable (Note 12)
ETH cable (Note 12)
Shutdown command from Plant SIS (Note 12)
Electrolyzer PLC Failure to plant SIS (Note 12)
Confirmed Gas and Smoke Alarm to plant F&G (Note 12)

In=630A Icc,max=36kA Vn=400Vac

In=480A Icc,max=36kA Vn=400Vac

Auxiliary equipments type 1

In=25A Icc,max=6kA Vn=230Vac

100QF5 2P 32

100GS5
UPS Pn=5kW
At least 1h of autonomy at 5kW

130QF1 2Px10A
130QF3 2Px10A
130QF5 2Px16A
130QF7 2Px10A
131QF1 2Px10A
131QF3 2Px10A

150GS5
230VAC / 24VDC
150GS1
150U1
Max. Output 40A
151QF1 2Px125A

For 24Vdc utilities refer to doc. C63-FOR-DGM-EL-003

HCU-400 2 kVA (Note 12)
SSI-1000 FSS Fire sys. 0,5 kW (Note 12)
Q.RIO1 WP1 0,3 kW (Note 12)
Q.RIO2 WP3 0,3 kW (Note 12)

100QF1 2Px25A
100QF3 4Px20A
101QF3 2Px20A Id=30mA
100QF7 4Px16A Id=30mA
102QM1 4Px200A
102QF3 4Px32A
102QM5 4Px125A
102QM7 4Px125A
104QM1 3Px6A
105QM1 3Px6A
106QM1 3Px16A
107QM1 3Px16A
108QM1 3Px32A
109QM1 3Px32A
101QF5 4Px20A
103QF1 4Px20A
103QF3 2Px16A
100QF1 2Px63A
120QM1 4Px50A

HCU-400 4kW (Note 12)
HCU-400 8kW (Note 12)
HE-61.1 (HPP-700) 3 kW (Note 12)
HE-64.1 (HPU-700) 6 kW (Note 12)
HVAC PANEL PAU003 85,2 kW (Note 12)
WTP-300 12 kW (Note 12)
WC-400 CHILLER PAU001 36,4 kW (Note 12)
WC-401 CHILLER PAU002 36,4 kW (Note 12)
LP-300A 1,5 kW (Note 12)
LP-300B 1,5 kW (Note 12)
CP-620A 5.5 kW (Note 12) (Note 9)
CP-620B 5.5 kW (Note 12) (Note 9)
CP-600A 11 KW (Note 12)
CP-600B 11 KW (Note 12)
SPARE
SPARE
SPARE
SPARE

PQ-001
120U3
Digital Power Meter
(Note 6)

F

DM

KM type 2 auxiliary equipment

Auxiliary equipments type 2

In=80A Icc,max=20kA Vn=400Vac

264KM2 2P 20A
260KM3 2P 20A
262KM3 2P 20A
264KM3 2P 20A
260KM4 2P 20A
262KM4 2P 20A
264KM4 2P 20A
260KM5 2P 6A

EXT-G01 15 W (Note 12)
EXT-G02 15 W (Note 12)
EXT-G03 15 W (Note 12)
EXT-G04 15 W (Note 12)
EXT-G05 15 W (Note 12)
EXT-G06 15 W (Note 12)
EXT-G07 15 W (Note 12)
EXT-G08 15 W (Note 12)

121QF1 2P 6A
121QF5 2P 6A
122QF5 2Px10A Id=30mA
122QF7 2Px10A Id=30mA
125QF1 2Px6A Id=30mA
125QF3 2Px6A Id=30mA
125QF5 2Px6A Id=30mA
125QF7 2Px6A Id=30mA
126QF1 2Px6A Id=30mA
126QF3 2Px6A Id=30mA
123QF7 2Px20A Id=30mA
124QF1 2Px20A Id=30mA
124QF3 2Px20A Id=30mA
124QF5 2Px20A Id=30mA
122QF1 2Px10A Id=30mA
122QF3 2Px10A Id=30mA
123QF1 2Px10A Id=30mA
123QF3 2Px10A Id=30mA
123QF5 2Px10A Id=30mA
124QF7 2Px20A Id=30mA

JB Heat tracing EHT-1009 HR-607B
JB Heat tracing EHT-1009 HR-607B
JB Heat tracing EHT-1001 HR-600A
JB Heat tracing EHT-1007 HR-306
JB Heat tracing EHT-1005 HR-625
Heat Tracing Circuit 1 390W

JB Heat tracing EHT-1004 HR-620
JB Heat tracing EHT-1008 HR-370
JB Heat tracing EHT-1006 HR-640
JB Heat tracing EHT-1002 HR-606
Heat Tracing Circuit 2 370W

JB Lighting WP1 270W
Normal Lighting
Emergency Lighting

JB Lighting WP2 180W
Normal and Emergency Lighting

JB Lighting WP3 180W
Normal and Emergency Lighting

JB Lighting WP4 90W
Normal and Emergency Lighting

External Lighting Ground Floor 75W
External Lighting First Floor 255W

Socket WP1 C63-JBS-01 3600W (Note 12)
Socket WP2 C63-JBS-02 3600W (Note 12)
Socket WP3 C63-JBS-03 3600W (Note 12)
Socket WP4 C63-SS-07 3600W (Note 12)
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE

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LCS	MOTOR LOCAL CONTROL STATION
	EARTHING SWITCH
	VARIABLE SPEED DRIVER
	LIGHT INDICATOR
	Skid Panel
OF/SD	CB AXILIARIE CONTACTS (ON/OFF/Trip)
	EMERGENCY PUSH BUTTON
	RELAY
	ELECTRICAL JUNCTION BOX
230VAC / 24VDC	CONVERTER FROM 230Vac TO 24Vdc
	REDUNDANCY MODULE
	MANUAL SWITCH
	RECTIFIER

REFERENCE DOCUMENTS:

1. TS Control Cabinet & Electrical wiring C0063-ELE-004

2. Bill Off Material (BOM) C0063-BOM-001

3. Balance of Power C0063-ELE-003

4. NIDEC SLD C63-ELO-SLD01 (Transformer Rectifier for E500 Electrolyzer)

REV	DATE	DESCRIPTION	DRFT	CHKD	APPR
02	22/11/2024	Issue For Review	AM	AM	MC
01	11/10/2024	Issue For Review	AM	AM	MC
00	22/05/2024	Issue For Revision	AM	AM	MC

elogen

JOB	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
OBJECT	LV SINGLE LINE DIAGRAM
Fores No.	224J10-DDL-EL-DG-00001_2
Elogen No.	C0063-FOR-DGM-EL-001
Crosswind No.	FORES-INN-BPH-DWG-00026
FORMAT	A2
SHEET	04 of 04

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DRAWING NO. DRAWING_NO.

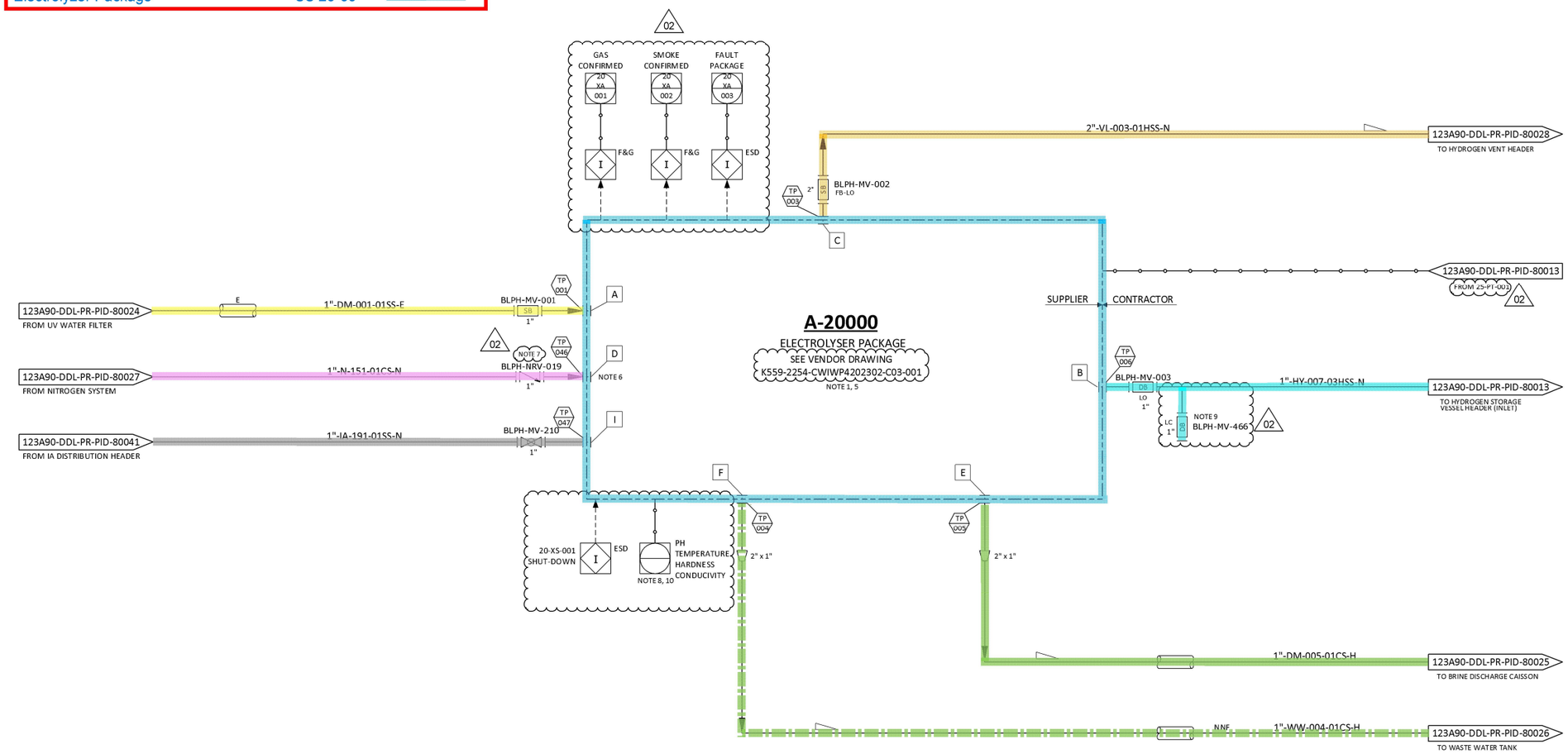
REV. REV

Instrumen Air Distribution Network	SS 63-30	
Water Desalination & Distribution System	SS 50-10	
Hydrogen Storage Vessel Header (Intel)	SS 43-00	
Nitrigen Distribution Network	SS 64-11	
Waste Water Brine Discharge System	SS 55-01	
Waste Water Disposal System	SS 55-00	
Hydrigen Storage Vessel Header (Intel)	SS 25-07	
Electrolyzer Package	SS 20-00	

A-20000

ELECTROLYSER PACKAGE

DUTY: 2.5MW
DESIGN PRESSURE: 40 barg
DESIGN TEMPERATURE: 80 °C
H2 GENERATING CAPACITY: 500 Nm³/h



NOTES

1. PACKAGE SUPPLIED WITH POWER FROM THE BLPH ELECTRICAL SYSTEM.
2. DELETED.
3. DELETED.
4. DELETED.
5. ELECTROLYSER PACKAGE INCLUDES AN OXYGEN VENT LINE WHICH IS IN THE SCOPE OF SUPPLY OF THE ELECTROLYSER PACKAGE UP TO THE ATMOSPHERE. NO PHYSICAL INTERFACE IS PRESENT BETWEEN ELECTROLYSER PACKAGE AND CONTRACTOR ON THIS LINE.
6. AN ISOLATION VALVE DOWNSTREAM THE CHECK VALVE NRV-019 IS PROVIDED WITHIN THE PACKAGE A-20000.
7. CHECK VALVE NRV-019 TO BE INSTALLED AS CLOSE AS POSSIBLE TO THE ELECTROLYSER PACKAGE A-20000.
8. SERIAL COMMUNICATION WITH CONTROL SYSTEM.
9. NITROGEN PURGING CONNECTION TO BE LOCATED AS CLOSE AS POSSIBLE TO MANUAL VALVE BLPH-MV-003.
10. PH, TEMPERATURE, HARDNESS AND CONDUCTIVITY SHALL BE SENT FROM CONTROL SYSTEM TO ELECTROLISER UCP IN ADDITION TO THE OTHER SOFTWARE SIGNALS.

02

HOLDS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	12/06/2024	CIM	RZI	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	15/02/2024	CIM	RZI	DLO	ISSUE FOR ACCEPTANCE (IFA)
00	20/10/2023	CIM	RZI	DLO	ISSUE FOR ACCEPTANCE (IFA)

CROSSWIND

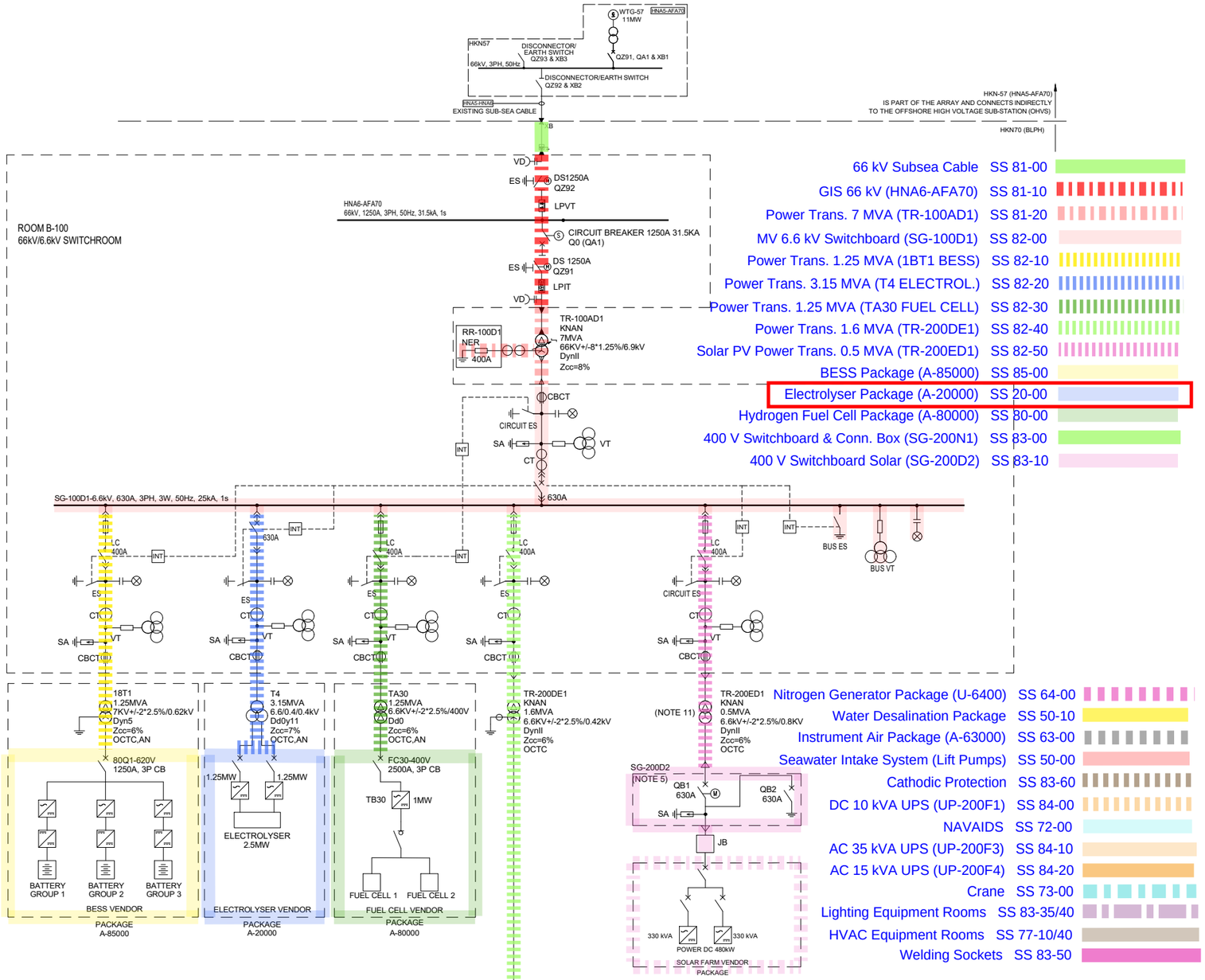
ROSETTI MARINO

TITLE :
BLPH PIPING AND INSTRUMENTATION DIAGRAM
ELECTROLYSER PACKAGE

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE NTS
DRAWN	CHECKED	APPROVED	DATE
A1	DRAWING NO. 123A90-DDL-PR-PID-80011		SHEET 001 / REV. 02

File Name : FILE_NAME

DRAWING NO. 123A90-DDL-EL-DG-20158 REV. 01



SYMBOL LEGEND:

- VOLTAGE DETECTOR
- EARTHING SWITCH DISCONNECTOR
- MOTORIZED EARTHING SWITCH
- CIRCUIT BREAKER
- FUSE
- CONTACTOR
- THREE-PHASE TRANSFORMER WITH TAP CHANGER
- THREE-PHASE TRANSFORMER
- CURRENT TRANSFORMER
- THREE-PHASE TRANSFORMER, WITH THREE WINDINGS
- NEUTRAL EARTHING RESISTOR
- SURGE ARRESTER
- CORE BALANCE CURRENT TRANSFORMER
- SURGE ARRESTOR FOR T-CONNECTOR (N.1 FOR EACH PHASE)
- VOLTAGE & CURRENT TRANSFORMER (3Ø X 2) (LPIT TYPE)
- VOLTAGE TRANSFORMER (3Ø X 2) (LPVT TYPE)
- VOLTAGE TRANSFORMER
- CABLE BOX
- T-CONNECTOR CABLE TERMINATION
- CABLE AIR TERMINATION

OLTC	= ON LOAD TAP CHANGER
OCTC	= OPEN CIRCUIT TAP CHANGER
KNAN	= NON-MINERAL OIL NATURAL AIR COOLED
AN	= AIR NATURAL
XB	= CABLE BOX
QZ	= DISCONNECT SWITCH & EARTH SWITCH
QA	= CIRCUIT BREAKER
LC	= LATCHED FUSED CONTACTOR (400A)
INT	= INTERLOCK SYSTEM
SA	= SURGE ARRESTER
CBCT	= CORE BALANCE CURRENT TRANSFORMER
ES	=EARTHING SWITCH
VD	=VOLTAGE DETECTOR
LCP	=LOCAL CONTROL PANEL
LPVT	=LOW POWER VOLTAGE TRANSFORMER
LPCT	=LOW POWER CURRENT TRANSFORMER
LPIT	=LOW POWER INSTRUMENT TRANSFORMER
JB	=JUNCTION BOX

NOTES:

1. TEMPORARY POWER SUPPLY CONNECTION BOX LOCATED ON OUTSIDE WALL OF LV SWITCHROOM / CONTAINER.
2. LOAD DEFINITION 'ESSENTIAL' / 'NON-ESSENTIAL' IS SHOWN IN THE LOAD LIST. THE CCS, EMCS AND 'SMART' SWITCHGEAR WILL OPEN / CLOSE CIRCUIT BREAKERS AS REQUIRED.
3. A COMBINED CCS/EMCS SYSTEM COMPRISES A MICROPROCESSOR BASED SYSTEM, ASSOCIATED SOFTWARE AND REQUIRED PERIPHERALS FOR MONITORING AND CONTROLLING OF ELECTRICAL POWER NETWORK. ALL ELECTRICAL EQUIPMENT AND PACKAGE UNITS SHALL BE CONNECTED TO THE CENTRAL CONTROL SYSTEM .
4. IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM SUPPLIED BY COMPANY.
5. THE SOLAR FARM IN-FEED POWER CIRCUIT BREAKERS PANEL IS LOCATED INSIDE THE LV SWITCHGEAR ROOM B-200.
6. DELETED.
7. DELETED.
8. DELETED.
9. CROSSWIND SHALL BE ABLE TO CONTROL THE BLPH 66KV MOTORISED CIRCUIT BREAKER Q0 (QA1) & MOTORISED ELECTRICAL DISCONNECTOR / EARTH SWITCH (QZ92, TYPE B) USING THEIR 'HV-SCADA' SYSTEM. THIS BACK-UP / REDUNDANT CONTROL SHALL BE ADDITIONAL TO THAT PROVIDED BY THE CCS AND BE OF HIGHER PRIORITY OVER A SEPARATE FIBRE OPTIC CABLE (FOC). THE CCS OPERATOR AND 'HV-SCADA' SHALL BOTH BE KEPT FULLY AWARE OF EQUIPMENT STATUS AT ALL TIMES. INTERTRIPPING, INHIBITS & INTERLOCKING FOR BLPH 66KV EQUIPMENT SHALL BE AS PER THE WIND FARM.
10. THE LOADS IN THE LOW VOLTAGE SWITCHGEAR AND THE CURRENT VALUES OF THE CIRCUIT BREAKERS ARE ONLY INDICATIVE.
11. NEUTRAL POINT OF TR-200ED1 SHALL NOT BE GROUNDED AS REQUIRED BY SOLAR FARM SUPPLIER IN 123A90-PML-PM-TQ-00040.

REFERENCES:

1. 123A90-DDL-EL-DG-20014 ELECTRICAL CONTROL, PROTECTION AND METERING DIAGRAMS
2. 123A90-DDL-EL-DG-20015 ELECTRICAL SINGLE LINE DIAGRAM 6.6kV SYSTEMS
3. 123A90-DDL-EL-DG-20159 ELECTRICAL SINGLE LINE DIAGRAMS LV SYSTEM
4. 123A90-DDL-EL-DG-20160 ELECTRICAL SINGLE LINE DIAGRAMS AC UPS SYSTEMS
5. 123A90-DDL-EL-DG-20161 ELECTRICAL SINGLE LINE DIAGRAMS DC UPS SYSTEMS
6. 123A90-DDL-EL-DG-20185 ELECTRICAL SINGLE LINE DIAGRAM HV SYSTEMS
7. 123A90-DDL-EL-DL-20104 ELECTRICAL EQUIPMENT LAYOUT - HV SWITCHROOM
8. 123A90-DDL-EL-DL-20105 ELECTRICAL EQUIPMENT LAYOUT - LV SWITCHROOM
9. 123A90-DDL-EL-LIS-20016 ELECTRICAL LOAD LIST and BALANCE -CCS MODE CHARGING-
10. 123A90-DDL-EL-RE-20152 ELECTRICAL EQUIPMENT SIZING CCALCULATION REPORT
11. 123A90-DDL-EL-RE-20170 ELECTRICAL SYSTEM STUDY REPORT - LOAD FLOW
12. 123A90-DDL-EL-RE-20171 ELECTRICAL SYSTEM STUDY REPORT - SHORT CIRCUIT
13. 123A90-DDL-EL-RE-20172 ELECTRICAL SYSTEM STUDY REPORT - ARC FLASH ENERGY CALCULATION
14. 123A90-DDL-EL-RE-20173 ELECTRICAL SYSTEM STUDY REPORT - HARMONICS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	02/11/2023	DSF	CB/AMA	OYFO/MDO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE :

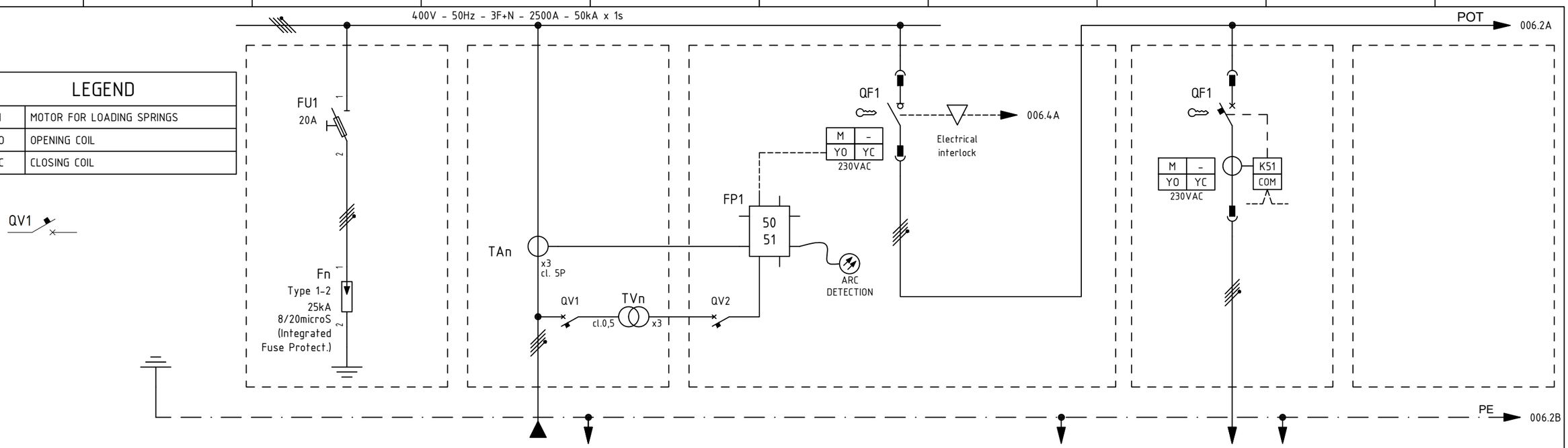
OVERALL/KEY SINGLE LINE DIAGRAM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE N/A
DRAWN GPA	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 26/03/2023
A1	DRAWING NO. 123A90-DDL-EL-DG-20158	SHEET 001	REV. 01

01

File Name : 123A90-DDL-EL-DG-20158_REV01.dwg

LEGEND	
M	MOTOR FOR LOADING SPRINGS
YO	OPENING COIL
YC	CLOSING COIL



ITEM			1	-	-	-	A-20000	
UTILITY			2	SURGE ARRESTER	-	INCOMING TRASFORMER	ELECTROLYSER AUXILIARY LOAD	
COLUMN/CUBICLE			3	-	A1 / +02	A1 / +05	A1 / +08	
RATED POWER | RATED CURRENT			4/5	- | -	- | -	- | -	293 kW | 497 A	
TYPICAL FUNCTIONAL			6	-	-	-	L3-630	
CIRCUIT BREAKER (ABB)	TYPE		7	-	-	E4.2N/MS-3200 4P	E1.2C-1250 4P	
	VERSION		8	-	-	WITHDRAWABLE	WITHDRAWABLE	
	TRIP UNITS		9	-	-	-	EKIP HI TOUCH LSIG = 630	
	Icu	KA	10	-	-	66 kA (1s)	50 kA	
OVERLOAD	L	Range A	11	-	-	-	(0.4 ÷ 1) x In	
		Range t	12	-	-	-	t=k/I^2	
SEL. SHORT-CIRCUIT	S	Range A	13	-	-	-	(0.6 ÷ 10) x In [EXCLUDABLE]	
		Range t	14	-	-	-	t=k / t=k/I²	
INST. SHORT-CIRCUIT	I	Range A	15	-	-	-	(1.5 ÷ 15) x In	
		Range t	16	-	-	-	instantaneous	
EARTH FAULT PROTECTION	G	Range A	17	-	-	-	(0.1 ÷ 1) x In (EXCLUDABLE)	
		Range t	18	-	-	-	t=k / t=k/I^2	
CONTACTOR (ABB)			19	-	-	-	-	
THERMAL OVERLOAD RELAY (ABB)			20	-	-	-	-	
SURGE ARRESTER (DEHN)			21	DVCI 1 255 FM (961205)	-	-	-	
TOROIDAL CURRENT TRANSFORMER (FRER)			22	-	-	-	-	
FUSE HOLDER (ITALWEBER)			23	Fuses 20A gG	FROM SUBSISTEM 82.40	-	SUBSISTEM 20.00	
INDIRECT PROTECTION (ABB)			24	-		REF615K-(version F) HBFFAEAGNDCABNA11G		
VOLTMETER			25	-		-	-	
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE		26	-	TAR1052K5N01V_18 - 2500/1A	-	-	
	PERFORMANCE/CLASS		27	SUBSISTEM 82.40	5VA / 5P20	SUBSISTEM 82.40	-	
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE		28		TTV020400VC1 - 400r3/110r3V		-	
	PERFORMANCE/CLASS		29		20VA / 0.5		-	
LOCK-OUT RELAY (-)			30	-	-	-	-	
POWER CONDUCTOR		mmq	31	-	-	-	1 x 150 + [4 x (1 x 300)]	

QV1

QV1

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

DWG n° : 231298/SD/11

Item n° : PF1002983/26

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00011

SHEET 005

REV. 03

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 03

ROSETTI MARINO

123A90 - HOLLANDSE KUST NOORD WIND PARK
BLPH Project

CROSSWIND

Ready For Operation (RFO) Certificate

COMPLETE	●	PARTIAL	

Revision:	3		Issued on:	2025-06-27	
System:	20	/	Electrolyser package		
SubSystem:	20-00	/	Electrolyser Package (A-20000)		

We hereby confirm that all Mechanical Completion (MC) and Pre-Commissioning/Commissioning (Pre-Comm./Comm.) activities for the above-mentioned System/Sub-System have been successfully completed in accordance with project specifications, relevant standards and contractual requirements. The System/Sub-System has been tested and verified to ensure readiness for operation. Issuance of this Certificate shall not release CONTRACTOR from any of his obligations, responsibilities or liabilities under the CONTRACT.

- **Mechanical Completion:** All required MC activities have been completed and approved
- **Pre-Commissioning & Commissioning:** All required Pre-Comm. and Comm. activities and OTPs have been completed and approved (Status Index attached)
- **Punch List:** All Punch items categorized as A and B have been cleared (PL report attached)
- **Documentation:** As-built documentation and Commissioning dossier has been completed, reviewed and approved

PUNCH LIST	PENDING POINTS
Note: All Category "A" and "B" Items must be cleared prior to issuance of the Ready For Operation (RFO) Certificate	B: 6

REMARKS:

	CONTRACTOR Commissioning Manager	**COMPANY** Commissioning Lead
Name	Anthony Iveson	Martin Taylor
Date	2025-06-27	2025-07-09
Signature	PROVERLIS Digitaly signed by Anthony Iveson 2025-06-27T08:14:58.068Z	PROVERLIS Digitaly signed by Martin Taylor 2025-07-09T10:11:41.172Z

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 20-00 & process: COMM

Electrical	20-00 Electrolyser Package (A-20000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
A1/+08-QF1	ELECTROLISER AUXILIARY LOAD - A1/+08-QF1	ONSHORE	C10002924	FP00	100	2025-01-23	RFO 3
		ONSHORE	C10002925	FTR-2	100	2024-10-11	RFO 3
		ONSHORE	C10002926	FTR-6	100	2025-04-29	RFO 3
		ONSHORE	C10003020	FTR-5	100	2025-06-05	RFO 3

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 20-00 & process: COMM

Instrumental	20-00 Electrolyser Package (A-20000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
20-XA-001	A-20000 Electrolyser PKG confirmed gas alarm	ONSHORE	C10003772	FJ01D	100	2025-03-26	RFO 3
20-XA-002	A-20000 Electrolyser PKG confirmed fire alarm	ONSHORE	C10003773	FJ01D	100	2025-03-26	RFO 3
20-XA-003	A-20000 Electrolyser PKG UCP fault	ONSHORE	C10003741	FJ01D	100	2025-04-06	RFO 3
20-XS-001	SHUT-DOWN A-20000 Electrolyser PKG	ONSHORE	C10003742	FJ01D	100	2025-04-06	RFO 3
A-20000	Electrolyser Auxiliary Load	ONSHORE	C10004884	FJ05	100	2025-03-28	RFO 3

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 20-00 & process: COMM

Miscellaneous	20-00 Electrolyser Package (A-20000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
123A90-PML-COM-PRO-03061	OTP – Electrolyser Package	ONSHORE	C10004612	5300	100	2025-06-27	RFO 3

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004178	A	A-20000 C10002348	Earthing package F11A is damaged and needs to be replaced	.		Lmussi 2025-02-28	2025-03-10	Gtangianu 2025-03-10	2025-03-10
C30004171	B	A-20000 C10002348	Package tag plate is missing	.		Lmussi 2025-02-28			
C30004172	B	A-20000 C10002348	Package is not fixed to the structure Upper stage of the package to be fixed to the lower stage	.		Lmussi 2025-02-28			
C30004173	B	A-20000 C10002348	Screws are missing on the top of transformator and on the package	.		Lmussi 2025-02-28	2025-03-18	LNovaga 2025-03-18	2025-03-18
C30004174	B	A-20000 C10002348	MCT for lines: 1"-DM-001-01SS-E 1"-N-151-01CS-N 1"-IA-191-01SS-N 1"-DM-005-01CS-H 1"-WW-004-01CS-H (water,	.		Lmussi 2025-02-28	2025-04-22	LNovaga 2025-04-22	2025-04-22
C30004175	B	A-20000 C10002348	MCT for lines: 2"-VL-003-01HSS-N & 1"-HY-007-03HSS-N (hydrogen lines)to be installed correctly	.		Lmussi 2025-02-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004176	B	A-20000 C10002348	General touch-up to be performed	.		Lmussi 2025-02-28	2025-05-06	LNovaga 2025-05-06	2025-05-06
C30004177	B	A-20000 C10002348	Diagonal beam on stairs side is short and not all screws are thightened	.		Lmussi 2025-02-28	2025-03-12	LNovaga 2025-03-12	2025-03-12
C30004179	B	A-20000 C10002348	On transformator and stairs of the package are present earthing tags not as per typical which have to be removed	.		Lmussi 2025-02-28	2025-04-14	JDuinhoven 2025-04-14	JDuinhoven 2025-04-14

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package

SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004180	B	A-20000 C10002348	Earthing connection between handrails and ladder to ground are missing	.		Lmussi 2025-02-28	2025-03-26	Gtangianu 2025-03-26	2025-03-26
C30004181	B	A-20000 C10002348	Stairs connection to ground type E11C is not as per typical 123A90-DDL-EL-DD-20090 rev. 02	.		Lmussi 2025-02-28	2025-03-26	Gtangianu 2025-03-26	2025-03-26

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000158	B	A1/+08-QF1 C10002925	New and definitive protection setting to be implemented on SG-200N1 drawer A1/+08	Update the Protection Setting on the drawer.	The definitive setting has been updated.	MGirotti 2024-10-09	MGirotti 2024-11-21	MGirotti 2024-11-21	2024-11-21
C30002627	B	83013-CEL-L1 C10001829	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002628	B	83013-CEL-L2 C10001830	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002629	B	83013-CEL-L3 C10001831	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002630	B	83013-CEL-N C10001832	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002631	B	83013-CEL-E C10001833	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002632	B	83013-CEL-L1 C10001829	MCT on roof top the container Electrolyser Package (A-20000) is open.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30002634	B	83013-CEL-L2 C10001830	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30002635	B	83013-CEL-L3 C10001831	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package
SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30002636	B	83013-CEL-N C10001832	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30002637	B	83013-CEL-E C10001833	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30003802	B	20001-CEC C10002327	Missing cable tag inside/outside the SG-100D1.After MCT. See attached photo. Construction Note: "not accessible inside the	.		Gtangianu 2025-02-13	2025-06-16	Ecarotenuto 2025-06-16	2025-06-16
C30003803	B	20001-CEC C10002327	wrong cable tag on top panel A-20000. And missing cable tag internal panel A-20000. See attached photo.	.		Gtangianu 2025-02-13	2025-02-21	Gtangianu 2025-02-21	2025-02-21
C30004279	B	A-20000	ATEX CERTIFICATE MISSING (Q.RIO2)			CPY 2025-03-26	2025-04-14	JDuinhoven 2025-04-14	JDuinhoven 2025-04-14
C30004280	B	A-20000	DOCUMENT NOT RECEIVED (Q.RIO2)			CPY 2025-03-26	2025-04-14	JDuinhoven 2025-04-14	JDuinhoven 2025-04-14
C30004281	B	A-20000	Ex ia equipment No DSD has been provided and no provision of circuit calculations			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004282	B	A-20000	WP3 Example of the suspected I.S systems wiring. No DSD has been provided and no provision of circuit calculations, this should be			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004283	B	A-20000	Electrolyser Void Damage to control cables on transit entering the lower container at the East end.			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package

SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004284	B	A-20000	Have ATEX signs been procured for fitting on the Entry to Zones?			CPY 2025-03-26			
C30004285	B	A-20000	DATA NAMEPLATE MISSING, INCLUDING PED AND ATEX MARKING (HPP-700)			CPY 2025-03-26			
C30004286	B	A-20000	MISSING CABLE TAGS [ELOGEN SUPPLY] (TS64.1)			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004287	B	A-20000	RUINED THE LOWER PART OF ITEM, THREAD DAMAGED. TO BE REPLACED (PT-632)		Pressure transmitter replaced	CPY 2025-03-26	JDuinhoven 2025-05-07	JDuinhoven 2025-05-07	JDuinhoven 2025-05-07
C30004288	B	A-20000	INSULATION TO BE RESTORED DUE TO UNMOUNT OF PIPING FOR CLEANING PURPOSE AND DUE TO BUMPS OCCOUR			CPY 2025-03-26			
C30004289	B	A-20000	Barrier 331T5 not suitable to be installed inside QRIO2			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004388	B	A-20000	Rectifier 1 currently supplies power to stacks 5-8, rectifier 2 currently supplies stacks 1-4. As per the documentation this should be reversed. Cabled			CPY 2025-05-19			

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package
SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Telecom

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30003303	B	20-UCP-001/B400-NET-001.01 C10004346	Missing identification tag inside/outside the Fores panel (20-UCP-001). See attached photo.	.		Gtangianu 2025-01-29	2025-02-21	Gtangianu 2025-02-21	2025-02-21
C30003304	B	20-UCP-001/B400-NET-001.02 C10004347	Missing identification tag inside/outside the Fores panel (20-UCP-001). See attached photo.	.		Gtangianu 2025-01-29	2025-02-21	Gtangianu 2025-02-21	2025-02-21

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004073	B	C-20-XS-001/B400-SIS-001 C10001448	Missing cable tags the from/to MCT internal electrolyzer A-20000 .	.		Gtangianu 2025-02-21	2025-03-12	JKrizanic 2025-03-12	2025-03-12
C30004075	B	C-20-XA-003/B400-SIS-001 C10001455	Missing cable tags the from/to MCT internal electrolyzer A-20000 .	.		Gtangianu 2025-02-21	2025-03-12	JKrizanic 2025-03-12	2025-03-12
C30004078	B	20-UCP-001/B400-FGS-003 C10001465	Missing cable tags the from/to MCT internal electrolyzer A-20000 .	.		Gtangianu 2025-02-21	2025-03-12	JKrizanic 2025-03-12	2025-03-12
C30004290	B	A-20000	THS-200_PSV THS-400_PSV HPP-700_PSV64.3 missing tubing for drain DP (C-63 SYSTEM)			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004291	B	A-20000	RV-200 RV-400 HPP-700_PSV64.3 missing antistatic bid (C-63 SYSTEM)			CPY 2025-03-26	2025-04-29	JDuinhoven 2025-04-29	JDuinhoven 2025-04-29

Section 2.2 Exception Punch Lists (per discipline)

CROSSWIND

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Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004171	B	A-20000 C10002348	Package tag plate is missing	.		Lmussi 2025-02-28			
C30004172	B	A-20000 C10002348	Package is not fixed to the structure Upper stage of the package to be fixed to the lower stage	.		Lmussi 2025-02-28			

CROSSWIND

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Project CROSSWIND

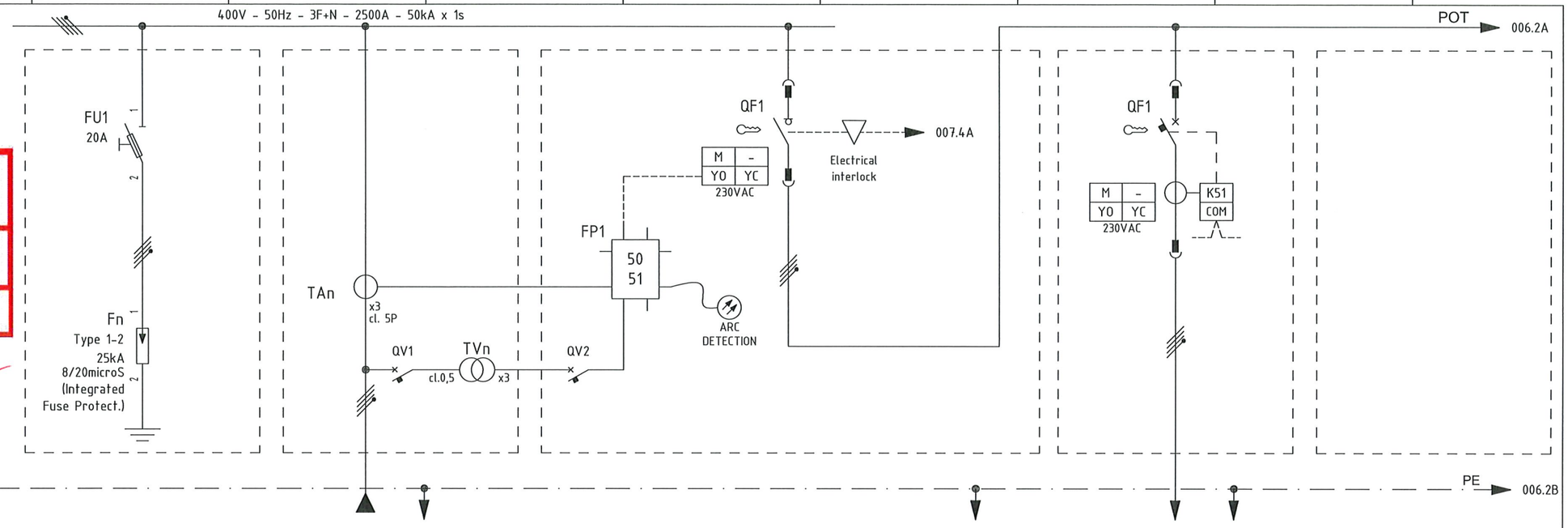
PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004284	B	A-20000	Have ATEX signs been procured for fitting on the Entry to Zones?			CPY 2025-03-26			
C30004285	B	A-20000	DATA NAMEPLATE MISSING, INCLUDING PED AND ATEX MARKING (HPP-700)			CPY 2025-03-26			
C30004288	B	A-20000	INSULATION TO BE RESTORED DUE TO UNMOUNT OF PIPING FOR CLEANING PURPOSE AND DUE TO BUMPS OCCOUR			CPY 2025-03-26			
C30004388	B	A-20000	Rectifier 1 currently supplies power to stacks 5-8, rectifier 2 currently supplies stacks 1-4. As per the documentation this should be reversed. Cabled			CPY 2025-05-19			

Section 2.3 “As-Commissioned” P&ID's / SLD's / D&ID's / C&E's



VALID FOR CONSTRUCTION

VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1723002197-EL-DG-00011

REV.:	DATE:	SIGNATURE:
4_A	18/12/24	V.Ramponi

ROSETTI MARINO SpA

AS - COMMISSIONED
DAVIDE ZUCCONELLI
20/03/2025
NO MARK UP

ITEM		1	-	-	-	A-20000
UTILITY		2	SURGE ARRESTER	-	INCOMING TRASFORMER	ELECTROLYSER AUXILIARY LOAD
COLUMN/CUBICLE		3	-	A1 / +02	A1 / +05	A1 / +08
RATED POWER | RATED CURRENT		4/5	- | -	- | -	- | -	293 kW | 497 A
TYPICAL FUNCTIONAL		6	-	-	-	L3-630
CIRCUIT BREAKER (ABB)	TYPE	7	-	-	E4.2N/MS-3200 4P	E1.2C-1250 4P
	VERSION	8	-	-	WITHDRAWABLE	WITHDRAWABLE
	TRIP UNITS	9	-	-	-	EKIP HI TOUCH LSIG = 630
	Icu KA	10	-	-	66 kA (1s)	50 kA
OVERLOAD	L Range A	11	-	-	-	(0.4 ÷ 1) x In
	L Range t	12	-	-	-	t=k/I^2
SEL. SHORT-CIRCUIT	S Range A	13	-	-	-	(0.6 ÷ 10) x In [EXCLUDABLE]
	S Range t	14	-	-	-	t=k / t=k/I²
INST. SHORT-CIRCUIT	I Range A	15	-	-	-	(1.5 ÷ 15) x In
	I Range t	16	-	-	-	instantaneous
EARTH FAULT PROTECTION	G Range A	17	-	-	-	(0.1 ÷ 1) x In (EXCLUDABLE)
	G Range t	18	-	-	-	t=k / t=k/I^2
CONTACTOR (ABB)		19	-	-	-	-
THERMAL OVERLOAD RELAY (ABB)		20	-	-	-	-
SURGE ARRESTER (DEHN)		21	DVCI 1 255 FM (961205)	-	-	-
TOROIDAL CURRENT TRANSFORMER (FRER)		22	-	-	-	-
FUSE HOLDER (ITALWEBER)		23	Fuses 20A gG	-	-	-
INDIRECT PROTECTION (ABB)		24	-	-	REF615-(version F) HBFFAEFCNDCABBA11G	-
VOLTMETER		25	-	-	-	-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE	26	-	TAR1052K5N01V_18 - 2500/1A	-	-
	PERFORMANCE/CLASS	27	-	5VA / 5P20	-	-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE	28	-	TTV020400VC1 - 400r3/110r3V	-	-
	PERFORMANCE/CLASS	29	-	20VA / 0.5	-	-
LOCK-OUT RELAY (-)		30	-	-	-	-
POWER CONDUCTOR mmq		31	-	-	-	1 x 150 + [4 x (1 x 300)]

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

DWG n°: 231298/SD/11
Item n°: PF1002983/26

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"
SINGLE LINE DIAGRAM
Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00011

SHEET 005

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 04

Section 3 CONSOLIDATED PUNCH LISTS

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004178	A	A-20000 C10002348	Earthing package F11A is damaged and needs to be replaced	.		Lmussi 2025-02-28	2025-03-10	Gtangianu 2025-03-10	2025-03-10
C30004171	B	A-20000 C10002348	Package tag plate is missing	.		Lmussi 2025-02-28			
C30004172	B	A-20000 C10002348	Package is not fixed to the structure Upper stage of the package to be fixed to the lower stage	.		Lmussi 2025-02-28			
C30004173	B	A-20000 C10002348	Screws are missing on the top of transformator and on the package	.		Lmussi 2025-02-28	2025-03-18	LNovaga 2025-03-18	2025-03-18
C30004174	B	A-20000 C10002348	MCT for lines: 1"-DM-001-01SS-E 1"-N-151-01CS-N 1"-IA-191-01SS-N 1"-DM-005-01CS-H 1"-WW-004-01CS-H (water,	.		Lmussi 2025-02-28	2025-04-22	LNovaga 2025-04-22	2025-04-22
C30004175	B	A-20000 C10002348	MCT for lines: 2"-VL-003-01HSS-N & 1"-HY-007-03HSS-N (hydrogen lines)to be installed correctly	.		Lmussi 2025-02-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004176	B	A-20000 C10002348	General touch-up to be performed	.		Lmussi 2025-02-28	2025-05-06	LNovaga 2025-05-06	2025-05-06
C30004177	B	A-20000 C10002348	Diagonal beam on stairs side is short and not all screws are thightened	.		Lmussi 2025-02-28	2025-03-12	LNovaga 2025-03-12	2025-03-12
C30004179	B	A-20000 C10002348	On transformator and stairs of the package are present earthing tags not as per typical which have to be removed	.		Lmussi 2025-02-28	2025-04-14	JDuinhoven 2025-04-14	JDuinhoven 2025-04-14

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package

SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004180	B	A-20000 C10002348	Earthing connection between handrails and ladder to ground are missing	.		Lmussi 2025-02-28	2025-03-26	Gtangianu 2025-03-26	2025-03-26
C30004181	B	A-20000 C10002348	Stairs connection to ground type E11C is not as per typical 123A90-DDL-EL-DD-20090 rev. 02	.		Lmussi 2025-02-28	2025-03-26	Gtangianu 2025-03-26	2025-03-26

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package

SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000158	B	A1/+08-QF1 C10002925	New and definitive protection setting to be implemented on SG-200N1 drawer A1/+08	Update the Protection Setting on the drawer.	The definitive setting has been updated.	MGirotti 2024-10-09	MGirotti 2024-11-21	MGirotti 2024-11-21	2024-11-21
C30002627	B	83013-CEL-L1 C10001829	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002628	B	83013-CEL-L2 C10001830	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002629	B	83013-CEL-L3 C10001831	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002630	B	83013-CEL-N C10001832	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002631	B	83013-CEL-E C10001833	MCT on (lower/top deck is open) . See attached photo.	.		Gtangianu 2025-01-10	2025-03-10	JKrizanic 2025-03-10	2025-03-10
C30002632	B	83013-CEL-L1 C10001829	MCT on roof top the container Electrolyser Package (A-20000) is open.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30002634	B	83013-CEL-L2 C10001830	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30002635	B	83013-CEL-L3 C10001831	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package

SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30002636	B	83013-CEL-N C10001832	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30002637	B	83013-CEL-E C10001833	MCT on the roof top the Electrolyser Package (A-20000) is open. See attached photo.	.		Gtangianu 2025-01-10	2025-03-05	Gtangianu 2025-03-05	2025-03-05
C30003802	B	20001-CEC C10002327	Missing cable tag inside/outside the SG-100D1.After MCT. See attached photo. Construction Note: "not accessible inside the	.		Gtangianu 2025-02-13	2025-06-16	Ecarotenuto 2025-06-16	2025-06-16
C30003803	B	20001-CEC C10002327	wrong cable tag on top panel A-20000. And missing cable tag internal panel A-20000. See attached photo.	.		Gtangianu 2025-02-13	2025-02-21	Gtangianu 2025-02-21	2025-02-21
C30004279	B	A-20000	ATEX CERTIFICATE MISSING (Q.RIO2)			CPY 2025-03-26	2025-04-14	JDuinhoven 2025-04-14	JDuinhoven 2025-04-14
C30004280	B	A-20000	DOCUMENT NOT RECEIVED (Q.RIO2)			CPY 2025-03-26	2025-04-14	JDuinhoven 2025-04-14	JDuinhoven 2025-04-14
C30004281	B	A-20000	Ex ia equipment No DSD has been provided and no provision of circuit calculations			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004282	B	A-20000	WP3 Example of the suspected I.S systems wiring. No DSD has been provided and no provision of circuit calculations, this should be			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004283	B	A-20000	Electrolyser Void Damage to control cables on transit entering the lower container at the East end.			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 20 Electrolyser package

SUBSYSTEM 20-00 Electrolyser Package (A-20000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004284	B	A-20000	Have ATEX signs been procured for fitting on the Entry to Zones?			CPY 2025-03-26			
C30004285	B	A-20000	DATA NAMEPLATE MISSING, INCLUDING PED AND ATEX MARKING (HPP-700)			CPY 2025-03-26			
C30004286	B	A-20000	MISSING CABLE TAGS [ELOGEN SUPPLY] (TS64.1)			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004287	B	A-20000	RUINED THE LOWER PART OF ITEM, THREAD DAMAGED. TO BE REPLACED (PT-632)		Pressure transmitter replaced	CPY 2025-03-26	JDuinhoven 2025-05-07	JDuinhoven 2025-05-07	JDuinhoven 2025-05-07
C30004288	B	A-20000	INSULATION TO BE RESTORED DUE TO UNMOUNT OF PIPING FOR CLEANING PURPOSE AND DUE TO BUMPS OCCOUR			CPY 2025-03-26			
C30004289	B	A-20000	Barrier 331T5 not suitable to be installed inside QRIO2			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004388	B	A-20000	Rectifier 1 currently supplies power to stacks 5-8, rectifier 2 currently supplies stacks 1-4. As per the documentation this should be reversed. Cabled			CPY 2025-05-19			

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Telecom									
CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30003303	B	20-UCP-001/B400-NET-001.01 C10004346	Missing identification tag inside/outside the Fores panel (20-UCP-001). See attached photo.	.		Gtangianu 2025-01-29	2025-02-21	Gtangianu 2025-02-21	2025-02-21
C30003304	B	20-UCP-001/B400-NET-001.02 C10004347	Missing identification tag inside/outside the Fores panel (20-UCP-001). See attached photo.	.		Gtangianu 2025-01-29	2025-02-21	Gtangianu 2025-02-21	2025-02-21

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	20	Electrolyser package
SUBSYSTEM	20-00	Electrolyser Package (A-20000)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30004073	B	C-20-XS-001/B400-SIS-001 C10001448	Missing cable tags the from/to MCT internal electrolyzer A-20000 .	.		Gtangianu 2025-02-21	2025-03-12	JKrizanic 2025-03-12	2025-03-12
C30004075	B	C-20-XA-003/B400-SIS-001 C10001455	Missing cable tags the from/to MCT internal electrolyzer A-20000 .	.		Gtangianu 2025-02-21	2025-03-12	JKrizanic 2025-03-12	2025-03-12
C30004078	B	20-UCP-001/B400-FGS-003 C10001465	Missing cable tags the from/to MCT internal electrolyzer A-20000 .	.		Gtangianu 2025-02-21	2025-03-12	JKrizanic 2025-03-12	2025-03-12
C30004290	B	A-20000	THS-200_PSV THS-400_PSV HPP-700_PSV64.3 missing tubing for drain DP (C-63 SYSTEM)			CPY 2025-03-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30004291	B	A-20000	RV-200 RV-400 HPP-700_PSV64.3 missing antistatic bid (C-63 SYSTEM)			CPY 2025-03-26	2025-04-29	JDuinhoven 2025-04-29	JDuinhoven 2025-04-29

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004171

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Package tag plate is missing

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:25:18.338Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:25:36.540Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004172

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Package is not fixed to the structure

Upper stage of the package to be fixed to the lower stage

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:37:14.424Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:37:34.482Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature











ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004284

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

Have ATEX signs been procured for fitting on the Entry to Zones?

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004285

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

DATA NAMEPLATE MISSING, INCLUDING PED AND ATEX MARKING (HPP-700)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004288

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

INSULATION TO BE RESTORED DUE TO UNMOUNT OF PIPING FOR CLEANING PURPOSE AND DUE TO BUMPS OCCOUR DURING INSTALLATION. Insulation Valves to be installed

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004388

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

Rectifier 1 currently supplies power to stacks 5-8, rectifier 2 currently supplies stacks 1-4. As per the documentation this should be reversed. Cabled connections to be corrected at an opportune time.

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	COMM Commissioning	Date	2025-05-19
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000158

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002925	1.4 Discipline	Electrical
1.2 Item	A1/+08-QF1		ELECTROLISER AUXILIARY LOAD - A1/+08-QF1
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

New and definitive protection setting to be implemented on SG-200N1 drawer A1/+08

Name: Mattia Girotti

Date: 2024-10-09

Signature: Digitaly signed by Mattia Girotti 2024-10-09T07:59:14.308Z

3 - DEFECT ASSESSMENT

Update the Protection Setting on the drawer.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Mattia Girotti
3.4 Activity code	COMM Commissioning	Date	2024-10-09
3.5 Action by	PRE-COMM	Signature	Digitaly signed by Mattia Girotti 2024-10-09T07:59:45.137Z

4 - PERFORMED ACTION

The definitive setting has been updated.

Name: Mattia Girotti

Date: 2024-11-21

Signature: Digitaly signed by Mattia Girotti 2024-11-21T09:52:35.171Z

5 - CLEARANCE CHECK

Done.

Name: Mattia Girotti

Date: 2024-11-21

Signature: Digitaly signed by Mattia Girotti 2024-11-21T09:52:41.153Z

6- CLEARANCE APPROVAL

Name

Date

Signature

Page Name	Group Name	Variable Name	Variable Value	Variable Unit
Settings A				
	Overload Protection (L - ANSI 49)			
		PU nominal current In	630	
		Status	Enabled	
		Function	t=k/i^2	
		Prealarm I1	90	% I1
		Threshold I1	0.870	In
		Time t1 std	3.00	s
		Thermal memory (TM)	Disabled	
		TM Algorithm	RMS-independent	
		TM Time	Automatic	
		TM custom time	830	s
	Time-delayed overcurrent protection (S - ANSI 50 TD/68/51)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Threshold I2 (t=k)	4.00	In
		Time t2 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.60	In
		Set Startup th. on ProgStatusD	--------	
		Thermal memory status	Disabled	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Second time-delayed overcurrent protection (S2 - ANSI 50 TD)			
		Status	Disabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I5 (t=k)	1.20	In
		Time t5 (t=k)	0.05	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Instantaneous overcurrent protection (I - ANSI 50)			
		Status	Enabled	
		Threshold I3	9.00	In
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	1.50	In
		Set Startup th. on ProgStatusD	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Second I			
		Prot Second I	---	
		Status	Disabled	
		Threshold I31	1.50	In
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
		Second I Mode	Function Dependent	
		Function	Disabled	
		Delay On	0.00	s
		Delay Off	15.00	s
	Earth fault protection (G - ANSI 50N TD/68/51N)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Prealarm I4	90	% I4
		Threshold I4 (t=k)	0.200	In
		Time t4 (t=k) IEC - UL489	0.10	s

		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.20	In
		Set Startup th. on ProgStatusD	--------	
		Zone selectivity status	Disabled	
		Zone selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Directional overcurrent protection (D - ANSI 67/68)			
		Status	Disabled	
		Trip enable	Disabled	
		tripOnlyForward	--------	
		tripOnlyBackward	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I7 FWD	2.00	In
		Time t7 FWD	0.20	s
		Threshold I7 BWD	2.00	In
		Time t7 BWD	0.20	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold FWD	2.00	In
		Startup threshold BWD	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time FWD	0.13	s
		Zone Selectivity time BWD	0.13	s
		Zone Selectivity Type	Logic and Hardware	
		Direction minimum angle	3.6	°
	Closing on short-circuit protection (MCR)			
		Status	Disabled	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I3	6.00	In
		Time t3	0.04	s
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Over Temperature (T)			
		Trip enable	Disabled	

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002627

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001829	1.4 Discipline	Electrical
1.2 Item	83013-CEL-L1	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on (lower/top deck is open) .

See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:36:17.707Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:36:32.352Z

4 - PERFORMED ACTION

Name

Date: 2025-03-10

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-10

Signature: Digitaly signed by Josip Krizanic 2025-03-10T14:29:03.971Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-10

Signature


2000 CEC
- ELECTRIC CABLE - 1000 V - 10X300 50MM - EPR/LSZ

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002628

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001830	1.4 Discipline	Electrical
1.2 Item	83013-CEL-L2	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on (lower/top deck is open) .

See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:36:59.749Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:37:18.890Z

4 - PERFORMED ACTION

Name

Date: 2025-03-10

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-10

Signature: Digitaly signed by Josip Krizanic 2025-03-10T14:29:15.667Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-10

Signature


2000 CEC
- ELECTRIC CABLE - 1000 V - 10X300 50MM - EPR/LSZ

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002629

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001831	1.4 Discipline	Electrical
1.2 Item	83013-CEL-L3	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on (lower/top deck is open) .

See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:37:46.262Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:37:58.331Z

4 - PERFORMED ACTION

Name

Date: 2025-03-10

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-10

Signature: Digitaly signed by Josip Krizanic 2025-03-10T14:29:26.347Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-10

Signature

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002630

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001832	1.4 Discipline	Electrical
1.2 Item	83013-CEL-N	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on (lower/top deck is open) .

See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:38:22.359Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:38:34.737Z

4 - PERFORMED ACTION

Name

Date: 2025-03-10

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-10

Signature: Digitaly signed by Josip Krizanic 2025-03-10T14:29:38.136Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-10

Signature

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002631

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001833	1.4 Discipline	Electrical
1.2 Item	83013-CEL-E	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on (lower/top deck is open) .

See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:38:59.227Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:39:10.852Z

4 - PERFORMED ACTION

Name

Date: 2025-03-10

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-10

Signature: Digitaly signed by Josip Krizanic 2025-03-10T14:29:48.982Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-10

Signature


2000 CEC
- ELECTRIC CABLE - 1000 V - 10X300 50MM - EPR/LSZ

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002632

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001829	1.4 Discipline	Electrical
1.2 Item	83013-CEL-L1	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on roof top the container Electrolyser Package (A-20000) is open.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:41:01.388Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:41:20.018Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Closed.

Name: Giovanni Tangianu

Date: 2025-03-05

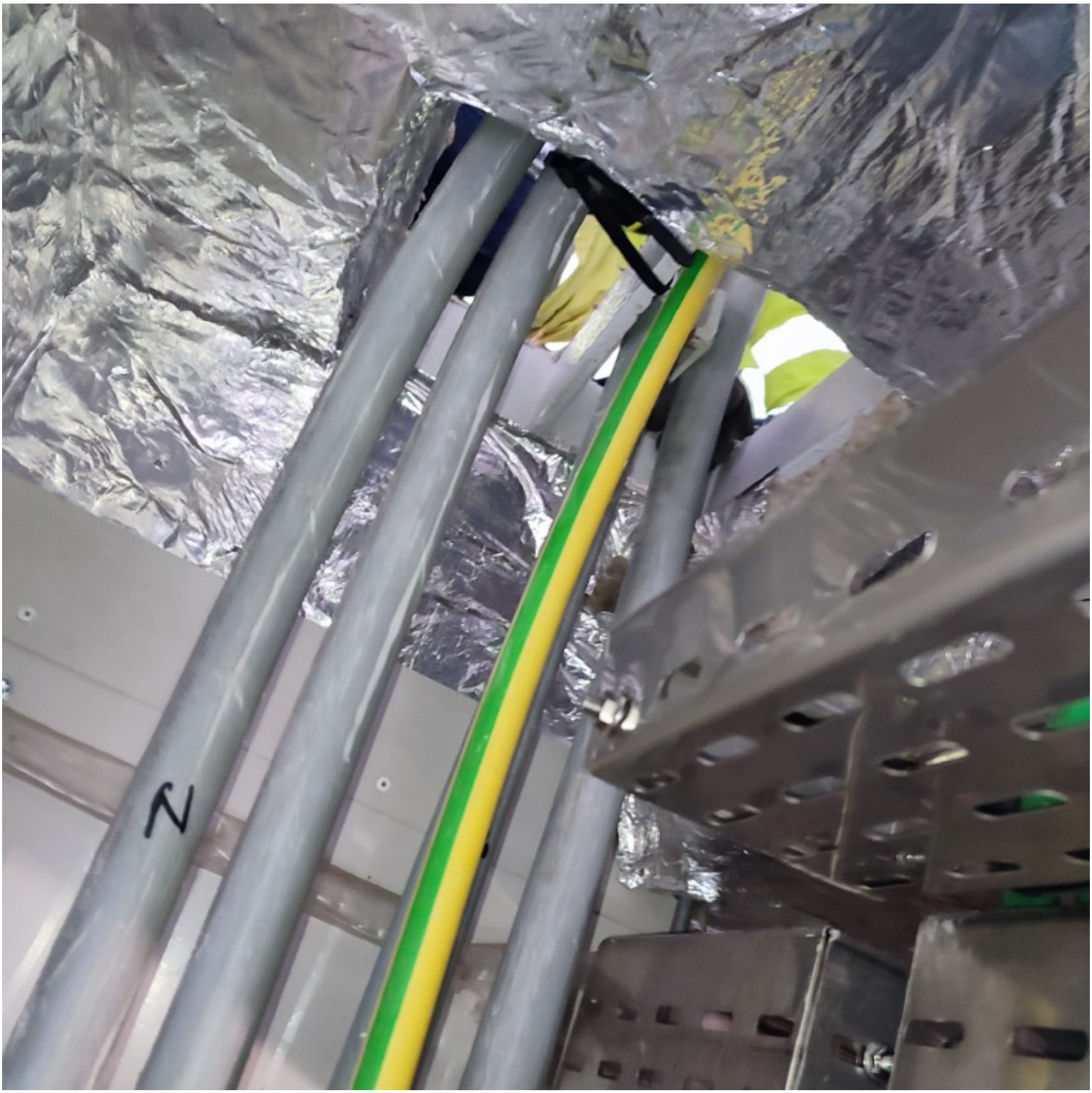
Signature: Digitaly signed by Giovanni Tangianu 2025-03-05T15:14:41.812Z

6- CLEARANCE APPROVAL

Name

Date

Signature


2

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002634

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001830	1.4 Discipline	Electrical
1.2 Item	83013-CEL-L2	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on the roof top the Electrolyser Package (A-20000) is open.
See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:42:15.147Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:42:26.618Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Closed.

Name: Giovanni Tangianu

Date: 2025-03-05

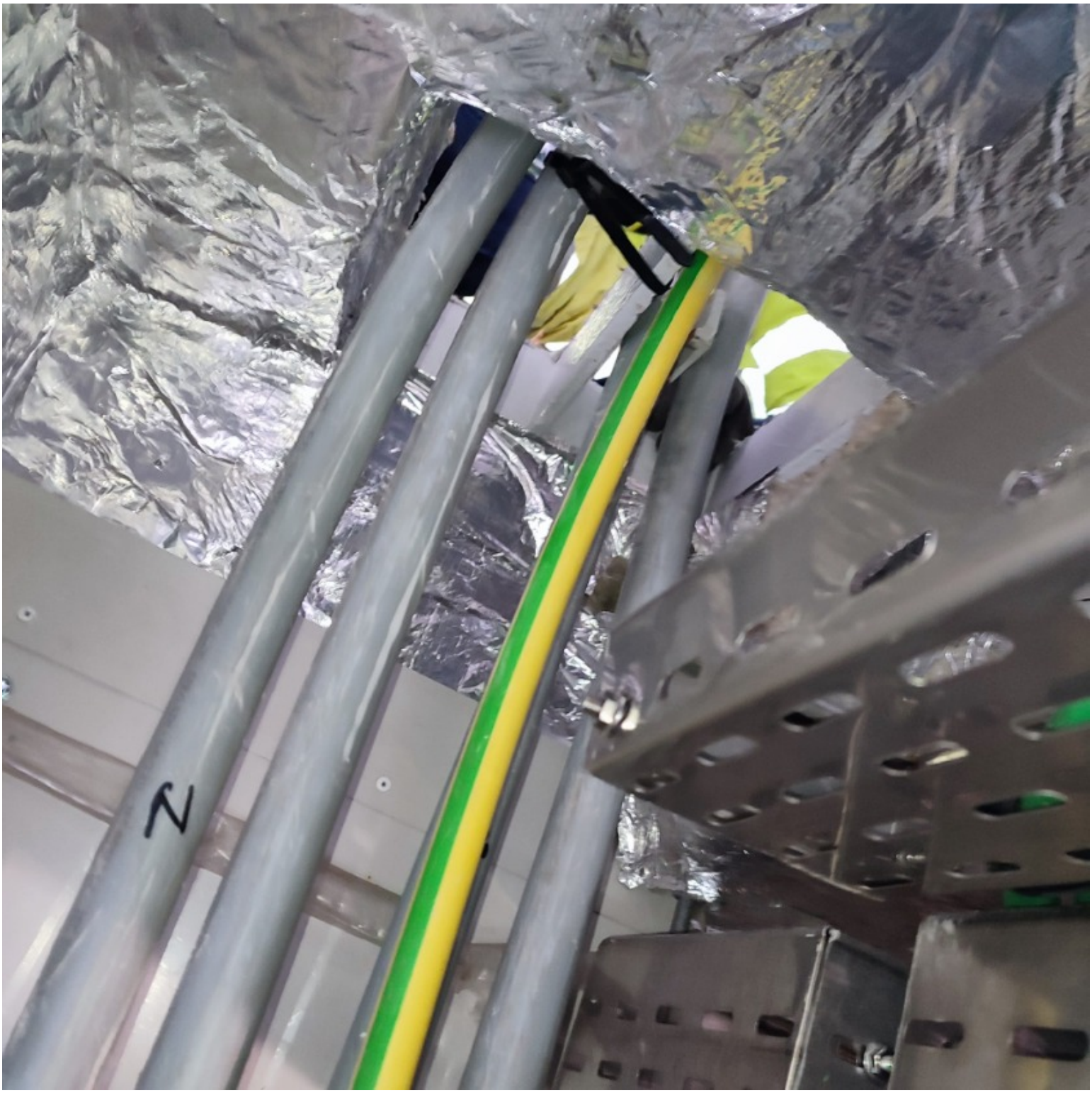
Signature: Digitaly signed by Giovanni Tangianu 2025-03-05T15:14:54.288Z

6- CLEARANCE APPROVAL

Name

Date

Signature


2

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002635

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001831	1.4 Discipline	Electrical
1.2 Item	83013-CEL-L3		LV Switchgear / Electrolyser Auxiliary load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

MCT on the roof top the Electrolyser Package (A-20000) is open.
See attached photo.

Name: Giovanni Tangianu
Date: 2025-01-10
Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:42:41.312Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:42:51.559Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Closed.

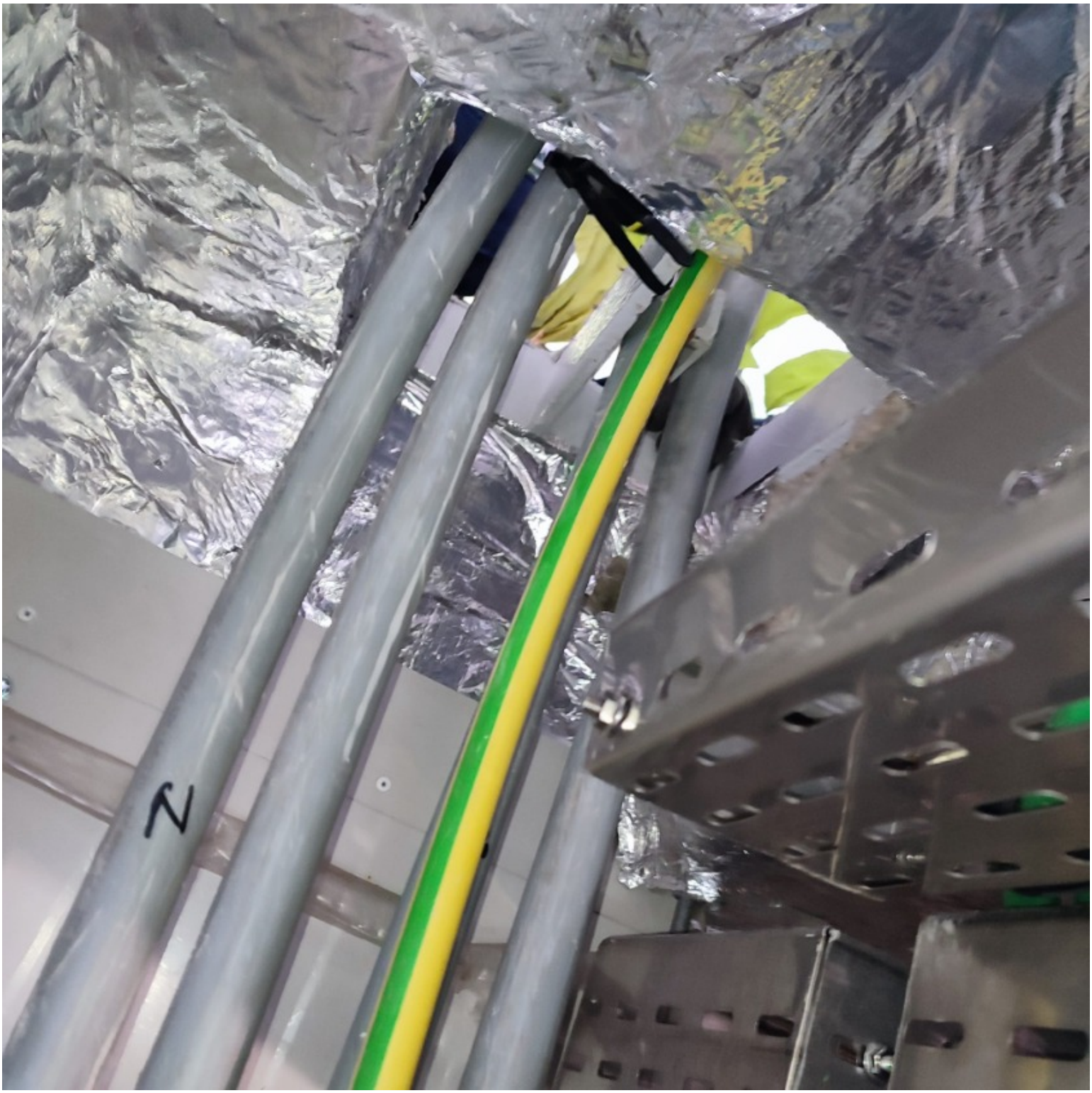
Name: Giovanni Tangianu
Date: 2025-03-05
Signature: Digitaly signed by Giovanni Tangianu 2025-03-05T15:15:20.178Z

6- CLEARANCE APPROVAL

Name

Date

Signature


2

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002636

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001832	1.4 Discipline	Electrical
1.2 Item	83013-CEL-N	LV Switchgear / Electrolyser Auxiliary load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT on the roof top the Electrolyser Package (A-20000) is open.
See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:43:08.117Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:43:17.903Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-03-05

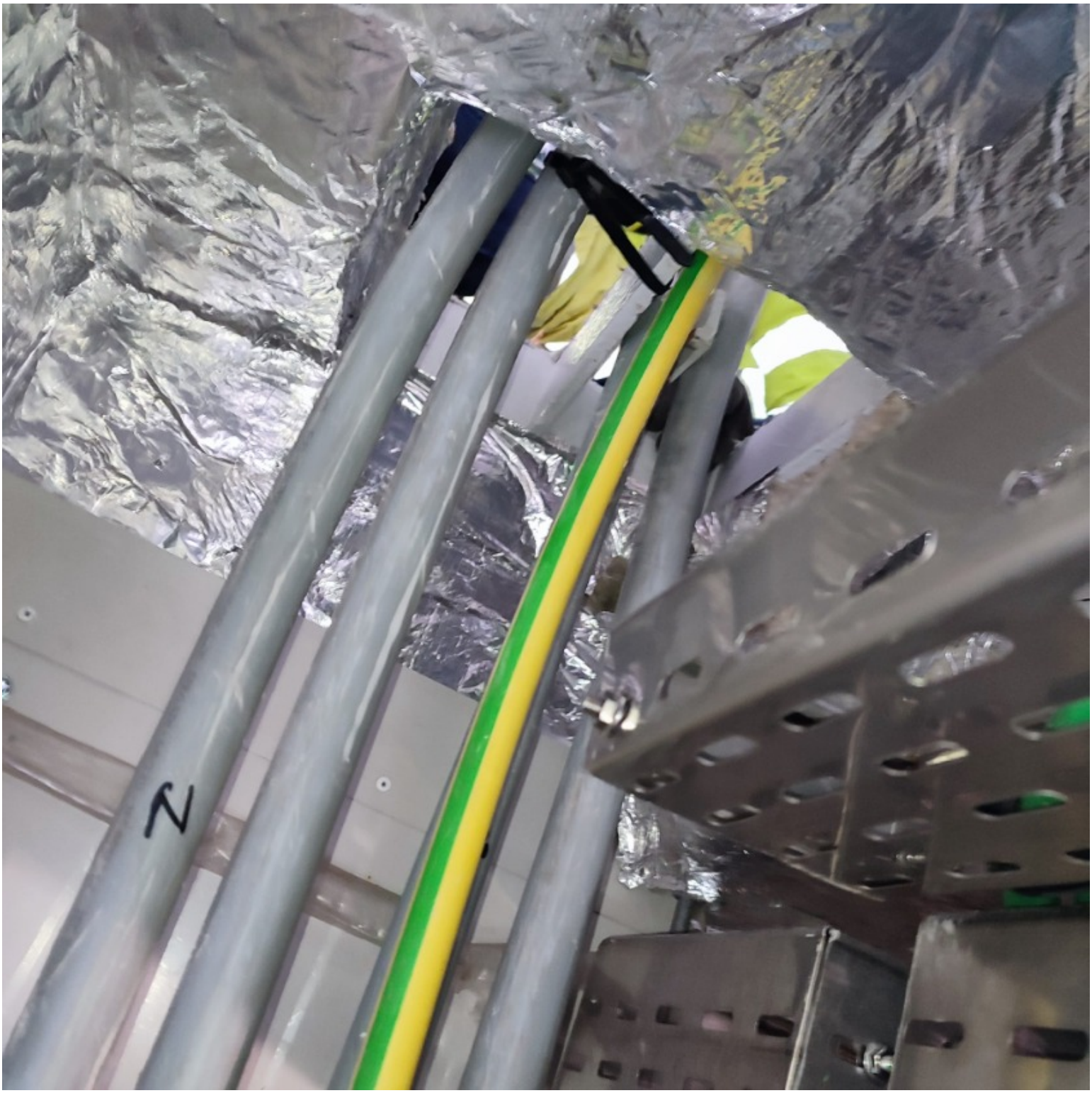
Signature: Digitaly signed by Giovanni Tangianu 2025-03-05T15:15:40.189Z

6- CLEARANCE APPROVAL

Name

Date

Signature


2

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30002637

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001833	1.4 Discipline	Electrical
1.2 Item	83013-CEL-E		LV Switchgear / Electrolyser Auxiliary load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

MCT on the roof top the Electrolyser Package (A-20000) is open.
See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-10

Signature: Digitaly signed by Giovanni Tangianu 2025-01-10T14:43:40.633Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-10
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-10T14:43:50.701Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-03-05

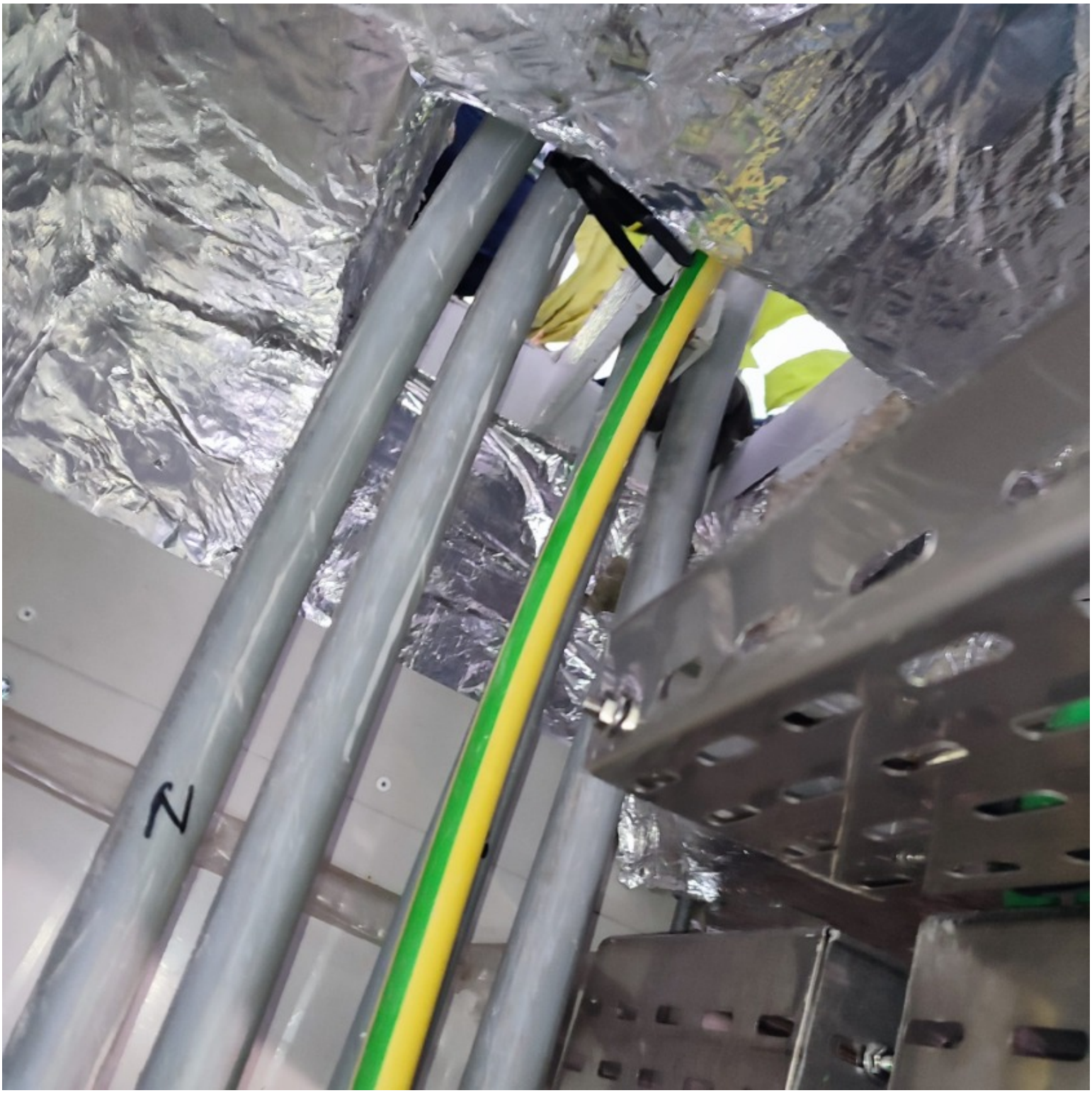
Signature: Digitaly signed by Giovanni Tangianu 2025-03-05T15:15:58.580Z

6- CLEARANCE APPROVAL

Name

Date

Signature


2

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30003303

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10004346	1.4 Discipline	Telecom
1.2 Item	20-UCP-001/B400-NET-001.01	COMMUNICATION / NETWORK CABINET	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Missing identification tag inside/outside the Fores panel (20-UCP-001). See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-29

Signature: Digitaly signed by Giovanni Tangianu 2025-01-29T13:56:10.769Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-29
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-29T13:56:24.654Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-02-21

Signature: Digitaly signed by Giovanni Tangianu 2025-02-21T14:09:44.505Z

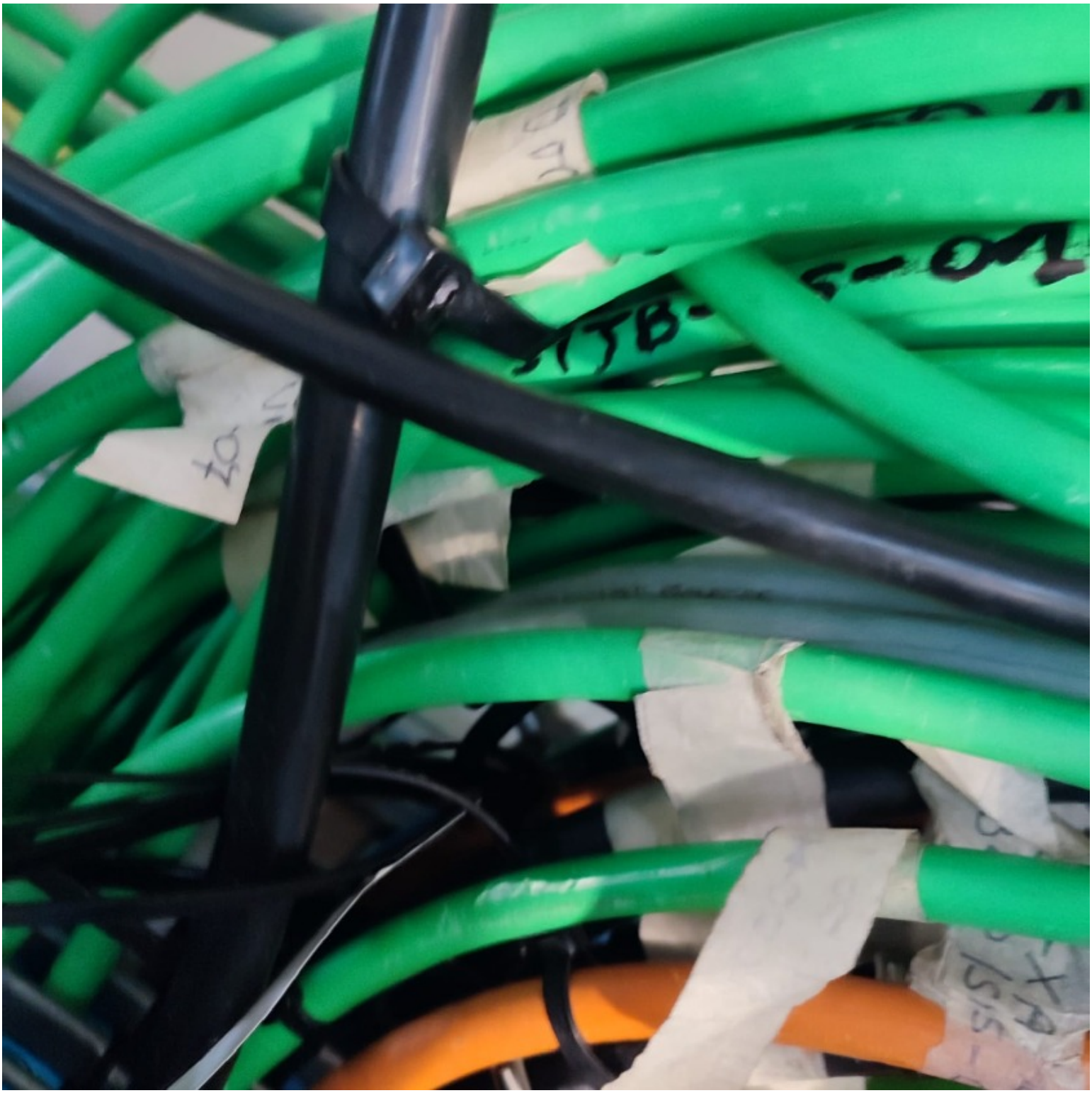
6- CLEARANCE APPROVAL

Name

Date

Signature


14
13



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30003304

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10004347	1.4 Discipline	Telecom
1.2 Item	20-UCP-001/B400-NET-001.02	COMMUNICATION / NETWORK CABINET	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Missing identification tag inside/outside the Fores panel (20-UCP-001). See attached photo.

Name: Giovanni Tangianu

Date: 2025-01-29

Signature: Digitaly signed by Giovanni Tangianu 2025-01-29T13:57:22.907Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-01-29
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-01-29T13:57:34.185Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-02-21

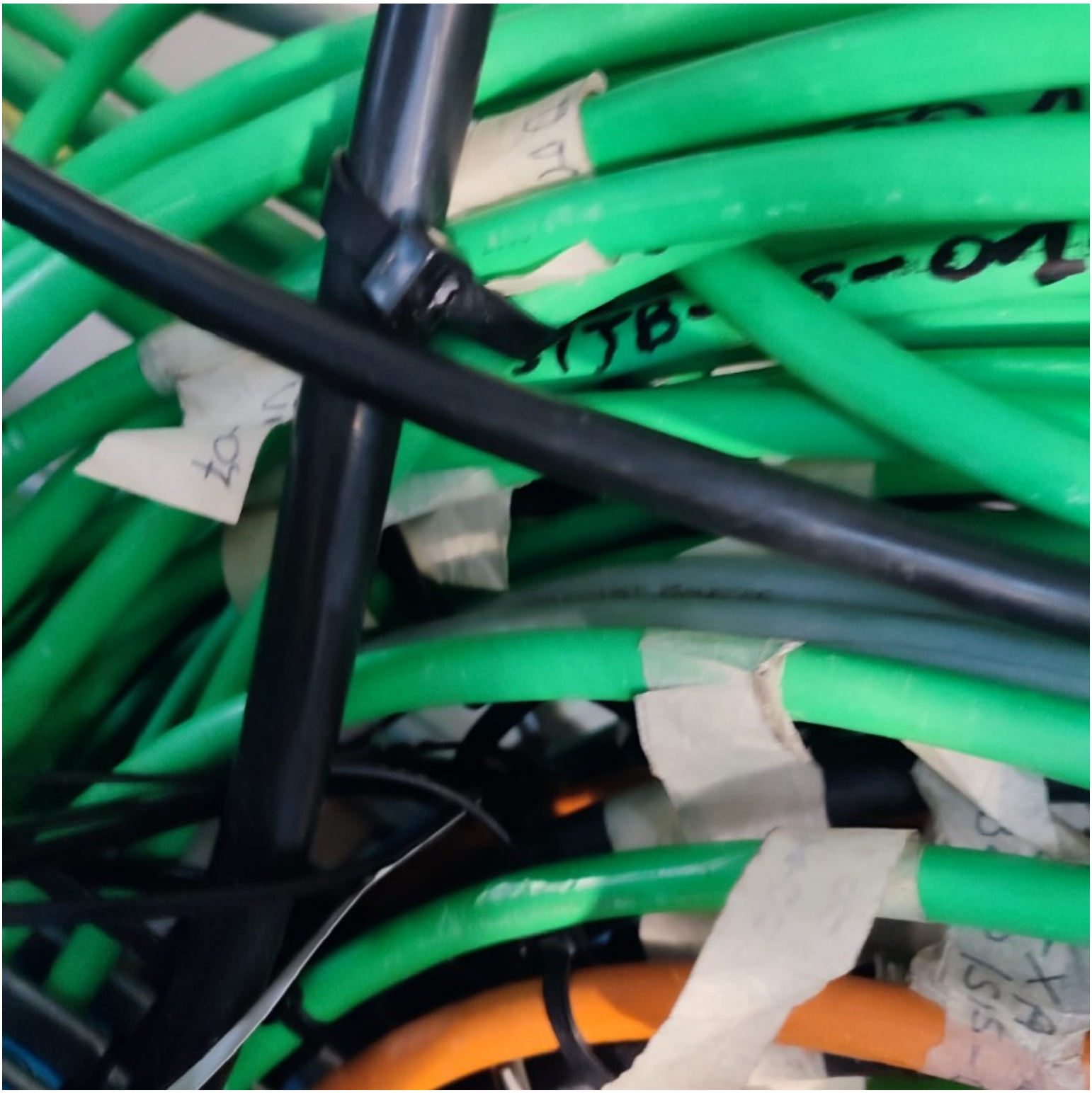
Signature: Digitaly signed by Giovanni Tangianu 2025-02-21T14:10:02.910Z

6- CLEARANCE APPROVAL

Name

Date

Signature




14
13

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30003802

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002327	1.4 Discipline	Electrical
1.2 Item	20001-CEC	Electrolyser / 6.6KV HV Switchgear	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Missing cable tag inside/outside the SG-100D1.After MCT. See attached photo.
Construction Note: "not accessible inside the electrical cabinet".

Name: Giovanni Tangianu
Date: 2025-02-13
Signature: Digitaly signed by Giovanni Tangianu 2025-02-13T14:57:44.034Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-02-13
3.5 Action by	PRE-COMM	Signature	Digitaly signed by Giovanni Tangianu 2025-02-13T14:58:02.904Z

4 - PERFORMED ACTION

Name
Date: 2025-06-16
Signature

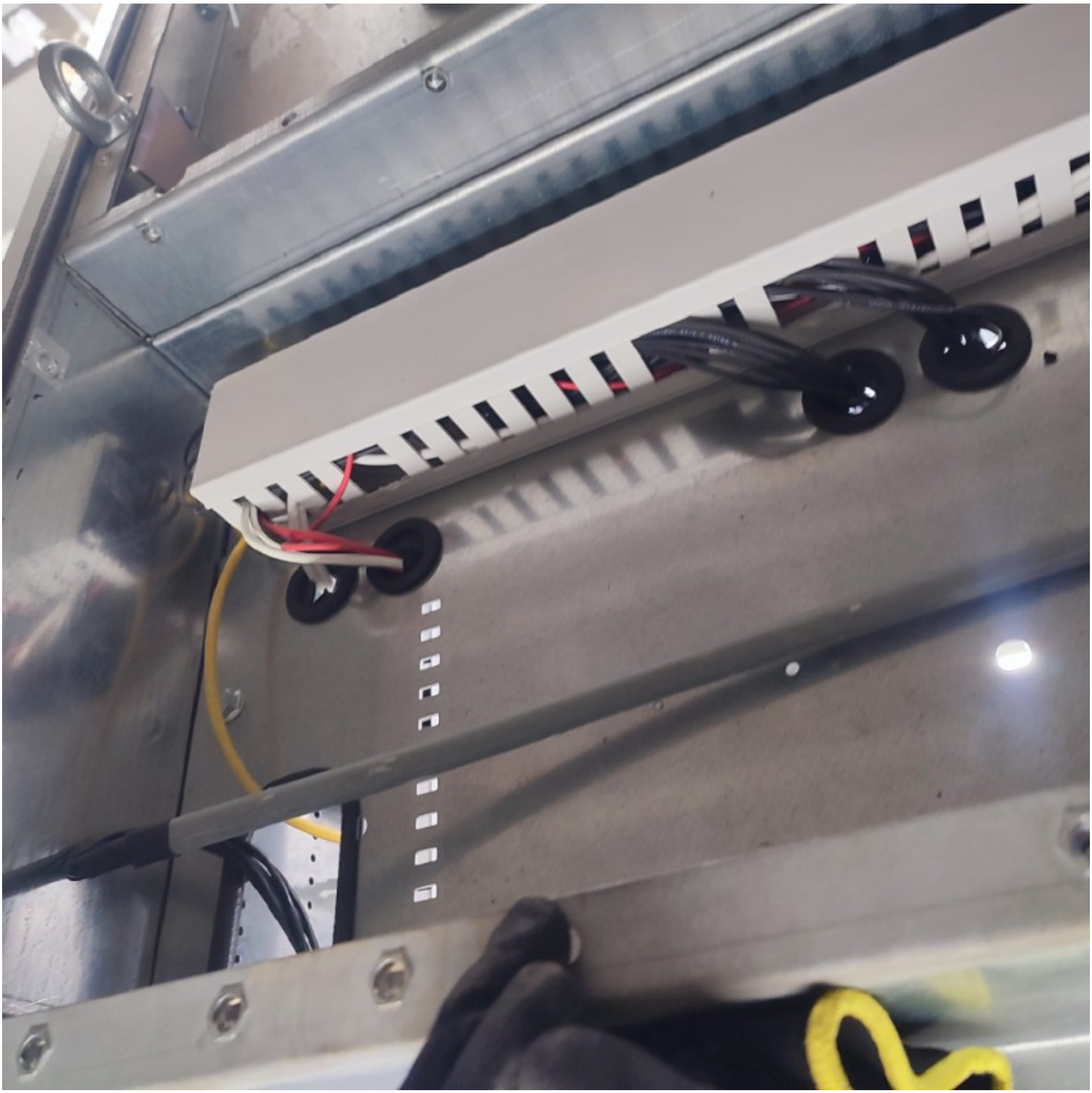
5 - CLEARANCE CHECK

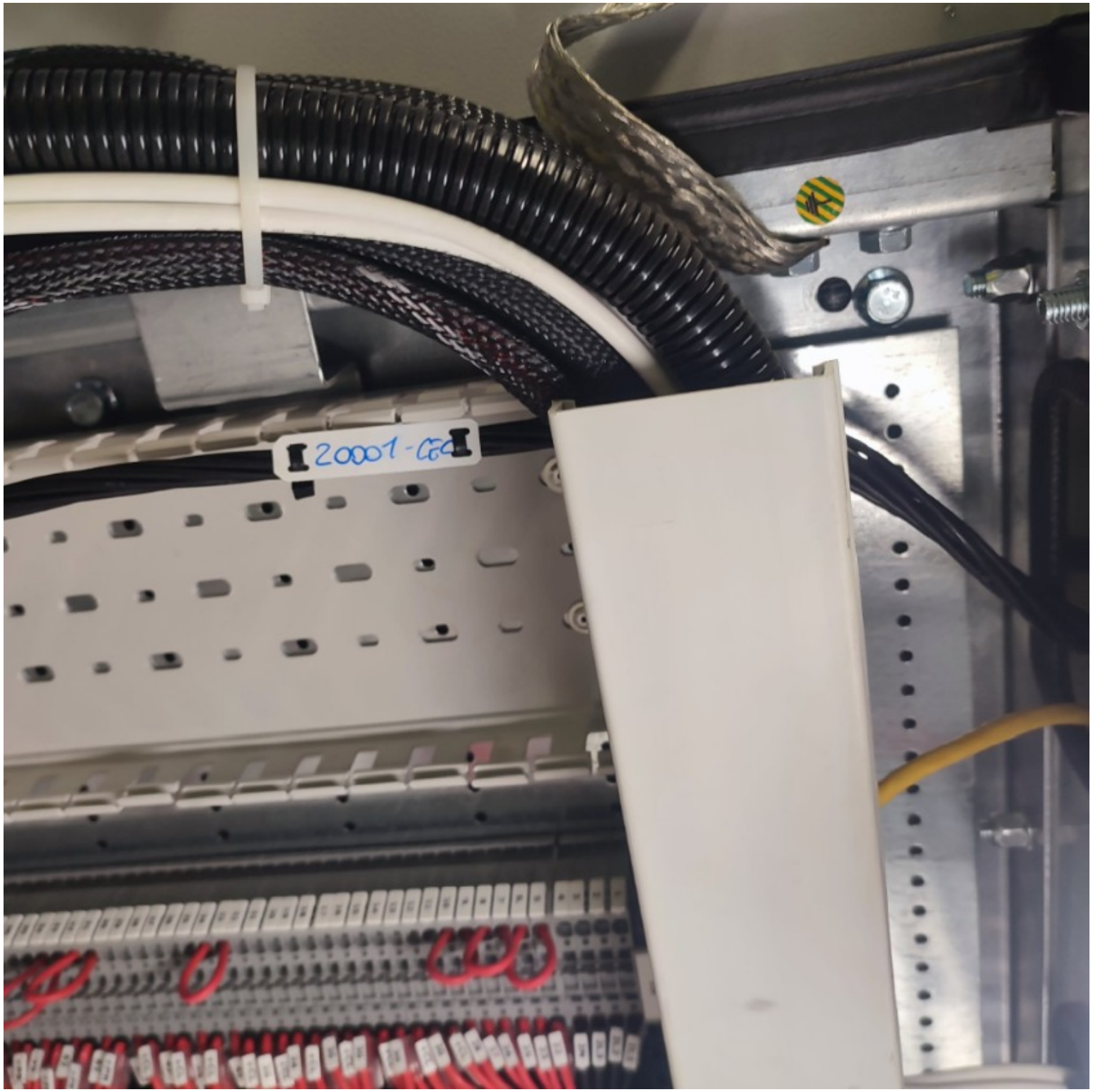
DONE

Name: Eleonora Carotenuto
Date: 2025-06-16
Signature: Digitaly signed by Eleonora Carotenuto 2025-06-16T09:49:27.940Z

6- CLEARANCE APPROVAL

Name
Date: 2025-06-16
Signature




20001-G

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30003803

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002327	1.4 Discipline	Electrical
1.2 Item	20001-CEC	Electrolyser / 6.6KV HV Switchgear	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

wrong cable tag on top panel A-20000. And missing cable tag internal panel A-20000. See attached photo.

Name: Giovanni Tangianu

Date: 2025-02-13

Signature: Digitaly signed by Giovanni Tangianu 2025-02-13T15:02:01.334Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-02-13
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-02-13T15:02:14.745Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed the correct cable tag.

Name: Giovanni Tangianu

Date: 2025-02-21

Signature: Digitaly signed by Giovanni Tangianu 2025-02-21T14:10:45.657Z

6- CLEARANCE APPROVAL

Name

Date

Signature


AHDU-4USC-200N1

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004073

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001448	1.4 Discipline	Instrumental
1.2 Item	C-20-XS-001/B400-SIS-001	TRIP SIGNAL TO UCP / MARSHALLING PCS	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Missing cable tags the from/to MCT internal electrolyzer A-20000
.

Name: Giovanni Tangianu

Date: 2025-02-21

Signature: Digitaly signed by Giovanni Tangianu 2025-02-21T13:59:09.858Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-02-21
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-02-21T13:59:26.842Z

4 - PERFORMED ACTION

Name

Date: 2025-03-12

Signature

5 - CLEARANCE CHECK

done

Name: Josip Krizanic

Date: 2025-03-12

Signature: Digitaly signed by Josip Krizanic 2025-03-12T07:11:24.538Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-12

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004075

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001455	1.4 Discipline	Instrumental
1.2 Item	C-20-XA-003/B400-SIS-001	UCP FAULT ALARM / MARSHALLING PCS	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Missing cable tags the from/to MCT internal electrolyzer A-20000 .

Name: Giovanni Tangianu

Date: 2025-02-21

Signature: Digitaly signed by Giovanni Tangianu 2025-02-21T14:00:03.811Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-02-21
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-02-21T14:00:22.542Z

4 - PERFORMED ACTION

Name

Date: 2025-03-12

Signature

5 - CLEARANCE CHECK

done

Name: Josip Krizanic

Date: 2025-03-12

Signature: Digitaly signed by Josip Krizanic 2025-03-12T07:11:39.194Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-12

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004078

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001465	1.4 Discipline	Instrumental
1.2 Item	20-UCP-001/B400-FGS-003	CONFIRMED GAS ALARM / MARSHALLING PCS	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Missing cable tags the from/to MCT internal electrolyzer A-20000 .

Name: Giovanni Tangianu

Date: 2025-02-21

Signature: Digitaly signed by Giovanni Tangianu 2025-02-21T14:00:39.825Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2025-02-21
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2025-02-21T14:00:52.543Z

4 - PERFORMED ACTION

Name

Date: 2025-03-12

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-12

Signature: Digitaly signed by Josip Krizanic 2025-03-12T07:12:04.344Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-12

Signature

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004173

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Screws are missing on the top of transformator and on the package

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:48:20.089Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:48:37.886Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Done, see attached.

Name: Lorenzo Novaga

Date: 2025-03-18

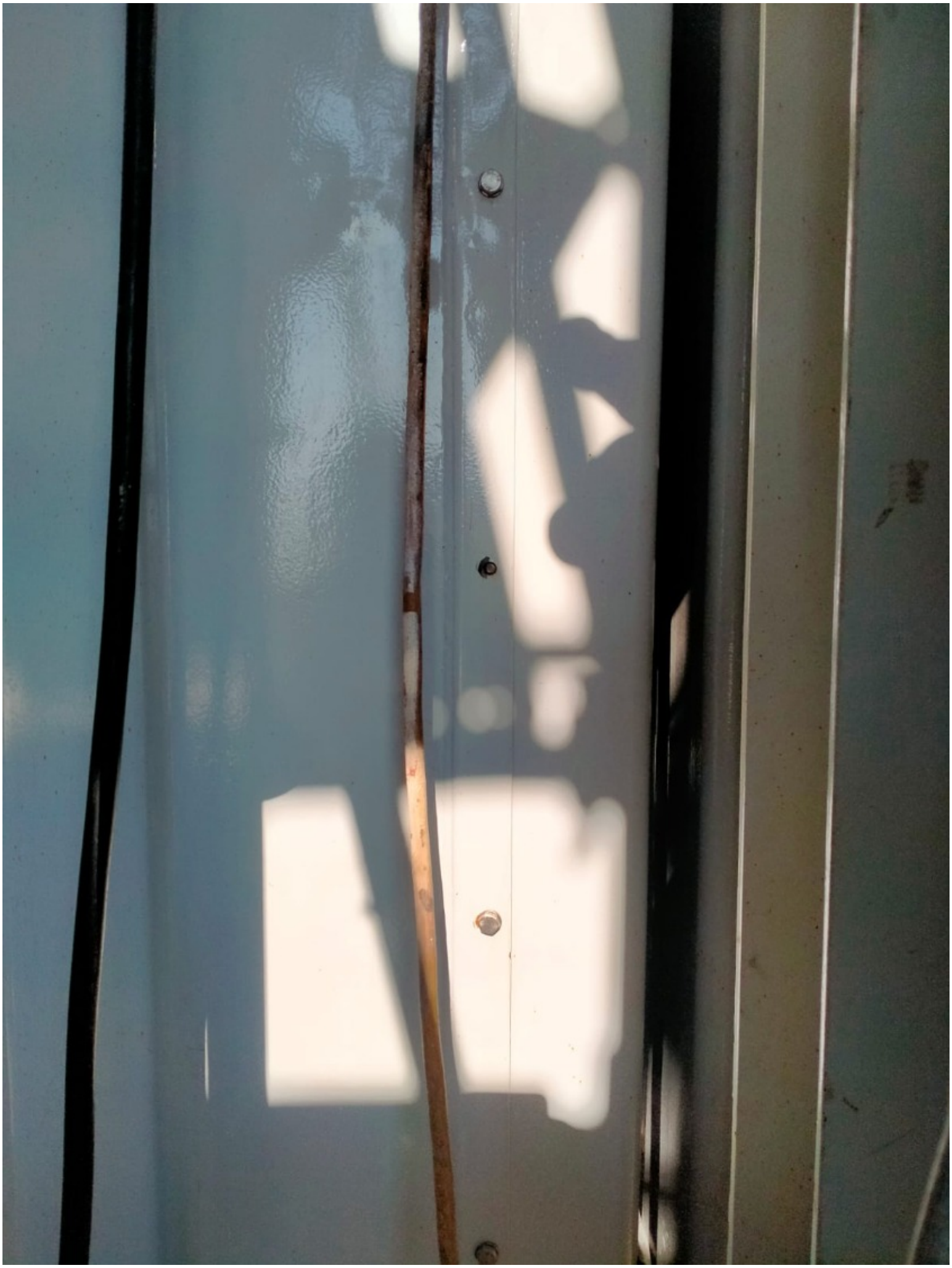
Signature: Digitaly signed by Lorenzo Novaga 2025-03-18T15:48:32.127Z

6- CLEARANCE APPROVAL

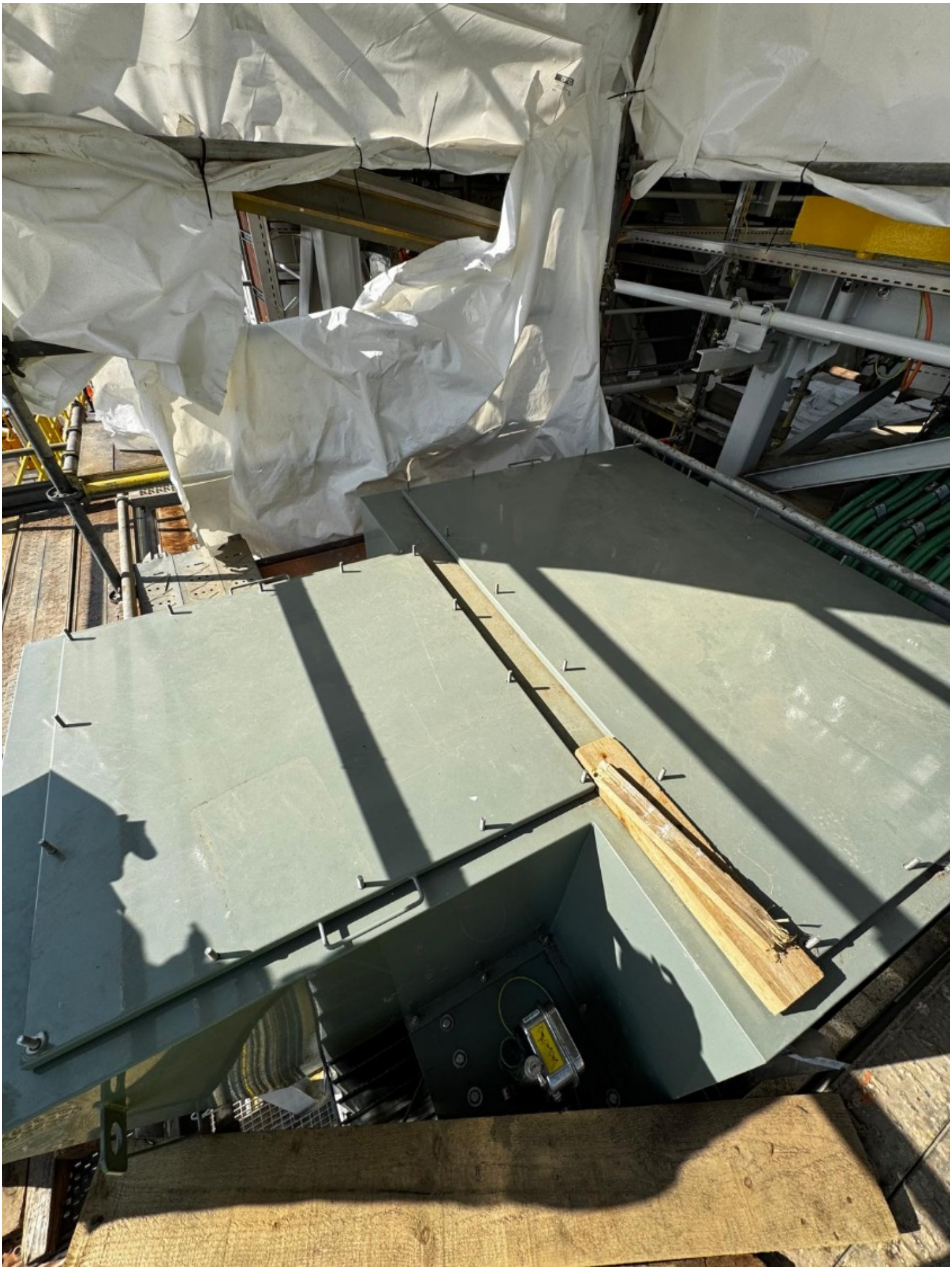
Name

Date

Signature















ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004174

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT for lines:

1"-DM-001-01SS-E
1"-N-151-01CS-N
1"-IA-191-01SS-N
1"-DM-005-01CS-H
1"-WW-004-01CS-H

(water, air and nitrogen lines) to be installed correctly.

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:44:44.342Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:48:52.544Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Accetpted by company as per last photo attached.

Name: Lorenzo Novaga

Date: 2025-04-22

Signature: Digitaly signed by Lorenzo Novaga 2025-04-22T06:29:00.831Z

6- CLEARANCE APPROVAL

Name

Date

Signature











ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004175

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

MCT for lines: 2"-VL-003-01HSS-N & 1"-HY-007-03HSS-N (hydrogen lines)to be installed correctly

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:39:09.760Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:49:01.434Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:01:49.949Z

6- CLEARANCE APPROVAL

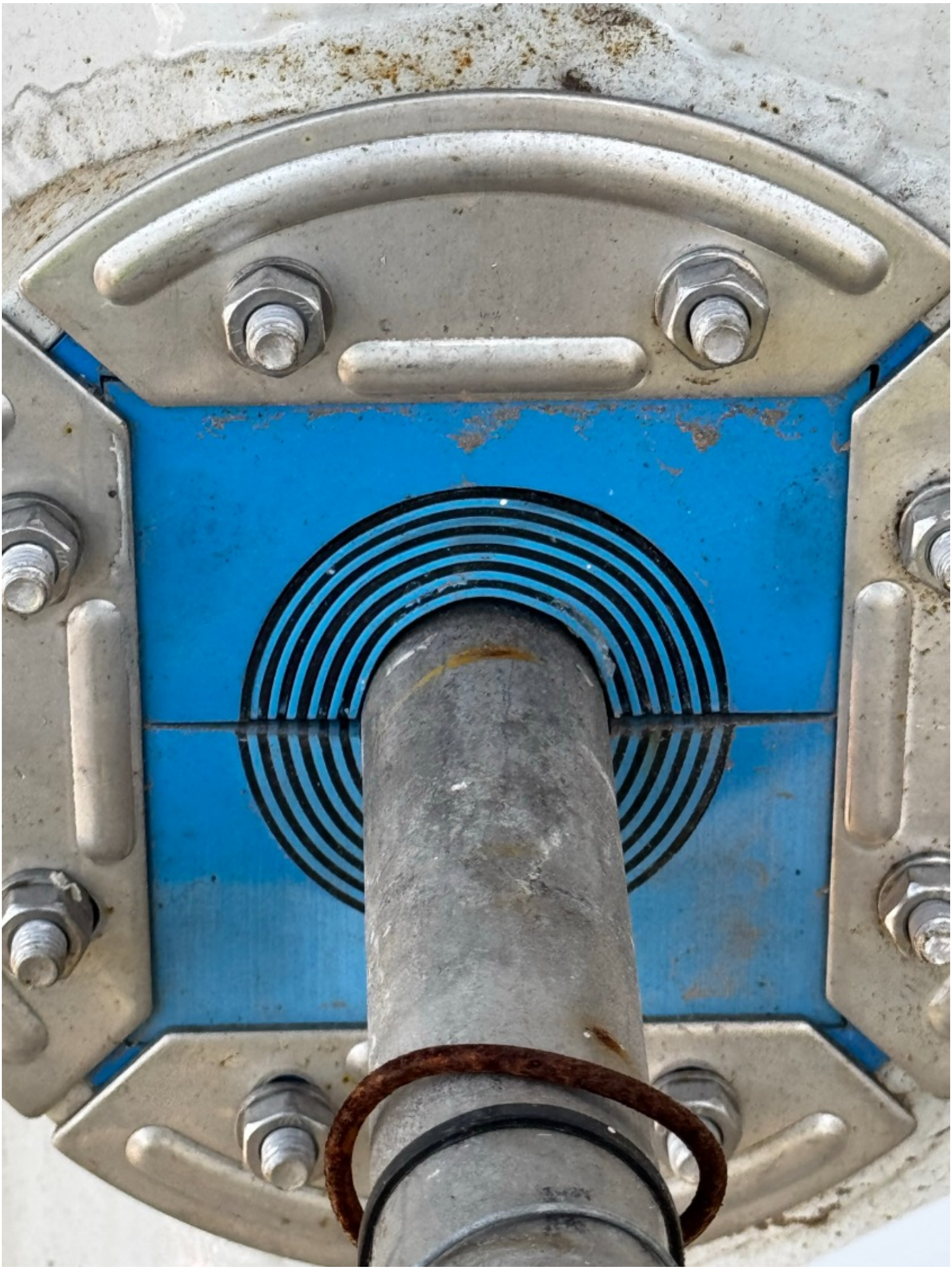
Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:02:11.784Z





ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004176

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

General touch-up to be performed

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:54:44.326Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:55:05.388Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DOne.

Name: Lorenzo Novaga

Date: 2025-05-06

Signature: Digitaly signed by Lorenzo Novaga 2025-05-06T09:57:50.276Z

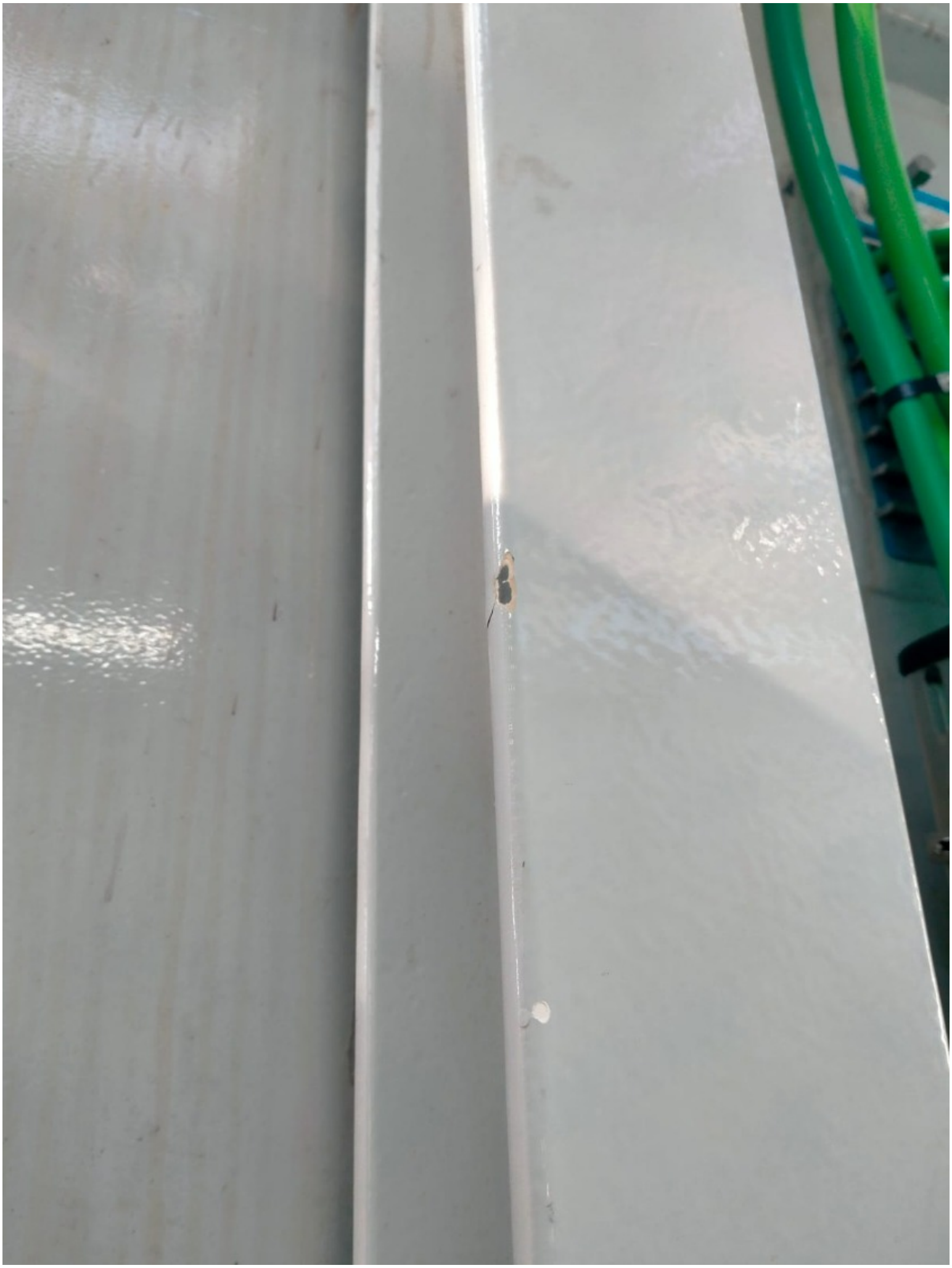
6- CLEARANCE APPROVAL

Name

Date

Signature






ALTRAD



ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004177

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Diagonal beam on stairs side is short and not all screws are thightened

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T10:59:15.797Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T10:59:43.629Z

4 - PERFORMED ACTION

Name

Date: 2025-03-12

Signature

5 - CLEARANCE CHECK

Done.

Name: Lorenzo Novaga

Date: 2025-03-12

Signature: Digitaly signed by Lorenzo Novaga 2025-03-12T07:14:36.795Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-12

Signature








TOP





ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004178

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Earthing package F11A is damaged and needs to be replaced

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T12:02:42.559Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T12:03:28.407Z

4 - PERFORMED ACTION

Name

Date: 2025-03-10

Signature

5 - CLEARANCE CHECK

CHANGED.

Name: Giovanni Tangianu

Date: 2025-03-07

Signature: Digitaly signed by Giovanni Tangianu 2025-03-07T15:31:28.453Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-10

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004179

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

On transformator and stairs of the package are present earthing tags not as per typical which have to be removed

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T12:19:35.478Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	VND Vendor	Signature	Digitaly signed by Luca Mussi 2025-02-28T12:19:49.837Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-14

Signature: Digitaly signed by Jan Duinhoven 2025-04-14T11:58:02.086Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-14

Signature: Digitaly signed by Jan Duinhoven 2025-04-14T11:58:20.381Z


L'INNOVATION
Au service de l'Environnement
GMT
AKHELEC







ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004180

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Earthing connection between handrails and ladder to ground are missing

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T12:22:35.000Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Luca Mussi 2025-02-28T12:22:49.035Z

4 - PERFORMED ACTION

Name

Date: 2025-03-26

Signature

5 - CLEARANCE CHECK

Done.

Name: Giovanni Tangianu

Date: 2025-03-26

Signature: Digitaly signed by Giovanni Tangianu 2025-03-26T14:42:26.270Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-26

Signature





ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004181

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002348	1.4 Discipline	Mechanical
1.2 Item	A-20000	Electrolyser Auxiliary Load	
1.3 Subsystem	20-00	Electrolyser Package (A-20000)	

2 - OBSERVATION

Stairs connection to ground type E11C is not as per typical 123A90-DDL-EL-DD-20090 rev. 02

Name: Luca Mussi

Date: 2025-02-28

Signature: Digitaly signed by Luca Mussi 2025-02-28T14:03:11.660Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Luca Mussi
3.4 Activity code	MC Mechanical Completion	Date	2025-02-28
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Luca Mussi 2025-02-28T14:03:31.836Z

4 - PERFORMED ACTION

Name

Date: 2025-03-26

Signature

5 - CLEARANCE CHECK

Done.

Name: Giovanni Tangianu

Date: 2025-03-26

Signature: Digitaly signed by Giovanni Tangianu 2025-03-26T14:42:55.229Z

6- CLEARANCE APPROVAL

Name

Date: 2025-03-26

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004279

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

ATEX CERTIFICATE MISSING (Q.RIO2)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-14

Signature Digitaly signed by Jan Duinhoven 2025-04-14T11:58:52.857Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-14

Signature Digitaly signed by Jan Duinhoven 2025-04-14T11:59:06.886Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004280

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

DOCUMENT NOT RECEIVED (Q.RIO2)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-14

Signature Digitaly signed by Jan Duinhoven 2025-04-14T11:59:31.105Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-14

Signature Digitaly signed by Jan Duinhoven 2025-04-14T11:59:46.367Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004281

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

Ex ia equipment No DSD has been provided and no provision of circuit calculations

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:02:35.403Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:02:51.764Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004282

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

WP3
Example of the suspected I.S systems wiring.
No DSD has been provided and no provision of circuit calculations, this should be provided and system design confirmed to be acceptable.
W-PT 64.1 is Ex ia equipment.
W-GS 64.3 T2 is Ex ia equipment
W-TS 64.4 is EX ia equipment
W-GS 64.1.1/1.2/1.3/1.4 is Ex ia equipment
FICV-611 is Ex ia equipment
FICV-610A/B/C Ex ia equipment
FICV – 800 Ex ia equipment

loop calculations for all I.S Systems required
10/01/25

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:03:13.399Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:03:29.579Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004283

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

Electrolyser Void
Damage to control cables on transit entering the lower container at the East end.

Name
Date
Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name
Date
Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven
Date: 2025-04-10
Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:03:55.916Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven
Date: 2025-04-10
Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:04:23.438Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004286

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

MISSING CABLE TAGS [ELOGEN SUPPLY] (TS64.1)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:07:32.456Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:08:09.250Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004287

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

RUINED THE LOWER PART OF ITEM, THREAD DAMAGED. TO BE REPLACED (PT-632)

Name: Jan Duinhoven

Date: 2025-05-07

Signature: Digitaly signed by Jan Duinhoven 2025-05-07T15:56:15.974Z

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Pressure transmitter replaced

Name: Jan Duinhoven

Date: 2025-05-07

Signature: Digitaly signed by Jan Duinhoven 2025-05-07T15:54:45.036Z

5 - CLEARANCE CHECK

Name: Jan Duinhoven

Date: 2025-05-07

Signature: Digitaly signed by Jan Duinhoven 2025-05-07T15:55:12.773Z

6- CLEARANCE APPROVAL

Name: Jan Duinhoven

Date: 2025-05-07

Signature: Digitaly signed by Jan Duinhoven 2025-05-07T15:55:31.589Z


Endress+Hauser
Cerabar
D-79689 Maulburg, Hauptstr. 1
Made in Germany
Order code: PMP71B-2MFR0/0
Ser. no.: X4060C01198
Ext. ord. cd.: PMP71B-BFBADBF6AA3SBI1WBJA1+CCNN#
4-20 mA HART
10.5...35 V
P: -1...40 bar rel
MWP: 100 bar
FW: 01.01.00 Dev.Rev.: 2
HW: 01.00.00
Fill Fluid:
Silicone oil
Mat.: 316L GOLD
T≥Ta + 20 K
0044
Type 4X/6P Encl.
IP66/68
Contains FCC ID: LCGVU101
Contains IC: 2519A-VU101
CMIIT ID: 2020DJ1481
Date:
2025-04

BBV-63


TAG no.:
PT-632

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004289

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

Barrier 331T5 not suitable to be installed inside QRIO2

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:08:56.204Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:10:00.625Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004290

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Instrumental
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

THS-200_PSV THS-400_PSV HPP-700_PSV64.3 missing tubing for drain DP (C-63 SYSTEM)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:10:44.973Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T11:11:10.495Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004291

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Instrumental
1.2 Item	A-20000		Electrolyser Auxiliary Load
1.3 Subsystem	20-00		Electrolyser Package (A-20000)

2 - OBSERVATION

RV-200 RV-400 HPP-700_PSV64.3 missing antistatic bid (C-63 SYSTEM)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Witness waived
3.4 Activity code	CPY Company	Date	2025-03-26
3.5 Action by	VND Vendor	Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date 2025-04-29

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-29

Signature Digitaly signed by Jan Duinhoven 2025-04-29T12:09:18.184Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-29

Signature Digitaly signed by Jan Duinhoven 2025-04-29T12:09:37.262Z

Section 4 FUNCTIONAL TESTS SHEETS

Section 4.1 Electrical functional test sheets index

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 20-00 & process: COMM & discipline : E

Electrical	20-00 Electrolyser Package (A-20000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
A1/+08-QF1	ELECTROLISER AUXILIARY LOAD - A1/+08-QF1	ONSHORE	C10002924	FP00	100	2025-01-23	RFO 3
		ONSHORE	C10002925	FTR-2	100	2024-10-11	RFO 3
		ONSHORE	C10002926	FTR-6	100	2025-04-29	RFO 3
		ONSHORE	C10003020	FTR-5	100	2025-06-05	RFO 3

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A1/+08-QF1	: ELECTROLISER AUXILIARY LOAD - A1/+08-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	20-00	: Electrolyser Package (A-20000)			Module	
TASK	code	C10002924		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Electrical	Form	FP00 Miscellaneous electrical Consumer

DATA

Switchboard	SG-200N1	Circuit ref:	A1/+08-QF1
Breaker rating (A)	630A	Nominal current (A)	497A

FUNCTION TEST REQUIREMENT

1	Check pre-commissioning activities have been carried out				OK
2	Check equipment for cleaness				OK
3	Measure I/R value of equipment and feeder cable at 1000V (Min value: 10 Mohm)	>1000	MΩ		OK
4	Energise control of equipment feeder				OK
5	Full test feeder breaker operation in test position				OK
6	Check protection setting				OK
7	Test interface trips and signals (remote alarms & status). Check the relevant ITR presence in the system				OK
8	Test control and safety functions according to manufacturer's procedure.				OK
9	Energize				OK
10	Measure Voltage and Current values at feeder breaker	422	V	0.1 A	OK
11	Attach test procedure, if any				NA

FUNCTION TEST REQUIREMENT	RESULT

Testing & measurement instruments used

Type	Serial n°	Calibration certificate	Validity
FLUKE 1663	5380144	7727/24	10/07/2025
FLUKE 376	A1711003	7710/24	10/07/2025

Comments:

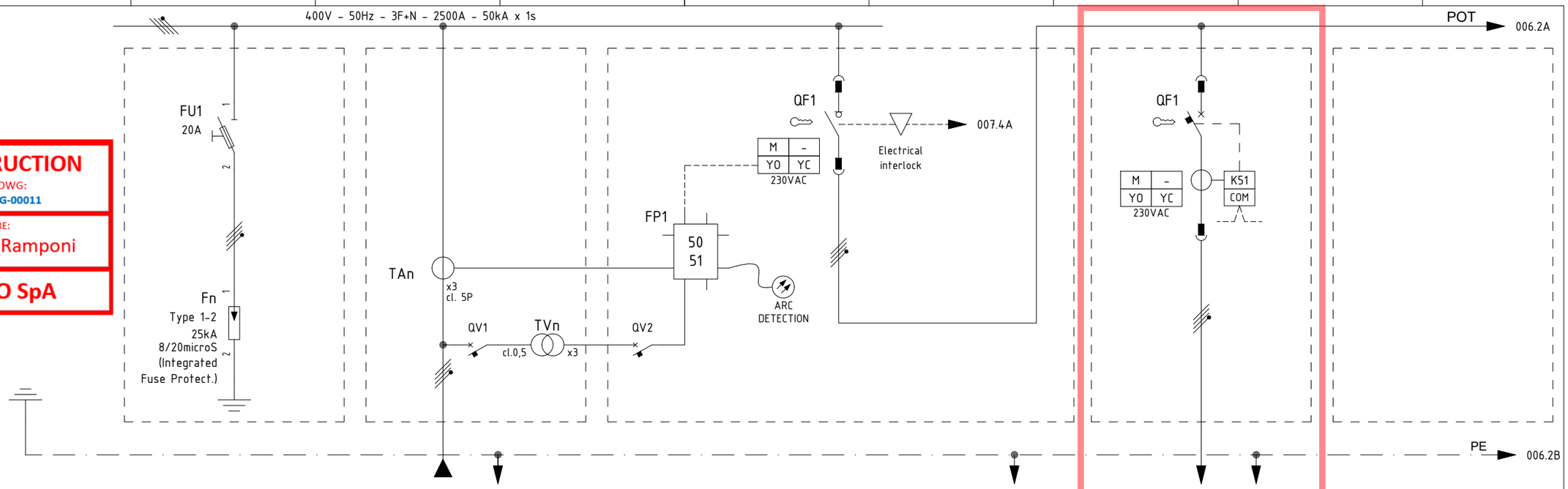
Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Kristian Castellani	Witness waived
Date	2025-01-22	2025-01-23	2025-01-23
Signature	Digitaly signed by Davide Zucconelli 2025-01-22T10:32:32.911Z	Digitaly signed by Kristian Castellani 2025-01-23T08:17:20.194Z	Digitaly signed by Witness waived 2025-01-23T08:24:11.749Z

VALID FOR CONSTRUCTION

VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1723002197-EL-DG-00011

REV.:	DATE:	SIGNATURE:
4_A	18/12/24	V.Ramponi

ROSETTI MARINO SpA



ITEM		1	-	-	-	A-20000
UTILITY		2	SURGE ARRESTER	-	INCOMING TRASFORMER	ELECTROLYSER AUXILIARY LOAD
COLUMN/CUBICLE		3	-	A1 / +02	A1 / +05	A1 / +08
RATED POWER | RATED CURRENT		4/5	- | -	- | -	- | -	293 kW | 497 A
TYPICAL FUNCTIONAL		6	-	-	-	L3-630
CIRCUIT BREAKER (ABB)	TYPE	7	-	-	E4.2N/MS-3200 4P	E1.2C-1250 4P
	VERSION	8	-	-	WITHDRAWABLE	WITHDRAWABLE
	TRIP UNITS	9	-	-	-	EKIP HI TOUCH LSIG = 630
	Icu KA	10	-	-	66 kA (1s)	50 kA
OVERLOAD	L Range A	11	-	-	-	(0.4 ÷ 1) x In
	Range t	12	-	-	-	t=k/I^2
SEL. SHORT-CIRCUIT	S Range A	13	-	-	-	(0.6 ÷ 10) x In [EXCLUDABLE]
	Range t	14	-	-	-	t=k / t=k/I²
INST. SHORT-CIRCUIT	I Range A	15	-	-	-	(1.5 ÷ 15) x In
	Range t	16	-	-	-	instantaneous
EARTH FAULT PROTECTION	G Range A	17	-	-	-	(0.1 ÷ 1) x In (EXCLUDABLE)
	Range t	18	-	-	-	t=k / t=k/I^2
CONTACTOR (ABB)		19	-	-	-	-
THERMAL OVERLOAD RELAY (ABB)		20	-	-	-	-
SURGE ARRESTER (DEHN)		21	DVCI 1 255 FM (961205)	-	-	-
TOROIDAL CURRENT TRANSFORMER (FRER)		22	-	-	-	-
FUSE HOLDER (ITALWEBER)		23	Fuses 20A gG	-	-	-
INDIRECT PROTECTION (ABB)		24	-	-	REF615-(version F) HBFFAEFCNDCABBA11G	-
VOLTMETER		25	-	-	-	-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE	26	-	TAR1052K5N01V_18 - 2500/1A	-	-
	PERFORMANCE/CLASS	27	-	5VA / 5P20	-	-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE	28	-	TTV020400VC1 - 400r3/110r3V	-	-
	PERFORMANCE/CLASS	29	-	20VA / 0.5	-	-
LOCK-OUT RELAY (-)		30	-	-	-	-
POWER CONDUCTOR mmq		31	-	-	-	1 x 150 + [4 x (1 x 300)]

=
+
DWG n° : 231298/SD/11
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING
CROSSWIND
ROSETTI MARINO

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

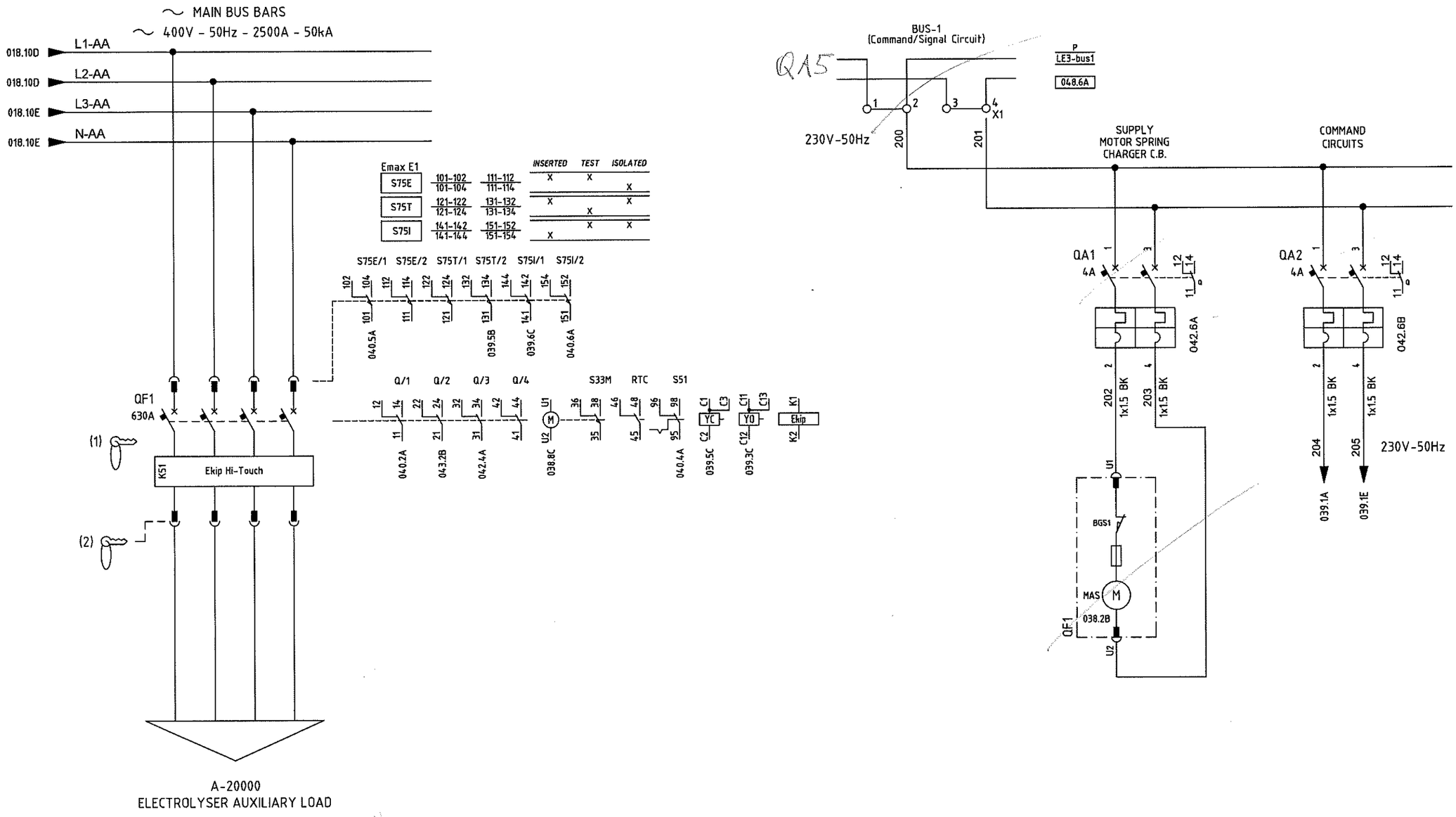
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00011 | SHEET 005 | REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 04

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



(1) KEY LOCK FOR OPEN POSITION (CIRCUIT-BREAKER)

(2) RACKIING-IN/RACKING-OUT PREVENTION LOCK WITH KEY (CIRCUIT-BREAKER)

=	SG-200N1
+	A1/+08
DWG n°:	231298/SD/30
Item n°:	PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxialiry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

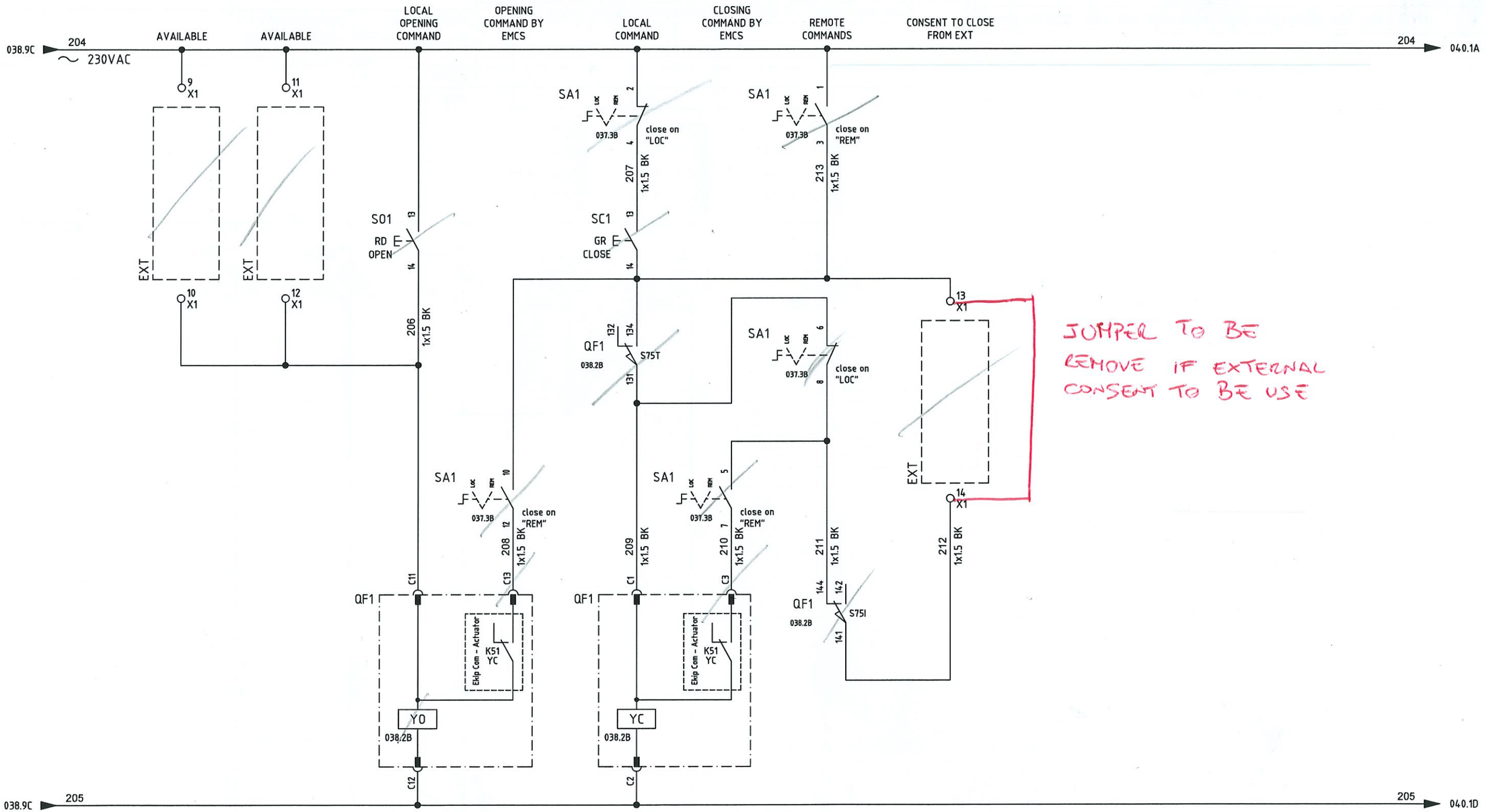
SHEET 038

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.01

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



=	SG-200N1
+	A1/+08
DWG n° :	231298/SD/30
Item n° :	PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliary Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

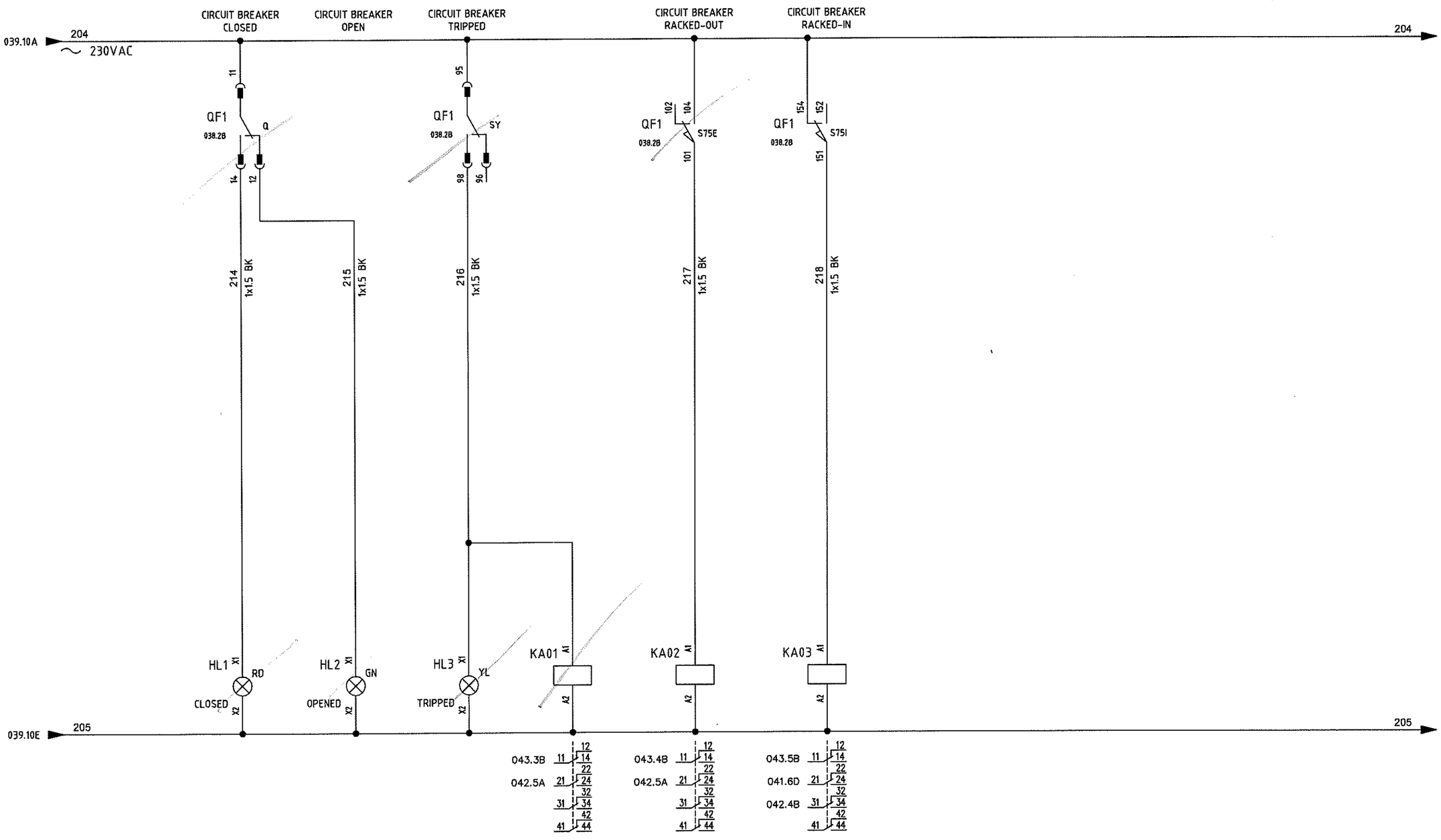
DRAWING NO. 1723002197-EL-DG-00030

SHEET 039

REV.

1723002197-EL-DG-00030 Rev.01

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



=	SG-200N1					
+	A1/+08					
DWG n°:	231298/SD/30					
Item n°:	PF1002983/30					
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)	
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)	
REV.	DATE	DRN	CHKD	APPD	DESCRIPTION	

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxialiry Load [L3-630]

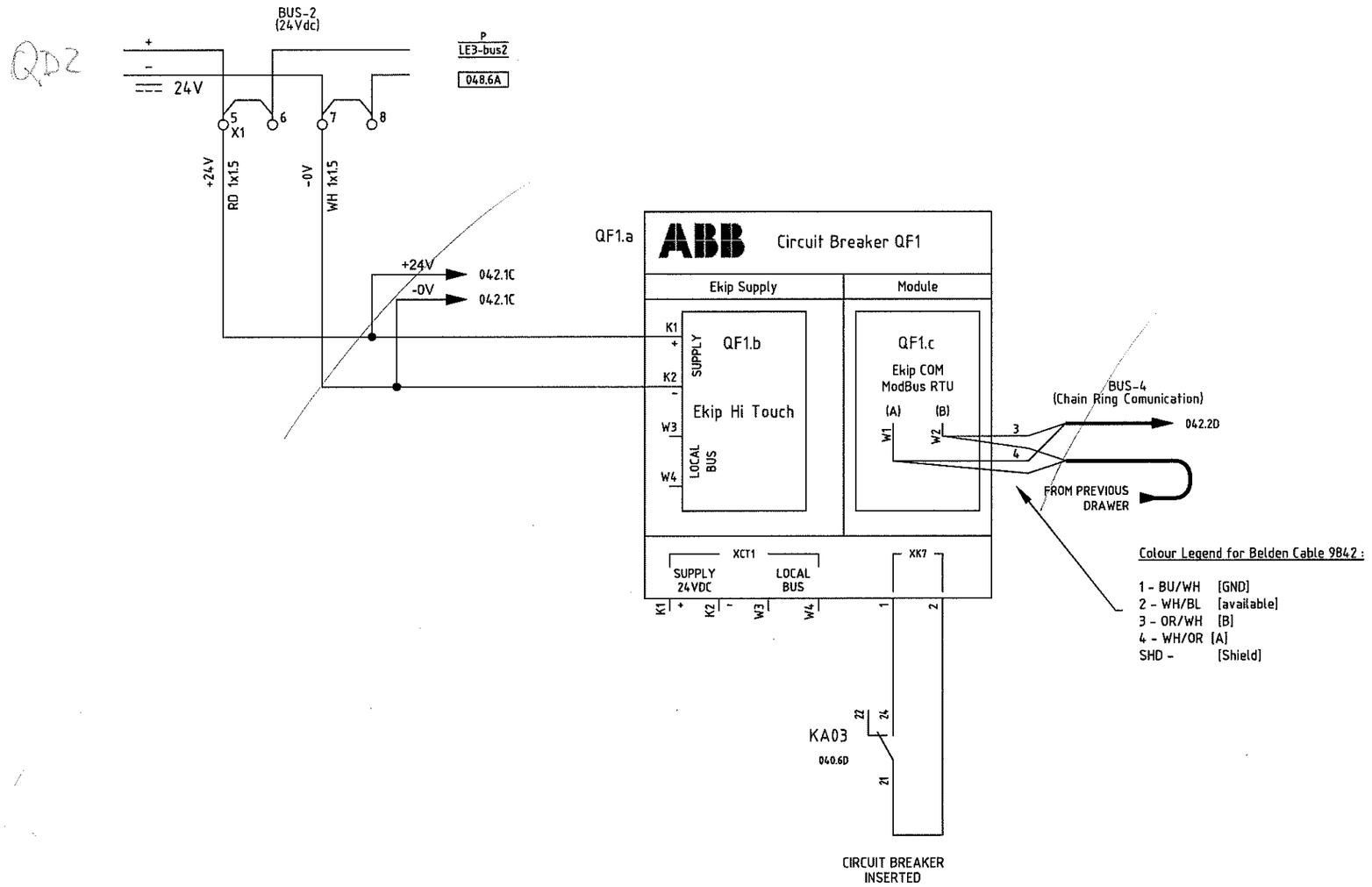
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00030 | SHEET 040 | REV. 01

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.01

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



=	SG-200N1
+	A1/+08
DWG n° :	231298/SD/30
Item n° :	PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

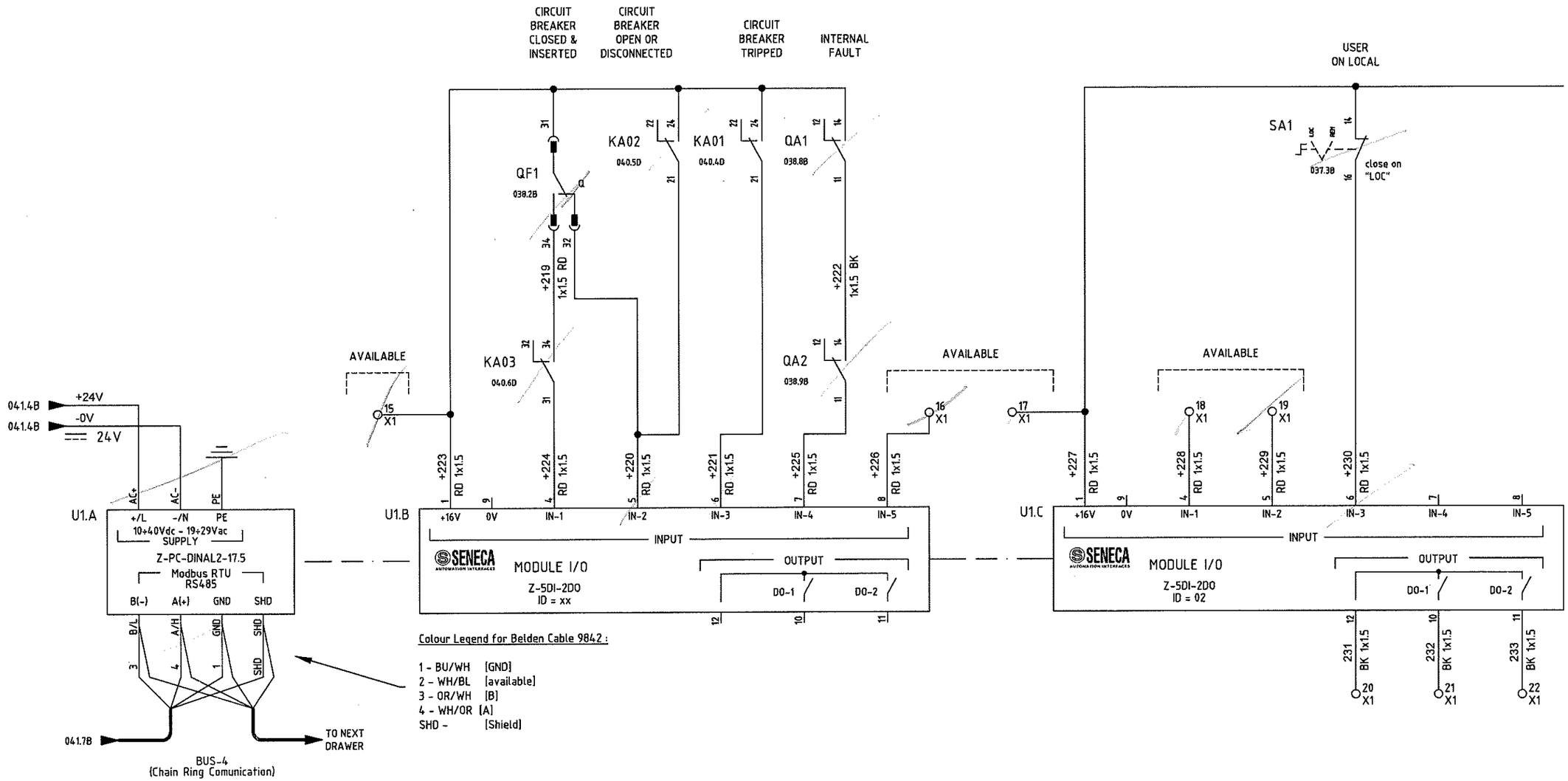
DRAWING NO. 1723002197-EL-DG-00030

SHEET 041

REV. 01

File Name : 1723002197-EL-DG-00030 Rev.01

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



=	SG-200N1						
+	A1/+08						
DWG n°:	231298/SD/30						
Item n°:	PF1002983/30						
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)		
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)		
REV.	DATE	DRN	CHKD	APPD	DESCRIPTION		

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxialiry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

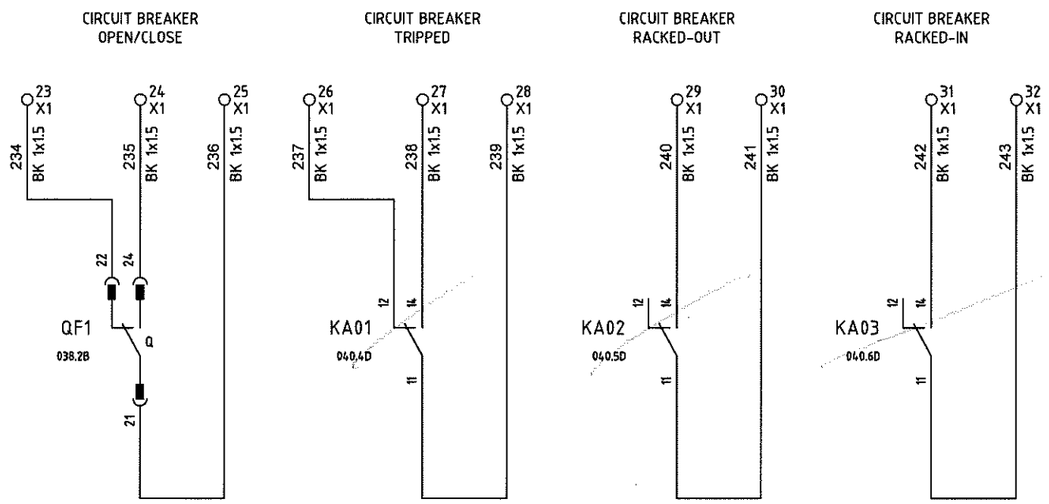
SHEET 042

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.01

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



=	SG-200N1
+	A1/+08
DWG n°:	231298/SD/30
Item n°:	PF1002983/30

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 043

REV. 01

File Name : 1723002197-EL-DG-00030 Rev.01

ITEM	Tag	A1/+08-QF1	: ELECTROLISER AUXILIARY LOAD - A1/+08-QF1		Dwg	1723002197-EL-DG-00011	
	S/Sys	20-00	: Electrolyser Package (A-20000)		Module		
TASK	code	C10002925	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity FTS	Discipline Electrical	Form	FTR-2	Protection Relay

FTR2 - Protection relay
Record sheet

RELAY DATA

Manufacturer:	ABB	Serial N°:	ECNA91573390X000	Relay type:	EKIP HI TOUCH LSIG
Auxiliary supply:	24Vdc	Location:	B200	Cubicle:	A1/+08
Switchboard:	SG-200N1				

Current transformers

Tag	Number of	Ratio	Location

Voltage transformers

Tag	Number of	Ratio	Location

Test result (refer to manufacturer's procedure)

ANSI function	Setting	Injection	Trip value	Time delay Setting	Time delay Trip value
L	422,1A	1890A		3s	1383ms
S	2.205A	3150A		0.1s	100ms
I	4410A	6300A		INSTANT	20ms
G	126A			0.1s	

Testing & measurement instruments used

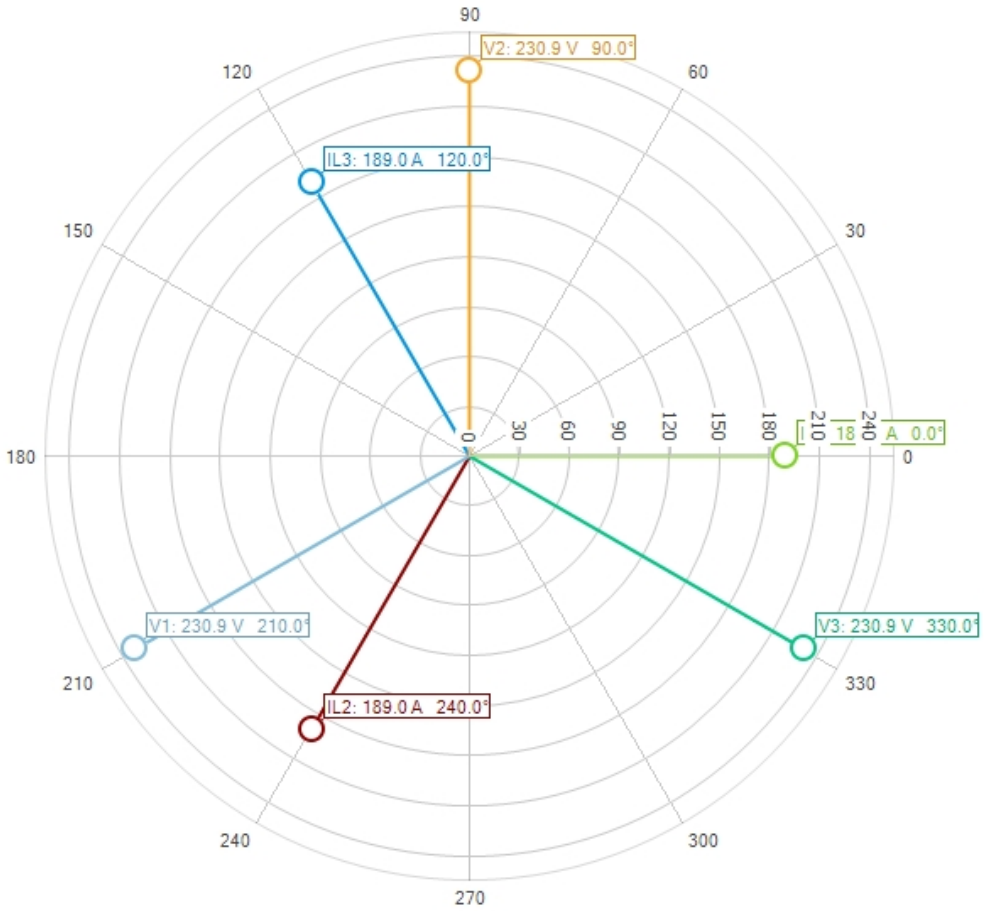
Type	Serial n°	Calibration certificate	Validity
ABB EKIP T&P	E34013804410W050		

Comments: The protection settings that have been implemented on drawer A1/+08 were defined by the Commissioning team to allow the internal testing of the Electroliser drawer. The definitive settings will be implemented asap, in the meantime a PUNCH B ref. C30000158 has been raised to ensure traceability of this outstanding task.

	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-10-09	2024-10-11	2024-10-11
Signature	PROVERLIS Digitaly signed by Mattia Girotti 2024-10-09T08:00:14.748Z	PROVERLIS Digitaly signed by Kristian Castellani 2024-10-11T07:37:45.687Z	PROVERLIS Digitaly signed by Witness waived 2024-10-11T07:52:21.074Z

Page Name	Group Name	Variable Name	Variable Value	Variable Unit
Settings A				
	Overload Protection (L - ANSI 49)			
		PU nominal current In	630	
		Status	Enabled	
		Function	t=k/i^2	
		Prealarm I1	90	% I1
		Threshold I1	0.670	In
		Time t1 std	3.00	s
		Thermal memory (TM)	Disabled	
		TM Algorithm	RMS-independent	
		TM Time	Automatic	
		TM custom time	830	s
	Time-delayed overcurrent protection (S - ANSI 50 TD/68/51)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Threshold I2 (t=k)	3.50	In
		Time t2 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.60	In
		Set Startup th. on ProgStatusD	--------	
		Thermal memory status	Disabled	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Second time-delayed overcurrent protection (S2 - ANSI 50 TD)			
		Status	Disabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I5 (t=k)	1.20	In
		Time t5 (t=k)	0.05	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Instantaneous overcurrent protection (I - ANSI 50)			
		Status	Enabled	
		Threshold I3	7.00	In
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	1.50	In
		Set Startup th. on ProgStatusD	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Second I			
		Prot Second I	---	
		Status	Disabled	
		Threshold I31	1.50	In
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
		Second I Mode	Function Dependent	
		Function	Disabled	
		Delay On	0.00	s
		Delay Off	15.00	s
	Earth fault protection (G - ANSI 50N TD/68/51N)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Prealarm I4	90	% I4
		Threshold I4 (t=k)	0.200	In
		Time t4 (t=k) IEC - UL489	0.10	s

		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.20	In
		Set Startup th. on ProgStatusD	--------	
		Zone selectivity status	Disabled	
		Zone selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Directional overcurrent protection (D - ANSI 67/68)			
		Status	Disabled	
		Trip enable	Disabled	
		tripOnlyForward	--------	
		tripOnlyBackward	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I7 FWD	2.00	In
		Time t7 FWD	0.20	s
		Threshold I7 BWD	2.00	In
		Time t7 BWD	0.20	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold FWD	2.00	In
		Startup threshold BWD	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time FWD	0.13	s
		Zone Selectivity time BWD	0.13	s
		Zone Selectivity Type	Logic and Hardware	
		Direction minimum angle	3.6	°
	Closing on short-circuit protection (MCR)			
		Status	Disabled	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I3	6.00	In
		Time t3	0.04	s
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Over Temperature (T)			
		Trip enable	Disabled	



Test

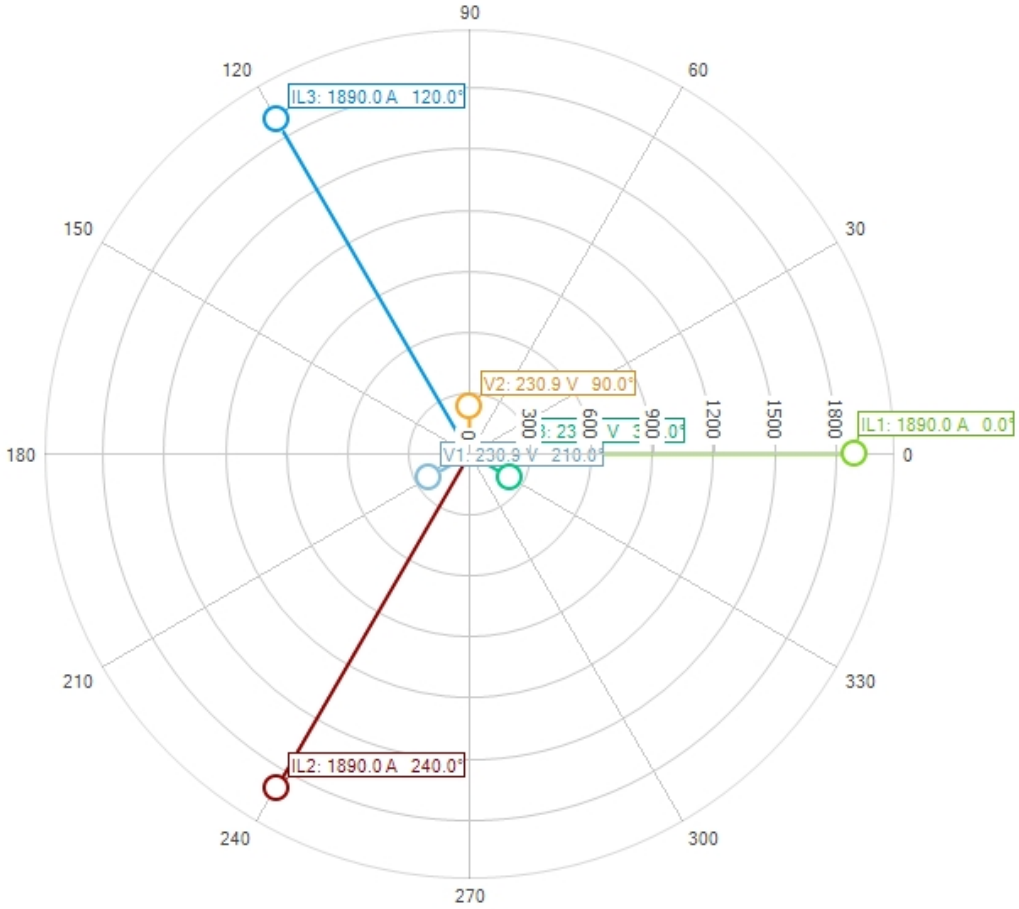
Name	Automatic test 1
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A1/+08
Relay Serial Number	ECNA91573390X000
Circuit Breaker Serial Number	CE61019335
	Ekip Touch Black
Device settings	In = 630 A Un = 400 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.670 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 3.50 In Time = 0.10 s Protection = I Threshold = 7.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

⚠ Test completed without any trip in 3000 ms.



Test

Name	Automatic test 2
Session	Default session
Customer	
Location	
Operator	

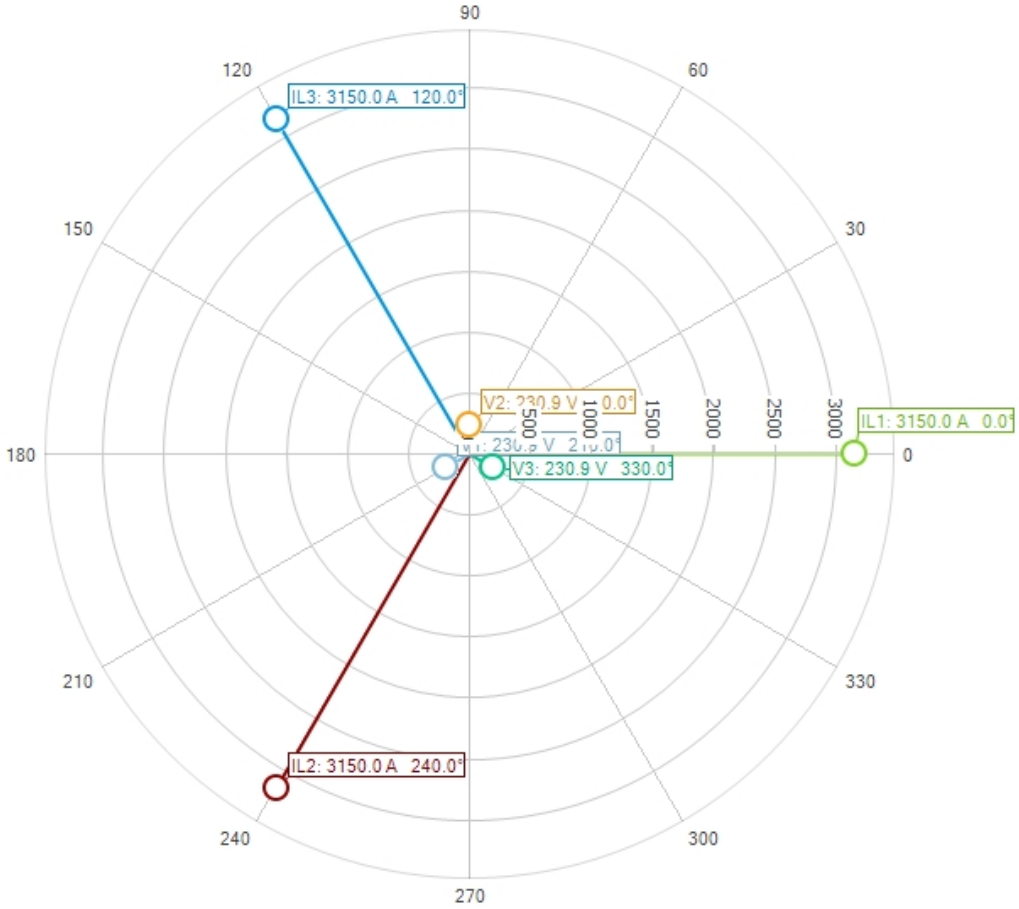
Device

Tag name	A1/+08
Relay Serial Number	ECNA91573390X000
Circuit Breaker Serial Number	CE61019335
	Ekip Touch Black
Device settings	In = 630 A Un = 400 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.670 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 3.50 In Time = 0.10 s Protection = I Threshold = 7.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

⚠ Test completed with trip but out of time. Protection L tripped in 1383 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 3
Session	Default session
Customer	
Location	
Operator	

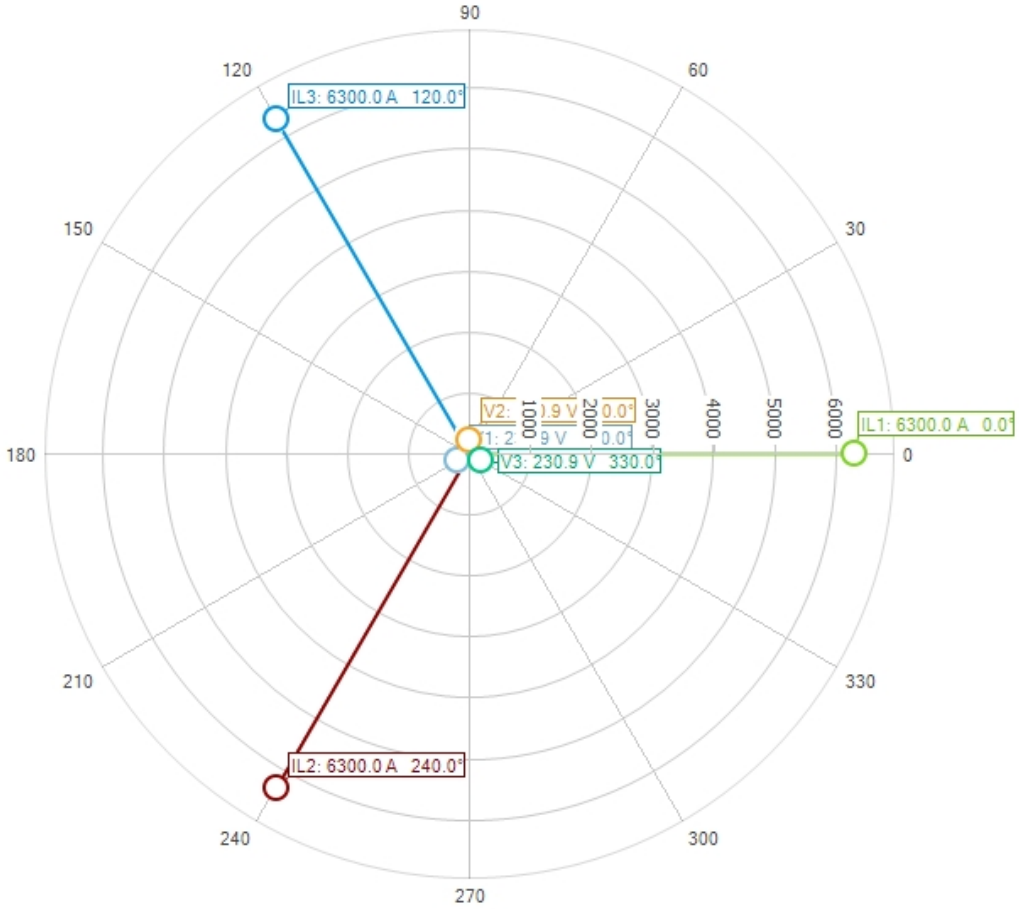
Device

Tag name	A1/+08
Relay Serial Number	ECNA91573390X000
Circuit Breaker Serial Number	CE61019335
	Ekip Touch Black
Device settings	In = 630 A Un = 400 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.670 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 3.50 In Time = 0.10 s Protection = I Threshold = 7.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	

Test result

Test completed with trip. Protection S tripped in 100 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 4
Session	Default session
Customer	
Location	
Operator	

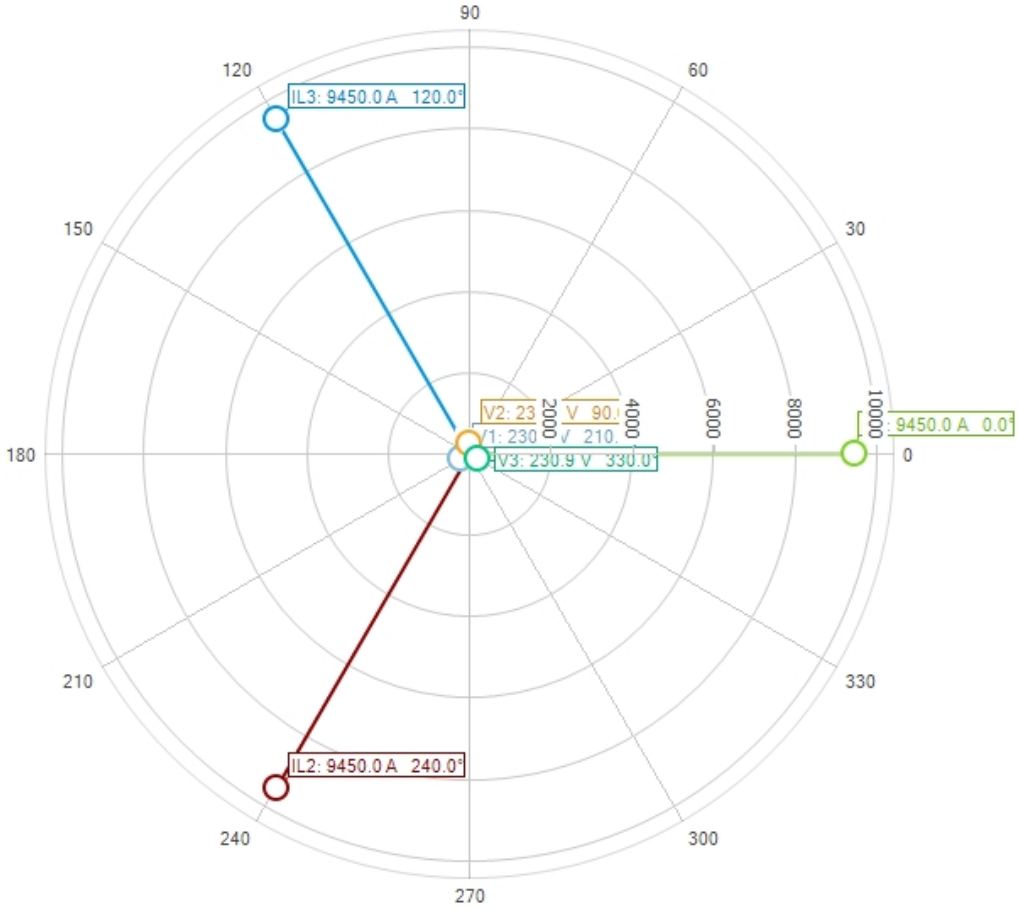
Device

Tag name	A1/+08
Relay Serial Number	ECNA91573390X000
Circuit Breaker Serial Number	CE61019335
	Ekip Touch Black
Device settings	In = 630 A Un = 400 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.670 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 3.50 In Time = 0.10 s Protection = I Threshold = 7.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 20 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 5
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A1/+08
Relay Serial Number	ECNA91573390X000
Circuit Breaker Serial Number	CE61019335
	Ekip Touch Black
Device settings	In = 630 A Un = 400 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.670 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 3.50 In Time = 0.10 s Protection = I Threshold = 7.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	

Test result

Test completed with trip. Protection I tripped in 27 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.

ITEM	Tag	A1/+08-QF1	: ELECTROLISER AUXILIARY LOAD - A1/+08-QF1	Dwg	1723002197-EL-DG-00011		
	S/Sys	20-00	: Electrolyser Package (A-20000)	Module			
TASK	code	C10002926	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Electrical	Form	FTR-6	Electrical IO

FTR 6 - Electrical I/O check record sheet

Equipment Tag:	INCOMER AUX ELECTROLYSER-A1/+08-QF1	Instrument Type / Serial N° :	FLUKE 175_1714079
Cubicle N°:	A1/+08-QF1	Calibration certificate date:	7715/24 _ 10/07/2025

Link Type: Hardwired ● Communication (strike through unapplicable type)

I/O Type: ● Digital ● Analogic (strike through unapplicable type)

DIGITAL

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Text Labelling Display Satisfactory (Y/N)	Blinking/Static Display Satisfactory (Y/N)	Color Coding Satisfactory (Y/N)	Status Check			Time Stamping Satisfactory (Y/N)	Refresh Time (if >1s)	Appearing in all applicable display (Y/N)
									Event (Y/N)	Alarm (Y/N)	Fault (Y/N)			
1	C.B. TRIP	CM	DI	EKIP HI TOUCH	PCS CABINET	NA	NA	NA	NA	NA	Y	NA	NA	NA
2	LOCAL POSITION	CM	DI	MODULE I/O	PCS CABINET	NA	NA	NA	Y	NA	NA	NA	NA	NA
3	CLOSE COMMAND	CM	DO	PCS CABINET	EKIP HI TOUCH	NA	NA	NA	Y	NA	NA	NA	NA	NA
4	OPEN COMMAND	CM	DO	PCS CABINET	EKIP HI TOUCH	NA	NA	NA	Y	NA	NA	NA	NA	NA
5														
6														
7	**SEE NOTE													
8														

ANALOGIC

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Min value sent	Min value received	Max value sent	Max value received	Intermediate value sent	Intermediate value received	Out of scale test (OK, Not OK)	Refresh time (if >2s)	Appearing in all applicable display (Y/N)
1	**SEE NOTE													
2														
3														

Comments: See the attachment for the signal's list.

Page 1/1	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2025-04-28	2025-04-28	2025-04-29
Signature	PROVERLIS Digitaly signed by Mattia Girotti 2025-04-28T12:01:03.376Z	PROVERLIS Digitaly signed by Kristian Castellani 2025-04-28T12:29:39.714Z	PROVERLIS Digitaly signed by Witness waived 2025-04-29T07:57:46.445Z

DEVICE LOCATION[1]	DEVICE	SIGNAL_DESCRIPTION	TYPE ANALOG/ DIGITAL	RELAY/DEVICE MODEL	UNIT	SCALE FACTOR	Note
Typical L 3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - PROTECTION TRIPPED "L"	SW-DI	Ekip Hi-Touch			1=tripped
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - PROTECTION TRIPPED "S"	SW-DI	Ekip Hi-Touch			1=tripped
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - PROTECTION TRIPPED "I"	SW-DI	Ekip Hi-Touch			1=tripped
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - PROTECTION TRIPPED G"	SW-DI	Ekip Hi-Touch			1=tripped
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - OPEN	SW-DI	Ekip Hi-Touch			1=open
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - CLOSED	SW-DI	Ekip Hi-Touch			1=closed
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - CONNECTED	SW-DI	Ekip Hi-Touch			1=connected
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - ISOLATED	SW-DI	Ekip Hi-Touch			0=isolated
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - TEST	SW-DI	Ekip Hi-Touch			1=test
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - TRIP UNIT FAILURE	SW-DI	Ekip Hi-Touch			1=Failure
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - CLOSE COMMAND	SW-DO	Ekip Hi-Touch			1=close command
Typical L3-630 Wiring Diagram	QF1	CIRCUIT-BREAKER - OPEN COMMAND	SW-DO	Ekip Hi-Touch			1=open command
Typical L3-630 Wiring Diagram	QF1	MEASURE - CURRENT "L1"	SW-AI	Ekip Hi-Touch	A	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - CURRENT "L2"	SW-AI	Ekip Hi-Touch	A	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - CURRENT "L3"	SW-AI	Ekip Hi-Touch	A	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - VOLTAGE "L1-L2"	SW-AI	Ekip Hi-Touch	V	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - VOLTAGE "L2-L3"	SW-AI	Ekip Hi-Touch	V	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - VOLTAGE "L3-L1"	SW-AI	Ekip Hi-Touch	V	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - FREQUENCY	SW-AI	Ekip Hi-Touch	Hz	0,01	
Typical L3-630 Wiring Diagram	QF1	MEASURE - APPARENT POWER	SW-AI	Ekip Hi-Touch	kVA	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - REAL POWER	SW-AI	Ekip Hi-Touch	kW	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - REACTIVE POWER	SW-AI	Ekip Hi-Touch	kVAR	0,1	
Typical L3-630 Wiring Diagram	QF1	MEASURE - POWER FACTOR	SW-AI	Ekip Hi-Touch	COSfi	0,001	
Typical L3-630 Wiring Diagram	U1B	CIRCUIT-BREAKER - CLOSED AND INSERTED	SW-DI	Module I/O			1=close
Typical L3-630 Wiring Diagram	U1B	CIRCUIT-BREAKER - OPEN OR DISCONNECTED	SW-DI	Module I/O			1=open
Typical L3-630 Wiring Diagram	U1B	CIRCUIT-BREAKER - TRIPPED	SW-DI	Module I/O			1=tripped

DEVICE LOCATION[1]	DEVICE	SIGNAL_DESCRIPTION	TYPE ANALOG/ DIGITAL	RELAY/DEVICE MODEL	UNIT	SCALE FACTOR	Note
Typical L3-630 Wiring Diagram	U1B	available	SW-DI	Module I/O			
Typical L3-630 Wiring Diagram	U1B	available	SW-DI	Module I/O			
Typical L3-630 Wiring Diagram	U1C	available	SW-DI	Module I/O			
Typical L3-630 Wiring Diagram	U1C	available	SW-DI	Module I/O			
Typical L3-630 Wiring Diagram	U1C	SA1 ON "LOCAL" POSITION	SW-DI	Module I/O			1=local
Typical L3-630 Wiring Diagram	U1C	available	SW-DI	Module I/O			
Typical L3-630 Wiring Diagram	U1C	available	SW-DI	Module I/O			

[1] See drawer list for device location

This typical WD is applied to following drawers:

Column	Position	Item TAG	Description TAG
A1	+08	A-20000	ELECTROLYSER AUXILIARY LOAD

Step	Description	Result	Verified by	Date
82	Confirm correct and positive result of precommissioning Check Sheet for above signals I/O list	Correct and positive results ..... ☐		

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ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A1/+08-QF1	: ELECTROLISER AUXILIARY LOAD - A1/+08-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	20-00	: Electrolyser Package (A-20000)			Module	
TASK	code	C10003020		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity FTS	Discipline	Electrical	Form	FTR-5 Remote Signalling

FTR5 - Remote signalling
Record sheet

DATA

Switchboard:	SG-200N1	Cubicle N°:	A1/+08

FUNCTION TEST

	Order/Inputs				Status/Output									
	Start order		Stop order		Run		Fault		Stop Signalisation	Available/Ready to start	TRIP		CB OPEN/CLOSE	
UCP														
ECS														
SSS														
PSS														
PCS	●	●	●	●	●	●	●	●			●	●	●	●
Control Station														
Control Panel														
HVAC Panel														
MCC	●	●	●	●							●	●	●	●

Column 1 (To check) to be filled during commissioning preparation stage - black if the check is asked
Column 2 (Checked) to be filled black if check is Ok

Comments: During the test, we tested all the Analog Input with success: Current "L1",Current "L2",Current "L3", Voltage "L1-L2", Voltage "L2-L3", Voltage "L1-L3", Frequency, Apparent Power, Real Power, Reactive Power, Power Factor. Abd other that we tested are CB closed and inserted, CB open or disconnected and Local position.

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM		
Name	Mattia Girotti	Anthony Iveson	Martin Taylor
Date	2025-05-30	2025-05-31	2025-06-05
Signature	PROVERLIS Digitaly signed by Mattia Girotti 2025-05-30T14:39:54.329Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-05-31T09:42:17.487Z	PROVERLIS Digitaly signed by Martin Taylor 2025-06-05T14:59:30.814Z

4.1 Electrical ITR's
(Hot Loop Test - 01 Analog Input)

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202 - LP
Serial Number	8R6L0119
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	275 VDC	523 VDC		275 VDC		
HMI Indication	0	58 VDC	110 VDC	276 VDC	526 VDC		276 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~630~~ VDC	245 ~~630~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	8R6L0120
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		56 VDC	110 VDC	274 VDC	523 VDC		274 VDC		
HMI Indication		256 VDC	110 VDC	277 VDC	527 VDC		277 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 VDC	245 VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTOUMA FRAN	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202 - LP
Serial Number	8R6L0084
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	274 VDC	523 VDC		274 VDC		
HMI Indication	0	56 VDC	110 VDC	276 VDC	527 VDC		276 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~650~~ VDC	245 ~~479~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTOVANA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	~~ET00276KB~~ 8R6L0109
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	275 VDC	523 VDC		275 VDC		
HMI Indication	0	56 VDC	111 VDC	278 VDC	529 VDC		278 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~420~~ VDC	245 ~~420~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAPI	MONTOUMA Foty	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-005
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202 - LP
Serial Number	EX002 7618 SRGL 0118
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~420~~ VDC	245 ~~420~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Foay	
DATE	20/02/25	20/02/25	
SIGNATURE		~~NG~~	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	Seneca
Type	Z 202 - LP
Serial Number	~~ET001 1613~~ 8R6L0081
Range	0/ 500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		56Vdc	110Vdc	274Vdc	523Vdc		274Vdc		
HMI Indication		56Vdc	111Vdc	277Vdc	528Vdc		277Vdc		

	Trip or Alarm Setting	Actual Trip or Alarm Point	(OK) / NOK / NA
HI HI Trip	245 ~~230~~ VDC	245 ~~240~~ VDC	
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTOYA Foay	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-007
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	Seneca
Type	Z-202 - LP
Serial Number	~~ET002761B~~ BR6L0083
Range	0/500 Vdc

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	274 VDC	522 VDC	274 VDC			
HMI Indication	0	56 VDC	110,8 VDC	277 VDC	528 VDC	277 VDC			

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~Vdc~~ VDC	245 ~~Vdc~~ VDC	
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-008
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	~~5[illegible]~~ SRGL 0115
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	274 VDC	522 VDC		274 VDC		
HMI Indication	0	56 VDC	110,9 VDC	277 VDC	528 VDC		277 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	(OK) / NOK / NA
HI HI Trip	245 ~~[illegible]~~ VDC	245 ~~[illegible]~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAZ.	MONTSOUNIA Josep	
DATE	20/02/25	20/02/25	
SIGNATURE			

FORES ENGINEERING

HAZARDOUS EQUIPMENT LIST

Process container - Upper
Hydrogen purification Unit, Separation room - A10

REF DOC		*TEMPLATE NAME*	*PAG NUMBER*
C63-PCX-002_05 (ATEX Zoning - PWH2 case)	**C63-PCX-001_05 (ATEX Zoning)**	**MOD-SGQ-044_00**	**03 OF 05**
C63-SPC-001_03_General specification	**224J10-DDL-EL-DL-00001**	*DOC CODE*	*DOC NAME*
C63-DUO-001_ 006 - ATEX_AREA	**224J10-DDL-EL-CA-00002**	**224J10-DDL-QHSE-LIS-00002**	**ATEX REGISTER**
TEM AMB **+5°C / +45°C** *ZONE Classification* **2**		*REVISION*	*DATE*
HUM AMB **40% / 60%**		**02**	**17 APR 2025**

N°	Item	Plant	Tag	Non-Electrical	Manufacturer	Type	Certificate - ATEX	SN	EU Declaration of conformity/ Technical file number	Special Conditions for Use	IP protection grade	Ambient temperature range (min-max)	Marking	Temperature Class	Ex protection type	Note
1	AMBIENT HYDROGEN DETECTOR	WP3	AHD-1000	N/A	MSA	X5000	SIRA 17 ATEX 1049X	100200183025F	10000094287/06	X	66	-40 / +60 °C	II 2G IIC	T6	Ex db	
2	AMBIENT HYDROGEN DETECTOR	WP3	AHD-1002	N/A	MSA	X5000	SIRA 17 ATEX 1049X	1002001850288	10000094287/06	X	66	-40 / +60 °C	II 2G IIC	T6	Ex db	
3	AMBIENT HYDROGEN DETECTOR	WP3	AHD-1003	N/A	MSA	X5000	SIRA 17 ATEX 1049X	10020018502C7	10000094287/06	X	66	-40 / +60 °C	II 2G IIC	T6	Ex db	
4	ELECTROPNEUMATIC PANEL	WP3	APC-900	N/A	FAV	99.00564	N/A	2445-0662	99.00564-D2445-0662	N/A	66	-20 / +40 °C	II 3G IIC	T4	Ex ec	
5	ELECTROPNEUMATIC PANEL	WP3	APC-980	N/A	FAV	99.00563	N/A	2445-0661	99.00564-D2445-0661	N/A	66	-10 / + 55 °C	II 3G IIC	T4	Ex ec	
6	LIGHTING FIXTURE	WP3	C63-IEL-010	N/A	CORTEM	LIFEX-ME-0630N-CCT	CML 20 ATEX 3018X	COV2403375/1	0259	X	66	-20 / +60 °C	II 2G IIC	T6	Ex db eb	
7	LIGHTING FIXTURE	WP3	C63-IEL-011	N/A	CORTEM	LIFEX-ME-0630N-CCT	CML 20 ATEX 3018X	COV2403375/2	0259	X	66	-20 / +60 °C	II 2G IIC	T6	Ex db eb	
8	LIGHTING FIXTURE	WP3	C63-IEL-012	N/A	CORTEM	LIFEX-ME-0630N-CCT	CML 20 ATEX 3018X	COV2403375/3	0259	X	66	-20 / +60 °C	II 2G IIC	T6	Ex db eb	
9	LIGHTING FIXTURE	WP3	C63-IEL-013	N/A	CORTEM	LIFEX-ME-0630N-CCT	CML 20 ATEX 3018X	COV2403375/4	0259	X	66	-20 / +60 °C	II 2G IIC	T6	Ex db eb	
10	LIGHTING FIXTURE	WP3	C63-INL-007	N/A	CORTEM	LIFEX-ME-0630-CCT	CML 20 ATEX 3018X	COV2403375/5	0259	X	66	-20 / +60 °C	II 2G IIC	T6	Ex db eb	
11	LIGHTING FIXTURE	WP3	C63-INL-008	N/A	CORTEM	LIFEX-ME-0630-CCT	CML 20 ATEX 3018X	COV2403375/6	0259	X	66	-20 / +60 °C	II 2G IIC	T6	Ex db eb	
12	JUNCTION BOX	WP3	C63-JBL-03	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-14299	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
13	JUNCTION BOX	WP3	C63-JBS-03	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-14298	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
14	SOCKET SWITCH	WP3	C63-SS-05	N/A	PALAZZOLI	461126EX	EPT 24 ATEX 5362X	N/A	N/A	X	66	-40 / +65°C	II 3G IIC	T5	Ex ec	
15	SOCKET SWITCH	WP3	C63-SS-06	N/A	PALAZZOLI	461126EX	EPT 24 ATEX 5362X	N/A	N/A	X	66	-40 / +65°C	II 3G IIC	T5	Ex ec	
16	LIGHTING SWITCH	WP3	C63-LS-05	N/A	EATON	CEAG D69412	PTB 00 ATEX 3117	N/A	N/A	N/A	66	-25 / +55°C	II 2G IIC	T6	Ex de	
17	LIGHTING SWITCH	WP3	C63-LS-06	N/A	EATON	CEAG D69412	PTB 00 ATEX 3117	N/A	N/A	N/A	66	-25 / +55°C	II 2G IIC	T6	Ex de	
18	DEW POINT TRANSMITTER	WP3	DPT-800A	N/A	MICHELL	Easidew Pro XP	CML19 ATEX 1411X	1FEB-070	N/A	X	66	-20 / +70 °C	II 2G IIC	T6	Ex db ia	
19	DEW POINT TRANSMITTER	WP3	DPT-800B	N/A	MICHELL	Easidew Pro XP	CML19 ATEX 1411X	1FEB-075	N/A	X	66	-20 / +70 °C	II 2G IIC	T6	Ex db ia	
20	DEW POINT TRANSMITTER	WP3	DPT-800C	N/A	MICHELL	Easidew Pro XP	CML19 ATEX 1411X	1AB0-072	N/A	X	66	-20 / +70 °C	II 2G IIC	T6	Ex db ia	
21	FLOW INDICATOR	WP3	FI-940	X	KROHNE	H250	PTB 03 ATEX 0127X	D2400000001351647	N/A	X	66/68	-40 / +70 °C	II 2G IIC	T6 / T2	Ex h	
22	FLOW METER	WP3	FICV-610A	N/A	KROHNE	DK32	KIWA 18 ATEX 0008X	D2400000001361420	N/A	X	65	-40 / +90°C	II 2G IIC	T6 / T1	Ex ia	
23	FLOW METER	WP3	FICV-610B	N/A	KROHNE	DK32	KIWA 18 ATEX 0008X	D2400000001361421	N/A	X	65	-40 / +90°C	II 2G IIC	T6 / T1	Ex ia	
24	FLOW METER	WP3	FICV-610C	N/A	KROHNE	DK32	KIWA 18 ATEX 0008X	D2400000001361422	N/A	X	65	-40 / +90°C	II 2G IIC	T6 / T1	Ex ia	
25	FLOW METER	WP3	FICV-611	N/A	KROHNE	DK32	KIWA 18 ATEX 0008X	D2400000001349709	N/A	X	65	-40 / +90°C	II 2G IIC	T6 / T1	Ex ia	
26	FLOW METER	WP3	FICV-800	N/A	KROHNE	DK32	KIWA 18 ATEX 0008X	D2400000001359045	N/A	X	65	-40 / +90°C	II 2G IIC	T6 / T1	Ex ia	
27	FLOW SWITCH	WP3	FSH-640	N/A	KROHNE	V25	PTB 12 ATEX 1025	D2400000001361423	N/A	N/A	N/A	-20 / +60 °C	II 2G IIC	T6 / T1	Ex db	
28	FLOW TRANSMITTER	WP3	FT-630	N/A	ENDRESS HAUSER	Promass F300	SIRA 16 ATEX 2219X	W11C8C02000	N/A	X	N/A	-40 / +60 °C	II 2G IIC	T6 / T1	Ex db	
29	FLOW TRANSMITTER	WP3	FT-900	N/A	ENDRESS HAUSER	Deltabar PMD75B	DEKRA 22 ATEX 0051	W701B00119A	N/A	N/A	N/A	-50 / +65 °C	II 2G IIC	T6 / T1	Ex db	
30	FLOW TRANSMITTER	WP3	FT-901	N/A	ENDRESS HAUSER	Deltabar PMD75B	DEKRA 22 ATEX 0051	W701B20119A	N/A	N/A	N/A	-50 / +65 °C	II 2G IIC	T6 / T1	Ex db	
31	FLOW TRANSMITTER	WP3	FT-920	N/A	ENDRESS HAUSER	Deltabar PMD75B	DEKRA 22 ATEX 0051	W701B10119A	N/A	N/A	N/A	-50 / +65 °C	II 2G IIC	T6 / T1	Ex db	
32	FLOW TRANSMITTER	WP3	FT-921	N/A	ENDRESS HAUSER	Deltabar PMD75B	DEKRA 22 ATEX 0051	W701B30119A	N/A	N/A	N/A	-50 / +65 °C	II 2G IIC	T6 / T1	Ex db	
33	HYDROGEN IN OXYGEN DETECTOR	WP3	HIOD-610A	N/A	MSA	X5000	FM 21 ATEX 0071	10020018502C8	10000094287/06	N/A	66	-40 / +60 °C	II 2G IIC	T5	Ex db	
34	HYDROGEN IN OXYGEN DETECTOR	WP3	HIOD-610B	N/A	MSA	X5000	FM 21 ATEX 0071	10020018502C0	10000094287/06	N/A	66	-40 / +60 °C	II 2G IIC	T5	Ex db	
35	HYDROGEN IN OXYGEN DETECTOR	WP3	HIOD-610C	N/A	MSA	X5000	FM 21 ATEX 0071	10020018502BF	10000094287/06	N/A	66	-40 / +60 °C	II 2G IIC	T5	Ex db	
36	DOOR SWITCH	WP3	DS-004	N/A	EX-TECH SOLUTION	ZCWD	INERIS 03 ATEX 0083X	batch: 24/195832-010	N/A	X	66 / 67	-20 / +60°C	II 2G IIC	T6	Ex db	
37	DOOR SWITCH	WP3	DS-005	N/A	EX-TECH SOLUTION	ZCWD	INERIS 03 ATEX 0083X	batch: 24/195832-010	N/A	X	66 / 67	-20 / +60°C	II 2G IIC	T6	Ex db	
38	DOOR SWITCH	WP3	DS-006	N/A	EX-TECH SOLUTION	ZCWD	INERIS 03 ATEX 0083X	batch: 24/195832-010	N/A	X	66 / 67	-20 / +60°C	II 2G IIC	T6	Ex db	
39	DOOR SWITCH	WP3	DS-007	N/A	EX-TECH SOLUTION	ZCWD	INERIS 03 ATEX 0083X	batch: 24/195832-010	N/A	X	66 / 67	-20 / +60°C	II 2G IIC	T6	Ex db	
40	OXYGEN IN HYDROGEN ANALYZER	WP3	OIHA-800A	N/A	BAKER HUGES PANAMETRICS	OXY.IQ-131-00	FM 14 ATEX 0032X	41623094954	DOC-0046	X	65	-20 / +60°C	II 1G IIC	T4	Ex ia	
41	OXYGEN IN HYDROGEN ANALYZER	WP3	OIHA-800B	N/A	BAKER HUGES PANAMETRICS	OXY.IQ-131-00	FM 14 ATEX 0032X	41623095099	DOC-0046	X	65	-20 / +60°C	II 1G IIC	T4	Ex ia	
42	OXYGEN IN HYDROGEN ANALYZER	WP3	OIHA-800C	N/A	BAKER HUGES PANAMETRICS	OXY.IQ-131-00	FM 14 ATEX 0032X	41623120596	DOC-0046	X	65	-20 / +60°C	II 1G IIC	T4	Ex ia	
43	JUNCTION BOX	WP3	JB-OIHA-800A	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13446	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
44	JUNCTION BOX	WP3	JB-OIHA-800B	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13453	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
45	JUNCTION BOX	WP3	JB-OIHA-800C	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13455	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
46	JUNCTION BOX	WP3	JB-WLD-005	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13448	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
47	WATER LEAK DETECTOR	WP3	WLD-005	N/A	KROHNE	OPTISWITCH 6600	TUV 16 ATEX 182791X	649498	N/A	X	67 / 69K	-40 / +74°C	II 1G IIC	T5/T4	Ex ia	
48	LEVEL SWITCH	WP3	LSH-500	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6043E01192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
49	LEVEL SWITCH	WP3	LSH-600	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W5101101192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
50	LEVEL SWITCH	WP3	LSH-610	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W5113801192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
51	LEVEL SWITCH	WP3	LSH-630	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6043F01192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
52	LEVEL SWITCH	WP3	LSH-631	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6044001192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
53	LEVEL SWITCH	WP3	LSH-640	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6044101192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
54	LEVEL SWITCH	WP3	LSHH-500	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W602F401192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
55	LEVEL SWITCH	WP3	LSL-500	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6024401192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
56	LEVEL SWITCH	WP3	LSL-600	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W5101201192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	

FORES ENGINEERING

HAZARDOUS EQUIPMENT LIST

Process container - Upper
Hydrogen purification Unit, Separation room - A10

REF DOC		*TEMPLATE NAME*	*PAG NUMBER*
C63-PCX-002_05 (ATEX Zoning - PWH2 case)	**C63-PCX-001_05 (ATEX Zoning)**	**MOD-SGQ-044_00**	**03 OF 05**
C63-SPC-001_03_General specification	**224J10-DDL-EL-DL-00001**	*DOC CODE*	*DOC NAME*
C63-DUO-001_ 006 - ATEX_AREA	**224J10-DDL-EL-CA-00002**	**224J10-DDL-QHSE-LIS-00002**	**ATEX REGISTER**
TEM AMB **+5°C / +45°C**	*ZONE Classification* **2**	*REVISION*	*DATE*
HUM AMB **40% / 60%**		**02**	**17 APR 2025**

N°	Item	Plant	Tag	Non-Electrical	Manufacturer	Type	Certificate - ATEX	SN	EU Declaration of conformity/ Technical file number	Special Conditions for Use	IP protection grade	Ambient temperature range (min-max)	Marking	Temperature Class	Ex protection type	Note
57	LEVEL SWITCH	WP3	LSL-610	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	WB09E601192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
58	LEVEL SWITCH	WP3	LSL-611	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W5101301192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
59	LEVEL SWITCH	WP3	LSL-620	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W602F5011192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
60	LEVEL SWITCH	WP3	LSL-630	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6024501192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
61	LEVEL SWITCH	WP3	LSL-640	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W6024601192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
62	LEVEL SWITCH	WP3	LSL-641	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W602F601192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
63	LEVEL SWITCH	WP3	LSLL-500	N/A	ENDRESS HAUSER	FTL51B	KIWA 19 ATEX 0017X	W60F401192	N/A	X	66 / 68	-50 / +70°C	II 2G IIC	T6...T1	Ex db	
64	LEVEL TRANSMITTER	WP3	LT-600	N/A	ENDRESS HAUSER	Levelflex FMP51	KEMA 10 ATEX 0093X	W900FF0112C	N/A	X	66 / 68	-50 / +80°C	II 2G IIC	T6...T1	Ex db	
65	LEVEL TRANSMITTER	WP3	LT-620	N/A	ENDRESS HAUSER	Levelflex FMP51	KEMA 10 ATEX 0093X	W900FE0112C	N/A	X	66 / 68	-50 / +80°C	II 2G IIC	T6...T1	Ex db	
66	MOTORISED PROPORTIONAL VALVE	WP3	MPV-611	N/A	PS AUTOMATION	PSF-EX	TPS 22 ATEX 110398 0002 X	395643	N/A	X	65	-10 / +60°C	II 2G IIC	T4	Ex db eb	
67	MOTORISED PROPORTIONAL VALVE	WP3	MPV-630	N/A	PS AUTOMATION	PSF-EX	TPS 22 ATEX 110398 0002 X	398817	N/A	X	65	-10 / +60°C	II 2G IIC	T4	Ex db eb	
68	PRESSURE TRANSMITTER	WP3	PT-150	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W7018F01198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
69	PRESSURE TRANSMITTER	WP3	PT-610	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W7075701198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
70	PRESSURE TRANSMITTER	WP3	PT-611	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W2028901198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
71	PRESSURE TRANSMITTER	WP3	PT-612	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W7075801198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
72	PRESSURE TRANSMITTER	WP3	PT-630	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W707DE01198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
73	PRESSURE TRANSMITTER	WP3	PT-631	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W3022601198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
74	PRESSURE TRANSMITTER	WP3	PT-632	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W707E101198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
75	PRESSURE TRANSMITTER	WP3	PT-633	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W3022701198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
76	PRESSURE TRANSMITTER	WP3	PT-900	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W7075901198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
77	PRESSURE TRANSMITTER	WP3	PT-910	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W707DF01198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
78	PRESSURE TRANSMITTER	WP3	PT-920	N/A	ENDRESS HAUSER	PMP71B	DEKRA 22 ATEX 0051 X	W709F201198	N/A	X	66 / 68	-50 / +60°C	II 2G IIC	T6 / T1	Ex db	
79	PNEUMATIC VALVE	WP3	PV-500	X	ASCO	T290	LCIE 20 ATEX 3037X	417315462ZP2411020 7	N/A	X	N/A	-10 / +60°C	II 1G IIC	T6 / T2	Ex h	
80	PNEUMATIC VALVE	WP3	PV-501	X	ASCO	T290	LCIE 20 ATEX 3037X	417315402ZP2411020 7	N/A	X	N/A	-10 / +60°C	II 1G IIC	T6 / T2	Ex h	
81	PNEUMATIC VALVE	WP3	PV-600	X	SCHUBERT & SALZER	7010	N/A	2848620001/4	7010-Declaration de conformité CE	N/A	-	-30 / +60°C	II 2G IIC	T6 / T2	Ex h	
82	PNEUMATIC VALVE	WP3	PV-601	X	ASCO	T290	LCIE 20 ATEX 3037X	4018112ZP24028733	N/A	X	N/A	-10 / +60°C	II 1G IIC	T6 / T2	Ex h	
83	PNEUMATIC VALVE	WP3	PV-610	X	EMERSON	T298	N/A	ZP24036667-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
84	PNEUMATIC VALVE	WP3	PV-620	X	SCHUBERT & SALZER	7010	N/A	2848620001/1	7010-Declaration de conformité CE	N/A	-	-30 / +60°C	II 2G IIC	T6 / T2	Ex h	
85	PNEUMATIC VALVE	WP3	PV-630	X	EMERSON	T298	N/A	ZP24036667-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
86	PNEUMATIC VALVE	WP3	PV-631	X	EMERSON	T298	N/A	ZP24040939-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
87	PNEUMATIC VALVE	WP3	PV-632	X	EMERSON	T298	N/A	ZP24036670-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
88	PNEUMATIC VALVE	WP3	PV-633	X	EMERSON	T298	N/A	ZP24036669-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
89	PNEUMATIC VALVE	WP3	PV-635	X	EMERSON	T298	N/A	ZP24036669-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
90	PNEUMATIC VALVE	WP3	PV-640	X	SFERACO	530IITA300+ASR130-40	LCIE 05 AR 023	2847610001/1	JC-Atex	N/A	-	-50 / +230°C	II 2G IIC	-	c	
91	PNEUMATIC VALVE	WP3	PV-641	X	SCHUBERT & SALZER	7010	N/A	2848620001/1	7010-Declaration de conformité CE	N/A	-	-30 / +60°C	II 2G IIC	T6 / T2	Ex h	
92	PNEUMATIC VALVE	WP3	PV-642	X	SCHUBERT & SALZER	7010	N/A	2848620001/3	7010-Declaration de conformité CE	N/A	-	-30 / +60°C	II 2G IIC	T6 / T2	Ex h	
93	PNEUMATIC VALVE	WP3	PV-800	X	SCHUBERT & SALZER	7010	N/A	2848620001/2	7010-Declaration de conformité CE	N/A	-	-30 / +60°C	II 2G IIC	T6 / T2	Ex h	
94	PNEUMATIC VALVE	WP3	PV-900	X	EMERSON	T298	N/A	ZP25001852-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
95	PNEUMATIC VALVE	WP3	PV-901	X	EMERSON	T298	N/A	ZP25001852-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
96	PNEUMATIC VALVE	WP3	PV-920	X	EMERSON	T298	N/A	ZP24101432-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
97	PNEUMATIC VALVE	WP3	PV-921	X	EMERSON	T298	N/A	ZP24113447-0	ASCO Technical file N° 293590, lodged with INERIS 0080	N/A	-	-10 / +180°C	II 2G IIC	Tx	Ex h	
98	SMOKE DETECTOR	WP3	SD-006A	N/A	APOLLO	XP95 IS OPTICAL	BAS 02 ATEX 1289X	N/A	APOLLO DECLARATION OF CONFORMITY	X	-	-20 / +45 °C	II 1G IIC	T5	Ex ia	
99	SMOKE DETECTOR	WP3	SD-006B	N/A	APOLLO	XP95 IS OPTICAL	BAS 02 ATEX 1289X	N/A	APOLLO DECLARATION OF CONFORMITY	X	-	-20 / +45 °C	II 1G IIC	T5	Ex ia	
100	SMOKE DETECTOR	WP3	SD-006C	N/A	APOLLO	XP95 IS OPTICAL	BAS 02 ATEX 1289X	N/A	APOLLO DECLARATION OF CONFORMITY	X	-	-20 / +45 °C	II 1G IIC	T5	Ex ia	
101	WALL HEATER	WP3	WH-206	N/A	AEIB VENTILATEUR	CONVECTEUR ATEX 1000W	LCIE 03 ATEX 6386X	202109/4510	N/A	X	-	-20 / +40°C	II 2G IIC	T3	Ex d	
102	LIMIT SWITCH	WP3	ZIO-605	N/A	Soldo Controls	SKD1200-10X23L3	CML 19 ATEX 1359X	IT03B0123927	N/A	X	N/A	-55 / +60°C	II 2G IIC	T6	Ex db	
103	LIMIT SWITCH	WP3	ZIO-624	N/A	Soldo Controls	SKD1200-10X23L3	CML 19 ATEX 1359X	IT03B0125716	N/A	X	N/A	-55 / +60°C	II 2G IIC	T6	Ex db	
104	LIMIT SWITCH	WP3	ZIO-625	N/A	Soldo Controls	SKD1200-10X23L3	CML 19 ATEX 1359X	IT03B0125479	N/A	X	N/A	-55 / +60°C	II 2G IIC	T6	Ex db	
105	JUNCTION BOX	WP3	JB-DS-004	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13454	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
106	JUNCTION BOX	WP3	JB-DS-005	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13449	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
107	JUNCTION BOX	WP3	JB-DS-006	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13450	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
108	JUNCTION BOX	WP3	JB-DS-007	N/A	CO.SI.ME.	GWM 1414	CEC 10 ATEX 158	24-13447	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
109	JUNCTION BOX	WP3	JB-PWR-01	N/A	CO.SI.ME.	GWR 3636	CEC 10 ATEX 158	23-08428	N/A	N/A	66	-40 / +40°C	II 2G IIC	T6	Ex e	
110	JUNCTION BOX	WP3	JB-PWR-03	N/A	COELBO	CCA3	BVI 14 ATEX 0007	1225/206	N/A	N/A	66	-20 / +40°C	II 2G IIC	T6	Ex db [ia]	
111	JUNCTION BOX	WP3	JB-SD-001	N/A	COELBO	CCA3	BVI 14 ATEX 0007	4324/759	N/A	N/A	66	-20 / +40°C	II 2G IIC	T6	Ex db [ia]	
112	PRESSURE SWITCH	WP3	PT-206	N/A	SCHISCHEK GMBH	ExCos-P-250	EPS 14 ATEX 1655X	056.3005 24390049	EUC-ExCos 2020-04-01 V02	X	66	-20 / +50°C	II 2G IIC	T6	Ex e ma [ia]	

FORES ENGINEERING

HAZARDOUS EQUIPMENT LIST

Process container - Upper
Hydrogen purification Unit, Separation room - A10

REF DOC		*TEMPLATE NAME*	*PAG NUMBER*
C63-PCX-002_05 (ATEX Zoning - PWH2 case)	**C63-PCX-001_05 (ATEX Zoning)**	**MOD-SGQ-044_00**	**03 OF 05**
C63-SPC-001_03_General specification	**224J10-DDL-EL-DL-00001**	*DOC CODE*	*DOC NAME*
C63-DUO-001_ 006 - ATEX_AREA	**224J10-DDL-EL-CA-00002**	**224J10-DDL-QHSE-LIS-00002**	**ATEX REGISTER**
TEM AMB **+5°C / +45°C**	*ZONE Classification* **2**	*REVISION*	*DATE*
HUM AMB **40% / 60%**		**02**	**17 APR 2025**

N°	Item	Plant	Tag	Non-Electrical	Manufacturer	Type	Certificate - ATEX	SN	EU Declaration of conformity/ Technical file number	Special Conditions for Use	IP protection grade	Ambient temperature range (min-max)	Marking	Temperature Class	Ex protection type	Note
113	TEMPERATURE SWITCH	WP3	TT-206	N/A	SCHISCHEK GMBH	TFR-2G	N/A	N/A	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
115	HYGROMETER	WP3	HY-206	N/A	SCHISCHEK GMBH	FFR-2G	N/A	N/A	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
114	Q2 SWITCH	WP3	C63-QF-001	N/A	PALAZZOLI	202282EX	N/A	N/A	DoC02	N/A	66	-20 / +40°C	II 3G IIC	T6	Ex nR	
116	REMOTE I/O CABINET	WP3	Q.RIO2	N/A	PROTEO	D240934CH03	P240934_W240716	QUADRO ELETTRICO RIO2	074/Q/24	N/A	66	-20 / +45 °C	II 3G IIC	T6	Ex ec	
116.1	PLC BLOCK	QRIO2 - WP3	201AP1	N/A	SIEMENS	6ES5710-8MA11	DEKRA 20 ATEX 0003X	S C-S4A0D5GQ2024	2030/ET 200SP-F/A5/10.2023	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.2	PLC BLOCK	QRIO2 - WP3	201AP10	N/A	SIEMENS	6ES7136-6BA01-0CA0	DEKRA 20 ATEX 0002X	S C-S4A137FU2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.3	PLC BLOCK	QRIO2 - WP3	201AP11	N/A	SIEMENS	6ES7136-6BA01-0CA0	DEKRA 20 ATEX 0002X	S C-S4A137JP2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.4	PLC BLOCK	QRIO2 - WP3	201AP12	N/A	SIEMENS	6ES7136-6BA01-0CA0	DEKRA 20 ATEX 0002X	S C-S4A137GJ2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.5	PLC BLOCK	QRIO2 - WP3	201AP20	N/A	SIEMENS	6ES7136-6AA00-0CA1	DEKRA 20 ATEX 0002X	S C-S6A0068Y2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.6	PLC BLOCK	QRIO2 - WP3	201AP21	N/A	SIEMENS	6ES7136-6AA00-0CA1	DEKRA 20 ATEX 0002X	S C-S5A02C9J2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.7	PLC BLOCK	QRIO2 - WP3	201AP22	N/A	SIEMENS	6ES7136-6AA00-0CA1	DEKRA 20 ATEX 0002X	S C-S5A02BY02024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.8	PLC BLOCK	QRIO2 - WP3	201AP30	N/A	SIEMENS	6ES7136-6DB00-0CA0	DEKRA 20 ATEX 0002X	S C-S5A0XH2M2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.9	PLC BLOCK	QRIO2 - WP3	201AP31	N/A	SIEMENS	6ES7136-6DB00-0CA0	DEKRA 20 ATEX 0002X	S C-S5A0XCXE2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.10	PLC BLOCK	QRIO2 - WP3	201AP32	N/A	SIEMENS	6ES7136-6DB00-0CA0	DEKRA 20 ATEX 0002X	S C-S5A0XDJZ2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.11	PLC BLOCK	QRIO2 - WP3	201AP33	N/A	SIEMENS	6ES7136-6DB00-0CA0	DEKRA 20 ATEX 0002X	S C-S5A0XEMD2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.12	PLC BLOCK	QRIO2 - WP3	202AP40	N/A	SIEMENS	6ES7131-6BH01-0BA0	DEKRA 20 ATEX 0002X	S C-S4A0SAK62024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.13	PLC BLOCK	QRIO2 - WP3	202AP41	N/A	SIEMENS	6ES7131-6BH01-0BA0	DEKRA 20 ATEX 0002X	S C-S4A0SAGN2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.14	PLC BLOCK	QRIO2 - WP3	202AP50	N/A	SIEMENS	6ES7134-6GF00-0AA1	DEKRA 20 ATEX 0002X	S C-S5A0F9HD2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.15	PLC BLOCK	QRIO2 - WP3	202AP51	N/A	SIEMENS	6ES7134-6GF00-0AA1	DEKRA 20 ATEX 0002X	S C-S5A0F9GQ2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.16	PLC BLOCK	QRIO2 - WP3	202AP52	N/A	SIEMENS	6ES7134-6GF00-0AA1	DEKRA 20 ATEX 0002X	S C-S8A0JGEV2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.17	PLC BLOCK	QRIO2 - WP3	202AP53	N/A	SIEMENS	6ES7134-6GF00-0AA1	DEKRA 20 ATEX 0002X	S C-S5A0F9NF2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.18	PLC BLOCK	QRIO2 - WP3	202AP54	N/A	SIEMENS	6ES7134-6GF00-0AA1	DEKRA 20 ATEX 0002X	S C-S5A0F9E32024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.19	PLC BLOCK	QRIO2 - WP3	202AP60	N/A	SIEMENS	6ES7132-6BH01-0BA0	DEKRA 20 ATEX 0002X	S C-S3A0PAUA2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.20	PLC BLOCK	QRIO2 - WP3	202AP70	N/A	SIEMENS	6ES7135-6HD00-0BA1	DEKRA 20 ATEX 0002X	S C-S2A11LQT2024	Nr. 664.MNERoEco.BO.38.2306.010	X	20	-30 / +50°C	II 3G IIC	T4	Ex ec	
116.21	PLC POWER SUPPLY	QRIO2 - WP3	150GS1	N/A	SIEMENS	6EP3336-7SC00-3AX0	EPS 19 ATEX 1 194X	Q6S4BA7SHMP	PSU6200_A1-1	X	20	-30 / +70°C	II 3G IIC	T4	Ex ec	
116.22	CABINET ENCLOSURE	QRIO2 - WP3	Q2	X	IRINOX	E10601400300044	N/A	203152	MANUFACTURER DECLARATION	N/A	66	N/A	II 3G IIC	N/A	Ex ec	
116.23	IS BARRIER	QRIO2 - WP3	320T1	N/A	PXC	MINI MCR-EX-NAM-RO	IBEXU 21 ATEX 1061X	1373944414	097161324_00_DoC_EU	X	20	-40 / +70°C	II 3G IIC	T4	Ex ec [ia]	
116.24	IS BARRIER	QRIO2 - WP3	320T3	N/A	PXC	MINI MCR-EX-NAM-RO	IBEXU 21 ATEX 1061X	1373943550	097161324_00_DoC_EU	X	20	-40 / +70°C	II 3G IIC	T4	Ex ec [ia]	
116.25	IS BARRIER	QRIO2 - WP3	320T5	N/A	PXC	MINI MCR-EX-NAM-RO	IBEXU 21 ATEX 1061X	1373944459	097161324_00_DoC_EU	X	20	-40 / +70°C	II 3G IIC	T4	Ex ec [ia]	
116.26	IS BARRIER	QRIO2 - WP3	320T7	N/A	PXC	MINI MCR-EX-NAM-RO	IBEXU 21 ATEX 1061X	1373943764	097161324_00_DoC_EU	X	20	-40 / +70°C	II 3G IIC	T4	Ex ec [ia]	
116.27	IS BARRIER	QRIO2 - WP3	330T1	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334720	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.28	IS BARRIER	QRIO2 - WP3	330T3	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334325	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.29	IS BARRIER	QRIO2 - WP3	330T5	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334770	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.30	IS BARRIER	QRIO2 - WP3	330T7	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375335002	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.31	IS BARRIER	QRIO2 - WP3	331T1	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334709	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.32	IS BARRIER	QRIO2 - WP3	331T3	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334730	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.33	IS BARRIER	QRIO2 - WP3	331T7	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334336	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.34	IS BARRIER	QRIO2 - WP3	332T1	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334673	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.35	IS BARRIER	QRIO2 - WP3	332T3	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375334743	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.36	IS BARRIER	QRIO2 - WP3	332T5	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375335143	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.37	IS BARRIER	QRIO2 - WP3	332T7	N/A	PXC	MACX MCR-EX-SL-NAM-R	IBEXU 07 ATEX 1069X	1375335083	083093741_07_DoC_EU	X	20	-40 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.38	IS BARRIER	QRIO2 - WP3	250T1	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025166	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.39	IS BARRIER	QRIO2 - WP3	340T1	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025170	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.40	IS BARRIER	QRIO2 - WP3	340T5	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025169	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.41	IS BARRIER	QRIO2 - WP3	341T5	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025182	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.42	IS BARRIER	QRIO2 - WP3	342T1	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025171	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.43	IS BARRIER	QRIO2 - WP3	342T5	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025172	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.44	IS BARRIER	QRIO2 - WP3	343T1	N/A	PR. ELECTRONICS	9106B	DEKRA 11 ATEX 0244X	251025173	9106DoC_104	X	20	-20 / +60°C	II 3G IIC	T4	Ex ec [ia]	
116.45	IS BARRIER	QRIO2 - WP3	270T5	N/A	GM INTERNATIONLA	D1020D/B	IMQ 09 ATEX 013X	1738100	N/A	X	20	-20 / +60°C	II 3G IIC	T4	Ex Na [ia]	
116.46	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-1	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-01	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.47	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-2	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-02	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.48	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-3	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-03	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.49	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-4	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-04	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.50	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-5	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-05	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.51	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-6	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-06	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.52	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-7	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-07	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	

FORES ENGINEERING

HAZARDOUS EQUIPMENT LIST

Process container - Upper
Hydrogen purification Unit, Separation room - A10

REF DOC		*TEMPLATE NAME*	*PAG NUMBER*
C63-PCX-002_05 (ATEX Zoning - PWH2 case)	**C63-PCX-001_05 (ATEX Zoning)**	**MOD-SGQ-044_00**	**03 OF 05**
C63-SPC-001_03_General specification	**224J10-DDL-EL-DL-00001**	*DOC CODE*	*DOC NAME*
C63-DUO-001_ 006 - ATEX_AREA	**224J10-DDL-EL-CA-00002**	**224J10-DDL-QHSE-LIS-00002**	**ATEX REGISTER**
TEM AMB **+5°C / +45°C**	*ZONE Classification* **2**	*REVISION*	*DATE*
HUM AMB **40% / 60%**		**02**	**17 APR 2025**

N°	Item	Plant	Tag	Non-Electrical	Manufacturer	Type	Certificate - ATEX	SN	EU Declaration of conformity/ Technical file number	Special Conditions for Use	IP protection grade	Ambient temperature range (min-max)	Marking	Temperature Class	Ex protection type	Note
116.53	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-8	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-08	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.54	MULTI CABLE TRANSIT	QRIO2 - WP3	MCT-9	X	ROXTEC	CF16	NEMKO 12 ATEX 1278X	CF/16-09	N/A	X	66	-60 / +80°C	II 2G IIC	N/A	Ex e	
116.55	TERMINAL BLOCK	QRIO2 - WP3	X.PWR	N/A	WEIDMULER	WDU 4 Codice 1020100000	DEMKO 14 ATEX 1338U	1020100000/001	DE_PT1001_20160414_197_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.56	TERMINAL BLOCK	QRIO2 - WP3	X.AI	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/001	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.57	TERMINAL BLOCK	QRIO2 - WP3	X.AO	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/002	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.58	TERMINAL BLOCK	QRIO2 - WP3	X.DO	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/003	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.59	TERMINAL BLOCK	QRIO2 - WP3	X.INT24	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/004	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.60	TERMINAL BLOCK	QRIO2 - WP3	X.DI	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/005	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.61	TERMINAL BLOCK	QRIO2 - WP3	X.DO.S	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/006	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.62	TERMINAL BLOCK	QRIO2 - WP3	X.AI.S	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/007	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.63	TERMINAL BLOCK	QRIO2 - WP3	X.DI-S	N/A	WEIDMULER	WDU 2.5 Codice 1020000000	DEMKO 14 ATEX 1338U	1020100000/008	DE_PT1001_20160414_150_ISSUE01	N/A	20	-60 / +70°C	II 2G IIC	T6...T1	Ex eb	
116.64	TERMINAL BLOCK	QRIO2 - WP3	X.AI	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/26	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.65	TERMINAL BLOCK	QRIO2 - WP3	X.AO	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/27	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.66	TERMINAL BLOCK	QRIO2 - WP3	X.DO	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/28	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.67	TERMINAL BLOCK	QRIO2 - WP3	X.INT24	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/29	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.68	TERMINAL BLOCK	QRIO2 - WP3	X.DI	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/30	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.69	TERMINAL BLOCK	QRIO2 - WP3	X.DO.S	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/31	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.70	TERMINAL BLOCK	QRIO2 - WP3	X.AI.S	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/32	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
116.71	TERMINAL BLOCK	QRIO2 - WP3	X.DI-S	N/A	PHOENIX	3214325	KIWA 14 ATEX 0025U	3214325-24/33	3214325.CE.00	N/A	20	-60 / +130°C	II 3G IIC	T6...T1	Ex ec	
117	HYDROGEN PURIFICATION UNIT	WP3	HPP-700	X	AQUAGAS	DEDR 500/36	N/A	A-23/24 140	MANUFACTURER DECLARATION	N/A	N/A	-20 / +40 °C	II 3G IIC	TX	Ex h	
117.1	TEMPERATURE SENSOR	HPP-700 - WP3	TT 60.1	N/A	JUMO	PT100 90.2550	N/A	90.2550.589	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.2	TEMPERATURE SENSOR	HPP-700 - WP3	TT 60.2	N/A	JUMO	PT100 90.2550	N/A	90.2550.564	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.3	TEMPERATURE SENSOR	HPP-700 - WP3	TT 61.1	N/A	JUMO	PT100 90.2550	N/A	90.2550.549	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.4	TEMPERATURE SENSOR	HPP-700 - WP3	TT 60.4	N/A	JUMO	PT100 90.2550	N/A	90.2550.578	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.5	TEMPERATURE SENSOR	HPP-700 - WP3	TT 64.5	N/A	JUMO	PT100 90.2550	N/A	90.2550.554	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.6	TEMPERATURE SENSOR	HPP-700 - WP3	TT 64.6	N/A	JUMO	PT100 90.2550	N/A	90.2550.597	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.7	TEMPERATURE SENSOR	HPP-700 - WP3	TT 64.7	N/A	JUMO	PT100 90.2550	N/A	90.2550.568	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.8	TEMPERATURE SENSOR	HPP-700 - WP3	TT 64.8	N/A	JUMO	PT100 90.2550	N/A	90.2550.552	N/A	N/A	N/A	N/A	II 2G IIC	N/A	Ex ia	simple apparatus
117.9	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64.1.1	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/16	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.10	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64.1.2	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/19	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.11	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64.1.3	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/26	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.12	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64.1.4	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/22	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.13	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64.2	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/13	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.14	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64.3	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/28	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.15	ELECTRIC LIMIT SWITCH SENSOR	HPP-700 - WP3	GS 64-T2	N/A	FESTO	SRBG-C1-N-20N- ZC-M12-EX5	TUV 16 ATEX 174269X	3568057/15	N/A	X	20	-25 / +50°C	II 1G IIC	T6	Ex ia	
117.16	PRESSURE TRANSMITTER	HPP-700 - WP3	PT 64.1	N/A	ROSEMOUNT	2088G3S22B2K1 Q4	BAS 00 ATEX 1166X	21737615	RMD 1010 Rev. P	X	54	-55 / +70°C	II 1G IIC	T4	Ex ia	
117.17	GAS DOWNSTREAM REGEN HEATER TS	HPP-700 - WP3	TS 64.3	N/A	BARKSDALE	ML1H-H454S-EXI	ISSEP 08 ATEX 016X	WN10261.2	N/A	X	66	-40 / +75°C	II 1G IIC	T6	Ex ia	
117.18	HYDROGEN GAS OUTLET TS.	HPP-700 - WP3	TS 64.4	N/A	BARKSDALE	ML1H-H203S-EXI	ISSEP 08 ATEX 016X	WN10261.1	N/A	X	66	-40 / +75°C	II 1G IIC	T6	Ex ia	
117.19	SOLENOID COIL	HPP-700 - WP3	64-V1	N/A	FESTO	VACF-B-K1-1-5- EX4 M	IBEXU 16 ATEX 1146X	773185	N/A	X	65	-30 / +40°C	II 2G IIC	T5	Ex mb	
117.20	SOLENOID COIL	HPP-700 - WP3	64-V2	N/A	FESTO	VACF-B-K1-1-5- EX4 M	IBEXU 16 ATEX 1146X	767746	N/A	X	65	-30 / +40°C	II 2G IIC	T5	Ex mb	
117.21	SOLENOID COIL	HPP-700 - WP3	64-V3	N/A	FESTO	VACF-B-K1-1-5- EX4 M	IBEXU 16 ATEX 1146X	773214	N/A	X	65	-30 / +40°C	II 2G IIC	T5	Ex mb	
117.22	SOLENOID COIL	HPP-700 - WP3	64-V8	N/A	FESTO	VACF-B-K1-1-5- EX4 M	IBEXU 16 ATEX 1146X	773163	N/A	X	65	-30 / +40°C	II 2G IIC	T5	Ex mb	
117.23	SOLENOID COIL	HPP-700 - WP3	64-V12	N/A	FESTO	VACF-B-K1-1-5- EX4 M	IBEXU 16 ATEX 1146X	767863	N/A	X	65	-30 / +40°C	II 2G IIC	T5	Ex mb	
117.24	SOLENOID COIL	HPP-700 - WP3	64-V17	N/A	FESTO	VACF-B-K1-1-5- EX4 M	IBEXU 16 ATEX 1146X	773113	N/A	X	65	-30 / +40°C	II 2G IIC	T5	Ex mb	
117.25	POSITIONER	HPP-700 - WP3	FC 64.1	N/A	POWER GENEX	EPR-IN2SN4NTR, EX IA IIC T6	INERIS 12 ATEX 0030X	23092296	N/A	X	66	-20 / +70°C	II 2G IIC	T6	Ex ia	
117.26	TERMINAL BOX SOLENOID COILS	HPP-700 - WP3	JB 1	N/A	STAHL	8146/1051	PTB 01 ATEX 1016	2222938802051000 6	N/A	N/A	66	-20 / +40 °C	II 2G IIC	T6	Ex eb	
117.27	TERMINAL BOX FOR TRACE HEATER	HPP-700 - WP3	JB 1.1	N/A	NVENT RAYCHEM	JB-EX-40-EP	PTB 00 ATEX 1002	1244-020505	N/A	N/A	66	-55 / +55 °C	II 2G IIC	T6	Ex eb	
117.28	TERMINAL BOX Ex i INSTRUMENTS	HPP-700 - WP3	JB 2	N/A	STAHL	8146/2S73	PTB 01 ATEX 1016	2221136004051000 2	N/A	N/A	N/A	-60 / +100°C	II 2G IIC	T6	Ex ia	
117.29	DRYER REGENERATION HEATER	HPP-700 - WP3	HE 64.1	N/A	ELMESS	DHG81B03GG-6- T1	IBEXU 15 ATEX 1019X	24-0450-001	N/A	X	66	-20 / +55°C	II 2G IIC	T1	Ex db eb	

Schedule Ref. #	1			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MSA / AMBIENT HYDROGEN DETECTOR			
Model	X5000			Serial Number		100200183025F			
Drawing				Datasheet					
Cert No.	FM21ATEX0071			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G	Temp class	T5	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	✓	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	MATTEO FABBRI	~~STROCCHI FRANCESCO~~	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	AHD-1002	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	2			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MSA / AMBIENT HYDROGEN DETECTOR			
Model	X5000			Serial Number		10020018502B8			
Drawing				Datasheet					
Cert No.	FM21ATEX0071			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G	Temp class	T5	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	AHD-1003	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	3			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MSA / AMBIENT HYDROGEN DETECTOR			
Model	X5000			Serial Number		10020018502C7			
Drawing				Datasheet					
Cert No.	FM21ATEX0071			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G	Temp class	T5	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	
Name	FABBRI MATTEO		
Date	12 FEB 2025	FORES ENGINEERING Srl	
Signature		Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #	4	TAG	APC-900	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA					**Area Code**		WP3			
Area Classification	IIC (IIB+H2)		**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1		
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03					**Item Datasheet**		DOCUMENTS IN THE SHARE POINT			
Model	99.00564					**Serial Number**		2445-0662			
Manufacturer	FAV					**Description**		ELECTROPNEUMATIC PANEL			
Item Ambient Temp.	-20 / + 40 °C	**Protection Type**	Ex ec	**EPL**	NA	**Gas group**	II 3G	**Temp class**	T4	**IP**	66
Cert No.	N/A										
EU Declaration of conformity/ Technical file number	99.00564-D2445-0662										
Detailed Note:											
Inspection shall only be performed by competent personnel with competency verified by CrossWind											
All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.											
An Inspection Sheet should be completed for EACH individual item of Equipment.											

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	① PL	/
2	Equipment group is correct	X	OM	/
3	Equipment temperature class is correct	X	OM	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	/
5	Equipment circuit identification is correct	X	OM	/
6	Equipment circuit identification is available	X	OM	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OM	/
9	There is no evidence of unauthorized modifications	X	OM	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OM	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OM	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	/
13	Condition of enclosure gaskets is satisfactory	X	OM	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	/
15	Electrical connections are tight	X	OM	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	/
17	Unused terminals are tightened	X	NA	/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X	OM	/
24	Type of cable is appropriate	X	OM	/
25	There is no obvious damage to the cables	X	OM	/
26	Cable glands are the correct type and installed correctly	X	OM	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OM	/

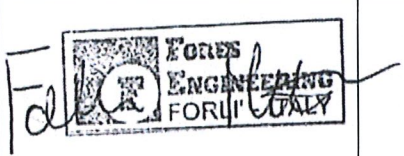
 REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP. NOT SUITABLE WITH WP3 — ITEM -20/+40
WP3 +5/+45

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X	NA	/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

Schedule Ref. #	5			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		FAV / ELECTROPNEUMATIC PANEL			
Model	99.00563			Serial Number		2445-0661			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / + 55 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ec	EPL		Gas group	II 3G	Temp class	T4	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	7			Area Code		WP3				
Area Class Drawing				Manufacturer / Description		CORTEM / LIGHTING FIXTURE				
Model	LIFEX-ME-0630N-CCT			Serial Number		COV2403375/2				
Drawing				Datasheet						
Cert No.	CML 20ATEX3018X			Equipment Ambient Temp.		-20 / +60 °C				
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1			
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66	

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	20 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature	FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025		

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx		FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION		
Type (ELE/MEC)		TAG C63-IEL-012	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	8			Area Code		WP3				
Area Class Drawing				Manufacturer / Description		CORTEM / LIGHTING FIXTURE				
Model	LIFEX-ME-0630N-CCT			Serial Number		COV2403375/3				
Drawing				Datasheet						
Cert No.	CML 20ATEX3018X			Equipment Ambient Temp.		-20 / +60 °C				
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1			
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66	

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x	NA	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	~~STROCCHI FRANCESCO~~	
Date	20 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	9			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		CORTEM / LIGHTING FIXTURE			
Model	LIFEX-ME-0630N-CCT			Serial Number		COV2403375/4			
Drawing				Datasheet					
Cert No.	CML 20ATEX3018X			Equipment Ambient Temp.		-20 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x	NA	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATEO	STROCCHI FRANCESCO	
Date	20 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	10			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		CORTEM / LIGHTING FIXTURE					
Model	LIFEX-ME-0630-CCT			Serial Number		COV2403375/5					
Drawing				Datasheet							
Cert No.	CML 20ATEX3018X			Equipment Ambient Temp.		-20 / +60 °C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x	NA	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
		Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	20 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	11			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		CORTEM / LIGHTING FIXTURE					
Model	LIFEX-ME-0630-CCT			Serial Number		COV2403375/6					
Drawing				Datasheet							
Cert No.	CML 20ATEX3018X			Equipment Ambient Temp.		-20 / +60 °C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OM	
60	Power conductors are not bunched together causing possible hot spots	x	OM	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**	**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	✓	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	20 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	C63-IEL-010	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	6			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		CORTEM / LIGHTING FIXTURE			
Model	LIFEX-ME-0630N-CCT			Serial Number		COV2403375/1			
Drawing				Datasheet					
Cert No.	CML 20ATEX3018X			Equipment Ambient Temp.		-20 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x	NA	
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	20 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	C63-JBL-03	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-14299				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	① PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

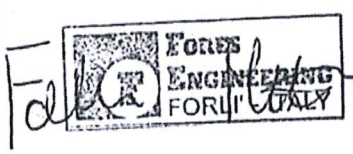
REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP. NOT SUITABLE WITH WP3 ITEM -40 / +40 WP3 +5 / +45

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	C63-JBS-03	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-14298				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	(1) PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

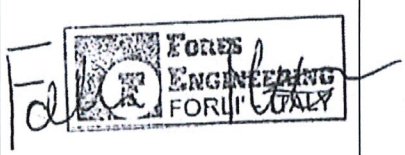
 REFER TO FINAL SHEET FOR ACCEPTANCE

(1) AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/(+40)
WP3 +5/(+45)

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	C63-SS-05	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	14			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / SOCKET SWITCH			
Model	[] 461126 EX			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] EPTI 24ATEX 0438X			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Exe	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

i) MISSING TAG LABEL ON ITEM AND CABLE ⇒ SOLVED 12/02

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	Ok	
36	No undue accumulation of dust and dirt	x	Ok	
37	All equipment housings are clean and dry	x	Ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	Ok	
60	Power conductors are not bunched together causing possible hot spots	x	Ok	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☐ Witness ☐ Review FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	C63-SS-06	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	15			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / SOCKET SWITCH			
Model	[] 461126 EX			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] EPT! 26 ATEX 0638X			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex e	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	Ok	
36	No undue accumulation of dust and dirt	x	Ok	
37	All equipment housings are clean and dry	x	Ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	Ok	
60	Power conductors are not bunched together causing possible hot spots	x	Ok	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	16			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / LIGHTING SWITCH			
Model	[]GHG411			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] PTB 00ATEX 3117			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex e	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	C63-LS-06	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	17			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / LIGHTING SWITCH			
Model	[] GHG411			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] PTB 00 ATEX 3117			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex e	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	N/A	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	C	TAG	DPT-800A	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	18			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MICHELL / DEW POINT TRANSMITTER			
Model	Easidew Pro XP			Serial Number		1FEB-070			
Drawing				Datasheet					
Cert No.	CML19ATEX1411X			Equipment Ambient Temp.		-20 / +70 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db ia	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature			

FORES ENGINEERING Srl
Project Quality Control Manager
☒ Witness ☐ Review
FORES ENGINEERING
STROCCHI FRANCESCO
08/APR/2025

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	DPT-800B	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	19			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MICHELL / DEW POINT TRANSMITTER			
Model	Easidew Pro XP			Serial Number		1FEB-075			
Drawing				Datasheet					
Cert No.	CML19ATEX1411X			Equipment Ambient Temp.		-20 / +70 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db ia	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	ND	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x	NA	
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEA	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	DPT-800C	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	20			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MICHELL / DEW POINT TRANSMITTER			
Model	Easidew Pro XP			Serial Number		1AB0-072			
Drawing				Datasheet					
Cert No.	CML19ATEX1411X			Equipment Ambient Temp.		-20 / +70 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db ia	EPL		Gas group	II 2GD	Temp class	T6	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x	NA	
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	21			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW INDICATOR			
Model	H250			Serial Number		D240000001351647			
Drawing				Datasheet					
Cert No.	PTB03ATEXD127X			Equipment Ambient Temp.		-40 / +70 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	NA	
6	Equipment circuit identification is available	X		
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	NA	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	NA	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x	NA	
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	FICV-610A	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	22			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW METER			
Model	DK32			Serial Number		D240000001361420			
Drawing				Datasheet					
Cert No.	KIWA18ATEX0008X			Equipment Ambient Temp.		-40 / +90°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	65

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

BARRIER:	Manufacturer:	PXC	Model:	MINI MCR-EX-NAM-RO
	Authority:	IBEXU	Cert No:	IBEXU 21ATEX1061X Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	FICV-610B	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	23			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW METER			
Model	DK32			Serial Number		D240000001361421			
Drawing				Datasheet					
Cert No.	KIWA18ATEX0008X			Equipment Ambient Temp.		-40 / +90°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	65

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PXC	**Model:**	MINI MCR-EX-NAM-RO	
		Authority:	IBEXU	**Cert No:**	21ATEX1061X	**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	FICV-610C	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	24			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW METER			
Model	DK32			Serial Number		D240000001361422			
Drawing				Datasheet					
Cert No.	KIWA18ATEX0008X			Equipment Ambient Temp.		-40 / +90°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	65

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PXC	**Model:**	MINI MCR-EX-NAM-RO		
		Authority:	IBEXU	**Cert No:**	21ATEX1961X	**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FABBRI MATTEO → FORES		
Name		FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	F	TAG	FICV-611	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	25			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW METER			
Model	DK32			Serial Number		D240000001349709			
Drawing				Datasheet					
Cert No.	KIWA18ATEX0008X			Equipment Ambient Temp.		-40 / +90°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	65

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x	NA	
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PXC	**Model:**	MACX MCR-EX-SL-NAM-R	
		Authority:	IBEXU	**Cert No:**	07ATEX1069X	**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	**Passed - Complete**
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO		
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	26			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW METER			
Model	DK32			Serial Number		D240000001359045			
Drawing				Datasheet					
Cert No.	KIWA18ATEX0008X			Equipment Ambient Temp.		-40 / +90°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	65

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	Manufacturer:	PXC	Model:	MACX MCR-EX-SL-NAM-R	
		Authority:	IBEXU	Cert No:	07ATEX1069X	Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	27			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / FLOW SWITCH			
Model	V25			Serial Number		D240000001361423			
Drawing				Datasheet					
Cert No.	PTB12ATEX1025			Equipment Ambient Temp.		-20 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		OK	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	No	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x	NA	
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

Schedule Ref. #	32			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / FLOW TRANSMITTER			
Model	Promass F300			Serial Number		W11C8C02000			
Drawing				Datasheet					
Cert No.	SIRA16ATEX2219X			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X		
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	OM	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	NA	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
58	Variable voltage/frequency installation complies with documentation	x	NA	
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	C	TAG	FT-900	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	34			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / FLOW TRANSMITTER			
Model	Deltabar PMD75B			Serial Number		W701B00119A			
Drawing				Datasheet					
Cert No.	DEKRA22ATEX0051			Equipment Ambient Temp.		-50 / +65 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		OK	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		OK	
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	FT-901	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	35			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / FLOW TRANSMITTER			
Model	Deltabar PMD75B			Serial Number		W701B20119A			
Drawing				Datasheet					
Cert No.	DEKRA22ATEX0051			Equipment Ambient Temp.		-50 / +65 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	FT-920	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	36			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / FLOW TRANSMITTER			
Model	Deltabar PMD75B			Serial Number		W701B10119A			
Drawing				Datasheet					
Cert No.	DEKRA22ATEX0051			Equipment Ambient Temp.		-50 / +65 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx		FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION		
Type (ELE/MEC)	E	TAG	FT-921	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	37			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / FLOW TRANSMITTER			
Model	Deltabar PMD75B			Serial Number		W701B30119A			
Drawing				Datasheet					
Cert No.	DEKRA22ATEX0051			Equipment Ambient Temp.		-50 / +65 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x	NA	
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	HIOD-610A	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	38			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MSA / HYDROGEN IN OXYGEN DETECTOR			
Model	X5000			Serial Number		10020018502C8			
Drawing				Datasheet					
Cert No.	FM21ATEX0071			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T5	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		-	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		-	
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	OK	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x	NA	
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	39			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MSA / HYDROGEN IN OXYGEN DETECTOR			
Model	X5000			Serial Number		10020018502C0			
Drawing				Datasheet					
Cert No.	FM21ATEX0071			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T5	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	OK	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	MATTEO FABBRI	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	HIOD-610C	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	40			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		MSA / HYDROGEN IN OXYGEN DETECTOR			
Model	X5000			Serial Number		10020018502BF			
Drawing				Datasheet					
Cert No.	FM21ATEX0071			Equipment Ambient Temp.		-40 / +60 °C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T5	IP Rating	66

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		OK	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		OK	
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	42			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / DOOR SWITCH			
Model	[] AC 15			Serial Number		[] 26/195832-007			
Drawing				Datasheet					
Cert No.	[] INERIS 03ATEX0083X			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex db	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	NA	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	ND	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	21 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)		TAG	DS-005	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	43			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / DOOR SWITCH			
Model	[] AC 15			Serial Number		[] 24/195832-005			
Drawing				Datasheet					
Cert No.	[]			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex db	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		-	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	NA	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**
	X **Passed - Complete**
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	21 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)		TAG	DS-006	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	44			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / DOOR SWITCH			
Model	[] AC-15			Serial Number		[] 24/195832-009			
Drawing				Datasheet					
Cert No.	[]			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Exdb	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	ND	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	NA	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	21 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)		TAG	DS-007	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	45			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / DOOR SWITCH			
Model	[] NC 1S			Serial Number		[] 24/195832-010			
Drawing				Datasheet					
Cert No.	[]			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex db	EPL		Gas group	[] IIC	Temp class	[] T6	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	NA	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	21 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	OIHA-800A	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	50			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		BAKER HUGES PANAMETRICS / OXYGEN IN HYDROGEN ANALYZER			
Model	OXY.IQ-131-00			Serial Number		41623094954			
Drawing				Datasheet					
Cert No.	FM14ATEX0032X			Equipment Ambient Temp.		-20 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 1G IIC	Temp class	T4	IP Rating	65

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	~~OK~~	
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	~~NA~~ NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	Manufacturer:	PR ELECTRONICS	Model:	9106 B		
		Authority:	DEKRA	Cert No:	11 ATEX 0246 X	Type:	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)		TAG	OIHA-800B	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	51			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		BAKER HUGES PANAMETRICS / OXYGEN IN HYDROGEN ANALYZER					
Model	OXY.IQ-131-00			Serial Number		41623095099					
Drawing				Datasheet							
Cert No.	FM14ATEX0032X			Equipment Ambient Temp.		-20 / +60°C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex ia	EPL		Gas group	II 1G IIC	Temp class	T4	IP Rating	65		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		OK	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	OK	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x	NP	
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NP	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PR ELECTRONICS	**Model:**	9106B		
		Authority:	DEKRA	**Cert No:**	11ATEX0211X	**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB-2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	52			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		BAKER HUGES PANAMETRICS / OXYGEN IN HYDROGEN ANALYZER					
Model	OXY.IQ-131-00			Serial Number		41623120596					
Drawing				Datasheet							
Cert No.	FM14ATEX0032X			Equipment Ambient Temp.		-20 / +60°C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex ia	EPL		Gas group	II 1G IIC	Temp class	T4	IP Rating	65		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	OM	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	OM	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x	NA	
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PR ELECTRONICS	**Model:**	9106B		
		Authority:	DEKRA	**Cert No:**	11ATEX0111X	**Type:**	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-OIHA-800A	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-13446				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	①PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

 REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/(+40)
WP3 +5/(+45)

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X	NA	/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

REFER TO FINAL SHEET FOR ACCEPTANCE

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-OIHA-800B	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-13453				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	② PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

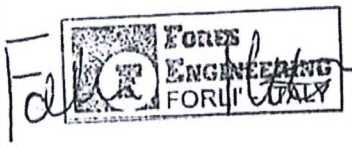
REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40 / -40
WP3 +5 / +45

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OM	/
34	Cable cores not in use are correctly terminated	X	OM	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OM	/
36	No undue accumulation of dust and dirt	X	OM	/
37	All equipment housings are clean and dry	X	OM	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OM	/
60	Power conductors are not bunched together causing possible hot spots	X	OM	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-OIHA-800C	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)		**Zone**	2	**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-13455				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	① PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

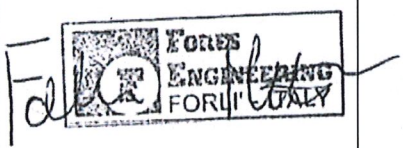
 REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/(+40)
WP3 +5/(+45)

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X	NA	/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-WLD-005	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-13448				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	(1) PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

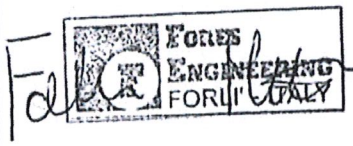
REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

REFER TO FINAL SHEET FOR ACCEPTANCE

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**
	Passed - Complete
X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	WLD-005	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	57			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		KROHNE / WATER LEAK DETECTOR			
Model	OPTISWITCH 6600			Serial Number		649498			
Drawing				Datasheet					
Cert No.	TUV 16 ATEX 182791X			Equipment Ambient Temp.		-40 / +74°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex ia	EPL		Gas group	II 1G IIC	Temp class	T5/T4	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	GM INTERNATIONAL	**Model:**	D1020D/B	
		Authority:	DMT	**Cert No:**	DMTATEX E240X	**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

	Please mark only one box as appropriate
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	17 FEB 2025	Project Quality Control Manager ☑ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSH-500	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	59			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W6023E0192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSH-600	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	60			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W5101101192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

Schedule Ref. #	61			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		WS113801192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	OM/NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSH-630	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	62			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W604 3F 01 192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

i) LACK OF COMPOUND IN THE CABLE GLAND OF CABLE 8-JB-PWR-01/LSH-630 → SOLVED 12/02

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x	NA	
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	MATTEO FABBRI	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSH-631	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	63			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W604400192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

i) LACK OF COMPOUND IN CABLE GLANDE CABLE: F-JB-PUR-01/LSH-631 → SOLVED 12/02

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	-	
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSH-640	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	64			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W604410192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	11 FEB 2025	Project Quality Control Manager ☑Witness ☐Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSHH-500	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	65			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W602F301192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSL-500	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	66			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W602440192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	~~OM~~ NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	C	TAG	LSL-600	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	67			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W 51012011 92			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Date	12 FEB 2025		
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

Schedule Ref. #	68			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		WB09E601192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OM	
36	No undue accumulation of dust and dirt	x	OM	
37	All equipment housings are clean and dry	x	OM	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OM	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OM	
50	Cable glands are of the correct type and installed correctly	x	OM	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OM	
52	Flame path are clean and undamaged	x	OM	
53	Flange gap dimensions are within tolerances	x	OM	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSL-611	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	69			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W55101301192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature			

FORES ENGINEERING Srl
Project Quality Control Manager
☒ Witness ☐ Review
FORES ENGINEERING
STROCCHI FRANCESCO
08/APR/2025

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSL-620	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	70			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W602F501192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OM	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OM	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OM	
24	Type of cable is appropriate	X	OM	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OM	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

i) LACK OF COMPOUND IN THE CABLE GLAND OF CABLE P-JB-PWR-01/LSL-620 → SOLVED 12/02

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x	NA	
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
		Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO		
Date	12/ FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSL-630	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	71			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W602501192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	C	TAG	LSL-640	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	72			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W602L601192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature			

FORES ENGINEERING Srl
Project Quality Control Manager
☒ Witness ☐ Review

FORES ENGINEERING
STROCCHI FRANCESCO
08/APR/2025

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSL-641	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	73			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		W602F60119Z			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LSLL-500	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	74			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL SWITCH			
Model	FTL51B			Serial Number		[] W602F401192			
Drawing				Datasheet					
Cert No.	KIWA 19ATEX0017X			Equipment Ambient Temp.		-50 / +70°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x	NA	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒Witness ☐Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LT-600	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	75			Area Code		WP4			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL TRANSMITTER			
Model	Levelflex FMP51			Serial Number		W900FF0112C			
Drawing				Datasheet					
Cert No.	KEMA10ATEX0093X			Equipment Ambient Temp.		-50 / +80°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	NA	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	LT-620	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	76			Area Code		WP5			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / LEVEL TRANSMITTER			
Model	Levelflex FMP51			Serial Number		W900FE0112C ✓			
Drawing				Datasheet					
Cert No.	KEMA10ATEX0093X			Equipment Ambient Temp.		-50 / +80°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6...T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	MPV-611	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	77			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		PS AUTOMATION / MOTORISED PROPORTIONAL VALVE			
Model	PSF-EX			Serial Number		[]			
Drawing				Datasheet					
Cert No.	TPS 22 ATEX 110398 0002 X			Equipment Ambient Temp.		-10 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2G IIC	Temp class	T4	IP Rating	64

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	MPV-630	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	78			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		PS AUTOMATION / MOTORISED PROPORTIONAL VALVE			
Model	PSF-EX			Serial Number		[]			
Drawing				Datasheet					
Cert No.	TPS 22 ATEX 110398 0002 X			Equipment Ambient Temp.		-10 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db eb	EPL		Gas group	II 2G IIC	Temp class	T4	IP Rating	64

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	OK	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x	OK	
60	Power conductors are not bunched together causing possible hot spots	x	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-150	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	79			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W7018F01198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Date	12 FEB 2025		
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-610	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	80			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W7075701198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FARSECI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-611	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	81			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W2028901198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	08/APR/2025	
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-612	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	82			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W7075801198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	08/APR/2025	
Signature		Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-630	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	83			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W707DE01198 ✓			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		B	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		OK	
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-631	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	84			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W3022601198 ✓			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

(i) lack of compound / to clarify if necessary compound type.
(ii) Too close cut HE ON RX
(iii) GND TO BE FIXED

SOLVED 12/02

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x	NA	
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025		
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

FORES ENGINEERING Srl
Project Quality Control Manager
☒ Witness ☐ Review

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-632	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	85			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W707E101198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x	NA	
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx		FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION		
Type (ELE/MEC)	E	TAG	PT-633	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	86			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W3022701198 ✓			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	N/A	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-900	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	87			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W7075901198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx		FORES ENGINEERING
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION	
Type (ELE/MEC)		TAG: PT-900	SYSTEM: C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:	
		Authority:		Cert No:	Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-910	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	88			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W707DF01198			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x	NA	
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	PT-920	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	89			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ENDRESS HAUSER / PRESSURE TRANSMITTER			
Model	PMP71B			Serial Number		W709F201198 ✓			
Drawing				Datasheet					
Cert No.	DEKRA 22ATEX0051 X			Equipment Ambient Temp.		-50 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2G IIC	Temp class	T6 / T1	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

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	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	**Passed - Complete**
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-500	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	90			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ASCO / PNEUMATIC VALVE			
Model	T290			Serial Number		41731546ZP2411020 7			
Drawing				Datasheet					
Cert No.	LCIE 20 ATEX 3037 X			Equipment Ambient Temp.		-10 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 1G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUMATIC
6	Equipment circuit identification is available	X	OK	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	NA	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	NA	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X	NA	
24	Type of cable is appropriate	X	NA	
25	There is no obvious damage to the cables	X	NA	
26	Cable glands are the correct type and installed correctly	X	NA	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	NA	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	NA	
33	All cable cores are uniquely labeled	x	NA	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x	NA	
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x	NA	
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	**BARRIER:**	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-501	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	91			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ASCO / PNEUMATIC VALVE			
Model	T290			Serial Number		41731540ZP2411020 7			
Drawing				Datasheet					
Cert No.	LCIE 20 ATEX 3037 X			Equipment Ambient Temp.		-10 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 1G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	ok	
2	Equipment group is correct	X	ok	
3	Equipment temperature class is correct	X	ok	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	ok	
5	Equipment circuit identification is correct	X	ok	PNEUMATIC
6	Equipment circuit identification is available	X	ok	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	ok	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	ok	
13	Condition of enclosure gaskets is satisfactory	X	ok	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	ok	
15	Electrical connections are tight	X	NA	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	NA	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X	NA	
24	Type of cable is appropriate	X	NA	
25	There is no obvious damage to the cables	X	NA	
26	Cable glands are the correct type and installed correctly	X	NA	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	ok	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	NA	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	NA	
33	All cable cores are uniquely labeled	x	NA	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	Ok	
36	No undue accumulation of dust and dirt	x	Ok	
37	All equipment housings are clean and dry	x	Ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x	NA	
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-501	SYSTEM	C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x	NA	
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	**BARRIER:**	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date		Project Quality Control Manager ☐Witness ☐Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-600	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	92			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		SCHUBERT & SALZER / PNEUMATIC VALVE			
Model	7010			Serial Number		2848620001/4			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-30 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	ok	
2	Equipment group is correct	X	ok	
3	Equipment temperature class is correct	X	ok	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	ok	
5	Equipment circuit identification is correct	X	ok	PNEUMATIC
6	Equipment circuit identification is available	X	ok	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	ok	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	ok	
13	Condition of enclosure gaskets is satisfactory	X	ok	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	ok	
15	Electrical connections are tight	X	NA	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	NA	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X	NA	
24	Type of cable is appropriate	X	NA	
25	There is no obvious damage to the cables	X	NA	
26	Cable glands are the correct type and installed correctly	X	NA	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	ok	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	NA	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	NA	
33	All cable cores are uniquely labeled	x	NA	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	ok	
36	No undue accumulation of dust and dirt	x	ok	
37	All equipment housings are clean and dry	x	ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-601	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	93			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		ASCO / PNEUMATIC VALVE			
Model	T290			Serial Number		4018112ZP24028733			
Drawing				Datasheet					
Cert No.	LCIE 20 ATEX 3037 X			Equipment Ambient Temp.		-10 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 1G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUMATIC
6	Equipment circuit identification is available	X	OK	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	NA	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	NA	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X	NA	
24	Type of cable is appropriate	X	NA	
25	There is no obvious damage to the cables	X	NA	
26	Cable glands are the correct type and installed correctly	X	NA	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	NA	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	NA	
33	All cable cores are uniquely labeled	x	NA	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-601	SYSTEM	C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x	NA	
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-610	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	94			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		ZP24036667-0			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUMATIC
6	Equipment circuit identification is available	X	OK	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	NA	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	NA	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X	NA	
23	Breathing and drainage devices are satisfactory	X	NA	
24	Type of cable is appropriate	X	NA	
25	There is no obvious damage to the cables	X	NA	
26	Cable glands are the correct type and installed correctly	X	NA	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	NA	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	NA	
33	All cable cores are uniquely labeled	x	NA	
34	Cable cores not in use are correctly terminated	x	NA	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:			
		Authority:		Cert No:		Type:	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
		Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING STROCCHI FRANCESCO	
Name	MATTEO FABBRI		
Date	12 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	95			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		SCHUBERT & SALZER / PNEUMATIC VALVE			
Model	7010			Serial Number		2848620001/1			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-30 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUMATIC
6	Equipment circuit identification is available	X	OK	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒Witness ☐Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-630	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	96			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE					
Model	T298			Serial Number		ZP24036667-0					
Drawing				Datasheet							
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	Ok	
2	Equipment group is correct	X	Ok	
3	Equipment temperature class is correct	X	Ok	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	Ok	
5	Equipment circuit identification is correct	X	Ok	PNEUMATIC
6	Equipment circuit identification is available	X	Ok	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X		
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	Ok	
11	Threaded covers on enclosures are of the correct type, are tight and secured		NA	
	Physical check	X		
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	Ok	
13	Condition of enclosure gaskets is satisfactory	X	Ok	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	Ok	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	Ok	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

1) INTERNAL CABLE NR 7 TO BE FIXED CABLE HEAD

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x	NA	
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	05 FEB 2025	08/APR/2025	
Signature		Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-631	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	97			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		ZP24040939-0			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUMATIC
6	Equipment circuit identification is available	X	OK	PNEUMATIC
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X		
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA

NA	**BARRIER:**	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	**Passed - Complete**
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	05 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-632	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	98			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		ZP24036670-0			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM.
6	Equipment circuit identification is available	X	OK	PNEUM.
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X		
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X		
13	Condition of enclosure gaskets is satisfactory	X		
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X		
15	Electrical connections are tight	X	NA	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x	NA	
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	05 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	A	TAG	PV-633	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	99			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		ZP24036669-0			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X		
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	NA	
13	Condition of enclosure gaskets is satisfactory	X		
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X		
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	Ok	
36	No undue accumulation of dust and dirt	x	Ok	
37	All equipment housings are clean and dry	x	Ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x	NA	
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x	NA	
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x	NA	
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Date	05 FEB 2025	FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-635	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	100			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE					
Model	T298			Serial Number		ZP24036669-0					
Drawing				Datasheet							
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X		
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		NA	
	Physical check	X		
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x	NA	
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x	NA	
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x	NA	
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x	NA	
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	05 FEB 2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Schedule Ref. #	101			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		SFERACO / PNEUMATIC VALVE			
Model	530IITA300+ASR130-40			Serial Number		2847610001/1			
Drawing				Datasheet					
Cert No.	LCIE 05 AR 023			Equipment Ambient Temp.		-50 / +230°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	c	EPL		Gas group	II 2GD	Temp class	-	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X		
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date		08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-641	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	102			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		SCHUBERT & SALZER / PNEUMATIC VALVE					
Model	7010			Serial Number		2848620001/1					
Drawing				Datasheet							
Cert No.	-			Equipment Ambient Temp.		-30 / +60°C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	T6 / T2	IP Rating	0		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X		
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		NA	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		NA	
	Physical check	X		
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x	NA	
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12FEB2025	08/APR/2025	
Signature		FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-642	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	103			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		SCHUBERT & SALZER / PNEUMATIC VALVE			
Model	7010			Serial Number		2848620001/3			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-30 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	Ok	
2	Equipment group is correct	X	Ok	
3	Equipment temperature class is correct	X	Ok	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	Ok	
5	Equipment circuit identification is correct	X	Ok	PNEUM
6	Equipment circuit identification is available	X	Ok	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X		
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	Ok	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	Ok	
13	Condition of enclosure gaskets is satisfactory	X	Ok	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	Ok	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	Ok	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	Ok	
36	No undue accumulation of dust and dirt	x	Ok	
37	All equipment housings are clean and dry	x	Ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-642	SYSTEM	C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	**BARRIER:**	**Manufacturer:**		**Model:**			
		Authority:		**Cert No:**		**Type:**	

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

	Please mark only one box as appropriate
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-800	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	104			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		SCHUBERT & SALZER / PNEUMATIC VALVE			
Model	7010			Serial Number		2848620001/2			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-30 / +60°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	T6 / T2	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	Ok	
36	No undue accumulation of dust and dirt	x	Ok	
37	All equipment housings are clean and dry	x	Ok	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-800	SYSTEM	C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-900	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	105			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		[]			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured		NA	
	Physical check	X		
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X	NA	
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA	
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x	NA	
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		Type:	
		Authority:		Cert No:			

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12FEB2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-901	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	106			Area Code		WP3					
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE					
Model	T298			Serial Number		[]					
Drawing				Datasheet							
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C					
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1				
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0		

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x	NA	
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	NA	
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x	NA	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-901	SYSTEM	C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☑ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-920	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	107			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		ZP24101432-0			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	PNEUM
6	Equipment circuit identification is available	X	OK	PNEUM
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X		
9	There is no evidence of unauthorized modifications	X	NA	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x	NA	
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	H	TAG	PV-920	SYSTEM	C-63 ELECTROLYZER

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	M	TAG	PV-921	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	108			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		EMERSON / PNEUMATIC VALVE			
Model	T298			Serial Number		ZP24113447-0			
Drawing				Datasheet					
Cert No.	-			Equipment Ambient Temp.		-10 / +180°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex h	EPL		Gas group	II 2G IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X		
8	There is no damage or unauthorized modifications	X	NA	
9	There is no evidence of unauthorized modifications	X		
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	NA	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X		
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X		
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X		
25	There is no obvious damage to the cables	X		
26	Cable glands are the correct type and installed correctly	X		
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	OK	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section		NA	
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x		
33	All cable cores are uniquely labeled	x		
34	Cable cores not in use are correctly terminated	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x		
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x	NA	
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x	NA	
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x	NA	
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x	NA	
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	NA	
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

NA	**BARRIER:**	**Manufacturer:**		**Model:**		
		Authority:		**Cert No:**		**Type:**

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO		
Date	12 FEB 2025	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	SD-006A	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	109			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / SMOKE DETECTOR			
Model	[] XP95			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] BAS 02ATEX1289X			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex ia	EPL		Gas group	[] IIC	Temp class	[] T5	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight		OK	
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x	NA	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PEPPERL+FUCHS	**Model:**	XP 95		
		Authority:	BASEEFA	**Cert No:**	00ATEX7067X	**Type:**	29600-098

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	21 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)		TAG	SD-006B	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	110			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / SMOKE DETECTOR			
Model	[] XP95			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] BAS 02ATEX1289			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex ia	EPL		Gas group	[] IIC	Temp class	[] T5	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	NA	
52	Flame path are clean and undamaged	x		
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PEPPERL+FUCHS	**Model:**	XP 95	
		Authority:	RASEEFA	**Cert No:**	00ATEX7067X	**Type:** 29600-098

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	11 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)		TAG	SD-006C	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	111			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		[] / SMOKE DETECTOR			
Model	[] XP95			Serial Number		[]			
Drawing				Datasheet					
Cert No.	[] BAS 02ATEX1289X			Equipment Ambient Temp.		[]			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	[] Ex ia	EPL		Gas group	[] IIC	Temp class	[] T5	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	
2	Equipment group is correct	X	OM	
3	Equipment temperature class is correct	X	OM	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	
5	Equipment circuit identification is correct	X	OM	
6	Equipment circuit identification is available	X	OM	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OM	
9	There is no evidence of unauthorized modifications	X	OM	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OM	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OM	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	
13	Condition of enclosure gaskets is satisfactory	X	OM	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	
15	Electrical connections are tight	X	OM	
16	Bridging links do not reduce creepage / clearance and are allowed	X		
17	Unused terminals are tightened	X		
18	Encapsulated components are undamaged	X		
19	Flameproof components are undamaged	X	NA	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X		
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OM	
26	Cable glands are the correct type and installed correctly	X	OM	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x	NA	
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x		
31	Automated electric protective devices operate within permitted limits	x		
32	Special conditions (if applicable) have been complied with.	x	OM	
33	All cable cores are uniquely labeled	x	OM	
34	Cable cores not in use are correctly terminated	x	OM	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x		
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x		
50	Cable glands are of the correct type and installed correctly	x		
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x		
52	Flame path are clean and undamaged	x	NA	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x	NA	
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x	OK	
92	Cables are installed in accordance with the documentation	x	OK	
93	Segregation is maintained between IS and non-IS Circuits	x	OK	
94	Cable screens are isolated at one end (field side)	x	OK	
95	Cable screens are earthed in accordance with the documentation	x	OK	
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	OK	
97	Equipment installed is the one specified in the documentation	x	OK	
98	Ambient temperature range of the apparatus is correct for the installation	x	OK	
99	Service temperature range of the apparatus is correct for the installation	x	OK	
100	Installation is clearly labelled	x	OK	
101	Printed circuit boards are clean and undamaged	x	OK	
102	The maximum voltage Um of the associated apparatus is not exceeded	x	OK	
103	Point-to-point connections are all correct	x	OK	
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x	OK	
105	Earth connections maintain the integrity of the type of protection	x	OK	
106	Intrinsically safe circuit earthing is satisfactory	x	OK	
107	Insulation resistance is satisfactory	x	OK	
108	Short-circuit protection of the power supply is in accordance with the documentation	x	OK	

	BARRIER:	**Manufacturer:**	PEPPERL+FUCHS	**Model:**	XP95		
		Authority:	BASEEFA	**Cert No:**	00ATEX7067X	**Type:**	29600-098

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	21 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	WH-206	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)		**Zone**	2	**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	CONVECTEUR ATEX 1000W				**Serial Number**		202109/4510				
Manufacturer	AEIB VENTILATEUR				**Description**		WALL HEATER				
Item Ambient Temp.	-20 / +40°C	**Protection Type**	Ex d	**EPL**	NA	**Gas group**	II 2G	**Temp class**	T3	**IP**	0
Cert No.	LCIE 03 ATEX 6386X										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	(1) PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	/
17	Unused terminals are tightened	X	OK	/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X	OK	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X	NA	/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

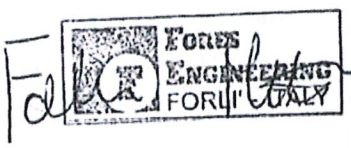
REFER TO FINAL SHEET FOR ACCEPTANCE

(1) AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -20/(40)
WP3 +5/(45)

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	OM	/
32	Special conditions (if applicable) have been complied with.	X	OM	/
33	All cable cores are uniquely labeled	X	OM	/
34	Cable cores not in use are correctly terminated	X	NA	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OM	/
36	No undue accumulation of dust and dirt	X	OM	/
37	All equipment housings are clean and dry	X	OM	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	OM	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	OM	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	OM	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	OM	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	OM	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	OM	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	OM	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	OM	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	OM	/
50	Cable glands are of the correct type and installed correctly	X	OM	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	OM	/
52	Flame path are clean and undamaged	X	OM	/
53	Flange gap dimensions are within tolerances	X	OM	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	NA	/
60	Power conductors are not bunched together causing possible hot spots	X	NA	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with	X	NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	ZIO-605	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	114			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		Soldo Controls / LIMIT SWITCH			
Model	SK012			Serial Number		[]			
Drawing				Datasheet					
Cert No.	CML 19ATEX1359X			Equipment Ambient Temp.		-55 / +105°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2GD IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x	NA	
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	C	TAG	ZIO-624	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	116			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		Soldo Controls / LIMIT SWITCH			
Model	SK012			Serial Number		[]			
Drawing				Datasheet					
Cert No.	CML 19ATEX1359X			Equipment Ambient Temp.		-55 / +105°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2GD IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	
28	Stopping boxes and cable boxes are corrected filled	X		
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x		
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
55	The ventilation airflow is not impeded	x		
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x	NA	
62	Insulation resistance (IR) of the motor windings is satisfactory	x		
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x		
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA	
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x	NA	
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x		
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	Please mark only one box as appropriate	
	X	Passed - Complete
		Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	
Date	12 FEB 2025		
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV00.docx			FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION			
Type (ELE/MEC)	E	TAG	ZIO-625	SYSTEM	C-63 ELECTROLYZER

Schedule Ref. #	115			Area Code		WP3			
Area Class Drawing				Manufacturer / Description		Soldo Controls / LIMIT SWITCH			
Model	SK012			Serial Number		[]			
Drawing				Datasheet					
Cert No.	CML 19ATEX1359X			Equipment Ambient Temp.		-55 / +105°C			
Area Classification	IIC (IIB+H2)	Zone	2	Gas group	3G	Temp class	T1		
Equipment Protection Type	Ex db	EPL		Gas group	II 2GD IIC	Temp class	Tx	IP Rating	0

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OK	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight			
	Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured			
	Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	NA	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X		
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	x		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section			
	Physical check	x	OK	
31	Automated electric protective devices operate within permitted limits	x	NA	
32	Special conditions (if applicable) have been complied with.	x	OK	
33	All cable cores are uniquely labeled	x	OK	
34	Cable cores not in use are correctly terminated	x	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	x	OK	
36	No undue accumulation of dust and dirt	x	OK	
37	All equipment housings are clean and dry	x	OK	
38	All moving parts are free and have no mechanical damage	x	NA	
	Applicable for Installation of Heating Systems			
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	x		
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	x	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	x		
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	x		
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	x		
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	x		
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	x		
	Extra Ex d checks			
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	x	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	x	OK	
50	Cable glands are of the correct type and installed correctly	x	OK	
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	x	OK	
52	Flame path are clean and undamaged	x	OK	
53	Flange gap dimensions are within tolerances	x		
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
55	The ventilation airflow is not impeded	x	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	x		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
58	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex e checks			
59	All Equipment is Ex e certified (including components within enclosure)	x		
60	Power conductors are not bunched together causing possible hot spots	x		
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	x		
62	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
64	The ventilation airflow is not impeded	x		
65	Motor protection devices operate within the permitted tE or tA time limits.	x		
66	Variable voltage/frequency installation complies with documentation	x		
	Extra Ex n (nR, nL) checks			
67	All Terminals are Ex n certified (if required on certificate)	x		
68	Hermetically sealed and enclosed break devices are undamaged	x		
69	Restricted breathing properties satisfactory (conduct vacuum test)	x		
70	Test port, if fitted, is functional (type "nR" only)	x		
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x		
73	The undamaged,ventilation motorairflow is foundationsnot impededhave	x		
74	Insulation resistance (IR) of the motor windings is satisfactory	x		
75	Motor protection devices operate within the permitted tE or tA time limits.	x		
76	Variable voltage/frequency installation complies with documentation	x		

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
	Extra Ex p checks			
77	Pressurization gas is correct type	x		
78	Actual pressure is within maximum and minimum settings for equipment	x		
79	Timers set as per certification documentation	x	NA	
80	Alarms and trip functions operate correctly as per certification documentation	x		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x		
82	Automatic electrical protective devices operate within permitted limits	x		
83	Automatic electrical protective devices are set correctly	x		
84	Protective gas inlet temperature is below maximum specified	x		
85	Ducts, pipes and enclosures are in good condition	x		
	General Equipment	**Detailed**	**OK/NA/PL**	**Comments**
86	Protective gas is substantially free from contaminants	x		
87	Protective gas pressure and/or flow is adequate	x		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA	
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x		
90	Specific conditions of use (if applicable) are complied with			
	Extra Ex i (Intrinsically Safe – IS) checks			
91	Equipment has adequate circuit identification for 'IS' Installation	x		
92	Cables are installed in accordance with the documentation	x		
93	Segregation is maintained between IS and non-IS Circuits	x		
94	Cable screens are isolated at one end (field side)	x		
95	Cable screens are earthed in accordance with the documentation	x		
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	x		
97	Equipment installed is the one specified in the documentation	x		
98	Ambient temperature range of the apparatus is correct for the installation	x		
99	Service temperature range of the apparatus is correct for the installation	x		
100	Installation is clearly labelled	x	NA	
101	Printed circuit boards are clean and undamaged	x		
102	The maximum voltage Um of the associated apparatus is not exceeded	x		
103	Point-to-point connections are all correct	x		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	x		
105	Earth connections maintain the integrity of the type of protection	x		
106	Intrinsically safe circuit earthing is satisfactory	x		
107	Insulation resistance is satisfactory	x		
108	Short-circuit protection of the power supply is in accordance with the documentation	x		

	BARRIER:	Manufacturer:		Model:		
		Authority:		Cert No:		Type:

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17

Please mark only one box as appropriate	
X	Passed - Complete
	Failed

	PERFORMED BY	WITNESS REVIEW	WITNESS REVIEW
Company	FORES		
Name	FABBRI MATTEO	FORES ENGINEERING Srl	
Date	12 FEB 2025	Project Quality Control Manager ☒ Witness ☐ Review	
Signature		FORES ENGINEERING STROCCHI FRANCESCO 08/APR/2025	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-DS-004	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA					**Area Code**		WP3			
Area Classification	IIC (IIB+H2)		**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1		
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03					**Item Datasheet**		DOCUMENTS IN THE SHARE POINT			
Model	GWM 1414					**Serial Number**		24-13454			
Manufacturer	CO.SI.ME.					**Description**		JUNCTION BOX			
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	PL (1)	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X	OK	/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

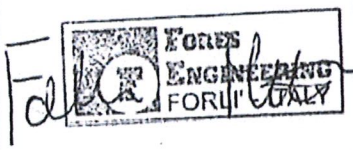
 REFER TO FINAL SHEET FOR ACCEPTANCE

(1) AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/(-10) WP3 +5/(+45)

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X	NA	/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**
	Passed - Complete
X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-DS-005	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-13449				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	① PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

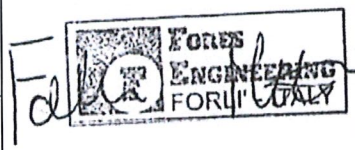
REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/40
WP3 +5/45

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	10/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-DS-006	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA					**Area Code**		WP3			
Area Classification	IIC (IIB+H2)		**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1		
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03					**Item Datasheet**		DOCUMENTS IN THE SHARE POINT			
Model	GWM 1414					**Serial Number**		24-13450			
Manufacturer	CO.SI.ME.					**Description**		JUNCTION BOX			
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	①PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

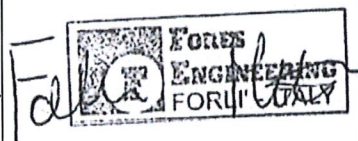
REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/+40
WP3 +5/+45

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-DS-007	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 1414				**Serial Number**		24-13447				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	① PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

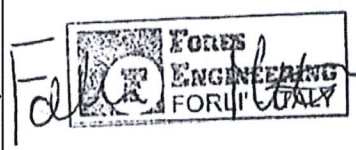
 REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMP NOT SUITABLE WITH WP3 ITEM -40/(-40) WP3 +5/(+45)

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-PWR-001	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)		**Zone**	2	**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	GWM 3636				**Serial Number**		23-08428				
Manufacturer	CO.SI.ME.				**Description**		JUNCTION BOX				
Item Ambient Temp.	-40 / +40°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	CEC 10ATEX158										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	PL ①	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	OK	/
17	Unused terminals are tightened	X	OK	/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X	OK	/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

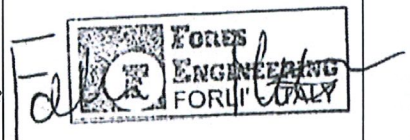
 REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMPERATURE NOT SUITABLE ITEM -40/+60°C → WP3 AMBIENT T° +5/+45°C

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X	NA	/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	FRANCESCO STROCCHI	
Date	12/FEB/2025	28/FEB/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-PWR-003	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)		**Zone**	2	**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	CCA3				**Serial Number**		1225/206				
Manufacturer	COELBO				**Description**		JUNCTION BOX				
Item Ambient Temp.	-20 / +40°C	**Protection Type**	Ex db	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	BVI 14ATEX0007										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	(1) PL	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	/
17	Unused terminals are tightened	X	OK	/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X	OK	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X	NA	/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	NA	/

REFER TO FINAL SHEET FOR ACCEPTANCE

(1) AMBIENT TEMPERATURE NOT SUITABLE ITEM -20/+40°C -> WP3 AMBIENT T° +5/+45°C

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	NA	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	OK	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	OK	/
50	Cable glands are of the correct type and installed correctly	X	OK	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	OK	/
53	Flange gap dimensions are within tolerances	X	OK	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X		/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X		/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X		/
58	Variable voltage/frequency installation complies with documentation	X		/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	NA	/
60	Power conductors are not bunched together causing possible hot spots	X	NA	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**
	Passed - Complete
X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	STROCCHI FRANCESCO	MELANDRI MATTEO	
Date	08/APR/2025	09/APR/2025	
Signature	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	FORES ENGINEERING Srl Matteo Melandri Project Quality Control Manager	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	JB-SD-001	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	CCA3				**Serial Number**		4324/759				
Manufacturer	COELBO				**Description**		JUNCTION BOX				
Item Ambient Temp.	-20 / +40°C	**Protection Type**	Ex db	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	BVI 14ATEX0007										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	① PL	/
2	Equipment group is correct	X	OM	/
3	Equipment temperature class is correct	X	OM	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	/
5	Equipment circuit identification is correct	X	OM	/
6	Equipment circuit identification is available	X	OM	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OM	/
9	There is no evidence of unauthorized modifications	X	OM	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OM	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OM	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	/
13	Condition of enclosure gaskets is satisfactory	X	OM	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	/
15	Electrical connections are tight	X	OM	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	/
17	Unused terminals are tightened	X	NA	/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X	OM	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X	NA	/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OM	/
25	There is no obvious damage to the cables	X	OM	/
26	Cable glands are the correct type and installed correctly	X	OM	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X	NA	/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X	NA	/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X		/

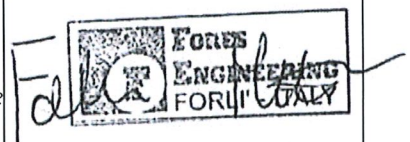
REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMPERATURE NOT SUITABLE ITEM -20/+40°C → WP3 AMBIENT T° +5/+45°C

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	NA	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	OK	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	OK	/
50	Cable glands are of the correct type and installed correctly	X	OK	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	OK	/
53	Flange gap dimensions are within tolerances	X	OK	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X		/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X		/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X		/
58	Variable voltage/frequency installation complies with documentation	X		/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	NA	/
60	Power conductors are not bunched together causing possible hot spots	X	NA	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	FRANCESCO STROCCHI	
Date	12/FEB/2025	28/FEB/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	PT-206	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA					**Area Code**		WP3			
Area Classification	IIC (IIB+H2)		**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1		
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03					**Item Datasheet**		DOCUMENTS IN THE SHARE POINT			
Model	ExCos-P-250					**Serial Number**		056.3005 24390049			
Manufacturer	SCHISCHEK GMBH					**Description**		PRESSURE TRANSMITTER			
Item Ambient Temp.	-20°C/+50°C	**Protection Type**	Ex e	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	66
Cert No.	EPS14ATEX1655X										
EU Declaration of conformity/ Technical file number	EUC-ExCos 2020-04-01 V02										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	/
2	Equipment group is correct	X	OM	/
3	Equipment temperature class is correct	X	OM	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	/
5	Equipment circuit identification is correct	X	OM	/
6	Equipment circuit identification is available	X	OM	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	OM	/
8	There is no damage or unauthorized modifications	X	OM	/
9	There is no evidence of unauthorized modifications	X	OM	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OM	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OM	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	/
13	Condition of enclosure gaskets is satisfactory	X	OM	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	/
15	Electrical connections are tight	X	OM	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	/
17	Unused terminals are tightened	X	OM	/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OM	/
25	There is no obvious damage to the cables	X	OM	/
26	Cable glands are the correct type and installed correctly	X	OM	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X	NA	/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X		/

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X	OM	/
33	All cable cores are uniquely labeled	X	OM	/
34	Cable cores not in use are correctly terminated	X	OM	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OM	/
36	No undue accumulation of dust and dirt	X	OM	/
37	All equipment housings are clean and dry	X	OM	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OM	/
60	Power conductors are not bunched together causing possible hot spots	X	OM	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	28/MAR/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	TT-206	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	TFR-2G				**Serial Number**		N/A				
Manufacturer	SCHISCHEK GMBH				**Description**		TEMPERATURE				
Item Ambient Temp.	-30°C/+60°C	**Protection Type**	Ex ia	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	0
Cert No.	N/A										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

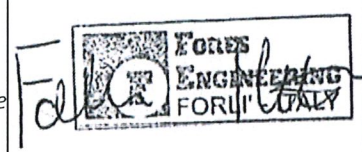
	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	NA	/
13	Condition of enclosure gaskets is satisfactory	X		/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X		/
29	Integrity of conduit system and interface with mixed system maintained	X	NA	/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X		/

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	NA	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	NA	/
60	Power conductors are not bunched together causing possible hot spots	X	NA	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	28/FEB/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	HY-206	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	FFR-2G				**Serial Number**		N/A				
Manufacturer	SCHISCHEK GMBH				**Description**		HYGROMETER				
Item Ambient Temp.	-30°C/+60°C	**Protection Type**	Ex ia	**EPL**	NA	**Gas group**	II 2G IIC	**Temp class**	T6	**IP**	0
Cert No.	N/A										
EU Declaration of conformity/ Technical file number	N/A										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

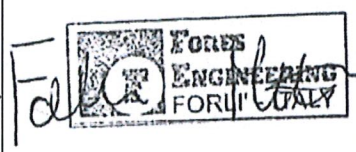
	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OK	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	NA	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X		/
13	Condition of enclosure gaskets is satisfactory	X		/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X	NA	/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X		/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X		/

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	NA	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	NA	/
60	Power conductors are not bunched together causing possible hot spots	X	NA	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	28/FEB/2025	
Signature			

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	C63-QF-001	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		DOCUMENTS IN THE SHARE POINT				
Model	202282EX				**Serial Number**		N/A				
Manufacturer	PALAZZOLI				**Description**		Q2 SWITCH				
Item Ambient Temp.	-20 °C ≤ Ta ≤ +40 °C	**Protection Type**	Ex nR	**EPL**	NA	**Gas group**	II 3G IIC	**Temp class**	T6	**IP**	66
Cert No.	N/A										
EU Declaration of conformity/ Technical file number	DoC02										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	PL (1)	/
2	Equipment group is correct	X	OK	/
3	Equipment temperature class is correct	X	OK	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	/
5	Equipment circuit identification is correct	X	OK	/
6	Equipment circuit identification is available	X	OK	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OK	/
9	There is no evidence of unauthorized modifications	X	OK	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	/
13	Condition of enclosure gaskets is satisfactory	X	OK	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	/
15	Electrical connections are tight	X	OK	/
16	Bridging links do not reduce creepage / clearance and are allowed	X		/
17	Unused terminals are tightened	X		/
18	Encapsulated components are undamaged	X	NA	/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OK	/
25	There is no obvious damage to the cables	X	OK	/
26	Cable glands are the correct type and installed correctly	X	OK	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	/

 REFER TO FINAL SHEET FOR ACCEPTANCE

(1) AMBIENT TEMPERATURE NOT SUITABLE ITEM: -20/40 <-> WP3 AMBIENT T° +5/+45°C

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	NA	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	NA	/
60	Power conductors are not bunched together causing possible hot spots	X	NA	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	OK	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X		/
70	Test port, if fitted, is functional (type "nR" only)	X	OK	/
71	Breathing operation is satisfactory (type "nR" only)	X	OK	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X		/
73	The ventilation airflow is not impeded.	X		/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X		/
76	Variable voltage/frequency installation complies with documentation	X		/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
		Passed - Complete
	X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	STROCCHI FRANCESCO	MELANDRI MATTEO	
Date	08/APR/2025	09/APR/2025	
Signature	FORES ENGINEERING Srl Project Quality Control Manager ☑ Witness ☐ Review	FORES ENGINEERING Srl Matteo Melandri Project Quality Control Manager	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	Q.RIO2	Non-Electrical	N/A	SYSTEM	WP3

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA					**Area Code**		WP3			
Area Classification	IIC (IIB+H2)		**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1		
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03					**Item Datasheet**		DOCUMENTS IN THE SHARE POINT			
Model	D240934CH03					**Serial Number**		QUADRO ELETTRICO RIO2			
Manufacturer	PROTEO					**Description**		REMOTE I/O CABINET			
Item Ambient Temp.	-20 / +45 °C	**Protection Type**	Ex ec	**EPL**	NA	**Gas group**	II 3G	**Temp class**	T6	**IP**	66
Cert No.	N/A										
EU Declaration of conformity/ Technical file number	074_Q_24_P240934_W240716_ENG										

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	OM	/
2	Equipment group is correct	X	OM	/
3	Equipment temperature class is correct	X	OM	/
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OM	/
5	Equipment circuit identification is correct	X	OM	/
6	Equipment circuit identification is available	X	OM	/
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	/
8	There is no damage or unauthorized modifications	X	OM	/
9	There is no evidence of unauthorized modifications	X	OM	/
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OM	/
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OM	/
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OM	/
13	Condition of enclosure gaskets is satisfactory	X	OM	/
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OM	/
15	Electrical connections are tight	X	OM	/
16	Bridging links do not reduce creepage / clearance and are allowed	X	OM	/
17	Unused terminals are tightened	X	OM	/
18	Encapsulated components are undamaged	X		/
19	Flameproof components are undamaged	X		/
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X	NA	/
21	HID lamps are not indicating EOL effects	X		/
22	Lamp type, rating, pin configuration and position are correct	X		/
23	Breathing and drainage devices are satisfactory	X		/
24	Type of cable is appropriate	X	OM	/
25	There is no obvious damage to the cables	X	OM	/
26	Cable glands are the correct type and installed correctly	X	OM	/
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		/
28	Stopping boxes and cable boxes are corrected filled	X	NA	/
29	Integrity of conduit system and interface with mixed system maintained	X		/
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OM	/

REFER TO FINAL SHEET FOR ACCEPTANCE

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	/
32	Special conditions (if applicable) have been complied with.	X		/
33	All cable cores are uniquely labeled	X	OK	/
34	Cable cores not in use are correctly terminated	X	OK	/
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	/
36	No undue accumulation of dust and dirt	X	OK	/
37	All equipment housings are clean and dry	X	OK	/
38	All moving parts are free and have no mechanical damage	X	NA	/
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	/
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	/
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	/
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	/
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	/
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	/
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	/
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	NA	/
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	/
50	Cable glands are of the correct type and installed correctly	X	NA	/
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	NA	/
52	Flame path are clean and undamaged	X	NA	/
53	Flange gap dimensions are within tolerances	X	NA	/
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	NA	/
55	The ventilation airflow is not impeded	X	NA	/
56	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
58	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	/
60	Power conductors are not bunched together causing possible hot spots	X	OK	/
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X	OK	/
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
64	The ventilation airflow is not impeded	X	NA	/
65	Motor protection devices operate within the permitted tE or tA time limits.	X	NA	/
66	Variable voltage/frequency installation complies with documentation	X	NA	/
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	X	NA	/
68	Hermetically sealed and enclosed break devices are undamaged	X	NA	/
69	Restricted breathing properties satisfactory (conduct vacuum test)	X	NA	/
70	Test port, if fitted, is functional (type "nR" only)	X	NA	/
71	Breathing operation is satisfactory (type "nR" only)	X	NA	/
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	X	NA	/
73	The ventilation airflow is not impeded.	X	NA	/
74	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	/
75	Motor protection devices operate within the permitted tE or tA time limits	X	NA	/
76	Variable voltage/frequency installation complies with documentation	X	NA	/

Extra Ex p checks				
77	Pressurization gas is correct type	X	NA	/
78	Actual pressure is within maximum and minimum settings for equipment	X	NA	/
79	Timers set as per certification documentation	X	NA	/
80	Alarms and trip functions operate correctly as per certification documentation	X	NA	/
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X	NA	/
82	Automatic electrical protective devices operate within permitted limits	X	NA	/
83	Automatic electrical protective devices are set correctly	X	NA	/
84	Protective gas inlet temperature is below maximum specified	X	NA	/
85	Ducts, pipes and enclosures are in good condition	X	NA	/
86	Protective gas is substantially free from contaminants	X	NA	/
87	Protective gas pressure and/or flow is adequate	X	NA	/
88	Pressure and/or flow indicators, alarms and interlocks function correctly	X	NA	/
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	X	NA	/
90	Specific conditions of use (if applicable) are complied with		NA	/
Extra Ex i (Intrinsically Safe – IS) checks				
91	Equipment has adequate circuit identification for 'IS' Installation	X	NA	/
92	Cables are installed in accordance with the documentation	X	NA	/
93	Segregation is maintained between IS and non-IS Circuits	X	NA	/
94	Cable screens are isolated at one end (field side)	X	NA	/
95	Cable screens are earthed in accordance with the documentation	X	NA	/
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	NA	/
97	Equipment installed is the one specified in the documentation	X	NA	/
98	Ambient temperature range of the apparatus is correct for the installation	X	NA	/
99	Service temperature range of the apparatus is correct for the installation	X	NA	/
100	Installation is clearly labelled	X	NA	/
101	Printed circuit boards are clean and undamaged	X	NA	/
102	The maximum voltage Um of the associated apparatus is not exceeded	X	NA	/
103	Point-to-point connections are all correct	X	NA	/
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	NA	/
105	Earth connections maintain the integrity of the type of protection	X	NA	/
106	Intrinsically safe circuit earthing is satisfactory	X	NA	/
107	Insulation resistance is satisfactory	X	NA	/
108	Short-circuit protection of the power supply is in accordance with the documentation	X	NA	/

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**	
	X	**Passed - Complete**
		Failed

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	STROCCHI FRANCESCO	MELANDRI MATTEO	
Date	08/APR/2025	09/APR/2025	
Signature	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	FORES ENGINEERING Srl Matteo Melandri Project Quality Control Manager	

CROSSWIND	Doc Name: 224J11_ATEX_INSPECTION_ITR_REV01.docx					FORES ENGINEERING	
	TASK	HAZARDOUS AREA EQUIPMENT DETAILED INSPECTION					
Schedule Ref. #		TAG	HPP-700	Type (ELE/MEC)	ELE	SYSTEM	C-63 ELECTROLYZER

Area Class Drawing	C63-DUO-001_ 006 - ATEX_AREA				**Area Code**		WP3				
Area Classification	IIC (IIB+H2)	**Zone**	2		**Gas group**	3G	**Temp class WP3**	T1			
Reference Drawing	CABLE LIST: C0063-FOR-LST-EL-001_Rev.03				**Item Datasheet**		REFER TO DOCUMENTS IN THE SHARE POINT				
Model	DEDR 500/36				**Serial Number**		A-23/24 140				
Manufacturer	AQUAGAS				**Description**		HYDROGEN PURIFICATION PACKAGE				
Item Ambient Temp.	-20 / +40°C	**Protection Type**	Ex h	**EPL**		**Gas group**		**Temp class**		**IP**	0
Cert No.	-										
EU Declaration of conformity/ Technical file number											

Detailed Note:

Inspection shall only be performed by competent personnel with competency verified by CrossWind

All fields are to be completed. Any non-applicable field shall state "NA". Comments are required for 'Failure' column ONLY.

An Inspection Sheet should be completed for EACH individual item of Equipment.

	General Equipment	Detailed	OK/NA/PL	Comments
1	Equipment is appropriate to the EPL / Zone requirements of the area	X	PL ①	
2	Equipment group is correct	X	OK	
3	Equipment temperature class is correct	X	OK	
4	Degree of IP protection of equipment is appropriate for the level of protection	X	OK	
5	Equipment circuit identification is correct	X	OK	
6	Equipment circuit identification is available	X	OK	
7	Enclosure glass parts and glass-to-metal sealing gaskets and / or compounds are satisfactory	X	NA	
8	There is no damage or unauthorized modifications	X	OK	
9	There is no evidence of unauthorized modifications	X	OK	
10	Bolts, cable entry devices (direct and indirect) & blanking elements are of the correct type, are complete & tight. Physical check	X	OK	
11	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check	X	OK	
12	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and positioned correctly	X	OK	
13	Condition of enclosure gaskets is satisfactory	X	OK	
14	There is no evidence or ingress of water or dust in the enclosure in accordance with the IP rating	X	OK	
15	Electrical connections are tight	X	OK	
16	Bridging links do not reduce creepage / clearance and are allowed	X	NA	
17	Unused terminals are tightened	X	OK	
18	Encapsulated components are undamaged	X	OK	
19	Flameproof components are undamaged	X	OK	
20	Fluorescent lamps are not indicating EOL effects (only for Ex "e" – Ex "n" – Ex "t")	X		
21	HID lamps are not indicating EOL effects	X	NA	
22	Lamp type, rating, pin configuration and position are correct	X		
23	Breathing and drainage devices are satisfactory	X	OK	
24	Type of cable is appropriate	X	OK	
25	There is no obvious damage to the cables	X	OK	
26	Cable glands are the correct type and installed correctly	X	OK	
27	Sealing of trunking, ducts, pipes and or conduits is satisfactory	X		
28	Stopping boxes and cable boxes are corrected filled	X	NA	
29	Integrity of conduit system and interface with mixed system maintained	X		
30	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are of sufficient cross-section. Physical check	X	OK	

REFER TO FINAL SHEET FOR ACCEPTANCE

① AMBIENT TEMPERATURE NOT SUITABLE ITEM: -20/+40°C -> WP3 AMBIENT T° +5/+45°C

	General Equipment	Detailed	OK/NA/PL	Comments
31	Automated electric protective devices operate within permitted limits	X	NA	
32	Special conditions (if applicable) have been complied with.	X	OK	
33	All cable cores are uniquely labeled	X	OK	
34	Cable cores not in use are correctly terminated	X	OK	
35	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors	X	OK	
36	No undue accumulation of dust and dirt	X	OK	
37	All equipment housings are clean and dry	X	OK	
38	All moving parts are free and have no mechanical damage	X	NA	
Applicable for Installation of Heating Systems				
39	Temperature sensors function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	
40	Safety cut off devices function according to manufacturer's documents (only applicable for Ex-d e Ex-e)	X	NA	
41	The setting of the safety cut off is sealed (only applicable for Ex-d e Ex-e)	X	NA	
42	Reset of a heating system safety cut off possible with tool only(only applicable for Ex-d e Ex-e)	X	NA	
43	Auto-reset is not possible (only applicable for Ex-d e Ex-e)	X	NA	
44	Reset of a safety cut off under fault conditions is prevented (only applicable for Ex-d e Ex-e)	X	NA	
45	Safety cut off independent from control system (only applicable for Ex-d e Ex-e)	X	NA	
46	Level switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	
47	Flow switch is installed and correctly set, if required (only applicable for Ex-d e Ex-e)	X	NA	
Extra Ex d checks				
48	Obstructions adjacent to flame proof flanged joints are in accordance with IEC 60079-14	X	OK	
49	Ex d conduits seals are fitted to all conduits and satisfactorily sealed	X	NA	
50	Cable glands are of the correct type and installed correctly	X	OK	APPLICABLE ONLY FOR HE64.1
51	Adaptors, reducers, stop ends, etc. are all certified Ex d	X	OK	
52	Flame path are clean and undamaged	X	OK	
53	Flange gap dimensions are within tolerances	X	OK	
54	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X		
55	The ventilation airflow is not impeded	X	NA	
56	Insulation resistance (IR) of the motor windings is satisfactory	X		
57	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X		
58	Variable voltage/frequency installation complies with documentation	X		
Extra Ex e checks				
59	All Equipment is Ex e certified (including components within enclosure)	X	OK	APPLICABLE ONLY FOR JB1 & JB1.1
60	Power conductors are not bunched together causing possible hot spots	X	OK	
61	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are undamaged, motor foundations have no indentations or cracks	X		
62	Insulation resistance (IR) of the motor windings is satisfactory	X	NA	
63	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	X		
64	The ventilation airflow is not impeded	X		
65	Motor protection devices operate within the permitted tE or tA time limits.	X		
66	Variable voltage/frequency installation complies with documentation	X		
Extra Ex n (nR, nL) checks				
67	All Terminals are Ex n certified (if required on certificate)	x	NA	
68	Hermetically sealed and enclosed break devices are undamaged	x	NA	
69	Restricted breathing properties satisfactory (conduct vacuum test)	x	NA	
70	Test port, if fitted, is functional (type "nR" only)	x	NA	
71	Breathing operation is satisfactory (type "nR" only)	x	NA	
72	Motor fans have sufficient clearance to the enclosure and/or covers, cooling systems are	x	NA	
73	The ventilation airflow is not impeded.	x	NA	
74	Insulation resistance (IR) of the motor windings is satisfactory	x	NA	
75	Motor protection devices operate within the permitted tE or tA time limits	x	NA	
76	Variable voltage/frequency installation complies with documentation	x	NA	

Extra Ex p checks					
77	Pressurization gas is correct type	x	NA		
78	Actual pressure is within maximum and minimum settings for equipment	x	NA		
79	Timers set as per certification documentation	x	NA		
80	Alarms and trip functions operate correctly as per certification documentation	x	NA		
81	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory	x	NA		
82	Automatic electrical protective devices operate within permitted limits	x	NA		
83	Automatic electrical protective devices are set correctly	x	NA		
84	Protective gas inlet temperature is below maximum specified	x	NA		
85	Ducts, pipes and enclosures are in good condition	x	NA		
86	Protective gas is substantially free from contaminants	x	NA		
87	Protective gas pressure and/or flow is adequate	x	NA		
88	Pressure and/or flow indicators, alarms and interlocks function correctly	x	NA		
89	Conditions of spark and particle barriers of ducts for exhausting the gas in hazardous area are satisfactory	x	NA		
90	Specific conditions of use (if applicable) are complied with		NA		
Extra Ex i (Intrinsically Safe – IS) checks					
91	Equipment has adequate circuit identification for 'IS' Installation	X	OM		
92	Cables are installed in accordance with the documentation	X	OM		APPLICABLE
93	Segregation is maintained between IS and non-IS Circuits	X	OM		ONLY FOR
94	Cable screens are isolated at one end (field side)	X	OM		TT XX
95	Cable screens are earthed in accordance with the documentation	X	OM		68 XX
96	Safety barrier units, relays and other energy limiting devices are of the approved type, installed in	X	OM		PT 64.1
97	Equipment installed is the one specified in the documentation	X	OM		TS 64.3 & 66.4
98	Ambient temperature range of the apparatus is correct for the installation	X	OM		FC 64.1
99	Service temperature range of the apparatus is correct for the installation	X	OM		JB 2
100	Installation is clearly labelled	X	OM		
101	Printed circuit boards are clean and undamaged	X	OM		
102	The maximum voltage Um of the associated apparatus is not exceeded	X	OM		
103	Point-to-point connections are all correct	X	OM		
104	Earth continuity is satisfactory (e.g. connections are tight, conductors are of sufficient cross-section)	X	OM		
105	Earth connections maintain the integrity of the type of protection	X	OM		
106	Intrinsically safe circuit earthing is satisfactory	X	OM		
107	Insulation resistance is satisfactory	X	OM		
108	Short-circuit protection of the power supply is in accordance with the documentation	X	OM		

Remarks: Initial inspection should be detailed and carried out before equipment is brought into service as per IEC 60079-17	**Please mark only one box as appropriate**
	Passed - Complete
X	**Failed**

	PERFORMED BY	APPROVED BY	WITNESS REVIEW
Company	FORES ENGINEERING	FORES ENGINEERING	
Name	FABBRI MATTEO	STROCCHI FRANCESCO	
Date	12/FEB/2025	08/APR/2025	
Signature	FORES ENGINEERING FORLI' (ITALY)	FORES ENGINEERING Srl Project Quality Control Manager ☒ Witness ☐ Review	

Section 4.2 Electrical
“As-Commissioned” interconnection diagrams

FROM	TO

DESCRIPTION: ELECTROLYSER
TAG NUMBER: A-20000

RECTIFIER HCU

X12.1

-X121 29
-X121 30

OPENING H.V. CELL

1 2 3 4 5 6 7

REFER C63-NID-ELO-DED01-A.5 SHT 182

MARCO MORETTO
21/3/25

BK — 20001-CEC 7C X 1.5 mm² — BK

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

COLUMN: A1

XM

1 K94WT
2 -25 XM
3 -26 XM
4
5 TRANSFORMER DGPT2 PROTECTION TRIP
6
7

REFER 1723002197-EL-DG-00018 SHT 23

DESCRIPTION: SIGNALS FOR CONTROL SYSTEM
TAG NUMBER: SG-200D2

-X2

MCB HEALTY ON SG-200D2
X2 / 42
X2 / 43
MCB HEALTY ON SG-200N1
X2 / 13
X2 / 14

1 2 3 4 5 6 7

BK — 83016-CEC 7C X 1.5 mm² — BK

NO MARK UP
MARCO MORETTO
18/3/25

AS COMMISSIONED: MATTIA GIROTTO

DESCRIPTION: AUXILIARY LV
TAG NUMBER: SG-200N1

COLUMN: +A2/02

-X2

1 X2 / 66
2 X2 / 67
3 X2 / 45
4 X2 / 46
5
6
7

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
SIGNALS FOR CONTROL SYSTEM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : 1:X

A3

DRAWING NO. 123A90-DDL-EL-DG-20149

SHEET 086

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

FROM	TO

DESCRIPTION: LV Switchgear
TAG NUMBER: SG-200N1

COLUMN/CUBIC.: A2/~~+08~~ +02

L1	BK	83010-CEL-L1 1C X 95 mm²	BK	L1
L2	BK	83010-CEL-L2 1C X 95 mm²	BK	L2
L3	BK	83010-CEL-L3 1C X 95 mm²	BK	L3
N	BK	83010-CEL-N 1C X 95 mm²	BK	N
PE	Y/G	83010-CEL-E 1C X 95 mm²	Y/G	PE

P.E. BUS BAR

NO MARK UP
19/3/25 MARCO MORETTO

DESCRIPTION: TEMPORARY GENERATOR / MOBILE BATTERY PACK
TAG NUMBER: JB-200E2

INCOMING FROM LV SWITCHGEAR
SG-200N1

P.E. BUS BAR

COLUMN/CUBIC.: A1/+08

L1	BK	83013-CEL-L1 1C X 300 mm²	BK	L1
L2	BK	83013-CEL-L2 1C X 300 mm²	BK	L2
L3	BK	83013-CEL-L3 1C X 300 mm²	BK	L3
N	BK	83013-CEL-N 1C X 300 mm²	BK	N
PE	Y/G	83013-CEL-E 1C X 150 mm²	Y/G	PE

P.E. BUS BAR

NO MARK UP MARCO MORETTO
21/3/25

DESCRIPTION: ELECTROLYSER AUXILIARY LOAD
TAG NUMBER: A-20000

P.E. BUS BAR

COLUMN/CUBIC.: A4/+03

L1	BN	83012-CEL 5G16 mm²	BN	1 L1
L2	BK		BK	2 L2
L3	GY		GY	3 L3
N	BU		BU	4 N
PE	Y/G		Y/G	5 PE

P.E. BUS BAR

AS COMMISSIONED : MATTIA GIROTTI

DESCRIPTION: FUEL CELL AUXILIARY LOAD
TAG NUMBER: A-80000

-XB01

P.E. BUS BAR

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DG-20149

REV.:	DATE:	SIGNATURE:
2_F	09/01/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
LV SWITCHGEAR SG-200N1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. 123A90-DDL-EL-DG-20149 | SHEET 021 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

CH6 AS-BUILT E&I

C0063-FOR-DGM-EL-002

Power and Control Panel Layout & Single Line Diagram

C63- CrossWind Project

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
01	Issue for Review	02-DEC-2024	A. MONTI	M. CHIARUCCI	L. MAIOLI
00	Issue for Revision	11-OCT-2024	A. MONTI	M. CHIARUCCI	L. MAIOLI

Elogen Project Document Number	C0063-FOR-DGM-EL-002
Elogen Project Document Title	Power and Control Panel Layout & Single Line Diagram
Crosswind Project Document Number	FORES-INN-BPH-DWG-00029
Vendor Document Number and Revision	224J10-DDL-EL-DG-00002

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Revision*
01	*Issue for Review*

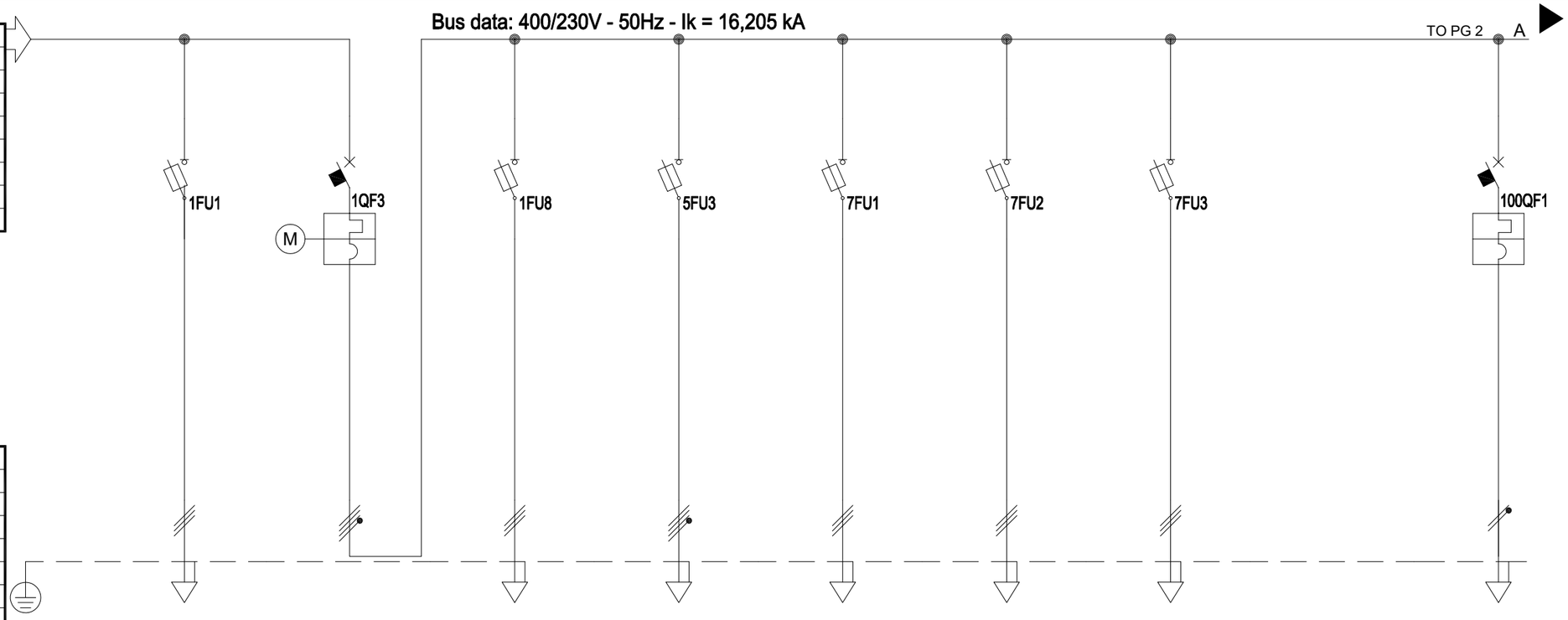
HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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From Switchboard:	SG-200N1
Feeder:	Q1
Cable [mm²]:	4(1x300)+(1G150)
Length [m]:	75
Voltage [V]:	400
Frequency [Hz]:	50
Poles:	FourPoles
Terminal type:	
Terminal number:	

Bus data: 400/230V - 50Hz - Ik = 16,205 kA



Switchboard prefix:	CONTROL CABINET
Distribution:	FourPoles
Ik Max [kA]:	16,258
Rated operating voltage [V]:	400
Rated insulation voltage[V]:	
Frequency [Hz]:	50
Icw (1s) [kA]:	36
Degree of protection IP:	IP55
TAG:	20-UCP-001

Load Code			1FU1	1QF3	1FU8	5FU1	1HL3	1HL4	1HL5		100QF1
Description			PHASE MONITORING RELAY	GENERAL SWITCH	DISCHARGER (FourPoles)	MAIN LINE MESURING DEVICE	VOLTAGE PRESENCE LAMP 1 MAIN CABINET	VOLTAGE PRESENCE LAMP 2 MAIN CABINET	VOLTAGE PRESENCE LAMP 3 MAIN CABINET		HCU-400 230 Vac
Simultaneous Power		[kW]	0,012	232	–	–	–	–	–		4
CURRENT (Ib)		[A]	0,03	392	125	10	1	1	1		6,41
CosPhi			1	0,865	1	1	1	1	1		0,9
SIMULTANEITY FACTOR		[%]	100	85	100	100	100	100	100		100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	ITALWEBER	SIEMENS	SIEMENS	SIEMENS	SIEMENS		SIEMENS
	MODEL		3NW7063+3NW6001-1	3VA1463-4GF42-0AA0	33200	3NW7063+3NW6003-1	3NW7063+3NW6011-1	3NW7063+3NW6011-1	3NW7063+3NW6011-1		5SY7225-7
	Execution		NO	NO	NO	NO	NO	NO	NO		NO
	TYPE		10x38 / gG	4 x 630	3 x 125 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG		2 x 25 / C
	Ir	[A]	–/– / 6	440/630/ 630	–/– / 125	–/– / 10	–/– / 1	–/– / 1	–/– / 1		–/– / 25
	Im	[A]	–/–/ 32	5040/2520/ 5040	–/–/ 160	–/–/32	–/–/ 32	–/–/ 32	–/–/ 32		–/–/25
	Breaking Capacity	[kA]	100	36	120	100	100	100	100		15
	RCD Id	[A]	–	–	–	–	–	–	–		–
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			ThreePoles	FourPoles	ThreePoles	FourPoles					SinglePhase R1+N
FEEDER	Code		–	–	–	–	–	–	–		–
	Lenght	[m]	–	–	–	–	–	–	–		–
	Installation type		–	–	–	–	–	–	–		–
	Cross Section	[mmq]	–	–	–	–	–	–	–		–
	Current Capacity (IZ)	[A]	–	–	–	–	–	–	–		–
	△V @Ib (end of line)	%	–	–	–	–	–	–	–		–
	Icc max (end of line)	[A]	–	–	–	–	–	–	–		–

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IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH

REVISIONI *Revision*					
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	
01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

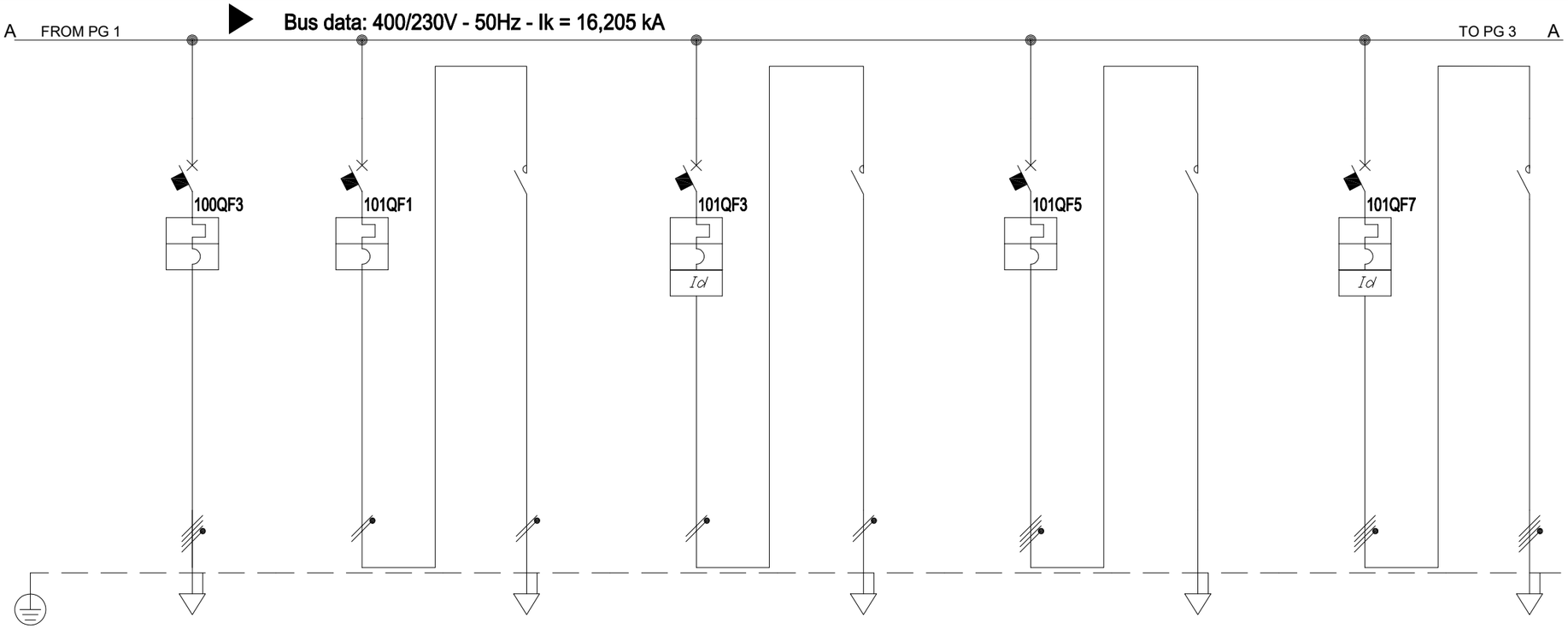
Sheet 1

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QUESTO DISEGNO E' DI NOSTRA PROPRIETA' NON PUO' ESSERE COPIATO-RIPRODOTTO E/O DIVULGATO SENZA AUTORIZZAZIONE SCRITTA.



Load Code			100QF3	101QF1	300KM5	101QF3	300KM3	101QF5	300KM1	101QF7	300KM4
Description			HCU-400 400 Vac	SPARE	SPARE	HE-61.1 (HPP-700)	HE-61.1 (HPP-700)	SPARE	SPARE	HE-64.1 (HPU-700)	HE-64.1 (HPU-700)
Simultaneous Power		[kW]	8	9,5	9,5	3	3	—	—	6	6
CURRENT (Ib)		[A]	12,8	63	63	13	13	20	20	8,66	8,66
CosPhi			0,9	0,9	0,9	1	1	0,9	0,9	1	1
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		5SY7420-7	5SY8263-7	3RT2036-1NB30	5SY7220-7	3RT2023-1BB40	5SY7420-7	3RT2325-1BB40	5SY7416-7	3RT2317-1BB40
	Execution		NO	NO	—	NO	—	NO	—	NO	—
	TYPE		4 x 20 / C	2 x 63 / C	2 x 51 / —	2 x 20 / C	2 x 9 / —	4 x 20 / C	4 x 15.5 / —	4 x 16 / C	4 x 12 / —
	Ir	[A]	—/— / 20	—/— / 63	—/— / 51	—/— / 20	—/— / 9	—/— / 20	—/— / 15.5	—/— / 16	—/— / 12
	Im	[A]	—/—/ 20	—/—/ 63	—/—/ —	—/—/ 20	—/—/ —	—/—/ 20	—/—/ —	—/—/ 16	—/—/ —
	Breaking Capacity	[kA]	15	25	—	15	—	15	—	15	—
	RCD Id	[A]	—	—	—	—	—	—	—	—	—
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			FourPoles	SinglePhase R1+N	SinglePhase R1+N	SinglePhase S1+N	SinglePhase S1+N	FourPoles	FourPoles	FourPoles	FourPoles
FEEDER	Code		—	—	—	—	—	—	—	—	—
	Lenght	[m]	—	—	—	—	—	—	—	—	—
	Installation type		—	—	—	—	—	—	—	—	—
	Cross Section	[mmq]	—	—	—	—	—	—	—	—	—
	Current Capacity (IZ)	[A]	—	—	—	—	—	—	—	—	—
	△V @Ib (end of line)	%	—	—	—	—	—	—	—	—	—
	Icc max (end of line)	[A]	—	—	—	—	—	—	—	—	—

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TITOLO *Title* ELECTRICAL CABINET - BLPH

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01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	

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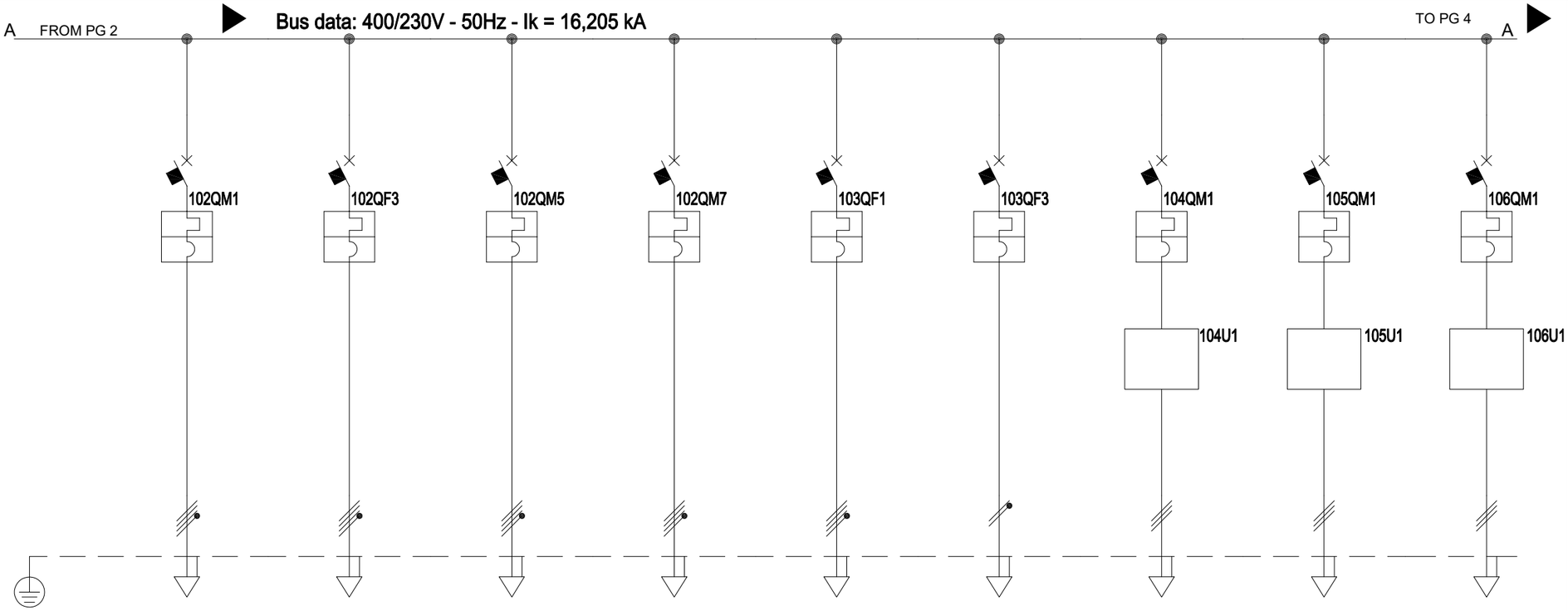
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QUESTO DISEGNO E' DI NOSTRA PROPRIETA' NON PUO' ESSERE COPIATO-RIPRODOTTO E/O DIVULGATO SENZA AUTORIZZAZIONE SCRITTA.



Load Code			102QM1	102QF3	102QM5	102QM7	103QF1	103QF3	104QM1	Q19	106QM1
Description			HVAC PANEL PAU003	WTP-300	CHILLER N.1 PAU001	CHILLER N.2 PAU002	SPARE	SPARE	LP-300A	LP-300B	CP-620A
Simultaneous Power		[kW]	64	12	43	43	--	--	1,5	1,5	5,5
CURRENT (Ib)		[A]	109	22	78	78	20	16	2,18	2,18	8,28
CosPhi			0,85	0,8	0,8	0,8	0,95	0,95	0,78	0,78	0,85
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		3VA1220-4GF42-0AA0	5SY7432-7	3VA1112-3GE46-0AA0	3VA1112-3GE46-0AA0	5SY7420-7	5SY7216-7	3RV2011-1GA10	3RV2011-1GA10	3RV2011-4AA10
	Execution		NO	NO	NO	NO	NO	NO	NO	NO	NO
	TYPE		4 x 200	4 x 32 / C	4 x 125	4 x 125	4 x 20 / C	2 x 16 / C	3 x 6.3	3 x 6.3	3 x 16
	Ir	[A]	140/200 / 200	--/-- / 32	88/125 / 125	88/125 / 125	--/-- / 20	--/-- / 16	4.5/6.3 / 6.3	4.5/6.3 / 6.3	10/16 / 32
	Im	[A]	--/--/200	--/--/ 32	--/--/ 1250	--/--/ 1250	--/--/ 20	--/--/ 16	--/--/82	--/--/82	--/--/208
	Breaking Capacity	[kA]	36	15	25	25	15	15	100	100	55
	RCD Id	[A]	--	--	--	--	--	--	--	--	--
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			FourPoles	FourPoles	FourPoles	FourPoles	FourPoles	SinglePhase T1+N	ThreePoles	ThreePoles	ThreePoles
FEEDER	Code		--	--	--	--	--	--	--	--	--
	Lenght	[m]	--	--	--	--	--	--	--	--	--
	Installation type		--	--	--	--	--	--	--	--	--
	Cross Section	[mmq]	--	--	--	--	--	--	--	--	--
	Current Capacity (IZ)	[A]	--	--	--	--	--	--	--	--	--
	△V @Ib (end of line)	%	--	--	--	--	--	--	--	--	--
	Icc max (end of line)	[A]	--	--	--	--	--	--	--	--	--

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IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH

REVISIONI *Revision*					
01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

Sheet 3

SEGUE *Next* 4

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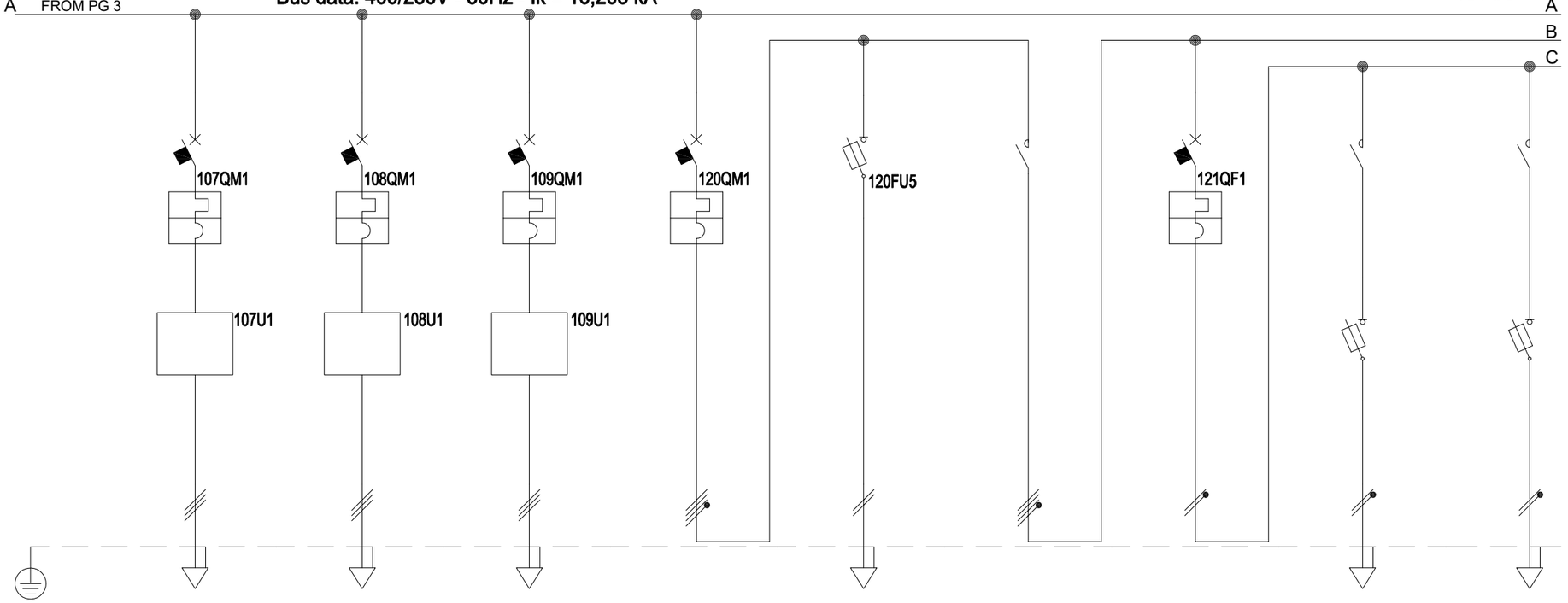
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QUESTO DISEGNO E' DI NOSTRA PROPRIETA' NON PUO' ESSERE COPIATO-RIPRODOTTO E/O DIVULGATO SENZA AUTORIZZAZIONE SCRITTA.

A FROM PG 3

Bus data: 400/230V - 50Hz - Ik = 16,205 kA

TO PG 5



Load Code			107QM1	108QM1	109QM1	120QM1	120FU5	300KM2	121QF1	264KM2	260KM3
Description			CP-620B	CP-600A	CP-600B	AUXILIARY EQUIPMENT TYPE 2	AUXILIARY EQUIPMENT TYPE 2	AUXILIARY EQUIPMENT TYPE 2	AIR EXTRACTOR SECTION	EXT-0001 COMMAND	EXT-0002 COMMAND
Simultaneous Power		[kW]	5,5	11	11	32,15	0,005	32,15	0,1	0,025	0,025
CURRENT (Ib)		[A]	8,28	15,33	15,33	50	0,0125	50	0,44	0,11	0,11
CosPhi			0,85	0,84	0,84	0,996	1	0,996	0,9	0,9	0,9
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		3RV2011-4AA10	3RV2021-4NA10	3RV2021-4NA10	ESB16-02N06	3NW7063+3NW6003-1	3RT2336-1NB30	5SY7206-7	5TT5000-2	5TT5000-2
	Execution		NO	NO	NO	NO	NO	—	NO	—	—
	TYPE		3 x 16	3 x 28	3 x 28	4 x 50	10x38 / gG	4 x 38 / —	2 x 6 / C	2 x 20 / —	2 x 20 / —
	Ir	[A]	10/16 / 32	23/28 / 28	23/28 / 28	35/50 / 50	—/— / 10	—/— / 38	—/— / 6	—/— / 20	—/— / 20
	Im	[A]	—/—/208	—/—/ 364	—/—/ 364	—/—/ 500	—/—/ 32	—/— / —	—/— / 6	—/— / —	—/— / —
	Breaking Capacity	[kA]	55	55	55	25	100	—	15	—	—
	RCD Id	[A]	—	—	—	—	—	—	—	—	—
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			ThreePoles	ThreePoles	ThreePoles	FourPoles		FourPoles	SinglePhase R12+N	SinglePhase R12+N	SinglePhase R12+N
FEEDER	Code		—	—	—	—	—	—	—	—	—
	Lenght	[m]	—	—	—	—	—	—	—	—	—
	Installation type		—	—	—	—	—	—	—	—	—
	Cross Section	[mmq]	—	—	—	—	—	—	—	—	—
	Current Capacity (IZ)	[A]	—	—	—	—	—	—	—	—	—
	△V @Ib (end of line)	%	—	—	—	—	—	—	—	—	—
	Icc max (end of line)	[A]	—	—	—	—	—	—	—	—	—

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

Sheet 4

SEGUE *Next* 5

PROTEO ENGINEERING GROUP

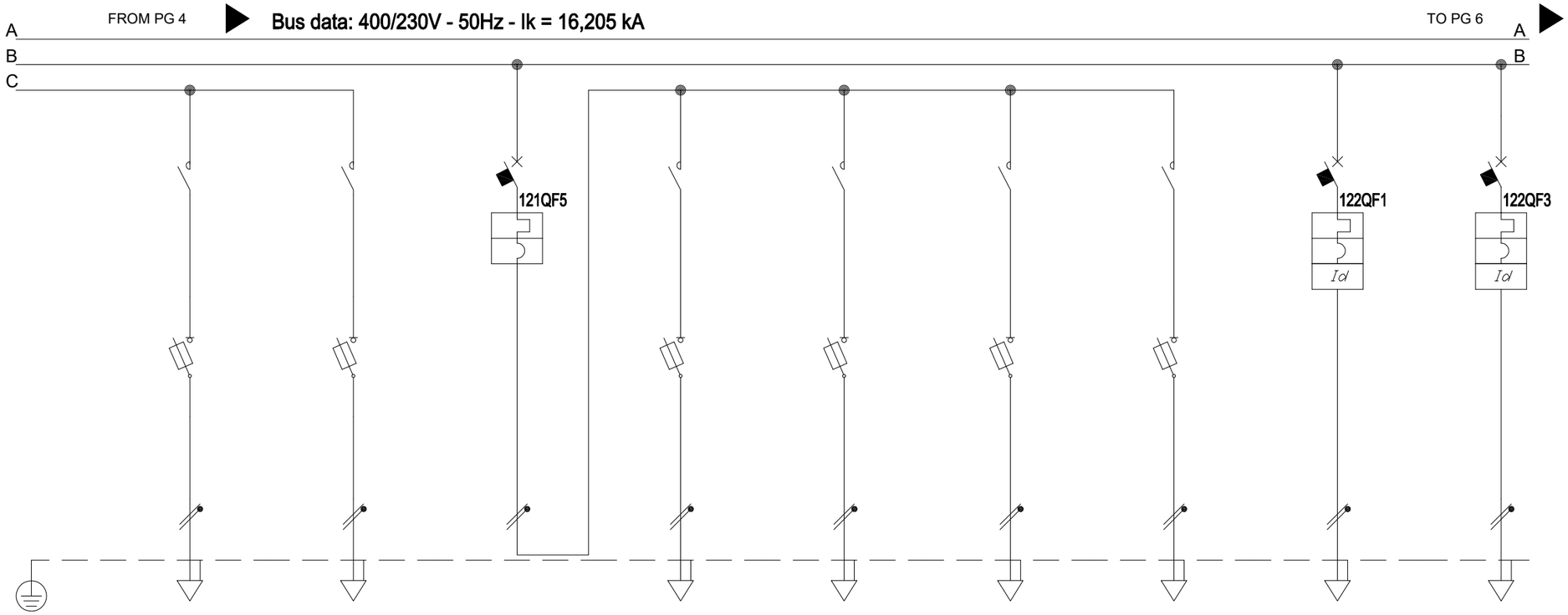
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FROM PG 4

Bus data: 400/230V - 50Hz - Ik = 16,205 kA

TO PG 6



Load Code			262KM3	264KM3	121QF5	260KM4	262KM4	264KM4	260KM5	122QF1	122QF3
Description			EXT-0003 COMMAND	EXT-0004 COMMAND	AIR EXTRACTOR SECTION	EXT-0005 COMMAND	EXT-0006 COMMAND	EXT-0007 COMMAND	EXT-0008 COMMAND	SPARE	SPARE
Simultaneous Power		[kW]	0,025	0,025	0,1	0,025	0,025	0,025	0,025	—	—
CURRENT (Ib)		[A]	0,11	0,11	0,44	0,11	0,11	0,11	0,11	10	10
CosPhi			0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,95	0,95
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		5TT5000-2	5TT5000-2	5SY7206-7	5TT5000-2	5TT5000-2	5TT5000-2	5TT5000-2	5SY7210-7+5SM2322-6	5SY7210-7+5SM2322-6
	Execution		—	—	NO	—	—	—	—	NO	NO
	TYPE		2 x 20 / —	2 x 20 / —	2 x 6 / C	2 x 20 / —	2 x 20 / —	2 x 20 / —	2 x 20 / —	2 x 10 / C	2 x 10 / C
	Ir	[A]	—/— / 20	—/— / 20	—/— / 6	—/— / 20	—/— / 20	—/— / 20	—/— / 20	—/— / 10	—/— / 10
	Im	[A]	—/— / —	—/— / —	—/— / 6	—/— / —	—/— / —	—/— / —	—/— / —	—/— / 10	—/— / 10
	Breaking Capacity	[kA]	—	—	15	—	—	—	—	15	15
	RCD Id	[A]	—	—	—	—	—	—	—	0,03 - Cl. A	0,03 - Cl. A
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			SinglePhase R12+N	SinglePhase R12+N	SinglePhase S12+N	SinglePhase S12+N	SinglePhase S12+N	SinglePhase S12+N	SinglePhase S12+N	SinglePhase T12+N	SinglePhase R12+N
FEEDER	Code		—	—	—	—	—	—	—	—	—
	Lenght	[m]	—	—	—	—	—	—	—	—	—
	Installation type		—	—	—	—	—	—	—	—	—
	Cross Section	[mmq]	—	—	—	—	—	—	—	—	—
	Current Capacity (IZ)	[A]	—	—	—	—	—	—	—	—	—
	△V @Ib (end of line)	%	—	—	—	—	—	—	—	—	—
	Icc max (end of line)	[A]	—	—	—	—	—	—	—	—	—

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH

REVISIONI *Revision*					
01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

Sheet 5

SEGUE *Next* 6

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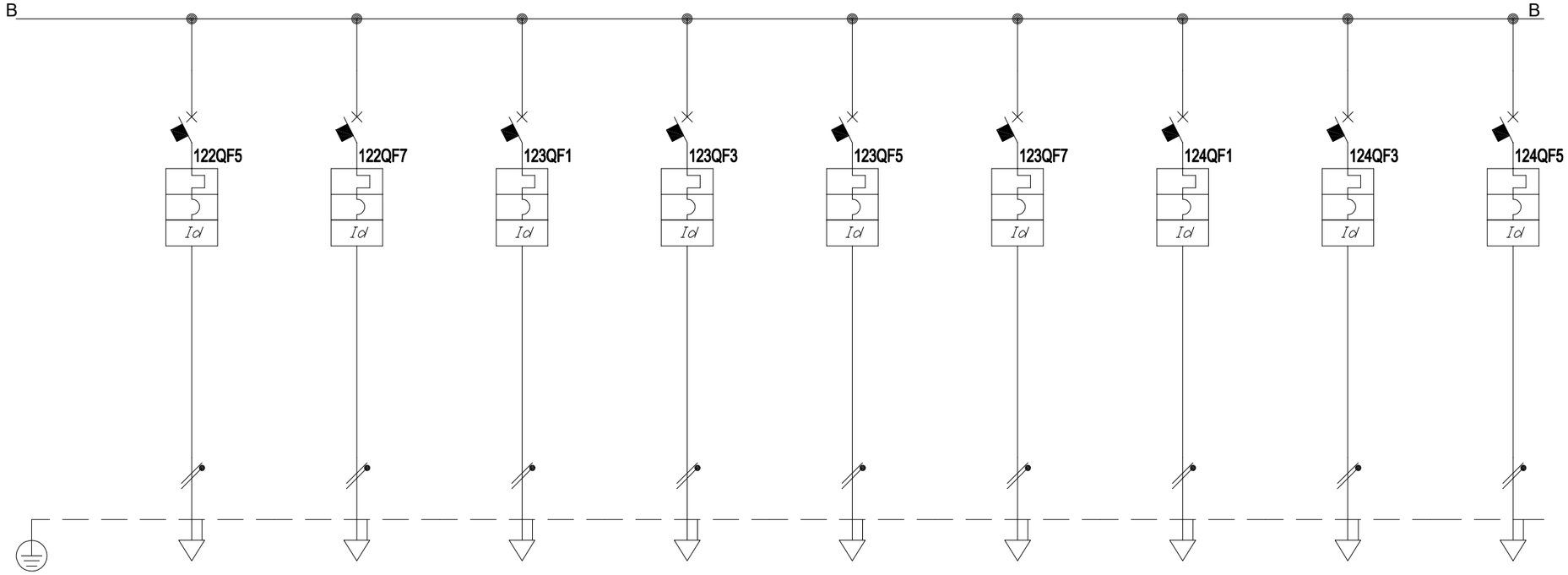
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FROM PG 5

Bus data: 400/230V - 50Hz - Ik = 16,205 kA

TO PG 7



Load Code		122QF5	122QF7	123QF1	123QF3	123QF5	123QF7	124QF1	124QF3	124QF5
Description		HEAT TRACING CIRCUIT 1	HEAT TRACING CIRCUIT 2	SPARE	SPARE	SPARE	SOCKETS WP1 C63-JBS-01	SOCKETS WP2 C63-JBS-02	SOCKETS WP3 C63-JBS-03	SOCKETS WP4 C63-SS-07
Simultaneous Power	[kW]	1,5	1,5	1,5	1,5	1,5	3,6	3,6	3,6	3,6
CURRENT (Ib)	[A]	6,5	6,5	6,5	6,5	6,5	16	16	16	16
CosPhi		1	1	1	1	1	1	1	1	1
SIMULTANEITY FACTOR	[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING										
PROTECTION DEVICE	BRAND NAME	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL	5SY7210-7+5SM2322-6	5SY7210-7+5SM2322-6	5SY7210-7+5SM2322-6	5SY7210-7+5SM2322-6	5SY7210-7+5SM2322-6	5SY7220-7+5SM2322-6	5SY7220-7+5SM2322-6	5SY7220-7+5SM2322-6	5SY7220-7+5SM2322-6
	Execution	NO	NO	NO	NO	NO	NO	NO	NO	NO
	TYPE	2 x 10 / C	2 x 10 / C	2 x 10 / C	2 x 10 / C	2 x 10 / C	2 x 20 / C	2 x 20 / C	2 x 20 / C	2 x 20 / C
	Ir [A]	–/– / 10	–/– / 10	–/– / 10	–/– / 10	–/– / 10	–/– / 20	–/– / 20	–/– / 20	–/– / 20
	Im [A]	–/–/ 10	–/–/ 10	–/–/ 10	–/–/ 10	–/–/ 10	–/–/ 20	–/–/ 20	–/–/ 20	–/–/ 20
	Breaking Capacity [kA]	15	15	15	15	15	15	15	15	15
	RCD Id [A]	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A
CONTACTOR TYPE										
THERMAL RELAY										
VOLTMETER / AMPEROMETER										
DISTRIBUTION		SinglePhase S12+N	SinglePhase T12+N	SinglePhase R12+N	SinglePhase S12+N	SinglePhase R12+N	SinglePhase S12+N	SinglePhase T12+N	SinglePhase R12+N	SinglePhase S12+N
FEEDER	Code	–	–	–	–	–	–	–	–	–
	Lenght [m]	–	–	–	–	–	–	–	–	–
	Installation type	–	–	–	–	–	–	–	–	–
	Cross Section [mmq]	–	–	–	–	–	–	–	–	–
	Current Capacity (IZ) [A]	–	–	–	–	–	–	–	–	–
	△V @Ib (end of line) %	–	–	–	–	–	–	–	–	–
	Icc max (end of line) [A]	–	–	–	–	–	–	–	–	–

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH

REVISIONI *Revision*					
01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

Sheet 6

SEGUE *Next* 7

PROTEO ENGINEERING GROUP

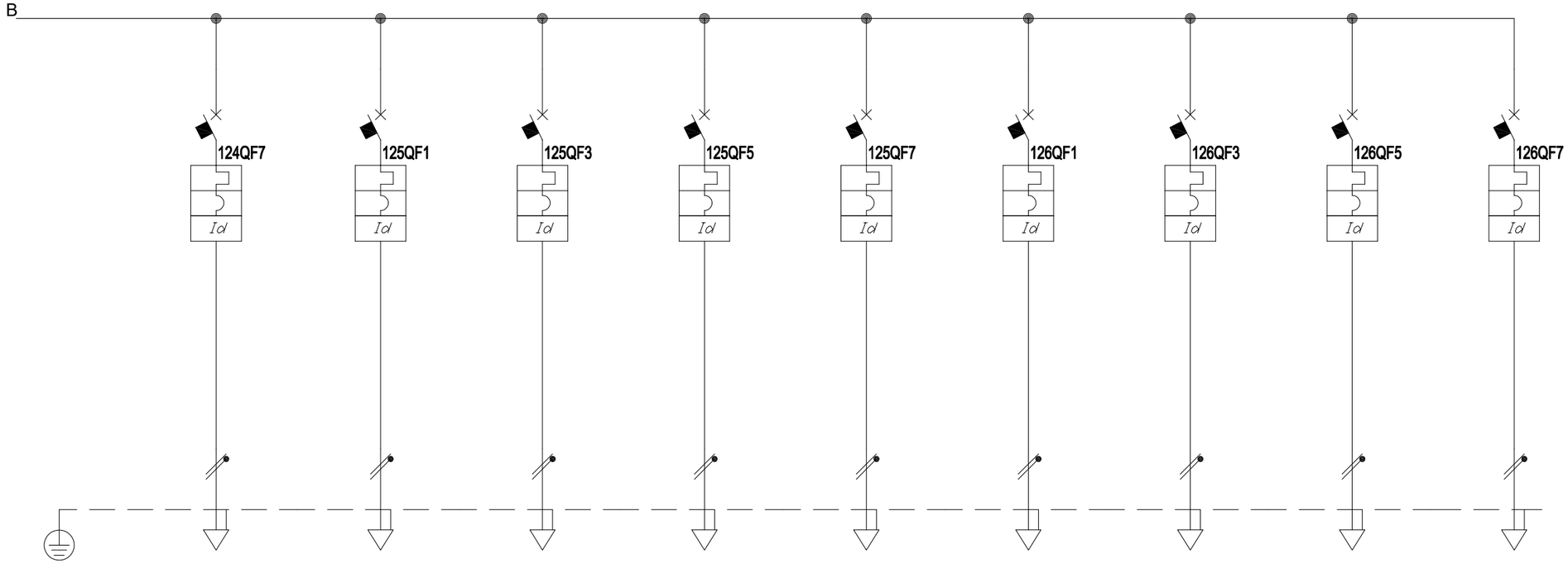
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FROM PG 6

Bus data: 400/230V - 50Hz - Ik = 16,205 kA

TO PG 8



Load Code			124QF7	125QF1	125QF3	125QF5	125QF7	126QF1	126QF3	126QF5	126QF7
Description			SPARE FOR SOCKETS	JB LIGHTING WP1	JB LIGHTING WP2	JB LIGHTING WP3	JB LIGHTING WP4	EXTERNAL LIGHTINGS GROUND FLOOR	EXTERNAL LIGHTINGS FIRST FLOOR	INTERNAL CABINET 230 Vac	INTERNAL HEATERS
Simultaneous Power		[kW]	3,6	0,15	0,15	0,15	0,15	0,15	0,15	0,05	5,5
CURRENT (Ib)		[A]	16	0,684	0,684	0,684	0,684	0,684	0,684	0,22	24
CosPhi			1	0,95	0,95	0,95	0,95	0,95	0,95	1	1
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		5SY7220-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7206-7+5SM2322-6	5SY7232-7+5SM2322-6
	Execution		NO	NO	NO	NO	NO	NO	NO	NO	NO
	TYPE		2 x 20 / C	2 x 6 / C	2 x 6 / C	2 x 6 / C	2 x 6 / C	2 x 6 / C	2 x 6 / C	2 x 6 / C	2 x 32 / C
	Ir	[A]	–/– / 20	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 32
	Im	[A]	–/– / 20	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 6	–/– / 32
	Breaking Capacity	[kA]	15	15	15	15	15	15	15	15	15
	RCD Id	[A]	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A	0,03 - Cl. A
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			SinglePhase T12+N	SinglePhase T12+N	SinglePhase R12+N	SinglePhase S12+N	SinglePhase T12+N	SinglePhase R12+N	SinglePhase S12+N	SinglePhase T12+N	SinglePhase R12+N
FEEDER	Code		–	–	–	–	–	–	–	–	–
	Lenght	[m]	–	–	–	–	–	–	–	–	–
	Installation type		–	–	–	–	–	–	–	–	–
	Cross Section	[mmq]	–	–	–	–	–	–	–	–	–
	Current Capacity (IZ)	[A]	–	–	–	–	–	–	–	–	–
	△V @Ib (end of line)	%	–	–	–	–	–	–	–	–	–
	Icc max (end of line)	[A]	–	–	–	–	–	–	–	–	–

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CLIENTE *Customer*: FORES ENGINEERING

IMPIANTO *Plant*:

TITOLO *Title*: ELECTRICAL CABINET - BLPH

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

Job: 224J10

Drawing: C0060-FOR-DGM-EL-002

Scale:

Sheet: 7

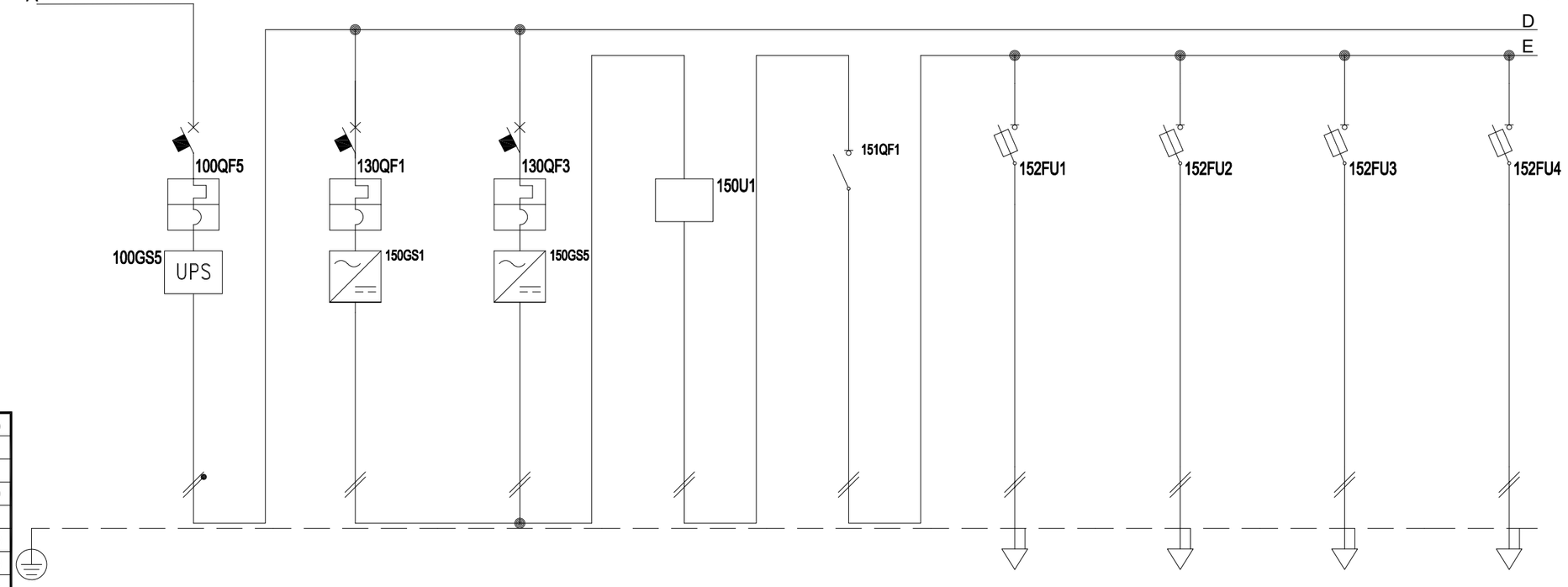
SEGUE *Next*: 8

PROTEO ENGINEERING GROUP

FROM PG 7

Bus data: 230V - 50Hz - Ik = 8,781 kA

TO PG 9



Switchboard prefix:	(BLPH-UPS)
Distribution:	SinglePhase L3+N
Ik Max [kA]:	8,781
Rated operating voltage [V]:	230
Rated insulation voltage[V]:	
Frequency [Hz]:	50
Icw (1s) [kA]:	10
Degree of protection IP:	---
Code:	(BLPH-UPS)

Load Code			100QF5	130QF1	130QF3	150U1	151QF1	152FU1	152FU2	152FU3	152FU4
Description			UPS	230Vac / 24VDC CONVERTER 1	230Vac / 24VDC CONVERTER 2	GENERAL 24VDC	GENERAL 24VDC	24VDC CPU	24VDC MAIN CABINET	24VDC HMI+SWITCH	24VDC INTERNAL CABINET FAN
Simultaneous Power		[kW]	5	0,96	0,96	0,78	0,78	0.072	0,458	0,09	0,11
CURRENT (Ib)		[A]	21,74	40	40	22,52	22,52	3	10	4	3,44
CosPhi			0,95	0.9	0.9	1	1	1	1	1	1
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	PHOENIX	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		5SY7232-7	5SY7210-7	5SY7210-7	QUINT-ORING/24DC	5TE2812-0	3NW7013+3NW6004-1	3NW7013+3NW6003-1	3NW7013+3NW6004-1	3NW7013+3NW6004-1
	Execution		NO	NO	NO	---	NO	NO	NO	NO	NO
	TYPE		2 x 32 / C	2 x 10 / C	2 x 10 / C	2 x 40 / ---	2 x 125	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG
	Ir	[A]	--/-- / 32	--/-- / 10	--/-- / 10	--/-- / 40	--/-- / 125	--/-- / 4	--/-- / 10	--/-- / 4	--/-- / 4
	Im	[A]	--/--/ 32	--/--/ 10	--/--/ 10	--/--/ ---	--/--/ 125	--/--/ 32	--/--/ 32	--/--/ 32	--/--/ 32
	Breaking Capacity	[kA]	15	15	15	---	10	100	100	100	100
	RCD Id	[A]	---	---	---	---	---	---	---	---	---
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			SinglePhase T1+N	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative
FEEDER	Code		---	---	---	---	---	---	---	---	---
	Lenght	[m]	---	---	---	---	---	---	---	---	---
	Installation type		---	---	---	---	---	---	---	---	---
	Cross Section	[mmq]	---	---	---	---	---	---	---	---	---
	Current Capacity (IZ)	[A]	---	---	---	---	---	---	---	---	---
	△ V @Ib (end of line)	%	---	---	---	---	---	---	---	---	---
	Icc max (end of line)	[A]	---	---	---	---	---	---	---	---	---

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH - SEZ. UPS

REVISIONI *Revision*					
01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

Sheet 8

SEGUE *Next* 9

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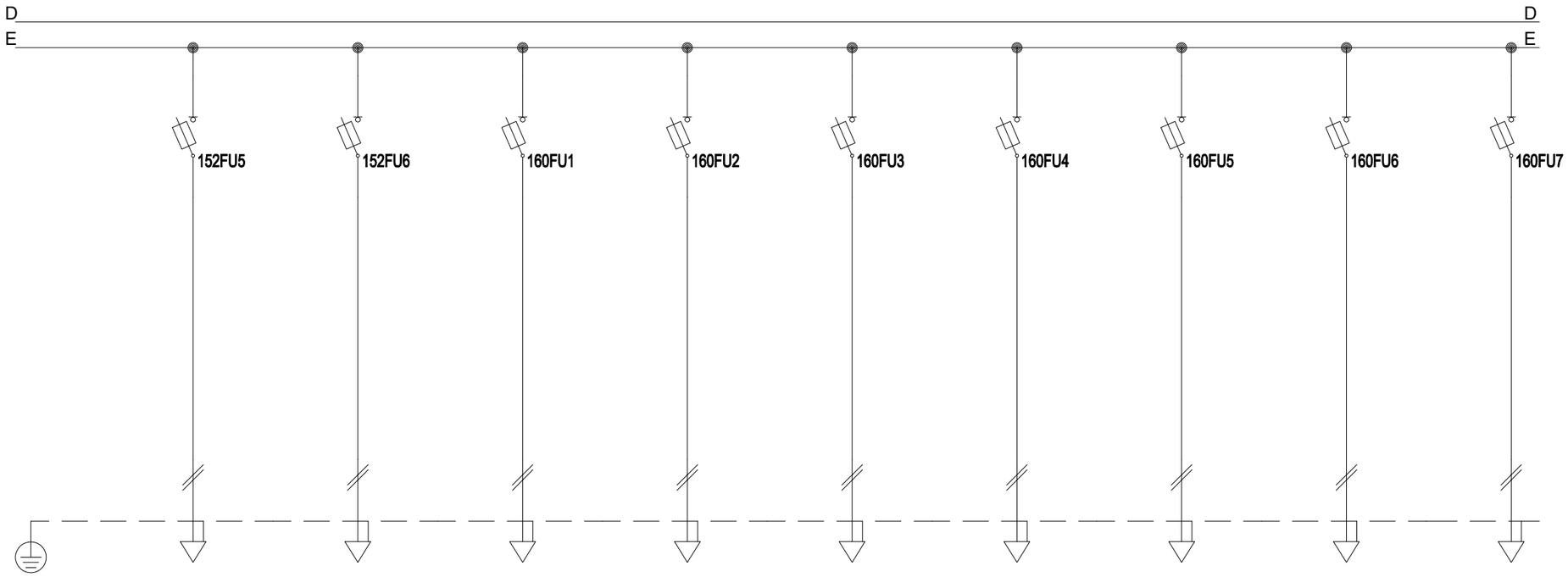
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FROM PG 8

Bus data: 230V - 50Hz - Ik = 8,781 kA

TO PG 10



Load Code			152FU5	152FU6	160FU1	160FU2	160FU3	160FU4	160FU5	160FU6	160FU7
Description			24VDC MIDDLE COLUMN TERMINAL BOARD	24VDC SPARE	PCA-001	PCA-002	PCA-003	PCA-004	PCA-005	PCA-006	PCA-007
Simultaneous Power		[kW]	–	–	0,0025	0,0025	0,0025	0,0025	0,0025	0,0025	0,0025
CURRENT (Ib)		[A]	4	4	0,11	0,11	0,11	0,11	0,11	0,11	0,11
CosPhi			1	1	1	1	1	1	1	1	1
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		3NW7013+3NW6004-1	3NW7013+3NW6004-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1
	Execution		NO	NO	NO	NO	NO	NO	NO	NO	NO
	TYPE		10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG
	Ir	[A]	–/– / 4	–/– / 4	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1
	Im	[A]	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32
	Breaking Capacity	[kA]	100	100	100	100	100	100	100	100	100
	RCD Id	[A]	–	–	–	–	–	–	–	–	–
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative
FEEDER	Code		–	–	–	–	–	–	–	–	–
	Lenght	[m]	–	–	–	–	–	–	–	–	–
	Installation type		–	–	–	–	–	–	–	–	–
	Cross Section	[mmq]	–	–	–	–	–	–	–	–	–
	Current Capacity (IZ)	[A]	–	–	–	–	–	–	–	–	–
	△ V @Ib (end of line)	%	–	–	–	–	–	–	–	–	–
	Icc max (end of line)	[A]	–	–	–	–	–	–	–	–	–

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH - SEZ. UPS

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

Job 224J10

Drawing C0060-FOR-DGM-EL-002

Scale

Sheet 9

SEGUE *Next* 10

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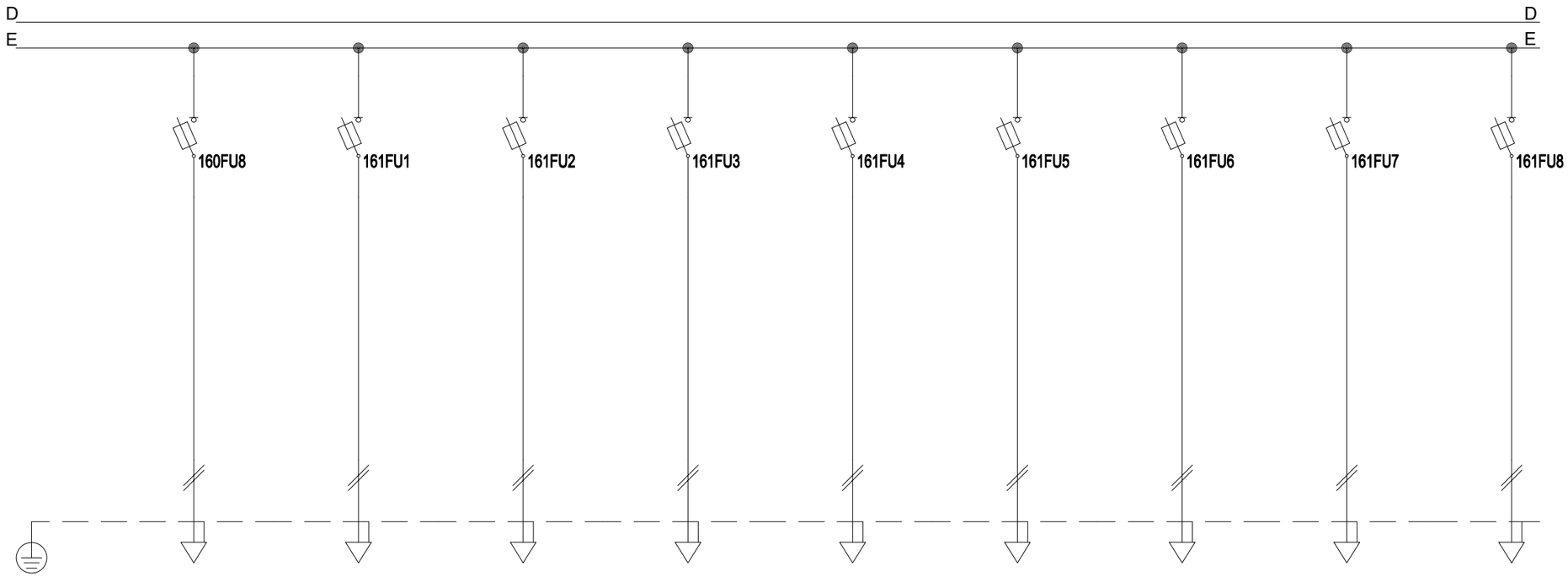
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FROM PG 9

Bus data: 230V - 50Hz - Ik = 8,781 kA

TO PG 11



Load Code			160FU8	161FU1	161FU2	161FU3	161FU4	161FU5	161FU6	161FU7	161FU8
Description			PCA-008	VM-001	VM-002	VM-003	VM-004	VM-005	VM-006	VM-007	VM-008
Simultaneous Power		[kW]	0,0025	0,0025	0,0025	0,0025	0,0025	0,0025	0,0025	0,0025	0,0025
CURRENT (Ib)		[A]	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11
CosPhi			1	1	1	1	1	1	1	1	1
SIMULTANEITY FACTOR		[%]	100	100	100	100	100	100	100	100	100
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
	MODEL		3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1
	Execution		NO	NO	NO	NO	NO	NO	NO	NO	NO
	TYPE		10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG
	Ir	[A]	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 1
	Im	[A]	–/– / 32	–/– / 32	–/– / 32	–/– / 32	–/– / 32	–/– / 32	–/– / 32	–/– / 32	–/– / 32
	Breaking Capacity	[kA]	100	100	100	100	100	100	100	100	100
	RCD Id	[A]	–	–	–	–	–	–	–	–	–
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative
FEEDER	Code		–	–	–	–	–	–	–	–	–
	Lenght	[m]	–	–	–	–	–	–	–	–	–
	Installation type		–	–	–	–	–	–	–	–	–
	Cross Section	[mmq]	–	–	–	–	–	–	–	–	–
	Current Capacity (IZ)	[A]	–	–	–	–	–	–	–	–	–
	△ V @Ib (end of line)	%	–	–	–	–	–	–	–	–	–
	Icc max (end of line)	[A]	–	–	–	–	–	–	–	–	–

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH - SEZ. UPS

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

Job 224J10 — *Scale*

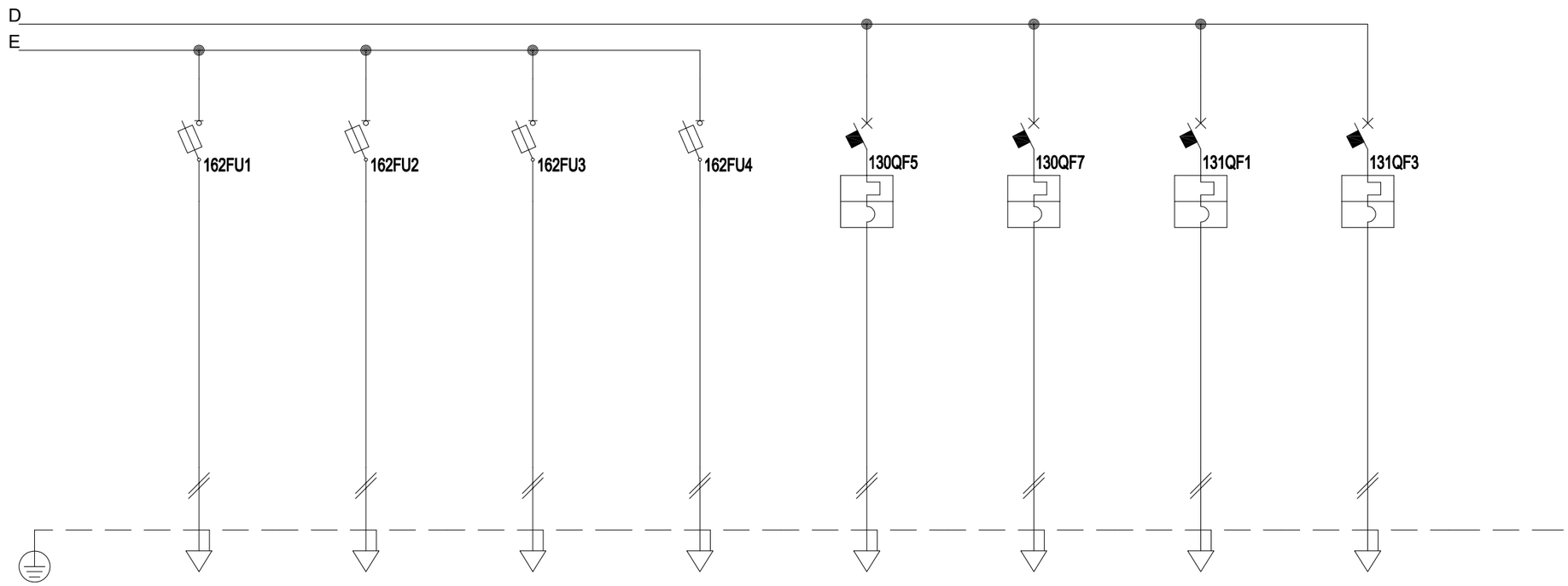
Drawing C0060-FOR-DGM-EL-002 — *Sheet* 10 — SEGUE *Next* 11

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QUESTO DISEGNO E' DI NOSTRA PROPRIETA' NON PUO' ESSERE COPIATO-RIPRODOTTO E/O DIVULGATO SENZA AUTORIZZAZIONE SCRITTA.

FROM PG 10 ▶ **Bus data: 230V - 50Hz - Ik = 8,781 kA**



Load Code			162FU1	162FU2	162FU3	162FU4	130QF5	130QF7	131QF1	131QF3	
Description			SPARE	SPARE	SPARE	SPARE	HCU 230Vac UPS	FIRE SYSTEM FSS SSI-1000	Q.RIO1 WP1	Q.RIO2 WP3	
Simultaneous Power		[kW]					2	0,5	0,3	0,3	
CURRENT (Ib)		[A]					8,70	2,17	1,31	1,31	
CosPhi							1	1	1	1	
SIMULTANEITY FACTOR		[%]					100	100	100	100	
FUNCTIONAL DRAWING											
PROTECTION DEVICE	BRAND NAME		SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	
	MODEL		3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	3NW7013+3NW6011-1	5SY7216-7	5SY7210-7	5SY7210-7	5SY7210-7	
	Execution		NO	NO	NO	NO	NO	NO	NO	NO	
	TYPE		10x38 / gG	10x38 / gG	10x38 / gG	10x38 / gG	2 x 16 / C	2 x 10 / C	2 x 10 / C	2 x 10 / C	
	Ir	[A]	–/– / 1	–/– / 1	–/– / 1	–/– / 1	–/– / 16	–/– / 10	–/– / 10	–/– / 10	
	Im	[A]	–/–/ 32	–/–/ 32	–/–/ 32	–/–/ 32	–/– / 16	–/–/ 10	–/–/ 10	–/–/ 10	
	Breaking Capacity	[kA]	100	100	100	100	15	15	15	15	
	RCD Id	[A]	–	–	–	–	–	–	–	–	
CONTACTOR TYPE											
THERMAL RELAY											
VOLTMETER / AMPEROMETER											
DISTRIBUTION			Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	Positive/Negative	
FEEDER	Code		–	–	–	–	–	–	–	–	
	Lenght	[m]	–	–	–	–	–	–	–	–	
	Installation type		–	–	–	–	–	–	–	–	
	Cross Section	[mmq]	–	–	–	–	–	–	–	–	
	Current Capacity (IZ)	[A]	–	–	–	–	–	–	–	–	
	△V @Ib (end of line)	%	–	–	–	–	–	–	–	–	
	Icc max (end of line)	[A]	–	–	–	–	–	–	–	–	

CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH - SEZ. UPS

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

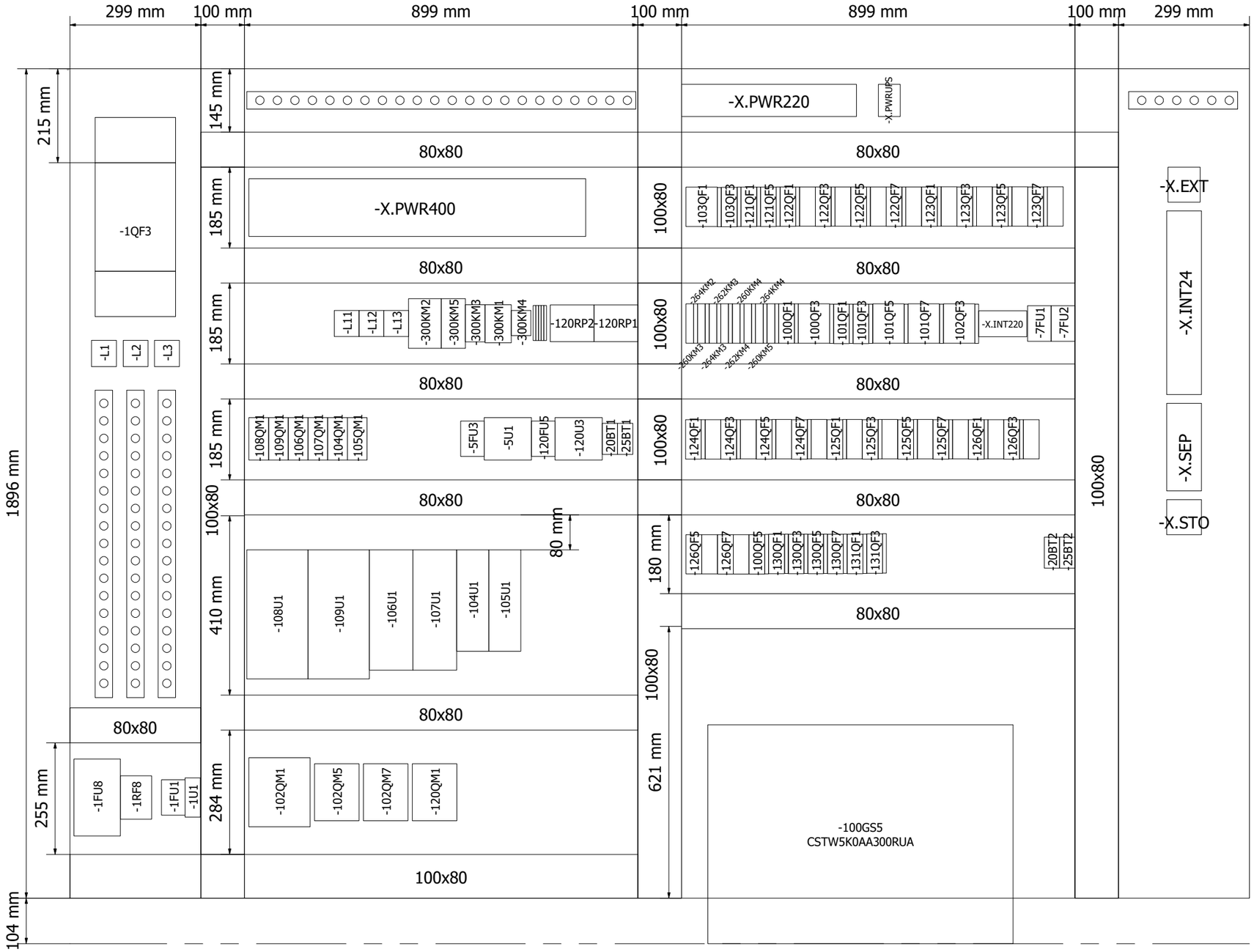
Job 224J10 | *Scale*

Drawing C0060-FOR-DGM-EL-002 | *Sheet* 11 | *Next* SEGUE 12

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CLIENTE *Customer*: FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title*: ELECTRICAL CABINET - BLPH - INTERNAL LAYOUT

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

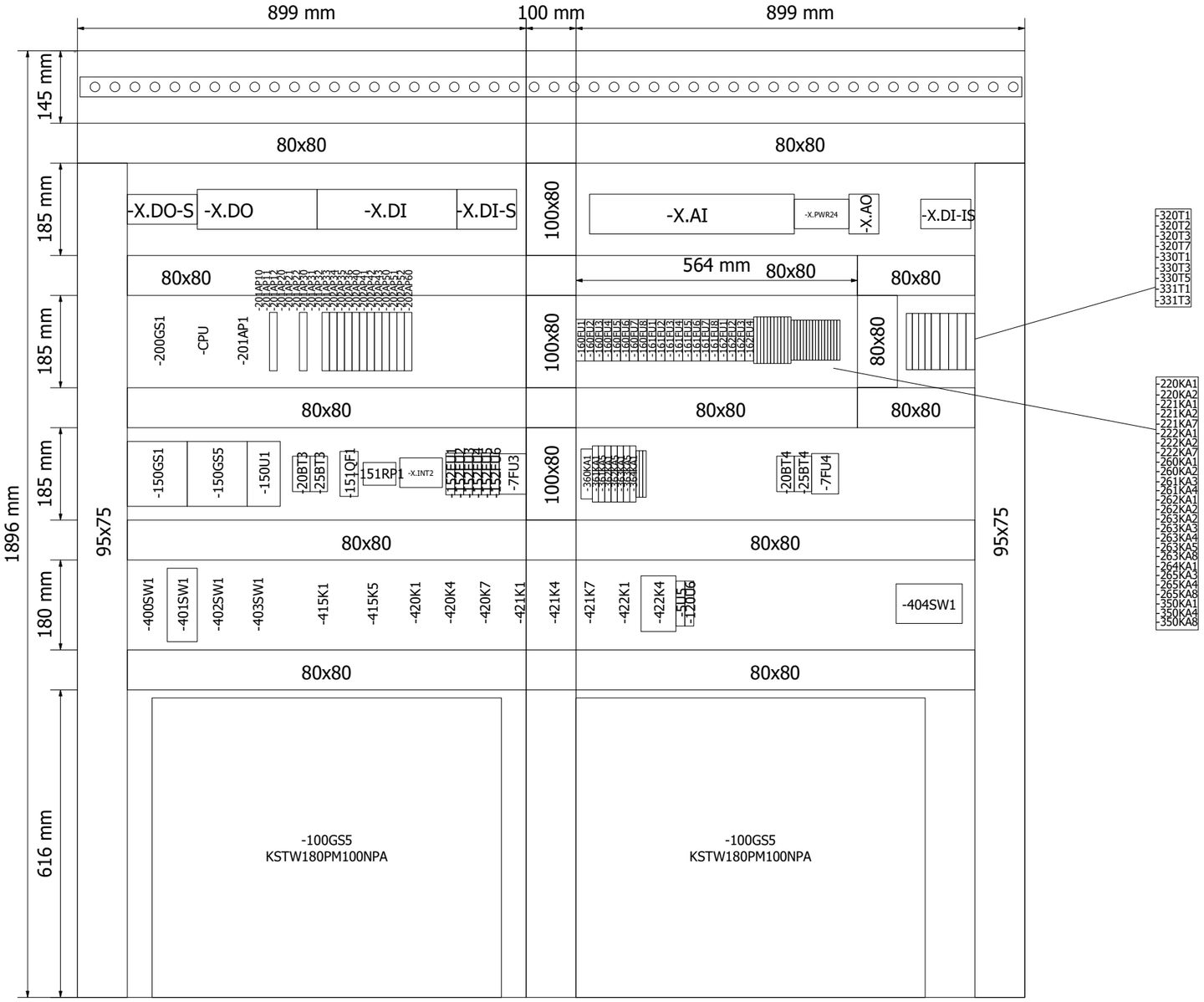
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Drawing: C0060-FOR-DGM-EL-002

SCALA *Scale*: -

Sheet: 12 | *Next*: 13

PROTEO ENGINEERING GROUP



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CLIENTE *Customer*: FORES ENGINEERING

IMPIANTO *Plant*:

TITOLO *Title*: ELECTRICAL CABINET - BLPH - INTERNAL LAYOUT

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

Job: 224J10

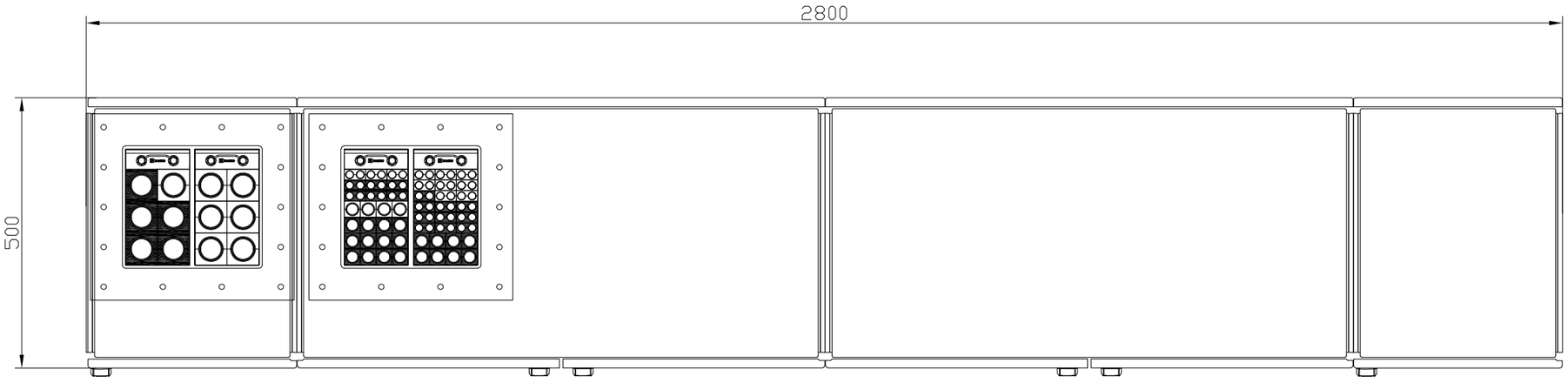
Drawing: C0060-FOR-DGM-EL-002

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PROTEO ENGINEERING GROUP

BACK



FRONT

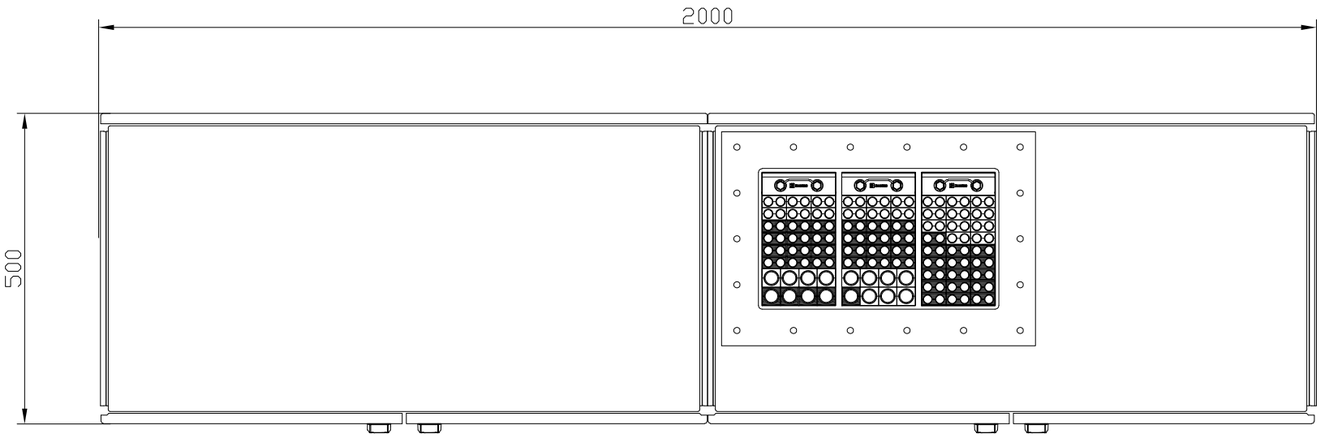
CLIENTE *Customer*	IMPIANTO *Plant*	REVISIONI *Revision*					*Job* 224J10	SCALA *Scale*
FORES ENGINEERING	TITOLO *Title* ELECTRICAL CABINET - BLPH - TOP VIEW LAYOUT	01	02/12/2024	A.M.	M.C.	L.M.		
		00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	*Drawing* C0060-FOR-DGM-EL-002	*Sheet* 14 *Next* 15
		N. *n.*	*Date*	*Designed*	*Checked*	*Approved*		

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BACK



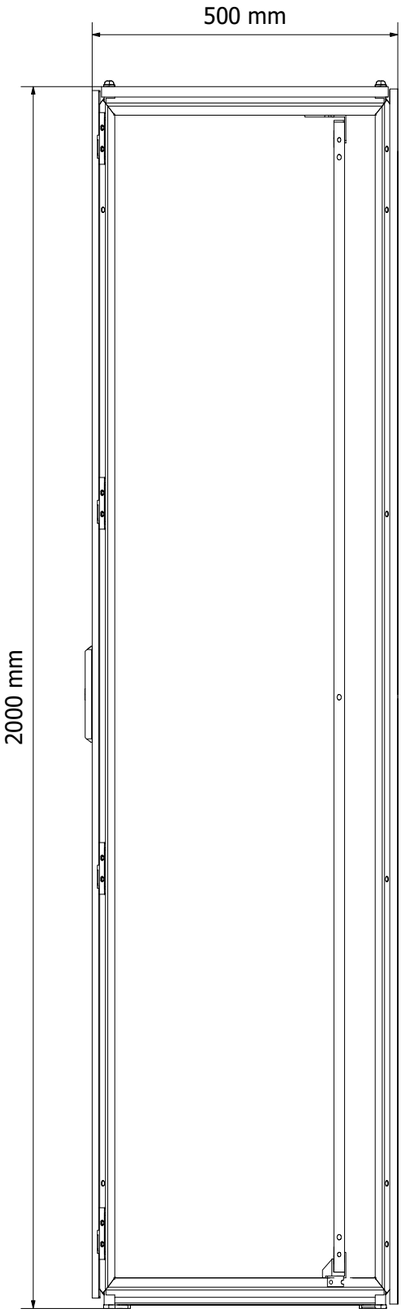
FRONT

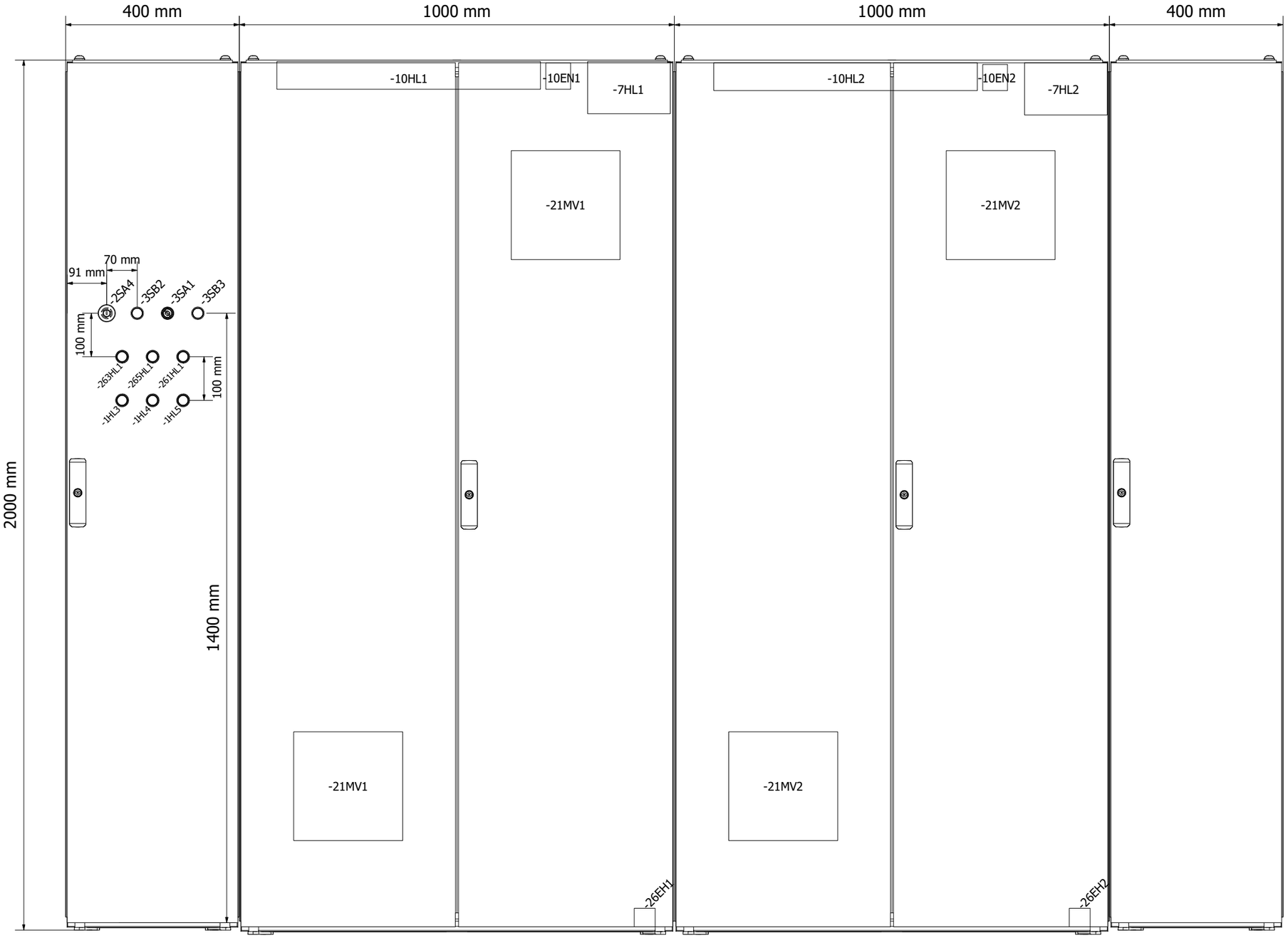
CLIENTE *Customer*	IMPIANTO *Plant*	REVISIONI *Revision*						SCALA *Scale*
FORES ENGINEERING	TITOLO *Title* ELECTRICAL CABINET - BLPH - TOP VIEW LAYOUT	01	02/12/2024	A.M.	M.C.	L.M.	*Job* 224J10	
		00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	*Drawing* C0060-FOR-DGM-EL-002	*Sheet* 15 *Next* 16
		N. *n.*		*Date*	*Designed*	*Checked*	*Approved*	

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CLIENTE *Customer*

FORES ENGINEERING

IMPIANTO *Plant*

TITOLO *Title* ELECTRICAL CABINET - BLPH - FRONT VIEW LAYOUT

REVISIONI *Revision*	N. *n.*	*Date*	*Designed*	*Checked*	*Approved*
	01	02/12/2024	A.M.	M.C.	L.M.
	00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.

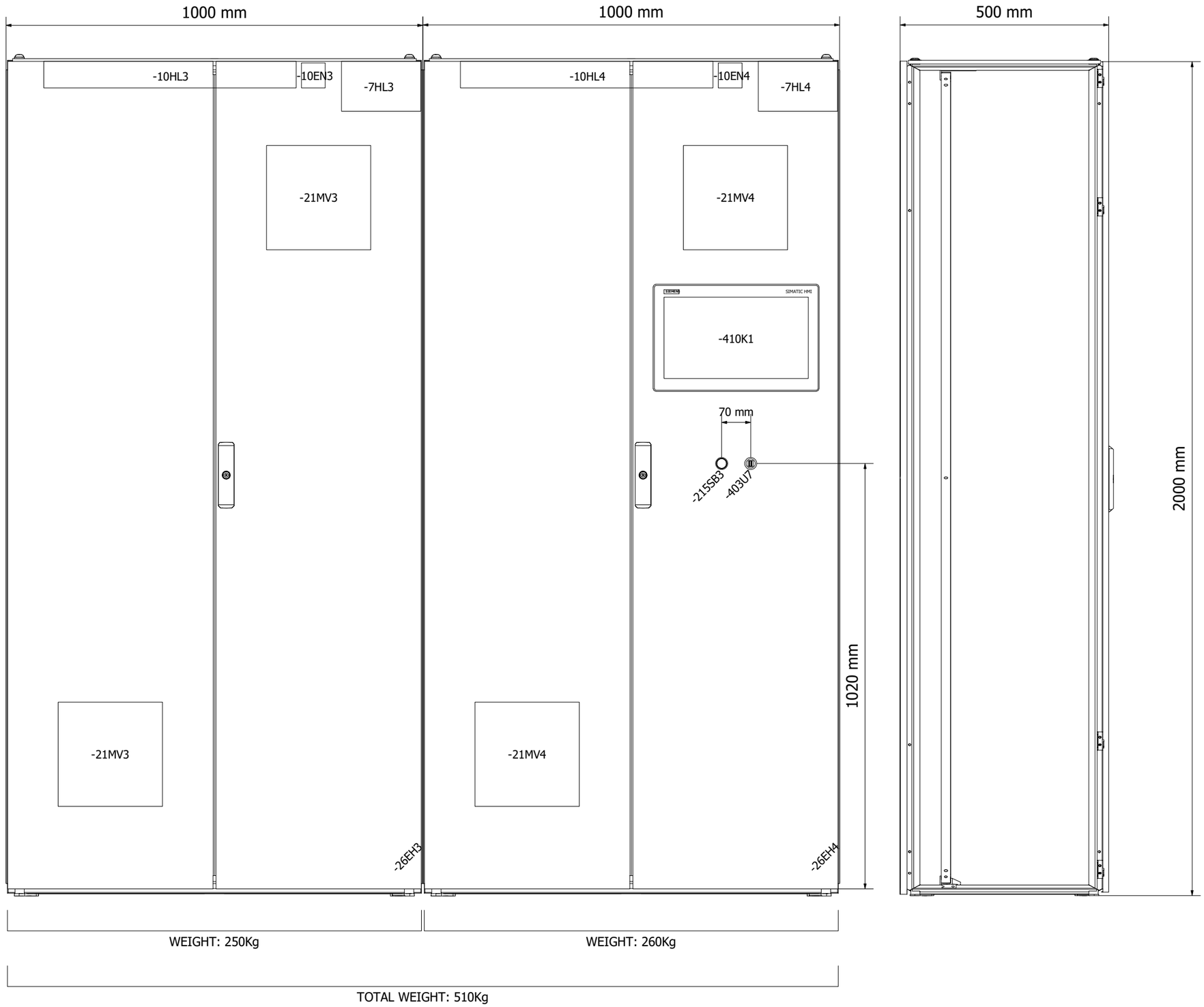
Job 224J10

Drawing C0060-FOR-DGM-EL-002

SCALA *Scale* -

Sheet 16 *Next* 17

PROTEO ENGINEERING GROUP



CLIENTE
Customer

FORES ENGINEERING

IMPIANTO
Plant

TITOLO *Title* ELECTRICAL CABINET - BLPH - FRONT VIEW LAYOUT

REVISIONI *Revision*					
N. *n.*	*Date*	*Designed*	*Checked*	*Approved*	
01	02/12/2024	A.M.	M.C.	L.M.	
00	10/09/2024	ANNOVI J.	ANNOVI J.	ANNOVI J.	

Job 224J10

Drawing C0060-FOR-DGM-EL-002

SCALA *Scale*

Sheet 17 *Next* -

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C0063-FOR-DGM-EL-003

Electrolyzer Wiring Diagram

C63- CrossWind Project

AS-BUILT

DATE 11/04/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
03	*Issue for Approval*	*04-APR-2025*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
02	*Issue for Approval*	*06-FEB-2025*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
01	*Issue for Review*	*02-DEC-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
00	*Issue for Revision*	*22-MAY-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	**C0063-FOR-DGM-EL-003**
Elogen Project Document Title	**Electrolyzer Wiring Diagram**
Crosswind Project Document Number	**FORES-INN-BPH-DWG-00030**
Vendor Document Number and Revision	**224J10-DDL-EL-DG-00003**

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Revision*
01	*Issue for Review*
02	*Issue for Approval*
03	*Issue for Approval*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

Documents reference:

- For details about Q.RIO1 Wiring refer to
  Doc ATTACHMENT_1_C0063-FOR-DGM-EL-003_Rev.01_QRIO1
  Pag 158-200
- For details about Q.RIO2 Wiring refer to
  Doc ATTACHMENT_2_C0063-FOR-DGM-EL-003_Rev.01_QRIO2
  Pag 201-260
- For details about Heat Tracing JB Wiring refer to
  Doc ATTACHEMENT_3_C0063-FOR-DGM-EL-003_Rev.01_HeatTracingJB
  Pag. 261-262
- For details about Lighting Wiring refer to
  Doc. ATTACHMENT_4_C0063-FOR-DGM-EL-003_Rev.01_LightingWiring
  Pag. 263
- For details about SSI-1000 Panel Wiring refer to
  Doc ATTACHMENT_5_C0063-FOR-DGM-EL-003_Rev.01_WiringSSI1000
  Pag. 264-275
- For detail about Safety Loop Equipment Wiring refer to
  Doc ATTACHMENT_6_C0063-FOR-DGM-EL-003_Rev.01_SafetyLoop
  Pag. 276

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Structure thickness	1,5 mm
Structure material	Sheet Metal
Standard of Construction	CEI EN 61439-2
Equipment Name	Control Cabinet
Equipment TAG	20-UCP-001
Year of construction	2024
Rated operational voltage	400 Vca ± 10%
Nominal Frequency	50 Hz ± 2%
Rated current (InA)	630 A
Short circuit current (Icc)	36 kA
Auxiliary voltage (EAUX)	24 Vdc
Degree of protection	IP 55
Dimensions HxWxD	2000x4800x500
Cable entry	From top

Proteo No. Order	W240569
Protoeo No. Scheme	D240934SCH01
Proteo Electrical cabinet code	QW24056901
Fores No. Order	2724000708
Fores No. Scheme	224J10-DDL-EL-DG-00003
Elogen No. Scheme	C0063-FOR-DGM-EL-003
Crosswind No. Scheme	FORES-INN-BPH-DWG-00030

Reference documents used for interface signals	
Vendor package	Doc. No.
Nidec	C63-NID-ELO-ED01
Ovivo	ECW SWL0000767
Acquagas	20240040
Paumier (HVAC panel)	P.0608871.L.02.304
Paumier (Chiller panel)	P.0608871.L.02.302

RELASE	DATE	FILE	OWNER	ADMINISTRATOR	REASON
00	01/10/24	224J10		PROTEO	Issue for Revision
01	02/12/24	224J10		PROTEO	Issue for Review
02	06/02/25	224J10		PROTEO	Issue for Review
03	03/03/25	224J10		PROTEO	Issue for Review
04	01/04/25	224J10		PROTEO	Issue for Review

PROTEO ENGINEERING GROUP

Order: W240569

Customer: FORES ENGENEERING

Date: 05/02/2025

Revision: 04

Title: ELECTRICAL CABINET - BLPH

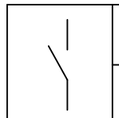
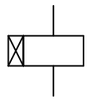
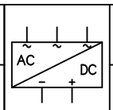
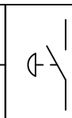
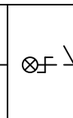
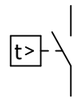
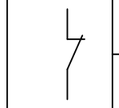
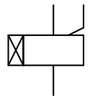
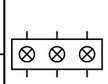
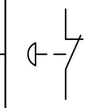
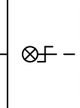
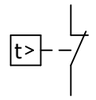
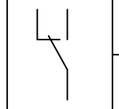
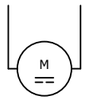
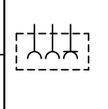
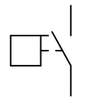
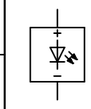
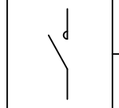
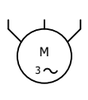
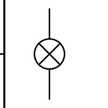
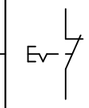
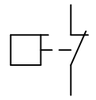
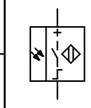
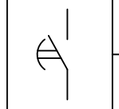
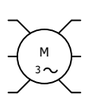
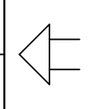
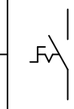
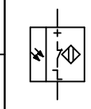
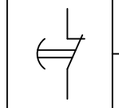
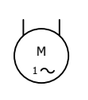
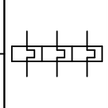
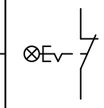
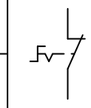
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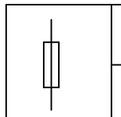
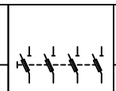
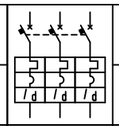
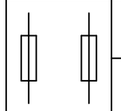
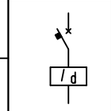
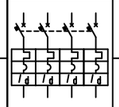
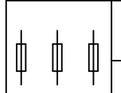
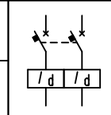
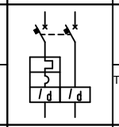
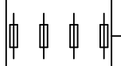
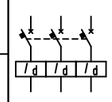
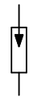
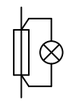
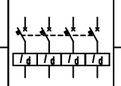
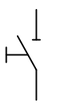
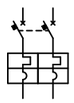
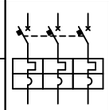
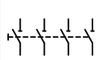
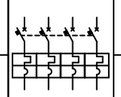
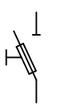
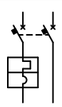
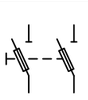
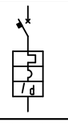
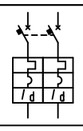
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	CONTATTO CHIUSO (NC) CLOSED CONTACT (NO)		TIMER A TRE MORSETTI THREE CLAMP TIMER		DISPOSITIVO LAMPEGGIANTE BLINKING DEVICE		PULSANTE DI EMERGENZA NC EMERGENCY PUSH-BUTTON NC		SELETTORE LUMINOSO NC SIGNALING SELECTOR NC		TERMOSTATO NC THERMOSTAT NC		FINECORSA NC LIMIT SWITCH NC
	CONTATTO IN SCAMBIO CHANGE-OVER CONTACT		MOTORE IN CORRENTE CONTINUA DIRECT CURRENT MOTOR		PRESE BIPOLARE DOUBLE PLUG SOCKET		PULSANTE MANUALE STABILE NO STABLE MANUAL PUSH-BUTTON NO		SELETTORE A TRE POSIZIONI NO THREE POSITION SELECTOR NO		FLUSSOSTATO NO FLOW SWITCH NO		FOTOCELLULA EMETTITORE PHOTOCELL EMITTER
	CONTATTO DI POTENZA POWER CONTACT		MOTORE ASINCRONO TRIFASE ASINCHRONOUSE THREE PHASE MOTOR		LAMPADA LAMP		PULSANTE MANUALE STABILE NC STABLE MANUAL PUSH-BUTTON NC		SELETTORE A TRE POSIZIONI NC THREE POSITION SELECTOR NC		FLUSSOSTATO NC FLOW SWITCH NC		FOTOCELLULA RICEVITORE A DUE FILI NO TWO WIRE NO RECIVER PHOTOCELL
	CONTATTO NO RITARDATO ALL'ECCITAZIONE DELAYED PICK-UP MAKE CONTACT NO		MOTORE ASINCRONO TRIFASE A 6 POLI SIX POLE ASINCHRONOUSE THREE PHASE MOTOR		SIRENA SIREN		PULSANTE MANUALE STABILE LUMINOSO NO STABLE SIGNALING MANUAL PUSH-BUTTON NO		SELETTORE STABILE NO STABLE SELECTOR NO		LIVELLOSTATO NO LEVEL SWITCH NO		FOTOCELLULA RICEVITORE A DUE FILI NC TWO WIRE NC RECIVER PHOTOCELL
	CONTATTO NC RITARDATO ALL'ECCITAZIONE DELAYED PICK-UP MAKE CONTACT NC		MOTORE MONOFASE MONOPHASE MOTOR		TERMICA TRIFASE THREE PHASE THERMAL CONTACT		PULSANTE MANUALE STABILE LUMINOSO NC STABLE SIGNALING MANUAL PUSH-BUTTON NC		SELETTORE STABILE NC STABLE SELECTOR NC		LIVELLOSTATO NC LEVEL SWITCH NC		FOTOCELLULA RICEVITORE A TRE FILI NO THREE WIRE NO RECIVER PHOTOCELL
	CONTATTO NO RITARDATO ALLA DISECCITAZIONE DELAYED DROP-OUT MAKE CONTACT NO		VENTILATORE MONOFASE SINGLE PHASE FAN		TRASFORMATORE DI CORRENTE (TA) CURRENT TRANSFORMER (TA)		PULSANTE DI EMERGENZA STABILE NO STABLE EMERGENCY PUSH-BUTTON NO		SELETTORE STABILE A CHIAVE NO STABLE KEY SELECTOR NO		PRESSOSTATO NO PRESSURE SWITCH NO		FOTOCELLULA RICEVITORE A TRE FILI NC THREE WIRE NC RECIVER PHOTOCELL
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	BOBINA COIL		AUTOTRASFORMATORE TRIFASE THREE PHASE AUTO-TRANSFORMER		PULSANTE MANUALE LUMINOSO NO SIGNALING MANUAL PUSH-BUTTON NO		SELETTORE A CHIAVE NO KEY SELECTOR NO		SELETTORE STABILE A TRE POSIZIONI NO THREE POSITION STABLE SELECTOR NO		DISPOSITIVO DI PROSSIMITA' INDUTTIVO A TRE FILI NO THREE WIRE NO INDUCTIVE PROXIMITY SWITCH		ELETTROVALVOLA SOLENOID VALVE
	PROTEZIONE CON DIODO RECOVERY DIODE MODULE		ALIMENTATORE MONOFASE SINGLE PHASE POWER SUPPLY		PULSANTE MANUALE LUMINOSO NC SIGNALING MANUAL PUSH-BUTTON NC		SELETTORE A CHIAVE NC KEY SELECTOR NC		SELETTORE STABILE A TRE POSIZIONI NC THREE POSITION STABLE SELECTOR NC		DISPOSITIVO DI PROSSIMITA' INDUTTIVO A TRE FILI NC THREE WIRE NC INDUCTIVE PROXIMITY SWITCH		SBARRA DISTRIBUTRICE TRIPOLARE THREE PHASE BUS BAR

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 0.a	Next: 0.b
00	03			FORES ENGENEERING	Page description: CABINET SUMMARY TABLE	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

0	1	2	3	4	5	6	7	8	9

	FUSIBILE UNIPOLARE SINGLE PHASE FUSE		SEZIONATORE TETRAPOLARE CON FUSIBILI FOUR PHASE DISCONNECT WITH FUSE		INT. AUT. MAGNETOTERMICO DIFFERENZIALE TRIPOLARE THREE PHASE AUT. MAGNETO-THERMAL SWITCH WITH DIFFERENTIAL				
	FUSIBILE BIPOLARE TWO PHASE FUSE		INTERRUTTORE AUTOMATICO DIFFERENZIALE UNIPOLARE SINGLE PHASE AUTOMATIC SWITCH WITH DIFFERENTIAL		INT. AUT. MAGNETOTERMICO DIFFERENZIALE TETRAPOLARE FOUR PHASE AUT. MAGNETO-THERMAL SWITCH WITH DIFFERENTIAL				
	FUSIBILE TRIPOLARE THREE PHASE FUSE		INTERRUTTORE AUTOMATICO DIFFERENZIALE BIPOLARE TWO PHASE AUTOMATIC SWITCH WITH DIFFERENTIAL		INT. AUT. MAGN. DIFFERENZIALE BIPOLARE CON UN SOLO POLO PROTETTO TWO PHASE AUT. MAGN. WITH DIFFERENTIAL SINGLE-POLE PROTECTED				
	FUSIBILE TETRAPOLARE FOUR PHASE FUSE		INTERRUTTORE AUTOMATICO DIFFERENZIALE TRIPOLARE THREE PHASE AUTOMATIC SWITCH WITH DIFFERENTIAL		SCARICATORE DISCHARGER				
	FUSIBILE UNIPOLARE CON SEGNALAZIONE LUMINOSA SINGLE PHASE FUSE WITH SIGNALING		INTERRUTTORE AUTOMATICO DIFFERENZIALE TETRAPOLARE FOUR PHASE AUTOMATIC SWITCH WITH DIFFERENTIAL		MORSETTO TERMINAL CLAMP				
	SEZIONATORE UNIPOLARE SINGLE PHASE DISCONNECT		INTERRUTTORE AUTOMATICO MAGNETOTERMICO UNIPOLARE SINGLE PHASE AUTOMATIC MAGNETO-THERMAL SWITCH		MORSETTO FUSIBILATO TERMINAL CLAMP WITH FUSE				
	SEZIONATORE BIPOLARE TWO PHASE DISCONNECT		INTERRUTTORE AUTOMATICO MAGNETOTERMICO BIPOLARE TWO PHASE AUTOMATIC MAGNETO-THERMAL SWITCH	⌀	MORSETTO SEZIONABILE DISCONNECT TERMINAL CLAMP				
	SEZIONATORE TRIPOLARE THREE PHASE DISCONNECT		INTERRUTTORE AUTOMATICO MAGNETOTERMICO TRIPOLARE THREE PHASE AUTOMATIC MAGNETO-THERMAL SWITCH		DIRAMAZIONE PARALLELA PARALLEL BRANCH				
	SEZIONATORE TETRAPOLARE FOUR PHASE DISCONNECT		INTERRUTTORE AUTOMATICO MAGNETOTERMICO TETRAPOLARE FOUR PHASE AUTOMATIC MAGNETO-THERMAL SWITCH		DIRAMAZIONE SERIALE SERIAL BRANCH				
	SEZIONATORE UNIPOLARE CON FUSIBILI SINGLE PHASE DISCONNECT WITH FUSE		INT. AUT. MAGNETOTERMICO BIPOLARE CON UN SOLO POLO PROTETTO TWO PHASE AUT. MAGNETO-THERMAL SINGLE-POLE PROTECTED		TERRA GROUND				
	SEZIONATORE BIPOLARE CON FUSIBILI TWO PHASE DISCONNECT WITH FUSE		INT. AUT. MAGNETOTERMICO DIFFERENZIALE UNIPOLARE SINGLE PHASE AUT. MAGNETO-THERMAL SWITCH WITH DIFFERENTIAL		MASSA GROUND-FRAME				
	SEZIONATORE TRIPOLARE CON FUSIBILI THREE PHASE DISCONNECT WITH FUSE		INT. AUT. MAGNETOTERMICO DIFFERENZIALE BIPOLARE TWO PHASE AUT. MAGNETO-THERMAL SWITCH WITH DIFFERENTIAL						

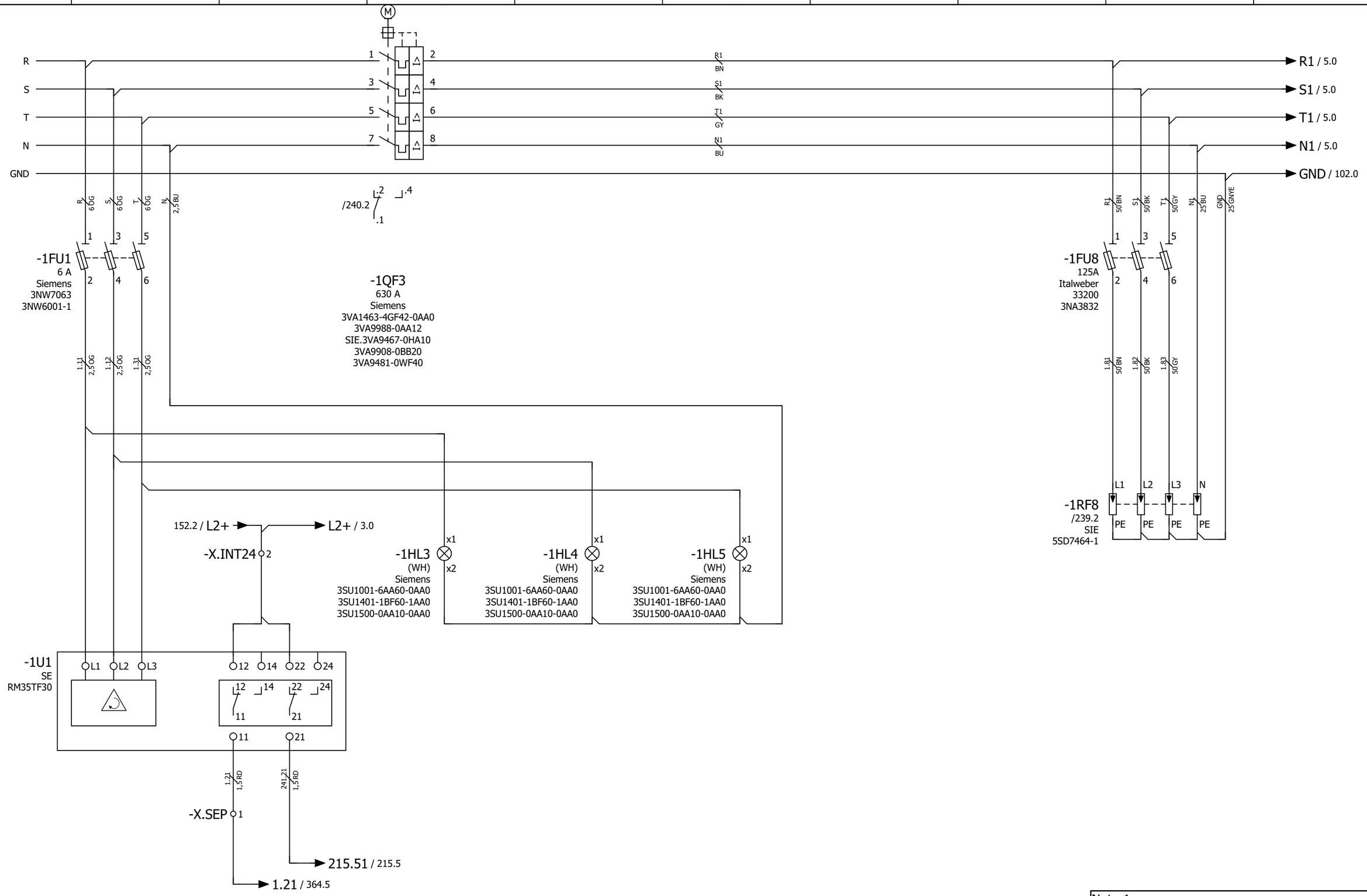
COLORI DEI CONDUTTORI CONDUCTORS COLOURS	
CIRCUITI DI POTENZA AC e DC AC & DC POWER CIRCUIT	NERO BLACK
CONDUTTORE NEUTRO NEUTRAL CONDUCTOR	BLU BLUE
CONDUTTORE PE CONDUCTOR EARTH PE	GIALLO VERDE GREEN YELLOW
CIRCUITI +24Vdc E SEGNALI +24Vdc CIRCUITS AND SIGNALS	ROSSO RED
CIRCUITI +0Vdc +0Vdc CIRCUITS	NERO BLACK

DATI GENERALI CONDUTTORI CONDUCTORS GENERAL DATA	
CONDUTTORE DI POTENZA POWER CONDUCTOR	TIPO DI CONDUTTORE ≥ 1,5mmq CONDUCTOR TYPE ≥ 1,5mmq
CONDUTTORE DI SEGNALE SIGNAL CONDUCTOR	TIPO DI CONDUTTORE ≥ 0,75mmq CONDUCTOR TYPE ≥ 0,75mmq

CODICE COLORI CONDUCTORS COLOURS	
NERO BLACK	BK
MARRONE BROWN	BN
GRIGIO GREY	GY
VERDE GREEN	GN
BLU BLUE	BU
ROSSO RED	RD
ARANCIONE ORANGE	OG
GIALLO YELLOW	YE
BIANCO WHITE	WH
GIALLO VERDE GREEN YELLOW	GNYE

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH Page description: CABINET SUMMARY TABLE
01	04				
02					

Order: W240569 File: D240934SCH01 Scheme: D240934SCH01	Sheet: 0.b	Next: 1
	Tot. Sheet: 156	



PHASE MONITORING RELAY

R PHASE VOLTAGE PRESENCE LAMP

S PHASE VOLTAGE PRESENCE LAMP

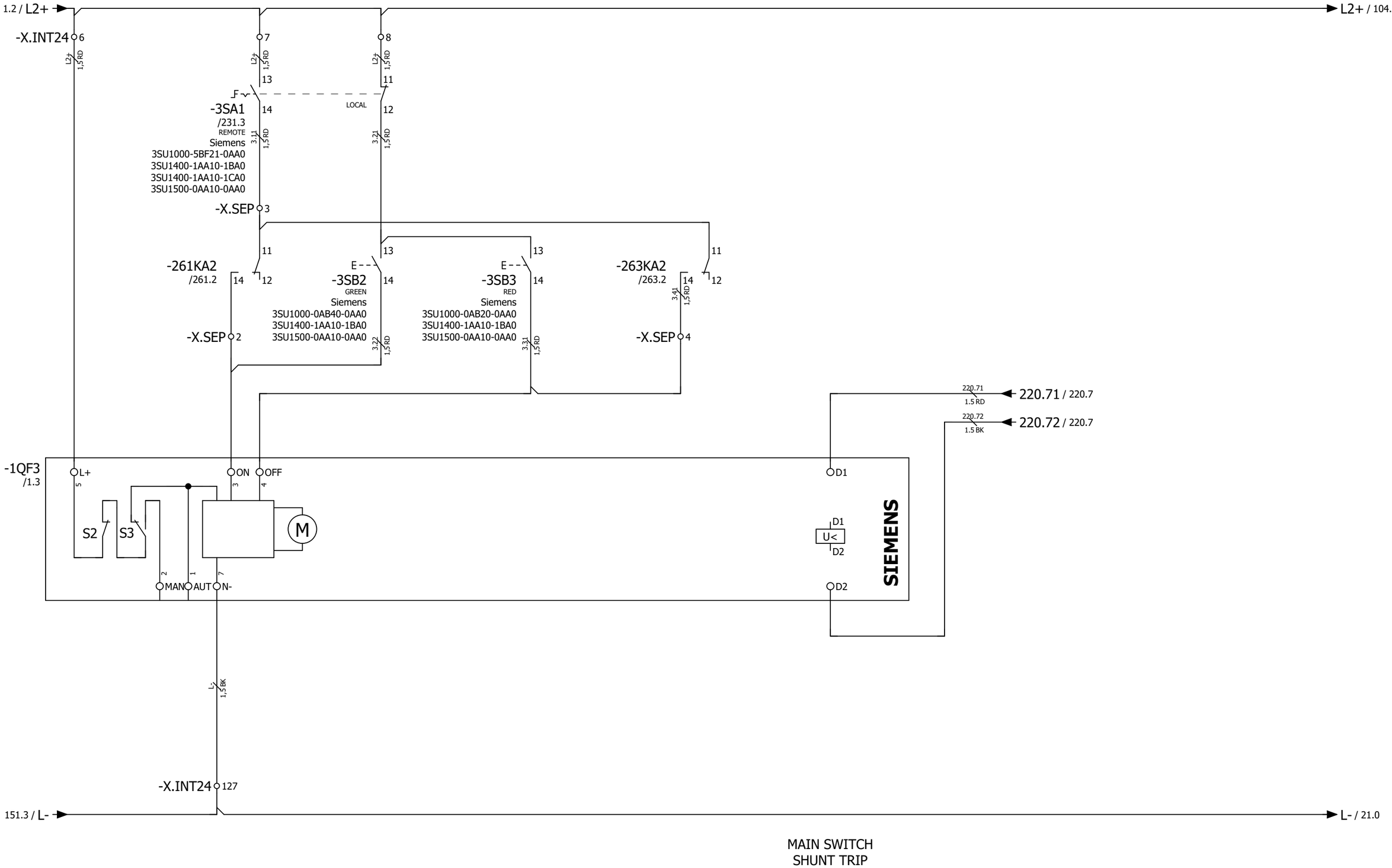
T PHASE VOLTAGE PRESENCE LAMP

Note 1:
Power supply source from Low Voltage Switchboard
Tag:SG-200N1
Doc. No. 123A90-DDL-EL-DG-20159 Sheet 01

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 1	Next: 2
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: MAIN LINE	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

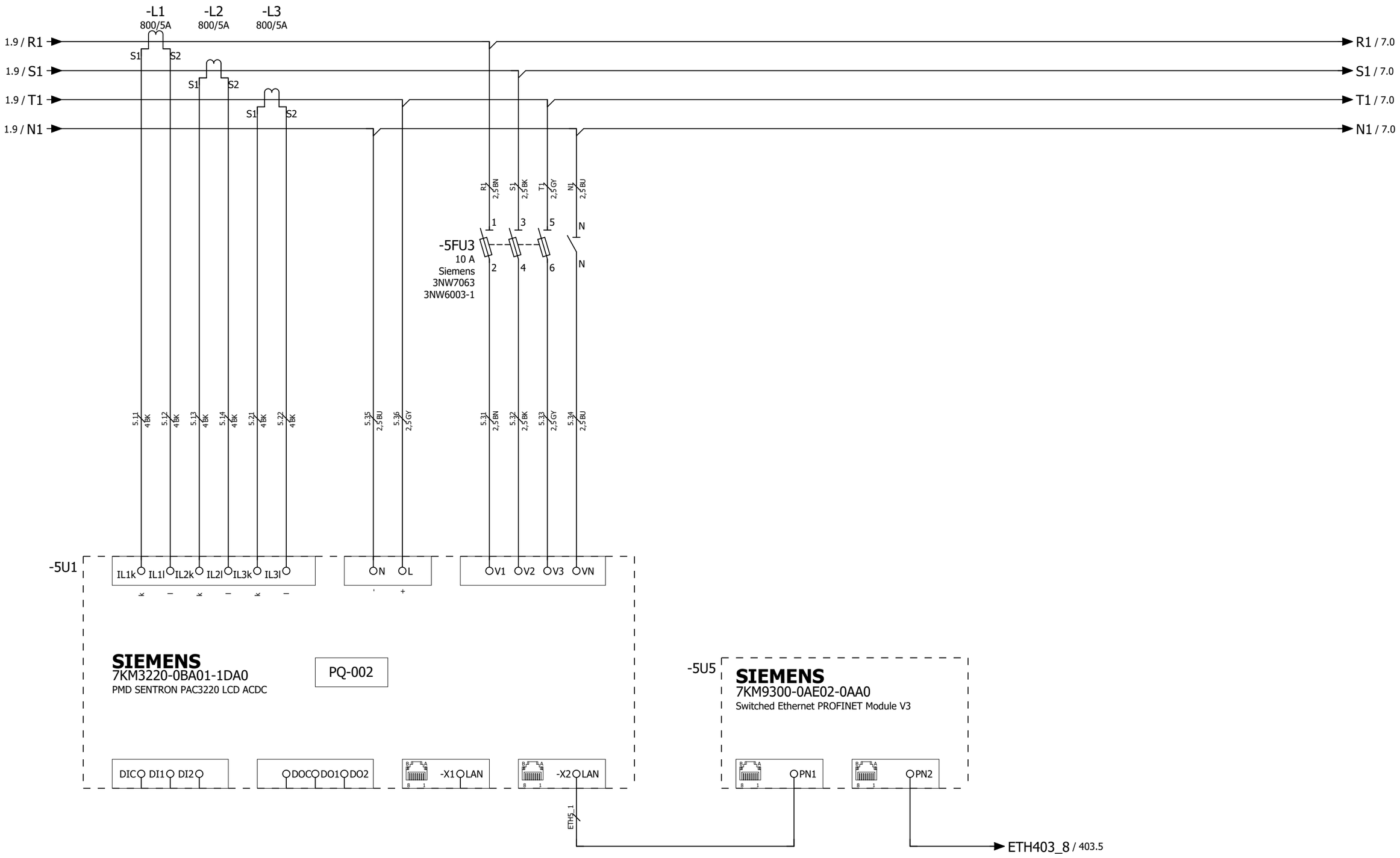
0	1	2	3	4	5	6	7	8	9

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 2	Next: 3
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: MAIN SWITCH SHUNT TRIP		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



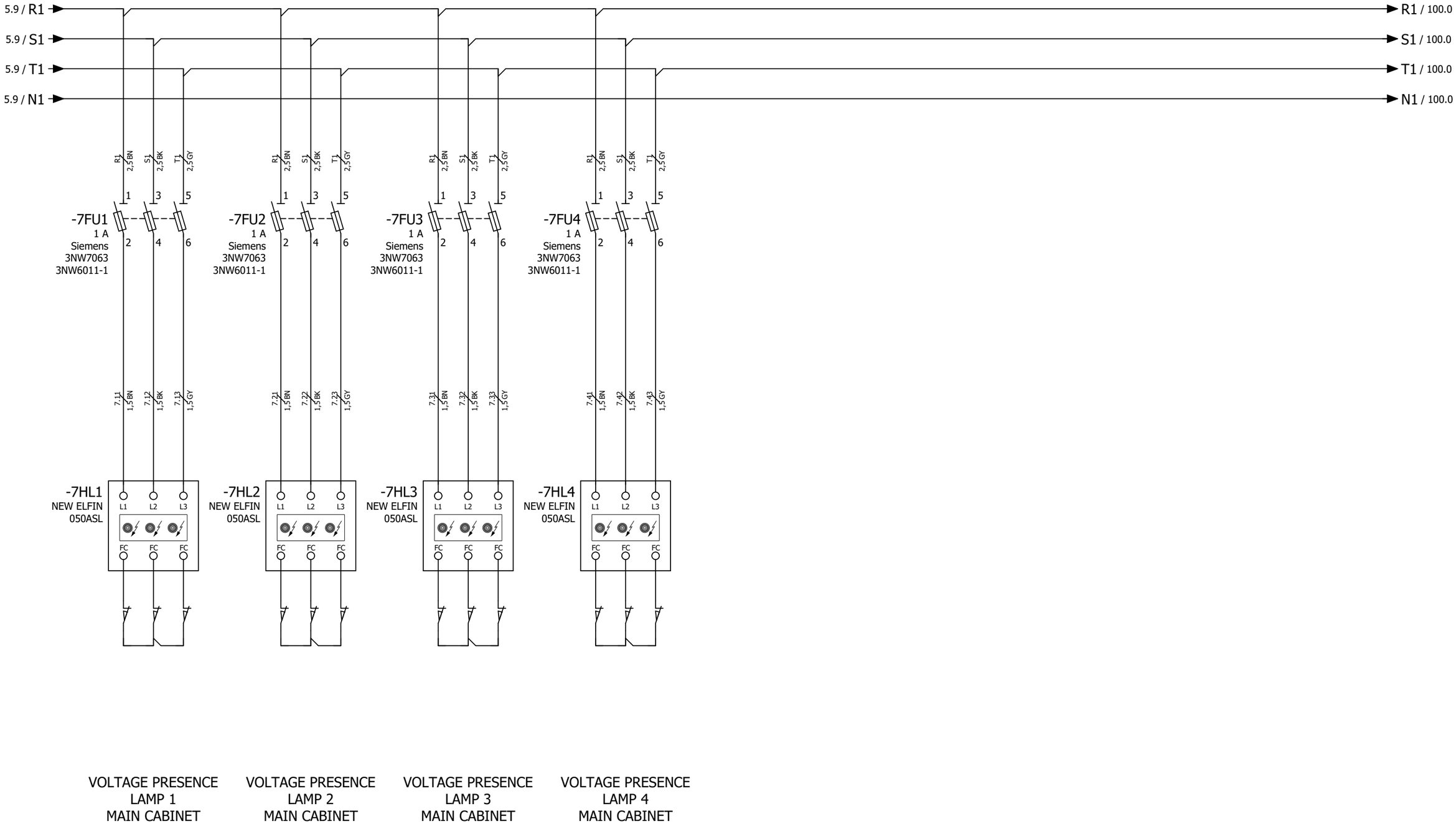
MAIN SWITCH
SHUNT TRIP

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 3	Next: 5
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: MAIN SWITCH COMMAND		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



MAIN LINE
MEASURING DEVICE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 5	Next: 7
00	03				Page description: MAIN LINE MEASURING DEVICE	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



VOLTAGE PRESENCE
LAMP 1
MAIN CABINET

VOLTAGE PRESENCE
LAMP 2
MAIN CABINET

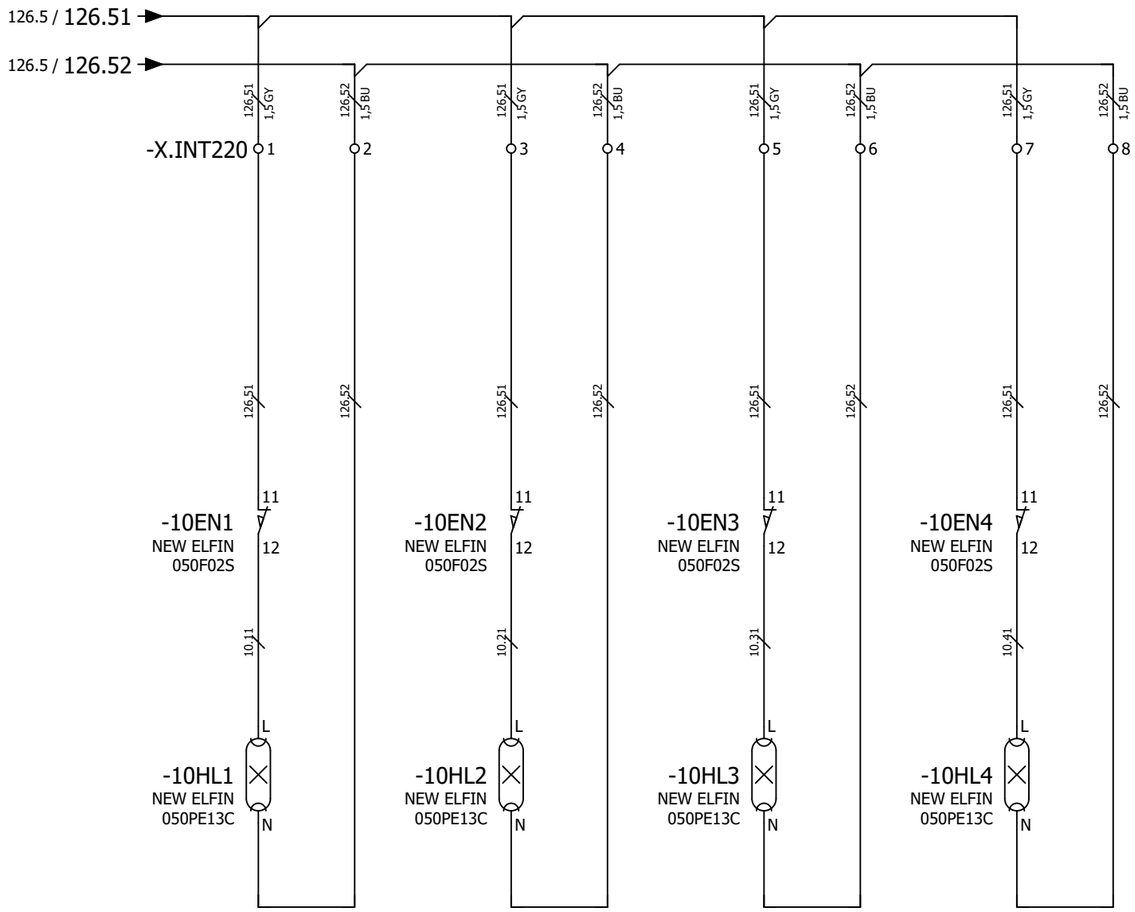
VOLTAGE PRESENCE
LAMP 3
MAIN CABINET

VOLTAGE PRESENCE
LAMP 4
MAIN CABINET

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH
01	04				Page description: VOLTAGE PRESENCE LAMPS
02					

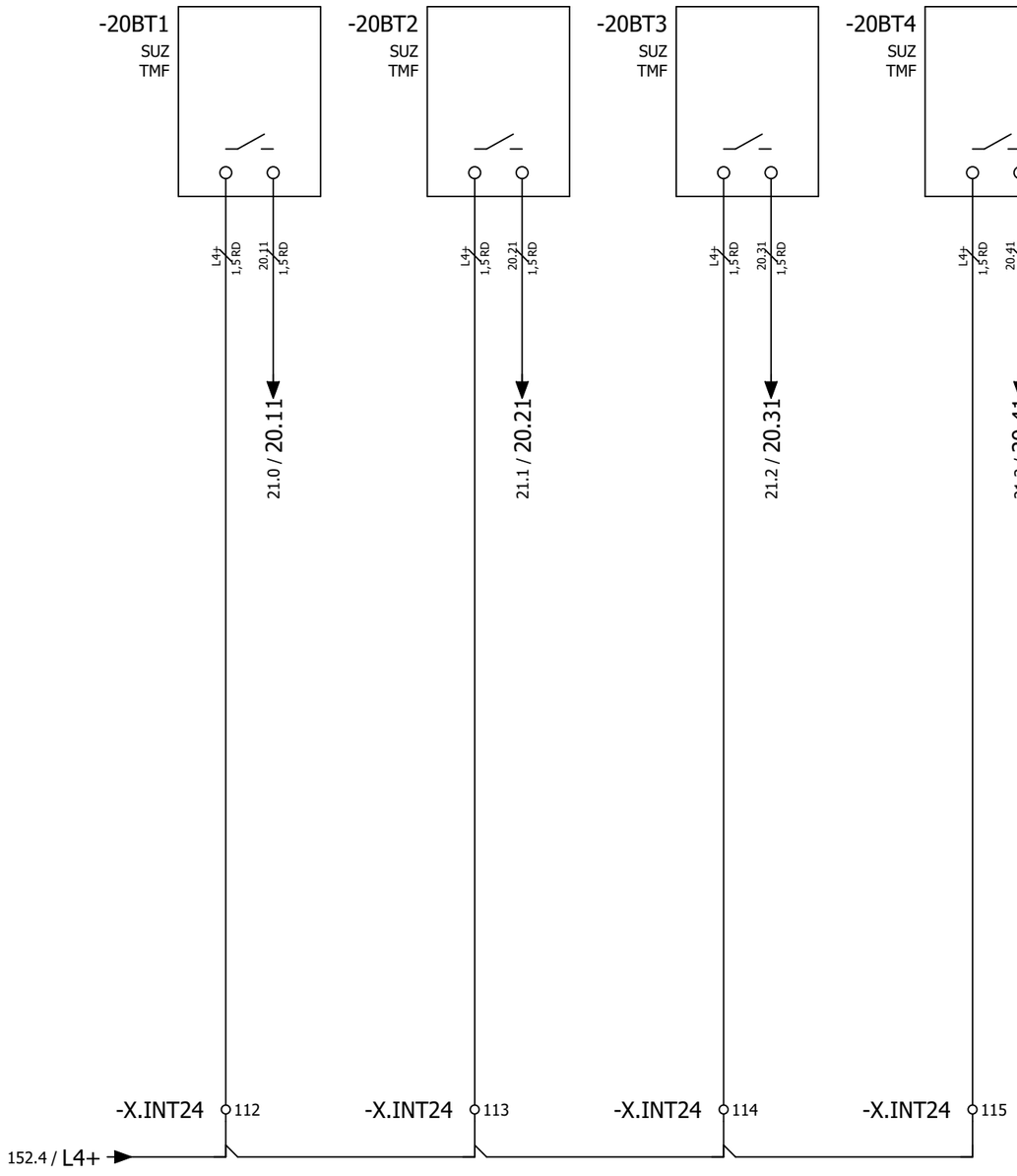
Order: W240569
File: D240934SCH01
Scheme: D240934SCH01

Sheet: 7 | Next: 10
Tot. Sheet: 156

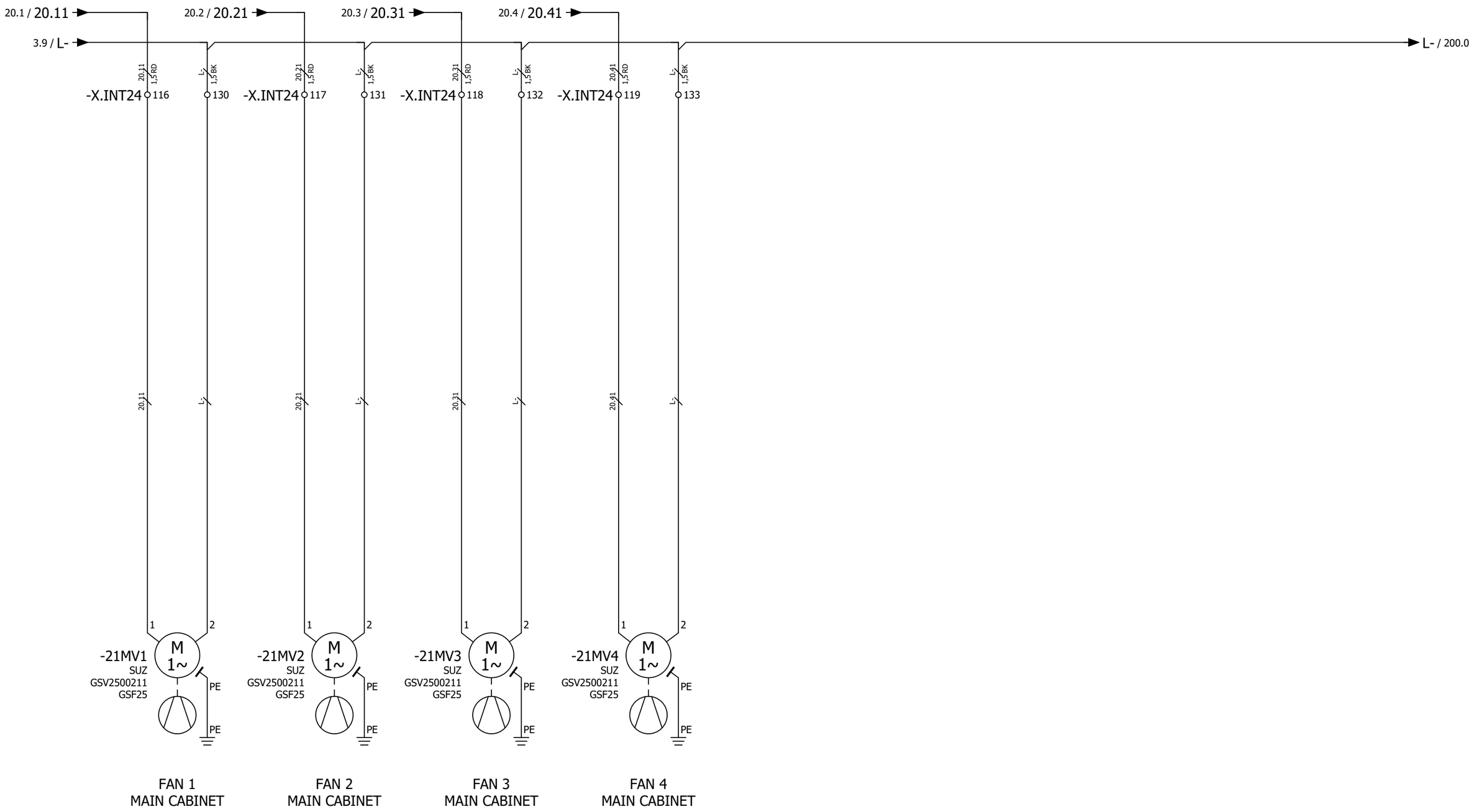


LIGHT 1 LIGHT 2 LIGHT 3 LIGHT 4

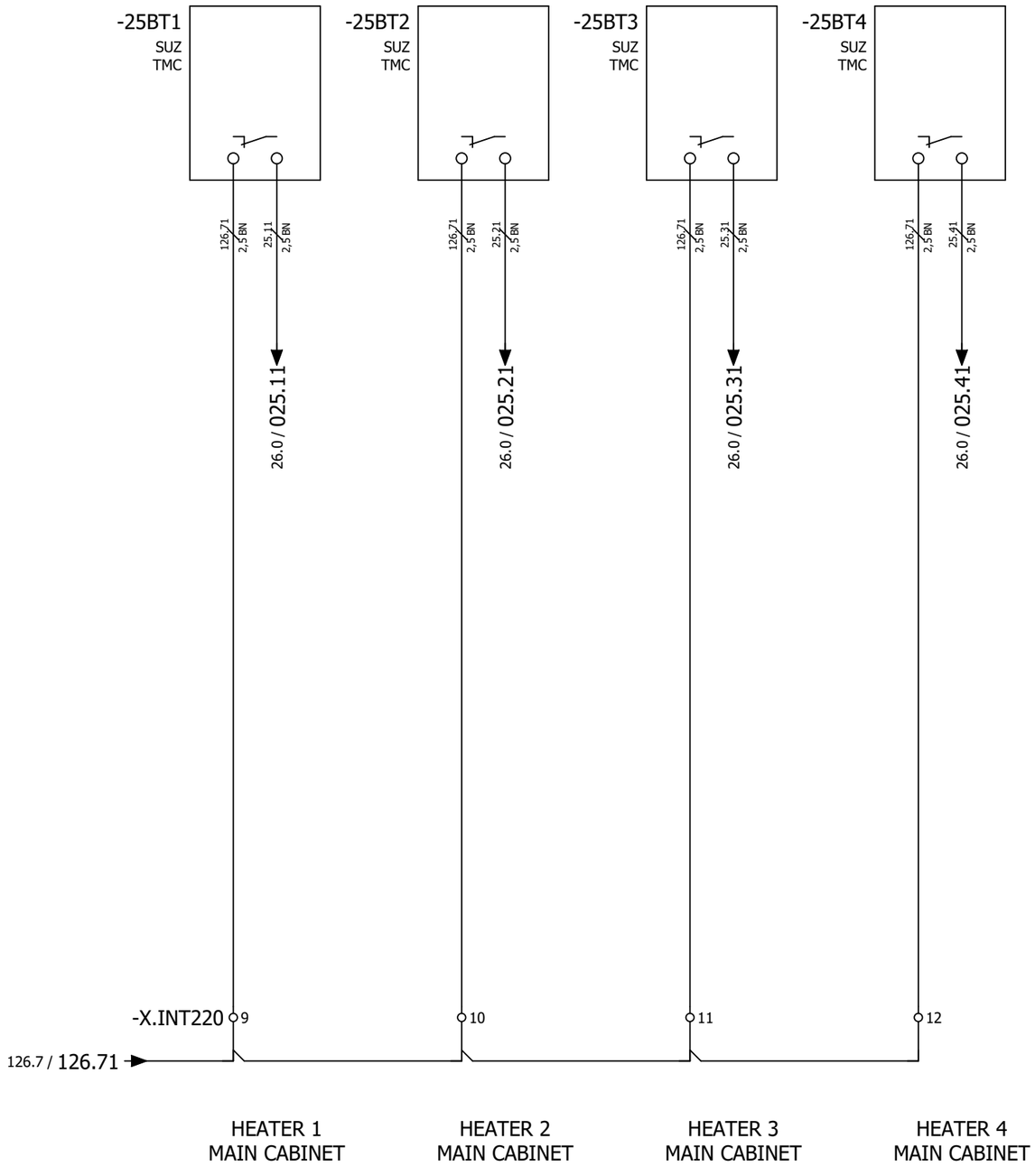
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 10	Next: 20
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: INTERNAL CABINET LIGHTING	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



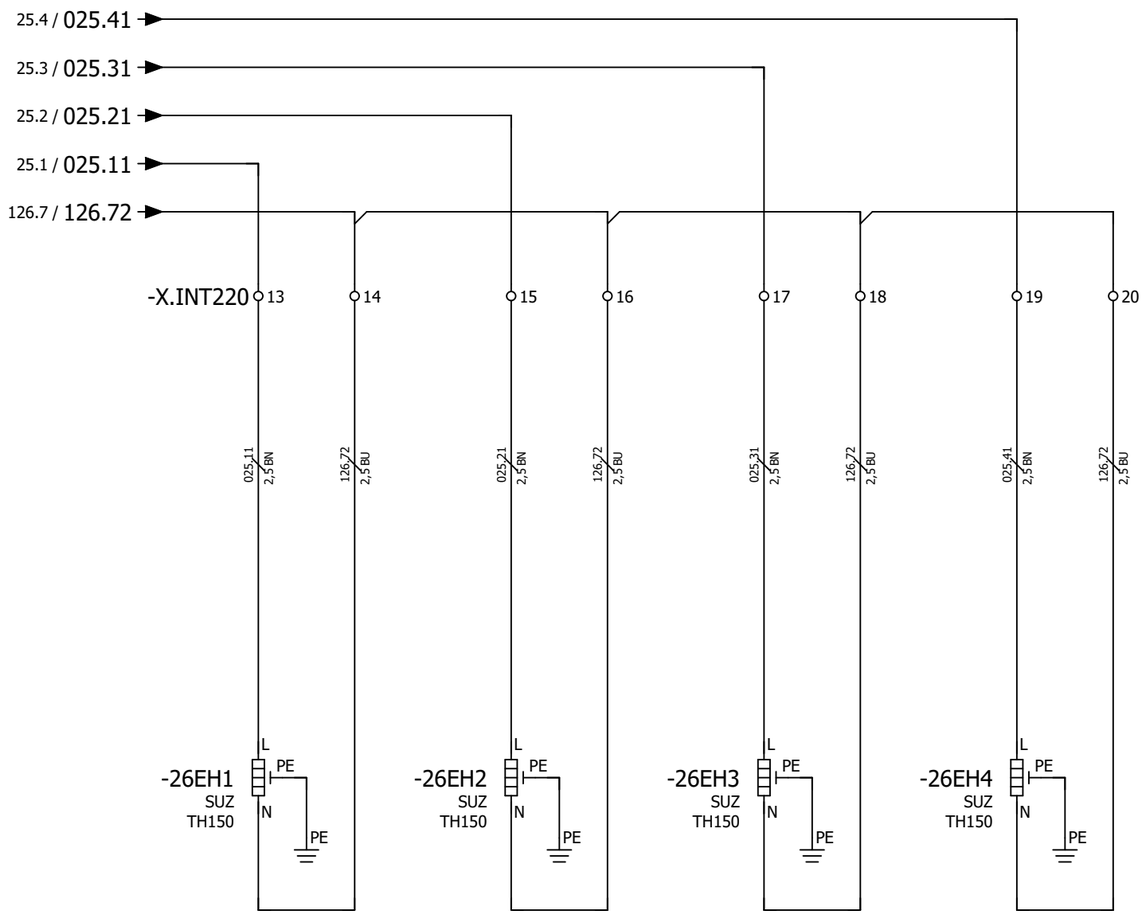
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 20	Next: 21
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: INTERNAL CABINET FAN CONTROLLERS		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 21	Next: 25
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: INTERNAL CABINET FANS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 25	Next: 26
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: INTERNAL CABINET HEATERS CONTROLLERS	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



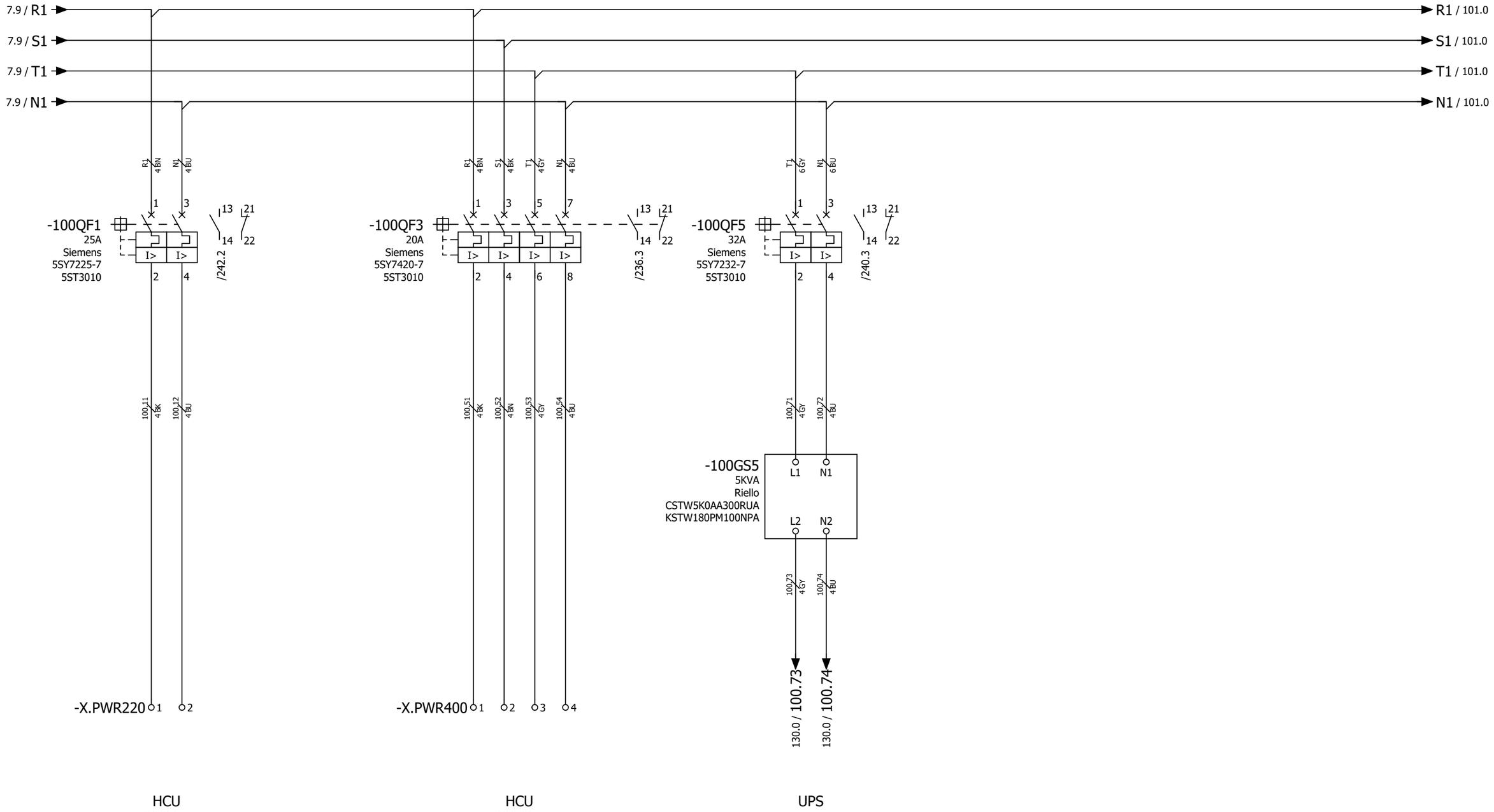
HEATER 1
MAIN CABINET

HEATER 2
MAIN CABINET

HEATER 3
MAIN CABINET

HEATER 4
MAIN CABINET

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH Page description: INTERNAL CABINET HEATERS
01	04				Order: W240569 File: D240934SCH01 Scheme: D240934SCH01
02					Sheet: 26 / Next: 100 Tot. Sheet: 156



HCU
230Vac
REC-01/02 AUX Supply 1

HCU
400 Vac
REC-01/02 AUX Supply 2

UPS

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 100	Next: 101
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: POWER DISTRIBUTION 400Vac		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

100.9 / R1
100.9 / S1
100.9 / T1
100.9 / N1

R1 / 102.0
S1 / 102.0
T1 / 102.0
N1 / 102.0

-101QF1
63A
Siemens
5SY8263-7
5ST3010
/243.1

-101QF3
20A
Siemens
5SY7220-7
5SM2322-6
5ST3010
/232.4

-101QF5
20A
Siemens
5SY7420-7
5ST3010
/236.4

-101QF7
16A
Siemens
5SY7416-7
5SM2342-6
5ST3010
/240.4

-300KM5 /300.5
-300KM3 /300.3
-300KM1 /300.1
-300KM4 /300.4

-X.PWR220
-X.PWR400

SPARE

HE-61.1
(HPP-700)

SPARE

HE-64.1
(HPU-700)

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

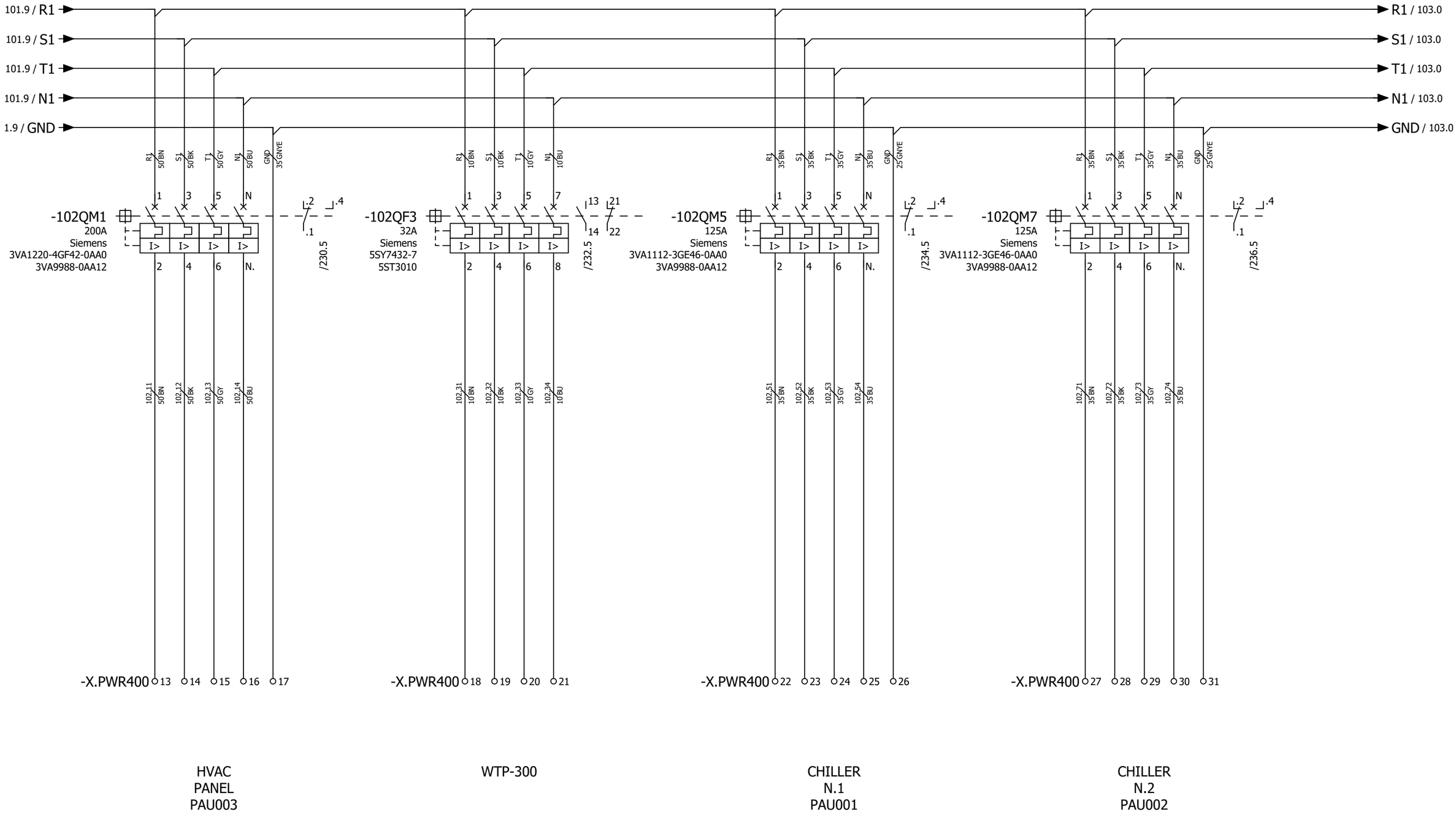
Page description: POWER DISTRIBUTION 400Vac

Order: W240569
File: D240934SCH01

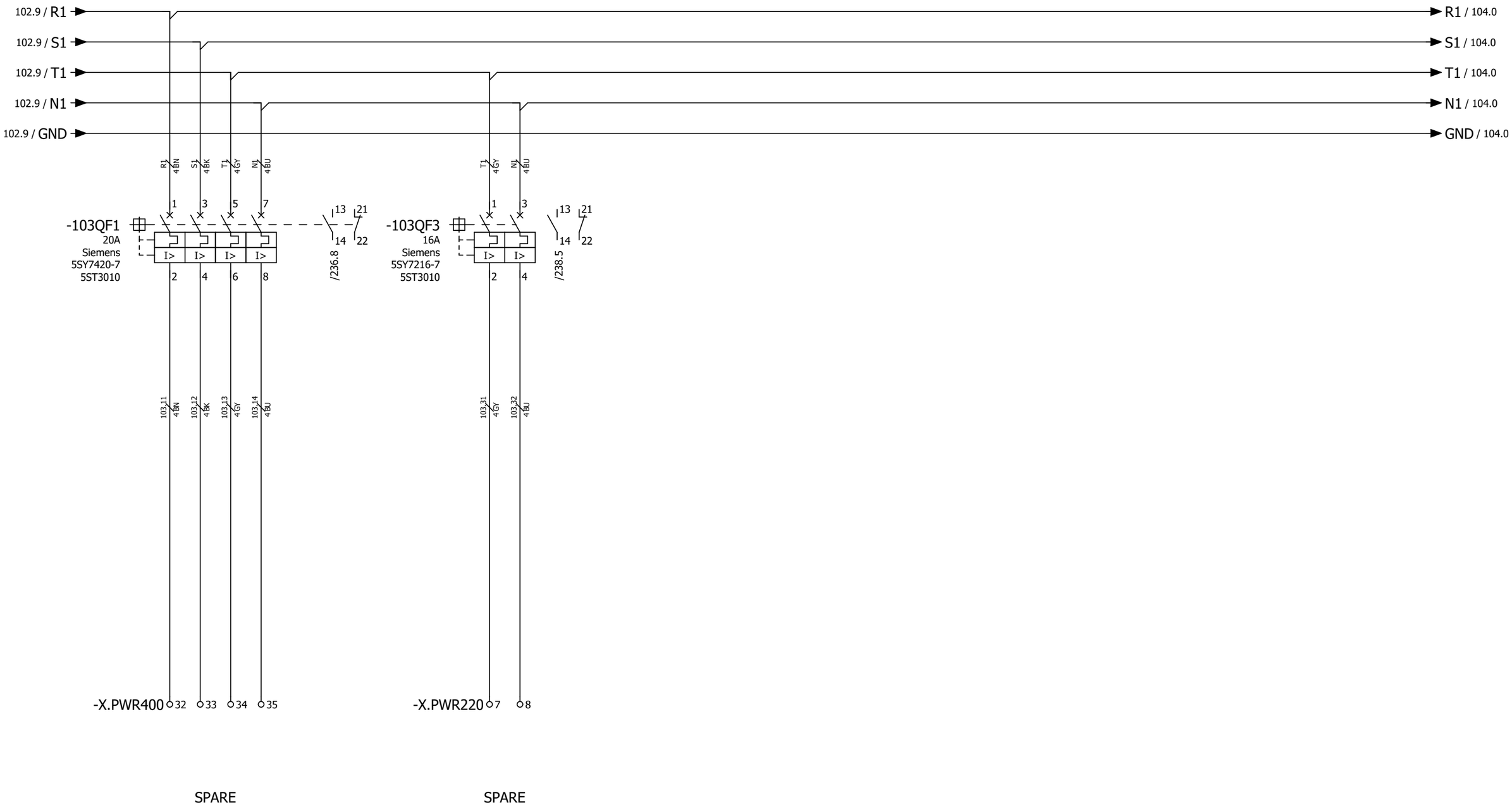
Scheme: D240934SCH01

Sheet: 101 | Next: 102

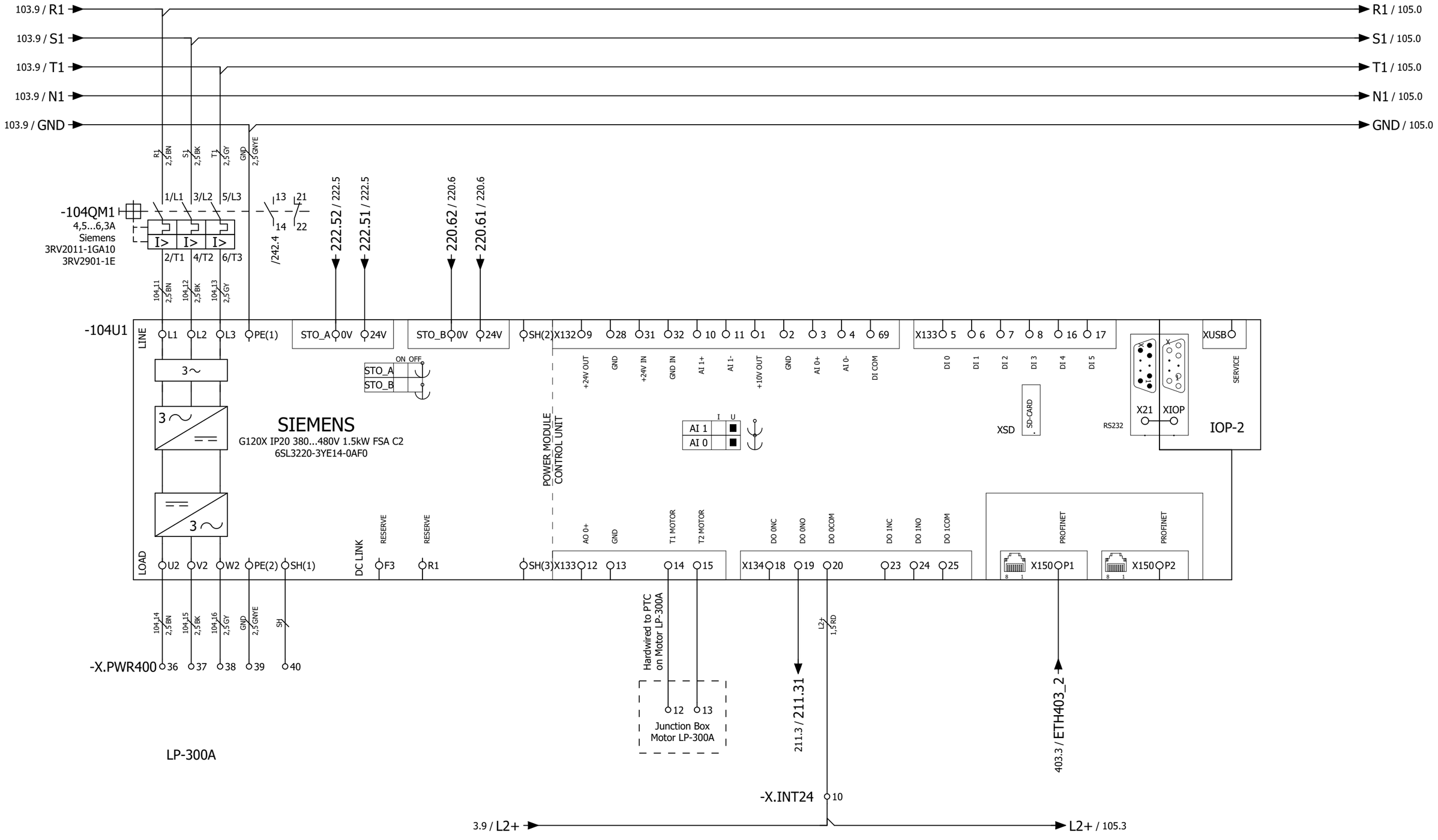
Tot. Sheet: 156



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 102	Next: 103
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 400Vac	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 103	Next: 104
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: POWER DISTRIBUTION 400Vac		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 104	Next: 105
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 400Vac	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

104.9 / R1 → R1 / 106.0
104.9 / S1 → S1 / 106.0
104.9 / T1 → T1 / 106.0
104.9 / N1 → N1 / 106.0
104.9 / GND → GND / 106.0

R1 2,5BN
S1 2,5BK
T1 2,5GY
GND 2,5GNYE

-105QM1
4,5...6,3A
Siemens
3RV2011-1GA10
3RV2901-1E
1/L1 3/L2 5/L3 13 21
I> I> I>
2/T1 4/T2 6/T3 14 22
/230.6

221.62 / 221.6
221.61 / 221.6
222.62 / 222.6
222.61 / 222.6

105.11 2,5BN
105.12 2,5BK
105.13 2,5GY

-105U1
LINE
L1 L2 L2 L3 PE(1) STO_A 0V 24V STO_B 0V 24V SH(2) X132 9 28 31 32 10 11 1 2 3 4 69 X133 5 6 7 8 16 17 XUSB

ON OFF
STO_A
STO_B

3~
3 ~
3 ~

SIEMENS
G120X IP20 380...480V 1.5kW FSA C2
6SL3220-3YE14-0AF0

POWER MODULE
CONTROL UNIT

+24V OUT GND +24V IN GND AI 1+ AI 1- +10V OUT GND AI 0+ AI 0- DI COM
DI 0 DI 1 DI 2 DI 3 DI 4 DI 5

I U
AI 1
AI 0

XSD . SD-CARD

RS232 X21 XIOP IOP-2
SERVICE

LOAD
U2 V2 W2 PE(2) SH(1)

DC LINK
RESERVE F3
RESERVE R1

SH(3) X133 12 13 14 15
AO 0+ GND T1 MOTOR T2 MOTOR

X134 18 19 20 23 24 25
DO 0NC DO 0NO DO 0COM DO 1NC DO 1NO DO 1COM

PROFINET X150 P1
PROFINET X150 P2

105.14 2,5BN
105.15 2,5BK
105.16 2,5GY
GND 2,5GNYE
SH

-X.PWR400 41 42 43 44 45

Hardwired to PTC
on Motor LP-300B
12 13
Junction Box
Motor LP-300B

LP-300B

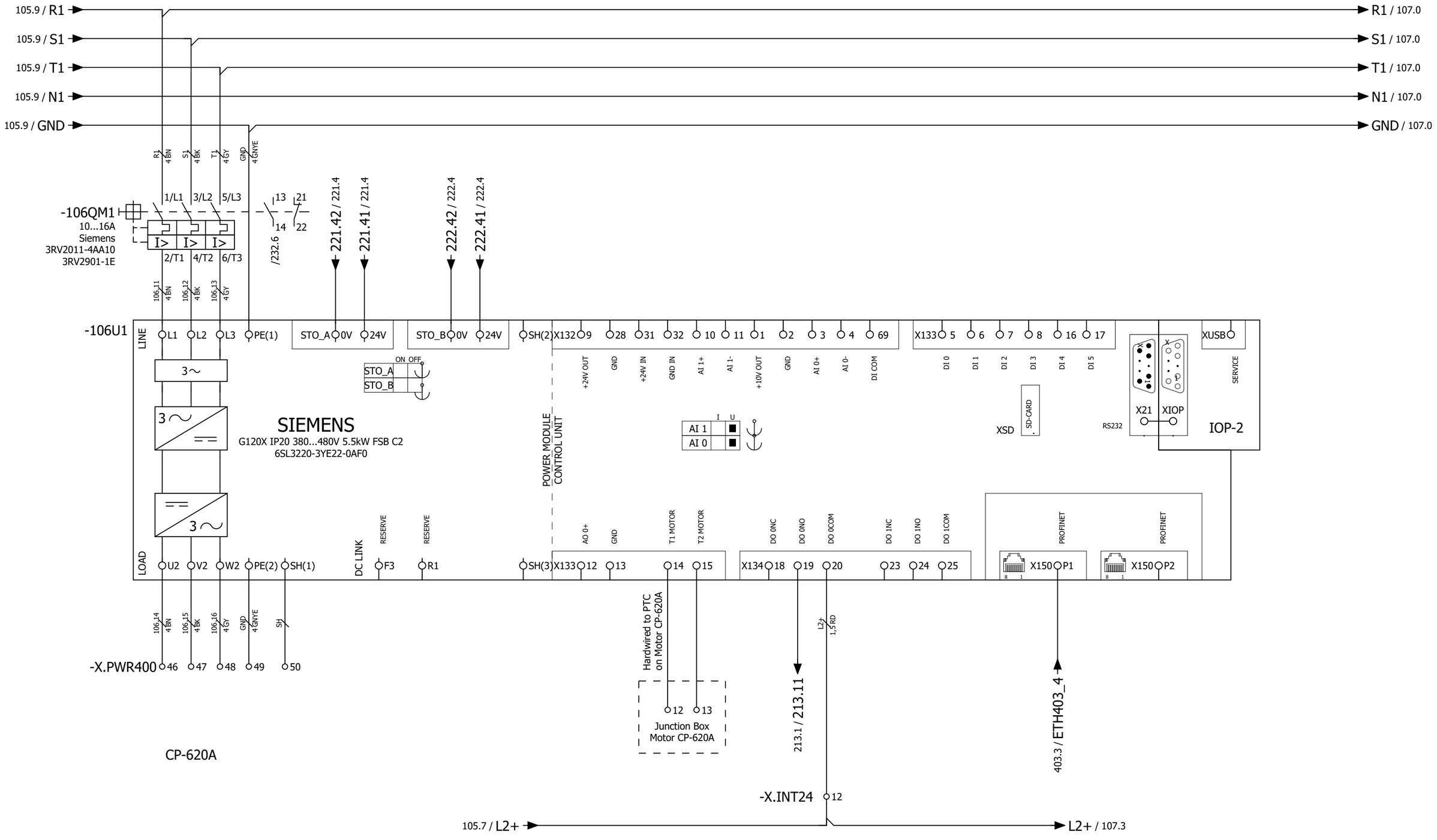
L2 1,5RD
213.3 / 213.31

403.3 / ETH403_3

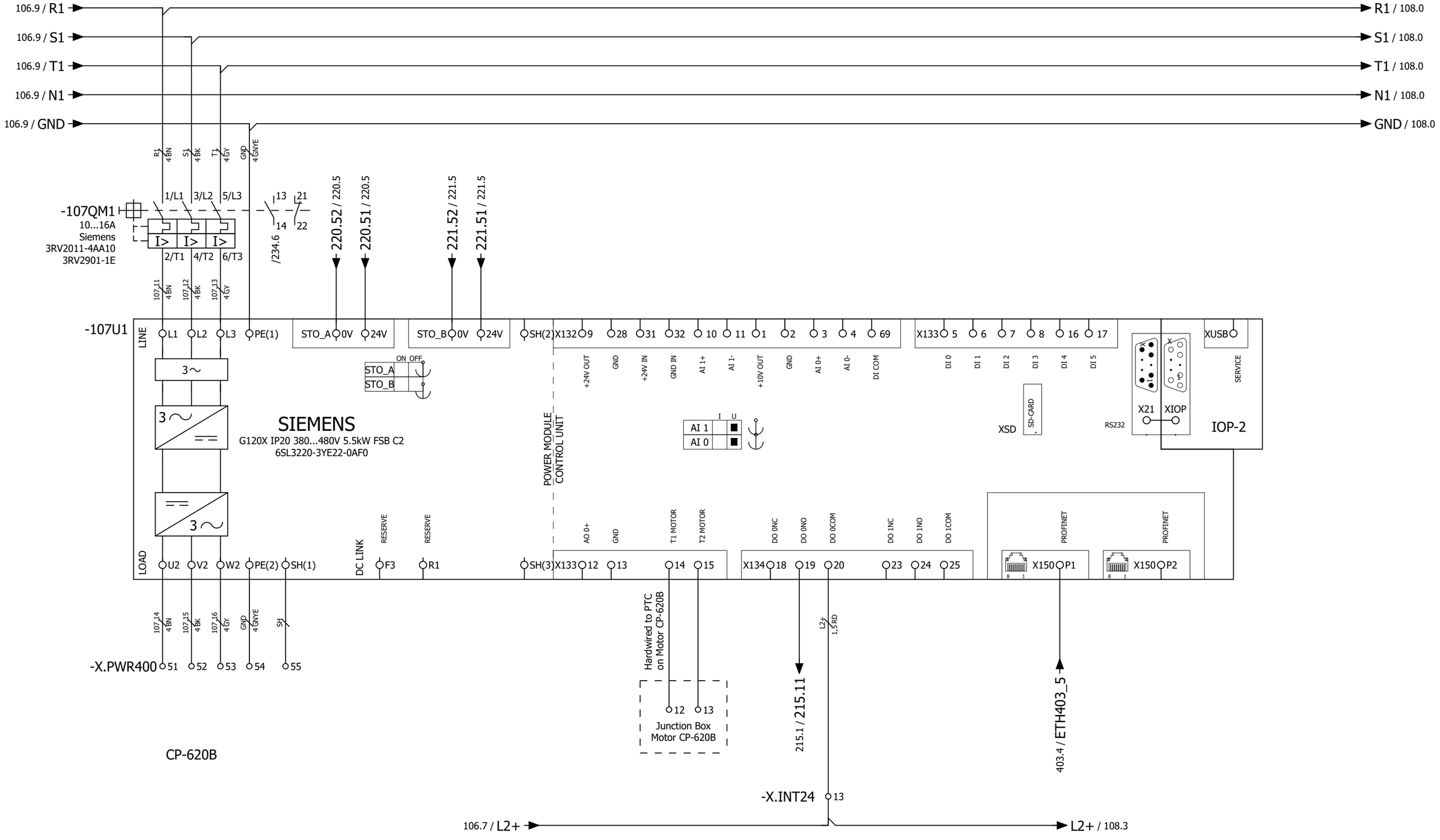
-X.INT24 11

104.7 / L2+ → L2+ / 106.3

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 105	Next: 106
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: POWER DISTRIBUTION 400Vac	Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 106	Next: 107
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 400Vac	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 107	Next: 108
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: POWER DISTRIBUTION 400Vac		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

107.9 / R1 → R1 / 109.0
107.9 / S1 → S1 / 109.0
107.9 / T1 → T1 / 109.0
107.9 / N1 → N1 / 109.0
107.9 / GND → GND / 109.0

R1 10BN
S1 10BK
T1 10GY
GND 10GNYE

-108QM1
23...28A
Siemens
3RV2021-4NA10
3RV2901-1E
1/L1 3/L2 5/L3
2/T1 4/T2 6/T3
13 21
14 22
/236.6

220.32 / 220.3
220.31 / 220.3
221.32 / 221.3
221.31 / 221.3

108.11 10BN
108.12 10BK
108.13 10GY

-108U1
LINE
L1 L2 L3 PE(1)
STO_A 0V 24V
STO_B 0V 24V
SH(2)

X132 9 28 31 32 10 11 1 2 3 4 69
+24V OUT | GND | +24V IN | GND IN | AI 1+ | AI 1- | +10V OUT | GND | AI 0+ | AI 0- | DI COM

X133 5 6 7 8 16 17
DI 0 | DI 1 | DI 2 | DI 3 | DI 4 | DI 5

XUSB
SERVICE

ON OFF
STO_A
STO_B

3~
3 ~
3 ~

SIEMENS
G120X IP20 380...480V 11kW FSC C2
6SL3220-3YE26-0AF0

POWER MODULE
CONTROL UNIT

I U
AI 1
AI 0

XSD
SD-CARD

RS232
X21 XIOP
IOP-2

LOAD
U2 V2 W2 PE(2) SH(1)

DC LINK
RESERVE F3
RESERVE R1

SH(3) X133 12 13 14 15
AO 0+ | GND | T1 MOTOR | T2 MOTOR

X134 18 19 20 23 24 25
DO 0NC | DO 0NO | DO 0COM | DO 1NC | DO 1NO | DO 1COM

PROFINET X150 P1
PROFINET X150 P2

108.14 10BN
108.15 10BK
108.16 10GY
GND 10GNYE
SH

-X.PWR400 56 57 58 59 60

Hardwired to PTC
on Motor CP-600A
12 13
Junction Box
Motor CP-600A

CP-600A

L2+ 1,5RD

214.7 / 214.71

403.4 / ETH403_6

-X.INT24 14

107.7 / L2+ → L2+ / 109.3

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 108	Next: 109
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: POWER DISTRIBUTION 400Vac		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

108.9 / R1 → R1 / 120.0
108.9 / S1 → S1 / 120.0
108.9 / T1 → T1 / 120.0
108.9 / N1 → N1 / 120.0
108.9 / GND → GND / 120.0

R1 10BN | S1 10BK | T1 10GY | GND 10GNYE

-109QM1
23...28A
Siemens
3RV2021-4NA10
3RV2901-1E
1/L1 3/L2 5/L3 | 13 21 | 14 22 | /238.6
2/T1 4/T2 6/T3

222.32 / 222.3
222.31 / 222.3
220.41 / 220.4
220.42 / 220.4

109_11 10BN | 109_12 10BK | 109_13 10GY

-109U1
LINE: L1 L2 L3 PE(1)
STO_A 0V 24V
STO_B 0V 24V
SH(2)
X132: 9 28 31 32 10 11 1 2 3 4 69
X133: 5 6 7 8 16 17
XUSB
SERVICE

3~
3 ~ ⎓
⎓ 3 ~

ON OFF
STO_A
STO_B

SIEMENS
G120X IP20 380...480V 11kW FSC C2
6SL3220-3YE26-0AF0

POWER MODULE
CONTROL UNIT

+24V OUT | GND | +24V IN | GND IN | AI 1+ | AI 1- | +10V OUT | GND | AI 0+ | AI 0- | DI COM
DI 0 | DI 1 | DI 2 | DI 3 | DI 4 | DI 5

I U
AI 1
AI 0

XSD . SD-CARD

RS232 X21 XIOP
IOP-2

LOAD: U2 V2 W2 PE(2) SH(1)
DC LINK: RESERVE F3 | RESERVE R1
SH(3) X133: 12 13 | 14 15
AO 0+ | GND | T1 MOTOR | T2 MOTOR

X134: 18 19 20 | 23 24 25
DO 0NC | DO 0NO | DO 0COM | DO 1NC | DO 1NO | DO 1COM

PROFINET X150 P1
PROFINET X150 P2

109_14 10BN | 109_15 10BK | 109_16 10GY | GND 10GNYE | SH

-X.PWR400 61 62 63 64 65

CP-600B

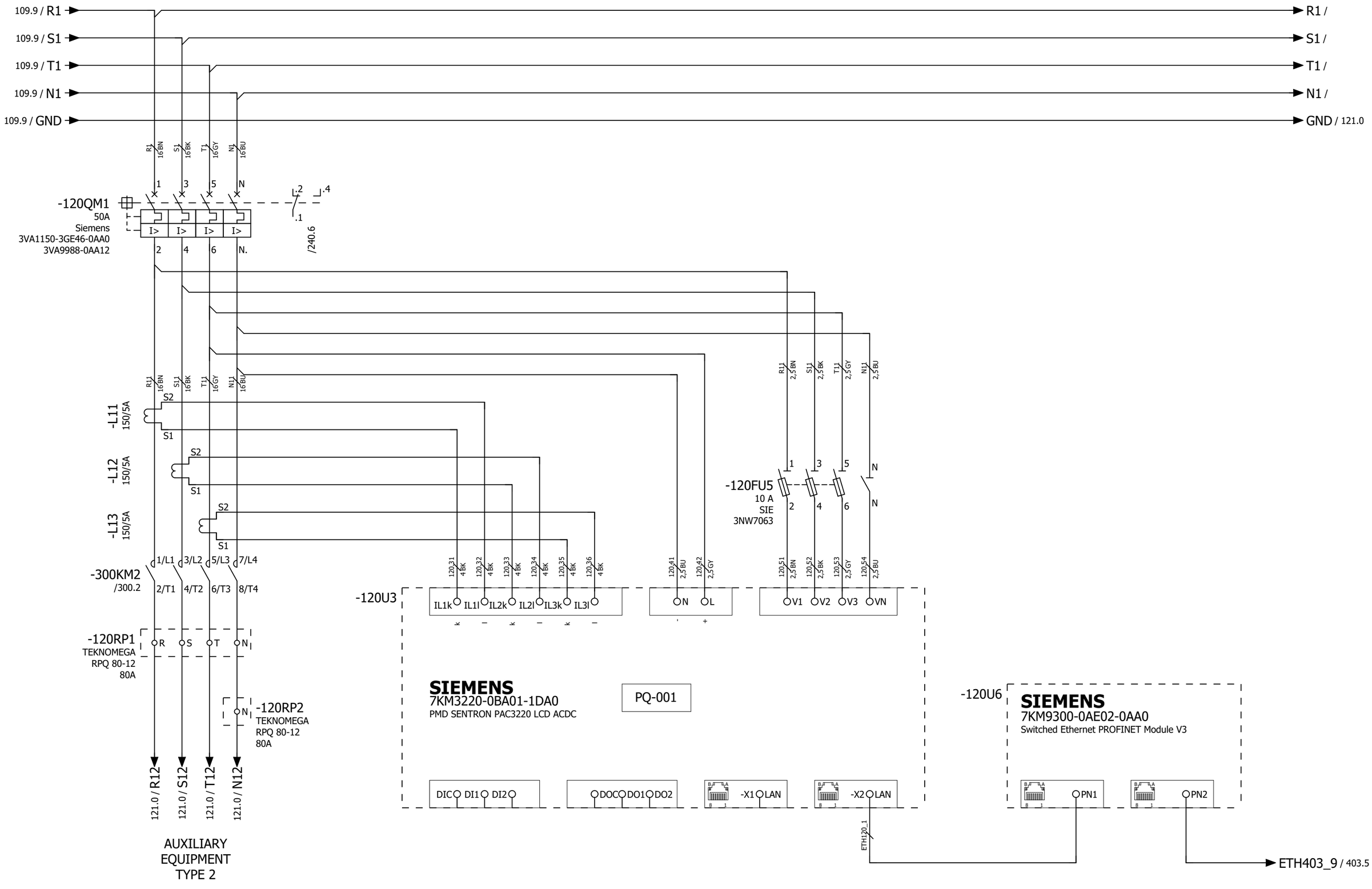
Hardwired to PTC
on Motor CP-600B
12 13
Junction Box
Motor CP-600B

L2+ 1,5RD
211.1 / 211.11
403.5 / ETH403_7 →

-X.INT24 15

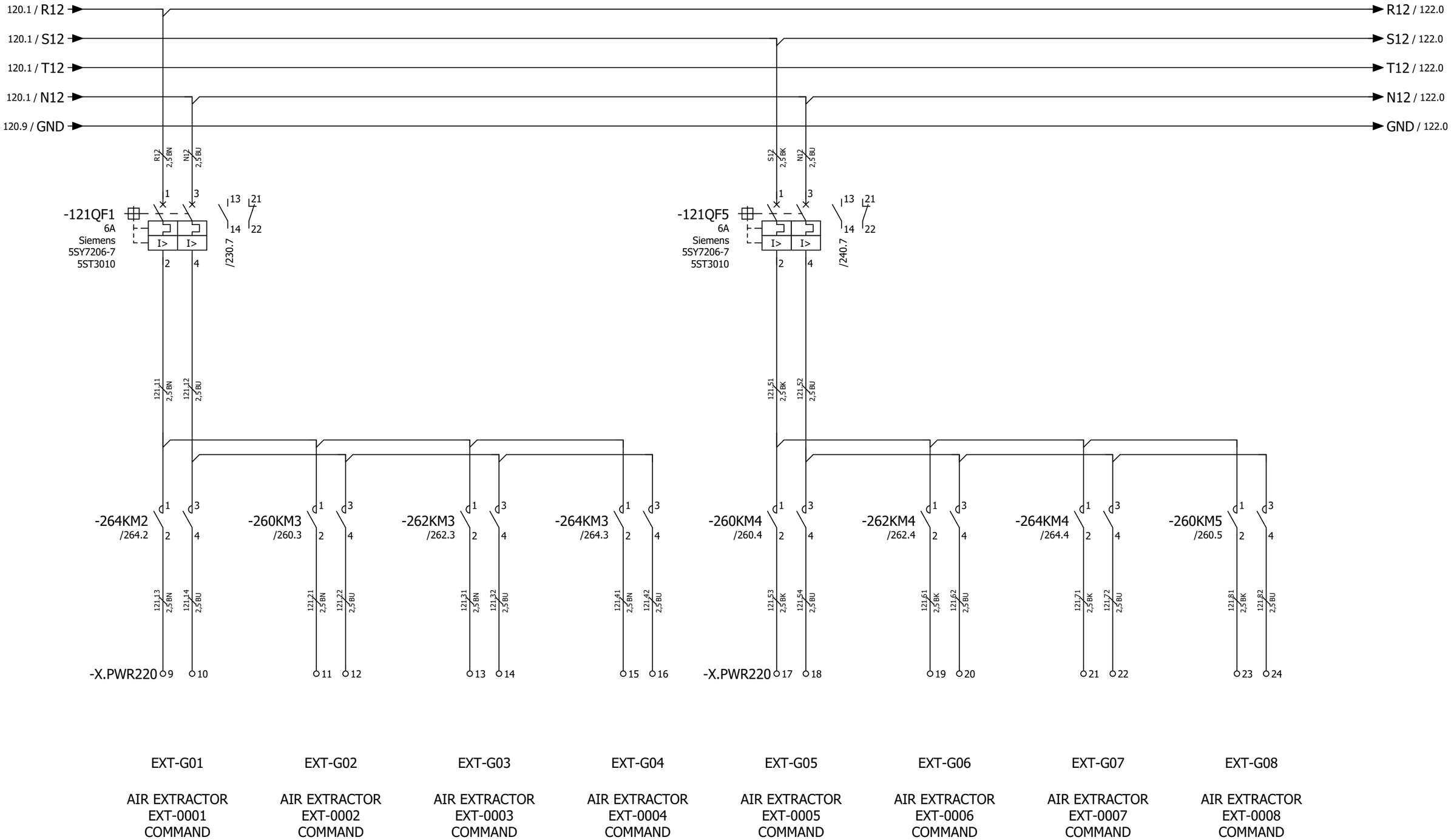
108.7 / L2+ → L2+ / 201.0

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 109	Next: 120
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 400Vac	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

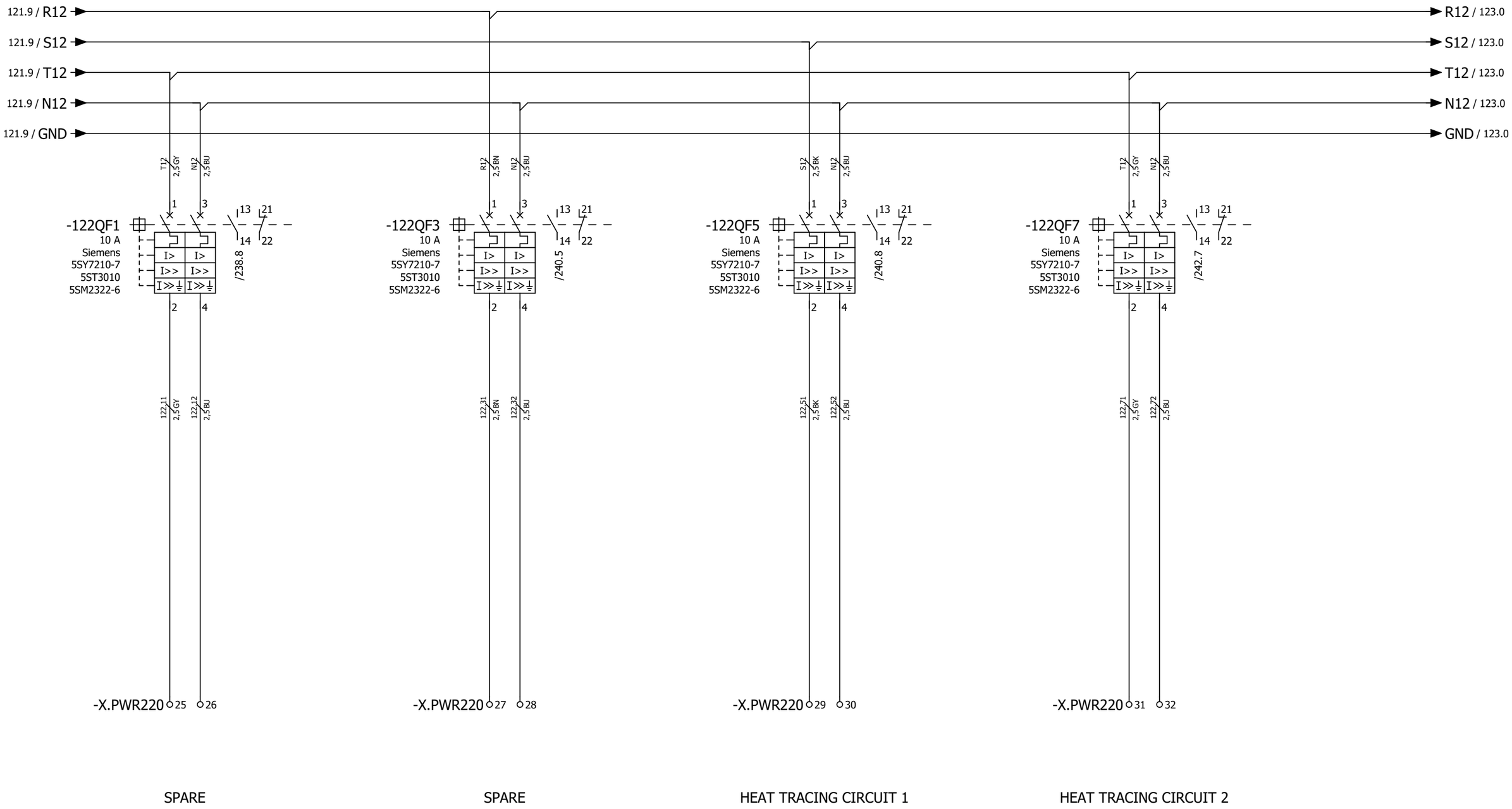


Release/Version:			Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569 / File: D240934SCH01 / Scheme: D240934SCH01	Sheet: 120 / Next: 121 / Tot. Sheet: 156
00	03		FORES ENGENEERING	Page description: POWER DISTRIBUTION 230Vac		
01	04					
02						

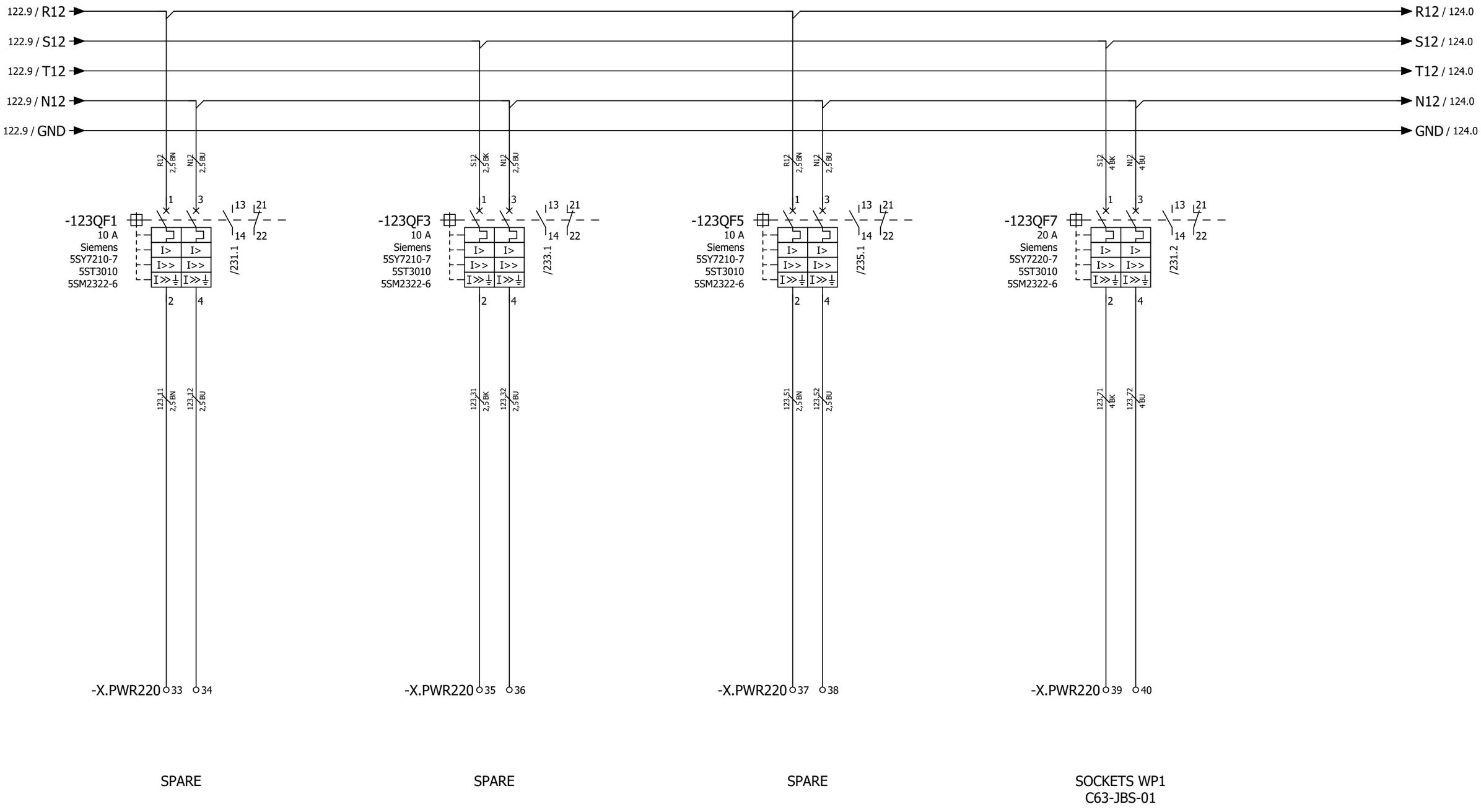
PROTEO ENGINEERING GROUP



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 121	Next: 122
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 230Vac	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 122	Next: 123
00	03					File: D240934SCH01		
01	04				Page description: POWER DISTRIBUTION 230Vac			
02						Scheme: D240934SCH01	Tot. Sheet: 156	



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 123	Next: 124
00	03			FORES ENGENEERING	Page description: POWER DISTRIBUTION 230Vac	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

123.9 / R12 → R12 / 125.0
123.9 / S12 → S12 / 125.0
123.9 / T12 → T12 / 125.0
123.9 / N12 → N12 / 125.0
123.9 / GND → GND / 125.0

-124QF1
20 A
Siemens
5SY7220-7
5ST3010
5SM2322-6
/231.2

-124QF3
20 A
Siemens
5SY7220-7
5ST3010
5SM2322-6
/231.2

-124QF5
20 A
Siemens
5SY7220-7
5ST3010
5SM2322-6
/231.2

-124QF7
20 A
Siemens
5SY7220-7
5ST3010
5SM2322-6
/231.2

-X.PWR220 41 42

-X.PWR220 43 44

-X.PWR220 45 46

-X.PWR220 47 48

SOCKETS WP2
C63-JBS-02

SOCKETS WP3
C63-JBS-03

SOCKETS WP4
C63-DS-07

SPARE
FOR SOCKETS

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

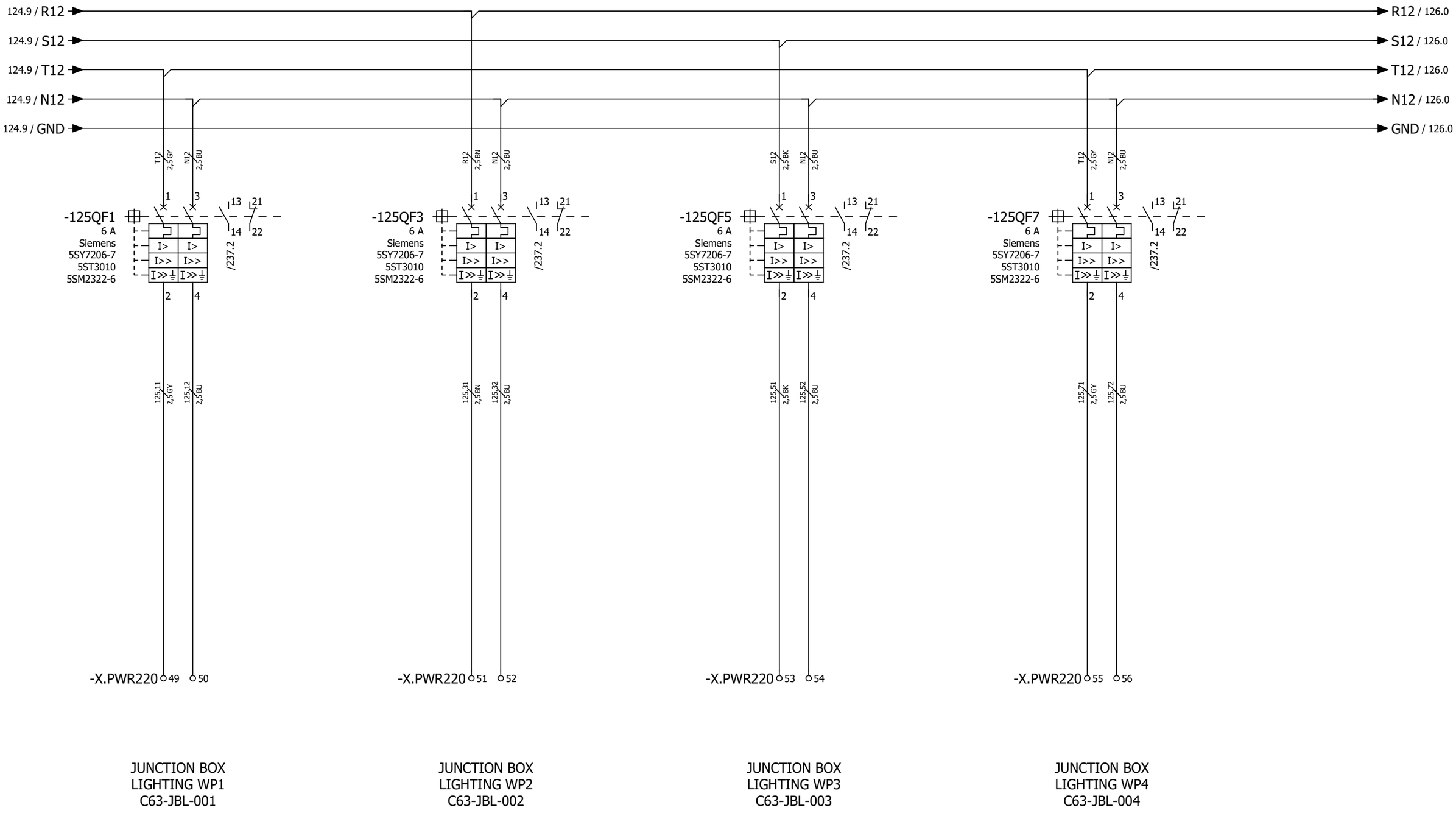
Page description: POWER DISTRIBUTION 230Vac

Order: W240569
File: D240934SCH01

Scheme: D240934SCH01

Sheet: 124 | Next: 125

Tot. Sheet: 156



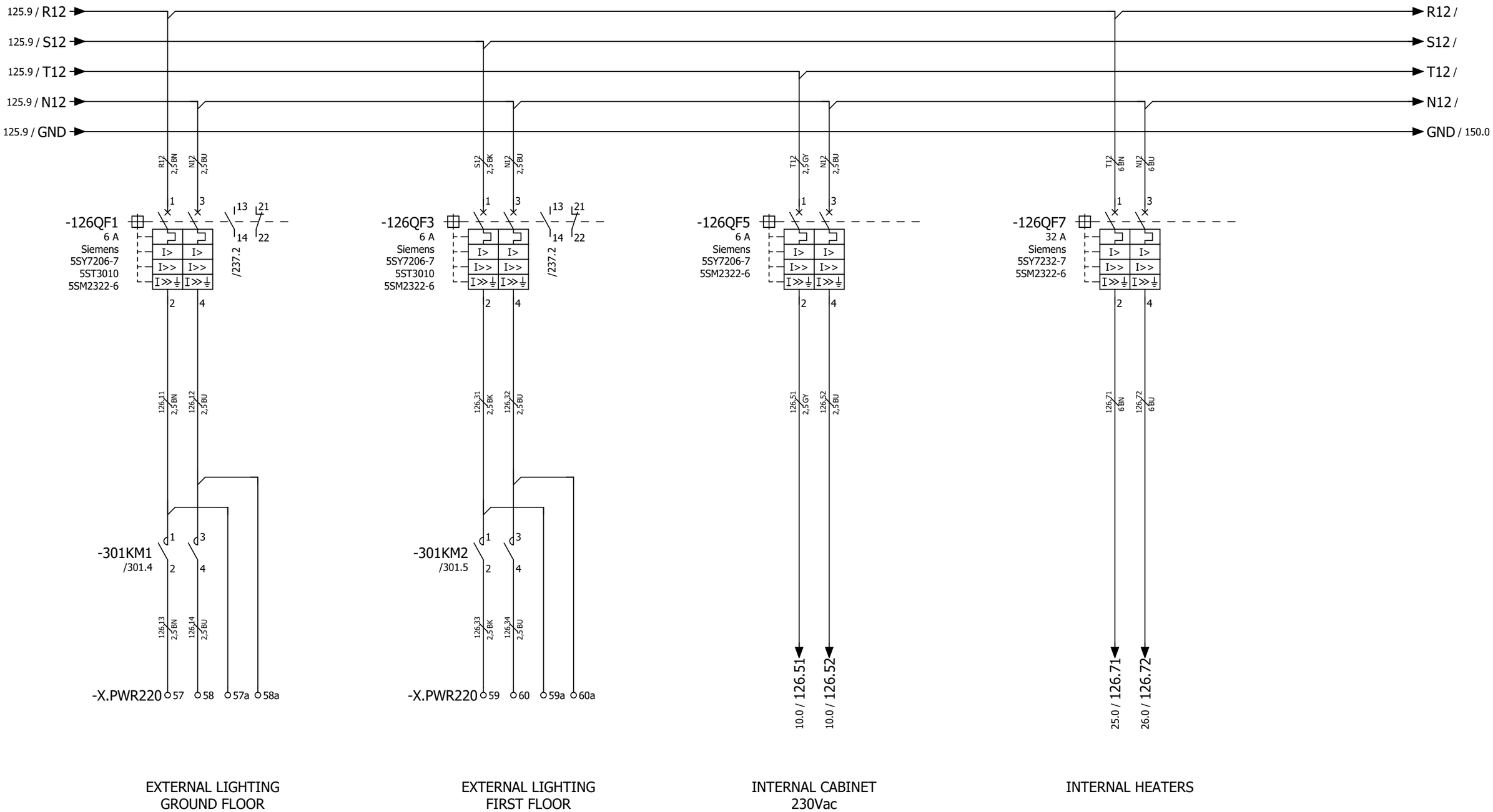
JUNCTION BOX
LIGHTING WP1
C63-JBL-001

JUNCTION BOX
LIGHTING WP2
C63-JBL-002

JUNCTION BOX
LIGHTING WP3
C63-JBL-003

JUNCTION BOX
LIGHTING WP4
C63-JBL-004

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 125	Next: 126
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 230Vac	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



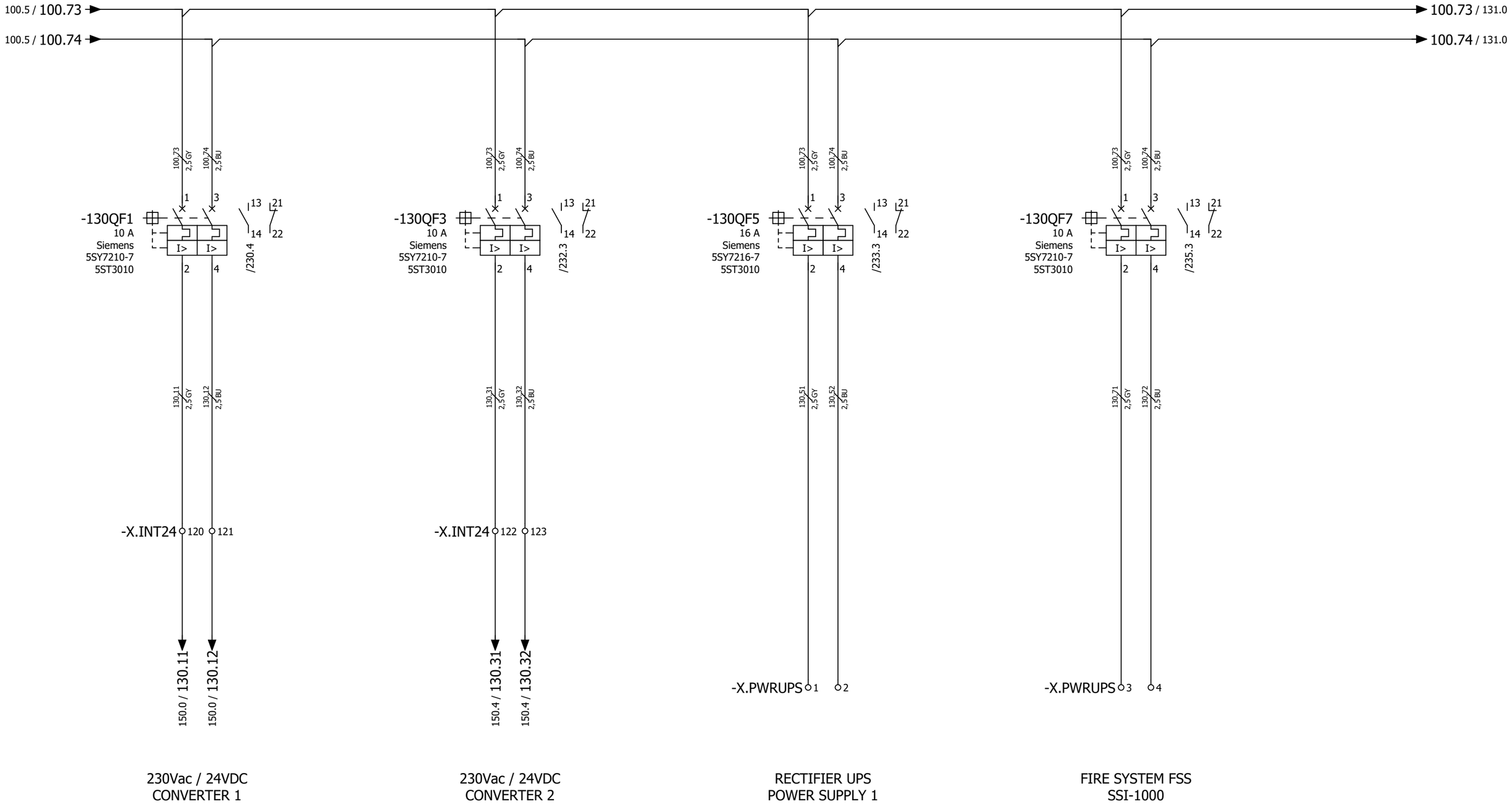
EXTERNAL LIGHTING
GROUND FLOOR

EXTERNAL LIGHTING
FIRST FLOOR

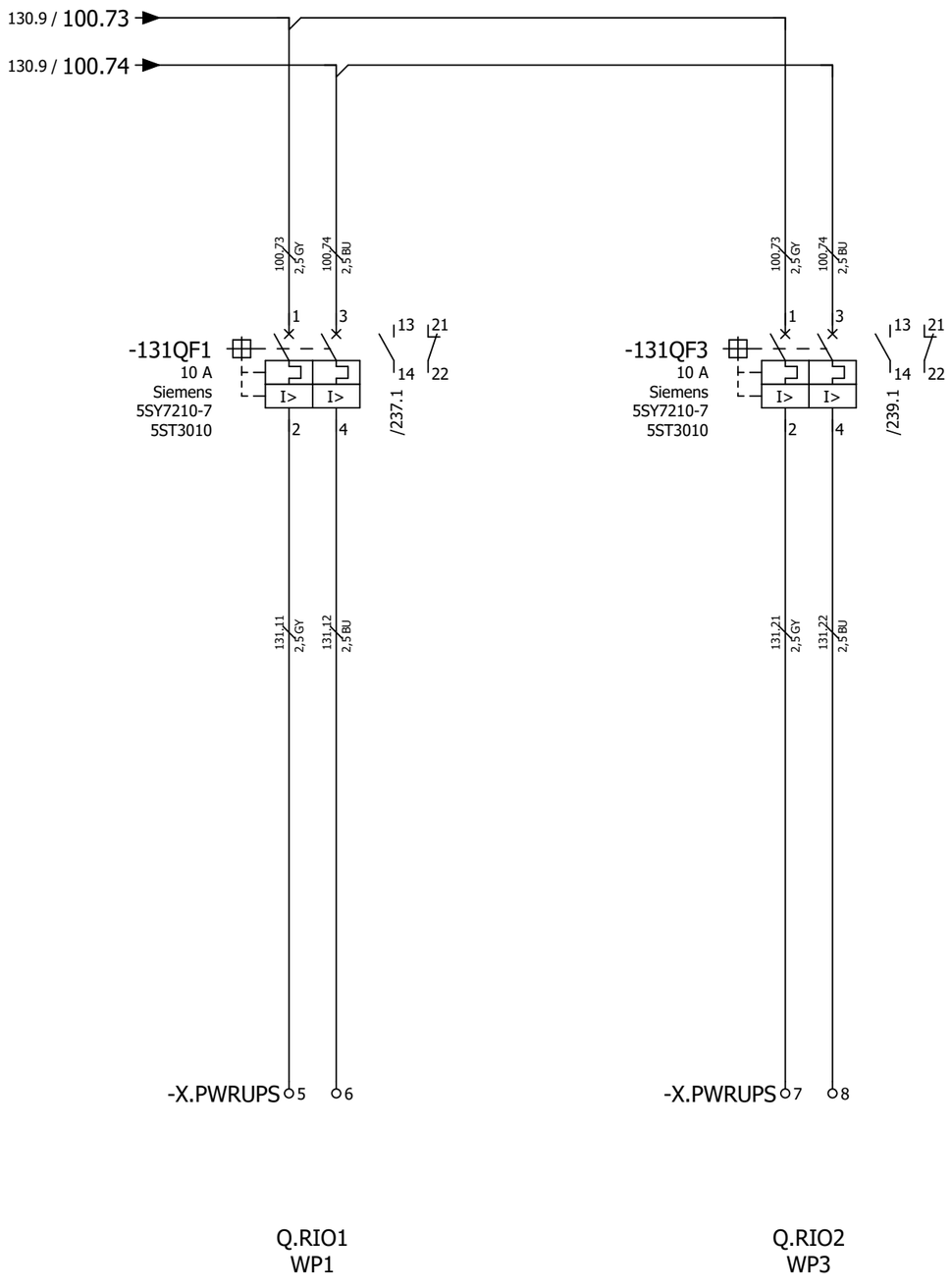
INTERNAL CABINET
230Vac

INTERNAL HEATERS

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 126	Next: 130
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 230Vac	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 130	Next: 131
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: POWER DISTRIBUTION 230Vac UPS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569 File: D240934SCH01	Sheet: 131	Next: 150
00	03				Page description: POWER DISTRIBUTION 230Vac UPS	Scheme: D240934SCH01	Tot. Sheet: 156	
01	04							
02								

130.1 / 130.11
130.1 / 130.12
126.9 / GND

130.3 / 130.31
130.3 / 130.32

GND / 151.0

130.11 2,5GY
130.21 2,5BU
GND 2,5GNYE

1.3 1.2 1.1

-150GS1 IN
L/+ N/- PE

Phoenix Contact
QUINT4-PS/1AC/24DC/40
2904603

OUT + + - - - SIGNAL Rem SGnd Out 1 Out 2
2.1 2.2 2.3 2.4 2.5 3.3 3.4 3.5 3.6

150.11 16RD
150.12 16BK

130.31 2,5GY
130.32 2,5BU
GND 2,5GNYE

1.3 1.2 1.1

-150GS5 IN
L/+ N/- PE

Phoenix Contact
QUINT4-PS/1AC/24DC/40
2904603

OUT + + - - - SIGNAL Rem SGnd Out 1 Out 2
2.1 2.2 2.3 2.4 2.5 3.3 3.4 3.5 3.6

150.51 16RD
150.52 16BK

-150U1
40 A
+ - + - IN1 IN2 13 14 23 24

OUTPUT

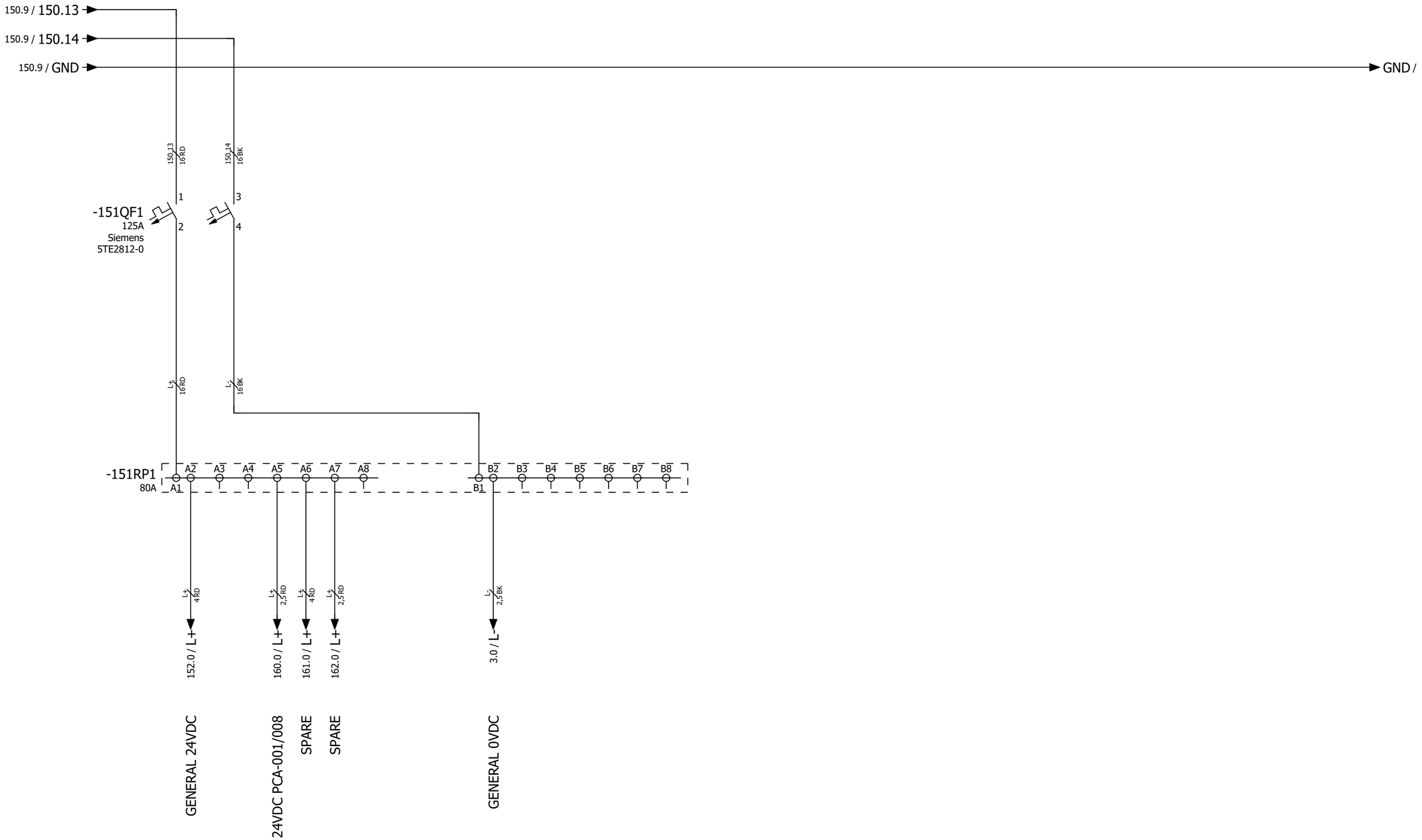
+ + -
QUINT-ORING/24DC/2X40/1X80

150.13 16RD
150.14 16BK

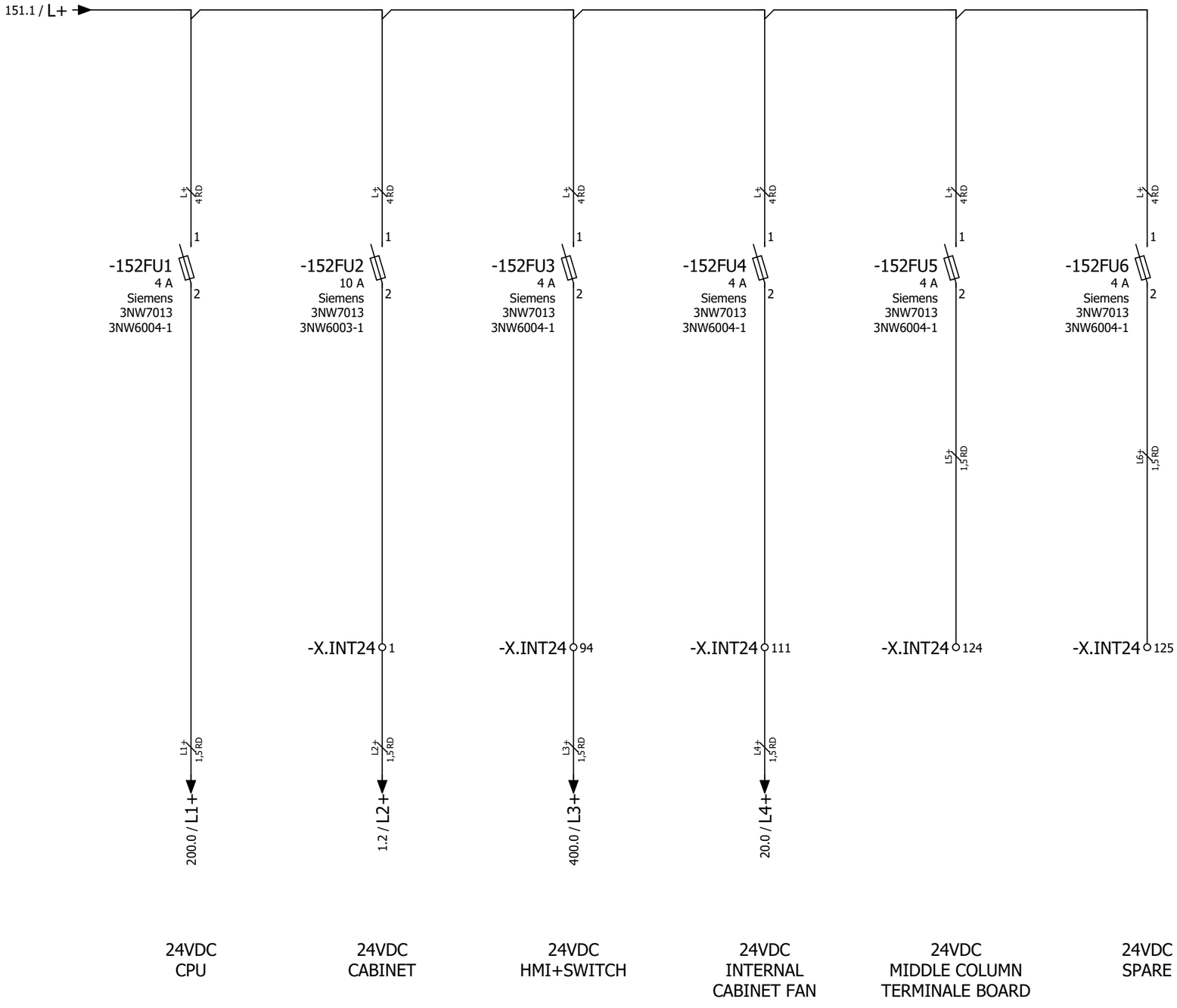
150.13 / 151.0
150.14 / 151.0

GENERAL
24VDC

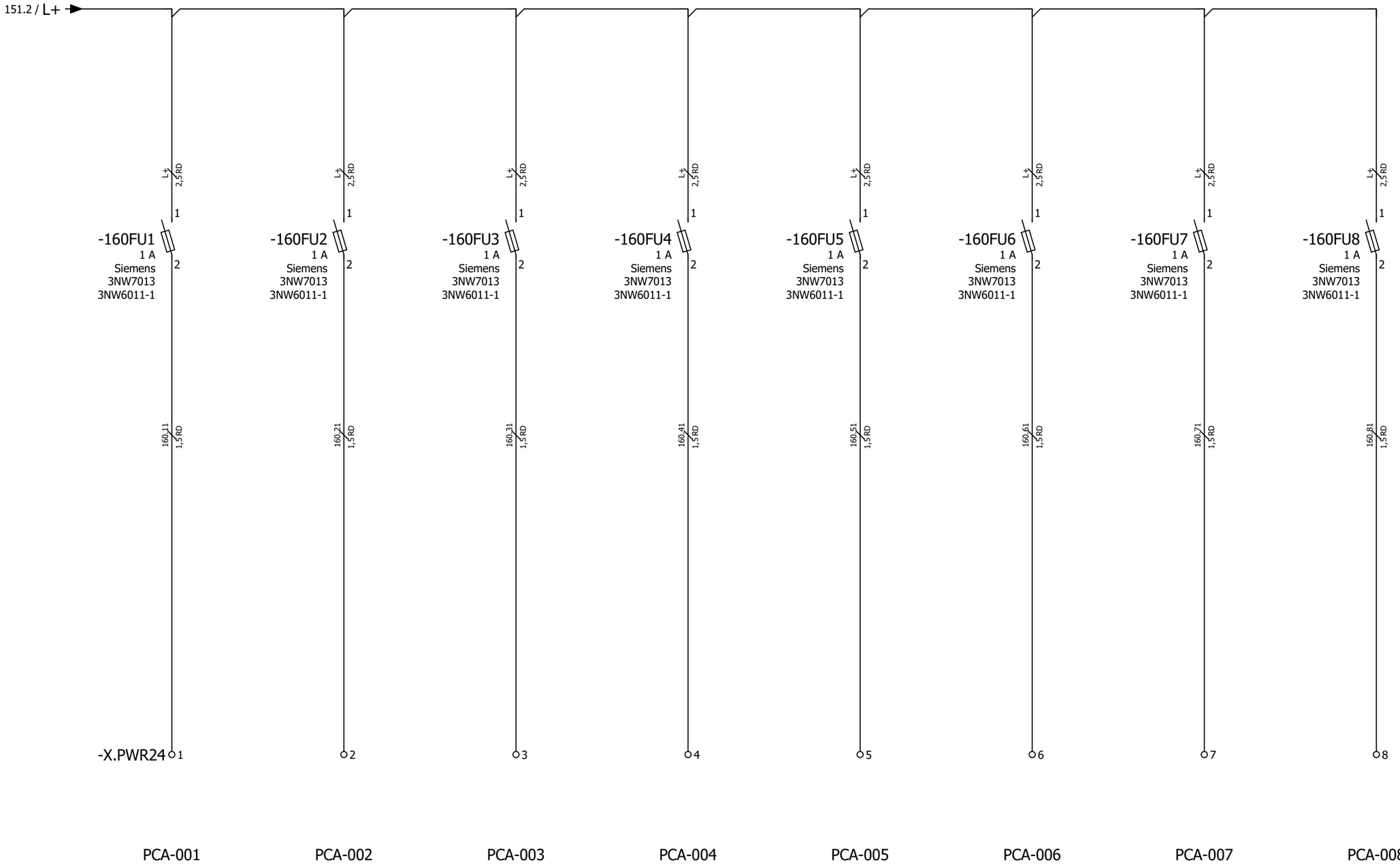
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 150	Next: 151
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: AUXILIARY DISTRIBUTION 24VDC			Tot. Sheet: 156
02						Scheme: D240934SCH01		



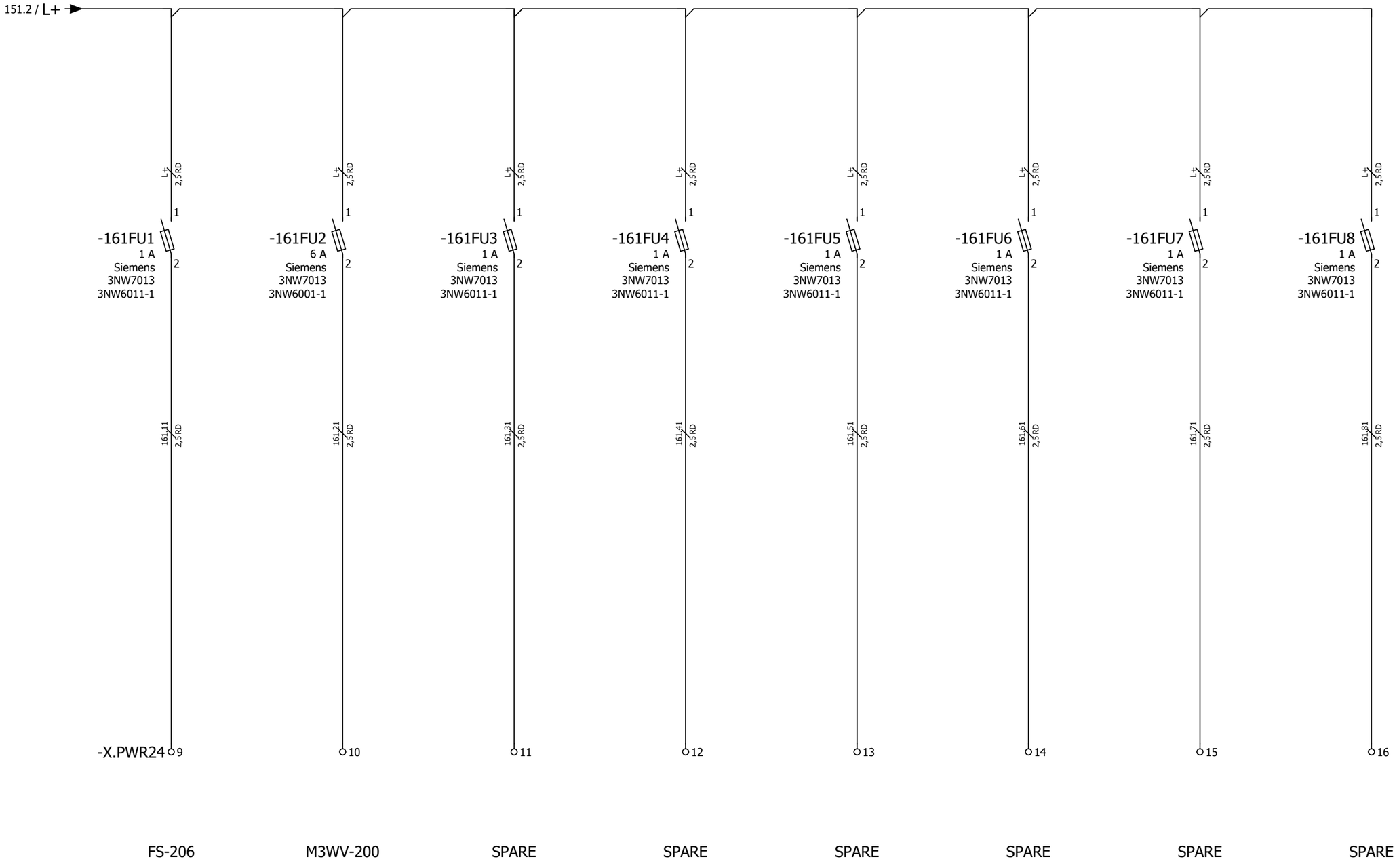
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 151	Next: 152
00	03			FORES ENGENEERING	Page description: AUXILIARY DISTRIBUTION 24VDC	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



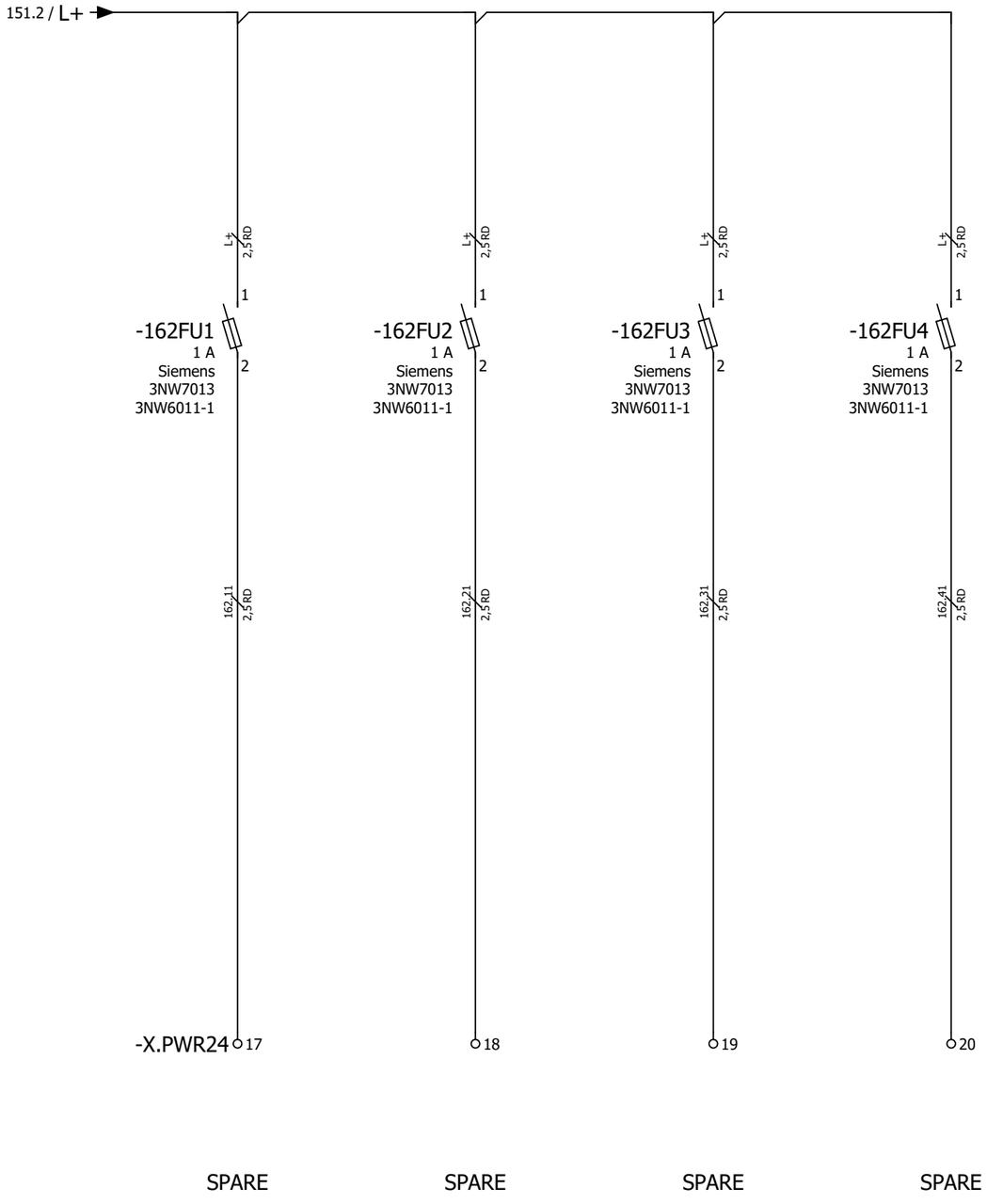
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 152	Next: 160
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: AUXILIARY DISTRIBUTION 24VDC MAIN CABINET	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 160	Next: 161
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: AUXILIARY DISTRIBUTION 24VDC		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



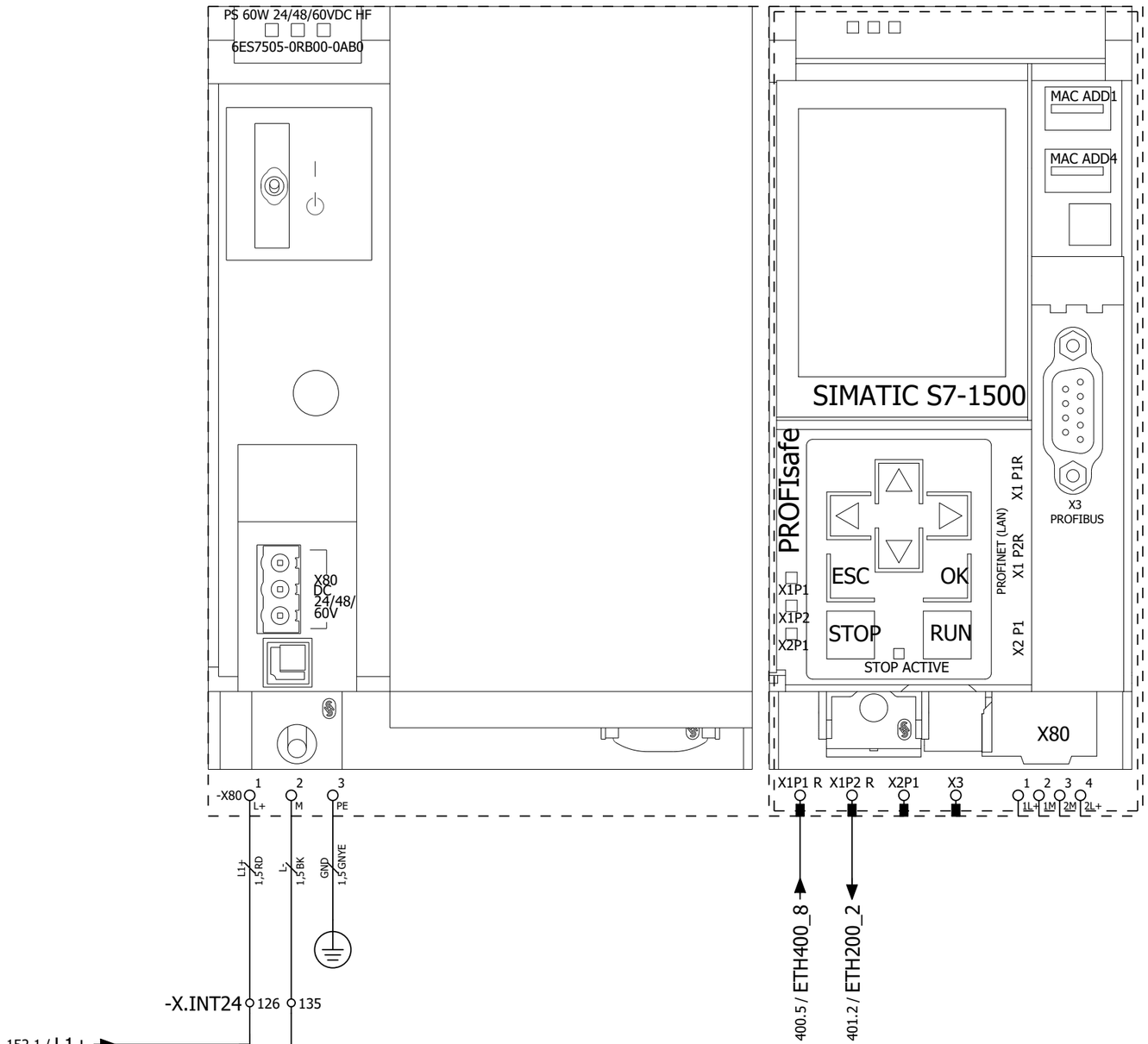
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 161	Next: 162
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: AUXILIARY DISTRIBUTION 24VDC		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



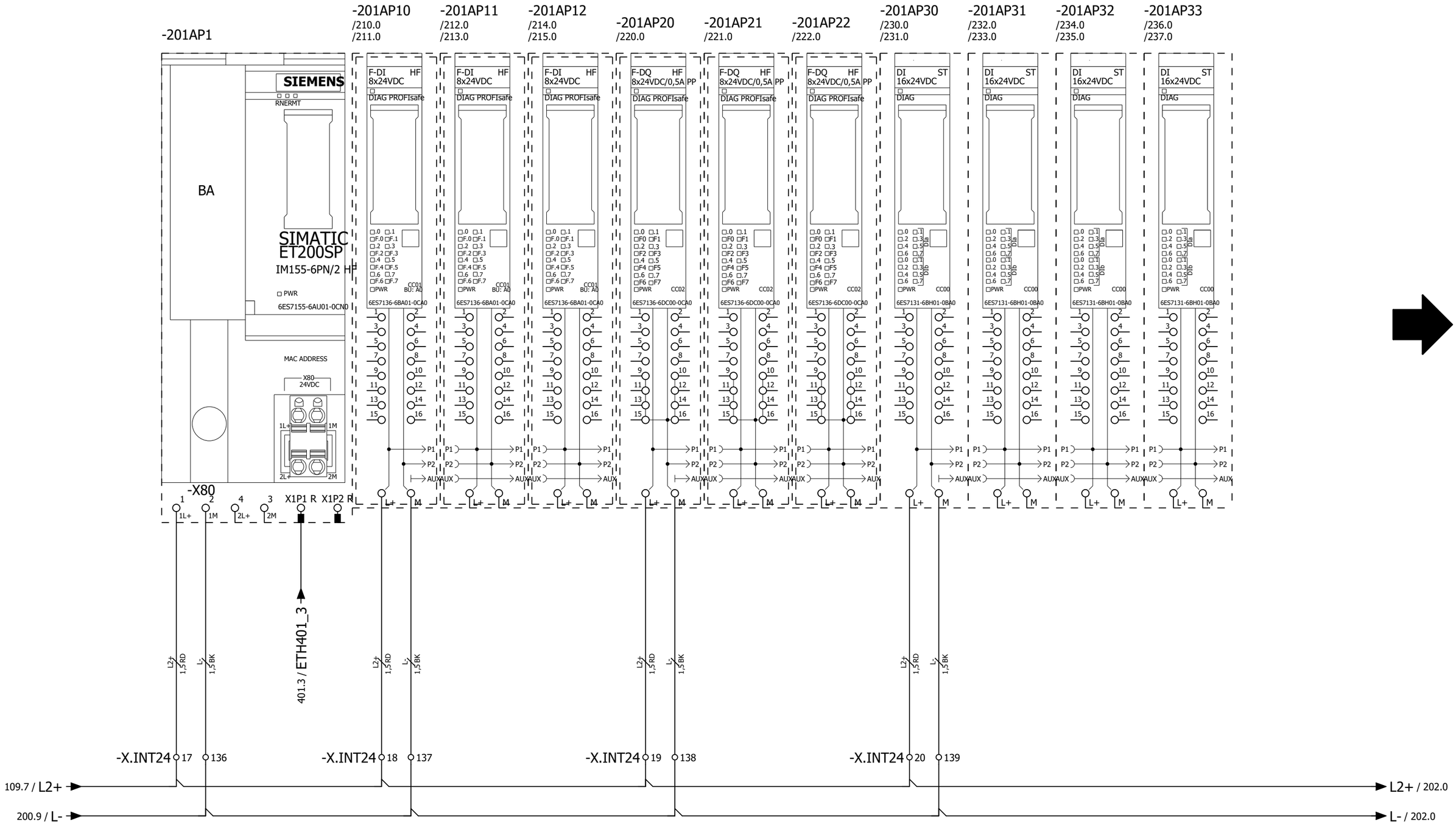
Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 162	Next: 200
00	03					File: D240934SCH01		
01	04				Page description: AUXILIARY DISTRIBUTION 24VDC			
02						Scheme: D240934SCH01	Tot. Sheet: 156	

-200GS1

-CPU

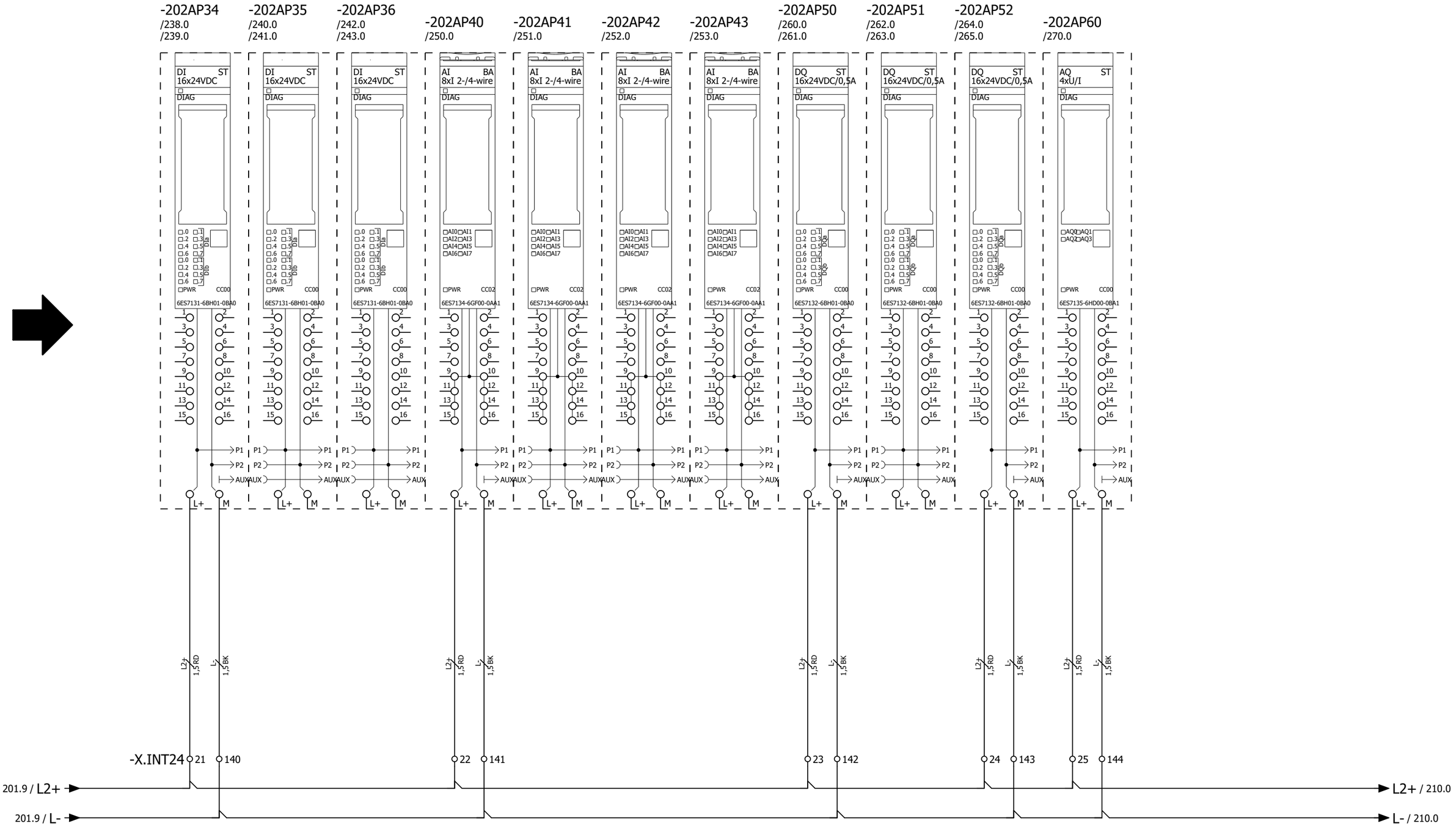


Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 200	Next: 201
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: CPU S7/1500 LAYOUT	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

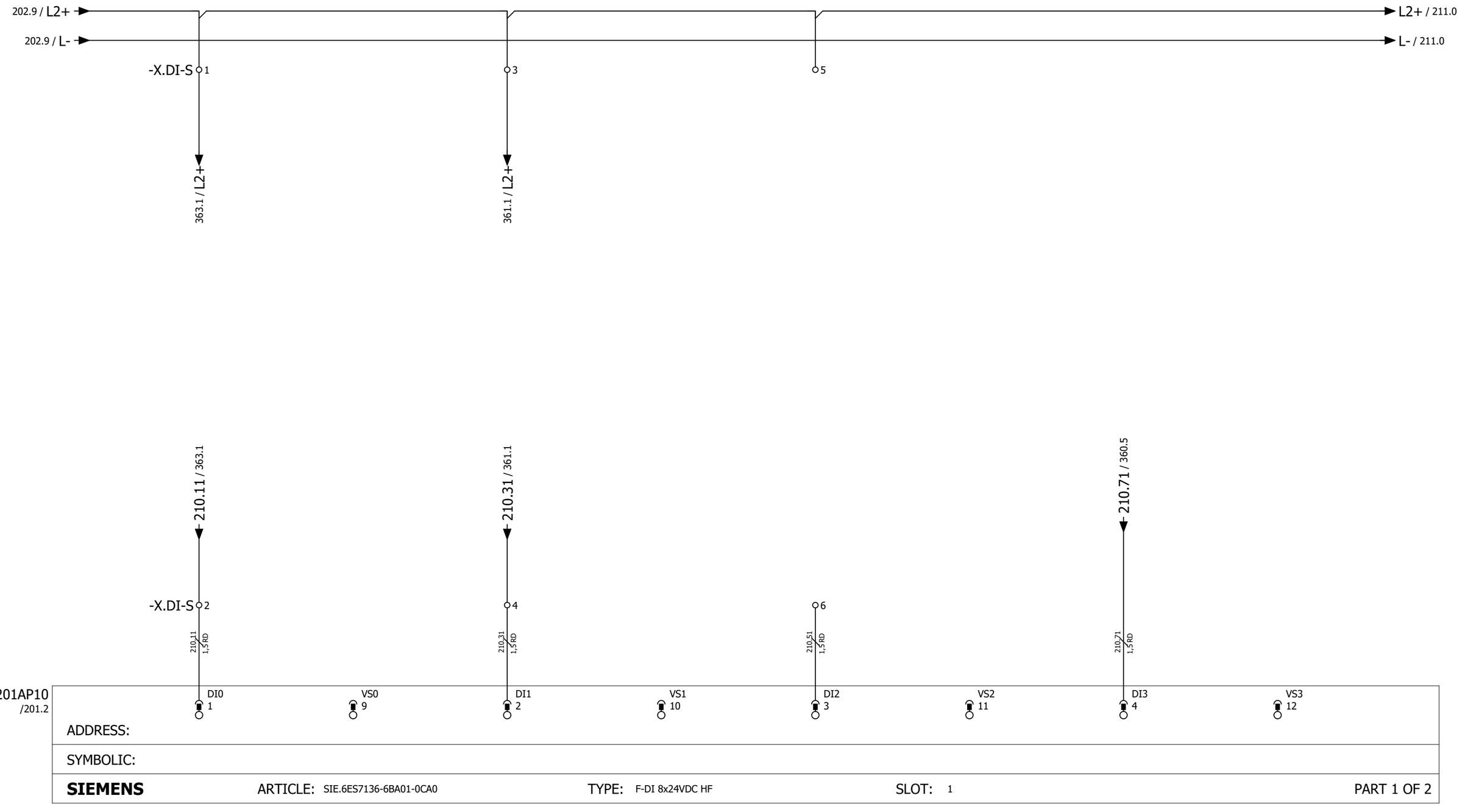


Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 201	Next: 202
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: PLC LAYOUT	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

0	1	2	3	4	5	6	7	8	9



Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 202	Next: 210
00	03					File: D240934SCH01		
01	04				Page description: PLC LAYOUT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



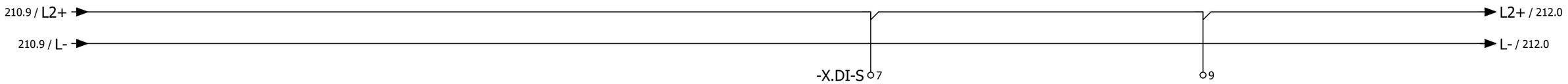
ESD-005
ESD-005A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 1

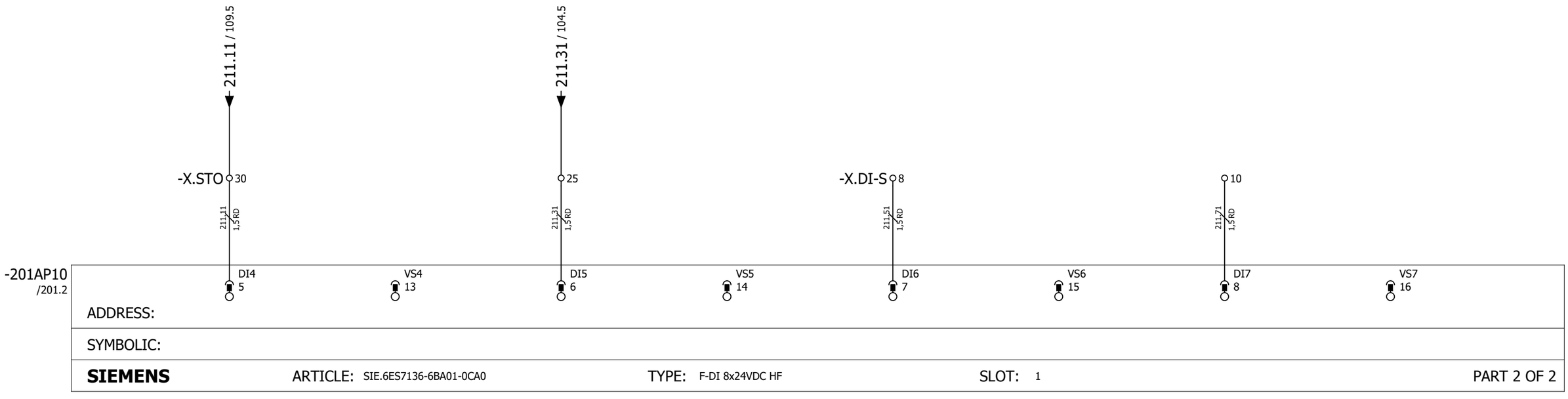
ESD-001
ESD-001A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

SSI-1000
XA-002A
FIRE ALARM
SYSTEM
GENERAL FAILURE

SM-001
ESD-008
EMERGENCY SHUTDOWN
FROM
SAFETY MODULE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 210	Next: 211
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: SAFETY DIGITAL INPUT MODULE 1	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								





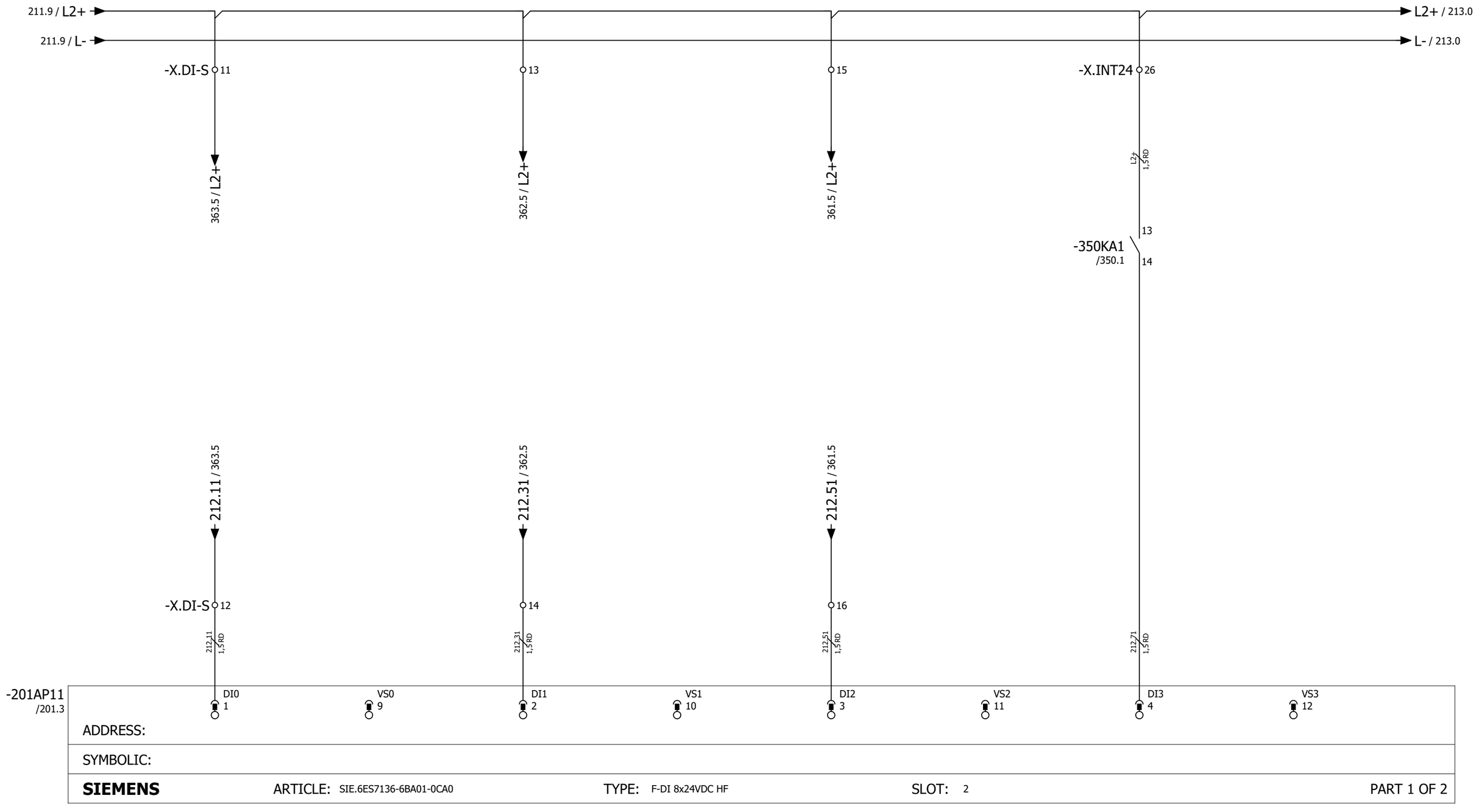
CP-600B
FB-STO-600B
FEEDBACK
SAFE TORQUE OFF A
CP-600B

LP-300A
FB-STO-300A
FEEDBACK
SAFE TORQUE OFF A
LP-300A

SPARE

SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 211	Next: 212
00	03				Page description: SAFETY DIGITAL INPUT MODULE 1	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



ESD-006
ESD-006A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 1

ESD-004
ESD-004A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

ESD-002
ESD-002A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

PLANT SIS
XS-001
SHUTDOWN COMMAND
FROM
PLANT SIS

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: SAFETY DIGITAL INPUT MODULE 2

Order: W240569
File: D240934SCH01
Scheme: D240934SCH01

Sheet:	Next:
212	213

Tot. Sheet: 156

212.9 / L2+ → L2+ / 214.0

212.9 / L- → L- / 214.0

-X.DI-S 19

-X.INT24 27

L2+ 1,5 RD

13

-350KA2 /350.2

14

213.11 / 106.5

213.31 / 105.5

-X.STO 27

213,11 1,5 RD

26

213,31 1,5 RD

-X.DI-S 20

213,51 1,5 RD

213,71 1,5 RD

-201AP11 /201.3

DI4	VS4	DI5	VS5	DI6	VS6	DI7	VS7
5	13	6	14	7	15	8	16

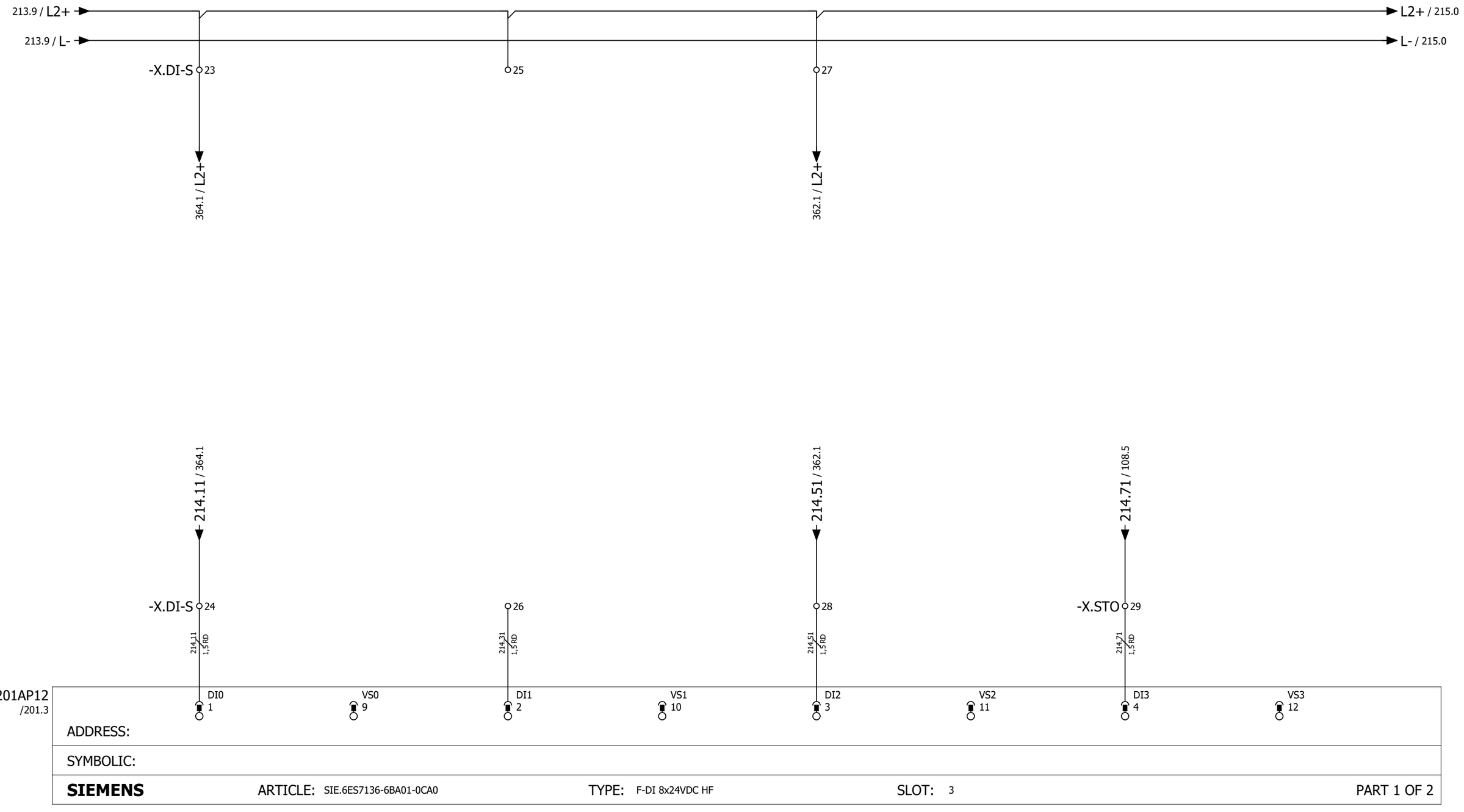
ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7136-6BA01-0CA0 TYPE: F-DI 8x24VDC HF SLOT: 2 PART 2 OF 2

CP-620A FB-STO-620A FEEDBACK SAFE TORQUE OFF A CP-620A	LP-300B FB-STO-300B FEEDBACK SAFE TORQUE OFF A LP-300B	SPARE	SPARE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 213	Next: 214
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: SAFETY DIGITAL INPUT MODULE 2	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



ESD-007
ESD-007A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 2

SSI-1000
XA-001A
CONFIRMED
FIRE ALARM

ESD-003
ESD-003A
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

CP-600A
FB-STO-600A
FEEDBACK
SAFE TORQUE OFF A
CP-600A

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 214	Next: 215
00	03			FORES ENGENEERING	Page description: SAFETY DIGITAL INPUT MODULE 3	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

214.9 / L2+

214.9 / L-

-X.INT24 28

-X.INT24 29

L2+ / 230.0

L- / 220.0

L2+ 1,5 RD

13

E - - -

-215SB3

BLUE

Siemens

3SU1000-0AB50-0AA0

3SU1400-1AA10-1BA0

3SU1500-0AA10-0AA0

14

-350KA3

/350.3

215.11 / 107.5

215.51 / 1.2

-X.STO 28

-X.DI-S 30

215.11 1,5 RD

215.31 1,5 RD

215.51 1,5 RD

215.71 1,5 RD

-201AP12

/201.3

DI4	VS4	DI5	VS5	DI6	VS6	DI7	VS7
5	13	6	14	7	15	8	16

ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7136-6BA01-0CA0 TYPE: F-DI 8x24VDC HF SLOT: 3 PART 2 OF 2

CP-620B
FB-STO-620B
FEEDBACK
SAFE TORQUE OFF A
CP-620B

YS-101
RESET

YS-057A
PHASE MONITORING
RELAY

SPARE

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: SAFETY DIGITAL INPUT MODULE 3

Order: W240569
File: D240934SCH01

Scheme: D240934SCH01

Sheet: 215 | Next: 220

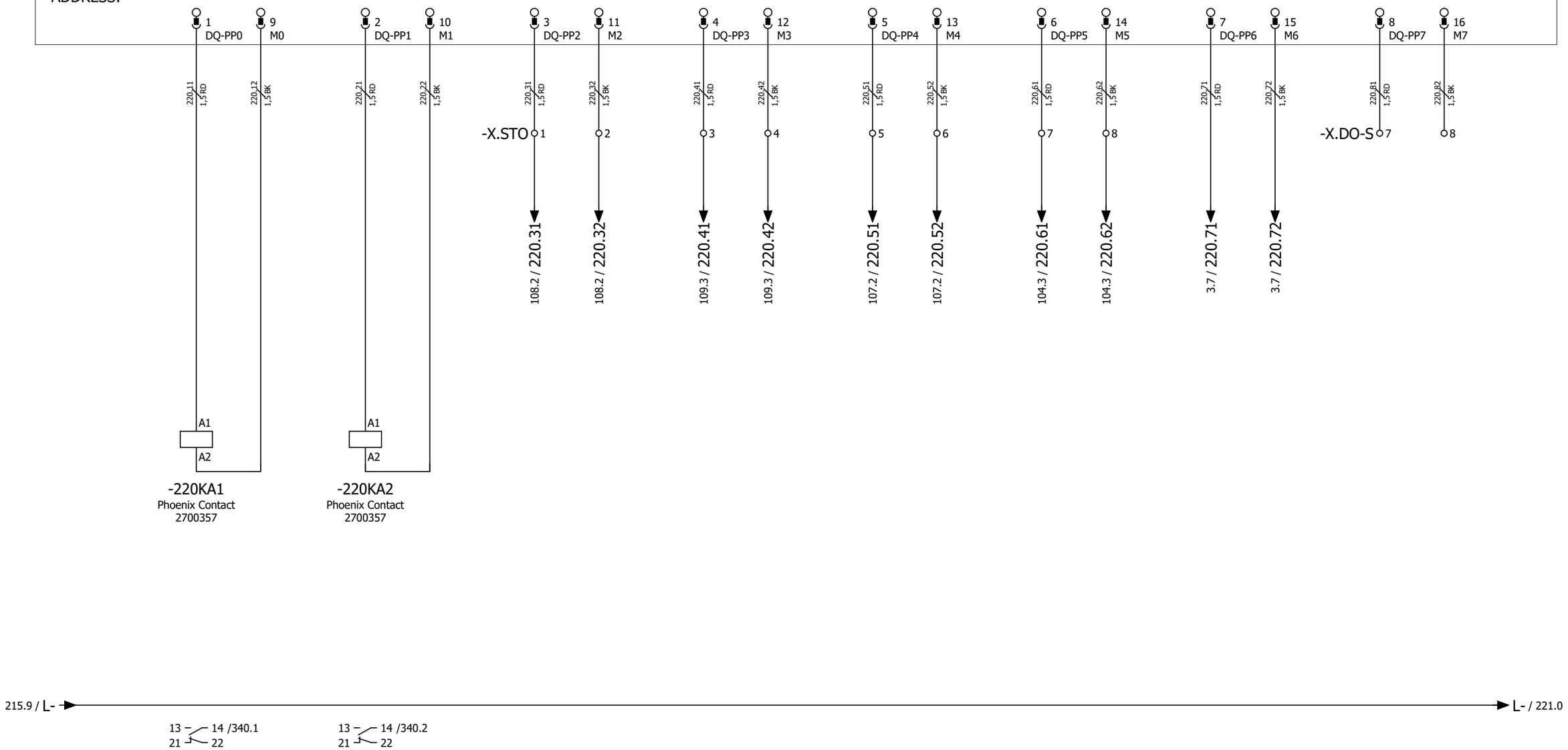
Tot. Sheet: 156

-201AP20
/201.4

SIEMENS ARTICLE: SIE.6ES7136-6DC00-0CA0 TYPE: F-DQ 8x24VDC/0.5A PP HF SLOT: 4 PART 1 OF 1

SYMBOLIC:

ADDRESS:



RECTIFIER XS-003A	PLANT F&G XA-001	CP-600A STO_A-600A	CP-600B STO_B-600B	CP-620B STO_A-620B	LP-300A STO_B-300A	1QF3	
RECTIFIER EMERGENCY STOP 1 CHANNEL 1	CONFIRMED GAS ALARM TO PLANT F&G	SAFE TORQUE OFF A CP-600A	SAFE TORQUE OFF B CP-600B	SAFE TORQUE OFF A CP-620B	SAFE TORQUE OFF B CP-300A	MINIMUM VOLTAGE COIL	SPARE

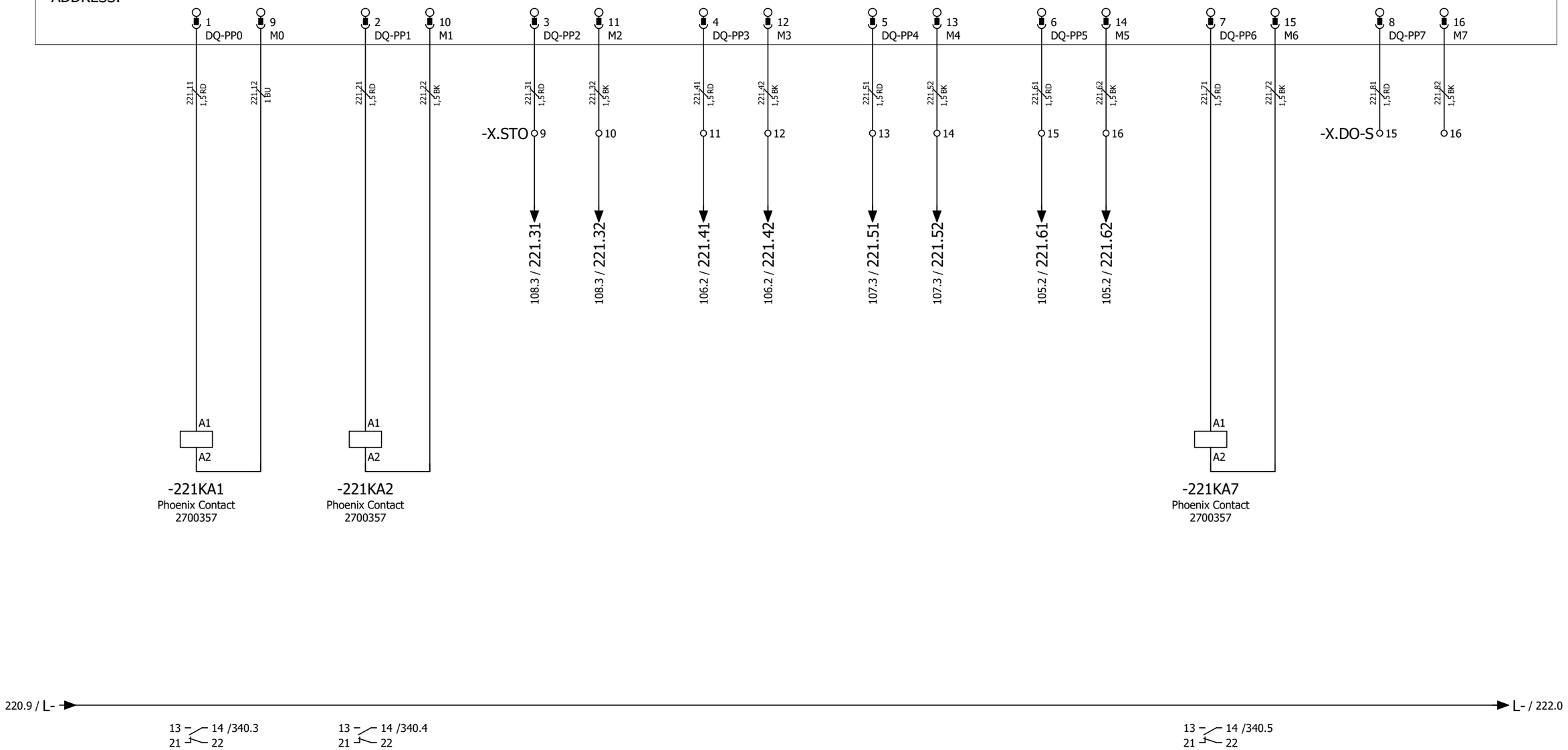
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 220	Next: 221
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: SAFETY DIGITAL OUTPUT MODULE 4		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

-201AP21
/201.4

SIEMENS ARTICLE: SIE.6ES7136-6DC00-0CA0 TYPE: F-DQ 8x24VDC/0.5A PP HF SLOT: 5 PART 1 OF 1

SYMBOLIC:

ADDRESS:



RECTIFIER XS-004A	PLANT SIS XA-003	CP-600A STO_B-600A	CP-620A STO_A-620A	CP-620B STO_B-620B	LP-300B STO_A-300B		
RECTIFIER EMERGENCY STOP 2 CHANNEL 1	ELECTROLYZER PLC FAILURE TO PLANT SIS	SAFE TORQUE OFF B CP-600A	SAFE TORQUE OFF A CP-620A	SAFE TORQUE OFF B CP-620B	SAFE TORQUE OFF A CP-300B	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569 File: D240934SCH01	Sheet: 221 / Next: 222
00	03				Page description: SAFETY DIGITAL OUTPUT MODULE 5	Scheme: D240934SCH01	Tot. Sheet: 156
01	04						
02							

-201AP22
/201.5

SIEMENS ARTICLE: SIE.6ES7136-6DC00-0CA0 TYPE: F-DQ 8x24VDC/0.5A PP HF SLOT: 6 PART 1 OF 1

SYMBOLIC:

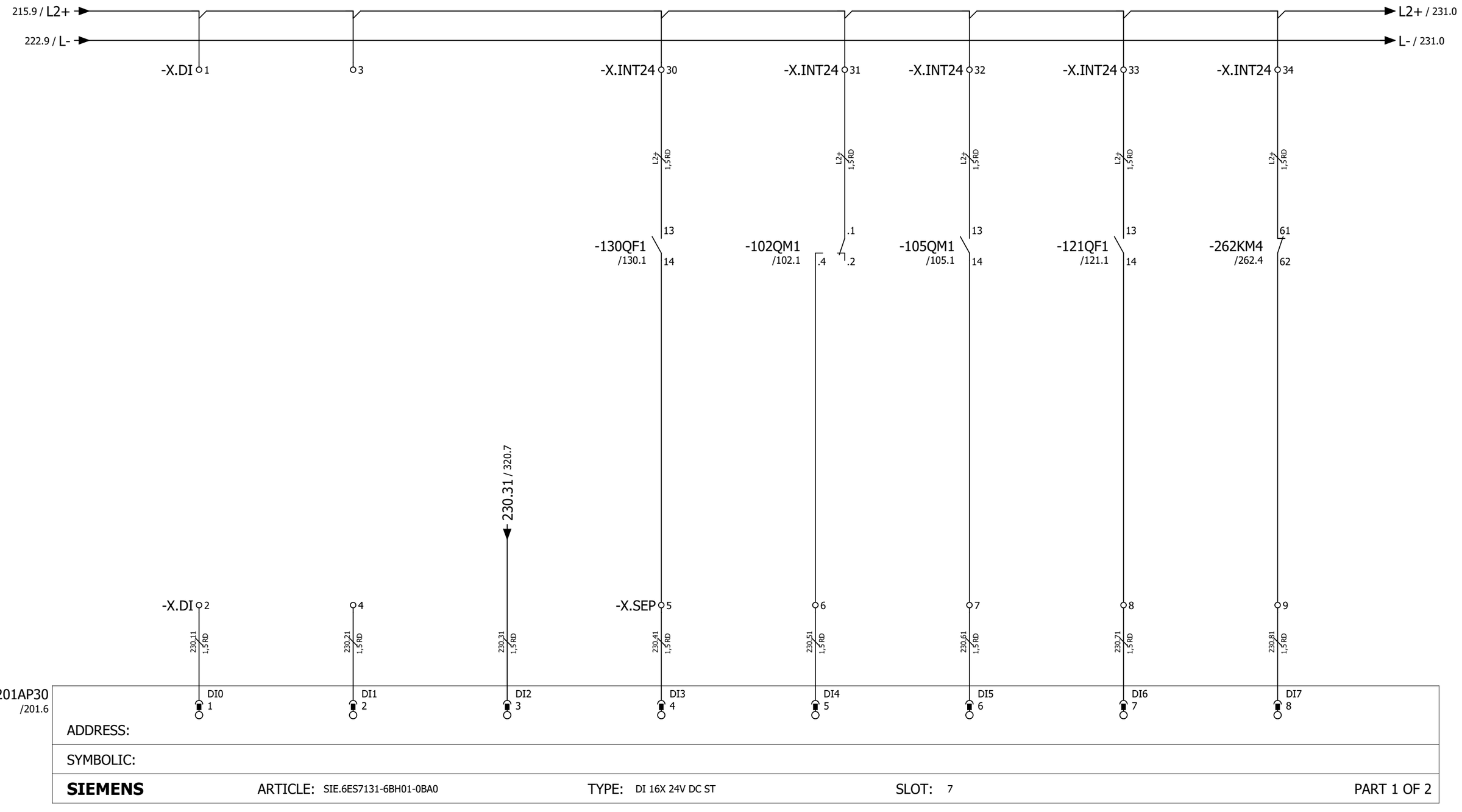
ADDRESS:

1	9	2	10	3	11	4	12	5	13	6	14	7	15	8	16
DQ-PP0	M0	DQ-PP1	M1	DQ-PP2	M2	DQ-PP3	M3	DQ-PP4	M4	DQ-PP5	M5	DQ-PP6	M6	DQ-PP7	M7
222,11 1,5RD	222,12 1,5BK	222,21 1,5RD	222,22 1,5BK	222,31 1,5RD	222,32 1,5BK	222,41 1,5RD	222,42 1,5BK	222,51 1,5RD	222,52 1,5BK	222,61 1,5RD	222,62 1,5BK	222,71 1,5RD	222,72 1,5BK	222,81 1,5RD	222,82 1,5BK
				-X.STO 17	18	19	20	21	22	23	24				
				109.2 / 222.31	109.2 / 222.32	106.3 / 222.41	106.3 / 222.42	104.2 / 222.51	104.2 / 222.52	105.3 / 222.61	105.3 / 222.62			366.1 / 222.81	366.1 / 222.82
A1		A1										A1			
A2		A2										A2			
-222KA1		-222KA2										-222KA7			
Phoenix Contact 2700357		Phoenix Contact 2700357										Phoenix Contact 2700357			

221.9 / L- → L- / 230.0

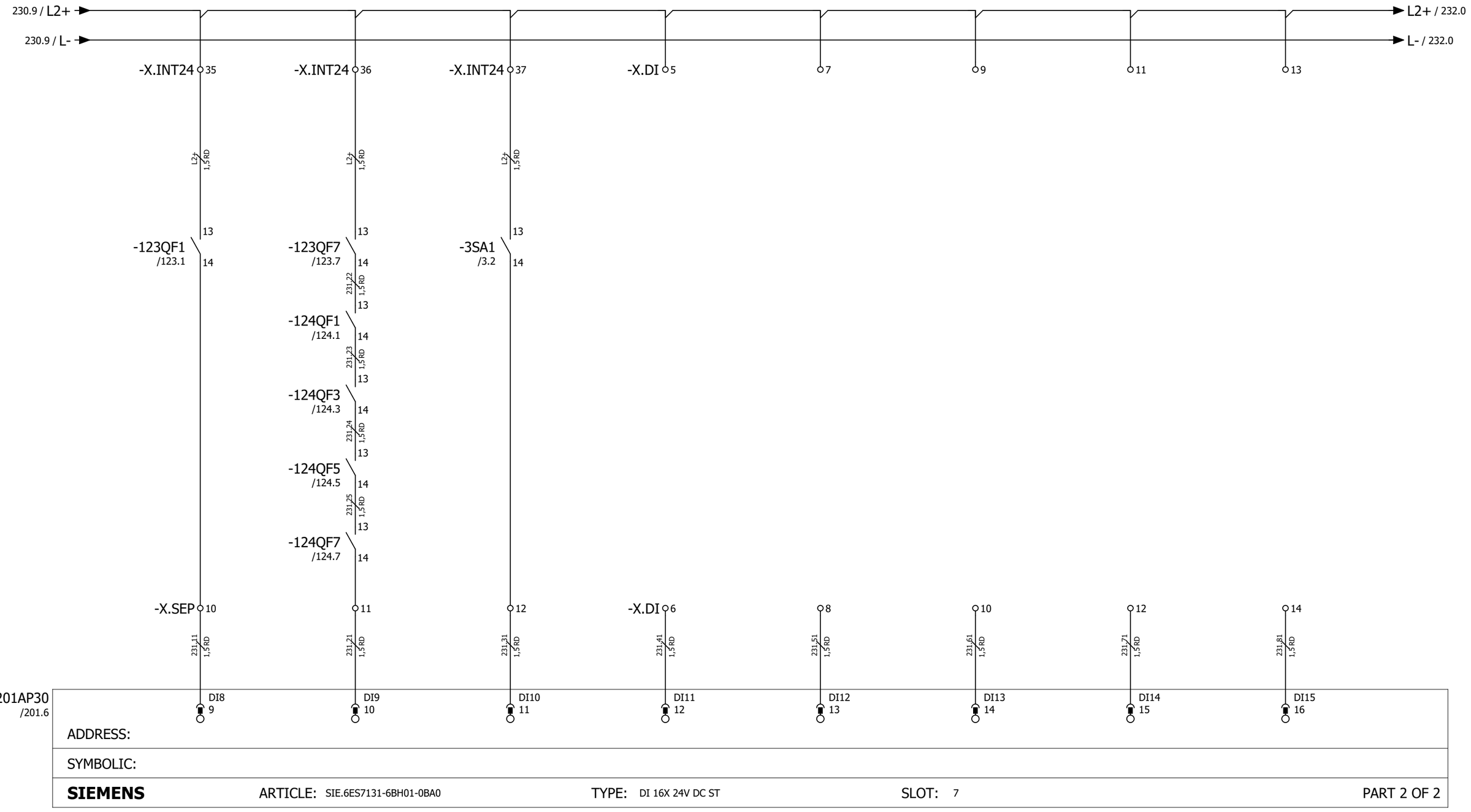
	13 – 14 /340.6	13 – 14 /340.7					13 – 14 /340.8		
	21 – 22	21 – 22					21 – 22		
		PLANT F&G XA-002	CP-600B STO_A-600B	CP-620A STO_B-620A	LP-300A STO_A-300A	LP-300B STO_B-300B		XS-101	
SPARE		CONFIRMED SMOKE ALARM TO PLANT F&G	SAFE TORQUE OFF A CP-600B	SAFE TORQUE OFF B CP-620A	SAFE TORQUE OFF A CP-300A	SAFE TORQUE OFF B CP-300B	SPARE	SAFETY MODULE RESET	

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 222	Next: 230
00	03				Page description: SAFETY DIGITAL OUTPUT MODULE 6	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



			YS-003	YS-017	YS-024	YS-031	YS-038
SPARE	SPARE	SPARE	24Vdc POWER SUPPLY MODULE 1 POWER SUPPLY	HVAC PANEL PAU003 CIRCUIT BREAKER AUXILIARY CONTACT	VFD LP-300B CIRCUIT BREAKER AUXILIARY CONTACT	AIR EXTRACTOR GROUP 1 CIRCUIT BREAKER AUXILIARY CONTACT	AIR EXTRACTOR 6 CONTACTOR AUXILIARY CONTACT

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 230	Next: 231
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: DIGITAL INPUT MODULE 7	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



YS-045	YS-052	YS-059	YS-105		FS-206	YS-106	
SPARE	UTILITIES AREA SOCKET CIRCUIT BREAKERS AUXILIARY CONTACTS	MAIN CIRCUIT BREAKER LOCAL/REMOTE SELECTOR	RIO 1 - 24VDC CONVERTER - POWER SUPPLY STATUS	SPARE	FLOW SWITCH	RIO 2 - 24VDC CONVERTER - POWER SUPPLY STATUS	SPARE

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

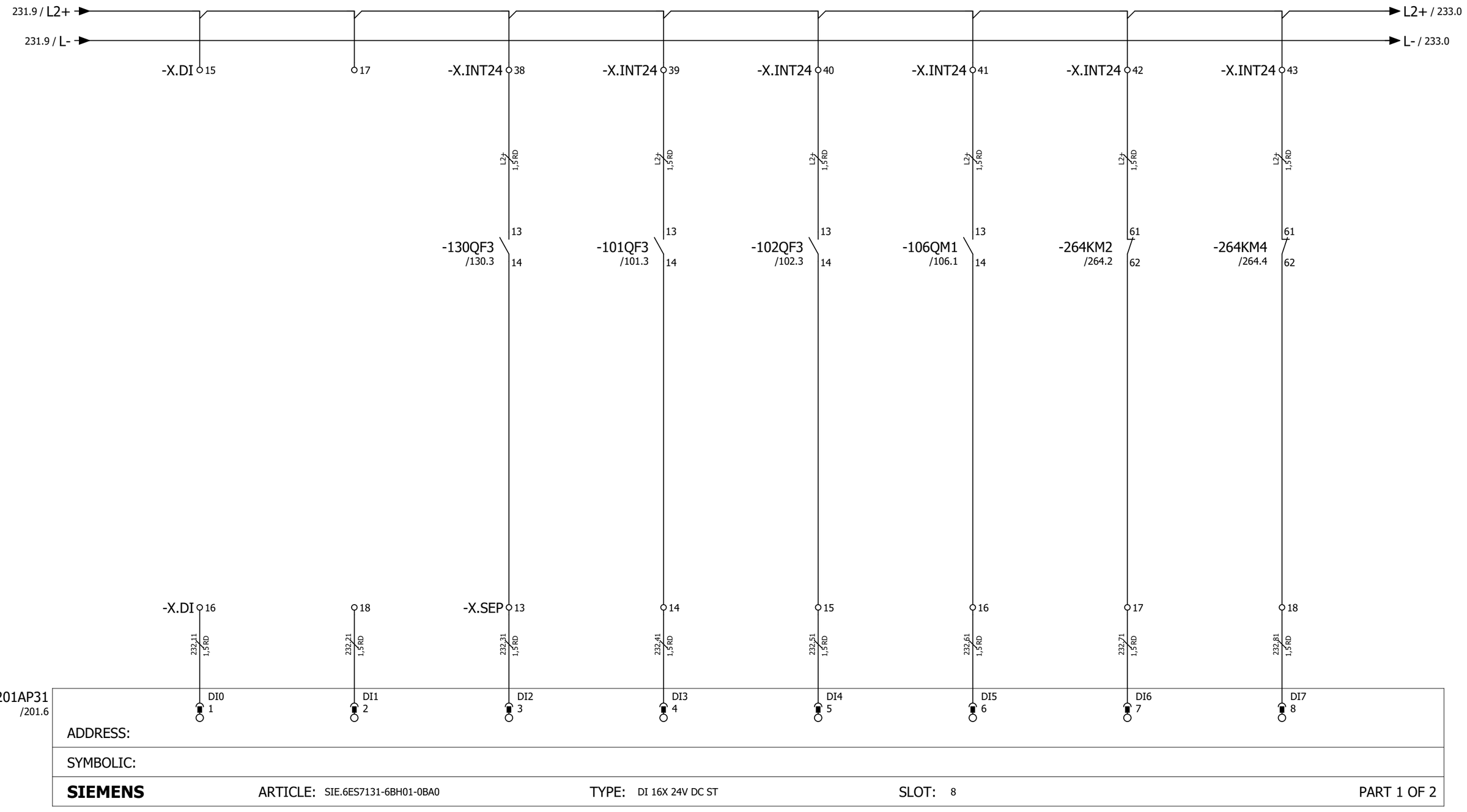
Page description: DIGITAL INPUT MODULE 7

Order: W240569
File: D240934SCH01

Scheme: D240934SCH01

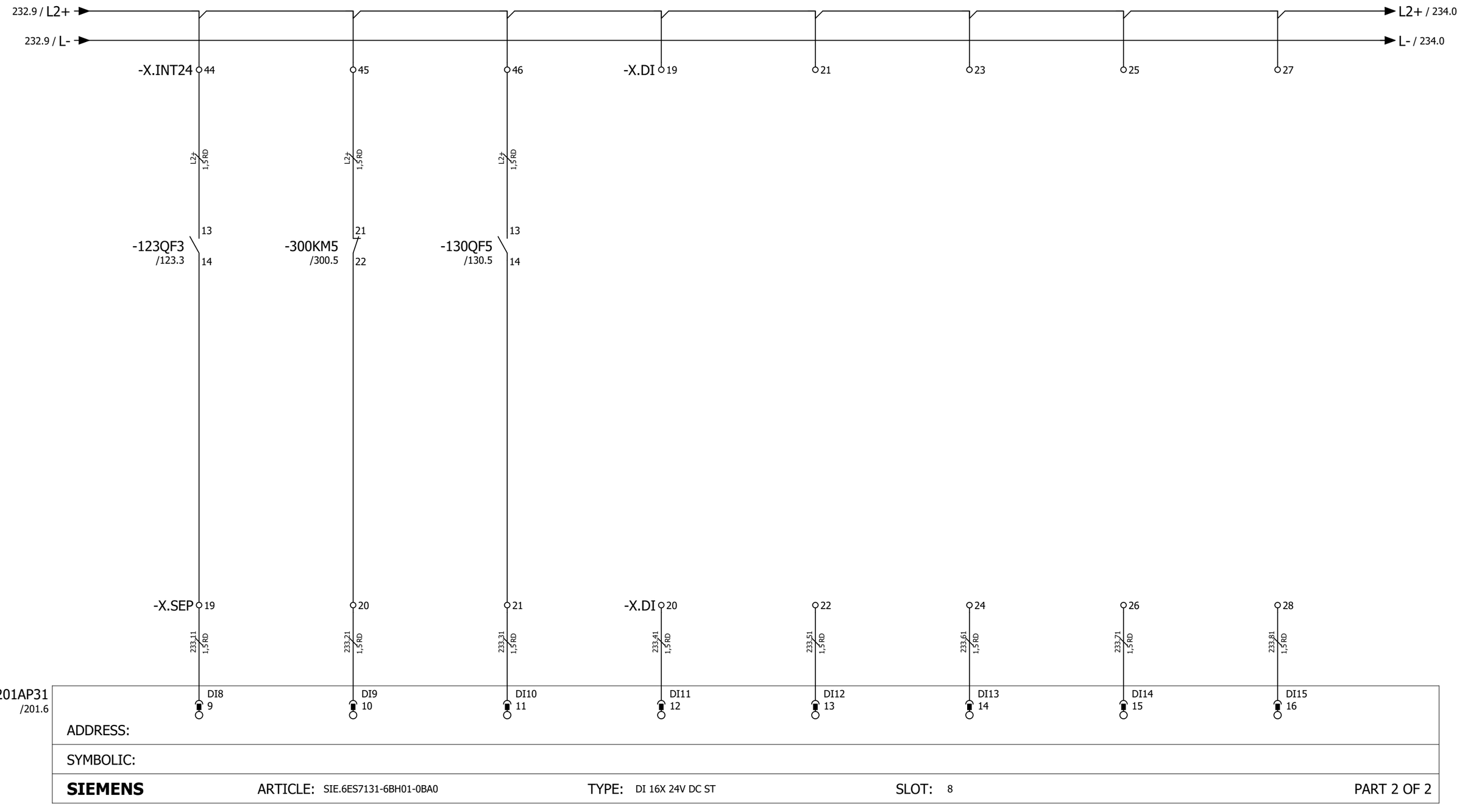
Sheet: 231 | Next: 232

Tot. Sheet: 156



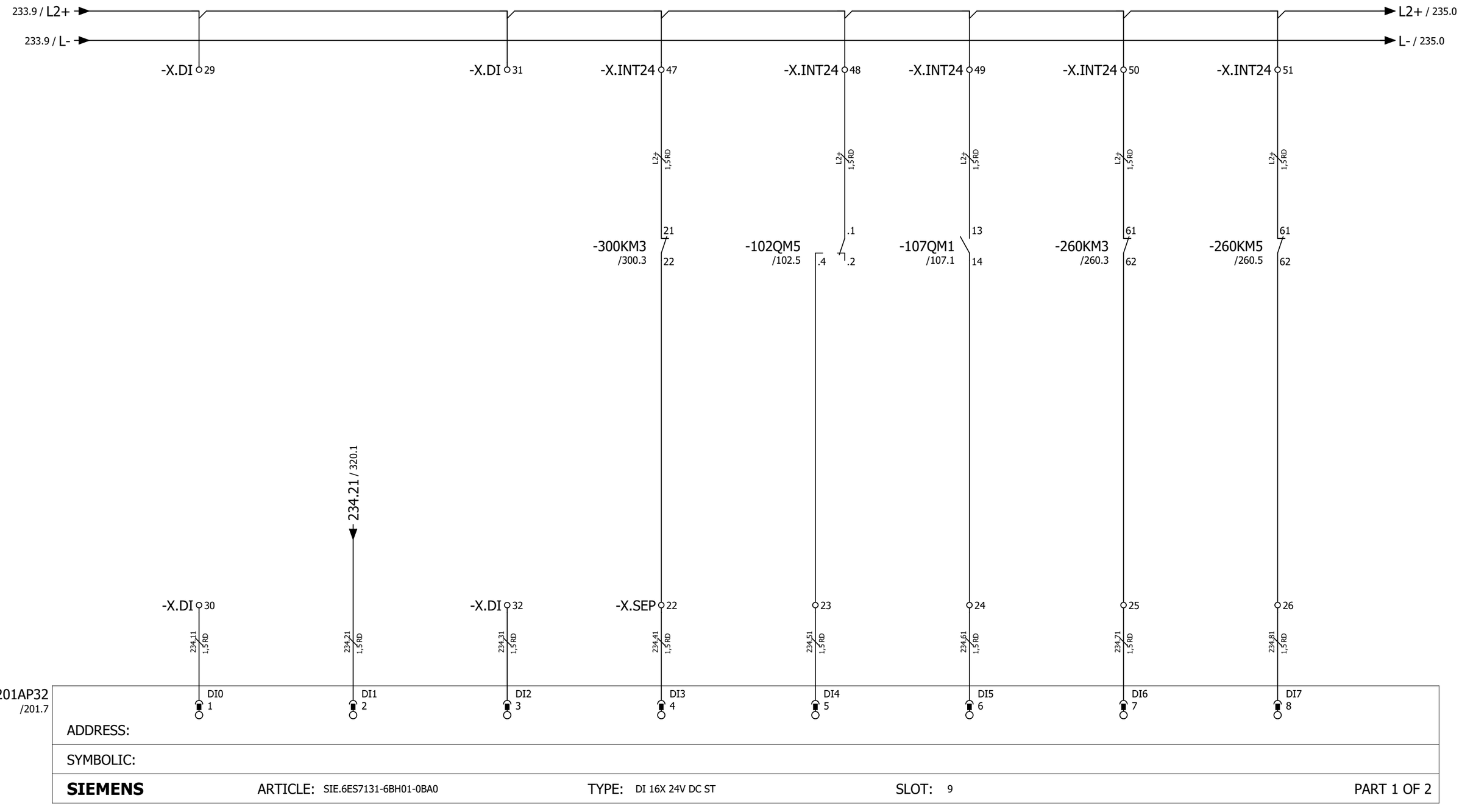
		YS-004	YS-011	YS-018	YS-025	YS-032	YS-039
SPARE	SPARE	24Vdc POWER SUPPLY MODULE 2 POWER SUPPLY	HE-61.1 (HPP-700) CIRCUIT BREAKER AUXILIARY CONTACT	WATER TREATMENT PACKAGE CIRCUIT BREAKER AUXILIARY CONTACT	VFD LP-620A CIRCUIT BREAKER AUXILIARY CONTACT	AIR EXTRACTOR 1 CONTACTOR AUXILIARY CONTACT	AIR EXTRACTOR 7 CONTACTOR AUXILIARY CONTACT

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 232	Next: 233
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: DIGITAL INPUT MODULE 8	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



YS-046		YS-061			DS-009	DS-010	DS-011	
SPARE CIRCUIT BREAKER AUXILIARY CONTACT	SPARE	RECTIFIER UPS POWER SUPPLY 1	SPARE	SPARE	DOOR SWITCH OPEN/CLOSE	DOOR SWITCH OPEN/CLOSE	DOOR SWITCH OPEN/CLOSE	

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 233	Next: 234
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: DIGITAL INPUT MODULE 8	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



DS-012	WLD-003		YS-012	YS-019	YS-026	YS-033	YS-040
DOOR SWITCH OPEN/CLOSE	WATER LEAK DETECTOR LEVEL 0	SPARE	HE-61.1 CONTACTOR AUXILIARY CONTACT	CHILLER 1 CIRCUIT BREAKER AUXILIARY CONTACT	VFD LP-620B CIRCUIT BREAKER AUXILIARY CONTACT	AIR EXTRACTOR 2 CONTACTOR AUXILIARY CONTACT	AIR EXTRACTOR 8 CONTACTOR AUXILIARY CONTACT

Release/Version:					
00	03				
01	04				
02					

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: DIGITAL INPUT MODULE 9

Order: W240569
File: D240934SCH01
Scheme: D240934SCH01

Sheet:	Next:
234	235

Tot. Sheet: 156

234.9 / L2+ →
234.9 / L- →

→ L2+ / 236.0
→ L- / 236.0

-X.INT24 52 | -X.DI 33 | -X.INT24 53 | -X.DI 35 | 37 | 39 | 41 | 43

L2+ 1,5 RD
L- 1,5 RD

-123QF5 /123.5: 13 / 14
-130QF7 /130.7: 13 / 14

-X.SEP 27 | -X.DI 34 | -X.SEP 28 | -X.DI 36 | 38 | 40 | 42 | 44

235,11 1,5 RD
235,21 1,5 RD
235,31 1,5 RD
235,41 1,5 RD
235,51 1,5 RD
235,61 1,5 RD
235,71 1,5 RD
235,81 1,5 RD

-201AP32 /201.7

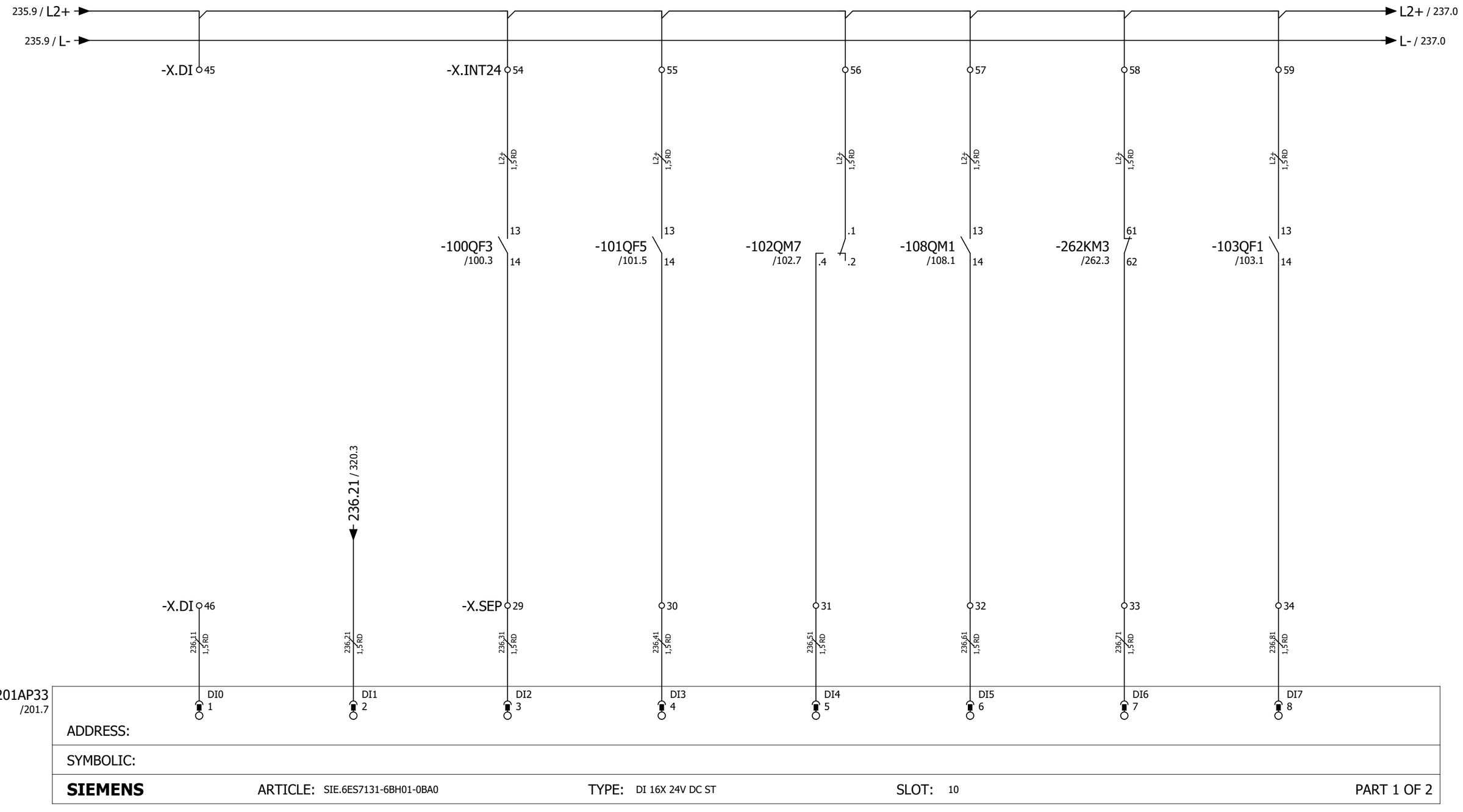
DI8	DI9	DI10	DI11	DI12	DI13	DI14	DI15
9	10	11	12	13	14	15	16

ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7131-6BH01-0BA0 TYPE: DI 16X 24V DC ST SLOT: 9 PART 2 OF 2

YS-047		YS-063	RECTIFIER YA-002F				
SPARE	SPARE	CIRCUIT BREAKER AUXILIARY CONTACT	RECTIFIER 2 FAULT	SPARE	SPARE	SPARE	SPARE



	WLD-004	YS-006	YS-013	YS-020	YS-027	YS-034	YS-041
SPARE	WATER LEAK DETECTOR LEVEL 0	HCU 400Vac REC-01/02 AUX SUPPLY 2 AUXILIARY CONTACT	SPARE CIRCUIT BREAKER AUXILIARY CONTACT	CHILLER 2 CIRCUIT BREAKER AUXILIARY CONTACT	VFD LP-600A CIRCUIT BREAKER AUXILIARY CONTACT	AIR EXTRACTOR 3 CONTACTOR AUXILIARY CONTACT	SPARE CIRCUIT BREAKER AUXILIARY CONTACT

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

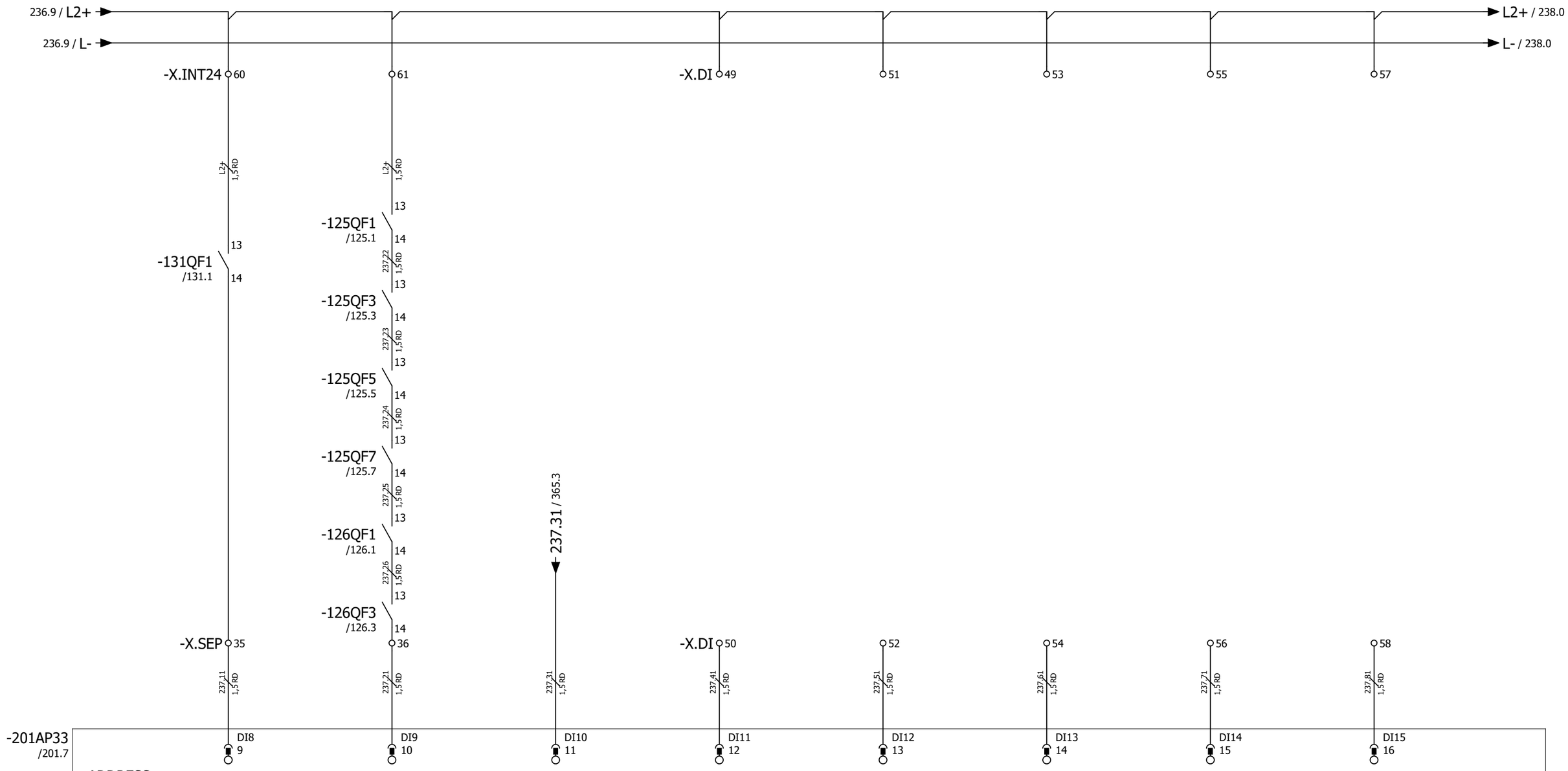
Installation: ELECTRICAL CABINET - BLPH

Page description: DIGITAL INPUT MODULE 10

Order: W240569
File: D240934SCH01
Scheme: D240934SCH01

Sheet:	Next:
236	237

Tot. Sheet: 156



YS-048	YS-055	RECTIFIER XA-001R	RECTIFIER YS-102				
RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT	LIGHTING CIRCUIT BREAKERS AUXILIARY CONTACTS	EMERGENCY STOP FEEDBACK 1	RECTIFIER 2 IN OPERATION	SPARE	SPARE	SPARE	SPARE

Release/Version:			Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 237	Next: 238
00	03		FORES ENGENEERING	Page description: DIGITAL INPUT MODULE 10	File: D240934SCH01	Tot. Sheet: 156	
01	04				Scheme: D240934SCH01		
02							

PROTEO ENGINEERING GROUP

237.9 / L2+ → L2+ / 239.0

237.9 / L- → L- / 239.0

	-X.DI 59	-X.DI 61	-X.INT24 62	63	64	65	66
			L2+ 1,5RD	L2+ 1,5RD	L2+ 1,5RD	L2+ 1,5RD	L2+ 1,5RD
			21	13	13	61	13
			-300KM1 /300.1	-103QF3 /103.3	-109QM1 /109.1	-264KM3 /264.3	-122QF1 /122.1
			22	14	14	62	14

238.21 / 320.5

-X.DI 60	-X.DI 62	-X.SEP 37	38	39	40	41
238,11 1,5 RD	238,21 1,5 RD	238,31 1,5 RD	238,41 1,5 RD	238,51 1,5 RD	238,61 1,5 RD	238,71 1,5 RD	238,81 1,5 RD

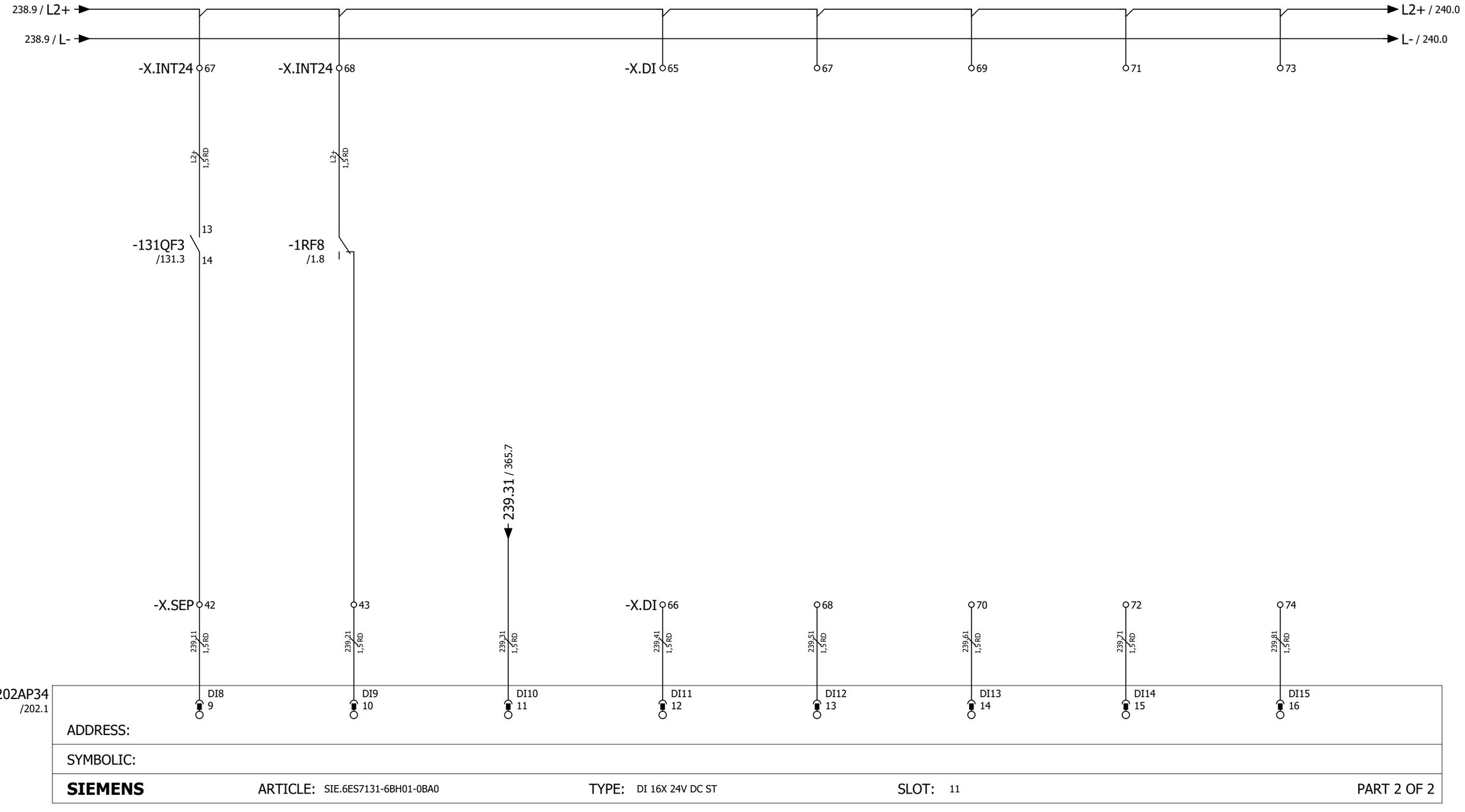
-202AP34 /202.1

DI0 1	DI1 2	DI2 3	DI3 4	DI4 5	DI5 6	DI6 7	DI7 8
SPARE	WLD-006 WATER LEAK DETECTOR LEVEL 1	SPARE	YS-014 SPARE CONTACTOR AUXILIARY CONTACT	YS-021 SPARE CIRCUIT BREAKER AUXILIARY CONTACT	YS-028 VFD LP-600B CIRCUIT BREAKER AUXILIARY CONTACT	YS-035 AIR EXTRACTOR 4 CONTACTOR AUXILIARY CONTACT	YS-042 SPARE CIRCUIT BREAKER AUXILIARY CONTACT

ADDRESS:

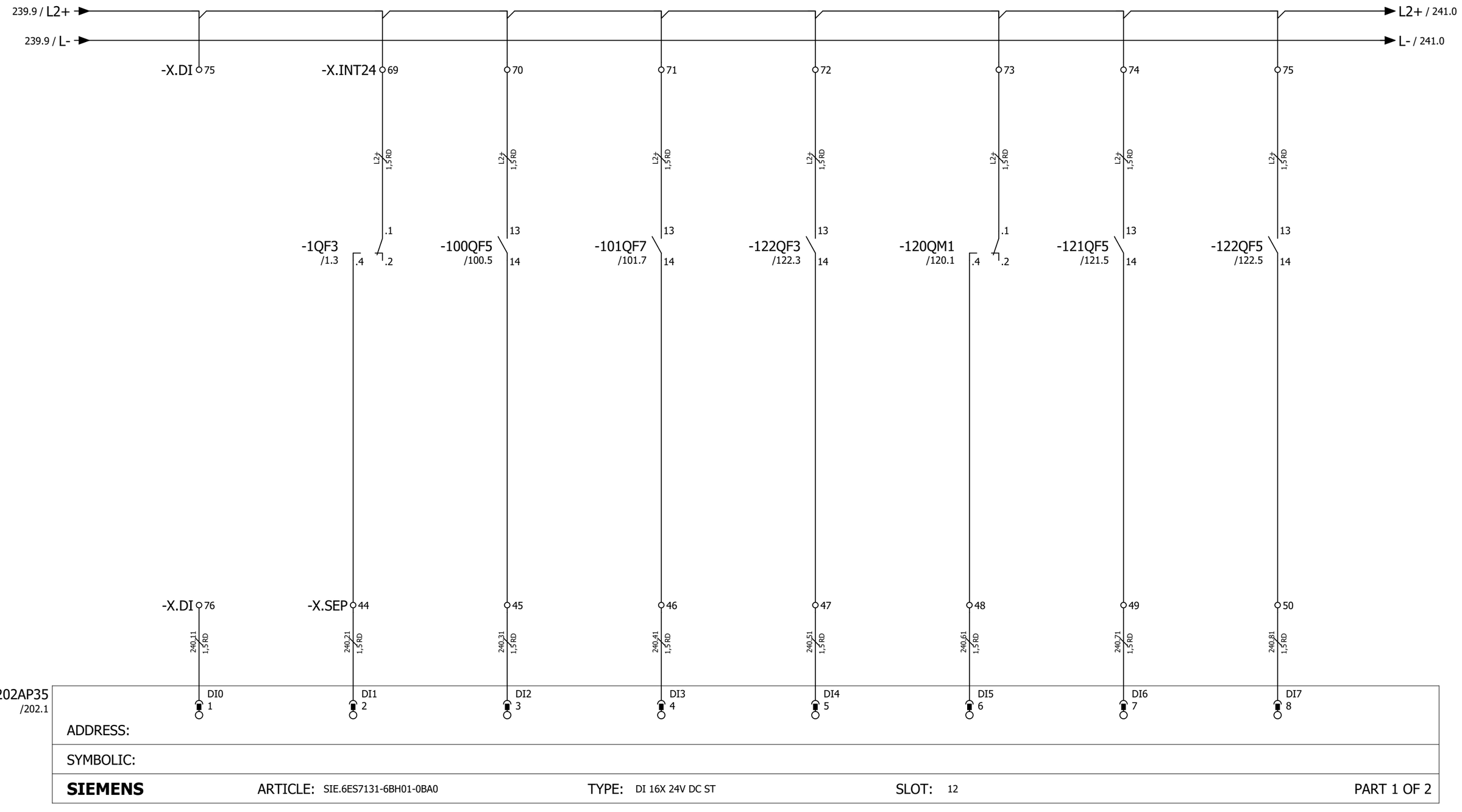
SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7131-6BH01-0BA0 TYPE: DI 16X 24V DC ST SLOT: 11 PART 1 OF 2



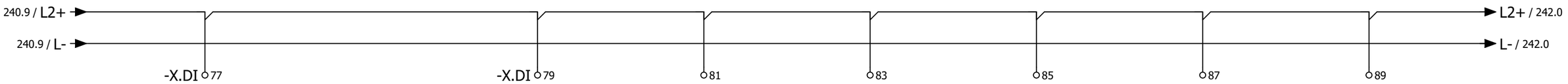
YS-049 RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT	YS-056 SURGE PROTECTOR DEVICE AUXILIARY CONTACT	RECTIFIER XA-002R EMERGENCY STOP FEEDBACK 2	SPARE	SPARE	SPARE	SPARE	SPARE

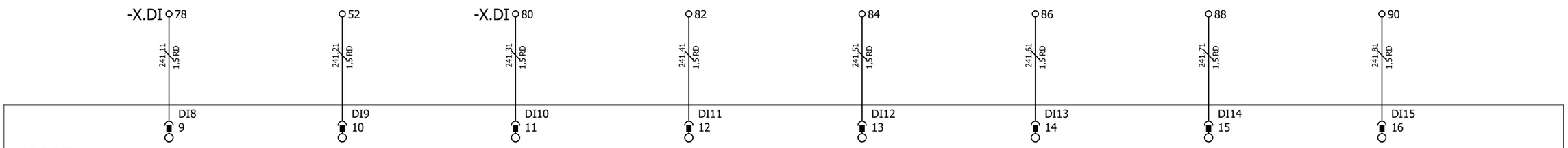
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 239	Next: 240
00	03			FORES ENGENEERING	Page description: DIGITAL INPUT MODULE 11	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



	YS-001	YS-008	YS-015	YS-022	YS-029	YS-036	YS-043
SPARE	GENERAL CIRCUIT BREAKER AUXILIARY CONTACT	UPS CIRCUIT BREAKER AUXILIARY CONTACT	HE-64.1 (HPP-700) CIRCUIT BREAKER AUXILIARY CONTACT	SPARE CIRCUIT BREAKER AUXILIARY CONTACT	AUXILIARY EQUIPMENT TYPE 2 CIRCUIT BREAKER AUXILIARY CONTACT	AIR EXTRACTOR GROUP 2 CIRCUIT BREAKER AUXILIARY CONTACT	HEAT TRACING CIRCUIT 1

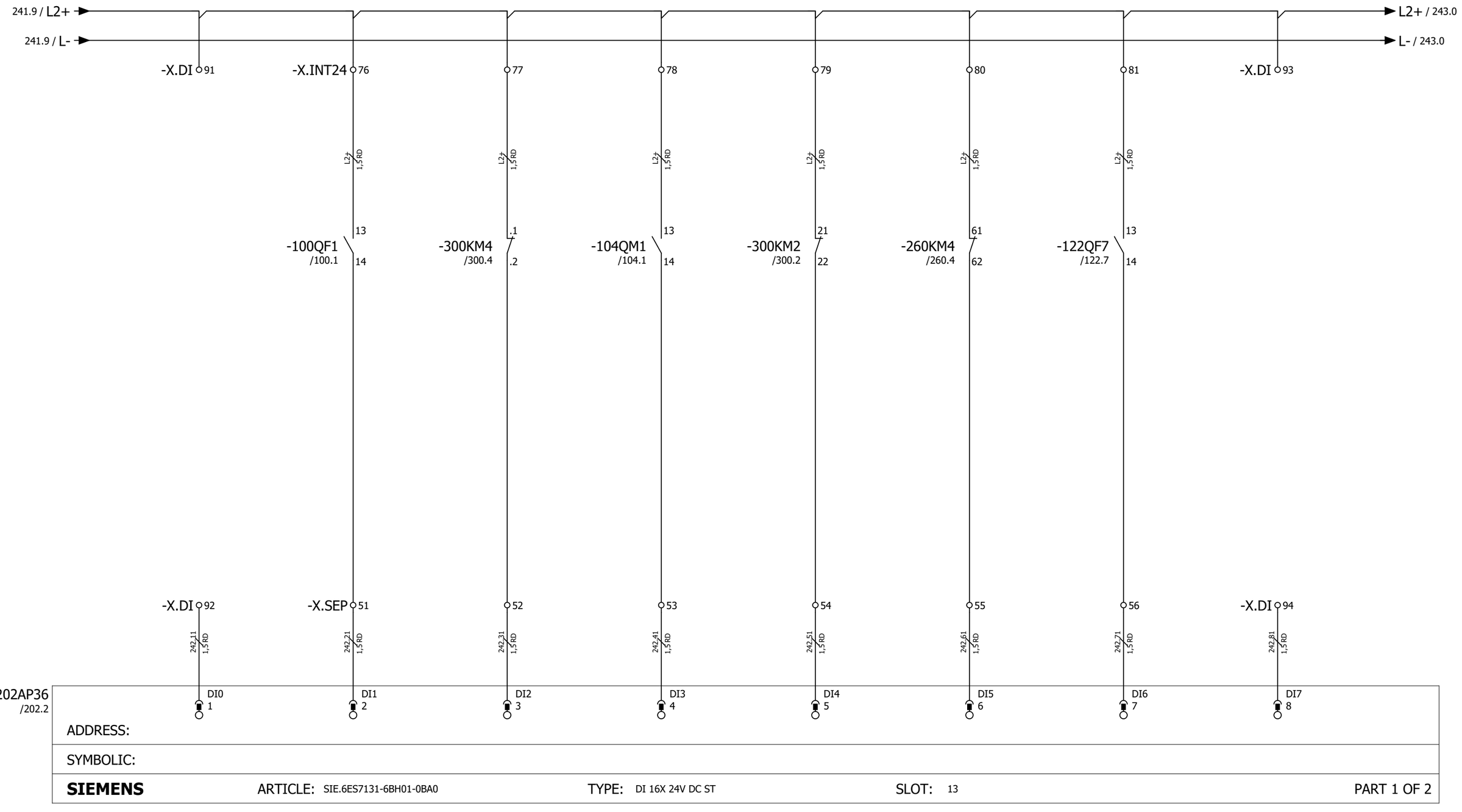
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 240	Next: 241
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: DIGITAL INPUT MODULE 12	Scheme: D240934SCH01	Tot. Sheet: 156	
02								





SPARE SPARE SPARE SPARE SPARE SPARE SPARE SPARE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 241	Next: 242
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: DIGITAL INPUT MODULE 12	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



	YS-002	YS-016	YS-023	YS-030	YS-037	YS-044	
SPARE	HCU 230Vac REC-01/02 AUX SUPPLY 1 AUXILIARY CONTACT	HE-64.1 (HPP-700) CONTACTOR AUXILIARY CONTACT	VFD LP-300A CIRCUIT BREAKER AUXILIARY CONTACT	AUXILIARY EQUIPMENT TYPE 2 CONTACTOR AUXILIARY CONTACT	AIR EXTRACTOR 5 CONTACTOR AUXILIARY CONTACT	HEAT TRACING CIRCUIT 2	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 242	Next: 243
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: DIGITAL INPUT MODULE 13		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

242.9 / L2+ → L2+ / 250.0

242.9 / L- → L-

-X.INT24 82 | -X.DI 107 | 95 | 97 | 99 | 101 | 103 | 105

L2+ 1,5 RD

-101QF1 /101.1 — 13 / 14

-X.SEP 57 | -X.DI 108 | 96 | 98 | 100 | 102 | 104 | 106

243,11 1,5 RD | 243,21 1,5 RD | 243,31 1,5 RD | 243,41 1,5 RD | 243,51 1,5 RD | 243,61 1,5 RD | 243,71 1,5 RD | 243,81 1,5 RD

-202AP36 /202.2

DI8	DI9	DI10	DI11	DI12	DI13	DI14	DI15
9	10	11	12	13	14	15	16

ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7131-6BH01-0BA0 TYPE: DI 16X 24V DC ST SLOT: 13 PART 2 OF 2

YS-058

SPARE CIRCUIT BREAKER AUXILIARY CONTACT | SPARE | SPARE | SPARE | SPARE | SPARE | SPARE | SPARE

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: DIGITAL INPUT MODULE 13

Order: W240569
File: D240934SCH01

Scheme: D240934SCH01

Sheet: 243 | Next: 250

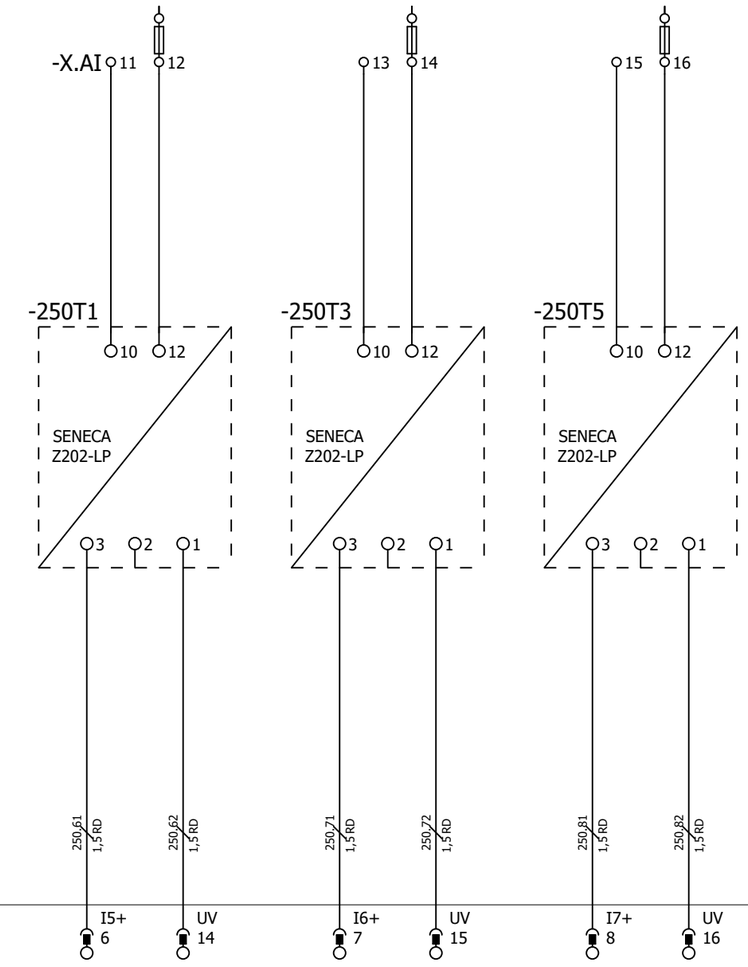
Tot. Sheet: 156

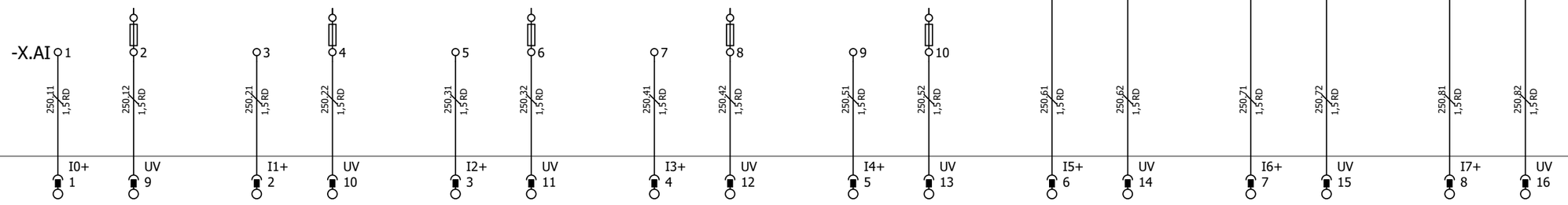
243.9 / L2+ → L2+ / 251.0

243.9 / L- → L- / 251.0

Setting SENECA Z202-LP on 300Vac / 270Vdc with Trimmer disabled (fourth dip switch up).

Portata	*DIP*	*Portata / Trimmer*	*DIP*
100Vac / 90 Vdc	on off 1 2 3 4	100 Vac + 0..100 Vac / 90 Vdc + 0..90 Vdc	on off 1 2 3 4
200Vac / 180 Vdc	on off 1 2 3 4	200 Vac + 0..100 Vac / 180 Vdc + 0..90 Vdc	on off 1 2 3 4
300Vac / 270 Vdc	on off 1 2 3 4	300 Vac + 0..100 Vac / 270 Vdc + 0..90 Vdc	on off 1 2 3 4
400Vac / 360 Vdc	on off 1 2 3 4	400 Vac + 0..100 Vac / 360 Vdc + 0..90 Vdc	on off 1 2 3 4
500Vac / 450 Vdc	on off 1 2 3 4	500 Vac + 0..100 Vac / 450 Vdc + 0..90 Vdc(1)	on off 1 2 3 4

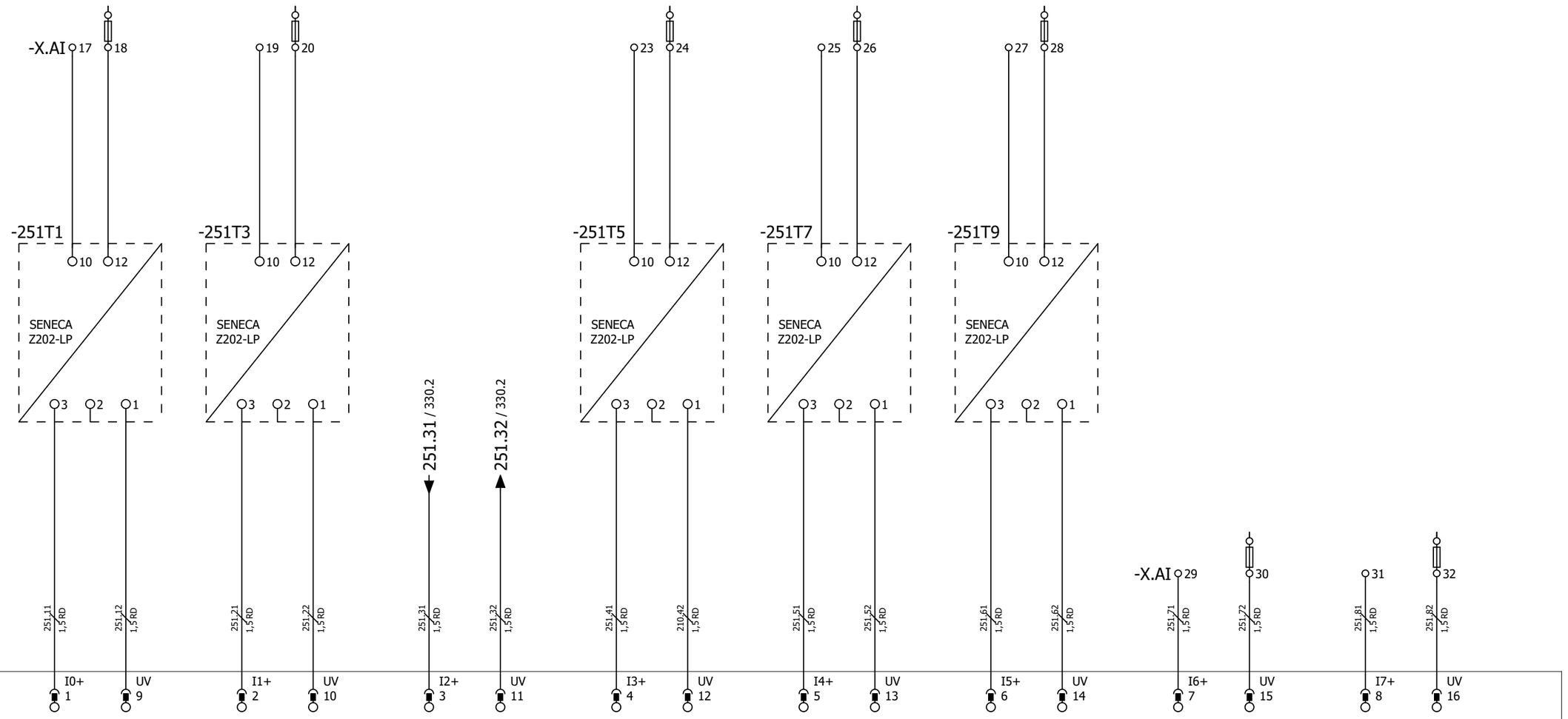




PT300 PI300	TT-60	TT-154		M3WV-200 M3WV-200 HOLD	WM-001	WM-002	WM-003
PURE WATER OUT WTP TO SERVICES			SPARE	MOTORIZED PROPORTIONAL VALVE POSITION	VOLTAGE OUTPUT STACK 001	VOLTAGE OUTPUT STACK 002	VOLTAGE OUTPUT STACK 003

250.9 / L2+ → L2+ / 252.0

250.9 / L- → L- / 252.0



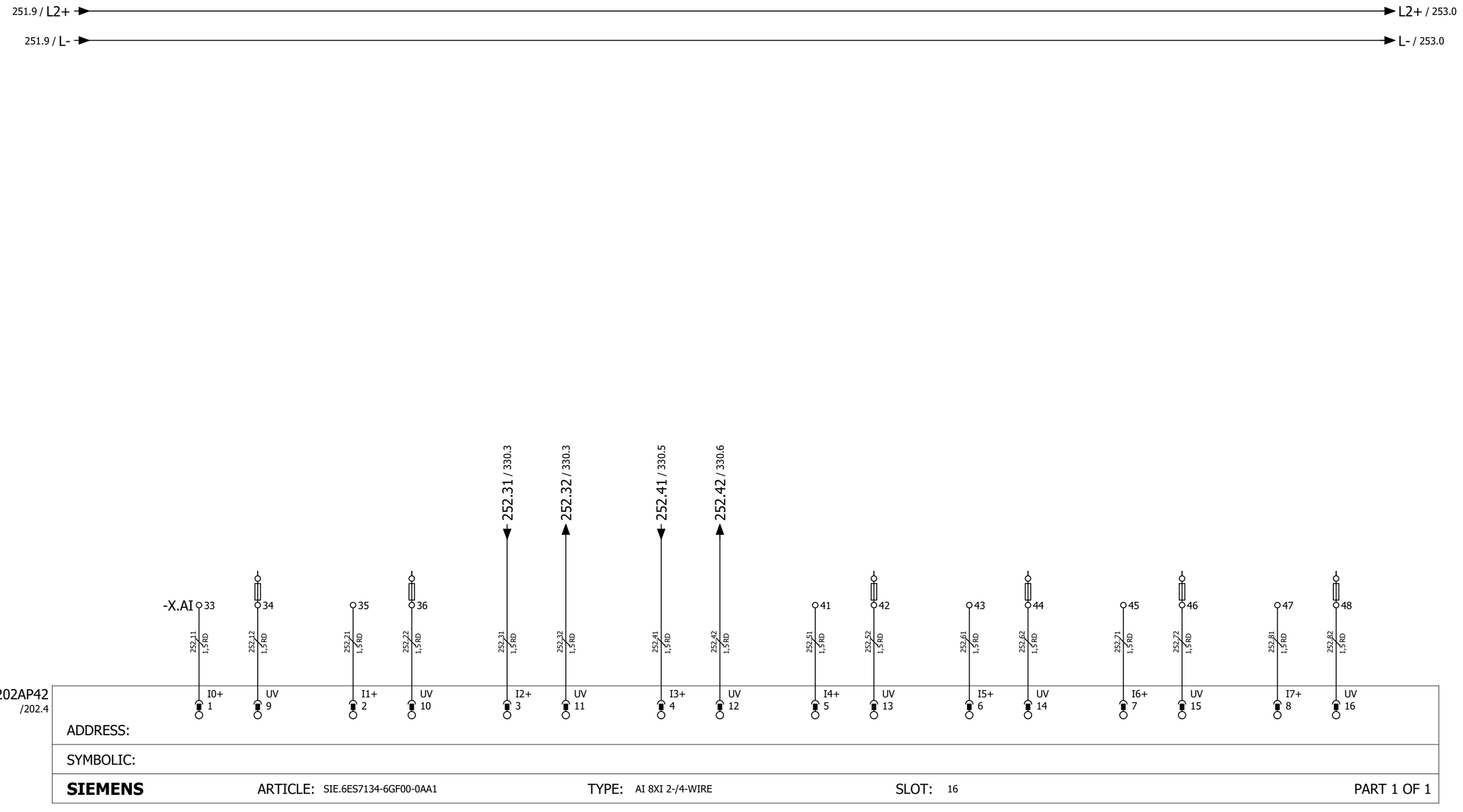
ADDRESS:

SYMBOLIC:

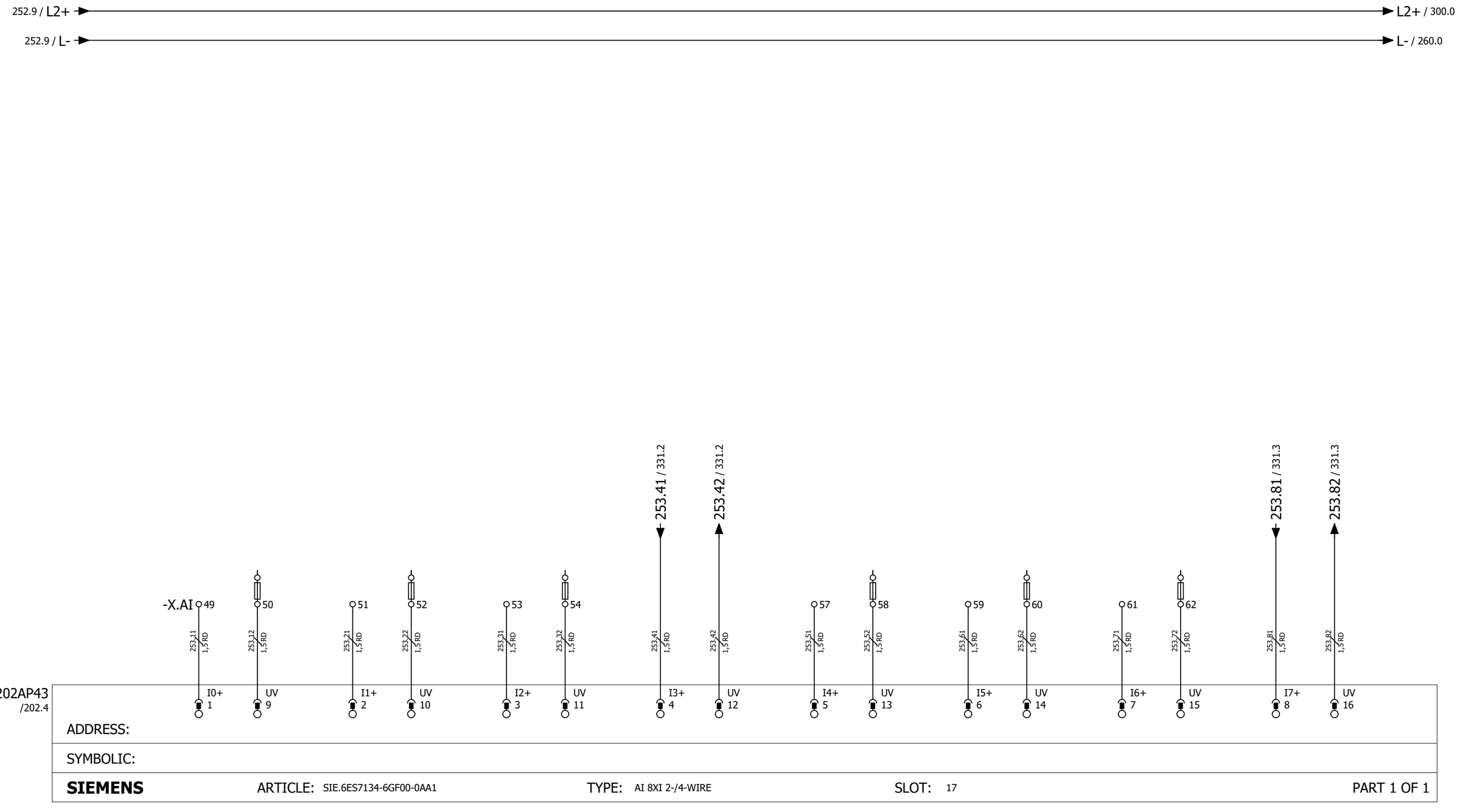
SIEMENS ARTICLE: SIE.6ES7134-6GF00-0AA1 TYPE: AI 8XI 2-/4-WIRE SLOT: 15 PART 1 OF 1

VM-004	VM-005	IM-001	VM-006	VM-007	VM-008		
VOLTAGE OUTPUT STACK 004	VOLTAGE OUTPUT STACK 005	RECTIFIER 1 OUTPUT CURRENT	VOLTAGE OUTPUT STACK 006	VOLTAGE OUTPUT STACK 007	VOLTAGE OUTPUT STACK 008	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 251	Next: 252
00	03					File: D240934SCH01		
01	04				Page description: ANALOGIC INPUT MODULE 15		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 252	Next: 253
00	03				Page description: ANALOGIC INPUT MODULE 16	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



VM-102

SPARE | SPARE | SPARE | RECTIFIER 2 DC VOLTAGE | SPARE | SPARE | SPARE | SPARE

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: ANALOGIC INPUT MODULE 17

Order: W240569
File: D240934SCH01
Scheme: D240934SCH01

Sheet:	Next:
253	260

Tot. Sheet: 156

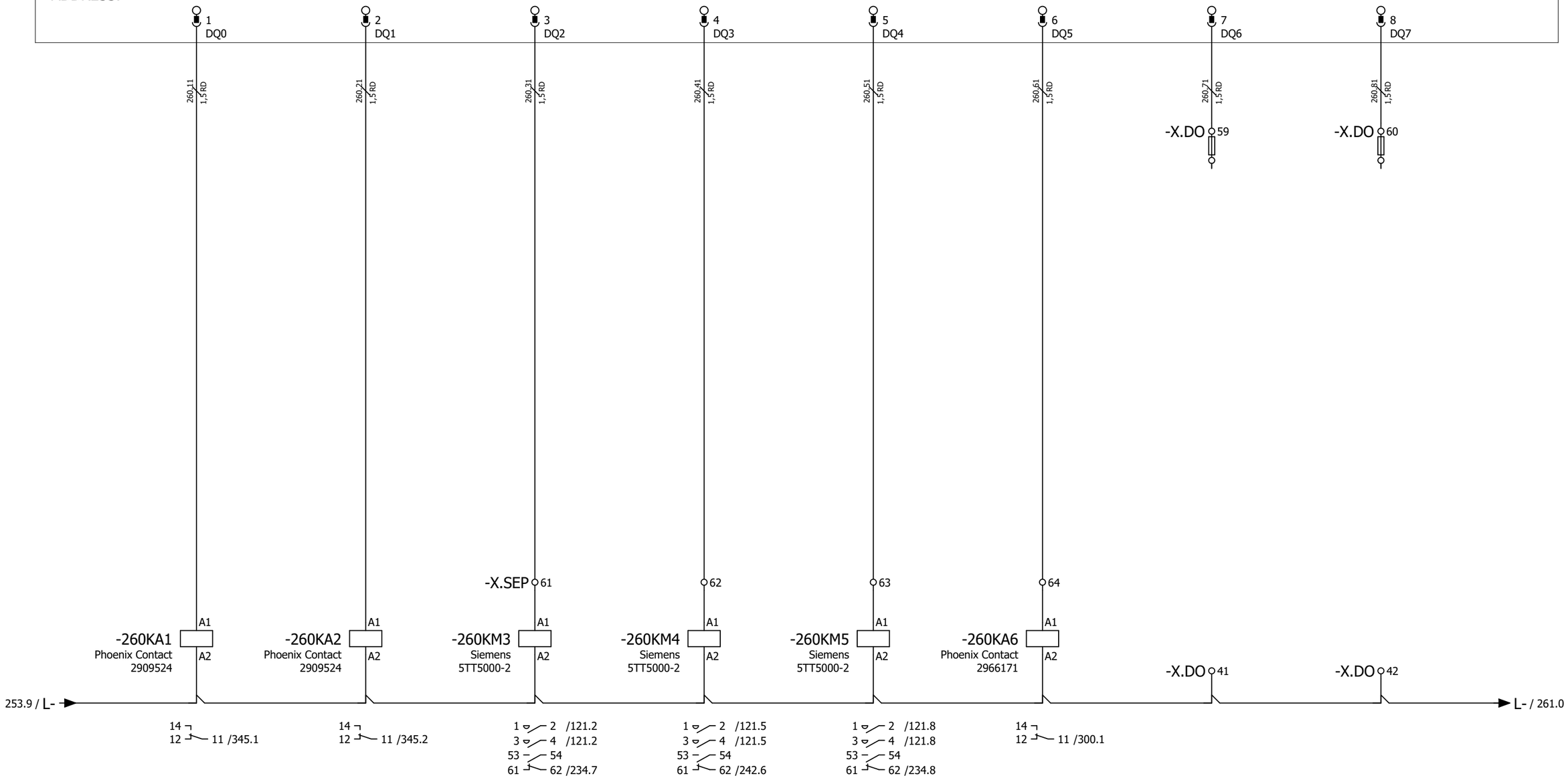
0	1	2	3	4	5	6	7	8	9

-202AP50
/202.5

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 18 PART 1 OF 2

SYMBOLIC:

ADDRESS:



RECTIFIER YS-103 ELECTROLYZER 1 SYSTEM HEALTY	SPARE	EXT-G02 AIR EXTRACTOR EXT-0002 COMMAND	EXT-G05 AIR EXTRACTOR EXT-0005 COMMAND	EXT-G08 AIR EXTRACTOR EXT-0008 COMMAND	ES-014 SPARE CONTACTOR COMMAND	SPARE	VE-003 LIGHT COLUMN LEVEL 0 GREEN

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 260	Next: 261
00	03			FORES ENGENEERING	Page description: DIGITAL OUTPUT MODULE 18	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

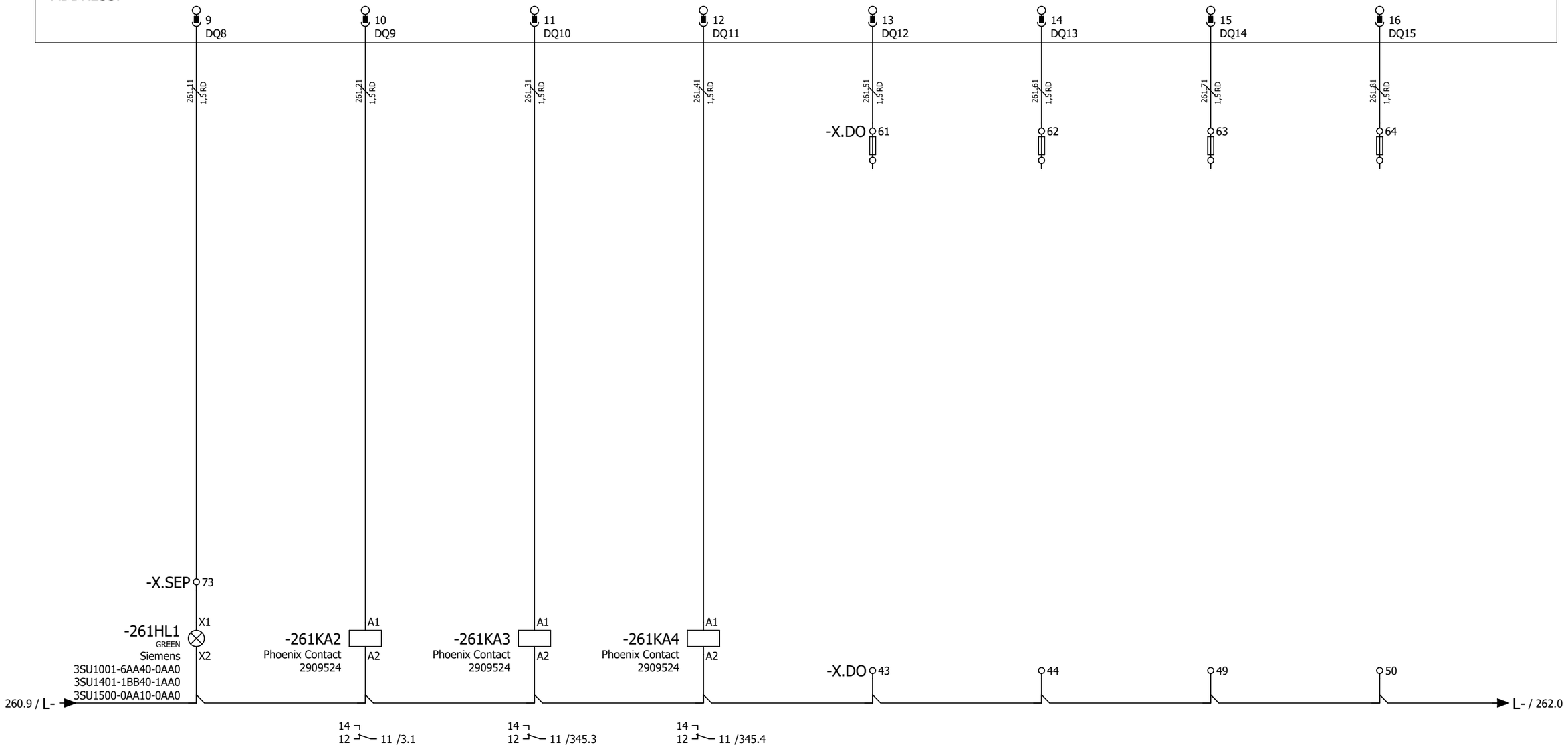
0	1	2	3	4	5	6	7	8	9

-202AP50
/202.5

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 18 PART 2 OF 2

SYMBOLIC:

ADDRESS:



VE-015

FRONT PANEL GREEN LIGHT	MAIN CIRCUIT BREAKER OPEN COMMAND	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569 File: D240934SCH01	Sheet: 261	Next: 262
00	03				Page description: DIGITAL OUTPUT MODULE 18	Scheme: D240934SCH01	Tot. Sheet: 156	
01	04							
02								

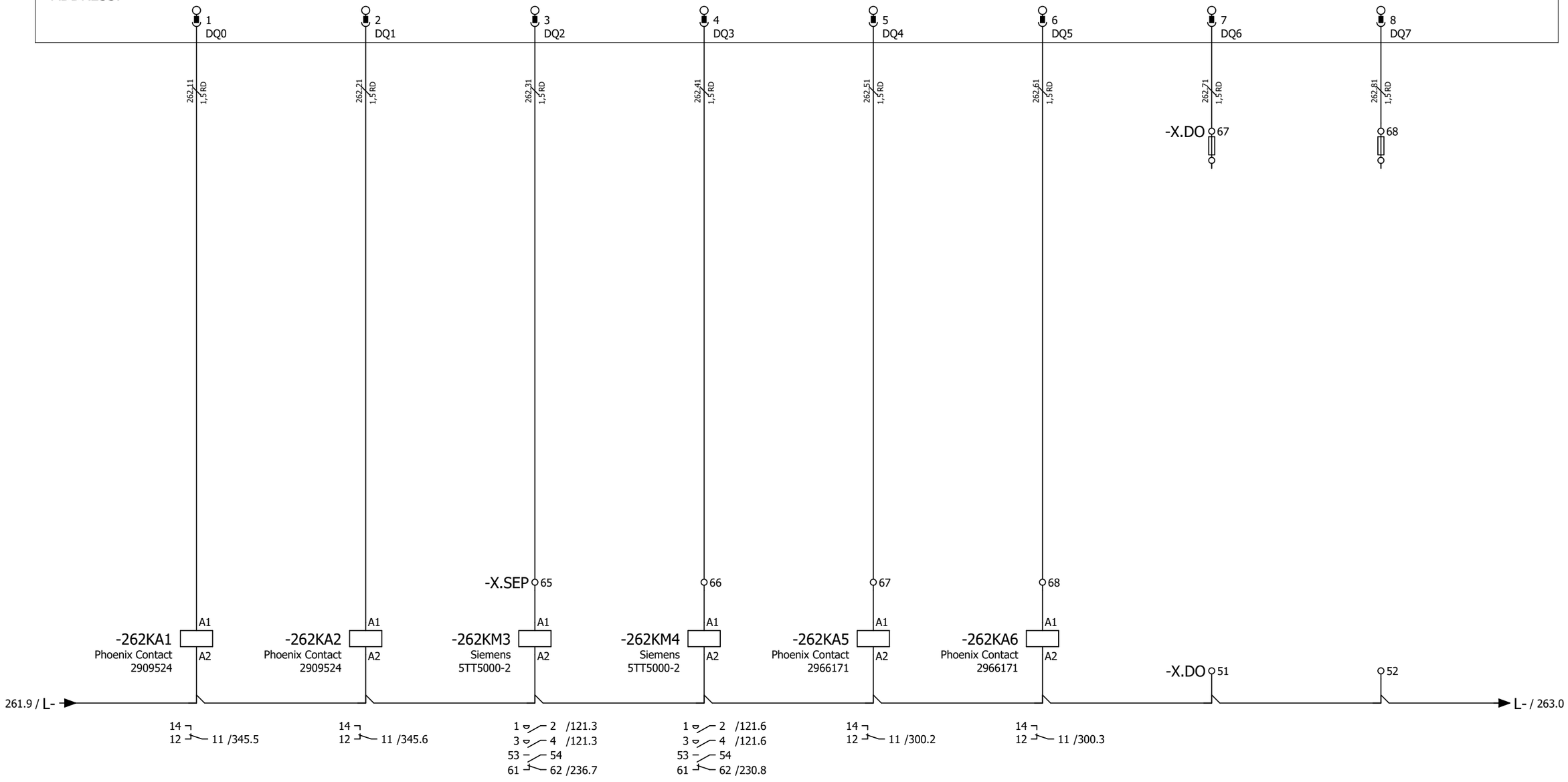
0	1	2	3	4	5	6	7	8	9

-202AP51
/202.5

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 19 PART 1 OF 2

SYMBOLIC:

ADDRESS:



RECTIFIER YS-104	RECTIFIER HS-101	EXT-G03	EXT-G06	ES-030	ES-012	VE-001	VE-004
ELECTROLYZER 2 SYSTEM HEALTY	RECTIFIER START/STOP COMMAND	AIR EXTRACTOR EXT-0003 COMMAND	AIR EXTRACTOR EXT-0006 COMMAND	AUXILIARY EQUIPMENT TYPE 2 CONTACTOR COMMAND	HE-61.1 (HPP-700) CONTACTOR COMMAND	LIGHT COLUMN LEVEL 0 RED	LIGHT COLUMN LEVEL 0 BLUE

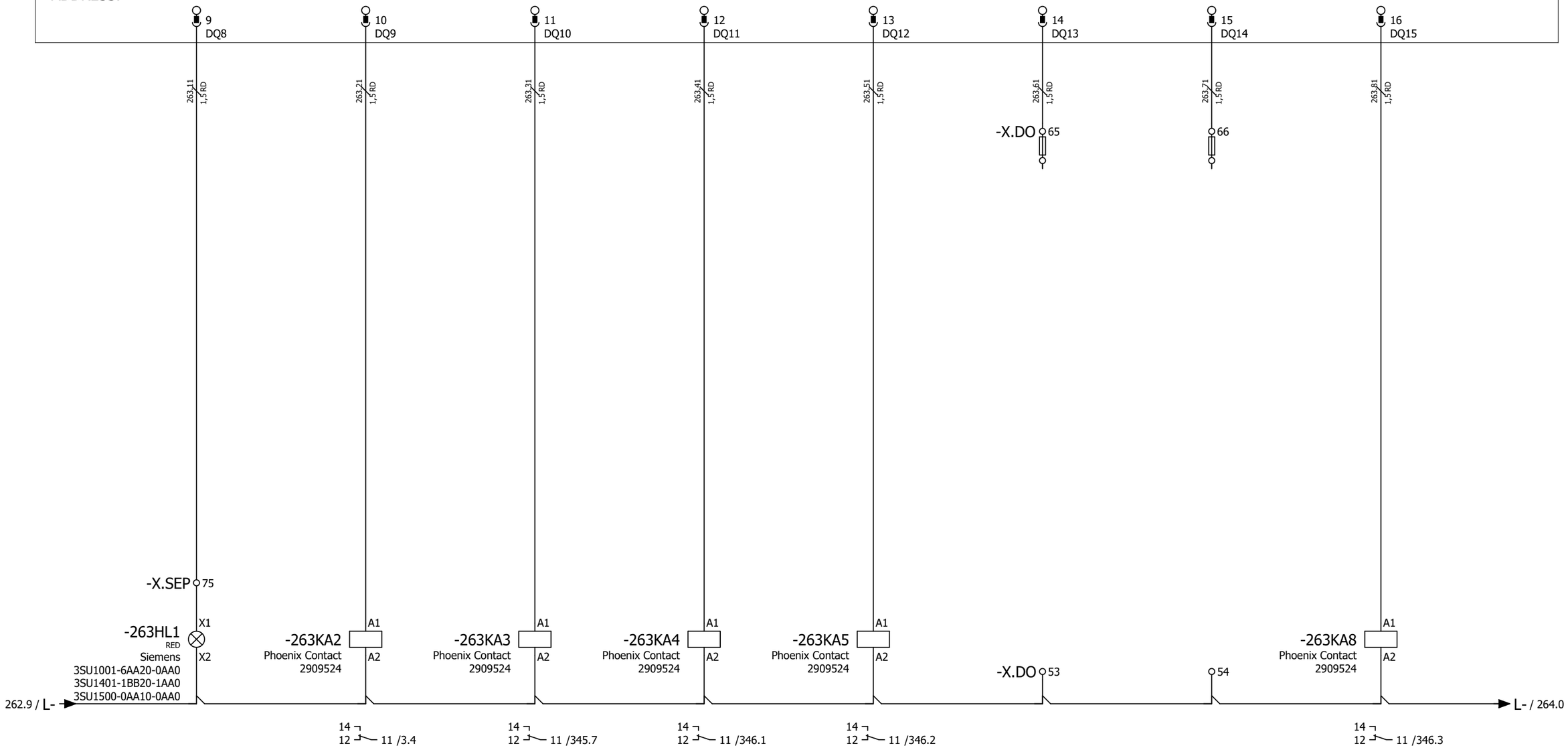
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 262	Next: 263
00	03			FORES ENGENEERING	Page description: DIGITAL OUTPUT MODULE 19	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

-202AP51
/202.5

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 19 PART 2 OF 2

SYMBOLIC:

ADDRESS:



VE-013

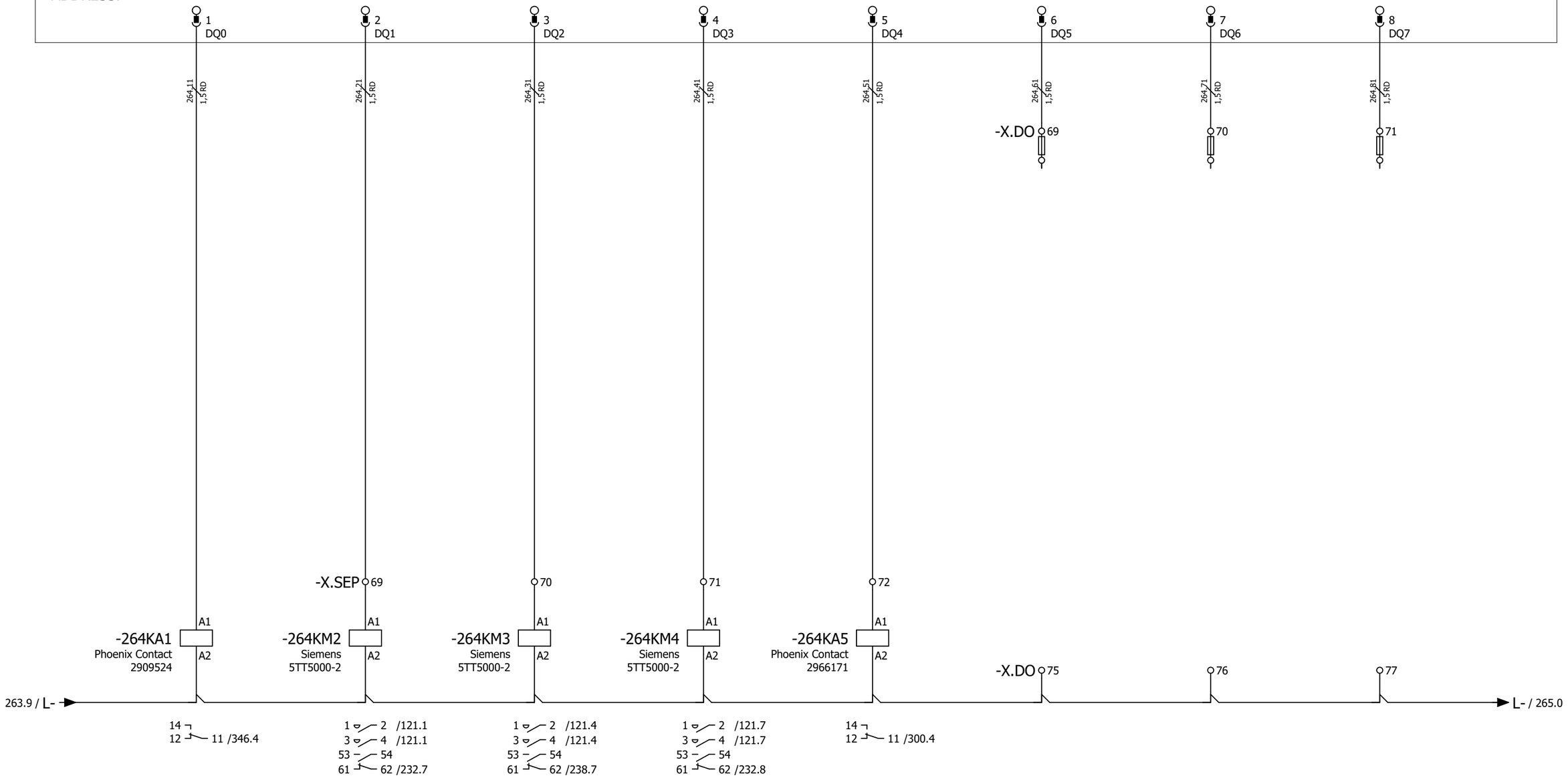
FRONT PANEL RED LIGHT	MAIN CIRUIT BREAKER CLOSE COMMAND	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE

-202AP52
/202.6

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 20 PART 1 OF 2

SYMBOLIC:

ADDRESS:



	EXT-G01	EXT-G04	EXT-G07	ES-016	VE-002		
SPARE	AIR EXTRACTOR EXT-0001 COMMAND	AIR EXTRACTOR EXT-0004 COMMAND	AIR EXTRACTOR EXT-0007 COMMAND	HE-64.1 (HPP-700) CONTACTOR COMMAND	LIGHT COLUMN LEVEL 0 ORANGE	BUZZER LEVEL 0	SPARE

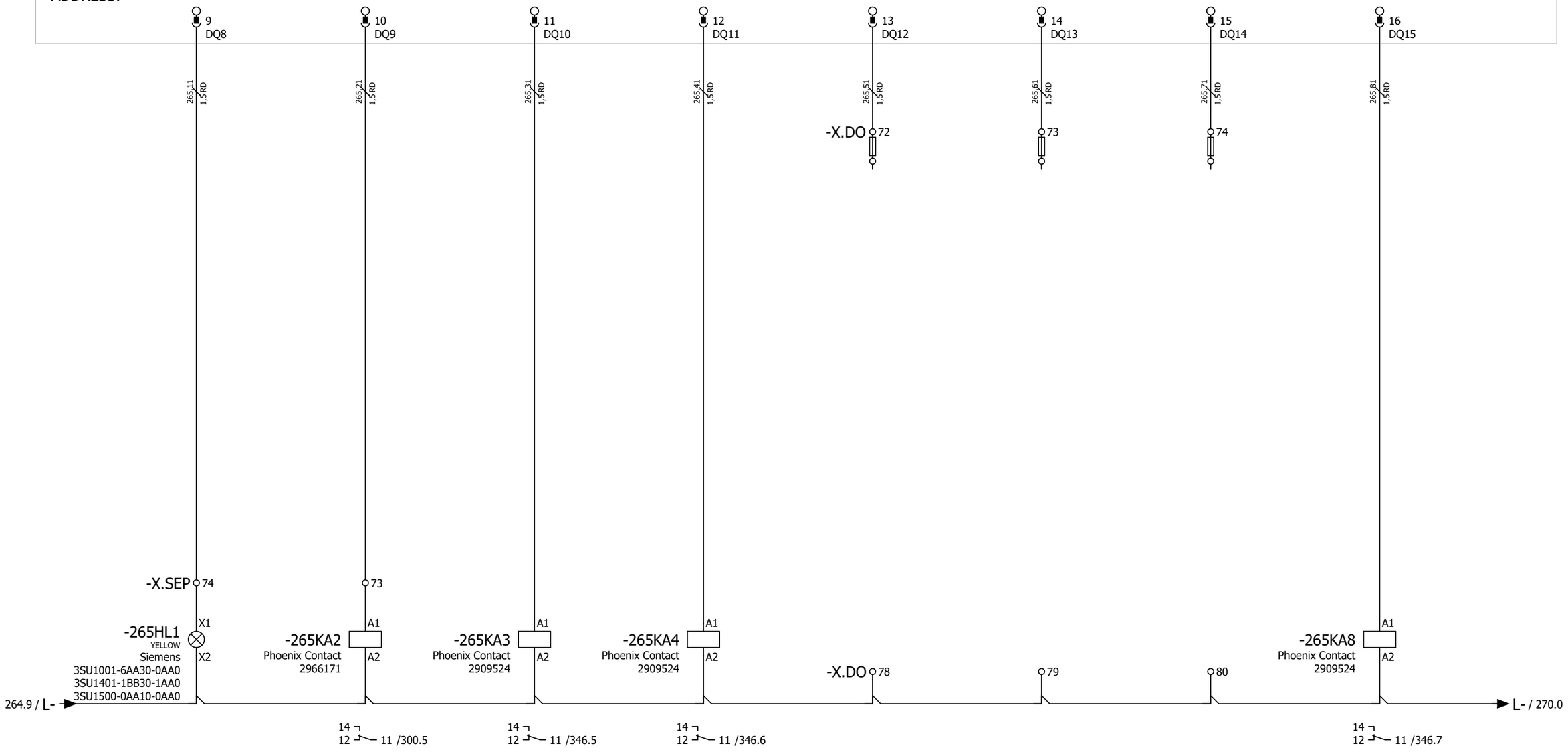
0	1	2	3	4	5	6	7	8	9

-202AP52
/202.6

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 20 PART 2 OF 2

SYMBOLIC:

ADDRESS:



VE-014	ES-011						
FRONT PANEL ORANGE LIGHT	SPARE CONTACTOR COMMAND	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation:	Order:	Sheet:	Next:
00	03			FORES ENGENEERING	ELECTRICAL CABINET - BLPH	W240569	265	270
01	04				Page description: DIGITAL OUTPUT MODULE 20	File: D240934SCH01	Tot. Sheet: 156	
02						Scheme: D240934SCH01		

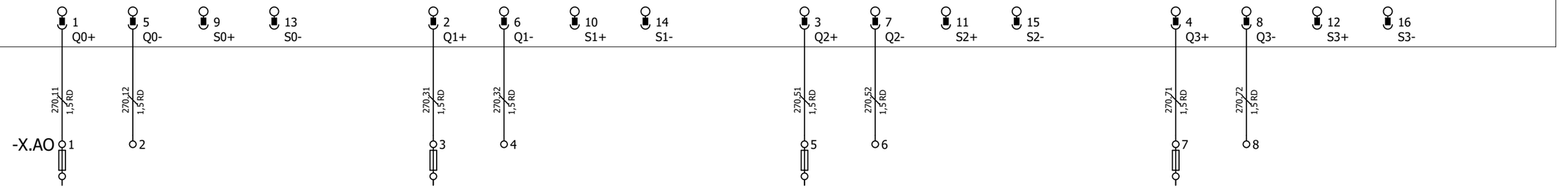
0	1	2	3	4	5	6	7	8	9

-202AP60
/202.7

SIEMENS ARTICLE: SIE.6ES7135-6HD00-0BA1 TYPE: AQ 4XU/I ST SLOT: 21 PART 1 OF 1

SYMBOLIC:

ADDRESS:



265.9 / L- → L- / 300.0

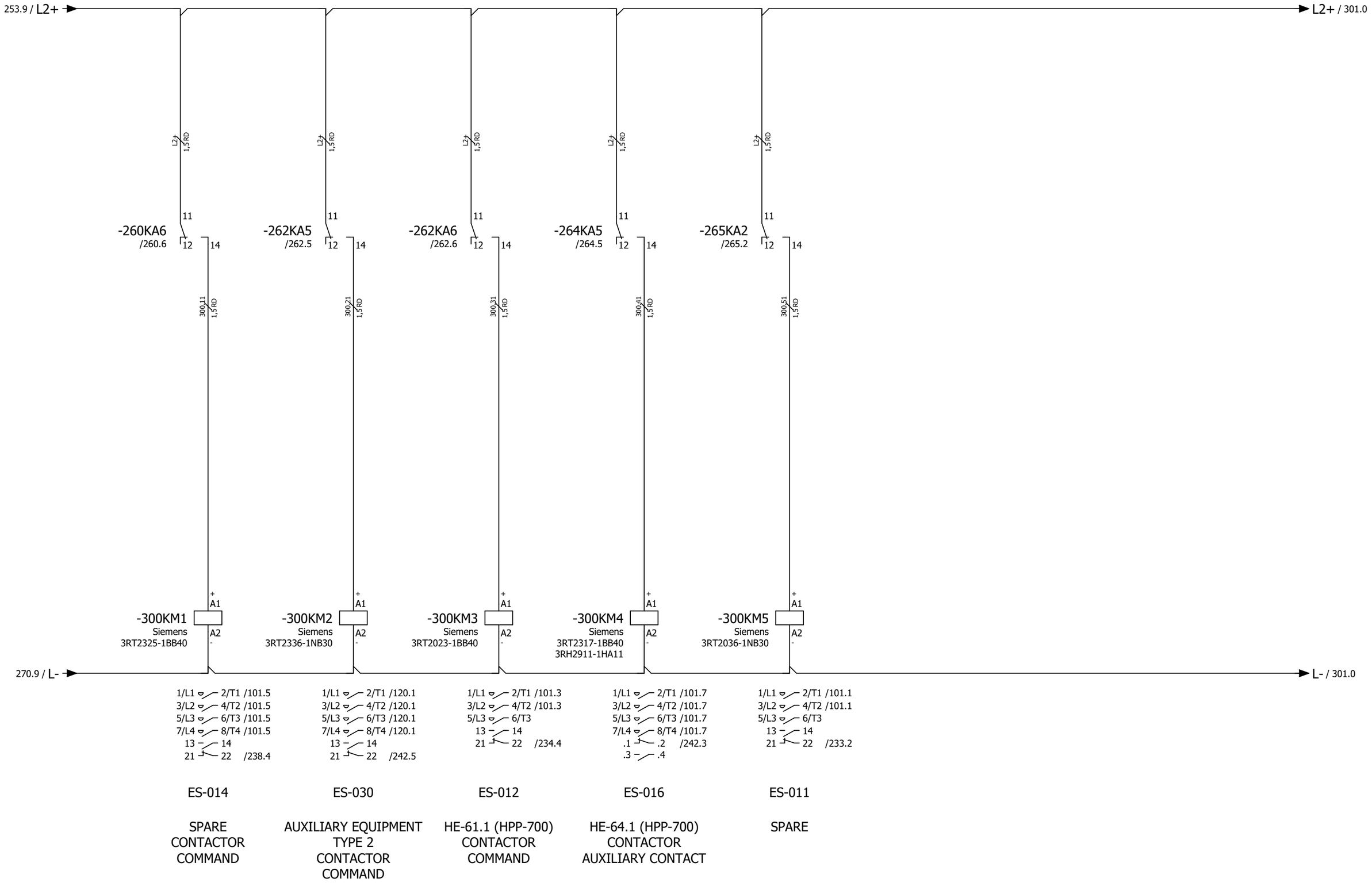
M3WV-200
M3WV-200 HOLD
MOTORIZED
PROPORTIONAL VALVE
FEEDBACK

SPARE

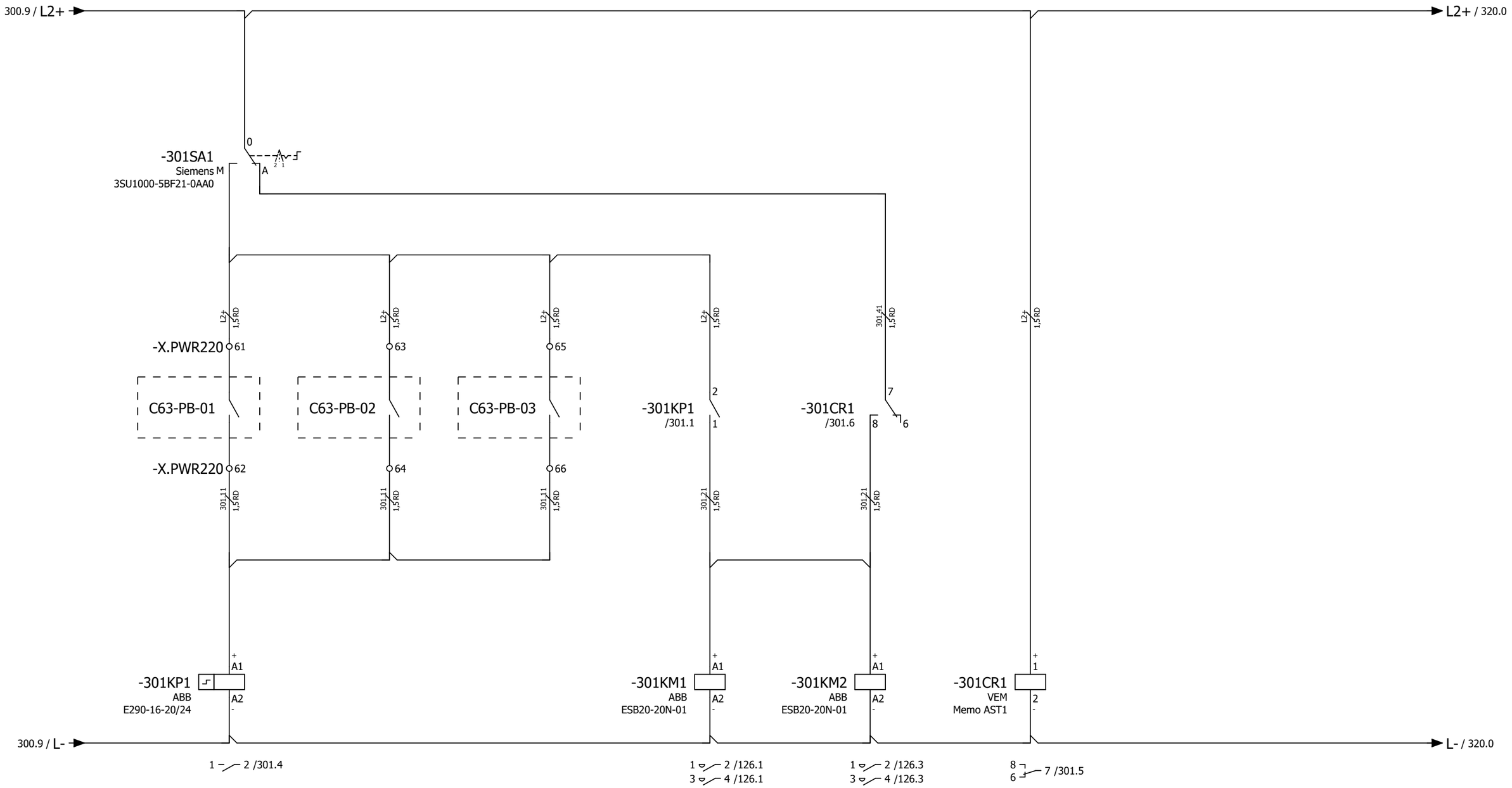
SPARE

SPARE

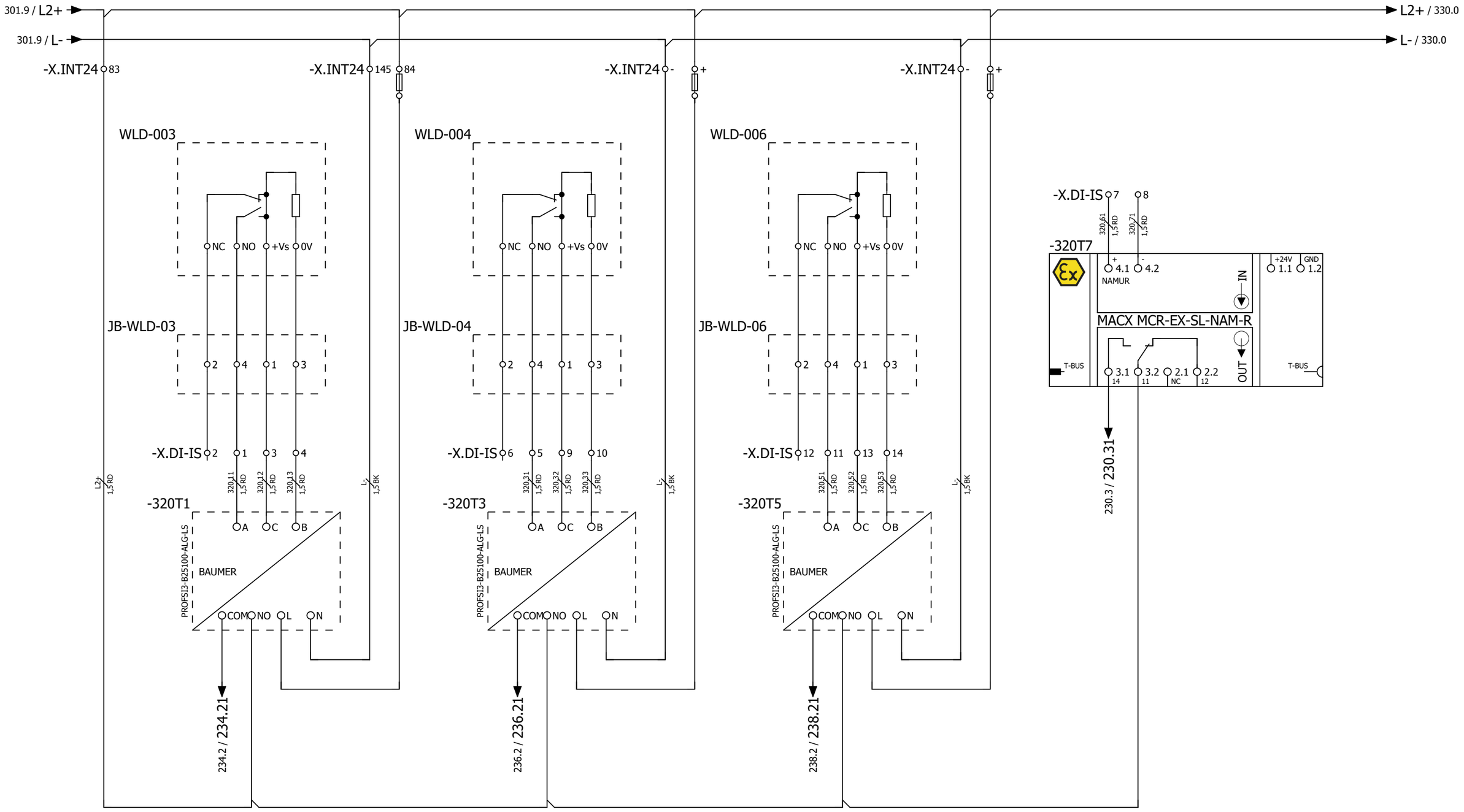
Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569 File: D240934SCH01	Sheet: 270 / Next: 300
00	03				Page description: ANALOGIC OUTPUT MODULE 21	Scheme: D240934SCH01	Tot. Sheet: 156
01	04						
02							



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 300	Next: 301
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: CONTACTORS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 301	Next: 320
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: CONTACTORS	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



WLD-003

WATER LEAK
DETECTOR LEVEL 0

WLD-004

WATER LEAK
DETECTOR LEVEL 0

WLD-006

WATER LEAK
DETECTOR LEVEL 1

SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 320	Next: 330
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: BARRIER RELAYS		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

320.9 / L2+ → L2+ / 331.0

320.9 / L- → L- / 331.0

-X.INT24 85 146 | -X.INT24 86 147 | -X.INT24 87 148

IM-001 - TO FIELD

-X.AI 21 22

330,11 1,5 RD | 330,12 1,5 RD | L+ 1,5 RD | L- 1,5 BK

-330T1

44+ 43- input I | 31- 32+ supply | 54+ 53- input II

PR electronics

output I: 12+ 11- → 251.3 / 251.31 | 251.3 / 251.32

output II: 14+ 13- → 252.3 / 252.31 | 252.3 / 252.32

9106B HART transparent repeater

IM-002 - TO FIELD

37 38

330,21 1,5 RD | 330,22 1,5 RD

VM-101 - TO FIELD

39 40

330,51 1,5 RD | 330,52 1,5 RD

-330T5

44+ 43- input I | 31- 32+ supply | 54+ 53- input II

PR electronics

output I: 12+ 11- → 252.4 / 252.41 | 252.4 / 252.42

output II: 14+ 13-

9106B HART transparent repeater

IM-001

RECTIFIER 1
OUTPUT CURRENT

IM-002

RECTIFIER 2
OUTPUT CURRENT

VM-101

RECTIFIER 1
DC VOLTAGE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 330	Next: 331
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: BARRIER RELAYS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

330.9 / L2+

330.9 / L-

L2+ / 340.0

L- / 360.0

-X.INT24 88 149

VM-102
-
TO FIELD

-X.AI 55 56

331,11 1,5RD

331,12 1,5RD

L+ 1,5RD

L- 1,5BK

-X.DI-IS 17 18

331,21 1,5RD

331,22 1,5RD

-331T1

44+ 43- input I

31- 32+ supply

54+ 53- input II

PR electronics

9106B
HART transparent repeater

output I
12+ 11-

output II
14+ 13-

253.4 / 253.41

253.4 / 253.42

253.8 / 253.81

253.8 / 253.82

VM-102

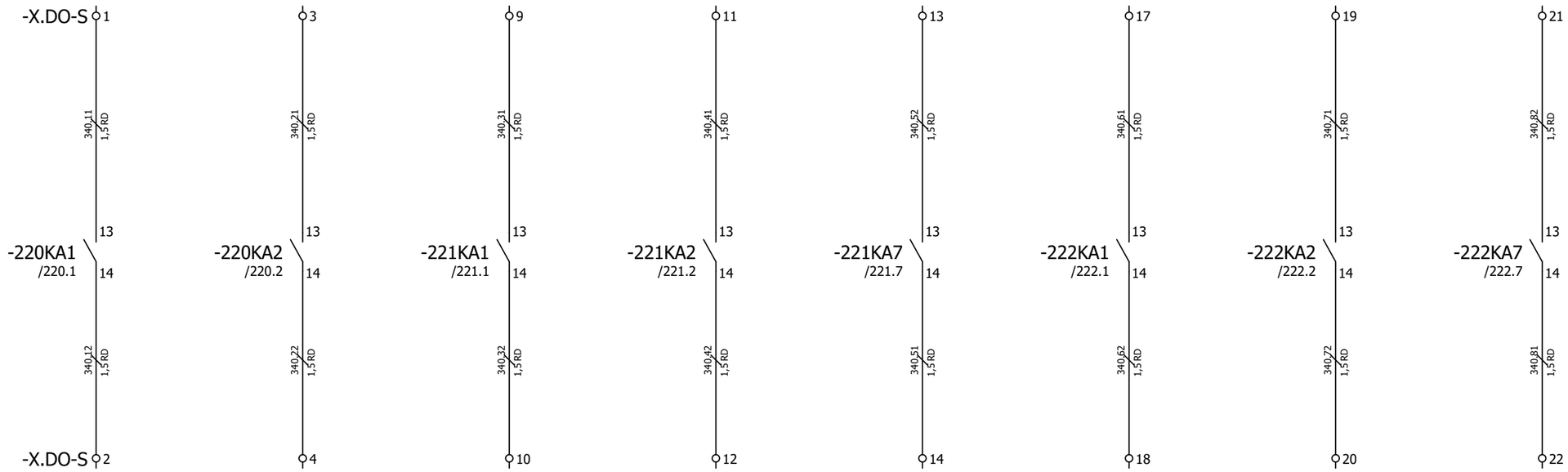
RECTIFIER 1
DC VOLTAGE

SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 331	Next: 340
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: BARRIER RELAYS		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

0	1	2	3	4	5	6	7	8	9

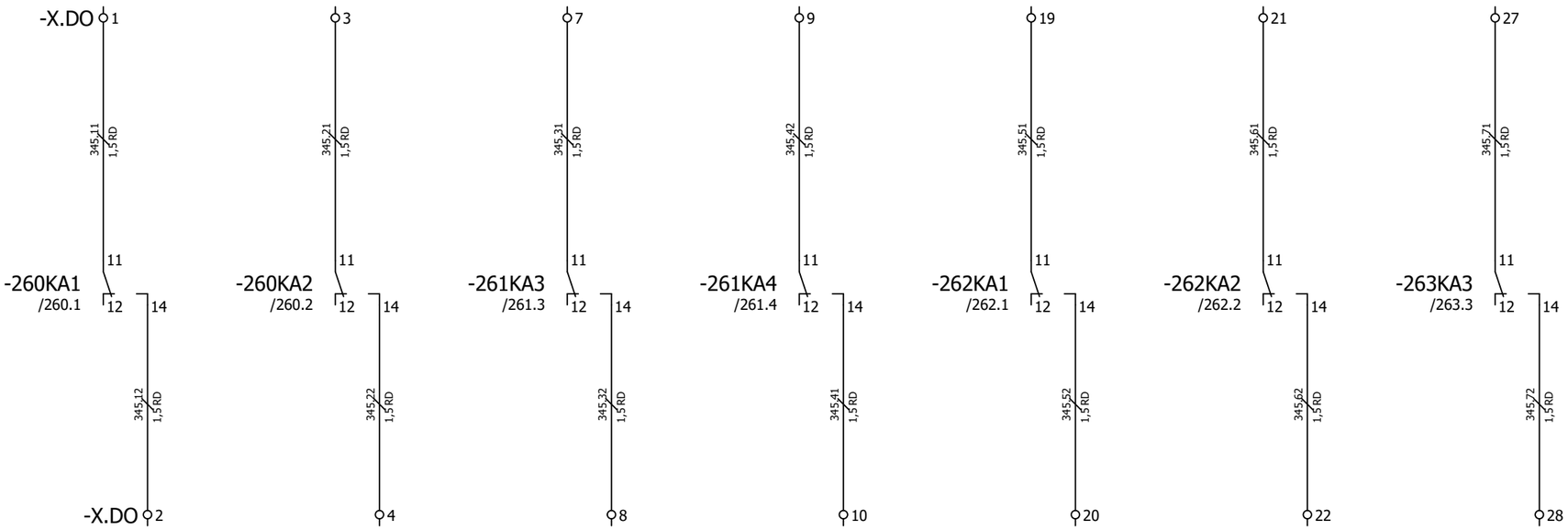
331.9 / L2+ → L2+ / 345.0



RECTIFIER XS-003A	PLANT F&G XA-001	RECTIFIER XS-004A	PLANT SIS XA-003				PLANT F&G XA-002		
RECTIFIER EMERGENCY STOP 1 CHANNEL 1	CONFIRMED GAS ALARM TO PLANT F&G	RECTIFIER EMERGENCY STOP 2 CHANNEL 1	ELECTROLYZER PLC FAILURE TO PLANT SIS	SPARE	SPARE		CONFIRMED SMOKE ALARM TO PLANT F&G	SPARE	

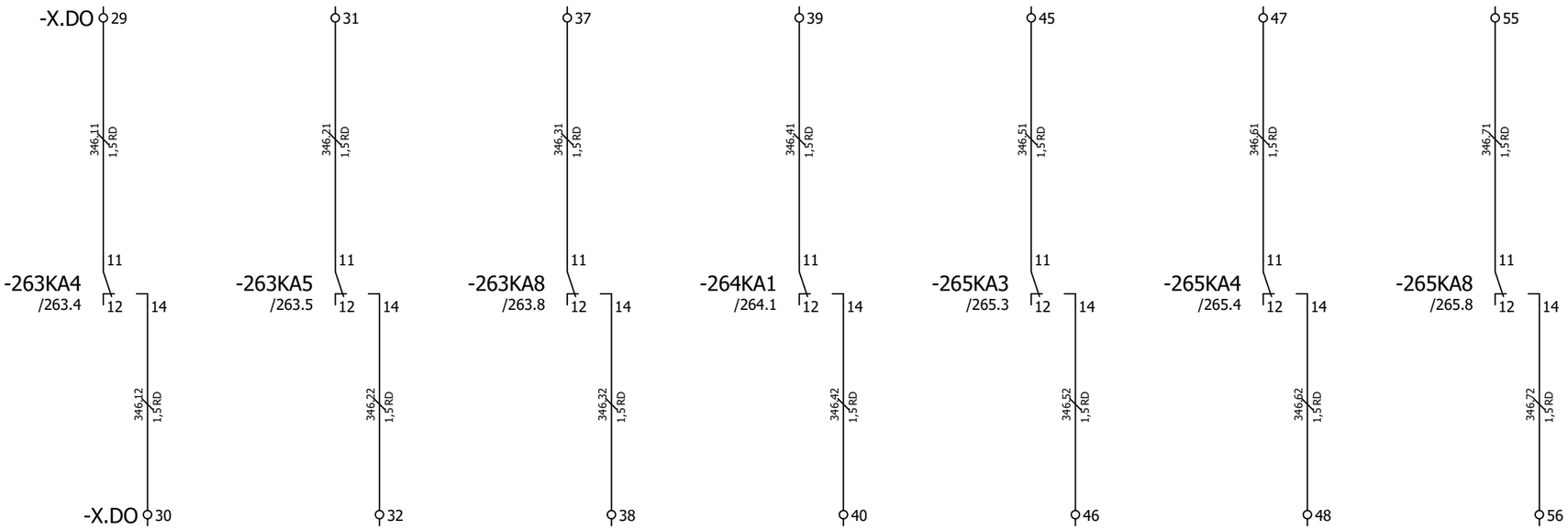
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 340	Next: 345
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: INTERFACE SIGNALS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

340.9 / L2+



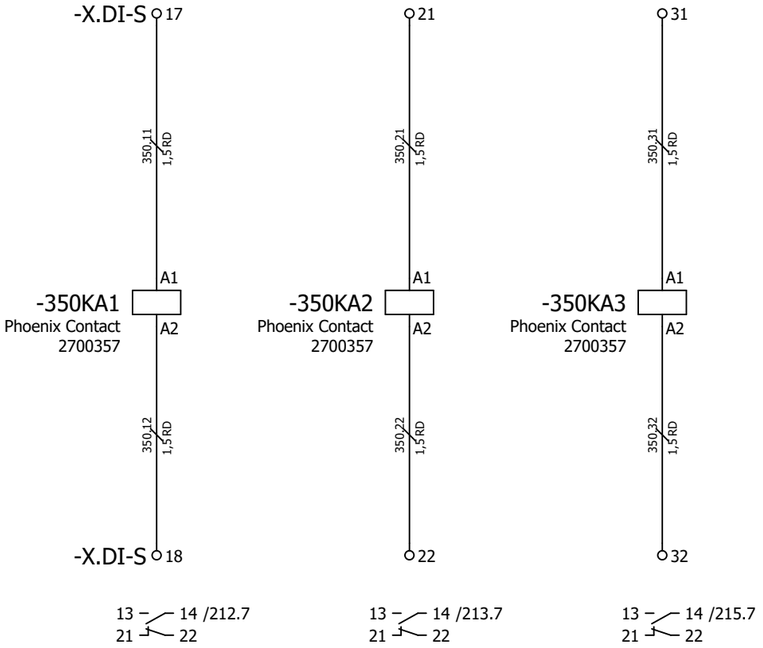
RECTIFIER YS-103 ELECTROLYZER 1 SYSTEM HEALTY	SPARE	SPARE	SPARE	RECTIFIER YS-104 ELECTROLYZER 2 SYSTEM HEALTY	RECTIFIER HS-101 RECTIFIER START/STOP COMMAND	SPARE		

345.9 / L2+ → L2+ / 360.0



SPARE SPARE SPARE SPARE SPARE SPARE SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 346	Next: 350
00	03					File: D240934SCH01		
01	04				Page description: INTERFACE SIGNALS		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



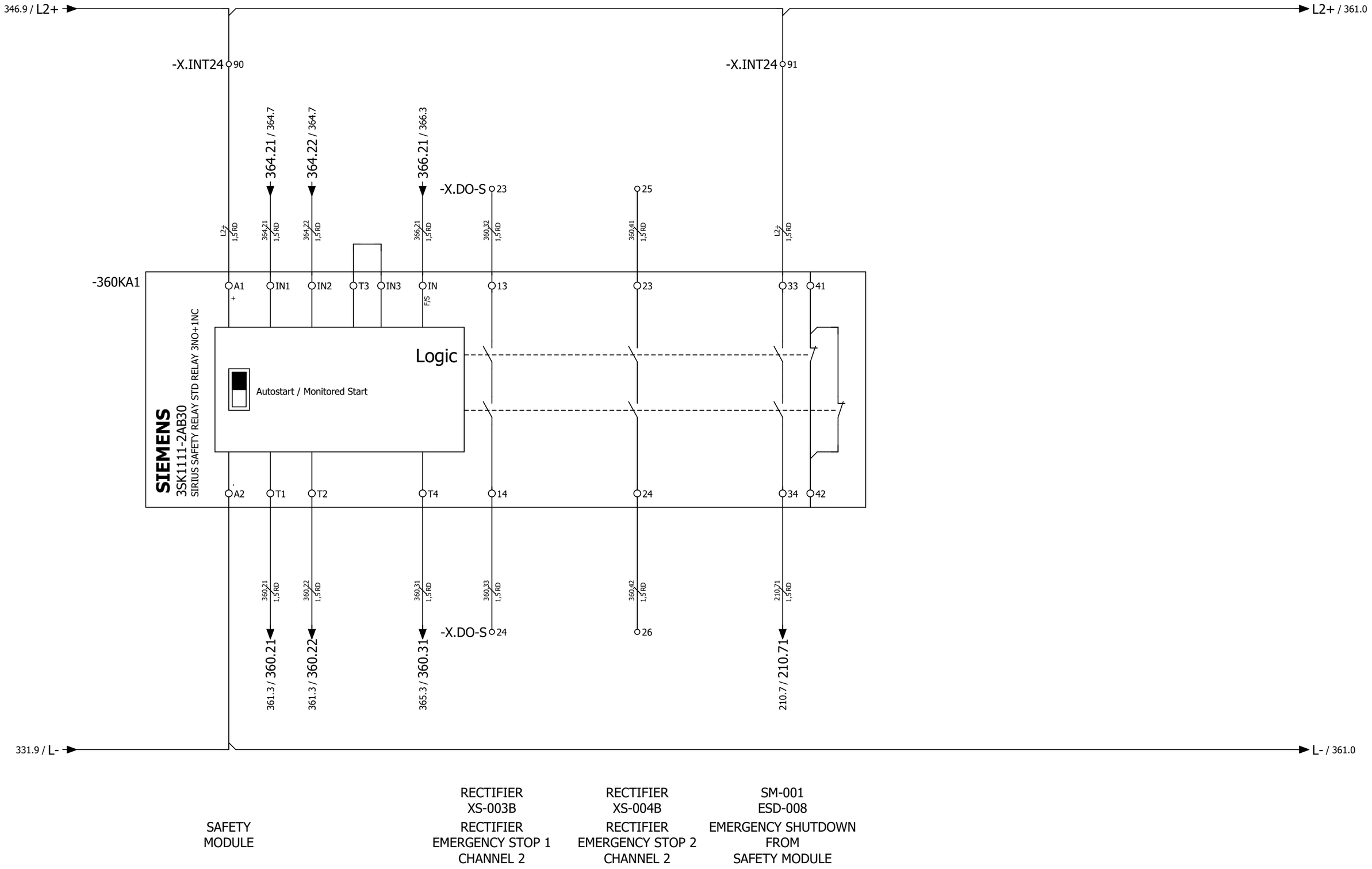
PLANT SIS
XS-001

SHUTDOWN COMMAND
FROM
PLANT SIS

SPARE

SPARE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 350	Next: 360
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: INTERFACE SIGNALS	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



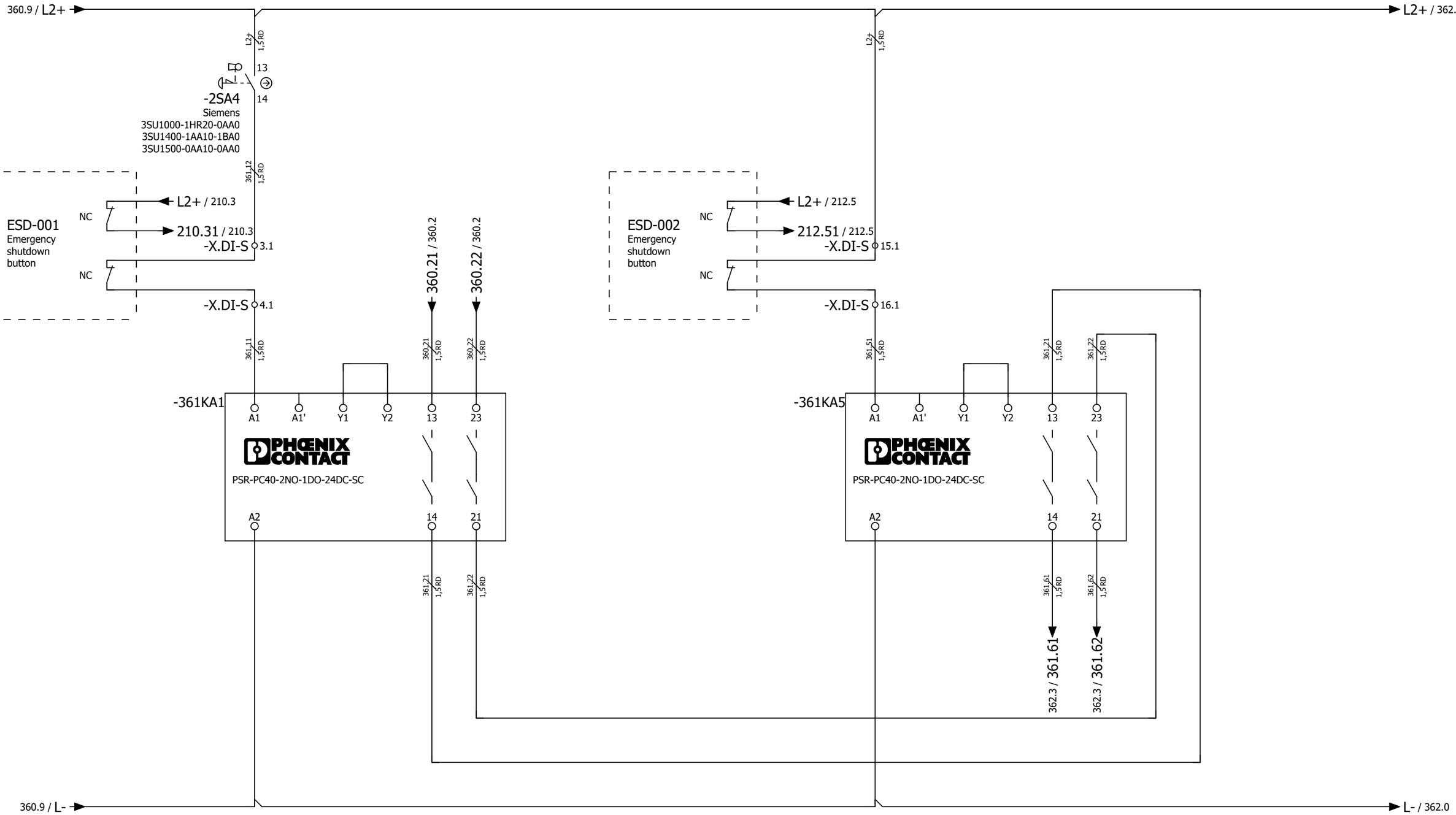
SAFETY MODULE

RECTIFIER XS-003B
RECTIFIER EMERGENCY STOP 1 CHANNEL 2

RECTIFIER XS-004B
RECTIFIER EMERGENCY STOP 2 CHANNEL 2

SM-001 ESD-008
EMERGENCY SHUTDOWN FROM SAFETY MODULE

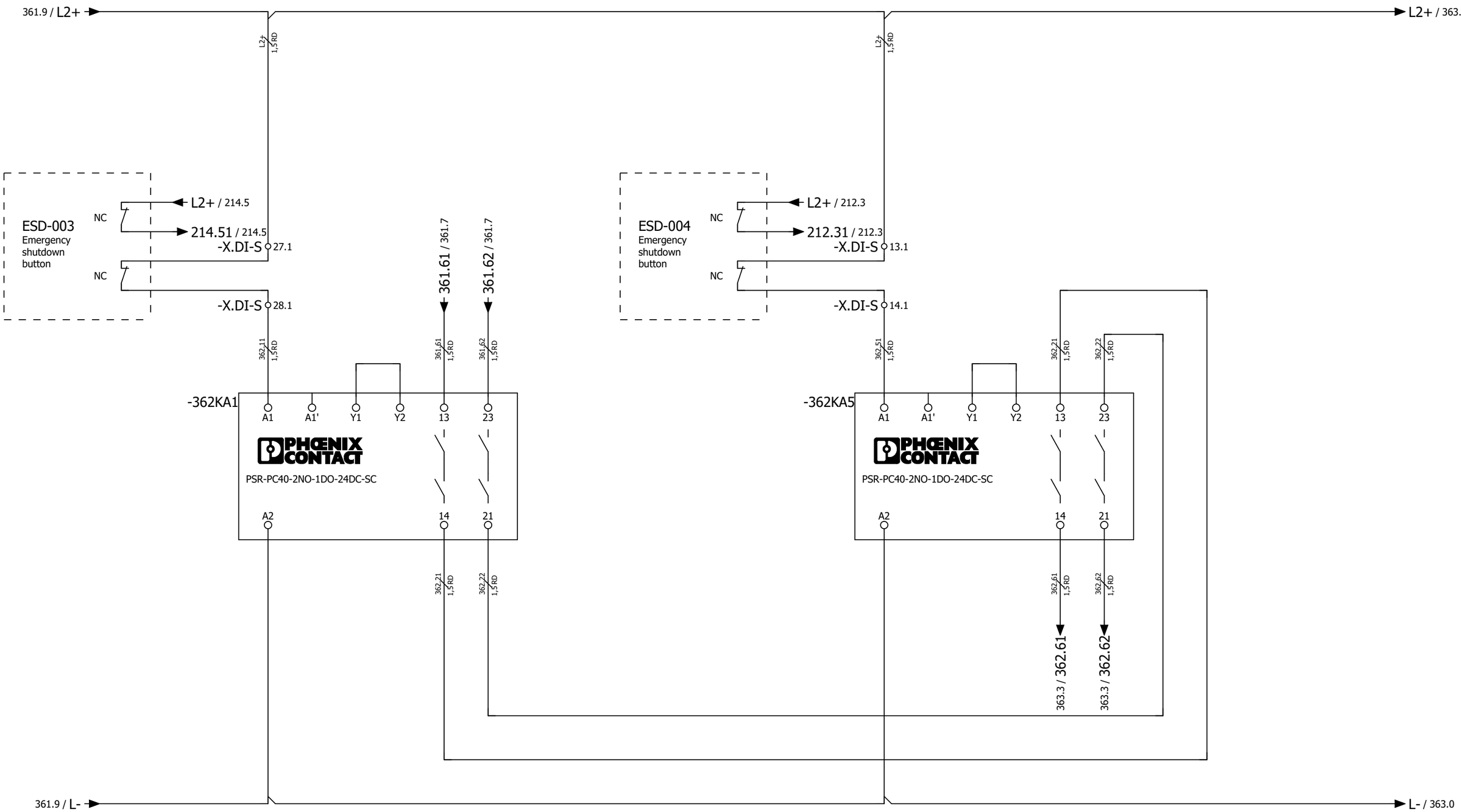
Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 360	Next: 361
00	03				Page description: EMERGENCY SIGNALS MANAGEMENT	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



ESD-001
ESD-001B
EMERGENCY
SHUTDOWN BUTTON
LEVEL 1

ESD-002
ESD-002B
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

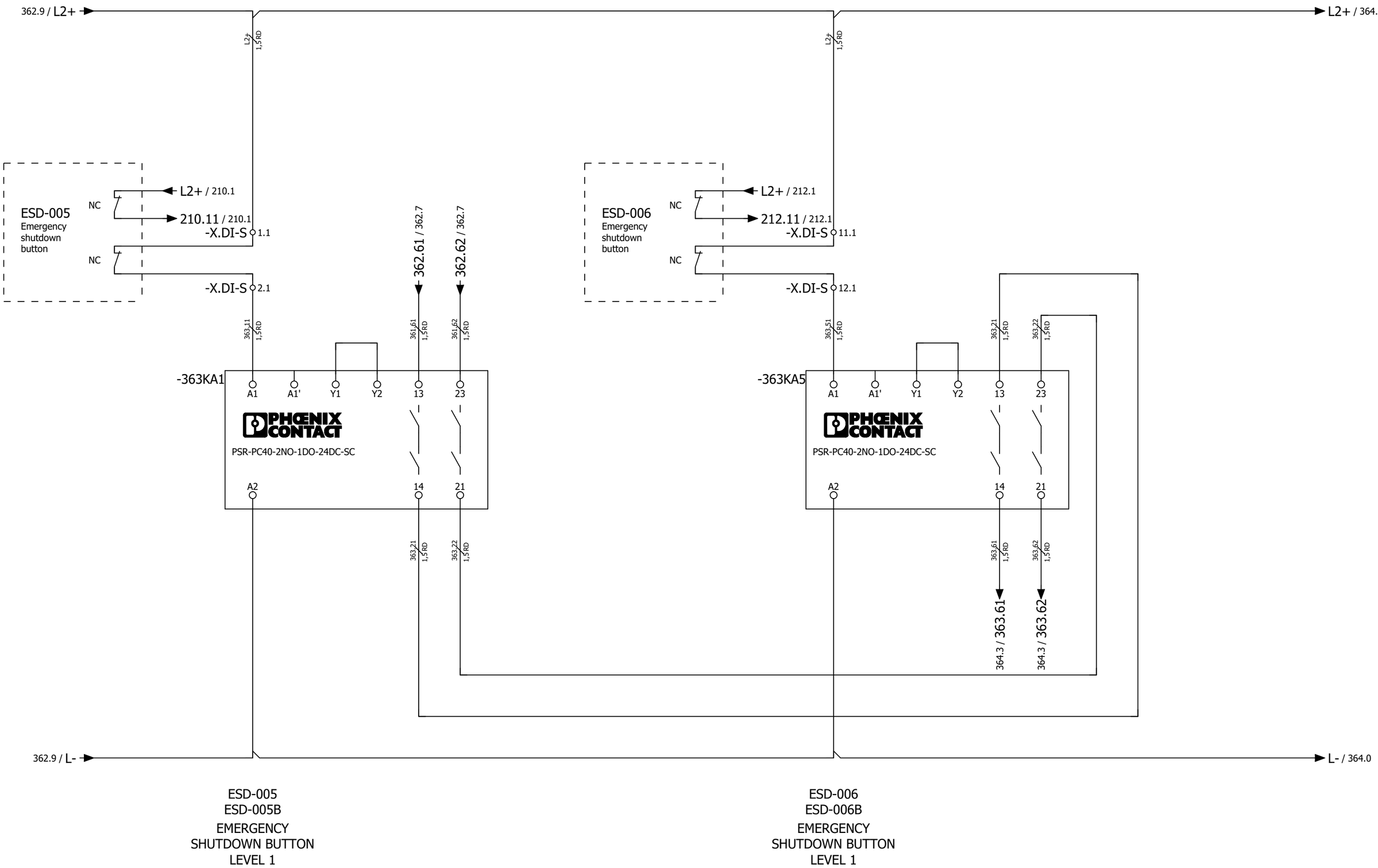
Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 361	Next: 362
00	03					File: D240934SCH01		
01	04				Page description: EMERGENCY SIGNALS MANAGEMENT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



ESD-003
ESD-003B
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

ESD-004
ESD-004B
EMERGENCY
SHUTDOWN BUTTON
LEVEL 0

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 362	Next: 363
00	03					File: D240934SCH01		
01	04				Page description: EMERGENCY SIGNALS MANAGEMENT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



ESD-005
ESD-005B
EMERGENCY
SHUTDOWN BUTTON
LEVEL 1

ESD-006
ESD-006B
EMERGENCY
SHUTDOWN BUTTON
LEVEL 1

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 363	Next: 364
00	03					File: D240934SCH01		
01	04				Page description: EMERGENCY SIGNALS MANAGEMENT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

363.9 / L2+

L2+ / 365.0

L2+ 1,5RD

ESD-007
Emergency
shutdown
button

NC

L2+ / 214.1

214.11 / 214.1

-X.DI-S 23.1

NC

-X.DI-S 24.1

363.61 / 363.7

363.62 / 363.7

364.11 1,5RD

363.61 1,5RD

363.62 1,5RD

-364KA1

A1 A1' Y1 Y2 13 23

PHOENIX CONTACT

PSR-PC40-2NO-1DO-24DC-SC

A2 14 21

364.12 1,5RD

364.13 1,5RD

1.21 / 1.2

1.21 1,5RD

364.12 1,5RD

364.13 1,5RD

-364KA5

A1 A1' Y1 Y2 13 23

PHOENIX CONTACT

PSR-PC40-2NO-1DO-24DC-SC

A2 14 21

364.21 1,5RD

364.22 1,5RD

360.2 / 364.21

360.2 / 364.22

363.9 / L-

L- / 365.0

ESD-007
ESD-007B

EMERGENCY
SHUTDOWN BUTTON
LEVEL 2

1U1

PHASE MONITORING
RELAY

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 364	Next: 365
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: EMERGENCY SIGNALS MANAGEMENT	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

364.9 / L2+

L2+ / 366.0

L2+ 1,5RD

-X.DI 47

-X.INT24 92

360.31 / 360.3

-X.DI 48

365_11 1,5RD

360_31 1,5RD

-365KA1

A1 13 22

PHOENIX CONTACT

PSR-PS20-1NO-1NC-24DC-SC

A2 14 21

237_31 1,5RD

365_21 1,5RD

237.3 / 237.31

365.7 / 365.21

RECTIFIER
XA-001R
EMERGENCY STOP
FEEDBACK 1

-X.DI 63

-X.INT24 93

365.21 / 365.3

-X.DI 64

366_11 1,5RD

365_21 1,5RD

-365KA5

A1 13 22

PHOENIX CONTACT

PSR-PS20-1NO-1NC-24DC-SC

A2 14 21

239_31 1,5RD

365_61 1,5RD

239.3 / 239.31

366.3 / 365.61

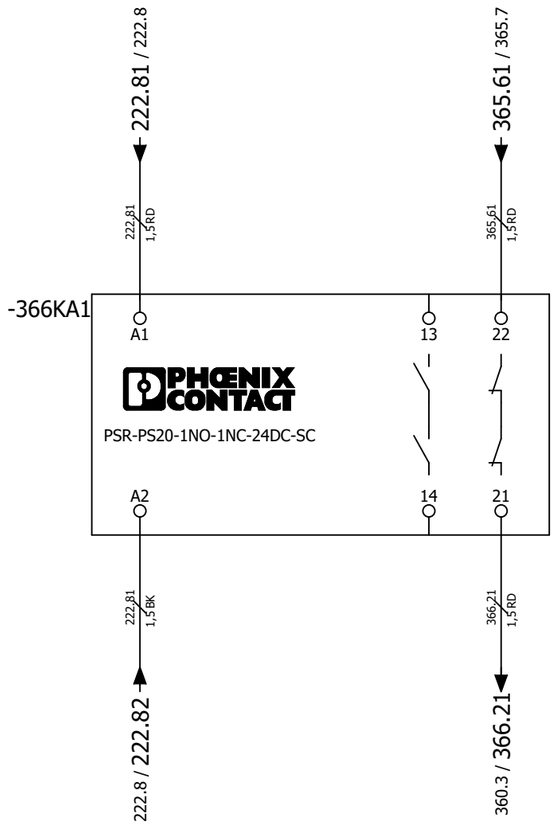
RECTIFIER
XA-002R
EMERGENCY STOP
FEEDBACK 2

364.9 / L-

L- / 366.0

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 365	Next: 366
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: EMERGENCY SIGNALS MANAGEMENT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

365.9 / L2+ → L2+ / 366



365.9 / L- → L- / 366

XS-101

SAFETY MODULE
RESET

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 366	Next: 400
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: EMERGENCY SIGNALS MANAGEMENT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

-400SW1

SIEMENS ARTICLE: SIE.6GK5108-2BD00-2AB2 TYPE: XB108-2 (SC)

FE1 L1 M1 FE2 L2 M2

P1 P2 P3 P4 P5 P6 P7 P8 P9_RxT P9_TxT P10_RxT P10_TxT

200.3 / ETH400_8

CPU

OPTICAL
FIBER
FROM FIELD

L3+ 1,5 RD
L- 1,5 BK
L3+ 1,5 RD
L- 1,5 BK

-X.INT2 L3+ L- L3+ L-

152.3 / L3+ → L3+ / 401.0

366 / L- → L- / 401.0

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569 File: D240934SCH01	Sheet: 400 / Next: 401
00	03				Page description: ETHERNET ARCHITECTURE	Scheme: D240934SCH01	Tot. Sheet: 156
01	04						
02							

-401SW1

SIEMENS ARTICLE: SIE.6GK5108-0BA00-2AC2 TYPE: XC108

FE1 L1 M1 FE2 L2 M2

P1 P2 P3 P4 P5 P6 P7 P8

200.4 / ETH200_2 → CPU

404.2 / ETH401_2 → eWon

201.2 / ETH401_3 → ET 200SP

/ ETH401_4 → PVI-980

/ ETH401_5 → RIO BOX 1

/ ETH401_6 → RIO BOX 2

402.8 / ETH401_7 → SWITCH 402SW1

403.8 / ETH401_8 → SWITCH 403SW1

FIELD

L3+ 1,5 RD

L- 1,5 BK

L3+ 1,5 RD

L- 1,5 BK

-X.INT2 L3+ L- L3+ L-

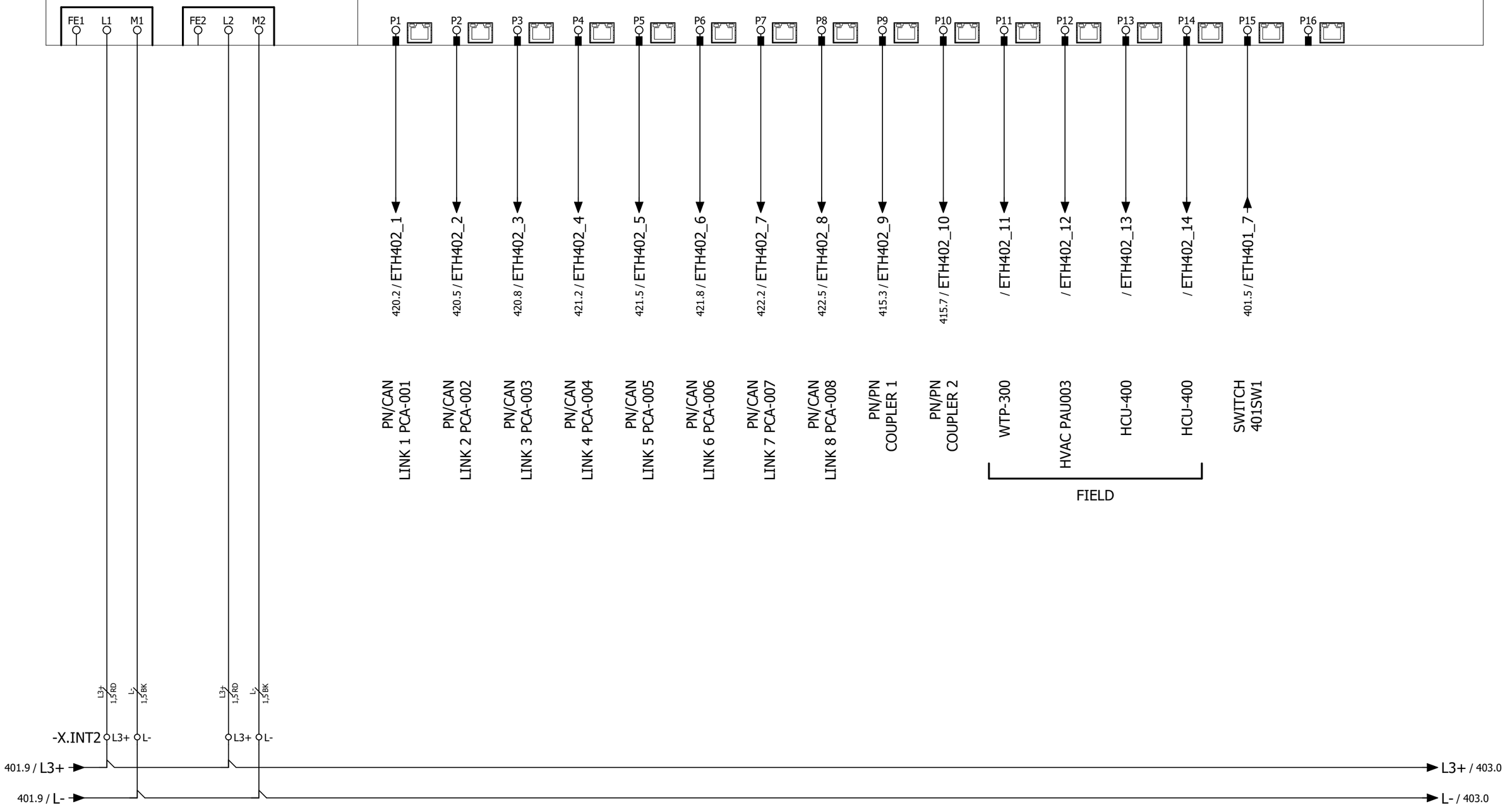
400.9 / L3+ → L3+ / 402.0

400.9 / L- → L- / 402.0

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 401	Next: 402
00	03					File: D240934SCH01		
01	04				Page description: ETHERNET ARCHITECTURE		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

-402SW1

SIEMENS ARTICLE: SIE.6GK5116-0BA00-2AB2 TYPE: XB116



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 402	Next: 403
00	03			FORES ENGENEERING	Page description: ETHERNET ARCHITECTURE	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

-403SW1

SIEMENS ARTICLE: SIE.6GK5116-0BA00-2AB2 TYPE: XB116

FE1 L1 M1 FE2 L2 M2

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16

410.2 / ETH403_1 HMI

104.7 / ETH403_2 G120X LP-300A

105.7 / ETH403_3 G120X LP-300B

106.7 / ETH403_4 G120X CP-620A

107.7 / ETH403_5 G120X CP-620B

108.7 / ETH403_6 G120X CP-600A

109.7 / ETH403_7 G120X CP-600B

5.6 / ETH403_8 PAC2200 MAIN LINE

120.9 / ETH403_9 PAC2200 AUXILIARY EQUIPMENT

ETH403_13 RJ45 -403U7 LOV LPCD06 RJ45 PORT FRONT CABINET

FIELD PNEUMATIC VALVES ISLAND

401.5 / ETH401_8 SWITCH 401SW1

L3+ 1,5 RD L- 1,5 BK L3+ 1,5 RD L- 1,5 BK

-X.INT2 L3+ L- L3+ L-

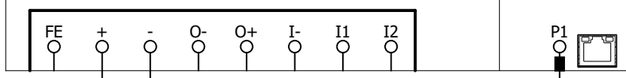
402.9 / L3+ → L3+ / 404.0

402.9 / L- → L- / 404.0

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 403	Next: 404
00	03				Page description: ETHERNET ARCHITECTURE	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

-404SW1

Ewon ARTICLE: EWON.FLEXY2020_00MA TYPE: FLEXY 202



401.3 / ETH401_2 →

eWon

L3+ 1,5 RD

L- 1,5 BK

-X.INT2 L3+ L-

403.9 / L3+ →

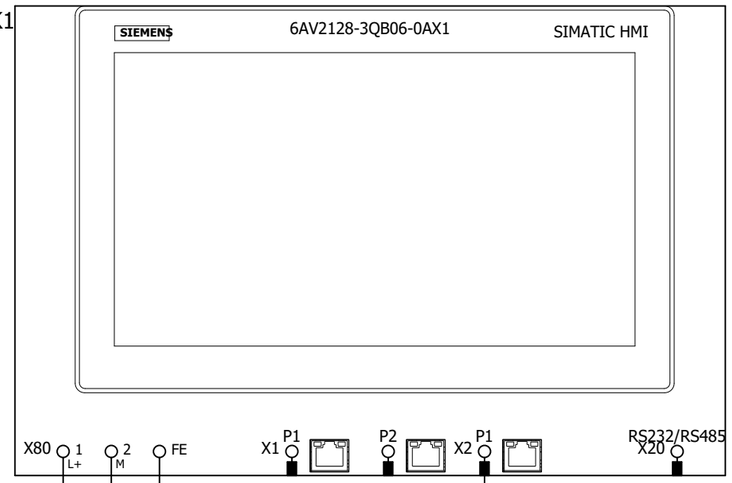
403.9 / L- →

→ L3+ / 410.0

→ L- / 410.0

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 404	Next: 410
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: ETHERNET ARCHITECTURE		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

-410K1



403.2 / ETH403_1

-X.INT2 L3+ L-

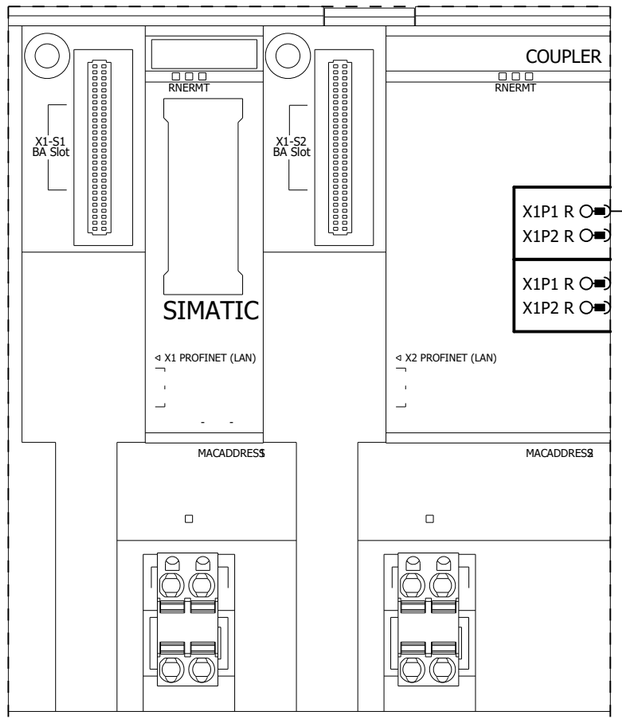
404.9 / L3+ → L3+ / 415.0

404.9 / L- → L- / 415.0

HMI

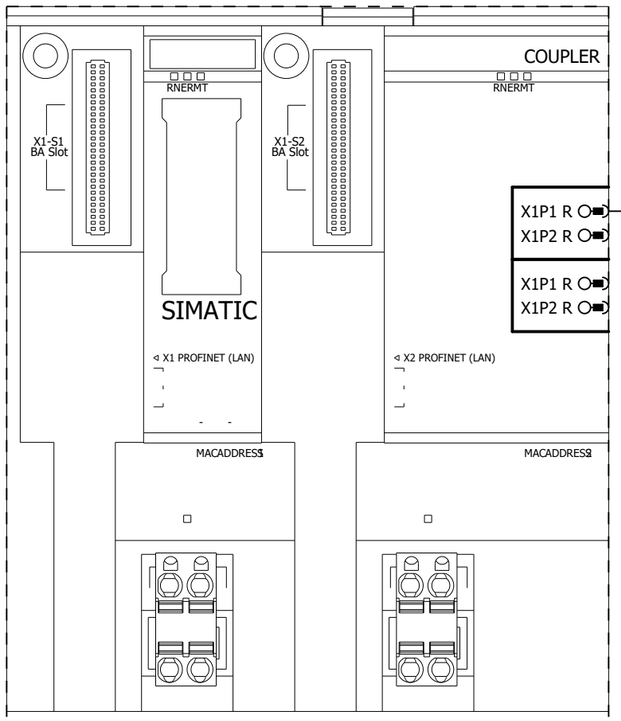
Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 410	Next: 415
00	03				Page description: HMI	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

-415K1



ETH402_9 / 402.5

-415K5



ETH402_10 / 402.6

L3+ 1,5RD
L- 1,5BK

-X.INT2 L3+ L-

410.9 / L3+

410.9 / L-

L3+ / 420.0

L- / 420.0

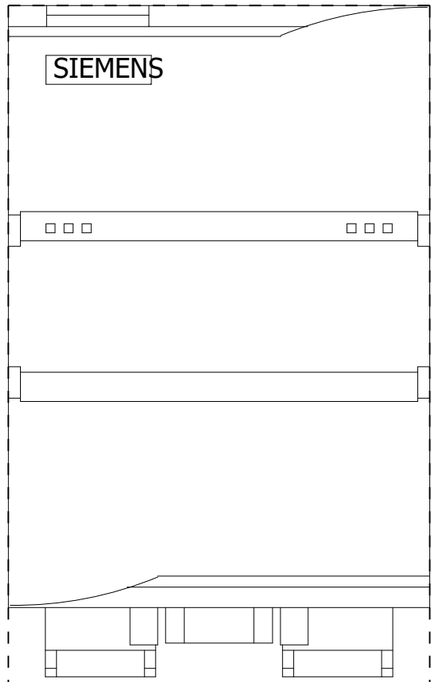
PN/PN
COUPLER 1

PN/PN
COUPLER 2

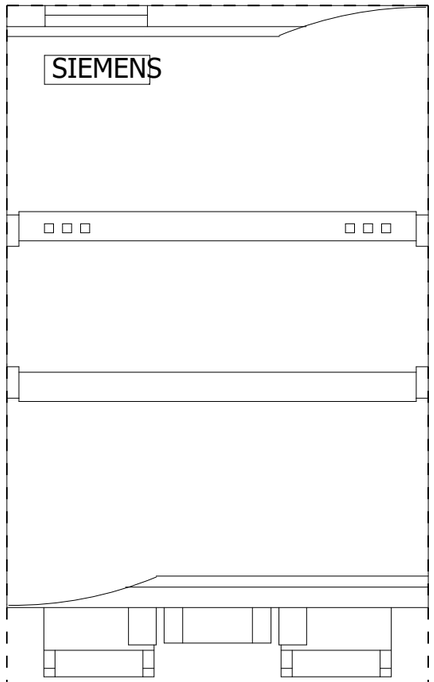
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 415	Next: 420
00	03			FORES ENGENEERING	Page description: PN/PN COUPLERS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

0	1	2	3	4	5	6	7	8	9

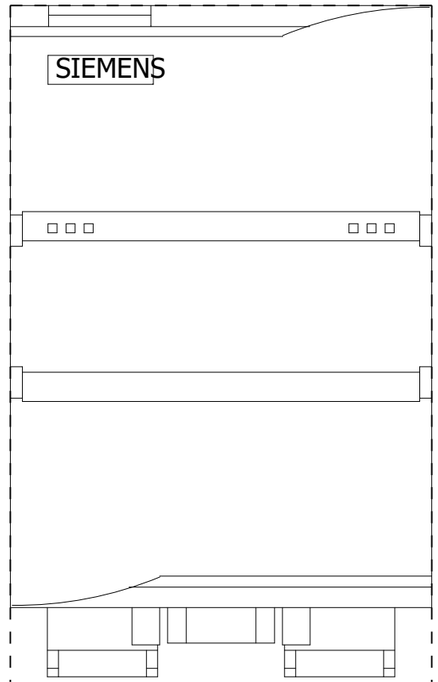
-420K1
6BK1620-0AA00-0AA0

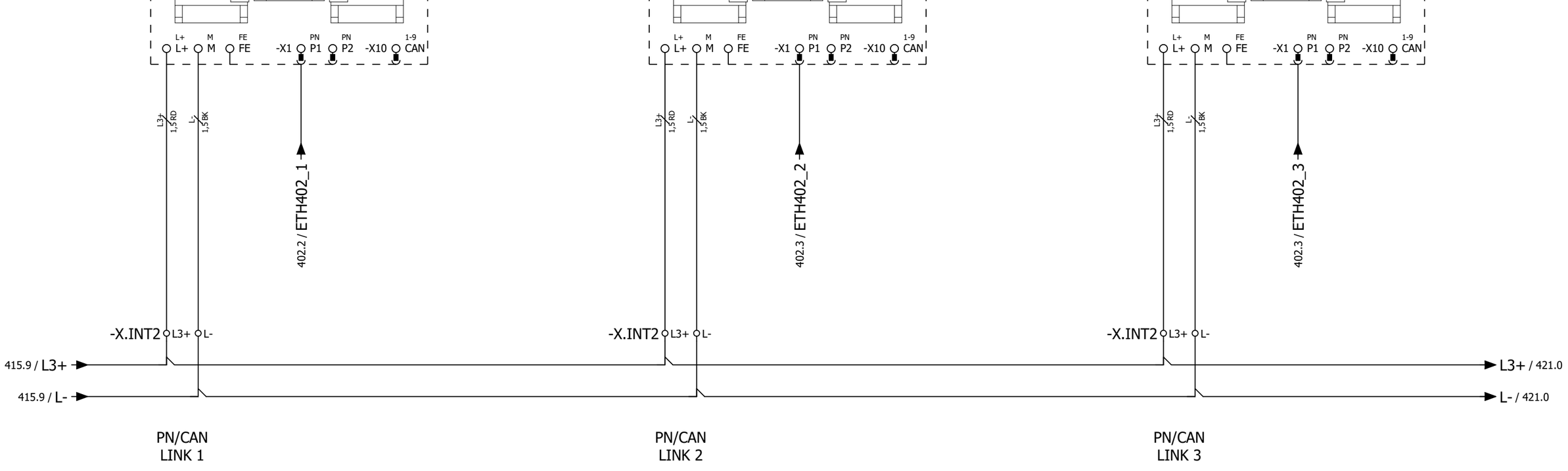


-420K4
6BK1620-0AA00-0AA0



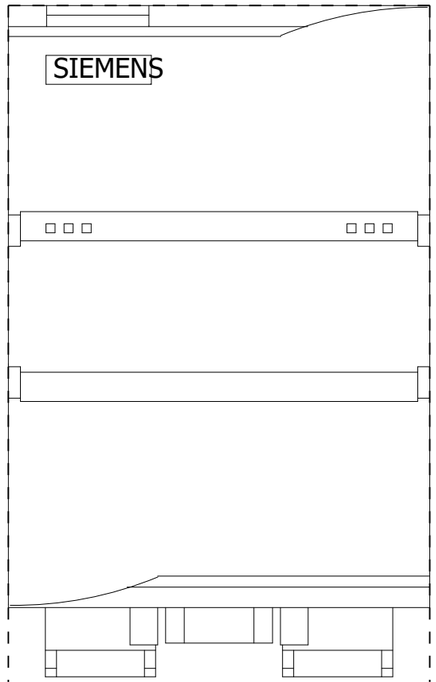
-420K7
6BK1620-0AA00-0AA0





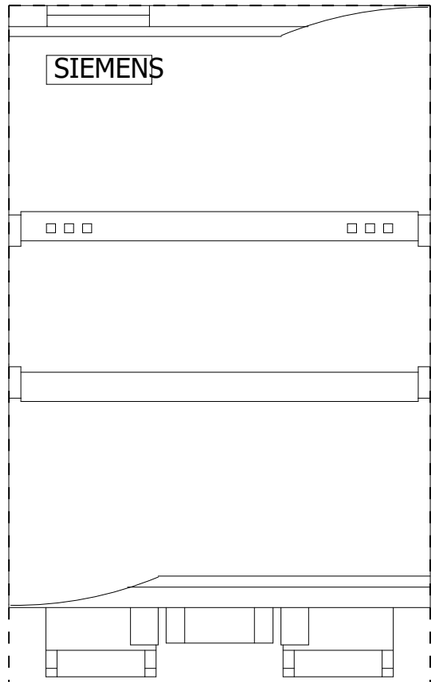
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 420	Next: 421
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: PN/CAN LINK	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								

-421K1
6BK1620-0AA00-0AA0



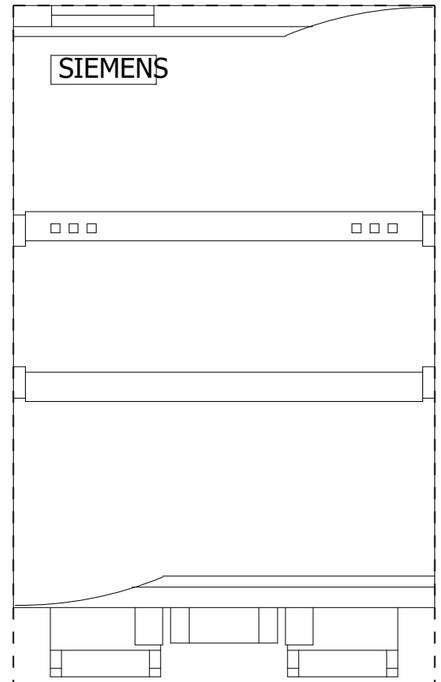
PN/CAN
LINK 4

-421K4
6BK1620-0AA00-0AA0



PN/CAN
LINK 5

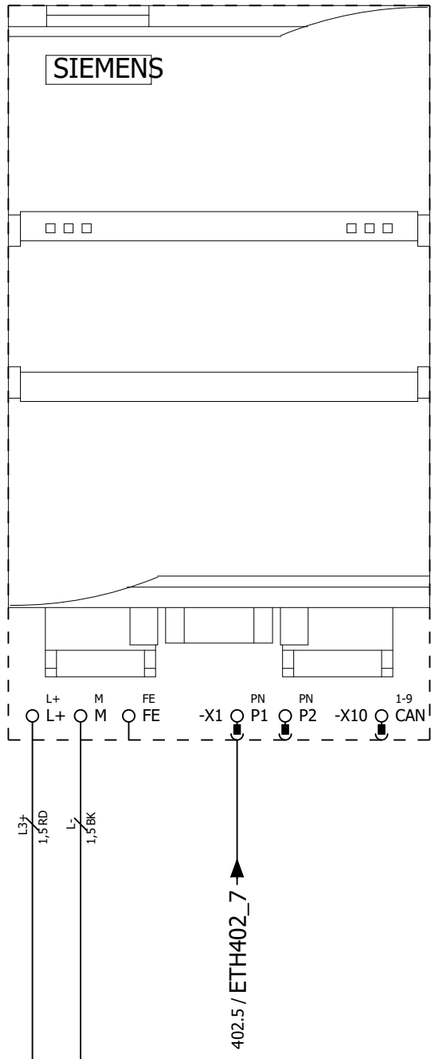
-421K7
6BK1620-0AA00-0AA0



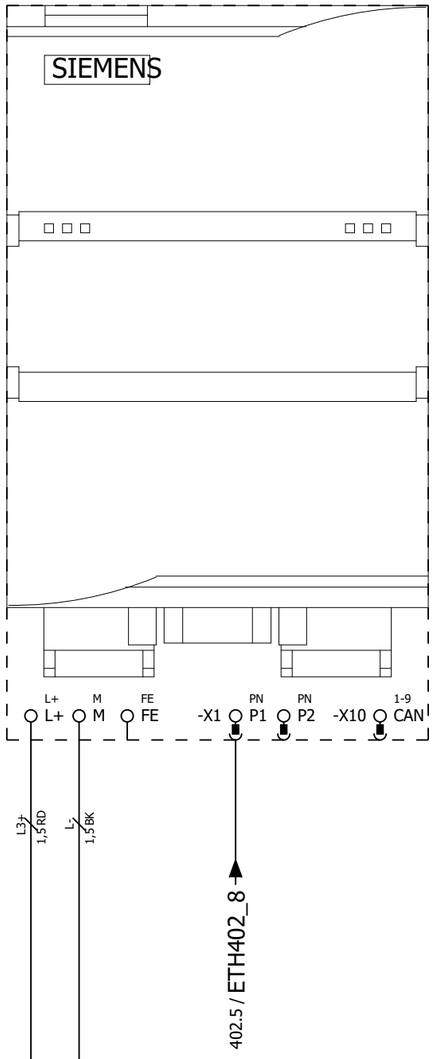
PN/CAN
LINK 6

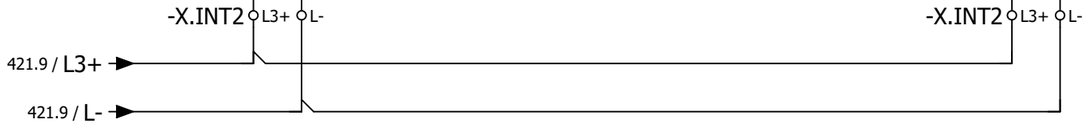
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 421	Next: 422
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: PN/CAN LINK		Tot. Sheet: 156	
02						Scheme: D240934SCH01		

-422K1
6BK1620-0AA00-0AA0



-422K4
6BK1620-0AA00-0AA0

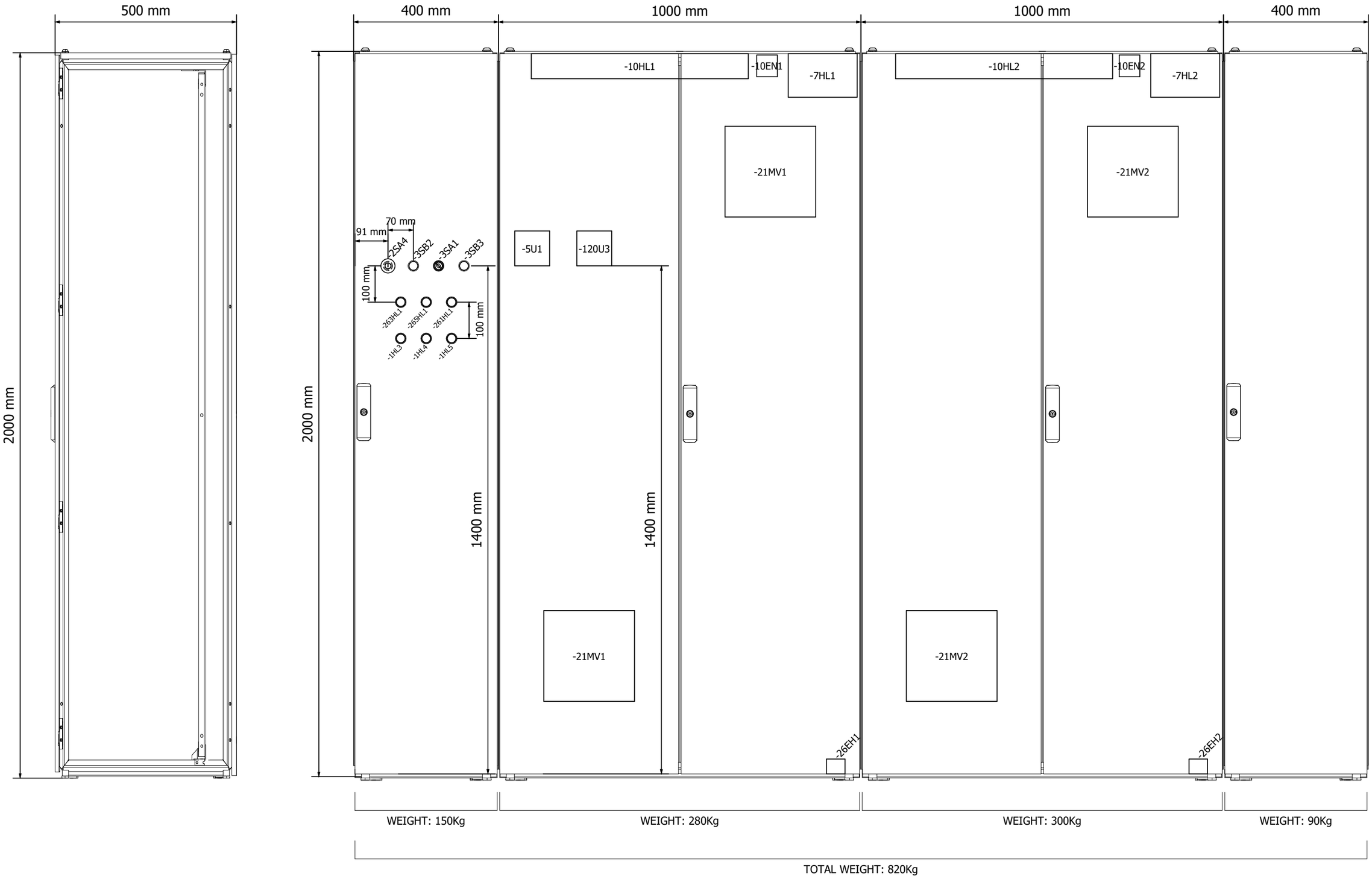




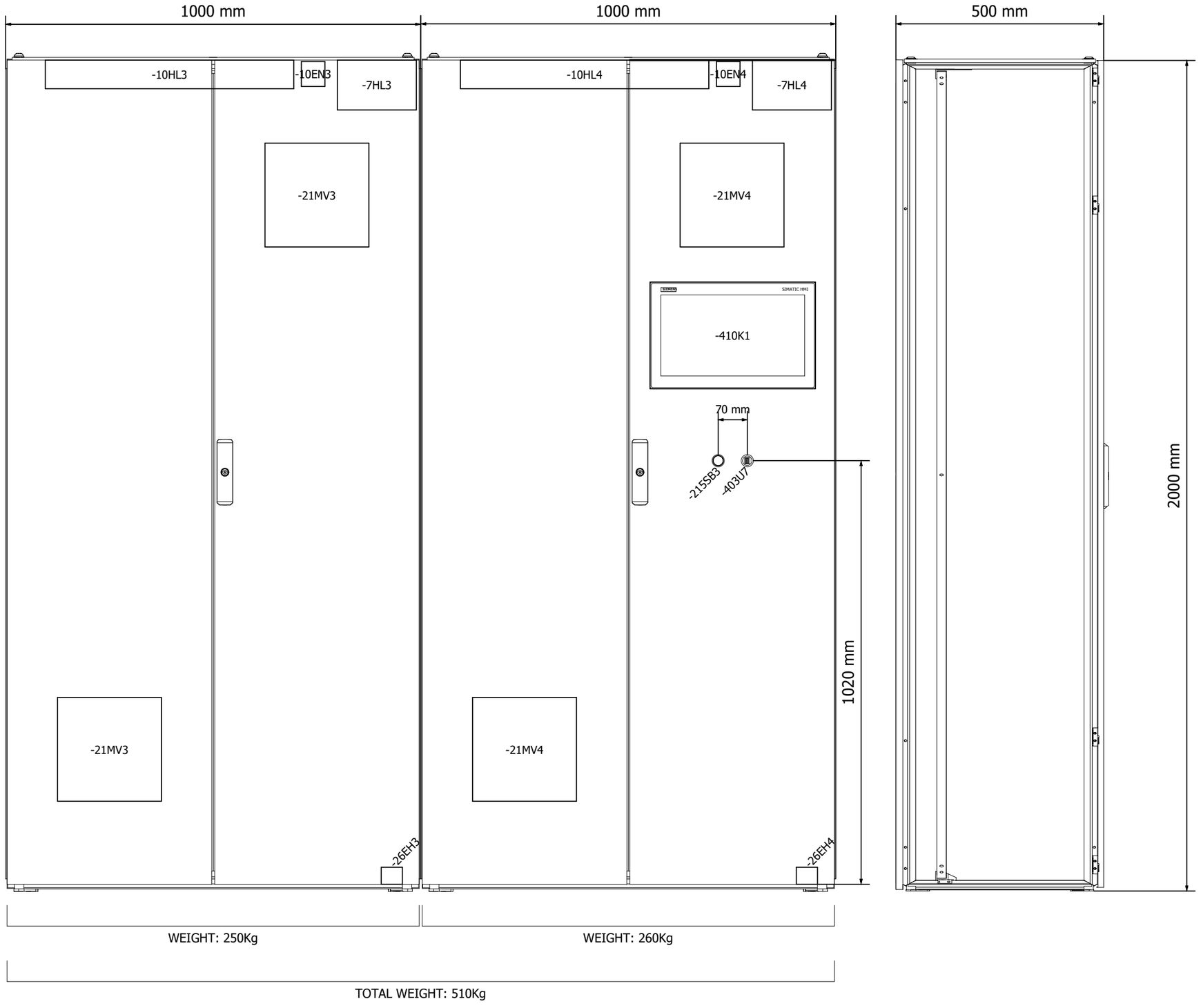
PN/CAN
LINK 7

PN/CAN
LINK 8

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 422	Next: 500
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: PN/CAN LINK	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

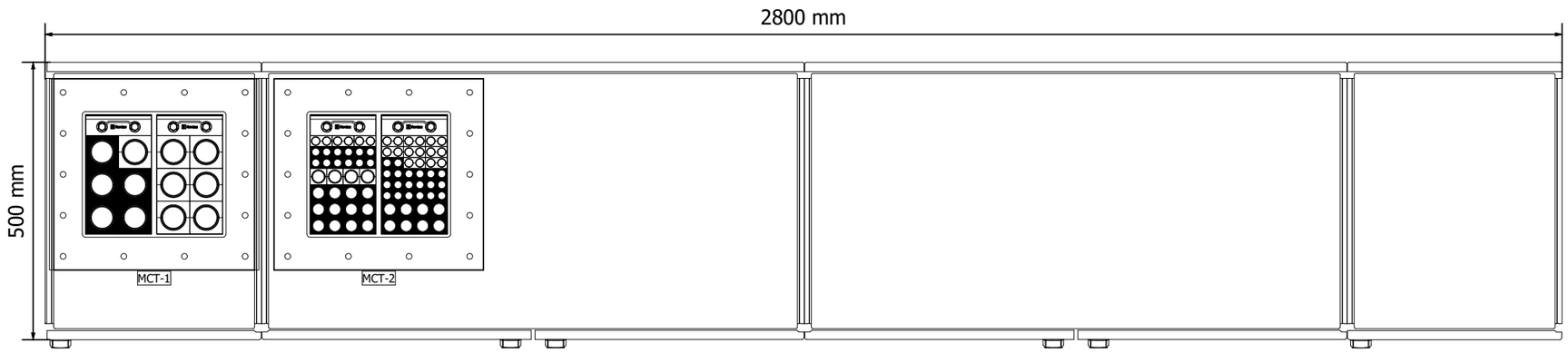


Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 500	Next: 501
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: MAIN CABINET EXTERNAL LAYOUT		Tot. Sheet: 156	
02						Scheme: D240934SCH01		



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 501	Next: 502
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: MAIN CABINET EXTERNAL LAYOUT	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

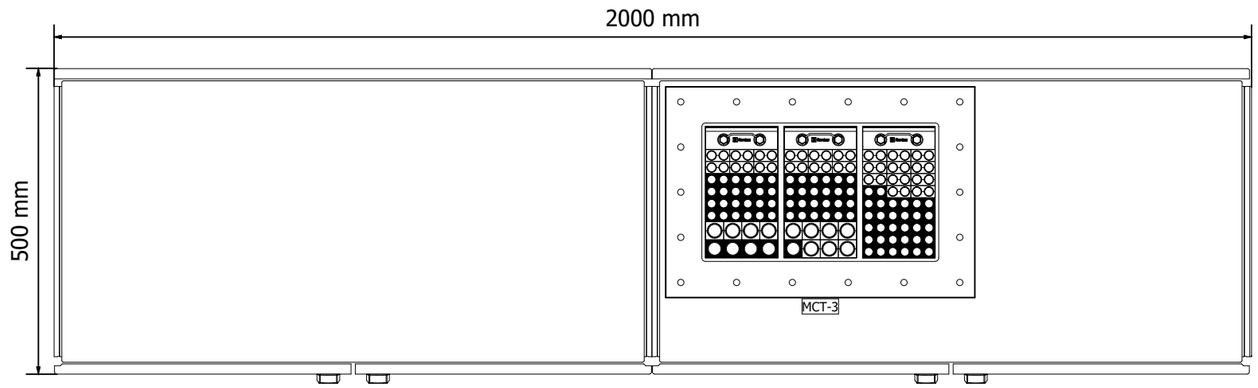
BACK



FRONT

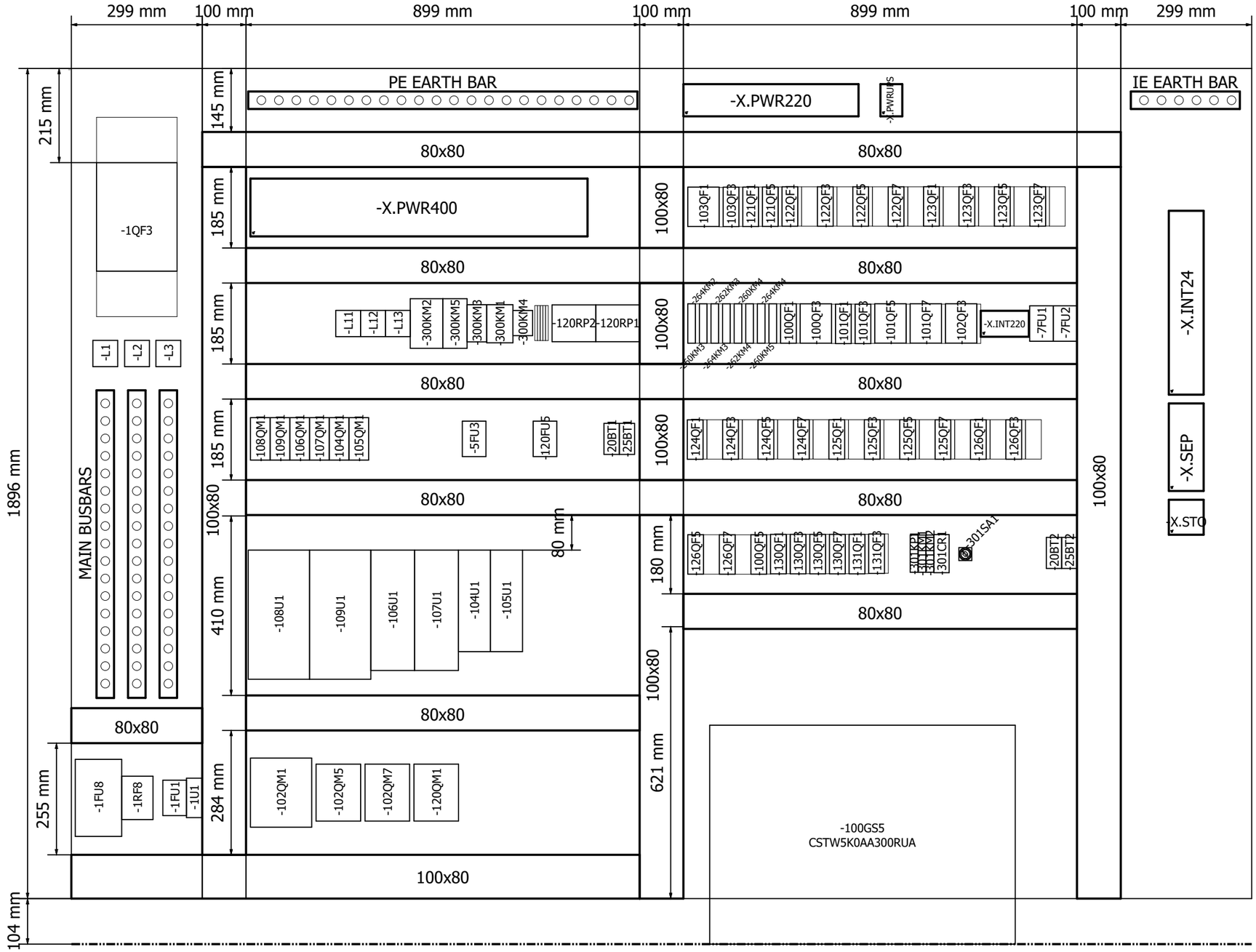
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 502	Next: 503
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: MAIN CABINET EXTERNAL LAYOUT	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

BACK

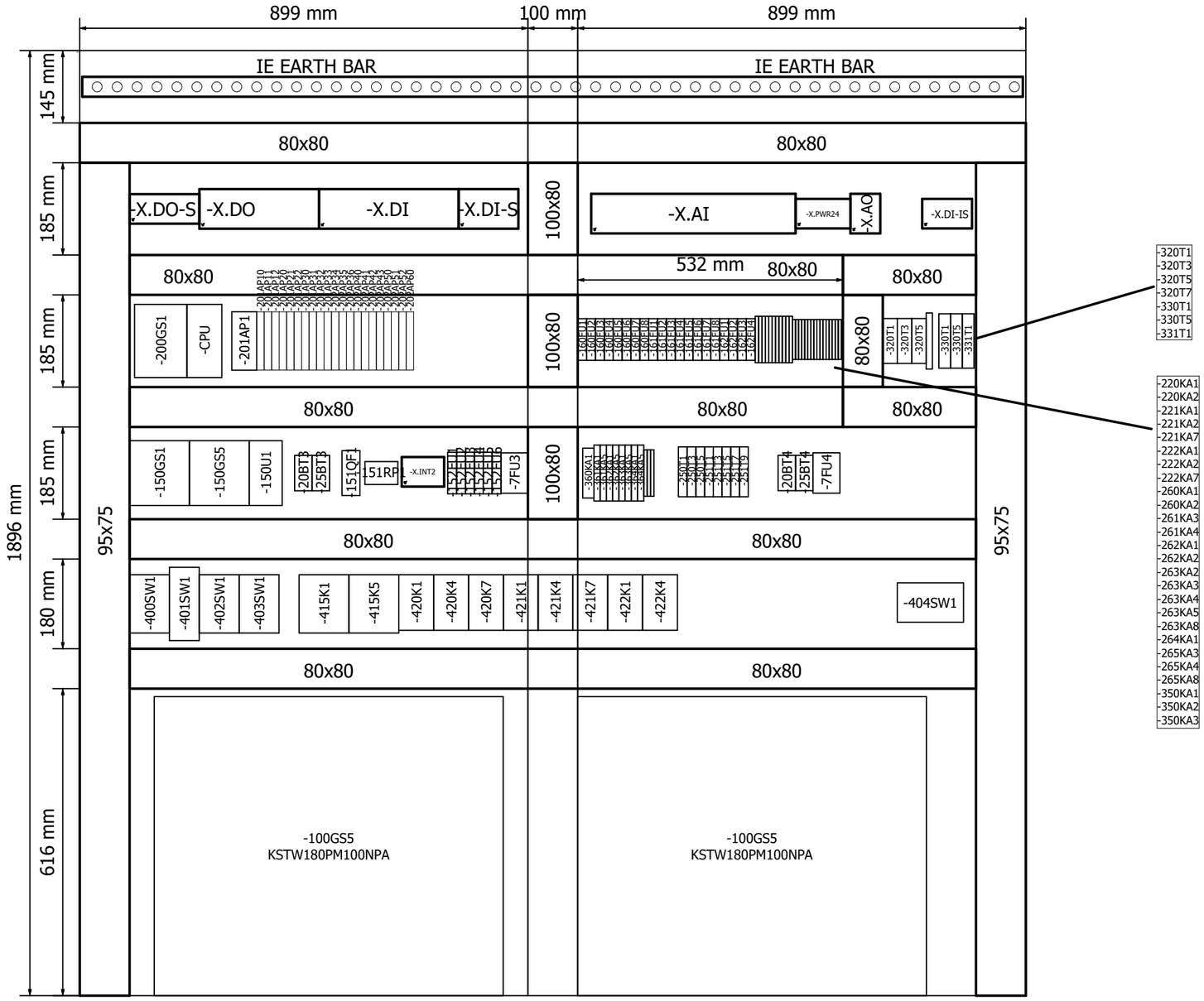


FRONT

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 503	Next: 505
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: MAIN CABINET EXTERNAL LAYOUT	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 505	Next: 506
00	03			FORES ENGENEERING	Page description: MAIN CABINET INTERNAL LAYOUT	File: D240934SCH01	Tot. Sheet: 156	
01	04					Scheme: D240934SCH01		
02								



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 506	Next: +SUMMARY/600
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: MAIN CABINET INTERNAL LAYOUT			
02						Scheme: D240934SCH01	Tot. Sheet: 156	

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.AI

ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
PURE WATER OUT WTP TO SERVICES					1	,	-202AP40	-X10:1			/250.1
=					2		-202AP40	-X10:9			/250.1
=					3	,	-202AP40	-X10:2			/250.2
=					4		-202AP40	-X10:10			/250.2
=					5	,	-202AP40	-X10:3			/250.3
=					6		-202AP40	-X10:11			/250.3
SPARE					7	,	-202AP40	-X10:4			/250.4
=					8		-202AP40	-X10:12			/250.4
MOTORIZED PROPORTIONAL VALVE POSITION					9	,	-202AP40	-X10:5			/250.5
=					10		-202AP40	-X10:13			/250.5
VOLTAGE OUTPUT STACK 001					11	,	-250T1	10			/250.6
=					12		-250T1	12			/250.6
VOLTAGE OUTPUT STACK 002					13	,	-250T3	10			/250.7
=					14		-250T3	12			/250.7
VOLTAGE OUTPUT STACK 003					15	,	-250T5	10			/250.8
=					16		-250T5	12			/250.8
VOLTAGE OUTPUT STACK 004					17	,	-251T1	10			/251.1
=					18		-251T1	12			/251.1
VOLTAGE OUTPUT STACK 005					19	,	-251T3	10			/251.2
=					20		-251T3	12			/251.2
					21	,	-330T1	44+			/330.1
RECTIFIER 1 OUTPUT CURRENT					22	,	-330T1	43-			/330.2
VOLTAGE OUTPUT STACK 006					23	,	-251T5	10			/251.4
=					24		-251T5	12			/251.4
VOLTAGE OUTPUT STACK 007					25	,	-251T7	10			/251.5
=					26		-251T7	12			/251.5
VOLTAGE OUTPUT STACK 008					27	,	-251T9	10			/251.6
=					28		-251T9	12			/251.6
SPARE					29	,	-202AP41	-X10:7			/251.7
=					30		-202AP41	-X10:15			/251.7
=					31	,	-202AP41	-X10:8			/251.8
=					32		-202AP41	-X10:16			/251.8
=					33	,	-202AP42	-X10:1			/252.1
=					34		-202AP42	-X10:9			/252.1
=					35	,	-202AP42	-X10:2			/252.2

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.AI

ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					36		-202AP42	-X10:10			/252.2
RECTIFIER 2 OUTPUT CURRENT					37	,	-330T1	54+			/330.3
=					38	,	-330T1	53-			/330.3
=					39	,	-330T5	44+			/330.5
RECTIFIER 1 DC VOLTAGE					40	,	-330T5	43-			/330.5
SPARE					41	,	-202AP42	-X10:5			/252.5
=					42		-202AP42	-X10:13			/252.5
=					43	,	-202AP42	-X10:6			/252.6
=					44		-202AP42	-X10:14			/252.6
=					45	,	-202AP42	-X10:7			/252.7
=					46		-202AP42	-X10:15			/252.7
=					47	,	-202AP42	-X10:8			/252.8
=					48		-202AP42	-X10:16			/252.8
=					49	,	-202AP43	-X10:1			/253.1
=					50		-202AP43	-X10:9			/253.1
=					51	,	-202AP43	-X10:2			/253.2
=					52		-202AP43	-X10:10			/253.2
=					53	,	-202AP43	-X10:3			/253.3
=					54		-202AP43	-X10:11			/253.3
					55	,	-331T1	44+			/331.1
RECTIFIER 1 DC VOLTAGE					56	,	-331T1	43-			/331.2
SPARE					57	,	-202AP43	-X10:5			/253.5
=					58		-202AP43	-X10:13			/253.5
=					59	,	-202AP43	-X10:6			/253.6
=					60		-202AP43	-X10:14			/253.6
=					61	,	-202AP43	-X10:7			/253.7
=					62		-202AP43	-X10:15			/253.7

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00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH01		
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02								

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.AO

ANALOGIC OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
					1		-202AP60	1			/270.1
					2	,	-202AP60	5			/270.1
MOTORIZED PROPORTIONAL VALVE FEEDBACK					3		-202AP60	2			/270.3
=					4	,	-202AP60	6			/270.3
SPARE					5		-202AP60	3			/270.5
=					6	,	-202AP60	7			/270.5
=					7		-202AP60	4			/270.7
=					8	,	-202AP60	8			/270.7

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 601	Next: 602
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: TERMINAL BOARDS			Tot. Sheet: 156
02						Scheme: D240934SCH01		

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					1		-X.INT24	29			/230.1
=					2		-201AP30	1			/230.1
=					3		-X.INT24	30			/230.2
=					4		-201AP30	2			/230.2
RIO 1 - 24VDC CONVERTER - POWER SUPPLY STATUS					5		-X.INT24	37			/231.4
=					6		-201AP30	12			/231.4
SPARE					7						/231.5
=					8		-201AP30	13			/231.5
FLOW SWITCH					9						/231.6
=					10		-201AP30	14			/231.6
RIO 2 - 24VDC CONVERTER - POWER SUPPLY STATUS					11						/231.7
=					12		-201AP30	15			/231.7
SPARE					13						/231.8
=					14		-201AP30	16			/231.8
=					15						/232.1
=					16		-201AP31	1			/232.1
=					17		-X.INT24	38			/232.2
=					18		-201AP31	2			/232.2
=					19		-X.INT24	46			/233.4
=					20		-201AP31	12			/233.4
=					21						/233.5
=					22		-201AP31	13			/233.5
DOOR SWITCH OPEN/CLOSE					23						/233.6
=					24		-201AP31	14			/233.6
=					25						/233.7
=					26		-201AP31	15			/233.7
=					27						/233.8
=					28		-201AP31	16			/233.8
=					29						/234.1
=					30		-201AP32	1			/234.1
SPARE					31		-X.INT24	47			/234.3
=					32		-201AP32	3			/234.3
=					33		-X.INT24	52			/235.2
							-X.INT24	53			
SPARE					34		-201AP32	10			/235.2

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
RECTIFIER 2 FAULT					35		-X.INT24	53			/235.4
=					36		-201AP32	12			/235.4
SPARE					37						/235.5
=					38		-201AP32	13			/235.5
=					39						/235.6
=					40		-201AP32	14			/235.6
=					41						/235.7
=					42		-201AP32	15			/235.7
=					43						/235.8
=					44		-201AP32	16			/235.8
=					45		-X.INT24	54			/236.1
=					46		-201AP33	1			/236.1
EMERGENCY STOP FEEDBACK 1					48		-365KA1	X1			/365.1
RECTIFIER 2 IN OPERATION					49		-X.INT24	61			/237.4
=					50		-201AP33	12			/237.4
SPARE					51						/237.5
=					52		-201AP33	13			/237.5
=					52		-202AP35	10			/241.2
=					53						/237.6
=					54		-201AP33	14			/237.6
=					55						/237.7
=					56		-201AP33	15			/237.7
=					57						/237.8
=					58		-201AP33	16			/237.8
=					59						/238.1
=					60		-202AP34	1			/238.1
=					61		-X.INT24	62			/238.3
=					62		-202AP34	3			/238.3
EMERGENCY STOP FEEDBACK 2					64		-365KA5	X1			/365.5
SPARE					65		-X.INT24	68			/239.4
=					66		-202AP34	12			/239.4
=					67						/239.5
=					68		-202AP34	13			/239.5
=					69						/239.6
=					70		-202AP34	14			/239.6

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					71						/239.7
=					72		-202AP34	15			/239.7
=					73						/239.8
=					74		-202AP34	16			/239.8
=					75		-X.INT24	69			/240.1
=					76		-202AP35	1			/240.1
=					77		-X.INT24	75			/241.1
=					78		-202AP35	9			/241.1
=					79						/241.3
=					80		-202AP35	11			/241.3
=					81						/241.4
=					82		-202AP35	12			/241.4
=					83						/241.5
=					84		-202AP35	13			/241.5
=					85						/241.6
=					86		-202AP35	14			/241.6
=					87						/241.7
=					88		-202AP35	15			/241.7
=					89						/241.8
=					90		-202AP35	16			/241.8
=					91		-X.INT24	76			/242.1
=					92		-202AP36	1			/242.1
EMERGENCY STOP FEEDBACK 2					63		-X.INT24	92			/365.5
							-X.INT24	93			
SPARE					93		-X.INT24	81			/242.8
							-X.INT24	82			
SPARE					94		-202AP36	8			/242.8
=					95						/243.3
=					96		-202AP36	11			/243.3
=					97						/243.4
=					98		-202AP36	12			/243.4
=					99						/243.5
=					100		-202AP36	13			/243.5
=					101						/243.6
=					102		-202AP36	14			/243.6

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					103						/243.7
=					104		-202AP36	15			/243.7
=					105		-260KA6	11			/243.8
=					106		-202AP36	16			/243.8
=					107		-X.INT24	82			/243.2
=					108		-202AP36	10			/243.2
EMERGENCY STOP FEEDBACK 1					47		-X.DI-S	23.1			/365.1
							-X.INT24	92			

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01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.DI-IS

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
SPARE					17	,	-331T1	54+			/331.3
=					18	,	-331T1	53-			/331.3

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00	03	
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PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

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Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DI-IS

ISOLATION DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-JB-WLD-03	4	1	,	-320T1	A			/320.1
			-JB-WLD-03	2	2	,					/320.1
WATER LEAK DETECTOR LEVEL 0			-JB-WLD-03	1	3	,	-320T1	C			/320.2
=			-JB-WLD-03	3	4	,	-320T1	B			/320.2
=			-JB-WLD-04	4	5	,	-320T3	A			/320.3
=			-JB-WLD-04	2	6	,					/320.3
WATER LEAK DETECTOR LEVEL 1					7	,	-320T7	4.1			/320.7
SPARE					8	,	-320T7	4.2			/320.7
WATER LEAK DETECTOR LEVEL 0			-JB-WLD-04	1	9	,	-320T3	C			/320.3
=			-JB-WLD-04	3	10	,	-320T3	B			/320.4
=			-JB-WLD-06	4	11	,	-320T5	A			/320.5
=			-JB-WLD-06	2	12	,					/320.5
WATER LEAK DETECTOR LEVEL 1			-JB-WLD-06	1	13	,	-320T5	C			/320.5
=			-JB-WLD-06	3	14	,	-320T5	B			/320.6

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01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.DI-S
SAFETY DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
EMERGENCY SHUTDOWN BUTTON LEVEL 1			-ESD-005		1		-X.INT24	25			/210.1
=			-ESD-005		2		-201AP10	1			/210.1
=			-ESD-005		2.1		-363KA1	X1			/363.1
EMERGENCY SHUTDOWN BUTTON LEVEL 0			-ESD-001		3						/210.3
=			-ESD-001		4		-201AP10	2			/210.3
EMERGENCY SHUTDOWN BUTTON LEVEL 1			-ESD-001		4.1		-361KA1	X1			/361.1
EMERGENCY SHUTDOWN BUTTON LEVEL 0			-ESD-003		28.1		-362KA1	X1			/362.1
FIRE ALARM SYSTEM GENERAL FAILURE					5						/210.5
=					6		-201AP10	3			/210.5
SPARE					7						/211.5
=					8		-201AP10	7			/211.5
=					9						/211.7
=					10		-201AP10	8			/211.7
EMERGENCY SHUTDOWN BUTTON LEVEL 1			-ESD-006		11						/212.1
=			-ESD-006		12		-201AP11	1			/212.1
=			-ESD-006		12.1		-363KA5	X1			/363.5
EMERGENCY SHUTDOWN BUTTON LEVEL 0			-ESD-004		13						/212.3
=			-ESD-004		14		-201AP11	2			/212.3
=			-ESD-004		14.1		-362KA5	X1			/362.5
=			-ESD-002		15		-X.INT24	26			/212.5
=			-ESD-002		16		-201AP11	3			/212.5
EMERGENCY SHUTDOWN BUTTON LEVEL 1			-ESD-005		1.1						/363.1
=			-ESD-001		3.1		-2SA4	14			/361.1
=			-ESD-006		11.1						/363.5
EMERGENCY SHUTDOWN BUTTON LEVEL 0			-ESD-004		13.1						/362.5
=					15.1						/361.5
EMERGENCY SHUTDOWN BUTTON LEVEL 2			-ESD-007		23.1		-X.DI	47			/364.1
EMERGENCY SHUTDOWN BUTTON LEVEL 0			-ESD-003		27.1		-ESD-002				/362.1
=			-ESD-002		16.1		-361KA5	X1			/361.5
SHUTDOWN COMMAND FROM PLANT SIS					17		-350KA1	A1			/350.1
=					18		-350KA1	A2			/350.1
SPARE					19		-X.INT24	26			/213.5
							-X.INT24	27			
SPARE					20		-201AP11	7			/213.5
=					21		-350KA2	A1			/350.2

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.DI-S
SAFETY DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
SPARE					22		-350KA2	A2			/350.2
EMERGENCY SHUTDOWN BUTTON LEVEL 2			-ESD-007		23		-X.INT24	27			/214.1
=			-ESD-007		24		-201AP12	1			/214.1
=			-ESD-007		24.1		-364KA1	X1			/364.1
CONFIRMED FIRE ALARM					25						/214.3
=					26		-201AP12	2			/214.3
EMERGENCY SHUTDOWN BUTTON LEVEL 0			-ESD-003		27		-X.INT24	28			/214.5
=			-ESD-003		28		-201AP12	3			/214.5
PHASE MONITORING RELAY			-1U1	21	30		-201AP12	7			/215.5
SPARE					31		-350KA3	A1			/350.3
=					32		-350KA3	A2			/350.3

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01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DO

DIGITAL OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
ELECTROLYZER 1 SYSTEM HEALTY			-260KA1	11	1	,					/345.1
=			-260KA1	14	2	,					/345.1
SPARE			-260KA2	11	3	,					/345.2
=			-260KA2	14	4	,					/345.2
=			-261KA3	11	7	,					/345.3
=			-261KA3	14	8	,					/345.3
=			-261KA4	11	9	,					/345.4
=			-261KA4	14	10	,					/345.4
ELECTROLYZER 2 SYSTEM HEALTY			-262KA1	11	19	,					/345.5
=			-262KA1	14	20	,					/345.5
RECTIFIER START/STOP COMMAND			-262KA2	11	21	,					/345.6
=			-262KA2	14	22	,					/345.6
SPARE			-263KA3	11	27	,					/345.7
=			-263KA3	14	28	,					/345.7
=			-263KA4	11	29	,					/346.1
=			-263KA4	14	30	,					/346.1
=			-263KA5	11	31	,					/346.2
=			-263KA5	14	32	,					/346.2
=			-263KA8	11	37	,					/346.3
=			-263KA8	14	38	,					/346.3
=			-264KA1	11	39	,					/346.4
=			-264KA1	14	40	,					/346.4
=					41	●	-260KA6	A2			/260.7
LIGHT COLUMN LEVEL 0 GREEN					42	●	-261HL1	X2			/260.8
SPARE					43	●	-261KA4	A2			/261.5
=					44	●					/261.6
=			-265KA3	11	45	,					/346.5
=			-265KA3	14	46	,					/346.5
=			-265KA4	11	47	,					/346.6
=			-265KA4	14	48	,					/346.6
=					49	●					/261.7
=					50	●	-262KA1	A2			/261.8
LIGHT COLUMN LEVEL 0 RED					51	●	-262KA6	A2			/262.7
LIGHT COLUMN LEVEL 0 BLUE					52	●	-263HL1	X2			/262.8
SPARE					53	●	-263KA5	A2			/263.6

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DO

DIGITAL OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					54		-263KA8	A2			/263.7
=			-265KA8	11	55						/346.7
=			-265KA8	14	56						/346.7
=					59		-202AP50	7			/260.7
LIGHT COLUMN LEVEL 0 GREEN					60		-202AP50	8			/260.8
SPARE					61		-202AP50	13			/261.5
=					62		-202AP50	14			/261.6
=					63		-202AP50	15			/261.7
=					64		-202AP50	16			/261.8
=					65		-202AP51	14			/263.6
=					66		-202AP51	15			/263.7
LIGHT COLUMN LEVEL 0 RED					67		-202AP51	7			/262.7
LIGHT COLUMN LEVEL 0 BLUE					68		-202AP51	8			/262.8
LIGHT COLUMN LEVEL 0 ORANGE					69		-202AP52	6			/264.6
BUZZER LEVEL 0					70		-202AP52	7			/264.7
SPARE					71		-202AP52	8			/264.8
=					72		-202AP52	13			/265.5
=					73		-202AP52	14			/265.6
=					74		-202AP52	15			/265.7
LIGHT COLUMN LEVEL 0 ORANGE					75		-264KA5	A2			/264.6
BUZZER LEVEL 0					76						/264.7
SPARE					77		-265HL1	X2			/264.8
=					78		-265KA4	A2			/265.5
=					79						/265.6
=					80		-265KA8	A2			/265.7

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02							

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.DO-S

DIGITAL OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
RECTIFIER EMERGENCY STOP 1 CHANNEL 1			-220KA1	13	1	,					/340.1
=			-220KA1	14	2	,					/340.1
CONFIRMED GAS ALARM TO PLANT F&G			-220KA2	13	3	,					/340.2
=			-220KA2	14	4	,					/340.2
SPARE					7	,	-201AP20	8			/220.8
=					8	,	-201AP20	16			/220.8
RECTIFIER EMERGENCY STOP 2 CHANNEL 1			-221KA1	13	9	,					/340.3
=			-221KA1	14	10	,					/340.3
ELECTROLYZER PLC FAILURE TO PLANT SIS			-221KA2	13	11	,					/340.4
=			-221KA2	14	12	,					/340.4
SPARE			-221KA7	13	13	,					/340.5
=			-221KA7	14	14	,					/340.5
=					15	,	-201AP21	8			/221.8
=					16	,	-201AP21	16			/221.8
=			-222KA1	13	17	,					/340.6
=			-222KA1	14	18	,					/340.6
CONFIRMED SMOKE ALARM TO PLANT F&G			-222KA2	13	19	,					/340.7
=			-222KA2	14	20	,					/340.7
SPARE			-222KA7	13	21	,					/340.8
=			-222KA7	14	22	,					/340.8
RECTIFIER EMERGENCY STOP 1 CHANNEL 2					23	,	-360KA1	13			/360.3
=					24	,	-360KA1	14			/360.3
RECTIFIER EMERGENCY STOP 2 CHANNEL 2					25	,	-360KA1	23			/360.4
=					26	,	-360KA1	24			/360.4

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation:	Order:	Sheet:	Next:
00	03			FORES ENGENEERING	ELECTRICAL CABINET - BLPH	W240569	607	608
01	04				Page description: TERMINAL BOARDS	File: D240934SCH01	Tot. Sheet: 156	
02						Scheme: D240934SCH01		

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.INT2

EXTERNAL SIGNALS TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-400SW1	L1	L3+		-X.INT24	94			/400.0
			-400SW1	L2	L3+						/400.1
			-401SW1	L1	L3+						/401.0
			-401SW1	L2	L3+						/401.1
			-402SW1	L1	L3+						/402.0
			-402SW1	L2	L3+						/402.1
			-403SW1	L1	L3+						/403.0
			-403SW1	L2	L3+						/403.1
			-404SW1	+	L3+						/404.0
			-410K1	X80:1	L3+						/410.0
			-415K1	X80:1	L3+						/415.1
PN/PN COUPLER 1			-415K5	X80:1	L3+						/415.5
			-420K1	L+	L3+						/420.1
PN/CAN LINK 1			-420K4	L+	L3+						/420.4
PN/CAN LINK 2			-420K7	L+	L3+						/420.7
			-421K1	L+	L3+						/421.1
PN/CAN LINK 4			-421K4	L+	L3+						/421.4
PN/CAN LINK 5			-421K7	L+	L3+						/421.7
			-422K1	L+	L3+						/422.1
PN/CAN LINK 7			-422K4	L+	L3+						/422.4
			-400SW1	M1	L-		-365KA5	X3			/400.1
			-400SW1	M2	L-						/400.1
			-401SW1	M1	L-						/401.1
			-401SW1	M2	L-						/401.1
			-402SW1	M1	L-						/402.1
			-402SW1	M2	L-						/402.1
			-403SW1	M1	L-						/403.1
			-403SW1	M2	L-						/403.1
			-404SW1	-	L-						/404.1
			-410K1	X80:2	L-						/410.1
			-415K1	X80:2	L-						/415.1
PN/PN COUPLER 1			-415K5	X80:2	L-						/415.5
PN/CAN LINK 1			-420K1	M	L-						/420.1
PN/CAN LINK 2			-420K4	M	L-						/420.4
PN/CAN LINK 3			-420K7	M	L-						/420.7

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.INT2

EXTERNAL SIGNALS TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
PN/CAN LINK 4			-421K1	M	L-						/421.1
PN/CAN LINK 5			-421K4	M	L-						/421.4
PN/CAN LINK 6			-421K7	M	L-						/421.7
PN/CAN LINK 7			-422K1	M	L-						/422.1
PN/CAN LINK 8			-422K4	M	L-						/422.4

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 608.a	Next: 609
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: TERMINAL BOARDS			
02						Scheme: D240934SCH01	Tot. Sheet: 156	

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.INT24
24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
24VDC CABINET					1		-152FU2	2			/152.2
PHASE MONITORING RELAY			-1U1	12	2						/1.2
			-1U1	22							
			-1QF3	L+	6						/3.0
			-3SA1	13	7						/3.2
			-3SA1	11	8						/3.2
Hardwired to PTC on Motor LP-300A			-104U1	X134:20	10						/104.5
Hardwired to PTC on Motor LP-300B			-105U1	X134:20	11						/105.5
Hardwired to PTC on Motor CP-620A			-106U1	X134:20	12						/106.5
Hardwired to PTC on Motor CP-620B			-107U1	X134:20	13						/107.5
Hardwired to PTC on Motor CP-600A			-108U1	X134:20	14						/108.5
Hardwired to PTC on Motor CP-600B			-109U1	X134:20	15						/109.5
			-201AP1	-X80:1	17						/201.1
			-201AP10	L+	18						/201.2
			-201AP20	L+	19						/201.4
			-201AP30	L+	20						/201.6
			-202AP34	L+	21						/202.1
			-202AP40	L+	22						/202.3
			-202AP50	L+	23						/202.5
			-202AP52	L+	24						/202.6
			-202AP60	L+	25		-X.DI-S	1			/202.7
SHUTDOWN COMMAND FROM PLANT SIS			-350KA1	13	26		-X.DI-S	15			/212.7
							-X.DI-S	19			
SPARE			-350KA2	13	27		-X.DI-S	19			/213.7
							-X.DI-S	23			
RESET			-215SB3	13	28		-X.DI-S	27			/215.3
SPARE			-350KA3	13	29		-X.DI	1			/215.7
24Vdc POWER SUPPLY MODULE 1 POWER SUPPLY			-130QF1	13	30		-X.DI	3			/230.4
HVAC PANEL PAU003 CIRCUIT BREAKER AUXILIARY CONTACT			-102QM1	.1	31						/230.5
VFD LP-300B CIRCUIT BREAKER AUXILIARY CONTACT			-105QM1	13	32						/230.6
AIR EXTRACTOR GROUP 1 CIRCUIT BREAKER AUXILIARY CONTACT			-121QF1	13	33						/230.7
AIR EXTRACTOR 6 CONTACTOR AUXILIARY CONTACT			-262KM4	61	34						/230.8
SPARE			-123QF1	13	35						/231.1
UTILITIES AREA SOCKET CIRCUIT BREAKERS AUXILIARY CONTACTS			-123QF7	13	36						/231.2
MAIN CIRCUIT BREAKER LOCAL/REMOTE SELECTOR			-3SA1	13	37		-X.DI	5			/231.3

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
24Vdc POWER SUPPLY MODULE 2 POWER SUPPLY			-130QF3	13	38		-X.DI	17			/232.3
HE-61.1 (HPP-700) CIRCUIT BREAKER AUXILIARY CONTACT			-101QF3	13	39						/232.4
WATER TREATMENT PACKAGE CIRCUIT BREAKER AUXILIARY CONTACT			-102QF3	13	40						/232.5
VFD LP-620A CIRCUIT BREAKER AUXILIARY CONTACT			-106QM1	13	41						/232.6
AIR EXTRACTOR 1 CONTACTOR AUXILIARY CONTACT			-264KM2	61	42						/232.7
AIR EXTRACTOR 7 CONTACTOR AUXILIARY CONTACT			-264KM4	61	43						/232.8
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-123QF3	13	44						/233.1
SPARE			-300KM5	21	45						/233.2
RECTIFIER UPS POWER SUPPLY 1			-130QF5	13	46		-X.DI	19			/233.3
HE-61.1 CONTACTOR AUXILIARY CONTACT			-300KM3	21	47		-X.DI	31			/234.4
CHILLER 1 CIRCUIT BREAKER AUXILIARY CONTACT			-102QM5	.1	48						/234.5
VFD LP-620B CIRCUIT BREAKER AUXILIARY CONTACT			-107QM1	13	49						/234.6
AIR EXTRACTOR 2 CONTACTOR AUXILIARY CONTACT			-260KM3	61	50						/234.7
AIR EXTRACTOR 8 CONTACTOR AUXILIARY CONTACT			-260KM5	61	51						/234.8
SPARE			-123QF5	13	52		-X.DI	33			/235.1
CIRCUIT BREAKER AUXILIARY CONTACT			-130QF7	13	53		-X.DI	33			/235.3
							-X.DI	35			
HCU 400Vac REC-01/02 AUX SUPPLY 2 AUXILIARY CONTACT			-100QF3	13	54		-X.DI	45			/236.3
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-101QF5	13	55						/236.4
CHILLER 2 CIRCUIT BREAKER AUXILIARY CONTACT			-102QM7	.1	56						/236.5
VFD LP-600A CIRCUIT BREAKER AUXILIARY CONTACT			-108QM1	13	57						/236.6
AIR EXTRACTOR 3 CONTACTOR AUXILIARY CONTACT			-262KM3	61	58						/236.7
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-103QF1	13	59						/236.8
RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT			-131QF1	13	60						/237.1
LIGHTING CIRCUIT BREAKERS AUXILIARY CONTACTS			-125QF1	13	61		-X.DI	49			/237.2
SPARE CONTACTOR AUXILIARY CONTACT			-300KM1	21	62		-X.DI	61			/238.4
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-103QF3	13	63						/238.5
VFD LP-600B CIRCUIT BREAKER AUXILIARY CONTACT			-109QM1	13	64						/238.6
AIR EXTRACTOR 4 CONTACTOR AUXILIARY CONTACT			-264KM3	61	65						/238.7
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-122QF1	13	66						/238.8
RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT			-131QF3	13	67						/239.1
=			-1RF8		68		-X.DI	65			/239.2
GENERAL CIRCUIT BREAKER AUXILIARY CONTACT			-1QF3	.1	69		-X.DI	75			/240.2
UPS CIRCUIT BREAKER AUXILIARY CONTACT			-100QF5	13	70						/240.3
HE-64.1 (HPP-700) CIRCUIT BREAKER AUXILIARY CONTACT			-101QF7	13	71						/240.4

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-122QF3	13	72						/240.5
AUXILIARY EQUIPMENT TYPE 2 CIRCUIT BREAKER AUXILIARY CONTACT			-120QM1	.1	73						/240.6
AIR EXTRACTOR GROUP 2 CIRCUIT BREAKER AUXILIARY CONTACT			-121QF5	13	74						/240.7
HEAT TRACING CIRCUIT 1			-122QF5	13	75		-X.DI	77			/240.8
HCU 230Vac REC-01/02 AUX SUPPLY 1 AUXILIARY CONTACT			-100QF1	13	76		-X.DI	91			/242.2
HE-64.1 (HPP-700) CONTACTOR AUXILIARY CONTACT			-300KM4	.1	77						/242.3
VFD LP-300A CIRCUIT BREAKER AUXILIARY CONTACT			-104QM1	13	78						/242.4
AUXILIARY EQUIPMENT TYPE 2 CONTACTOR AUXILIARY CONTACT			-300KM2	21	79						/242.5
AIR EXTRACTOR 5 CONTACTOR AUXILIARY CONTACT			-260KM4	61	80						/242.6
HEAT TRACING CIRCUIT 2			-122QF7	13	81		-X.DI	93			/242.7
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-101QF1	13	82		-X.DI	93			/243.1
							-X.DI	107			
			-320T1	NO	83		-301CR1	1			/320.0
WATER LEAK DETECTOR LEVEL 0			-320T1	L	84						/320.2
=			-320T3	L	+						/320.4
WATER LEAK DETECTOR LEVEL 1			-320T5	L	+						/320.6
RECTIFIER 1 OUTPUT CURRENT			-330T1	31-	85						/330.2
RECTIFIER 2 OUTPUT CURRENT					86						/330.4
RECTIFIER 1 DC VOLTAGE			-330T5	31-	87						/330.6
=			-331T1	31-	88						/331.2
SAFETY MODULE			-360KA1	A1	90						/360.1
EMERGENCY SHUTDOWN FROM SAFETY MODULE			-360KA1	33	91		-2SA4	13			/360.5
EMERGENCY STOP FEEDBACK 1			-365KA1	X2	92		-X.DI	47			/365.3
							-X.DI	63			
EMERGENCY STOP FEEDBACK 2			-365KA5	X2	93		-X.DI	63			/365.7
24VDC HMI+SWITCH			-X.INT2	L3+	94		-152FU3	2			/152.3
24VDC INTERNAL CABINET FAN					111		-152FU4	2			/152.4
			-20BT1		112						/20.1
			-20BT2		113						/20.2
			-20BT3		114						/20.3
			-20BT4		115						/20.4
			-21MV1	1	116		-20BT1				/21.1
FAN 1 MAIN CABINET			-21MV2	1	117		-20BT2				/21.2
FAN 2 MAIN CABINET			-21MV3	1	118		-20BT3				/21.3
FAN 3 MAIN CABINET			-21MV4	1	119		-20BT4				/21.4

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.INT24
24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-150GS1	1.3	120		-130QF1	2			/130.1
230Vac / 24VDC CONVERTER 1			-150GS1	1.2	121		-130QF1	4			/130.1
=			-150GS5	1.3	122		-130QF3	2			/130.3
230Vac / 24VDC CONVERTER 2			-150GS5	1.2	123		-130QF3	4			/130.3
24VDC MIDDLE COLUMN TERMINALE BOARD					124		-152FU5	2			/152.5
24VDC SPARE					125		-152FU6	2			/152.6
			-200GS1	-X80:1	126		-152FU1	2			/200.1
			-1QF3	N-	127		-151RP1	B2			/3.1
FAN 1 MAIN CABINET			-21MV1	2	130						/21.1
FAN 2 MAIN CABINET			-21MV2	2	131						/21.2
FAN 3 MAIN CABINET			-21MV3	2	132						/21.3
FAN 4 MAIN CABINET			-21MV4	2	133						/21.4
			-200GS1	-X80:2	135						/200.1
			-201AP1	-X80:2	136						/201.1
			-201AP10	M	137						/201.2
			-201AP20	M	138						/201.4
			-201AP30	M	139						/201.6
			-202AP34	M	140						/202.1
			-202AP40	M	141						/202.3
			-202AP50	M	142						/202.5
			-202AP52	M	143						/202.6
			-202AP60	M	144		-260KA1	A2			/202.7
WATER LEAK DETECTOR LEVEL 0			-320T1	N	145		-301CR1	2			/320.2
=			-320T3	N	-						/320.4
WATER LEAK DETECTOR LEVEL 1			-320T5	N	-						/320.6
RECTIFIER 1 OUTPUT CURRENT			-330T1	32+	146						/330.2
RECTIFIER 2 OUTPUT CURRENT					147						/330.4
RECTIFIER 1 DC VOLTAGE			-330T5	32+	148						/330.6
=			-331T1	32+	149		-360KA1	A2			/331.2

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.INT220

230Vac MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
LIGHT 1			-10EN1	11	1		-126QF5	2			/10.1
=			-10HL1	N	2		-126QF5	4			/10.1
LIGHT 2			-10EN2	11	3						/10.2
=			-10HL2	N	4						/10.2
LIGHT 3			-10EN3	11	5						/10.3
=			-10HL3	N	6						/10.3
LIGHT 4			-10EN4	11	7						/10.4
=			-10HL4	N	8						/10.4
			-126QF7	2	9		-25BT1				/25.1
HEATER 1 MAIN CABINET					10		-25BT2				/25.2
HEATER 2 MAIN CABINET					11		-25BT3				/25.3
HEATER 3 MAIN CABINET					12		-25BT4				/25.4
HEATER 1 MAIN CABINET			-26EH1	L	13		-25BT1				/26.1
=			-26EH1	N	14		-126QF7	4			/26.1
HEATER 2 MAIN CABINET			-26EH2	L	15		-25BT2				/26.2
=			-26EH2	N	16						/26.2
HEATER 3 MAIN CABINET			-26EH3	L	17		-25BT3				/26.3
=			-26EH3	N	18						/26.3
HEATER 4 MAIN CABINET			-26EH4	L	19		-25BT4				/26.4
=			-26EH4	N	20						/26.4

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 610	Next: 611
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH01		
01	04					Scheme: D240934SCH01	Tot. Sheet: 156	
02								

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.PWR24

24VDC MB TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
PCA-001			-160FU1	2	1						/160.1
PCA-002			-160FU2	2	2						/160.2
PCA-003			-160FU3	2	3						/160.3
PCA-004			-160FU4	2	4						/160.4
PCA-005			-160FU5	2	5						/160.5
PCA-006			-160FU6	2	6						/160.6
PCA-007			-160FU7	2	7						/160.7
PCA-008			-160FU8	2	8						/160.8
FS-206			-161FU1	2	9						/161.1
M3WV-200			-161FU2	2	10						/161.2
SPARE			-161FU3	2	11						/161.3
=			-161FU4	2	12						/161.4
=			-161FU5	2	13						/161.5
=			-161FU6	2	14						/161.6
=			-161FU7	2	15						/161.7
=			-161FU8	2	16						/161.8
=			-162FU1	2	17						/162.1
=			-162FU2	2	18						/162.2
=			-162FU3	2	19						/162.3
=			-162FU4	2	20						/162.4

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 611	Next: 612
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: TERMINAL BOARDS			
02						Scheme: D240934SCH01	Tot. Sheet: 156	

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.PWR220
230Vac MB TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
					1	,	-100QF1	2			/100.1
HCU 230Vac REC-01/02 AUX Supply 1					2	,	-100QF1	4			/100.1
					3	,	-300KM5	2/T1			/101.1
SPARE					4	,	-300KM5	4/T2			/101.1
=					5	,	-300KM3	2/T1			/101.3
HE-61.1 (HPP-700)					6	,	-300KM3	4/T2			/101.3
SPARE					7	,	-103QF3	2			/103.3
=					8	,	-103QF3	4			/103.3
					9	,	-264KM2	2			/121.1
AIR EXTRACTOR EXT-0001 COMMAND					10	,	-264KM2	4			/121.1
=					11	,	-260KM3	2			/121.2
AIR EXTRACTOR EXT-0002 COMMAND					12	,	-260KM3	4			/121.2
=					13	,	-262KM3	2			/121.3
AIR EXTRACTOR EXT-0003 COMMAND					14	,	-262KM3	4			/121.3
=					15	,	-264KM3	2			/121.4
AIR EXTRACTOR EXT-0004 COMMAND					16	,	-264KM3	4			/121.4
=					17	,	-260KM4	2			/121.5
AIR EXTRACTOR EXT-0005 COMMAND					18	,	-260KM4	4			/121.5
=					19	,	-262KM4	2			/121.6
AIR EXTRACTOR EXT-0006 COMMAND					20	,	-262KM4	4			/121.6
=					21	,	-264KM4	2			/121.7
AIR EXTRACTOR EXT-0007 COMMAND					22	,	-264KM4	4			/121.7
=					23	,	-260KM5	2			/121.8
AIR EXTRACTOR EXT-0008 COMMAND					24	,	-260KM5	4			/121.8
					25	,	-122QF1	2			/122.1
SPARE					26	,	-122QF1	4			/122.1
=					27	,	-122QF3	2			/122.3
=					28	,	-122QF3	4			/122.3
=					29	,	-122QF5	2			/122.5
HEAT TRACING CIRCUIT 1					30	,	-122QF5	4			/122.5
=					31	,	-122QF7	2			/122.7
HEAT TRACING CIRCUIT 2					32	,	-122QF7	4			/122.7
					33	,	-123QF1	2			/123.1
SPARE					34	,	-123QF1	4			/123.1
=					35	,	-123QF3	2			/123.3

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.PWR220
230Vac MB TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
SPARE					36	,	-123QF3	4			/123.3
=					37	,	-123QF5	2			/123.5
=					38	,	-123QF5	4			/123.5
=					39	,	-123QF7	2			/123.7
SOCKETS WP1 C63-JBS-01					40	,	-123QF7	4			/123.7
					41	,	-124QF1	2			/124.1
SOCKETS WP2 C63-JBS-02					42	,	-124QF1	4			/124.1
=					43	,	-124QF3	2			/124.3
SOCKETS WP3 C63-JBS-03					44	,	-124QF3	4			/124.3
=					45	,	-124QF5	2			/124.5
SOCKETS WP4 C63-DS-07					46	,	-124QF5	4			/124.5
=					47	,	-124QF7	2			/124.7
SPARE FOR SOCKETS					48	,	-124QF7	4			/124.7
					49	,	-125QF1	2			/125.1
JUNCTION BOX LIGHTING WP1 C63-JBL-001					50	,	-125QF1	4			/125.1
=					51	,	-125QF3	2			/125.3
JUNCTION BOX LIGHTING WP2 C63-JBL-002					52	,	-125QF3	4			/125.3
=					53	,	-125QF5	2			/125.5
JUNCTION BOX LIGHTING WP3 C63-JBL-003					54	,	-125QF5	4			/125.5
=					55	,	-125QF7	2			/125.7
JUNCTION BOX LIGHTING WP4 C63-JBL-004					56	,	-125QF7	4			/125.7
					57	,	-301KM1	2			/126.1
EXTERNAL LIGHTING GROUND FLOOR					57a	,	-301KM1	1			/126.1
					58	,	-301KM1	4			/126.1
EXTERNAL LIGHTING GROUND FLOOR					58a	,	-301KM1	3			/126.1
=					59	,	-301KM2	2			/126.3
EXTERNAL LIGHTING FIRST FLOOR					59a	,	-301KM2	1			/126.3
EXTERNAL LIGHTING GROUND FLOOR					60	,	-301KM2	4			/126.3
EXTERNAL LIGHTING FIRST FLOOR					60a	,	-301KM2	3			/126.3
STEP-BY-STEP RELAY			-C63-PB-01		61		-301SA1	M			/301.1
=			-301KP1	A1	62	,	-C63-PB-01				/301.1
=			-C63-PB-02		63						/301.2
=			-301KP1	A1	64		-C63-PB-02				/301.2
=			-C63-PB-03		65		-301KP1	2			/301.3
=					66		-C63-PB-03				/301.3

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.PWR400

400Vac MB TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
HCU 230Vac REC-01/02 AUX Supply 1					1	,	-100QF3	2			/100.3
=					2	,	-100QF3	4			/100.3
HCU 400 Vac REC-01/02 AUX Supply 2					3	,	-100QF3	6			/100.3
=					4	,	-100QF3	8			/100.3
HE-61.1 (HPP-700)					5	,	-300KM1	2/T1			/101.5
=					6	,	-300KM1	4/T2			/101.5
SPARE					7	,	-300KM1	6/T3			/101.5
=					8	,	-300KM1	8/T4			/101.5
=					9	,	-300KM4	2/T1			/101.7
=					10	,	-300KM4	4/T2			/101.7
HE-64.1 (HPU-700)					11	,	-300KM4	6/T3			/101.7
=					12	,	-300KM4	8/T4			/101.7
					13	,	-102QM1	2			/102.1
					14	,	-102QM1	4			/102.1
HVAC PANEL PAU003					15	,	-102QM1	6			/102.1
=					16	,	-102QM1	N.			/102.1
=					17	●	-1RF8	PE			/102.2
=					18	,	-102QF3	2			/102.3
=					19	,	-102QF3	4			/102.3
WTP-300					20	,	-102QF3	6			/102.3
=					21	,	-102QF3	8			/102.3
=					22	,	-102QM5	2			/102.5
=					23	,	-102QM5	4			/102.5
CHILLER N.1 PAU001					24	,	-102QM5	6			/102.5
=					25	,	-102QM5	N.			/102.5
=					26	●					/102.6
=					27	,	-102QM7	2			/102.7
=					28	,	-102QM7	4			/102.7
CHILLER N.2 PAU002					29	,	-102QM7	6			/102.7
=					30	,	-102QM7	N.			/102.7
=					31	●	-104U1	PE(1)			/102.8
					32	,	-103QF1	2			/103.1
					33	,	-103QF1	4			/103.1
SPARE					34	,	-103QF1	6			/103.1
=					35	,	-103QF1	8			/103.1

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.PWR400

400Vac MB TERMINAL STRIP

function text									Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type						Page / column
													36	,	-104U1	U2								/104.1
LP-300A													37	,	-104U1	V2								/104.1
=													38	,	-104U1	W2								/104.1
=													39	,	-104U1	PE(2)								/104.1
=													40	,	-104U1	SH(1)								/104.2
													41	,	-105U1	U2								/105.1
LP-300B													42	,	-105U1	V2								/105.1
=													43	,	-105U1	W2								/105.1
=													44	,	-105U1	PE(2)								/105.1
=													45	,	-105U1	SH(1)								/105.2
													46	,	-106U1	U2								/106.1
CP-620A													47	,	-106U1	V2								/106.1
=													48	,	-106U1	W2								/106.1
=													49	,	-106U1	PE(2)								/106.1
=													50	,	-106U1	SH(1)								/106.2
													51	,	-107U1	U2								/107.1
CP-620B													52	,	-107U1	V2								/107.1
=													53	,	-107U1	W2								/107.1
=													54	,	-107U1	PE(2)								/107.1
=													55	,	-107U1	SH(1)								/107.2
													56	,	-108U1	U2								/108.1
CP-600A													57	,	-108U1	V2								/108.1
=													58	,	-108U1	W2								/108.1
=													59	,	-108U1	PE(2)								/108.1
=													60	,	-108U1	SH(1)								/108.2
													61	,	-109U1	U2								/109.1
CP-600B													62	,	-109U1	V2								/109.1
=													63	,	-109U1	W2								/109.1
=													64	,	-109U1	PE(2)								/109.1
=													65	,	-109U1	SH(1)								/109.2

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: TERMINAL BOARDS

Order: W240569

File: D240934SCH01

Scheme: D240934SCH01

Sheet: 613.a

Next: 614

Tot. Sheet: 156

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.PWRUPS

230Vac UPS TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
230Vac / 24VDC CONVERTER 2					1	,	-130QF5	2			/130.5
RECTIFIER UPS POWER SUPPLY 1					2	,	-130QF5	4			/130.5
=					3	,	-130QF7	2			/130.7
FIRE SYSTEM FSS SSI-1000					4	,	-130QF7	4			/130.7
					5	,	-131QF1	2			/131.1
Q.RIO1 WP1					6	,	-131QF1	4			/131.1
=					7	,	-131QF3	2			/131.3
Q.RIO2 WP3					8	,	-131QF3	4			/131.3

Release/Version:		
00	03	
01	04	
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - BLPH

Page description: TERMINAL BOARDS

Order: W240569

File: D240934SCH01

Scheme: D240934SCH01

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Tot. Sheet: 156

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.SEP

MC SEPARATION TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
PHASE MONITORING RELAY			-364KA5	X1	1	,	-1U1	11			/1.2
			-261KA2	14	2	,	-1QF3	ON			/3.1
			-3SA1	14	3	,	-261KA2	11			/3.2
			-263KA2	14	4	,	-3SB3	14			/3.4
24Vdc POWER SUPPLY MODULE 1 POWER SUPPLY			-130QF1	14	5	,	-201AP30	4			/230.4
HVAC PANEL PAU003 CIRCUIT BREAKER AUXILIARY CONTACT			-102QM1	.4	6	,	-201AP30	5			/230.5
VFD LP-300B CIRCUIT BREAKER AUXILIARY CONTACT			-105QM1	14	7	,	-201AP30	6			/230.6
AIR EXTRACTOR GROUP 1 CIRCUIT BREAKER AUXILIARY CONTACT			-121QF1	14	8	,	-201AP30	7			/230.7
AIR EXTRACTOR 6 CONTACTOR AUXILIARY CONTACT			-262KM4	62	9	,	-201AP30	8			/230.8
SPARE			-123QF1	14	10	,	-201AP30	9			/231.1
UTILITIES AREA SOCKET CIRCUIT BREAKERS AUXILIARY CONTACTS			-124QF7	14	11	,	-201AP30	10			/231.2
MAIN CIRCUIT BREAKER LOCAL/REMOTE SELECTOR			-3SA1	14	12	,	-201AP30	11			/231.3
24Vdc POWER SUPPLY MODULE 2 POWER SUPPLY			-130QF3	14	13	,	-201AP31	3			/232.3
HE-61.1 (HPP-700) CIRCUIT BREAKER AUXILIARY CONTACT			-101QF3	14	14	,	-201AP31	4			/232.4
WATER TREATMENT PACKAGE CIRCUIT BREAKER AUXILIARY CONTACT			-102QF3	14	15	,	-201AP31	5			/232.5
VFD LP-620A CIRCUIT BREAKER AUXILIARY CONTACT			-106QM1	14	16	,	-201AP31	6			/232.6
AIR EXTRACTOR 1 CONTACTOR AUXILIARY CONTACT			-264KM2	62	17	,	-201AP31	7			/232.7
AIR EXTRACTOR 7 CONTACTOR AUXILIARY CONTACT			-264KM4	62	18	,	-201AP31	8			/232.8
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-123QF3	14	19	,	-201AP31	9			/233.1
SPARE			-300KM5	22	20	,	-201AP31	10			/233.2
RECTIFIER UPS POWER SUPPLY 1			-130QF5	14	21	,	-201AP31	11			/233.3
HE-61.1 CONTACTOR AUXILIARY CONTACT			-300KM3	22	22	,	-201AP32	4			/234.4
CHILLER 1 CIRCUIT BREAKER AUXILIARY CONTACT			-102QM5	.4	23	,	-201AP32	5			/234.5
VFD LP-620B CIRCUIT BREAKER AUXILIARY CONTACT			-107QM1	14	24	,	-201AP32	6			/234.6
AIR EXTRACTOR 2 CONTACTOR AUXILIARY CONTACT			-260KM3	62	25	,	-201AP32	7			/234.7
AIR EXTRACTOR 8 CONTACTOR AUXILIARY CONTACT			-260KM5	62	26	,	-201AP32	8			/234.8
SPARE			-123QF5	14	27	,	-201AP32	9			/235.1
CIRCUIT BREAKER AUXILIARY CONTACT			-130QF7	14	28	,	-201AP32	11			/235.3
HCU 400Vac REC-01/02 AUX SUPPLY 2 AUXILIARY CONTACT			-100QF3	14	29	,	-201AP33	3			/236.3
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-101QF5	14	30	,	-201AP33	4			/236.4
CHILLER 2 CIRCUIT BREAKER AUXILIARY CONTACT			-102QM7	.4	31	,	-201AP33	5			/236.5
VFD LP-600A CIRCUIT BREAKER AUXILIARY CONTACT			-108QM1	14	32	,	-201AP33	6			/236.6
AIR EXTRACTOR 3 CONTACTOR AUXILIARY CONTACT			-262KM3	62	33	,	-201AP33	7			/236.7
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-103QF1	14	34	,	-201AP33	8			/236.8
RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT			-131QF1	14	35	,	-201AP33	9			/237.1

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.SEP

MC SEPARATION TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
LIGHTING CIRCUIT BREAKERS AUXILIARY CONTACTS			-126QF3	14	36	,	-201AP33	10			/237.2
SPARE CONTACTOR AUXILIARY CONTACT			-300KM1	22	37	,	-202AP34	4			/238.4
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-103QF3	14	38	,	-202AP34	5			/238.5
VFD LP-600B CIRCUIT BREAKER AUXILIARY CONTACT			-109QM1	14	39	,	-202AP34	6			/238.6
AIR EXTRACTOR 4 CONTACTOR AUXILIARY CONTACT			-264KM3	62	40	,	-202AP34	7			/238.7
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-122QF1	14	41	,	-202AP34	8			/238.8
RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT			-131QF3	14	42	,	-202AP34	9			/239.1
SURGE PROTECTOR DEVICE AUXILIARY CONTACT			-1RF8		43	,	-202AP34	10			/239.2
GENERAL CIRCUIT BREAKER AUXILIARY CONTACT			-1QF3	.4	44	,	-202AP35	2			/240.2
UPS CIRCUIT BREAKER AUXILIARY CONTACT			-100QF5	14	45	,	-202AP35	3			/240.3
HE-64.1 (HPP-700) CIRCUIT BREAKER AUXILIARY CONTACT			-101QF7	14	46	,	-202AP35	4			/240.4
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-122QF3	14	47	,	-202AP35	5			/240.5
AUXILIARY EQUIPMENT TYPE 2 CIRCUIT BREAKER AUXILIARY CONTACT			-120QM1	.4	48	,	-202AP35	6			/240.6
AIR EXTRACTOR GROUP 2 CIRCUIT BREAKER AUXILIARY CONTACT			-121QF5	14	49	,	-202AP35	7			/240.7
HEAT TRACING CIRCUIT 1			-122QF5	14	50	,	-202AP35	8			/240.8
HCU 230Vac REC-01/02 AUX SUPPLY 1 AUXILIARY CONTACT			-100QF1	14	51	,	-202AP36	2			/242.2
HE-64.1 (HPP-700) CONTACTOR AUXILIARY CONTACT			-300KM4	.2	52	,	-202AP36	3			/242.3
VFD LP-300A CIRCUIT BREAKER AUXILIARY CONTACT			-104QM1	14	53	,	-202AP36	4			/242.4
AUXILIARY EQUIPMENT TYPE 2 CONTACTOR AUXILIARY CONTACT			-300KM2	22	54	,	-202AP36	5			/242.5
AIR EXTRACTOR 5 CONTACTOR AUXILIARY CONTACT			-260KM4	62	55	,	-202AP36	6			/242.6
HEAT TRACING CIRCUIT 2			-122QF7	14	56	,	-202AP36	7			/242.7
SPARE CIRCUIT BREAKER AUXILIARY CONTACT			-101QF1	14	57	,	-202AP36	9			/243.1
AIR EXTRACTOR EXT-0002 COMMAND			-202AP50	3	61	,	-260KM3	A1			/260.3
AIR EXTRACTOR EXT-0005 COMMAND			-202AP50	4	62	,	-260KM4	A1			/260.4
AIR EXTRACTOR EXT-0008 COMMAND			-202AP50	5	63	,	-260KM5	A1			/260.5
SPARE CONTACTOR COMMAND			-202AP50	6	64	,	-260KA6	A1			/260.6
AIR EXTRACTOR EXT-0003 COMMAND			-202AP51	3	65	,	-262KM3	A1			/262.3
AIR EXTRACTOR EXT-0006 COMMAND			-202AP51	4	66	,	-262KM4	A1			/262.4
AUXILIARY EQUIPMENT TYPE 2 CONTACTOR COMMAND			-202AP51	5	67	,	-262KA5	A1			/262.5
HE-61.1 (HPP-700) CONTACTOR COMMAND			-202AP51	6	68	,	-262KA6	A1			/262.6
AIR EXTRACTOR EXT-0001 COMMAND			-202AP52	2	69	,	-264KM2	A1			/264.2
AIR EXTRACTOR EXT-0004 COMMAND			-202AP52	3	70	,	-264KM3	A1			/264.3
AIR EXTRACTOR EXT-0007 COMMAND			-202AP52	4	71	,	-264KM4	A1			/264.4
HE-64.1 (HPP-700) CONTACTOR COMMAND			-202AP52	5	72	,	-264KA5	A1			/264.5
FRONT PANEL GREEN LIGHT			-202AP50	9	73	,	-261HL1	X1			/261.1

Terminal diagram

F13_001

Strip

=BLPH+Q1-X.SEP

MC SEPARATION TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE CONTACTOR COMMAND			-202AP52	10	73	,	-265KA2	A1			/265.2
FRONT PANEL ORANGE LIGHT			-202AP52	9	74	,	-265HL1	X1			/265.1
FRONT PANEL RED LIGHT			-202AP51	9	75	,	-263HL1	X1			/263.1

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - BLPH	Order: W240569	Sheet: 615.b	Next: 616
00	03			FORES ENGENEERING		File: D240934SCH01		
01	04				Page description: TERMINAL BOARDS			Tot. Sheet: 156
02						Scheme: D240934SCH01		

Terminal diagram

F13_001

Strip
=BLPH+Q1-X.STO
SAFE TORQUE OFF TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SAFE TORQUE OFF A CP-600A			-108U1	STO_A:24V	1	,	-201AP20	3			/220.3
=			-108U1	STO_A:0V	2	,	-201AP20	11			/220.3
SAFE TORQUE OFF B CP-600B			-109U1	STO_B:0V	3	,	-201AP20	4			/220.4
=			-109U1	STO_B:24V	4	,	-201AP20	12			/220.4
SAFE TORQUE OFF A CP-620B			-107U1	STO_A:24V	5	,	-201AP20	5			/220.5
=			-107U1	STO_A:0V	6	,	-201AP20	13			/220.5
SAFE TORQUE OFF B CP-300A			-104U1	STO_B:24V	7	,	-201AP20	6			/220.6
=			-104U1	STO_B:0V	8	,	-201AP20	14			/220.6
SAFE TORQUE OFF B CP-600A			-108U1	STO_B:24V	9	,	-201AP21	3			/221.3
=			-108U1	STO_B:0V	10	,	-201AP21	11			/221.3
SAFE TORQUE OFF A CP-620A			-106U1	STO_A:24V	11	,	-201AP21	4			/221.4
=			-106U1	STO_A:0V	12	,	-201AP21	12			/221.4
SAFE TORQUE OFF B CP-620B			-107U1	STO_B:24V	13	,	-201AP21	5			/221.5
=			-107U1	STO_B:0V	14	,	-201AP21	13			/221.5
SAFE TORQUE OFF A CP-300B			-105U1	STO_A:24V	15	,	-201AP21	6			/221.6
=			-105U1	STO_A:0V	16	,	-201AP21	14			/221.6
SAFE TORQUE OFF A CP-600B			-109U1	STO_A:24V	17	,	-201AP22	3			/222.3
=			-109U1	STO_A:0V	18	,	-201AP22	11			/222.3
SAFE TORQUE OFF B CP-620A			-106U1	STO_B:24V	19	,	-201AP22	4			/222.4
=			-106U1	STO_B:0V	20	,	-201AP22	12			/222.4
SAFE TORQUE OFF A CP-300A			-104U1	STO_A:24V	21	,	-201AP22	5			/222.5
=			-104U1	STO_A:0V	22	,	-201AP22	13			/222.5
SAFE TORQUE OFF B CP-300B			-105U1	STO_B:24V	23	,	-201AP22	6			/222.6
=			-105U1	STO_B:0V	24	,	-201AP22	14			/222.6
FEEDBACK SAFE TORQUE OFF A LP-300A			-104U1	X134:19	25	,	-201AP10	6			/211.3
FEEDBACK SAFE TORQUE OFF A LP-300B			-105U1	X134:19	26	,	-201AP11	6			/213.3
FEEDBACK SAFE TORQUE OFF A CP-620A			-106U1	X134:19	27	,	-201AP11	5			/213.1
FEEDBACK SAFE TORQUE OFF A CP-620B			-107U1	X134:19	28	,	-201AP12	5			/215.1
FEEDBACK SAFE TORQUE OFF A CP-600A			-108U1	X134:19	29	,	-201AP12	4			/214.7
FEEDBACK SAFE TORQUE OFF A CP-600B			-109U1	X134:19	30	,	-201AP10	5			/211.1

Parts list

F01_003

Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.6ES7155-6AU01-0CN0	1	ET 200SP, IM155-6PN/2 HF	6ES7155-6AU01-0CN0	SIE	201AP1	
SIE.6ES5710-8MA11	1	STAND.SECTIONAL RAIL 35MM, LENGTH 483MM	6ES5710-8MA11	SIE	201AP1	
SIE.6ES7193-6AR00-0AA0	1	ET 200SP, BA 2XRJ45	6ES7193-6AR00-0AA0	SIE	201AP1	
SIE.6ES7954-8LC03-0AA0	1	SIMATIC S7 memory card, 4 MB	6ES7954-8LC03-0AA0	SIE	201AP1	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP10	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP10	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP11	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP11	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP12	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP12	
SIE.6ES7136-6DC00-0CA0	1	SIMATIC ET 200SP F-DQ 8x24 V DC/0.5 A PP HF	6ES7136-6DC00-0CA0	SIE	201AP20	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP20	
SIE.6ES7136-6DC00-0CA0	1	SIMATIC ET 200SP F-DQ 8x24 V DC/0.5 A PP HF	6ES7136-6DC00-0CA0	SIE	201AP21	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP21	
SIE.6ES7136-6DC00-0CA0	1	SIMATIC ET 200SP F-DQ 8x24 V DC/0.5 A PP HF	6ES7136-6DC00-0CA0	SIE	201AP22	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP22	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	201AP30	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP30	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	201AP31	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP31	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	201AP32	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP32	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	201AP33	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP33	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	202AP34	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP34	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	202AP35	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP35	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	202AP36	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP36	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP40	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP40	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP41	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP41	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP42	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP42	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP43	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP43	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.6ES7132-6BH01-0BA0	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	SIE	202AP50	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP50	
SIE.6ES7132-6BH01-0BA0	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	SIE	202AP51	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP51	
SIE.6ES7132-6BH01-0BA0	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	SIE	202AP52	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP52	
SIE.6ES7135-6HD00-0BA1	1	SIMATIC ET 200SP AQ 4xU/I ST	6ES7135-6HD00-0BA1	SIE	202AP60	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP60	
SUZ.TMF	1	Thermostat	TMF	SUZ	20BT1	
SUZ.TMF	1	Thermostat	TMF	SUZ	20BT2	
SUZ.TMF	1	Thermostat	TMF	SUZ	20BT3	
SUZ.TMF	1	Thermostat	TMF	SUZ	20BT4	
SUZ.TMC	1	Hygrostat	TMC	SUZ	25BT1	
SUZ.TMC	1	Hygrostat	TMC	SUZ	25BT2	
SUZ.TMC	1	Hygrostat	TMC	SUZ	25BT3	
SUZ.TMC	1	Hygrostat	TMC	SUZ	25BT4	
SIE.6ES7516-3FN02-0AB0	1	SIMATIC S7-1500 CPU 1516F-3 PN/DP	6ES7516-3FN02-0AB0	SIE	CPU	
SIE.6ES7590-1AC40-0AA0	1	MOUNTING RAIL 245MM (9.6")	6ES7590-1AC40-0AA0	SIE	CPU	
SIE.6ES7954-8LC03-0AA0	1	SIMATIC S7 memory card, 4 MB	6ES7954-8LC03-0AA0	SIE	CPU	
VEM.VE344800	1	Time delay relay - for voltage release MN - 48 V AC - 50/60Hz	Memo AST1	VEM	301CR1	ASTRONOMICAL TWILIGHT SWITCH
SUZ.TH150	1	Enclosure heater	TH150	SUZ	26EH1	HEATER 1 MAIN CABINET
SUZ.TH150	1	Enclosure heater	TH150	SUZ	26EH2	HEATER 2 MAIN CABINET
SUZ.TH150	1	Enclosure heater	TH150	SUZ	26EH3	HEATER 3 MAIN CABINET
SUZ.TH150	1	Enclosure heater	TH150	SUZ	26EH4	HEATER 4 MAIN CABINET
ELF.050F02S	1	Finecorsa posizionamento 2NC	050F02S	NEW ELFIN	10EN1	LIGHT 1
ELF.050F02S	1	Finecorsa posizionamento 2NC	050F02S	NEW ELFIN	10EN2	LIGHT 2
ELF.050F02S	1	Finecorsa posizionamento 2NC	050F02S	NEW ELFIN	10EN3	LIGHT 3
ELF.050F02S	1	Finecorsa posizionamento 2NC	050F02S	NEW ELFIN	10EN4	LIGHT 4
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	1FU1	
SIE.3NW6001-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6001-1	SIE	1FU1	
ITW.33200	1	HRC-fuse-disconnector 160 A,3-pole, screw M8 HRC fuse switch-disconnector 3200 panel mounting	33200	ITW	1FU8	
SIE.3NA3832	3	LV HRC FUSE LINK GL/GG WITH NON-INSULATED GRIP LUGS	3NA3832	SIE	1FU8	
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	5FU3	
SIE.3NW6003-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6003-1	SIE	5FU3	
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	7FU1	
SIE.3NW6011-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	7FU1	
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	7FU2	
SIE.3NW6011-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	7FU2	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	7FU3	
SIE.3NW6011-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	7FU3	
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	7FU4	
SIE.3NW6011-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	7FU4	
SIE.3NW7063	1	Fuseholder	3NW7063	SIE	120FU5	
SIE.3NW6003-1	3	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6003-1	SIE	120FU5	
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	152FU1	24VDC CPU
SIE.3NW6004-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6004-1	SIE	152FU1	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	152FU2	24VDC CABINET
SIE.3NW6003-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6003-1	SIE	152FU2	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	152FU3	24VDC HMI+SWITCH
SIE.3NW6004-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6004-1	SIE	152FU3	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	152FU4	24VDC INTERNAL CABINET FAN
SIE.3NW6004-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6004-1	SIE	152FU4	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	152FU5	24VDC MIDDLE COLUMN TERMINALE BOARD
SIE.3NW6004-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6004-1	SIE	152FU5	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	152FU6	24VDC SPARE
SIE.3NW6004-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6004-1	SIE	152FU6	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU1	PCA-001
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU1	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU2	PCA-002
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU2	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU3	PCA-003
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU3	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU4	PCA-004
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU4	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU5	PCA-005
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU5	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU6	PCA-006
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU6	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU7	PCA-007
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU7	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	160FU8	PCA-008
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	160FU8	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU1	FS-206
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU1	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU2	M3WV-200
SIE.3NW6001-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6001-1	SIE	161FU2	=

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU3	SPARE
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU3	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU4	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU4	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU5	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU5	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU6	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU6	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU7	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU7	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	161FU8	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	161FU8	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	162FU1	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	162FU1	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	162FU2	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	162FU2	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	162FU3	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	162FU3	=
SIE.3NW7013	1	Fuseholder	3NW7013	SIE	162FU4	=
SIE.3NW6011-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6011-1	SIE	162FU4	=
RIE.CSTW5K0AA300RUA	1	Stand-by unit	CSTW5K0AA300RUA	RIE	100GS5	
RIE.KSTW180PM100NPA	2	Batterie per UPS	KSTW180PM100NPA	RIE	100GS5	
PXC.2904603	1	Continuous current supply	QUINT4-PS/1AC/24DC/40	PXC	150GS1	
PXC.2904603	1	Continuous current supply	QUINT4-PS/1AC/24DC/40	PXC	150GS5	
SIE.6ES7505-0RB00-0AB0	1	S7-1500, PS 60W 24/48/60V DC HF	6ES7505-0RB00-0AB0	SIE	200GS1	
SIE.3SU1001-6AA60-0AA0	1	INDICATOR LIGHT, WHITE	3SU1001-6AA60-0AA0	SIE	1HL3	R PHASE VOLTAGE PRESENCE LAMP
SIE.3SU1401-1BF60-1AA0	1	LED MODULE, WHITE	3SU1401-1BF60-1AA0	SIE	1HL3	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	1HL3	=
SIE.3SU1001-6AA60-0AA0	1	INDICATOR LIGHT, WHITE	3SU1001-6AA60-0AA0	SIE	1HL4	S PHASE VOLTAGE PRESENCE LAMP
SIE.3SU1401-1BF60-1AA0	1	LED MODULE, WHITE	3SU1401-1BF60-1AA0	SIE	1HL4	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	1HL4	=
SIE.3SU1001-6AA60-0AA0	1	INDICATOR LIGHT, WHITE	3SU1001-6AA60-0AA0	SIE	1HL5	T PHASE VOLTAGE PRESENCE LAMP
SIE.3SU1401-1BF60-1AA0	1	LED MODULE, WHITE	3SU1401-1BF60-1AA0	SIE	1HL5	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	1HL5	=
ELF.050ASL	1	FLASHING LIGHT 220-690V WITH BRACKET AND WIRED LIMIT SWITCH	050ASL	NEW ELFIN	7HL1	
ELF.050ASL	1	FLASHING LIGHT 220-690V WITH BRACKET AND WIRED LIMIT SWITCH	050ASL	NEW ELFIN	7HL2	
ELF.050ASL	1	FLASHING LIGHT 220-690V WITH BRACKET AND WIRED LIMIT SWITCH	050ASL	NEW ELFIN	7HL3	
ELF.050ASL	1	FLASHING LIGHT 220-690V WITH BRACKET AND WIRED LIMIT SWITCH	050ASL	NEW ELFIN	7HL4	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
ELF.050PE13C	1	LED system light	050PE13C	NEW ELFIN	10HL1	LIGHT 1
ELF.050PE13C	1	LED system light	050PE13C	NEW ELFIN	10HL2	LIGHT 2
ELF.050PE13C	1	LED system light	050PE13C	NEW ELFIN	10HL3	LIGHT 3
ELF.050PE13C	1	LED system light	050PE13C	NEW ELFIN	10HL4	LIGHT 4
SIE.3SU1001-6AA40-0AA0	1	INDICATOR LIGHT, GREEN	3SU1001-6AA40-0AA0	SIE	261HL1	FRONT PANEL GREEN LIGHT
SIE.3SU1401-1BB40-1AA0	1	LED MODULE, GREEN	3SU1401-1BB40-1AA0	SIE	261HL1	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	261HL1	=
SIE.3SU1001-6AA20-0AA0	1	INDICATOR LIGHT, RED	3SU1001-6AA20-0AA0	SIE	263HL1	FRONT PANEL RED LIGHT
SIE.3SU1401-1BB20-1AA0	1	LED MODULE, RED	3SU1401-1BB20-1AA0	SIE	263HL1	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	263HL1	=
SIE.3SU1001-6AA30-0AA0	1	INDICATOR LIGHT, YELLOW	3SU1001-6AA30-0AA0	SIE	265HL1	FRONT PANEL ORANGE LIGHT
SIE.3SU1401-1BB30-1AA0	1	LED MODULE, YELLOW	3SU1401-1BB30-1AA0	SIE	265HL1	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	265HL1	=
SIE.6AV2128-3QB06-0AX1	1	SIMATIC HMI MTP1500 Unified Comfort	6AV2128-3QB06-0AX1	SIE	410K1	
SIE.6AV6881-0AQ10-0AA0	1	SIMATIC SD outdoor card 2 GB	6AV6881-0AQ10-0AA0	SIE	410K1	
SIE.6ES7158-3AD10-0XA0	1	SIMATIC PN/PN Coupler	6ES7158-3AD10-0XA0	SIE	415K1	
SIE.6ES5710-8MA11	1	STAND.SECTIONAL RAIL 35MM, LENGTH 483MM	6ES5710-8MA11	SIE	415K1	
SIE.6ES7193-6AR00-0AA0	2	ET 200SP, BA 2XRJ45	6ES7193-6AR00-0AA0	SIE	415K1	
SIE.6ES7158-3AD10-0XA0	1	SIMATIC PN/PN Coupler	6ES7158-3AD10-0XA0	SIE	415K5	
SIE.6ES7193-6AR00-0AA0	2	ET 200SP, BA 2XRJ45	6ES7193-6AR00-0AA0	SIE	415K5	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	420K1	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	420K1	
SIE.6ES5710-8MA11	2	STAND.SECTIONAL RAIL 35MM, LENGTH 483MM	6ES5710-8MA11	SIE	420K1	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	420K4	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	420K7	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	421K1	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	421K4	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	421K7	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	422K1	
SIE.6BK1620-0AA00-0AA0	1	SIMATIC PN/CAN LINK	6BK1620-0AA00-0AA0	SIE	422K4	
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	220KA1	RECTIFIER EMERGENCY STOP 1 CHANNEL 1
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	220KA2	CONFIRMED GAS ALARM TO PLANT F&G
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	221KA1	RECTIFIER EMERGENCY STOP 2 CHANNEL 1
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	221KA2	ELECTROLYZER PLC FAILURE TO PLANT SIS
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	221KA7	SPARE
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	222KA1	=
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	222KA2	CONFIRMED SMOKE ALARM TO PLANT F&G
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	222KA7	SPARE
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	260KA1	ELECTROLYZER 1 SYSTEM HEALTY

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	260KA2	SPARE
PXC.2966171	1	Standard all-or-nothing relay	PLC-RSC- 24DC/21	PXC	260KA6	SPARE CONTACTOR COMMAND
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	261KA2	MAIN CIRCUIT BREAKER OPEN COMMAND
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	261KA3	SPARE
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	261KA4	=
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	262KA1	ELECTROLYZER 2 SYSTEM HEALTY
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	262KA2	RECTIFIER START/STOP COMMAND
PXC.2966171	1	Standard all-or-nothing relay	PLC-RSC- 24DC/21	PXC	262KA5	AUXILIARY EQUIPMENT TYPE 2 CONTACTOR COMMAND
PXC.2966171	1	Standard all-or-nothing relay	PLC-RSC- 24DC/21	PXC	262KA6	HE-61.1 (HPP-700) CONTACTOR COMMAND
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	263KA2	MAIN CIRUIT BREAKER CLOSE COMMAND
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	263KA3	SPARE
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	263KA4	=
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	263KA5	=
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	263KA8	=
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	264KA1	=
PXC.2966171	1	Standard all-or-nothing relay	PLC-RSC- 24DC/21	PXC	264KA5	HE-64.1 (HPP-700) CONTACTOR COMMAND
PXC.2966171	1	Standard all-or-nothing relay	PLC-RSC- 24DC/21	PXC	265KA2	SPARE CONTACTOR COMMAND
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	265KA3	SPARE
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	265KA4	=
PXC.2909524	1	Standard all-or-nothing relay	PLC-RSC-24DC/21/EX	PXC	265KA8	=
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	350KA1	SHUTDOWN COMMAND FROM PLANT SIS
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	350KA2	SPARE
PXC.2700357	1	Coupling relay	PSR-PS21-1NO-1NC-24DC-SC	PXC	350KA3	=
SIE.3SK1111-2AB30	1	SIRIUS SAFETY RELAY STD RELAY 3NO+1NC	3SK1111-2AB30	SIE	360KA1	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	361KA1	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	361KA5	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	362KA1	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	362KA5	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	363KA1	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	363KA5	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	364KA1	
PXC.2700588	1	Coupling relay	PSR-PC40-2NO-1DO-24DC-SC	PXC	364KA5	
PXC.2700356	1	Coupling relay	PSR-PS20-1NO-1NC-24DC-SC	PXC	365KA1	
PXC.2700356	1	Coupling relay	PSR-PS20-1NO-1NC-24DC-SC	PXC	365KA5	
PXC.2700356	1	Coupling relay	PSR-PS20-1NO-1NC-24DC-SC	PXC	366KA1	
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	260KM3	AIR EXTRACTOR EXT-0002 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	260KM3	=
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	260KM4	AIR EXTRACTOR EXT-0005 COMMAND

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	260KM4	AIR EXTRACTOR EXT-0005 COMMAND
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	260KM5	AIR EXTRACTOR EXT-0008 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	260KM5	=
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	262KM3	AIR EXTRACTOR EXT-0003 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	262KM3	=
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	262KM4	AIR EXTRACTOR EXT-0006 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	262KM4	=
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	264KM2	AIR EXTRACTOR EXT-0001 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	264KM2	=
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	264KM3	AIR EXTRACTOR EXT-0004 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	264KM3	=
SIE.5TT5000-2	1	INSTA CONTACTOR WITH 2 NO CONTACTS	5TT5000-2	SIE	264KM4	AIR EXTRACTOR EXT-0007 COMMAND
SIE.5TT5910-1	1	Auxiliary switch 1NO+1NC for 5TT58 and 5TT50	5TT5910-1	SIE	264KM4	=
SIE.3RT2325-1BB40	1	4NO CONTACTOR, AC1: 35A, 24V DC	3RT2325-1BB40	SIE	300KM1	SPARE CONTACTOR COMMAND
SIE.3RT2336-1NB30	1	4NO CONTACTOR,AC1:60A, 20-33VAC/DC	3RT2336-1NB30	SIE	300KM2	AUXILIARY EQUIPMENT TYPE 2 CONTACTOR COMMAND
SIE.3RT2023-1BB40	1	CONTACTOR,AC3:4KW 1NO+1NC DC24V	3RT2023-1BB40	SIE	300KM3	HE-61.1 (HPP-700) CONTACTOR COMMAND
SIE.3RT2317-1BB40	1	4NO CONTACTOR, AC1: 22A, 24V DC	3RT2317-1BB40	SIE	300KM4	HE-64.1 (HPP-700) CONTACTOR AUXILIARY CONTACT
SIE.3RH2911-1HA11	1	AUX. SWITCH BLOCK , 1NO+1NC COND. PATHS: 1NC, 1NO	3RH2911-1HA11	SIE	300KM4	=
SIE.3RT2036-1NB30	1	CONTACTOR,AC3:22KW 1NO+1NC 20-33VAC/DC	3RT2036-1NB30	SIE	300KM5	SPARE
ABB.1SBE121111R0120	1	ESB20-20N-01 Installation Contactor 2NO/0NC, 24V AC/DC	ESB20-20N-01	ABB	301KM1	JB EXTERNAL LIGHTING GROUND FLOOR
ABB.1SBE121111R0120	1	ESB20-20N-01 Installation Contactor 2NO/0NC, 24V AC/DC	ESB20-20N-01	ABB	301KM2	JB EXTERNAL LIGHTING FIRST FLOOR
ABB.2TAZ312000R2042	1	ESB20-20N-01 Installation Contactor 2NO/0NC, 24V AC/DC	E290-16-20/24	ABB	301KP1	STEP-BY-STEP RELAY
SIE.4NC6080-0YB00	1	Current transformer 800/5A class 0.5 load VA 10 brown	4NC6080-0YB00	SIE	L1	
SIE.4NC6080-0YB00	1	Current transformer 800/5A class 0.5 load VA 10 brown	4NC6080-0YB00	SIE	L2	
SIE.4NC6080-0YB00	1	Current transformer 800/5A class 0.5 load VA 10 brown	4NC6080-0YB00	SIE	L3	
SIE.4NC6015-0YB00	1	Current transformer 800/5A class 0.5 load VA 3 brown	4NC6015-0YB00	SIE	L11	
SIE.4NC6015-0YB00	1	Current transformer 800/5A class 0.5 load VA 3 brown	4NC6015-0YB00	SIE	L12	
SIE.4NC6015-0YB00	1	Current transformer 800/5A class 0.5 load VA 3 brown	4NC6015-0YB00	SIE	L13	
RXT.5GHM000004027	1	Square multi cable frame GHM 6x2 AISI316 INCL TSL 15x6	GHM 6x2 AISI316 INCL TSL 15x6	RXT	MCT-1	
RXT.RM00000601000	5	Module x1 cable Ø28 - 54mm RM 60 WOC	RM 60 WOC	RXT	MCT-1	
RXT.RM00100601000	7	Module x1 cable Ø28 - 54mm RM 60	RM 60	RXT	MCT-1	
RXT.AWK0001201021	2	WEDGEKIT 120 AISI316	WEDGEKIT 120 AISI316	RXT	MCT-1	
RXT.ASP0001200021	6	STAYPLATE 120 AISI316	STAYPLATE 120 AISI316	RXT	MCT-1	
RXT.S006000000212	1	Square multi cable frame S 6x2 PRIMED	S 6x2 PRIMED	RXT	MCT-2	
RXT.RM00100301000	32	Module x1 cable Ø10 - 25mm RM 30	RM 30	RXT	MCT-2	
RXT.RM00120401000	18	Module x2 cables Ø3.5 - 16.5mm RM 20w40	RM 20w40	RXT	MCT-2	
RXT.ARW0001201018	2	WEDGE 120 GALV	WEDGE 120 GALV	RXT	MCT-2	
RXT.ASP0001200018	15	STAYPLATE 120 GALV	STAYPLATE 120 GALV	RXT	MCT-2	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
RXT.S006000000312	1	Square multi cable frame S 6x3 PRIMED	S 6x3 PRIMED	RXT	MCT-3	
RXT.RM00100301000	24	Module x1 cable Ø10 - 25mm RM 30	RM 30	RXT	MCT-3	
RXT.RM00120401000	54	Module x2 cables Ø3.5 - 16.5mm RM 20w40	RM 20w40	RXT	MCT-3	
RXT.ARW0001201018	3	WEDGE 120 GALV	WEDGE 120 GALV	RXT	MCT-3	
RXT.ASP0001200018	24	STAYPLATE 120 GALV	STAYPLATE 120 GALV	RXT	MCT-3	
SUZ.GSV2500211	1	Fan-and-filter units	GSV2500211	SUZ	21MV1	
SUZ.GSF25	1	Outlet filter	GSF25	SUZ	21MV1	
SUZ.GSV2500211	1	Fan-and-filter units	GSV2500211	SUZ	21MV2	
SUZ.GSF25	1	Outlet filter	GSF25	SUZ	21MV2	
SUZ.GSV2500211	1	Fan-and-filter units	GSV2500211	SUZ	21MV3	
SUZ.GSF25	1	Outlet filter	GSF25	SUZ	21MV3	
SUZ.GSV2500211	1	Fan-and-filter units	GSV2500211	SUZ	21MV4	
SUZ.GSF25	1	Outlet filter	GSF25	SUZ	21MV4	
RIT.8005000	4	Baying enclosure system VX25	VX.8005000	RIT	Q1	
RIT.8405000	2	Baying enclosure system VX25	VX.8405000	RIT	Q1	
RIT.8105245	1	Side panel, screw-fastened, sheet steel	VX.8105245	RIT	Q1	
RIT.8617500	5	Baying bracket, internal	VX.8617500	RIT	Q1	
RIT.8609204	1	Divider panel	VX.8609204	RIT	Q1	
RIT.4591700	5	Mounting plate infill	TS.4591700	RIT	Q1	
SIE.3VA1463-4GF42-0AA0	1	SENTRON Molded case circuit breaker Line protection	3VA1463-4GF42-0AA0	SIE	1QF3	
SIE.3VA9988-0AA12	1	SENTRON auxiliary switch Accessories for 3VA circuit breakers	3VA9988-0AA12	SIE	1QF3	
SIE.3VA9467-0HA10	1				1QF3	
SIE.3VA9908-0BB20	1	SENTRON Accessories Auxiliary release	3VA9908-0BB20	SIE	1QF3	
SIE.3VA9481-0WF40	2	SENTRON accessories	3VA9481-0WF40	SIE	1QF3	
SIE.5SY7225-7	1	SENTRON Miniature circuit breaker	5SY7225-7	SIE	100QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	100QF1	
SIE.5SY7420-7	1	SENTRON Miniature circuit breaker	5SY7420-7	SIE	100QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	100QF3	
SIE.5SY7232-7	1	SENTRON Miniature circuit breaker	5SY7232-7	SIE	100QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	100QF5	
SIE.5SY8263-7	1	SENTRON Miniature circuit breaker	5SY8263-7	SIE	101QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	101QF1	
SIE.5SY7220-7	1	SENTRON Miniature circuit breaker	5SY7220-7	SIE	101QF3	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	101QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	101QF3	
SIE.5SY7420-7	1	SENTRON Miniature circuit breaker	5SY7420-7	SIE	101QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	101QF5	
SIE.5SY7416-7	1	SENTRON Miniature circuit breaker	5SY7416-7	SIE	101QF7	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.5SM2342-6	1	RC unit	5SM2342-6	SIE	101QF7	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	101QF7	
SIE.5SY7432-7	1	SENTRON Miniature circuit breaker	5SY7432-7	SIE	102QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	102QF3	
SIE.5SY7420-7	1	SENTRON Miniature circuit breaker	5SY7420-7	SIE	103QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	103QF1	
SIE.5SY7216-7	1	SENTRON Miniature circuit breaker	5SY7216-7	SIE	103QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	103QF3	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	121QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	121QF1	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	121QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	121QF5	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	122QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	122QF1	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	122QF1	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	122QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	122QF3	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	122QF3	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	122QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	122QF5	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	122QF5	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	122QF7	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	122QF7	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	122QF7	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	123QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	123QF1	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	123QF1	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	123QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	123QF3	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	123QF3	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	123QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	123QF5	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	123QF5	
SIE.5SY7220-7	1	SENTRON Miniature circuit breaker	5SY7220-7	SIE	123QF7	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	123QF7	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	123QF7	
SIE.5SY7220-7	1	SENTRON Miniature circuit breaker	5SY7220-7	SIE	124QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	124QF1	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	124QF1	
SIE.5SY7220-7	1	SENTRON Miniature circuit breaker	5SY7220-7	SIE	124QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	124QF3	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	124QF3	
SIE.5SY7220-7	1	SENTRON Miniature circuit breaker	5SY7220-7	SIE	124QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	124QF5	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	124QF5	
SIE.5SY7220-7	1	SENTRON Miniature circuit breaker	5SY7220-7	SIE	124QF7	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	124QF7	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	124QF7	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	125QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	125QF1	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	125QF1	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	125QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	125QF3	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	125QF3	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	125QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	125QF5	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	125QF5	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	125QF7	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	125QF7	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	125QF7	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	126QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	126QF1	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	126QF1	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	126QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	126QF3	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	126QF3	
SIE.5SY7206-7	1	SENTRON Miniature circuit breaker	5SY7206-7	SIE	126QF5	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	126QF5	
SIE.5SY7232-7	1	SENTRON Miniature circuit breaker	5SY7232-7	SIE	126QF7	
SIE.5SM2322-6	1	RC unit	5SM2322-6	SIE	126QF7	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	130QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	130QF1	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	130QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	130QF3	
SIE.5SY7216-7	1	SENTRON Miniature circuit breaker	5SY7216-7	SIE	130QF5	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	130QF5	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	130QF7	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	130QF7	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	131QF1	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	131QF1	
SIE.5SY7210-7	1	SENTRON Miniature circuit breaker	5SY7210-7	SIE	131QF3	
SIE.5ST3010	1	SENTRON Auxiliary current switch Mountable	5ST3010	SIE	131QF3	
SIE.5TE2812-0	1	400V 2 pole 125A switch	5TE2812-0	SIE	151QF1	
SIE.3VA1220-4GF42-0AA0	1	MCCB_IEC_FS250_200A_4P_36KA_TM_ ATAM	3VA1220-4GF42-0AA0	SIE	102QM1	
SIE.3VA9988-0AA12	1	SENTRON auxiliary switch Accessories for 3VA circuit breakers	3VA9988-0AA12	SIE	102QM1	
SIE.3VA1112-3GE46-0AA0	1	MCCB_IEC_FS160_125A_4P_25KA_TM_ ATFM	3VA1112-3GE46-0AA0	SIE	102QM5	
SIE.3VA9988-0AA12	1	SENTRON auxiliary switch Accessories for 3VA circuit breakers	3VA9988-0AA12	SIE	102QM5	
SIE.3VA1112-3GE46-0AA0	1	MCCB_IEC_FS160_125A_4P_25KA_TM_ ATFM	3VA1112-3GE46-0AA0	SIE	102QM7	
SIE.3VA9988-0AA12	1	SENTRON auxiliary switch Accessories for 3VA circuit breakers	3VA9988-0AA12	SIE	102QM7	
SIE.3RV2011-1GA10	1	CIRCUIT-BREAKER SCREW CONNECTION 6.3A	3RV2011-1GA10	SIE	104QM1	
SIE.3RV2901-1E	1	TRANSVERSE AUX. SWITCH, 1NO+1NC, SCREW CONNECTION	3RV2901-1E	SIE	104QM1	
SIE.3RV2011-1GA10	1	CIRCUIT-BREAKER SCREW CONNECTION 6.3A	3RV2011-1GA10	SIE	105QM1	
SIE.3RV2901-1E	1	TRANSVERSE AUX. SWITCH, 1NO+1NC, SCREW CONNECTION	3RV2901-1E	SIE	105QM1	
SIE.3RV2011-4AA10	1	CIRCUIT-BREAKER SCREW CONNECTION 16A	3RV2011-4AA10	SIE	106QM1	
SIE.3RV2901-1E	1	TRANSVERSE AUX. SWITCH, 1NO+1NC, SCREW CONNECTION	3RV2901-1E	SIE	106QM1	
SIE.3RV2011-4AA10	1	CIRCUIT-BREAKER SCREW CONNECTION 16A	3RV2011-4AA10	SIE	107QM1	
SIE.3RV2901-1E	1	TRANSVERSE AUX. SWITCH, 1NO+1NC, SCREW CONNECTION	3RV2901-1E	SIE	107QM1	
SIE.3RV2021-4NA10	1	CIRCUIT-BREAKER SCREW CONNECTION 28A	3RV2021-4NA10	SIE	108QM1	
SIE.3RV2901-1E	1	TRANSVERSE AUX. SWITCH, 1NO+1NC, SCREW CONNECTION	3RV2901-1E	SIE	108QM1	
SIE.3RV2021-4NA10	1	CIRCUIT-BREAKER SCREW CONNECTION 28A	3RV2021-4NA10	SIE	109QM1	
SIE.3RV2901-1E	1	TRANSVERSE AUX. SWITCH, 1NO+1NC, SCREW CONNECTION	3RV2901-1E	SIE	109QM1	
SIE.3VA1150-3GE46-0AA0	1	MCCB_IEC_FS160_50A_4P_25KA_TM_ ATFM	3VA1150-3GE46-0AA0	SIE	120QM1	
SIE.3VA9988-0AA12	1	SENTRON auxiliary switch Accessories for 3VA circuit breakers	3VA9988-0AA12	SIE	120QM1	
SIE.5SD7464-1	1	SURGE ARR.C/T2/II 350V TN-S/TT RD	5SD7464-1	SIE	1RF8	
TKM.RPQ 80-12	1	Distribution Blocks 4P 80A	RPQ0995	TKM	120RP1	
TKM.RPQ 80-12	1	Distribution Blocks 4P 80A	RPQ0995	TKM	120RP2	
TKM.RPB 80-07	1	Distribution Blocks 2P 80A	RPB0995	TKM	151RP1	
SIE.3SU1000-1HR20-0AA0	1	EM. STOP MUSHROOM PUSHBUTTON, 40MM, RED	3SU1000-1HR20-0AA0	SIE	2SA4	EMERGENCY SHUTDOWN BUTTON LEVEL 1
SIE.3SU1400-1AA10-1BA0	1	CONTACT MODULE 1NO	3SU1400-1AA10-1BA0	SIE	2SA4	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	2SA4	=
SIE.3SU1000-5BF21-0AA0	1	KEY-OPERATED SWITCH CES, O-I	3SU1000-5BF21-0AA0	SIE	3SA1	
SIE.3SU1400-1AA10-1BA0	2	CONTACT MODULE 1NO	3SU1400-1AA10-1BA0	SIE	3SA1	
SIE.3SU1400-1AA10-1CA0	1	CONTACT MODULE 1NC	3SU1400-1AA10-1CA0	SIE	3SA1	
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	3SA1	

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SIE.3SU1000-5BF21-0AA0	1	KEY-OPERATED SWITCH CES, O-I	3SU1000-5BF21-0AA0	SIE	301SA1	STEP-BY-STEP RELAY
SIE.3SU1000-0AB40-0AA0	1	PUSHBUTTON, GREEN	3SU1000-0AB40-0AA0	SIE	3SB2	
SIE.3SU1400-1AA10-1BA0	1	CONTACT MODULE 1NO	3SU1400-1AA10-1BA0	SIE	3SB2	
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	3SB2	
SIE.3SU1000-0AB20-0AA0	1	PUSHBUTTON, RED	3SU1000-0AB20-0AA0	SIE	3SB3	
SIE.3SU1400-1AA10-1BA0	1	CONTACT MODULE 1NO	3SU1400-1AA10-1BA0	SIE	3SB3	
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	3SB3	
SIE.3SU1000-0AB50-0AA0	1	PUSHBUTTON, BLUE	3SU1000-0AB50-0AA0	SIE	215SB3	RESET
SIE.3SU1400-1AA10-1BA0	1	CONTACT MODULE 1NO	3SU1400-1AA10-1BA0	SIE	215SB3	=
SIE.3SU1500-0AA10-0AA0	1	HOLDER	3SU1500-0AA10-0AA0	SIE	215SB3	=
SIE.6GK5108-2BD00-2AB2	1	SCALANCE XB108-2SC	6GK5108-2BD00-2AB2	SIE	400SW1	
SIE.6GK5108-0BA00-2AC2	1	SCALANCE XC108	6GK5108-0BA00-2AC2	SIE	401SW1	=
SIE.6GK5116-0BA00-2AB2	1	SCALANCE XB116	6GK5116-0BA00-2AB2	SIE	402SW1	=
SIE.6GK5116-0BA00-2AB2	1	SCALANCE XB116	6GK5116-0BA00-2AB2	SIE	403SW1	=
EWON.FLEXY2020_00MA	1	Multipurpose IIoT data gateway	FLEXY2020_00MA	EWON	404SW1	=
EWON.FLX3101_00	1	Ewon Flexy extension Card - WAN Ethernet	FLX3101_00	EWON	404SW1	=
EWON.FLB320A_00	1	Ewon Flexy extension card - 4G Europe	FLB320A_00	EWON	404SW1	=
EWON.EW99008+	1	ANTENNA 4G/5G	EW99008+	EWON	404SW1	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	250T1	Z202-LP
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	250T3	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	250T5	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	251T1	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	251T3	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	251T5	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	251T7	=
SEN.Z202-LP	1	AC/DC voltage converter 0..500 Vac, 0..540 Vdc, loop powered (5-28 Vdc)	Z202-LP	SEN	251T9	=
BAU.PROFSI3-B25100-ALG-LS	1	Switching Repeater (CleverLevel Ex i)	11049888	BAU	320T1	PROFSI3-B25100-ALG-LS
BAU.PROFSI3-B25100-ALG-LS	1	Switching Repeater (CleverLevel Ex i)	11049888	BAU	320T3	=
BAU.PROFSI3-B25100-ALG-LS	1	Switching Repeater (CleverLevel Ex i)	11049888	BAU	320T5	=
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	320T7	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	330T1	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	330T5	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	331T1	
SE.RM35TF30	1	Multifunction phase control relay RM35-T - range 194..528 V AC	RM35TF30	SE	1U1	
SIE.7KM3220-0BA01-1DA0	1	PMD SENTRON PAC3220 LCD ACDC	7KM3220-0BA01-1DA0	SIE	5U1	
SIE.7KM9300-0AE02-0AA0	1	Switched Ethernet PROFINET Module V3	7KM9300-0AE02-0AA0	SIE	5U5	
SIE.6SL3220-3YE14-0AF0	1	G120X IP20 380...480V 1.5kW FSA C2	6SL3220-3YE14-0AF0	SIE	104U1	
SIE.6SL3220-3YE14-0AF0	1	G120X IP20 380...480V 1.5kW FSA C2	6SL3220-3YE14-0AF0	SIE	105U1	

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.6SL3220-3YE22-0AF0	1	G120X IP20 380...480V 5.5kW FSB C2	6SL3220-3YE22-0AF0	SIE	106U1	
SIE.6SL3220-3YE22-0AF0	1	G120X IP20 380...480V 5.5kW FSB C2	6SL3220-3YE22-0AF0	SIE	107U1	
SIE.6SL3220-3YE26-0AF0	1	G120X IP20 380...480V 11kW FSC C2	6SL3220-3YE26-0AF0	SIE	108U1	
SIE.6SL3220-3YE26-0AF0	1	G120X IP20 380...480V 11kW FSC C2	6SL3220-3YE26-0AF0	SIE	109U1	
SIE.7KM3220-0BA01-1DA0	1	PMD SENTRON PAC3220 LCD ACDC	7KM3220-0BA01-1DA0	SIE	120U3	
SIE.7KM9300-0AE02-0AA0	1	Switched Ethernet PROFINET Module V3	7KM9300-0AE02-0AA0	SIE	120U6	
PXC.2902879	1	Redundancy module	QUINT-ORING/24DC/2X40/1X80	PXC	150U1	
LOV.LPCD06	1	Communication interface Ø22mm RJ45 interface, Ethernet connection type LPCD06		LOV	403U7	
WEI.1616400000	27	Fuse terminal block	ZSI 2.5	WEI	X.AI	
WEI.1831280000	35	Disconnect and test disconnect rail-mount terminal block	ZTR 2.5	WEI	X.AI	
WEI.1616400000	4	Fuse terminal block	ZSI 2.5	WEI	X.AO	
WEI.1831280000	4	Disconnect and test disconnect rail-mount terminal block	ZTR 2.5	WEI	X.AO	
WEI.1608510000	109	Feed-through terminal block	ZDU 2.5	WEI	X.DI	
WEI.1608510000	14	Feed-through terminal block	ZDU 2.5	WEI	X.DI-IS	
WEI.1608510000	45	Feed-through terminal block	ZDU 2.5	WEI	X.DI-S	
WEI.1608510000	44	Feed-through terminal block	ZDU 2.5	WEI	X.DO	
WEI.1616400000	16	Fuse terminal block	ZSI 2.5	WEI	X.DO	
WEI.1608510000	26	Feed-through terminal block	ZDU 2.5	WEI	X.DO-S	
WEI.1608510000	40	Feed-through terminal block	ZDU 2.5	WEI	X.INT2	
WEI.1608510000	121	Feed-through terminal block	ZDU 2.5	WEI	X.INT24	
WEI.1616400000	7	Fuse terminal block	ZSI 2.5	WEI	X.INT24	
WEI.1608510000	20	Feed-through terminal block	ZDU 2.5	WEI	X.INT220	
WEI.1608510000	20	Feed-through terminal block	ZDU 2.5	WEI	X.PWR24	
WEI.1608510000	52	Feed-through terminal block	ZDU 2.5	WEI	X.PWR220	
WEI.1632050000	16	Feed-through terminal block	ZDU 4	WEI	X.PWR220	
WEI.1746750000	2	Feed-through terminal block	ZDU 10	WEI	X.PWR220	
WEI.1608510000	10	Feed-through terminal block	ZDU 2.5	WEI	X.PWR400	
WEI.1632050000	26	Feed-through terminal block	ZDU 4	WEI	X.PWR400	
WEI.1746750000	14	Feed-through terminal block	ZDU 10	WEI	X.PWR400	
WEI.1020500000	10	Feed-through terminal block	WDU 35	WEI	X.PWR400	
WEI.1820840000	5	Feed-through terminal block	WDU 50N	WEI	X.PWR400	
WEI.1608510000	8	Feed-through terminal block	ZDU 2.5	WEI	X.PWRUPS	
WEI.1608510000	73	Feed-through terminal block	ZDU 2.5	WEI	X.SEP	
WEI.1608510000	30	Feed-through terminal block	ZDU 2.5	WEI	X.STO	

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=BLPH+Q1/0.b	CABINET SUMMARY TABLE		06/02/2025	Proteo	
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=BLPH+Q1/2	MAIN SWITCH SHUNT TRIP		05/02/2025	PROTEO	
=BLPH+Q1/3	MAIN SWITCH COMMAND		05/02/2025	Proteo	
=BLPH+Q1/5	MAIN LINE MEASURING DEVICE		05/02/2025	PROTEO	
=BLPH+Q1/7	VOLTAGE PRESENCE LAMPS		05/02/2025	PROTEO	
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=BLPH+Q1/20	INTERNAL CABINET FAN CONTROLLERS		05/02/2025	PROTEO	
=BLPH+Q1/21	INTERNAL CABINET FANS		05/02/2025	PROTEO	
=BLPH+Q1/25	INTERNAL CABINET HEATERS CONTROLLERS		05/02/2025	PROTEO	
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=BLPH+Q1/211	SAFETY DIGITAL INPUT MODULE 1		11/04/2025	Proteo	
=BLPH+Q1/212	SAFETY DIGITAL INPUT MODULE 2		11/04/2025	Proteo	
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=BLPH+Q1/214	SAFETY DIGITAL INPUT MODULE 3		11/04/2025	Proteo	
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=BLPH+Q1/262	DIGITAL OUTPUT MODULE 19		11/04/2025	Proteo	
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=BLPH+Q1/331	BARRIER RELAYS		13/03/2025	Proteo	
=BLPH+Q1/340	INTERFACE SIGNALS		13/02/2025	PROTEO	
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=BLPH+Q1/360	EMERGENCY SIGNALS MANAGEMENT		04/03/2025	PROTEO	
=BLPH+Q1/361	EMERGENCY SIGNALS MANAGEMENT		11/04/2025	Proteo	
=BLPH+Q1/362	EMERGENCY SIGNALS MANAGEMENT		11/04/2025	Proteo	
=BLPH+Q1/363	EMERGENCY SIGNALS MANAGEMENT		11/04/2025	Proteo	
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=BLPH+Q1/366	EMERGENCY SIGNALS MANAGEMENT		05/02/2025	PROTEO	
=BLPH+Q1/400	ETHERNET ARCHITECTURE		05/02/2025	PROTEO	
=BLPH+Q1/401	ETHERNET ARCHITECTURE		05/02/2025	PROTEO	
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=BLPH+Q1/415	PN/PN COUPLERS		05/02/2025	PROTEO	
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F06_001

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ATTACHMENT_1_C0063-FOR-DGM-EL-003_Rev.03_QRIO1

RELASE	DATE	FILE	OWNER	ADMINISTRATOR	REASON
00	04/10/24	224J10		PROTEO	Issue for Revision
01	06/02/25	224J10		PROTEO	Issue for Review
02	03/03/25	224J10		PROTEO	Issue for Review
03	01/04/25	224J10		PROTEO	Issue for Review

PROTEO ENGINEERING GROUP

Order: W240716

Customer: FORES ENGENEERING

Date: 05/02/2025

Revision: 03

Title: ELECTRICAL CABINET - RIO1

Editing: Proteo

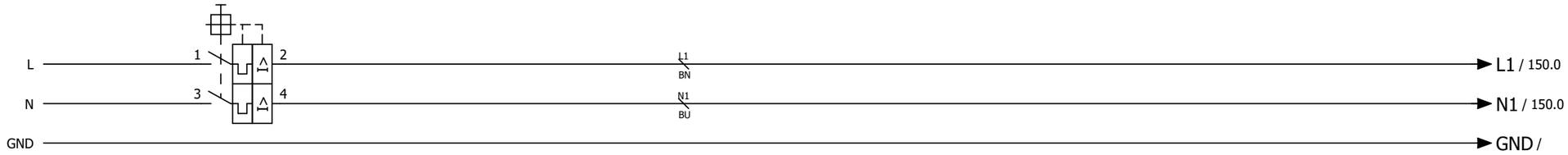
Signature: Proteo

ELECTRICAL DIAGRAM:

File: D240934SCH02

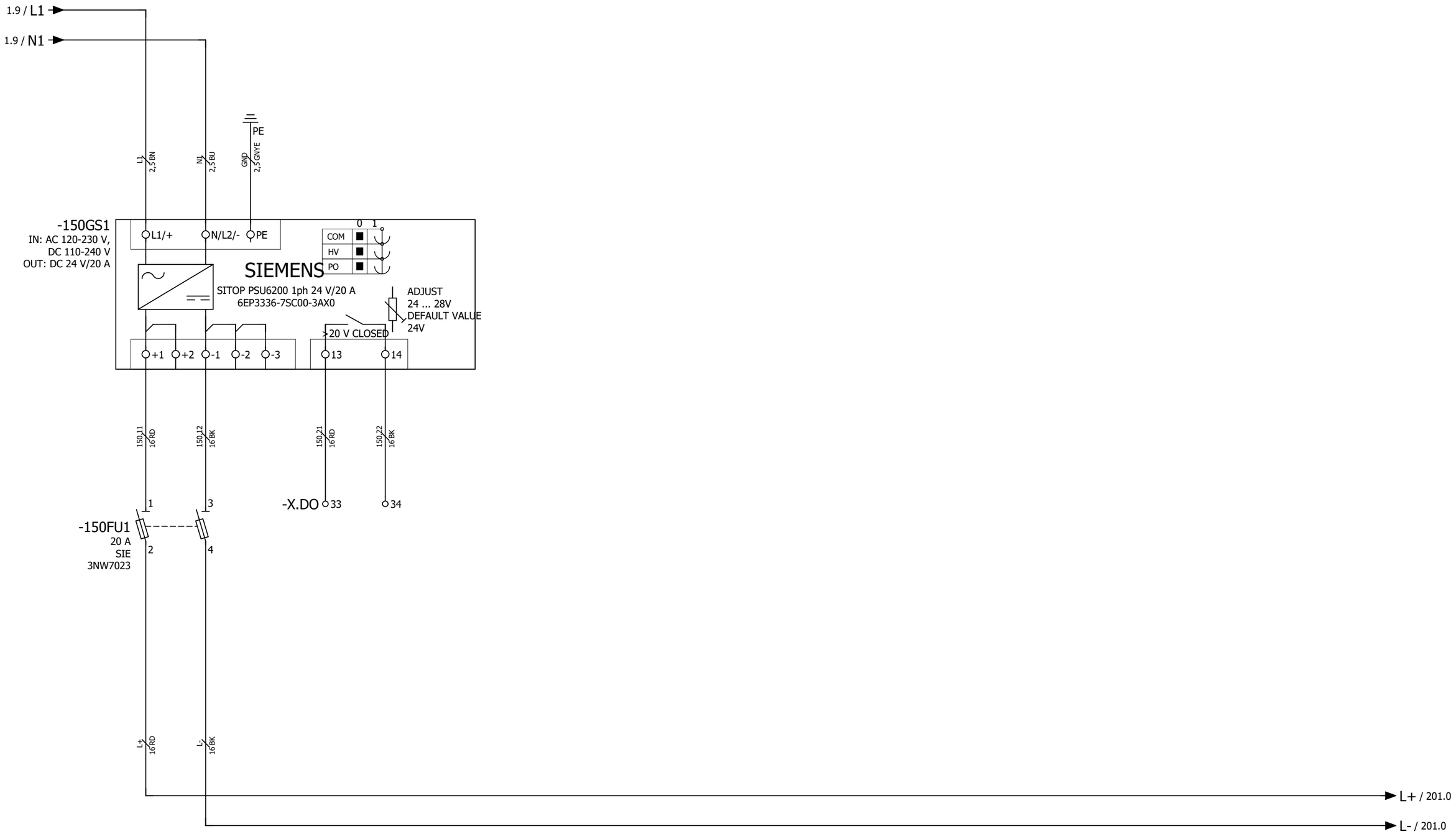
Structure thickness	1,5 mm
Structure material	Sheet Metal
Standard of Construction	CEI EN 61439-2
Equipment Name	RIO Panel WP1
Equipment TAG	Q.RIO1
Year of construction	2024
Rated operational voltage	220 Vca
Nominal Frequency	50 Hz
Rated current (InA)	2 A
Short circuit current (Icc)	6 kA
Auxiliary voltage (EAUX)	24 Vdc
Degree of protection	IP 65
Dimensions HxWxD	1400x600x300
Cable entry	From side and bottom

From Control Cabinet
TAG: 20-UCP-001
Doc. C0063-FOR-DGM-EL-003 Pag.131
Cable 3G2,5



-1QF3
16 A
Siemens
5SY4216-7

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 1	Next: 150
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01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

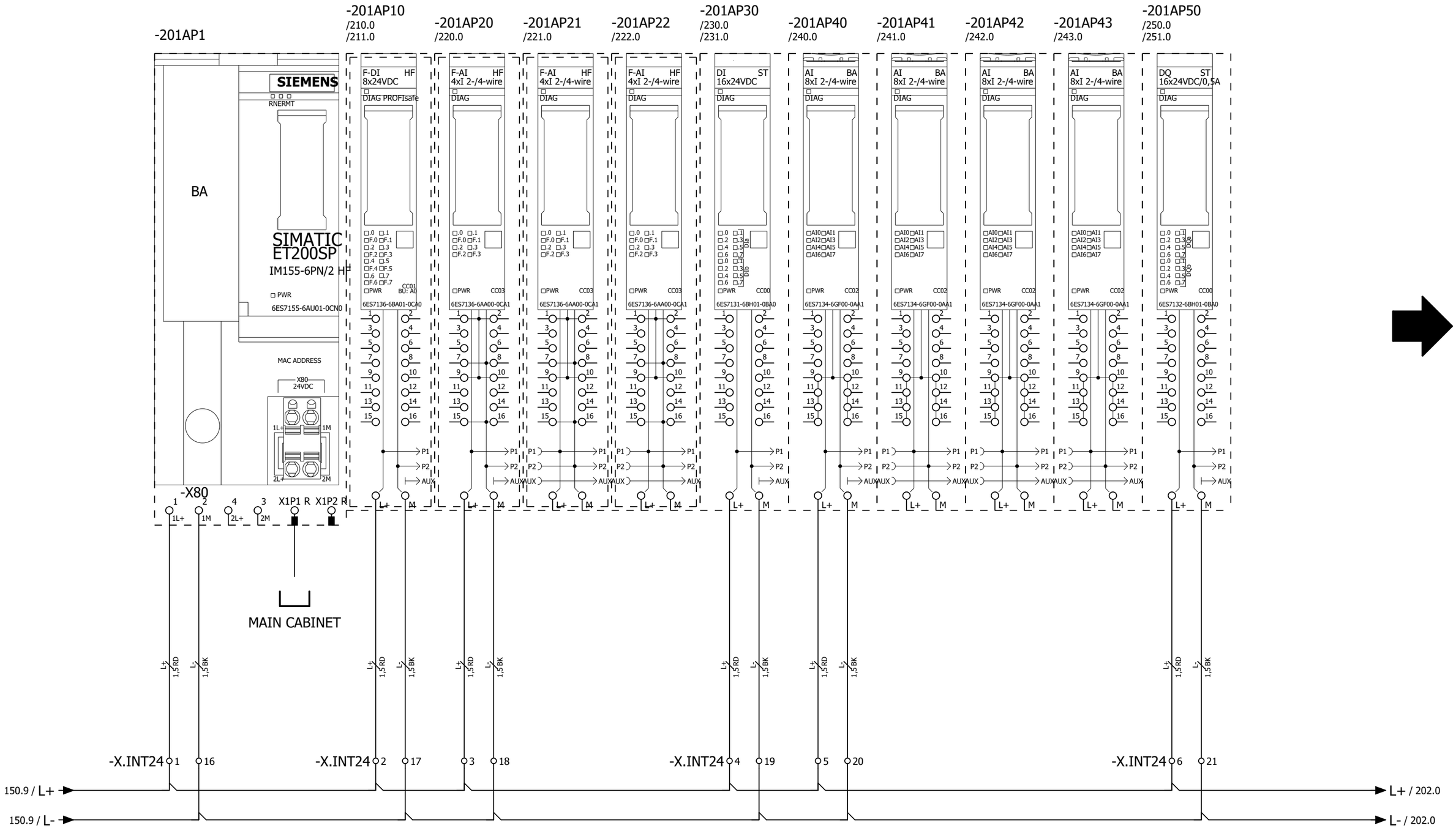


YS-105

GENERAL 24VDC

RIO 1 - 24Vdc converter - Power supply status to Control Cabinet

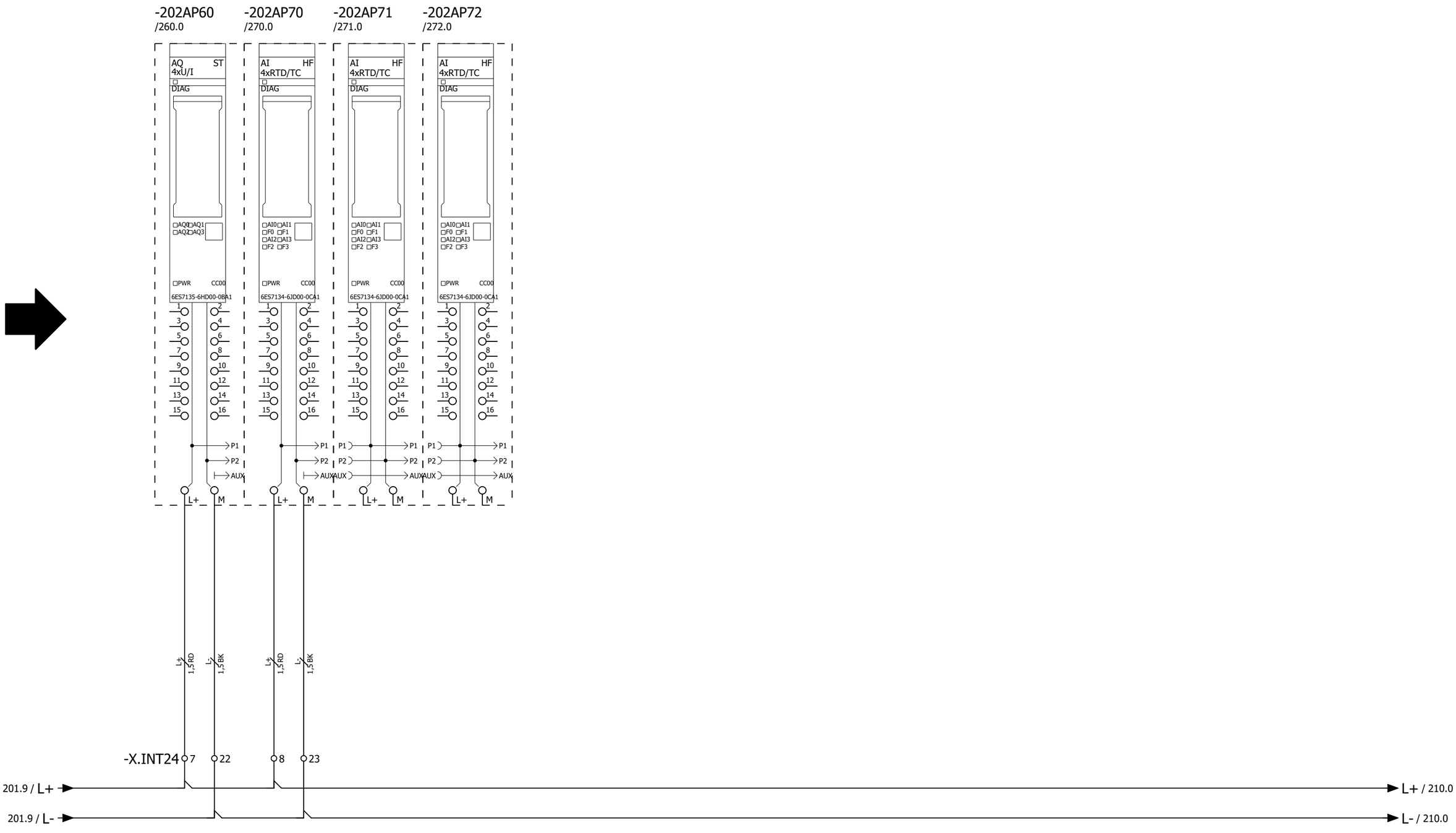
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01						Scheme: D240934SCH02	Tot. Sheet: 43	
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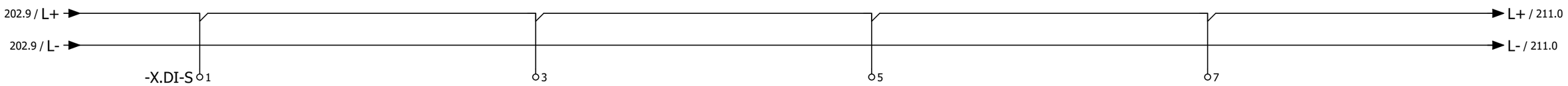
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02					

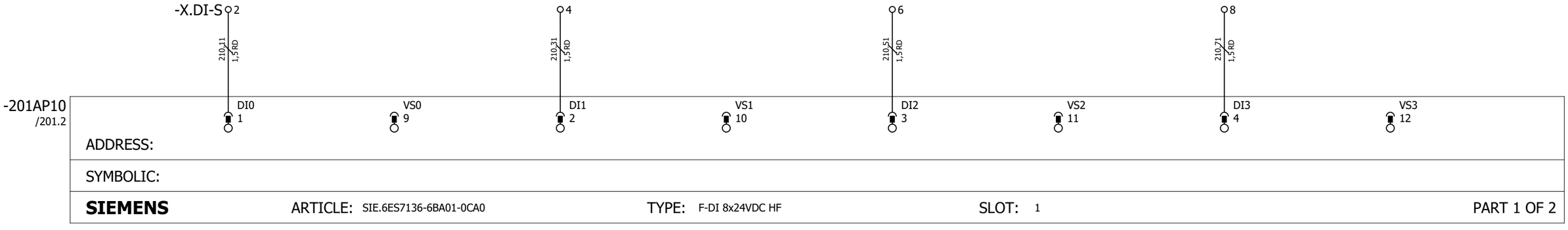
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Scheme:	D240934SCH02	Tot. Sheet: 43	

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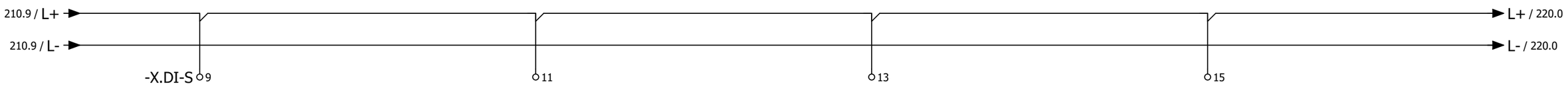
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ZI-604
HV-604 VALVE
OPEN POSITION
PWO2 TO STACKS

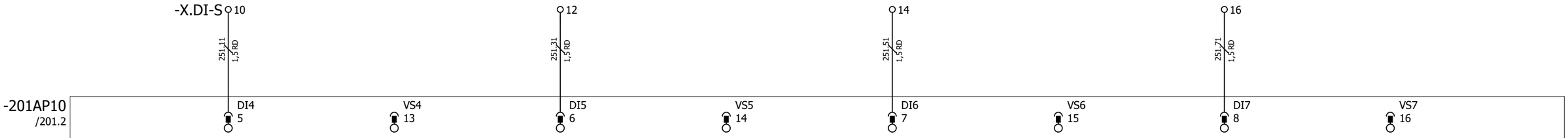
ZIO-623
ZI-623
HV-623 VALVE
OPEN POSITION
PWH2 TO STACKS

SPARE

SPARE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 210	Next: 211
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01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								





SPARE

SPARE

SPARE

SPARE

Release/Version:					
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01					Page description: SAFETY DIGITAL INPUT MODULE 1
02					

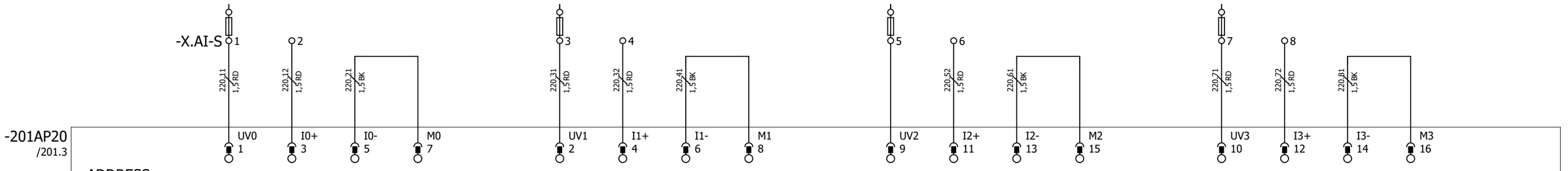
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File: D240934SCH02
Scheme: D240934SCH02

Sheet: 211 | Next: 220
Tot. Sheet: 43

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211.9 / L+ → L+ / 221.0

211.9 / L- → L- / 221.0



PT-600A
PI-600A
PWO2 OUTLET
CP-600A

PT-620A
PI-620A
PWH2 OUTLET
CP-620A

AHD-1002
AMBIENT
HYDROGEN DETECTOR
LEVEL 1

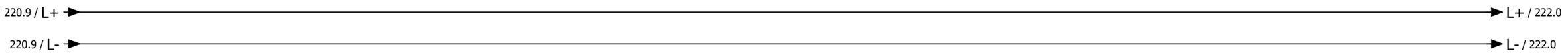
AHD-1004
AMBIENT
HYDROGEN DETECTOR
LEVEL 0

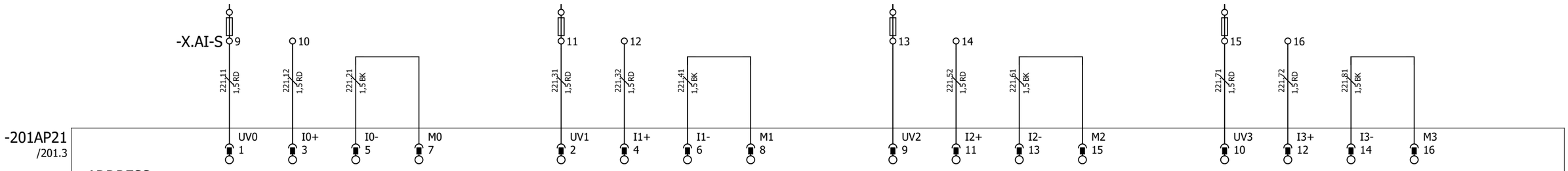
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01					Page description: ANALOGIC SAFETY INPUT MODULE 2
02					

Order: W240716
File: D240934SCH02
Scheme: D240934SCH02

Sheet:	Next:
220	221

Tot. Sheet: 43





PT-600B
PI-600B
PWO2 OUTLET
CP-600B

PT-620B
PI-620B
PWH2 OUTLET
CP-620B

SPARE

SPARE

Release/Version:					
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02					

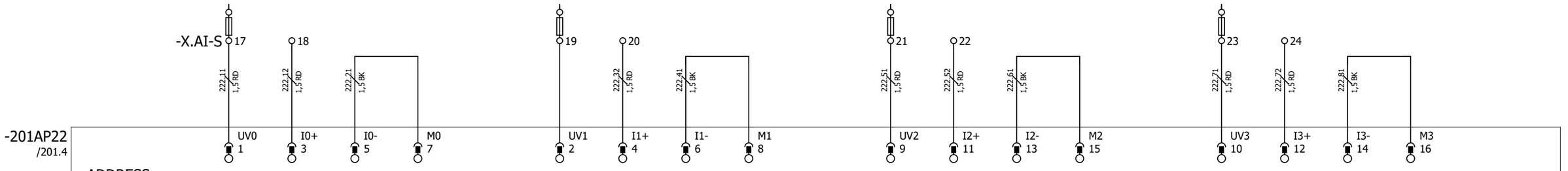
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File: D240934SCH02
Scheme: D240934SCH02

Sheet: 221 | Next: 222
Tot. Sheet: 43

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221.9 / L+ → L+ / 230.0

221.9 / L- → L- / 230.0



ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7136-6AA00-0CA1 TYPE: F-AI 4xI 2-/4-WIRE HF SLOT: 4 PART 1 OF 1

FT-600 FI-600 PWO2 TO STACKS	AHD-1001 AMBIENT HYDROGEN DETECTOR LEVEL 0	SPARE	SPARE

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO1

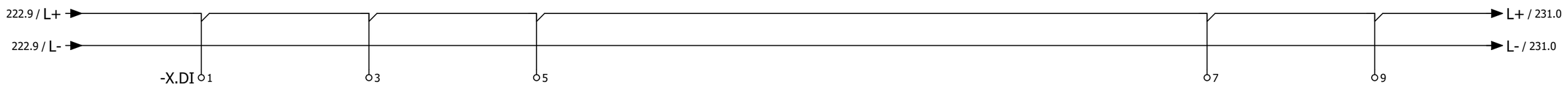
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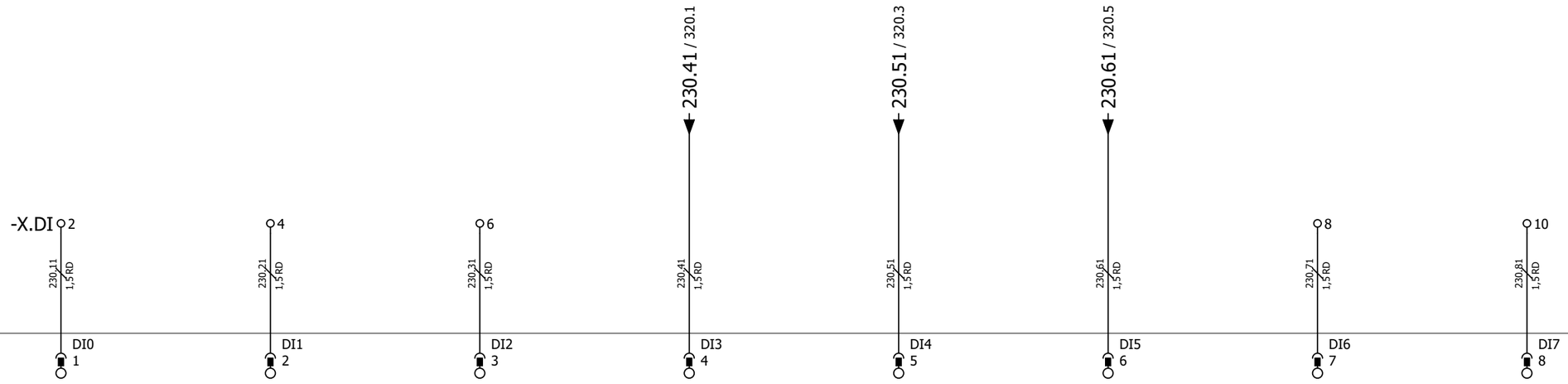
Order: W240716
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Scheme: D240934SCH02

Sheet:	Next:
222	230

Tot. Sheet: 43

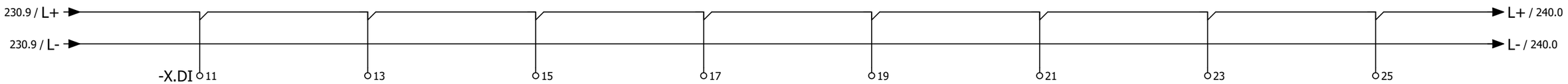


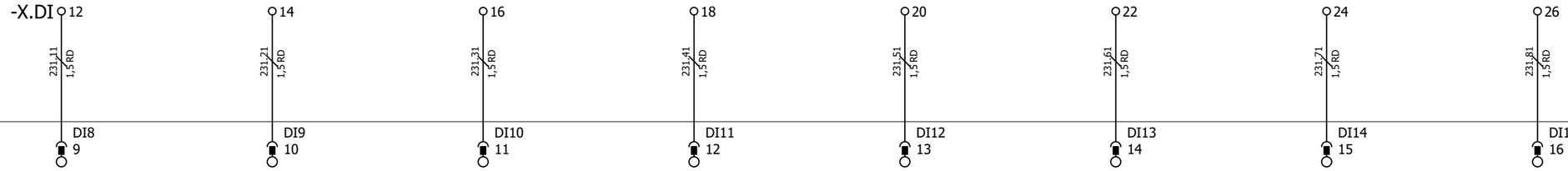


DS-001	DS-002	DS-003	WLD-001	WLD-002		DS-008	
DOOR SWITCH OPEN / CLOSE LEVEL 0	DOOR SWITCH OPEN / CLOSE LEVEL 0	DOOR SWITCH OPEN / CLOSE LEVEL 0	WATER LEAK DETECTOR LEVEL 0	WATER LEAK DETECTOR LEVEL 0	SPARE	DOOR SWITCH	SPARE

Release/Version:						
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01					Page description: DIGITAL INPUT MODULE 5	File: D240934SCH02
02						Scheme: D240934SCH02

Sheet:	Next:
230	231
Tot. Sheet: 43	





-201AP30
/201.4

DI8	DI9	DI10	DI11	DI12	DI13	DI14	DI15
9	10	11	12	13	14	15	16

ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7131-6BH01-0BA0 TYPE: DI 16X 24V DC ST SLOT: 5 PART 2 OF 2

SPARE SPARE SPARE SPARE SPARE SPARE SPARE SPARE

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO1

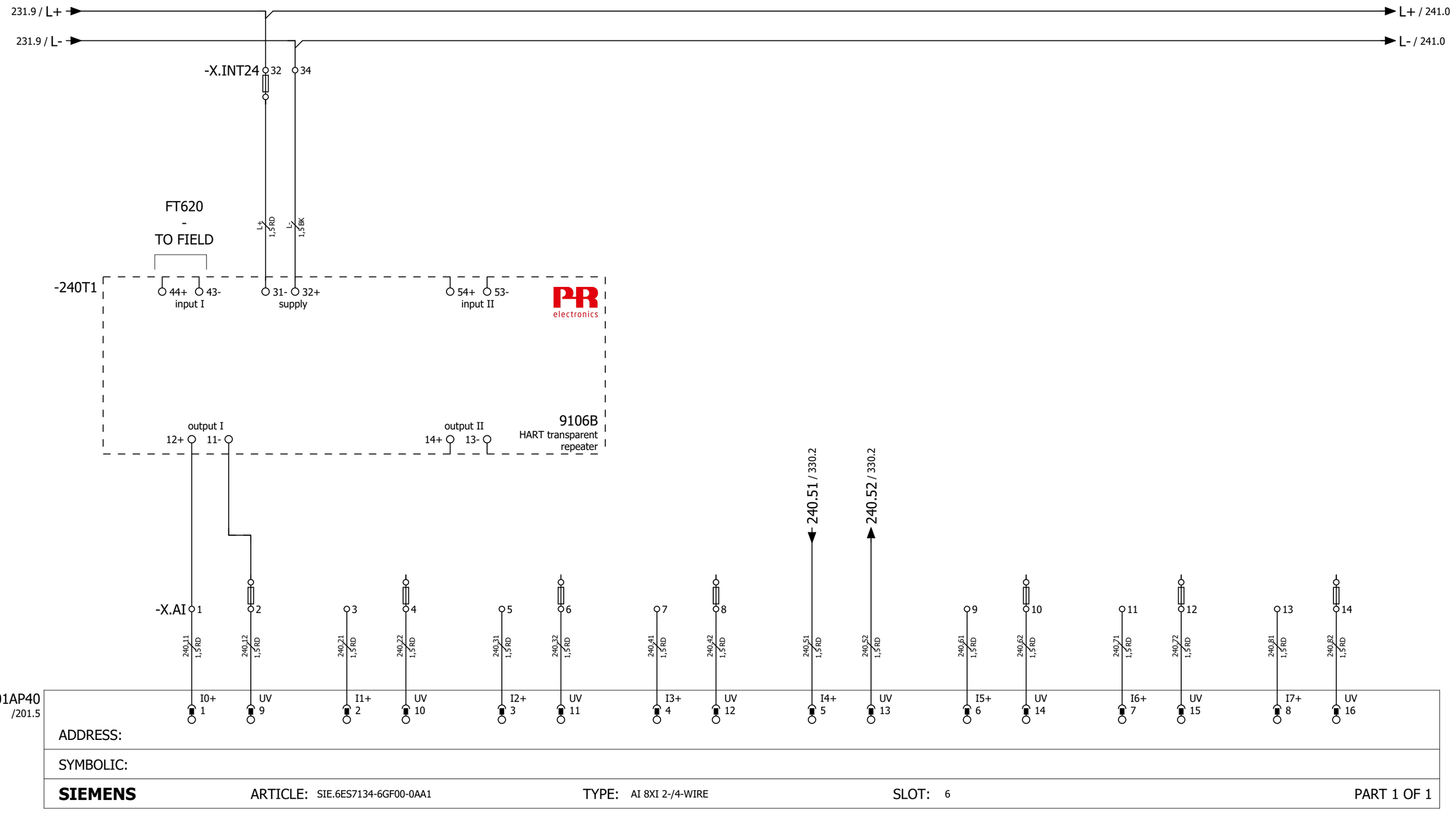
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Order: W240716
File: D240934SCH02

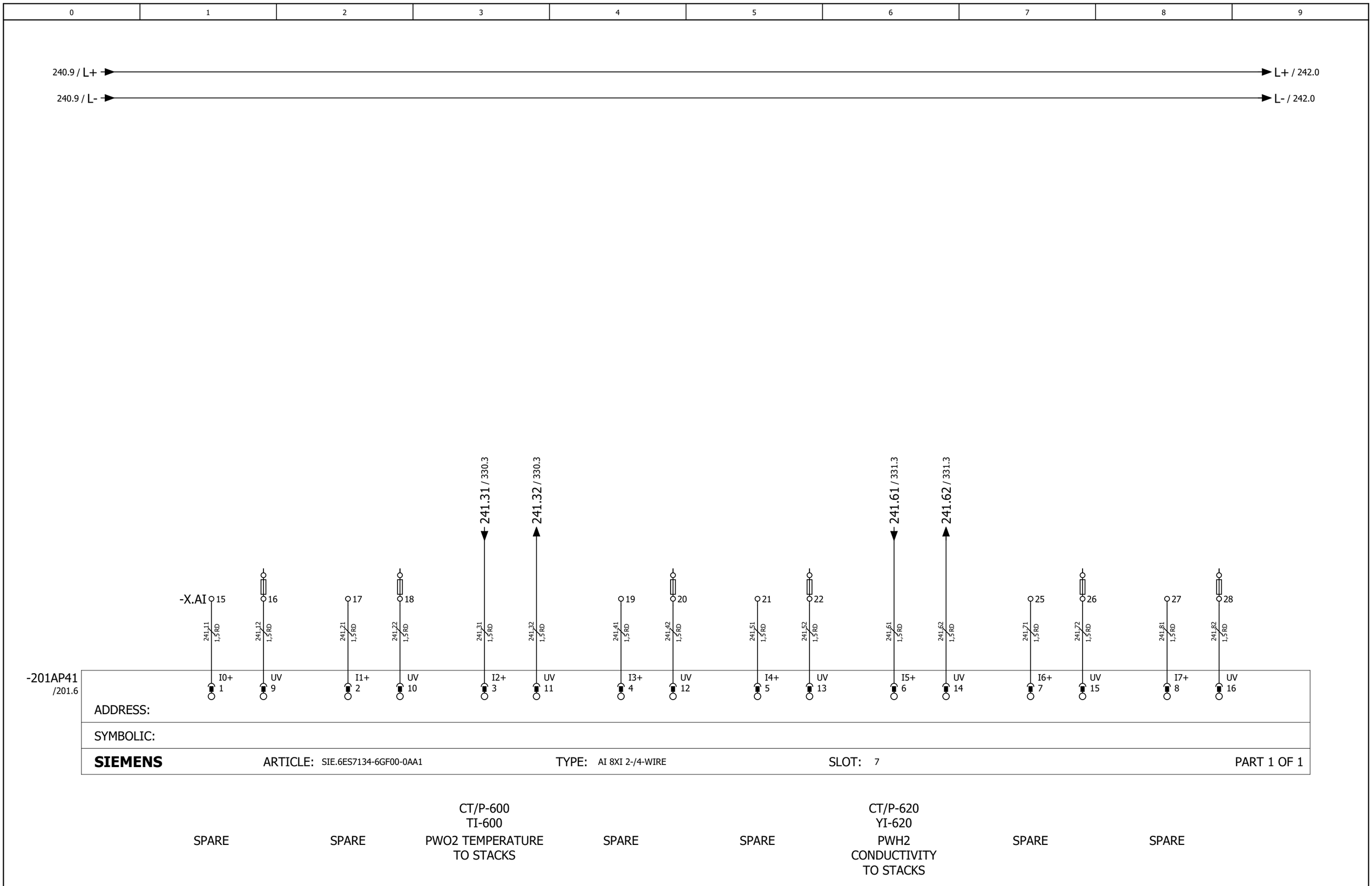
Scheme: D240934SCH02

Sheet: 231 | Next: 240

Tot. Sheet: 43



Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 240	Next: 241
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: ANALOGIC INPUT MODULE 6	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								



SPARE | SPARE | CT/P-600 TI-600 PWO2 TEMPERATURE TO STACKS | SPARE | SPARE | CT/P-620 YI-620 PWH2 CONDUCTIVITY TO STACKS | SPARE | SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 241	Next: 242
00	03			FORES ENGENEERING	Page description: ANALOGIC INPUT MODULE 7	File: D240934SCH02	Tot. Sheet: 43	
01						Scheme: D240934SCH02		
02								

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241.9 / L+ → L+ / 243.0

241.9 / L- → L- / 243.0

242.31 / 330.5

242.32 / 330.6

-X.AI

	29	30	31	32	33	34	35	36	37	38	39	40	41	42
	242.11 1,5 RD	242.12 1,5 RD	242.21 1,5 RD	242.22 1,5 RD	242.31 1,5 RD	242.32 1,5 RD	242.41 1,5 RD	242.42 1,5 RD	242.51 1,5 RD	242.52 1,5 RD	242.61 1,5 RD	242.62 1,5 RD	242.71 1,5 RD	242.72 1,5 RD	242.81 1,5 RD	242.82 1,5 RD
-201AP42 /201.6	I0+ 1	UV 9	I1+ 2	UV 10	I2+ 3	UV 11	I3+ 4	UV 12	I4+ 5	UV 13	I5+ 6	UV 14	I6+ 7	UV 15	I7+ 8	UV 16

ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7134-6GF00-0AA1 TYPE: AI 8XI 2-/4-WIRE SLOT: 8 PART 1 OF 1

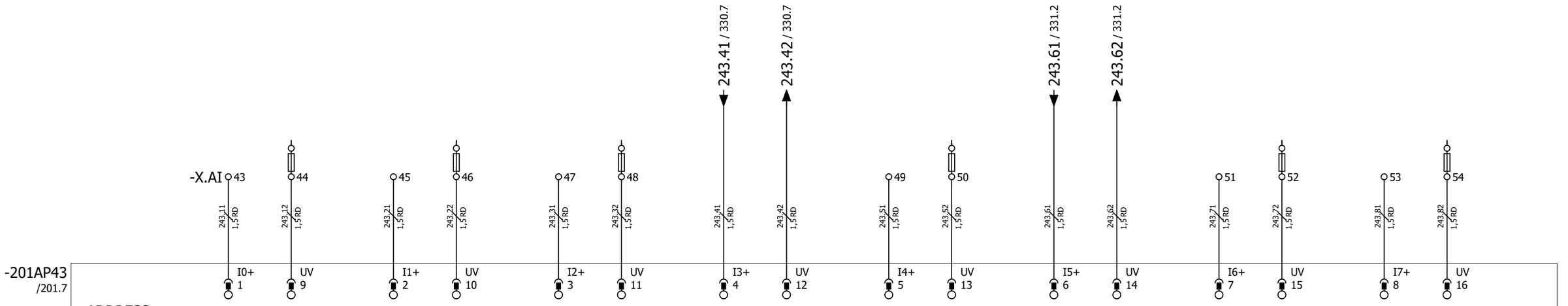
SPARE	SPARE	CT/P-600 YI-600 PWO2 CONDUCTIVITY TO STACKS	PT-620 PI-620 PWH2 TO FH-620	SPARE	SPARE	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716 File: D240934SCH02	Sheet: 242 / Next: 243
00	03			FORES ENGENEERING	Page description: ANALOGIC INPUT MODULE 8	Scheme: D240934SCH02	Tot. Sheet: 43
01							
02							

0	1	2	3	4	5	6	7	8	9

242.9 / L+ → L+ / 260.0

242.9 / L- → L- / 250.0



SPARE	SPARE	SPARE	TT-621A TAHH-621A MOTOR CP-620A WINDINGS TEMPERATURE	SPARE	CT/P-620 TI-620 PWH2 TEMPERATURE TO STACKS	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 243	Next: 250
00	03			FORES ENGENEERING	Page description: ANALOGIC INPUT MODULE 9	File: D240934SCH02	Tot. Sheet: 43	
01						Scheme: D240934SCH02		
02								

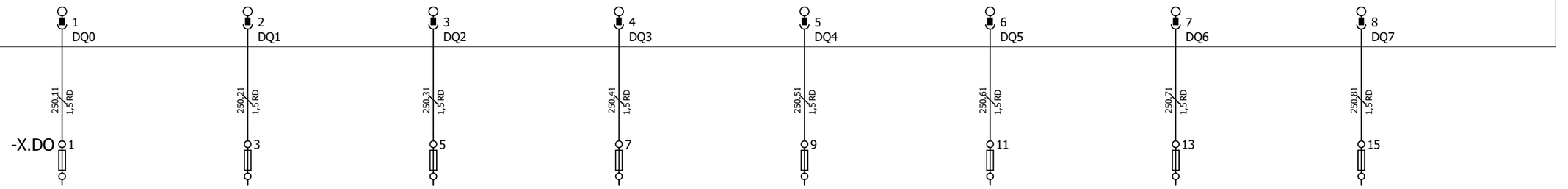
0	1	2	3	4	5	6	7	8	9

-201AP50
/201.7

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 10 PART 1 OF 2

SYMBOLIC:

ADDRESS:





VE-005	VE-006	VE-007	VE-008	BUZ-1002	VE-009	VE-010	VE-011
LIGHT COLUMN LEVEL 1 RED	LIGHT COLUMN LEVEL 1 ORANGE	LIGHT COLUMN LEVEL 1 GREEN	LIGHT COLUMN LEVEL 1 BLUE	BUZZER LEVEL 1	LIGHT COLUMN LEVEL 2 RED	LIGHT COLUMN LEVEL 2 ORANGE	LIGHT COLUMN LEVEL 2 GREEN

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 250	Next: 251
00	03			FORES ENGENEERING	Page description: DIGITAL OUTPUT MODULE 10	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

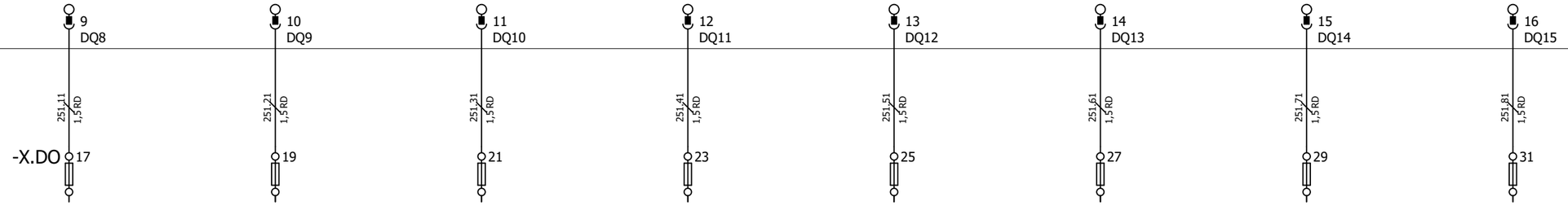
0	1	2	3	4	5	6	7	8	9

-201AP50
/201.7

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 10 PART 2 OF 2

SYMBOLIC:

ADDRESS:





VE-012	BUZ-1003							
LIGHT COLUMN LEVEL 2 BLUE	BUZZER LEVEL 2	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 251	Next: 260
00	03			FORES ENGENEERING		File: D240934SCH02		
01					Page description: DIGITAL OUTPUT MODULE 10		Tot. Sheet: 43	
02						Scheme: D240934SCH02		

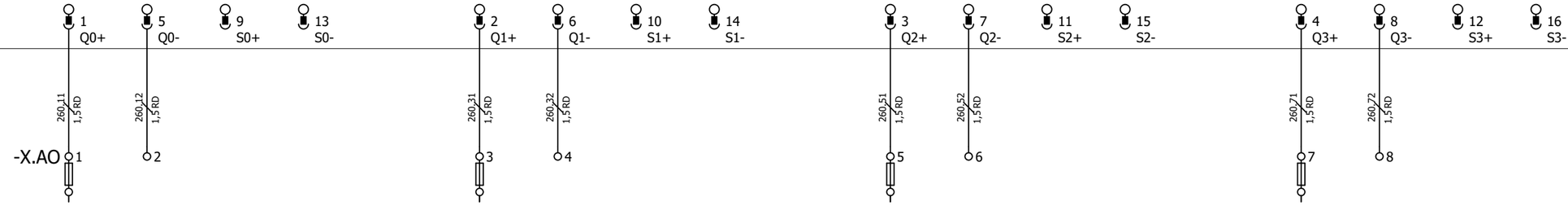
0	1	2	3	4	5	6	7	8	9

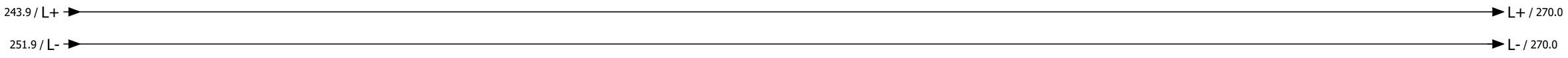
-202AP60
/202.1

SIEMENS ARTICLE: SIE.6ES7135-6HD00-0BA1 TYPE: AQ 4XU/I ST SLOT: 11 PART 1 OF 1

SYMBOLIC:

ADDRESS:





VAT-001

VOLTAGE DISPLAY

VAT-002

VOLTAGE DISPLAY

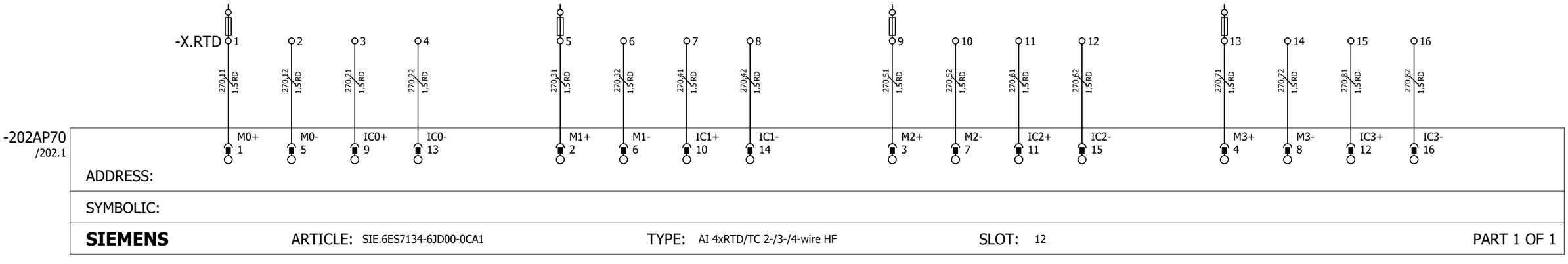
SPARE

SPARE

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 260	Next: 270
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: ANALOGIC OUTPUT MODULE 11	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

260.9 / L+ → L+ / 271.0

260.9 / L- → L- / 271.0



TT-601A TI-601A PWO2 OUT STACK-001	TT-601D TI-601D PWO2 OUT STACK-004	TT-601G TI-601G PWO2 OUT STACK-007
		SPARE

270.9 / L+ → L+ / 272.0

270.9 / L- → L- / 272.0

-X.RTD

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
271.11 1,5 RD	271.12 1,5 RD	271.21 1,5 RD	271.22 1,5 RD	271.31 1,5 RD	271.32 1,5 RD	271.41 1,5 RD	271.42 1,5 RD	271.51 1,5 RD	271.52 1,5 RD	271.61 1,5 RD	271.62 1,5 RD	271.71 1,5 RD	271.72 1,5 RD	271.81 1,5 RD	271.82 1,5 RD
M0+ 1	M0- 5	IC0+ 9	IC0- 13	M1+ 2	M1- 6	IC1+ 10	IC1- 14	M2+ 3	M2- 7	IC2+ 11	IC2- 15	M3+ 4	M3- 8	IC3+ 12	IC3- 16

-202AP71
/202.2

ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7134-6JD00-0CA1 TYPE: AI 4xRTD/TC 2-/3-/4-wire HF SLOT: 13 PART 1 OF 1

TT-601B TI-601B PWO2 OUT STACK-002				TT-601E TI-601E PWO2 OUT STACK-005				TT-601H TI-601H PWO2 OUT STACK-008				SPARE			

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO1

Page description: ANALOGIC INPUT MODULE 13

Order: W240716
File: D240934SCH02

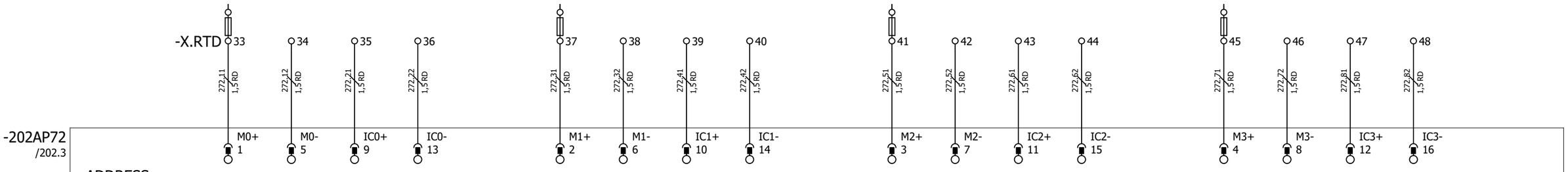
Scheme: D240934SCH02

Sheet: 271 | Next: 272

Tot. Sheet: 43

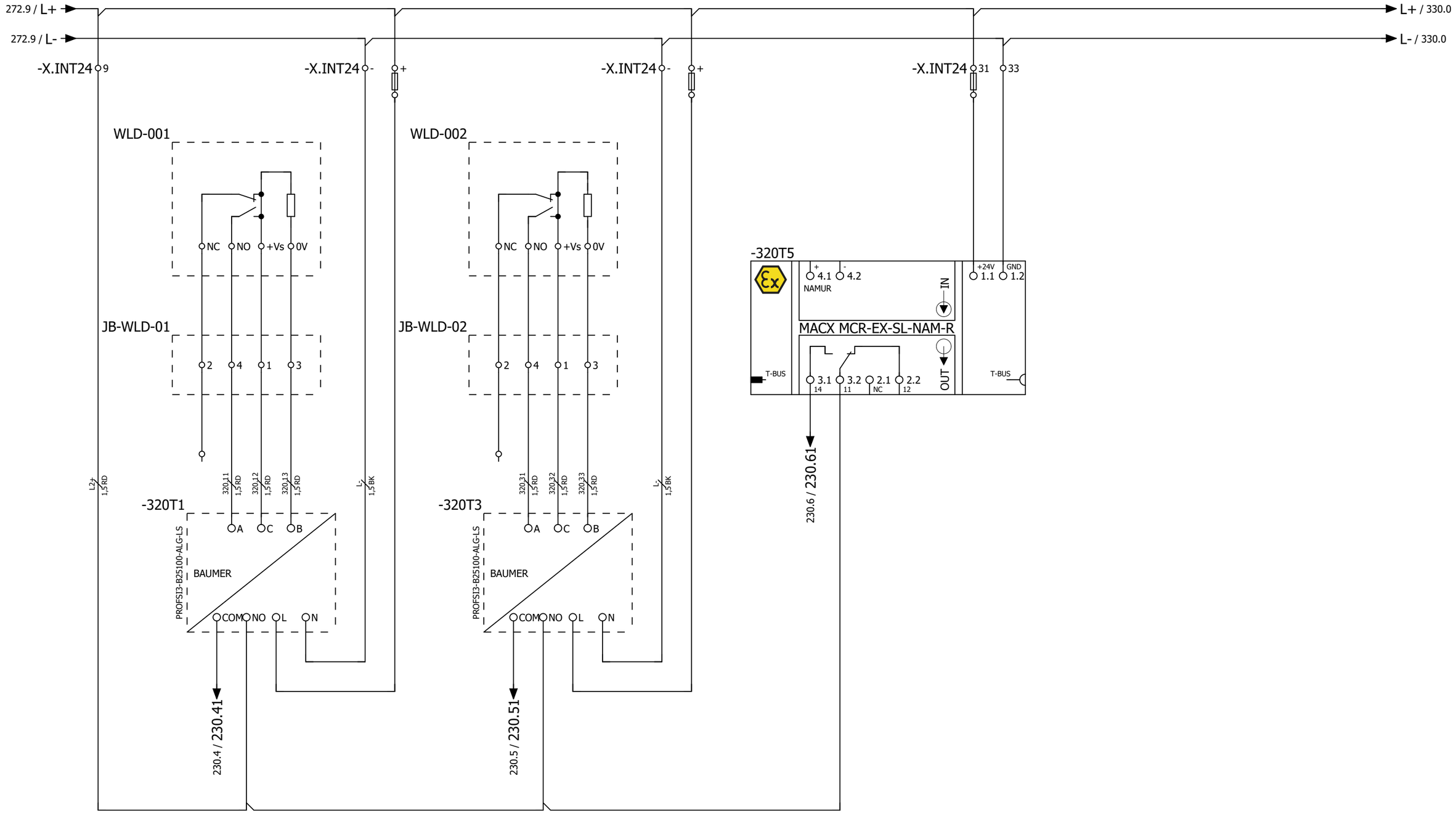
271.9 / L+ → L+ / 320.0

271.9 / L- → L- / 320.0



TT-601C TI-601C PWO2 OUT STACK-003	TT-601F TI-601F PWO2 OUT STACK-006	SPARE

SPARE



WLD-001

WATER LEAK
DETECTOR
LEVEL 0

WLD-002

WATER LEAK
DETECTOR
LEVEL 0

SPARE

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO1
01					Page description: BARRIER RELAYS
02					

Order: W240716	Sheet: 320	Next: 330
File: D240934SCH02		
Scheme: D240934SCH02	Tot. Sheet: 43	

320.9 / L+
320.9 / L-

L+ / 331.0
L- / 331.0

-X.INT24 11 25
-X.INT24 12 26
-X.INT24 13 27
-X.INT24 14 28

L+ 1,5 RD
L- 1,5 BK

TAHH-621B
-
TO FIELD

TI-600
-
TO FIELD

YI-600
-
TO FIELD

TAHH-621A
-
TO FIELD

-330T1

44+ 43- input I
31- 32+ supply
54+ 53- input II

PR electronics

output I
12+ 11-
output II
14+ 13-

9106B
HART transparent repeater

-330T5

44+ 43- input I
31- 32+ supply
54+ 53- input II

PR electronics

output I
12+ 11-
output II
14+ 13-

9106B
HART transparent repeater

240.5 / 240.51
240.5 / 240.52

241.3 / 241.31
241.3 / 241.32

242.3 / 242.31
242.3 / 242.32

243.4 / 243.41
243.4 / 243.42

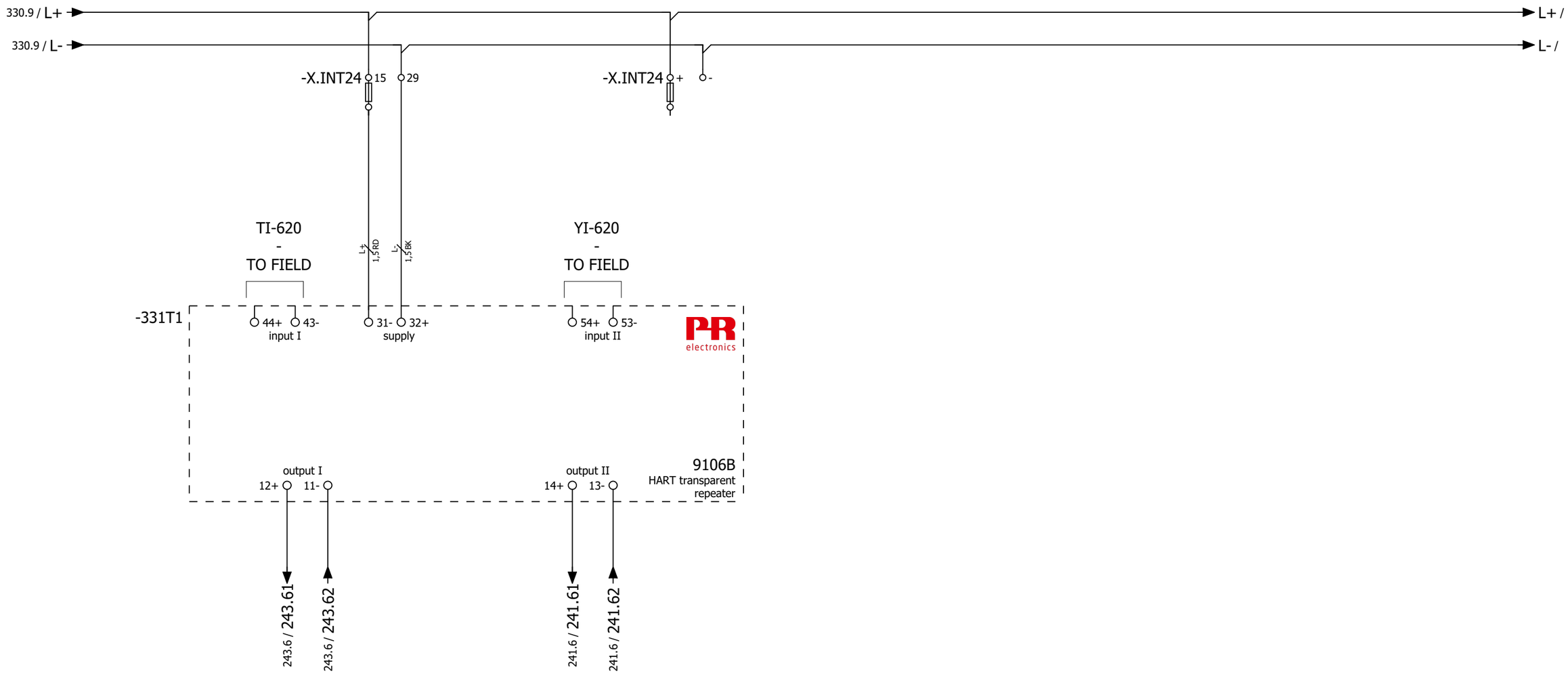
TT-621B
TAHH-621B
MOTOR CP-620B
WINDINGS
TEMPERATURE

CT/P-600
TI-600
PWO2 TEMPERATURE
TO STACKS

CT/P-600
YI-600
PWO2 CONDUCTIVITY
TO STACKS

TT-621A
TAHH-621A
MOTOR CP-620A
WINDINGS
TEMPERATURE

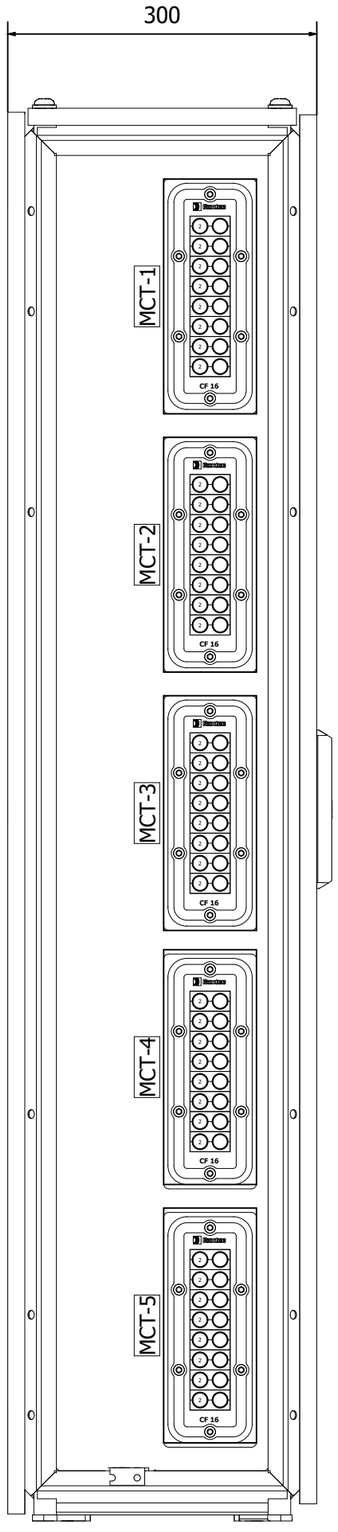
Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 330	Next: 331
00	03			FORES ENGENEERING		File: D240934SCH02		
01					Page description: BARRIER RELAYS		Tot. Sheet: 43	
02						Scheme: D240934SCH02		

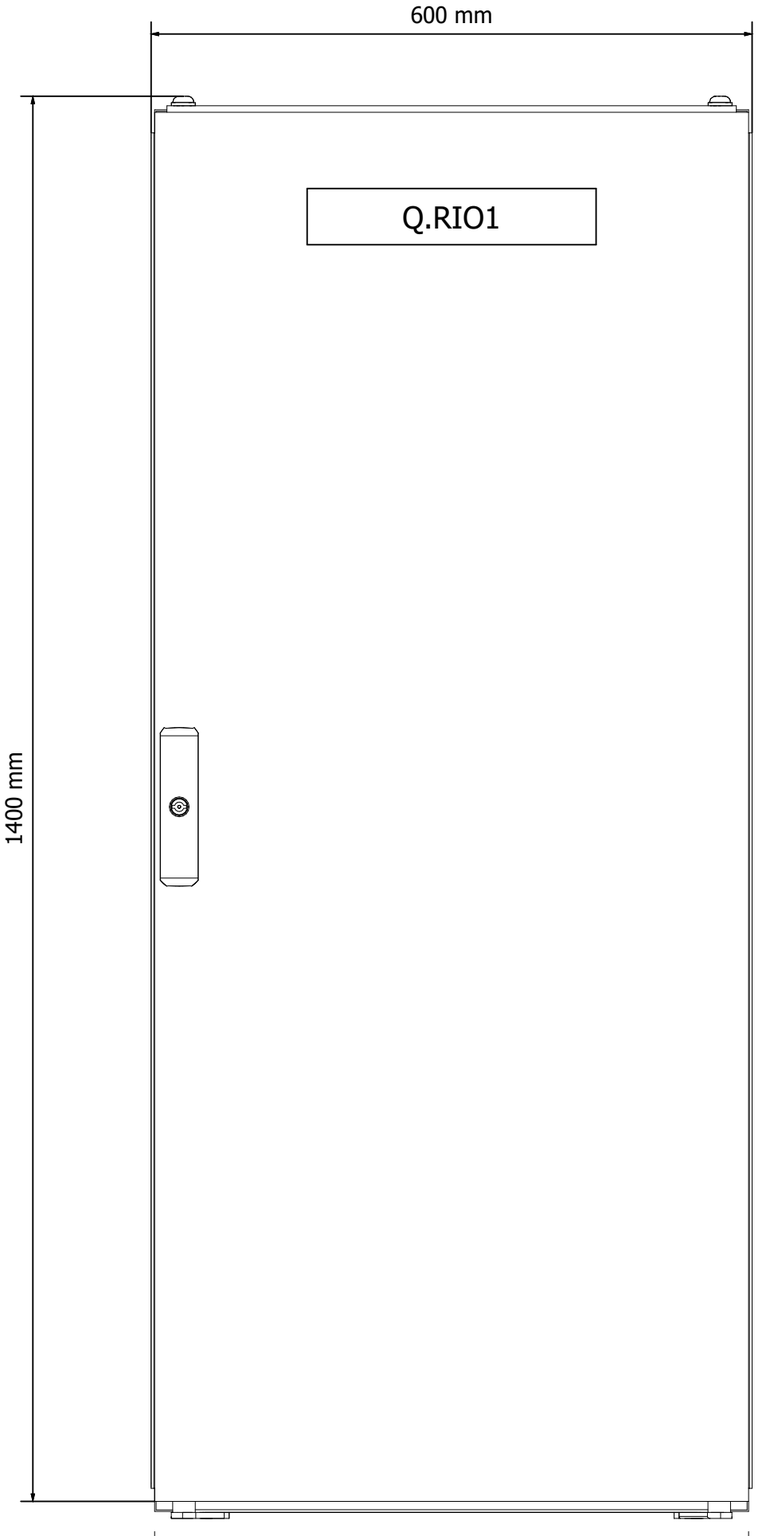


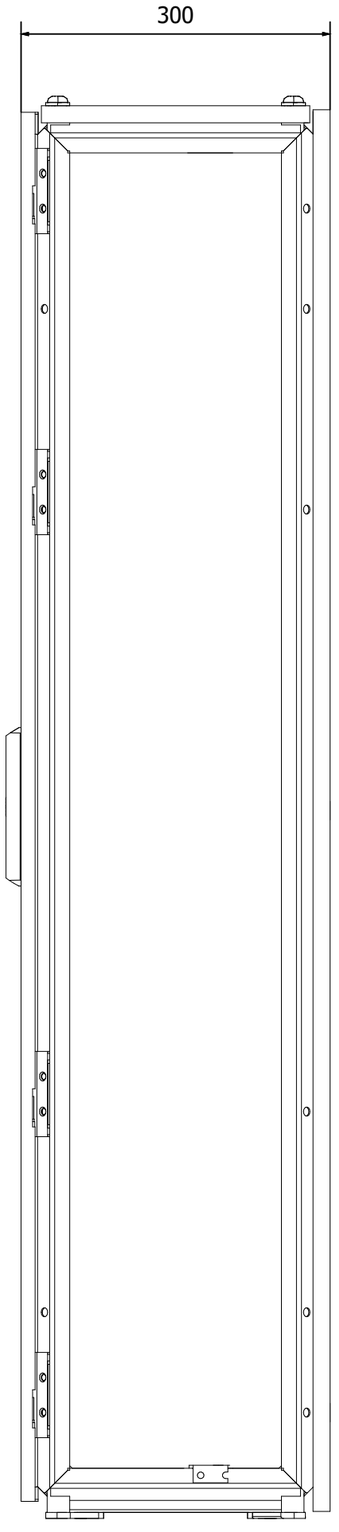
CT/P-620
TI-620
PWH2 TEMPERATURE
TO STACKS

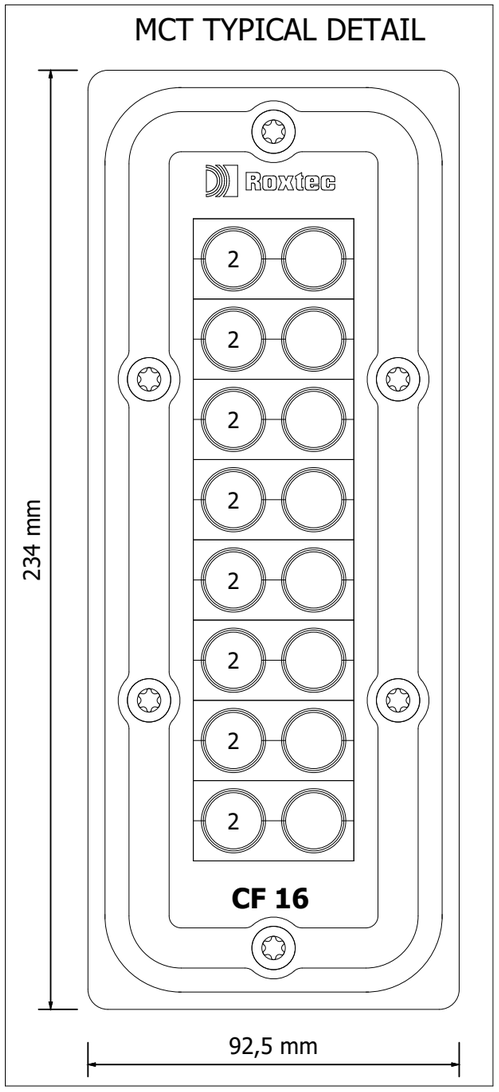
CT/P-620
YI-620
PWH2 CONDUCTIVITY
TO STACKS

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 331	Next: 500
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: BARRIER RELAYS	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

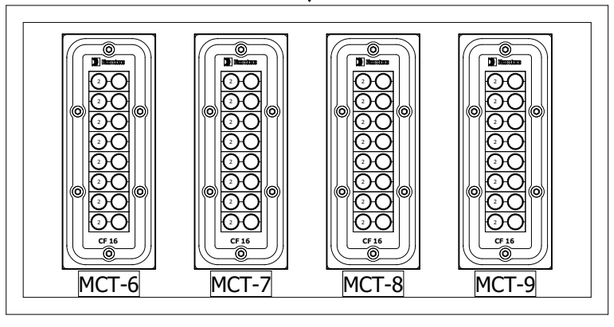








FRONT

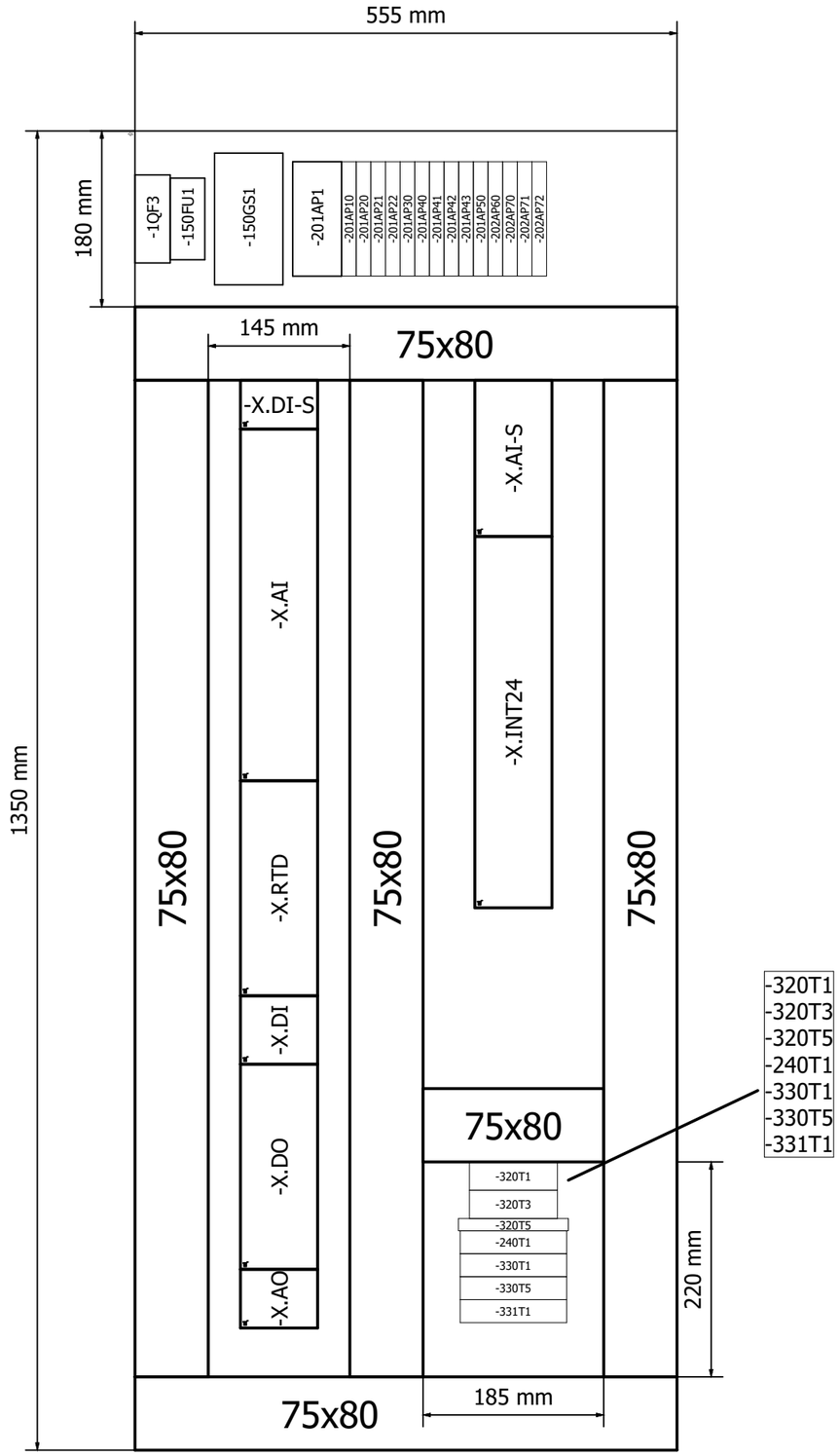


BOTTOM VIEW

WEIGHT: 100Kg

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO1
01					Page description: MAIN CABINET EXTERNAL LAYOUT
02					

Order: W240716	Sheet: 500	Next: 505
File: D240934SCH02		
Scheme: D240934SCH02	Tot. Sheet: 43	



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 505	Next: +SUMMARY/600
00	03			FORES ENGENEERING	Page description: MAIN CABINET INTERNAL LAYOUT	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.AI

ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-240T1	12+	1	,	-201AP40	-X10:1			/240.1
			-240T1	11-	2		-201AP40	-X10:9			/240.1
SPARE					3	,	-201AP40	-X10:2			/240.2
=					4		-201AP40	-X10:10			/240.2
PWO2 TO HE600					5	,	-201AP40	-X10:3			/240.3
=					6		-201AP40	-X10:11			/240.3
SPARE					7	,	-201AP40	-X10:4			/240.4
=					8		-201AP40	-X10:12			/240.4
=					9	,	-201AP40	-X10:6			/240.6
=					10		-201AP40	-X10:14			/240.6
=					11	,	-201AP40	-X10:7			/240.7
=					12		-201AP40	-X10:15			/240.7
=					13	,	-201AP40	-X10:8			/240.8
=					14		-201AP40	-X10:16			/240.8
=					15	,	-201AP41	-X10:1			/241.1
=					16		-201AP41	-X10:9			/241.1
=					17	,	-201AP41	-X10:2			/241.2
=					18		-201AP41	-X10:10			/241.2
=					19	,	-201AP41	-X10:4			/241.4
=					20		-201AP41	-X10:12			/241.4
=					21	,	-201AP41	-X10:5			/241.5
=					22		-201AP41	-X10:13			/241.5
=					25	,	-201AP41	-X10:7			/241.7
=					26		-201AP41	-X10:15			/241.7
=					27	,	-201AP41	-X10:8			/241.8
=					28		-201AP41	-X10:16			/241.8
=					29	,	-201AP42	-X10:1			/242.1
=					30		-201AP42	-X10:9			/242.1
=					31	,	-201AP42	-X10:2			/242.2
=					32		-201AP42	-X10:10			/242.2
PWH2 TO FH-620					33	,	-201AP42	-X10:4			/242.4
=					34		-201AP42	-X10:12			/242.4
SPARE					35	,	-201AP42	-X10:5			/242.5
=					36		-201AP42	-X10:13			/242.5
=					37	,	-201AP42	-X10:6			/242.6

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.AI

ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					38		-201AP42	-X10:14			/242.6
=					39	,	-201AP42	-X10:7			/242.7
=					40		-201AP42	-X10:15			/242.7
=					41	,	-201AP42	-X10:8			/242.8
=					42		-201AP42	-X10:16			/242.8
=					43	,	-201AP43	-X10:1			/243.1
=					44		-201AP43	-X10:9			/243.1
=					45	,	-201AP43	-X10:2			/243.2
=					46		-201AP43	-X10:10			/243.2
=					47	,	-201AP43	-X10:3			/243.3
=					48		-201AP43	-X10:11			/243.3
=					49	,	-201AP43	-X10:5			/243.5
=					50		-201AP43	-X10:13			/243.5
=					51	,	-201AP43	-X10:7			/243.7
=					52		-201AP43	-X10:15			/243.7
=					53	,	-201AP43	-X10:8			/243.8
=					54		-201AP43	-X10:16			/243.8

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation:	Order:	Sheet:	Next:
00	03			FORES ENGENEERING	ELECTRICAL CABINET - RIO1	W240716	600.a	601
01					Page description: TERMINAL BOARDS	File: D240934SCH02	Tot. Sheet:	
02						Scheme: D240934SCH02	43	

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.AI-S

SAFETY ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
					1		-201AP20	-X10:1			/220.1
					2	,	-201AP20	-X10:3			/220.1
PWO2 OUTLET CP-600A					3		-201AP20	-X10:2			/220.3
=					4	,	-201AP20	-X10:4			/220.3
PWH2 OUTLET CP-620A					5		-201AP20	-X10:9			/220.5
=					6	,	-201AP20	-X10:11			/220.5
AMBIENT HYDROGEN DETECTOR LEVEL 1					7		-201AP20	-X10:10			/220.7
=					8	,	-201AP20	-X10:12			/220.7
					9		-201AP21	-X10:1			/221.1
					10	,	-201AP21	-X10:3			/221.1
PWO2 OUTLET CP-600B					11		-201AP21	-X10:2			/221.3
=					12	,	-201AP21	-X10:4			/221.3
PWH2 OUTLET CP-620B					13		-201AP21	-X10:9			/221.5
=					14	,	-201AP21	-X10:11			/221.5
SPARE					15		-201AP21	-X10:10			/221.7
=					16	,	-201AP21	-X10:12			/221.7
					17		-201AP22	-X10:1			/222.1
					18	,	-201AP22	-X10:3			/222.1
PWO2 TO STACKS					19		-201AP22	-X10:2			/222.3
=					20	,	-201AP22	-X10:4			/222.3
AMBIENT HYDROGEN DETECTOR LEVEL 0					21		-201AP22	-X10:9			/222.5
=					22	,	-201AP22	-X10:11			/222.5
SPARE					23		-201AP22	-X10:10			/222.7
=					24	,	-201AP22	-X10:12			/222.7

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 601	Next: 602
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.AO

ANALOGIC OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
VOLTAGE DISPLAY					1		-202AP60	1			/260.1
=					2	,	-202AP60	5			/260.1
=					3		-202AP60	2			/260.3
=					4	,	-202AP60	6			/260.3
SPARE					5		-202AP60	3			/260.5
=					6	,	-202AP60	7			/260.5
=					7		-202AP60	4			/260.7
=					8	,	-202AP60	8			/260.7

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO1

Page description: TERMINAL BOARDS

Order: W240716

File: D240934SCH02

Scheme: D240934SCH02

Sheet: 602 | Next: 603

Tot. Sheet: 43

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
DOOR SWITCH OPEN / CLOSE LEVEL 0					1		-X.DI-S	15			/230.1
=					2		-201AP30	1			/230.1
=					3						/230.2
=					4		-201AP30	2			/230.2
=					5						/230.3
=					6		-201AP30	3			/230.3
DOOR SWITCH					7						/230.7
=					8		-201AP30	7			/230.7
SPARE					9						/230.8
=					10		-201AP30	8			/230.8
=					11						/231.1
=					12		-201AP30	9			/231.1
=					13						/231.2
=					14		-201AP30	10			/231.2
=					15						/231.3
=					16		-201AP30	11			/231.3
=					17						/231.4
=					18		-201AP30	12			/231.4
=					19						/231.5
=					20		-201AP30	13			/231.5
=					21						/231.6
=					22		-201AP30	14			/231.6
=					23						/231.7
=					24		-201AP30	15			/231.7
=					25		-X.INT24	32			/231.8
=					26		-201AP30	16			/231.8

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 603	Next: 604
00	03			FORES ENGENEERING		File: D240934SCH02		
01					Page description: TERMINAL BOARDS			Tot. Sheet: 43
02						Scheme: D240934SCH02		

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.DI-S

SAFETY DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
HV-604 VALVE OPEN POSITION PWO2 TO STACKS					1		-X.INT24	8			/210.1
=					2		-201AP10	1			/210.1
HV-623 VALVE OPEN POSITION PWH2 TO STACKS					3						/210.3
=					4		-201AP10	2			/210.3
SPARE					5						/210.5
=					6		-201AP10	3			/210.5
=					7						/210.7
=					8		-201AP10	4			/210.7
=					9						/211.1
=					10		-201AP10	5			/211.1
=					11						/211.3
=					12		-201AP10	6			/211.3
=					13						/211.5
=					14		-201AP10	7			/211.5
=					15		-X.DI	1			/211.7
=					16		-201AP10	8			/211.7

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation:	Order:	Sheet:	Next:
00	03			FORES ENGENEERING	ELECTRICAL CABINET - RIO1	W240716	604	605
01					Page description: TERMINAL BOARDS	File: D240934SCH02	Tot. Sheet: 43	
02						Scheme: D240934SCH02		

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.DO

DIGITAL OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
LIGHT COLUMN LEVEL 1 RED					1		-201AP50	1			/250.1
=					2		-X.INT24	34			/250.1
LIGHT COLUMN LEVEL 1 ORANGE					3		-201AP50	2			/250.2
=					4						/250.2
LIGHT COLUMN LEVEL 1 GREEN					5		-201AP50	3			/250.3
=					6						/250.3
LIGHT COLUMN LEVEL 1 BLUE					7		-201AP50	4			/250.4
=					8						/250.4
BUZZER LEVEL 1					9		-201AP50	5			/250.5
=					10						/250.5
LIGHT COLUMN LEVEL 2 RED					11		-201AP50	6			/250.6
=					12						/250.6
LIGHT COLUMN LEVEL 2 ORANGE					13		-201AP50	7			/250.7
=					14						/250.7
LIGHT COLUMN LEVEL 2 GREEN					15		-201AP50	8			/250.8
=					16						/250.8
LIGHT COLUMN LEVEL 2 BLUE					17		-201AP50	9			/251.1
=					18						/251.1
BUZZER LEVEL 2					19		-201AP50	10			/251.2
=					20						/251.2
SPARE					21		-201AP50	11			/251.3
=					22						/251.3
=					23		-201AP50	12			/251.4
=					24						/251.4
=					25		-201AP50	13			/251.5
=					26						/251.5
=					27		-201AP50	14			/251.6
=					28						/251.6
=					29		-201AP50	15			/251.7
=					30						/251.7
=					31		-201AP50	16			/251.8
=					32		-X.INT24	-			/251.8
GENERAL 24VDC					33		-150GS1	13			/150.2
RIO 1 - 24Vdc converter -Power supply status to Control Cabinet					34		-150GS1	14			/150.2

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 605	Next: 606
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-201AP1	-X80:1	1		-150FU1	2			/201.1
			-201AP10	L+	2						/201.2
			-201AP20	L+	3						/201.3
			-201AP30	L+	4						/201.5
			-201AP40	L+	5						/201.5
			-201AP50	L+	6						/201.7
			-202AP60	L+	7						/202.1
			-202AP70	L+	8		-X.DI-S	1			/202.2
			-320T1	NO	9						/320.0
MOTOR CP-620B WINDINGS TEMPERATURE			-330T1	31-	11						/330.2
PWO2 TEMPERATURE TO STACKS					12						/330.4
PWO2 CONDUCTIVITY TO STACKS			-330T5	31-	13						/330.6
MOTOR CP-620A WINDINGS TEMPERATURE					14						/330.8
PWH2 TEMPERATURE TO STACKS			-331T1	31-	15						/331.2
			-201AP1	-X80:2	16		-150FU1	4			/201.1
			-201AP10	M	17						/201.2
			-201AP20	M	18						/201.3
			-201AP30	M	19						/201.5
			-201AP40	M	20						/201.5
			-201AP50	M	21						/201.8
			-202AP60	M	22						/202.1
			-202AP70	M	23						/202.2
MOTOR CP-620B WINDINGS TEMPERATURE			-330T1	32+	25						/330.2
PWO2 TEMPERATURE TO STACKS					26						/330.4
PWO2 CONDUCTIVITY TO STACKS			-330T5	32+	27						/330.6
MOTOR CP-620A WINDINGS TEMPERATURE					28						/330.8
PWH2 TEMPERATURE TO STACKS			-331T1	32+	29						/331.2
SPARE			-320T5	1.1	31						/320.6
			-240T1	31-	32		-X.DI	25			/240.2
SPARE			-320T5	1.2	33						/320.6
			-240T1	32+	34		-X.DO	2			/240.2
WATER LEAK DETECTOR LEVEL 0			-320T1	L	+						/320.2
=			-320T3	L	+						/320.4
PWH2 CONDUCTIVITY TO STACKS					+						/331.4
WATER LEAK DETECTOR LEVEL 0			-320T1	N	-		-X.DO	32			/320.2

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
WATER LEAK DETECTOR LEVEL 0			-320T3	N	-						/320.4
PWH2 CONDUCTIVITY TO STACKS					-						/331.4

Release/Version:		
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PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO1

Page description: TERMINAL BOARDS

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Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.RTD

TEMPERATURE ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
					1		-202AP70	-X10:1			/270.1
					2	,	-202AP70	-X10:5			/270.1
PWO2 OUT STACK-001					3	,	-202AP70	-X10:9			/270.2
=					4	,	-202AP70	-X10:13			/270.2
=					5		-202AP70	-X10:2			/270.3
=					6	,	-202AP70	-X10:6			/270.3
PWO2 OUT STACK-004					7	,	-202AP70	-X10:10			/270.4
=					8	,	-202AP70	-X10:14			/270.4
=					9		-202AP70	-X10:3			/270.5
=					10	,	-202AP70	-X10:7			/270.5
PWO2 OUT STACK-007					11	,	-202AP70	-X10:11			/270.6
=					12	,	-202AP70	-X10:15			/270.6
=					13		-202AP70	-X10:4			/270.7
=					14	,	-202AP70	-X10:8			/270.7
SPARE					15	,	-202AP70	-X10:12			/270.8
=					16	,	-202AP70	-X10:16			/270.8
					17		-202AP71	-X10:1			/271.1
					18	,	-202AP71	-X10:5			/271.1
PWO2 OUT STACK-002					19	,	-202AP71	-X10:9			/271.2
=					20	,	-202AP71	-X10:13			/271.2
=					21		-202AP71	-X10:2			/271.3
=					22	,	-202AP71	-X10:6			/271.3
PWO2 OUT STACK-005					23	,	-202AP71	-X10:10			/271.4
=					24	,	-202AP71	-X10:14			/271.4
=					25		-202AP71	-X10:3			/271.5
=					26	,	-202AP71	-X10:7			/271.5
PWO2 OUT STACK-008					27	,	-202AP71	-X10:11			/271.6
=					28	,	-202AP71	-X10:15			/271.6
=					29		-202AP71	-X10:4			/271.7
=					30	,	-202AP71	-X10:8			/271.7
SPARE					31	,	-202AP71	-X10:12			/271.8
=					32	,	-202AP71	-X10:16			/271.8
					33		-202AP72	-X10:1			/272.1
					34	,	-202AP72	-X10:5			/272.1
PWO2 OUT STACK-003					35	,	-202AP72	-X10:9			/272.2

Terminal diagram

F13_001

Strip

=QW24071601+Q1-X.RTD

TEMPERATURE ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
PWO2 OUT STACK-003					36	,	-202AP72	-X10:13			/272.2
=					37		-202AP72	-X10:2			/272.3
=					38	,	-202AP72	-X10:6			/272.3
PWO2 OUT STACK-006					39	,	-202AP72	-X10:10			/272.4
=					40	,	-202AP72	-X10:14			/272.4
=					41		-202AP72	-X10:3			/272.5
=					42	,	-202AP72	-X10:7			/272.5
SPARE					43	,	-202AP72	-X10:11			/272.6
=					44	,	-202AP72	-X10:15			/272.6
=					45		-202AP72	-X10:4			/272.7
=					46	,	-202AP72	-X10:8			/272.7
=					47	,	-202AP72	-X10:12			/272.8
=					48	,	-202AP72	-X10:16			/272.8

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO1	Order: W240716	Sheet: 607.a	Next: 700
00	03				Page description: TERMINAL BOARDS	File: D240934SCH02		
01						Scheme: D240934SCH02	Tot. Sheet: 43	
02								

Parts list

F01_003

Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.6ES7155-6AU01-0CN0	1	ET 200SP, IM155-6PN/2 HF	6ES7155-6AU01-0CN0	SIE	201AP1	
SIE.6ES5710-8MA11	1	STAND.SECTIONAL RAIL 35MM, LENGTH 483MM	6ES5710-8MA11	SIE	201AP1	
SIE.6ES7193-6AR00-0AA0	1	ET 200SP, BA 2XRJ45	6ES7193-6AR00-0AA0	SIE	201AP1	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP10	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP10	
SIE.6ES7136-6AA00-0CA1	1	SIMATIC ET 200SP F-AI 4xI 0(4)..20mA 2-/4-wire HF	6ES7136-6AA00-0CA1	SIE	201AP20	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP20	
SIE.6ES7136-6AA00-0CA1	1	SIMATIC ET 200SP F-AI 4xI 0(4)..20mA 2-/4-wire HF	6ES7136-6AA00-0CA1	SIE	201AP21	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP21	
SIE.6ES7136-6AA00-0CA1	1	SIMATIC ET 200SP F-AI 4xI 0(4)..20mA 2-/4-wire HF	6ES7136-6AA00-0CA1	SIE	201AP22	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP22	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	201AP30	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP30	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	201AP40	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP40	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	201AP41	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP41	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	201AP42	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP42	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	201AP43	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP43	
SIE.6ES7132-6BH01-0BA0	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	SIE	201AP50	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP50	
SIE.6ES7135-6HD00-0BA1	1	SIMATIC ET 200SP AQ 4xU/I ST	6ES7135-6HD00-0BA1	SIE	202AP60	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP60	
SIE.6ES7134-6JD00-0CA1	1	SIMATIC ET 200SP AI 4xRTD/TC 2-/3-/4-wire HF	6ES7134-6JD00-0CA1	SIE	202AP70	
SIE.6ES7193-6BP00-0DA1	1	SIMATIC ET 200SP BU type A1 BU15-P16+A0+2D/T	6ES7193-6BP00-0DA1	SIE	202AP70	
SIE.6ES7134-6JD00-0CA1	1	SIMATIC ET 200SP AI 4xRTD/TC 2-/3-/4-wire HF	6ES7134-6JD00-0CA1	SIE	202AP71	
SIE.6ES7193-6BP00-0BA1	1	SIMATIC ET 200SP BU type A1 BU15-P16+A0+2B/T	6ES7193-6BP00-0BA1	SIE	202AP71	
SIE.6ES7134-6JD00-0CA1	1	SIMATIC ET 200SP AI 4xRTD/TC 2-/3-/4-wire HF	6ES7134-6JD00-0CA1	SIE	202AP72	
SIE.6ES7193-6BP00-0BA1	1	SIMATIC ET 200SP BU type A1 BU15-P16+A0+2B/T	6ES7193-6BP00-0BA1	SIE	202AP72	
SIE.3NW7023	1	Fuseholder 2P	3NW7023	SIE	150FU1	
SIE.3NW6007-1	1	CYLINDRICAL FUSE GG ACC. TO FRENCH STANDARD (NFC)	3NW6007-1	SIE	150FU1	
SIE.6EP3336-7SC00-3AX0	1	SITOP PSU6200 1ph 24 V/20 A	6EP3336-7SC00-3AX0	SIE	150GS1	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-1	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-1	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-2	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-2	

Parts list

F01_003

Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-3	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-3	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-4	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-4	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-5	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-5	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-6	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-6	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-7	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-7	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-8	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-8	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-9	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-9	
IRINOX.E10601400300044	1	Enclosure system 600x1400x300 Aisi 316L	E10601400300044	IRINOX	Q1	
SIE.5SY4216-7	1	SENTRON Miniature circuit breaker	5SY4216-7	SIE	1QF3	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	240T1	
BAU.PROFSI3-B25100-ALG-LS	1	Switching Repeater (CleverLevel Ex i)	11049888	BAU	320T1	PROFSI3-B25100-ALG-LS
BAU.PROFSI3-B25100-ALG-LS	1	Switching Repeater (CleverLevel Ex i)	11049888	BAU	320T3	=
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	320T5	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	330T1	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	330T5	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	331T1	
PXC.3214325	26	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.AI	
WEI.1020000000	26	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.AI	
PXC.3214325	12	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.AI-S	
WEI.1020000000	12	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.AI-S	
PXC.3214325	4	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.AO	
WEI.1020000000	4	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.AO	
WEI.1020000000	26	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DI	
WEI.1020000000	16	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DI-S	
PXC.3214325	16	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.DO	
WEI.1020000000	18	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DO	
PXC.3214325	10	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.INT24	
WEI.1020000000	27	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.INT24	
PXC.3214325	12	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.RTD	
WEI.1020000000	36	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.RTD	

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=QW24071601+Q1/0.a	CABINET SUMMARY TABLE		05/02/2025	Proteo	
=QW24071601+Q1/1	MAIN LINE		05/02/2025	PROTEO	
=QW24071601+Q1/150	AUXILIARY DISTRIBUTION 24VDC		06/02/2025	PROTEO	
=QW24071601+Q1/201	PLC LAYOUT		11/04/2025	Proteo	
=QW24071601+Q1/202	PLC LAYOUT		11/04/2025	Proteo	
=QW24071601+Q1/210	SAFETY DIGITAL INPUT MODULE 1		05/02/2025	PROTEO	
=QW24071601+Q1/211	SAFETY DIGITAL INPUT MODULE 1		05/02/2025	PROTEO	
=QW24071601+Q1/220	ANALOGIC SAFETY INPUT MODULE 2		13/02/2025	PROTEO	
=QW24071601+Q1/221	ANALOGIC SAFETY INPUT MODULE 3		13/02/2025	PROTEO	
=QW24071601+Q1/222	ANALOGIC SAFETY INPUT MODULE 4		06/02/2025	PROTEO	
=QW24071601+Q1/230	DIGITAL INPUT MODULE 5		05/02/2025	Proteo	
=QW24071601+Q1/231	DIGITAL INPUT MODULE 5		11/04/2025	Proteo	
=QW24071601+Q1/240	ANALOGIC INPUT MODULE 6		11/04/2025	Proteo	
=QW24071601+Q1/241	ANALOGIC INPUT MODULE 7		11/04/2025	Proteo	
=QW24071601+Q1/242	ANALOGIC INPUT MODULE 8		11/04/2025	Proteo	
=QW24071601+Q1/243	ANALOGIC INPUT MODULE 9		11/04/2025	Proteo	
=QW24071601+Q1/250	DIGITAL OUTPUT MODULE 10		11/04/2025	Proteo	
=QW24071601+Q1/251	DIGITAL OUTPUT MODULE 10		11/04/2025	Proteo	
=QW24071601+Q1/260	ANALOGIC OUTPUT MODULE 11		05/02/2025	PROTEO	
=QW24071601+Q1/270	ANALOGIC INPUT MODULE 12		05/02/2025	PROTEO	
=QW24071601+Q1/271	ANALOGIC INPUT MODULE 13		05/02/2025	PROTEO	
=QW24071601+Q1/272	ANALOGIC INPUT MODULE 14		05/02/2025	PROTEO	
=QW24071601+Q1/320	BARRIER RELAYS		11/04/2025	Proteo	
=QW24071601+Q1/330	BARRIER RELAYS		11/04/2025	Proteo	
=QW24071601+Q1/331	BARRIER RELAYS		11/04/2025	Proteo	
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=QW24071601+Q1/505	MAIN CABINET INTERNAL LAYOUT		11/04/2025	Proteo	
=QW24071601+SUMMARY/600	TERMINAL BOARDS		11/04/2025	Proteo	
=QW24071601+SUMMARY/600.a	TERMINAL BOARDS		11/04/2025	Proteo	
=QW24071601+SUMMARY/601	TERMINAL BOARDS		11/04/2025	Proteo	
=QW24071601+SUMMARY/602	TERMINAL BOARDS		11/04/2025	Proteo	
=QW24071601+SUMMARY/603	TERMINAL BOARDS		11/04/2025	Proteo	

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F06_001

Page	Page description	supplementary page field	Date	Edited by	X
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=QW24071601+SUMMARY/607.a	TERMINAL BOARDS		11/04/2025	Proteo	
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ATTACHMENT_2_C0063-FOR-DGM-EL-003_Rev.03_QRIO2

RELASE	DATE	FILE	OWNER	ADMINISTRATOR	REASON
00	04/10/24	224J10		PROTEO	Issue for Revision
01	06/02/25	224J10		PROTEO	Issue for Review
02	03/03/25	224J10		PROTEO	Issue for Review
03	01/04/25	224J10		PROTEO	Issue for Review

PROTEO ENGINEERING GROUP

Order: W240716

Customer: FORES ENGENEERING

Date: 05/02/2025

Revision: 03

Title: ELECTRICAL CABINET - RIO2

Editing: Proteo

Signature: Proteo

ELECTRICAL DIAGRAM:

File: D240934SCH03

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO2

Page description: COVER SHEET

Order: W240716
File: D240934SCH03

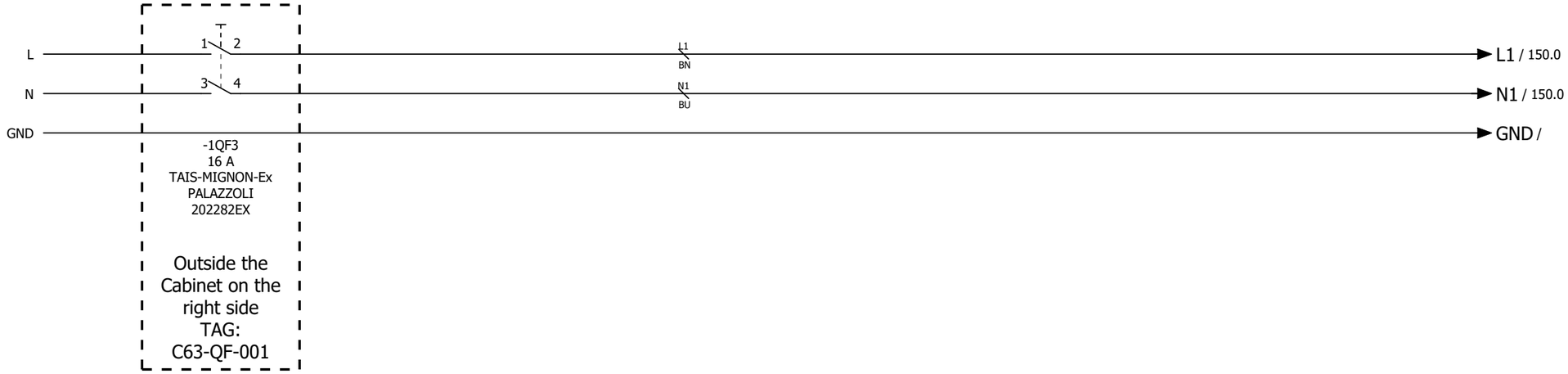
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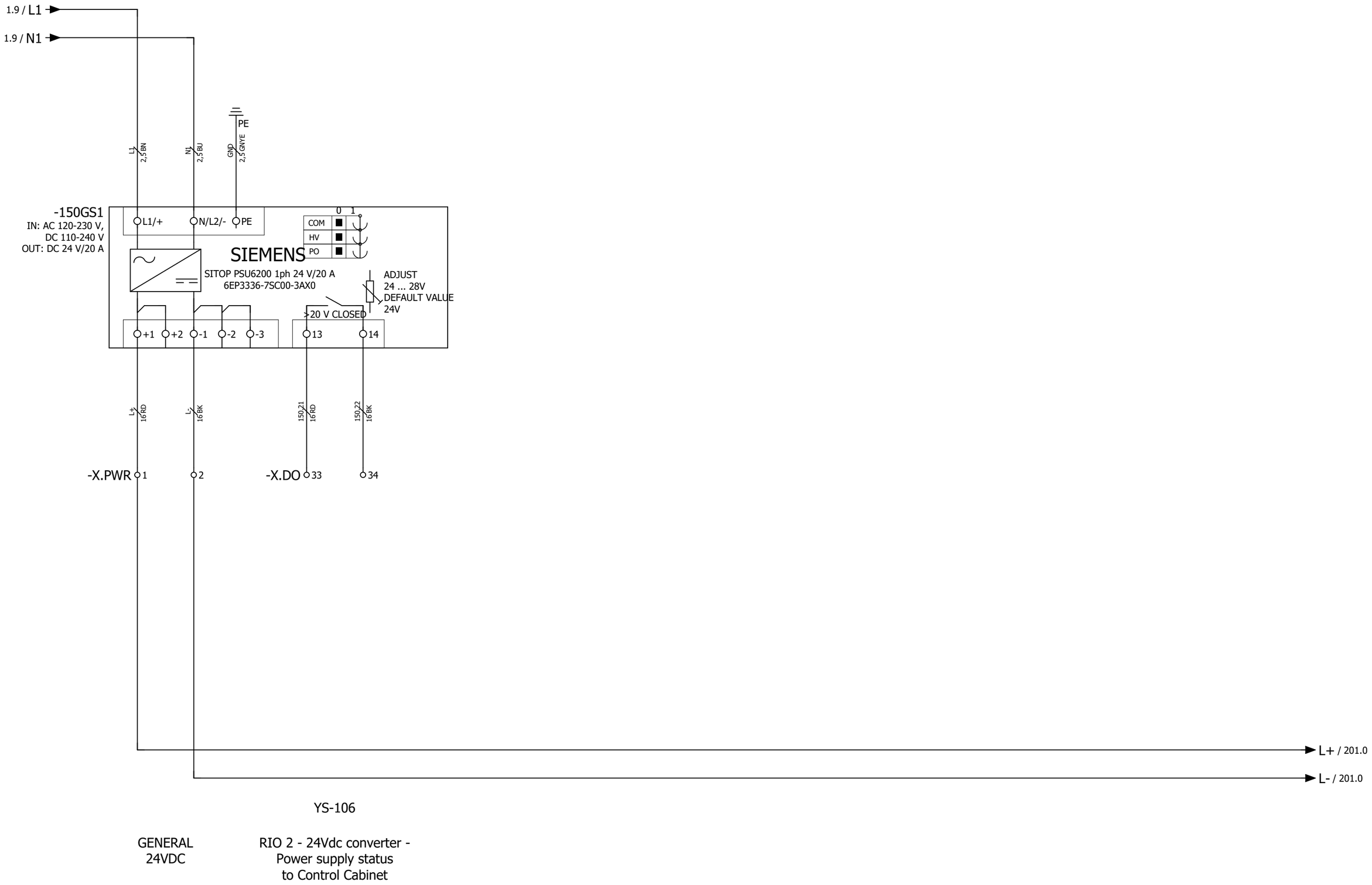
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Structure thickness	1,5 mm
Structure material	Sheet Metal
Standard of Construction	CEI EN 61439-2
Equipment Name	RIO Panel WP3
Equipment TAG	Q.RIO2
Year of construction	2024
Rated operational voltage	220 Vca
Nominal Frequency	50 Hz
Rated current (InA)	1,3 A
Auxiliary voltage (EAUX)	24 Vdc
Degree of protection	Ex II 3 GD Ex ec IIC T6 Gc IP66
Dimensions HxWxD	1400x600x300
Cable entry	From side and bottom

From Control Cabinet
TAG: 20-UCP-001
Doc. C0063-FOR-DGM-EL-003 Pag.131
Cable 3G2,5



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 1	Next: 150
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02								

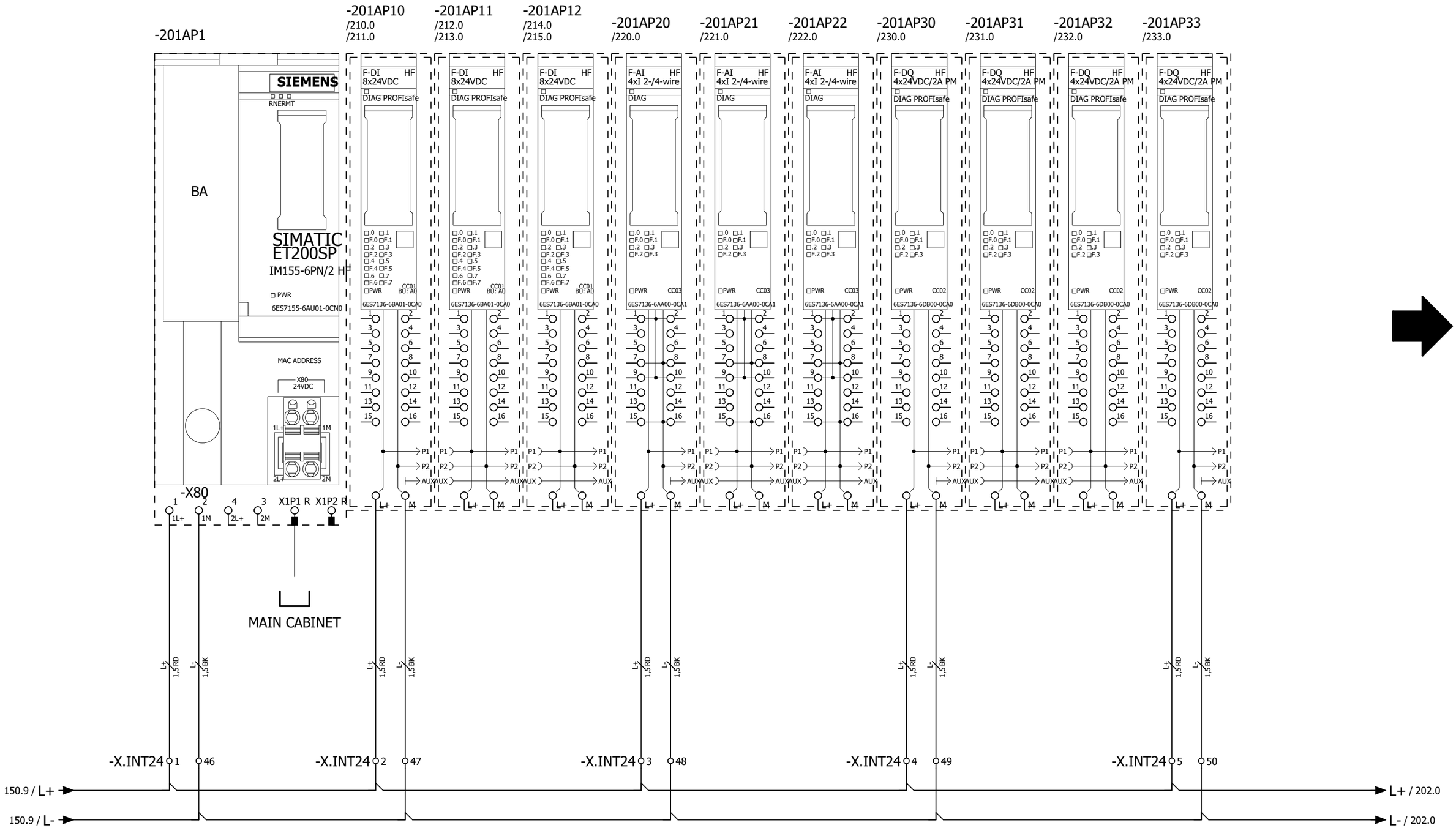


YS-106

GENERAL 24VDC

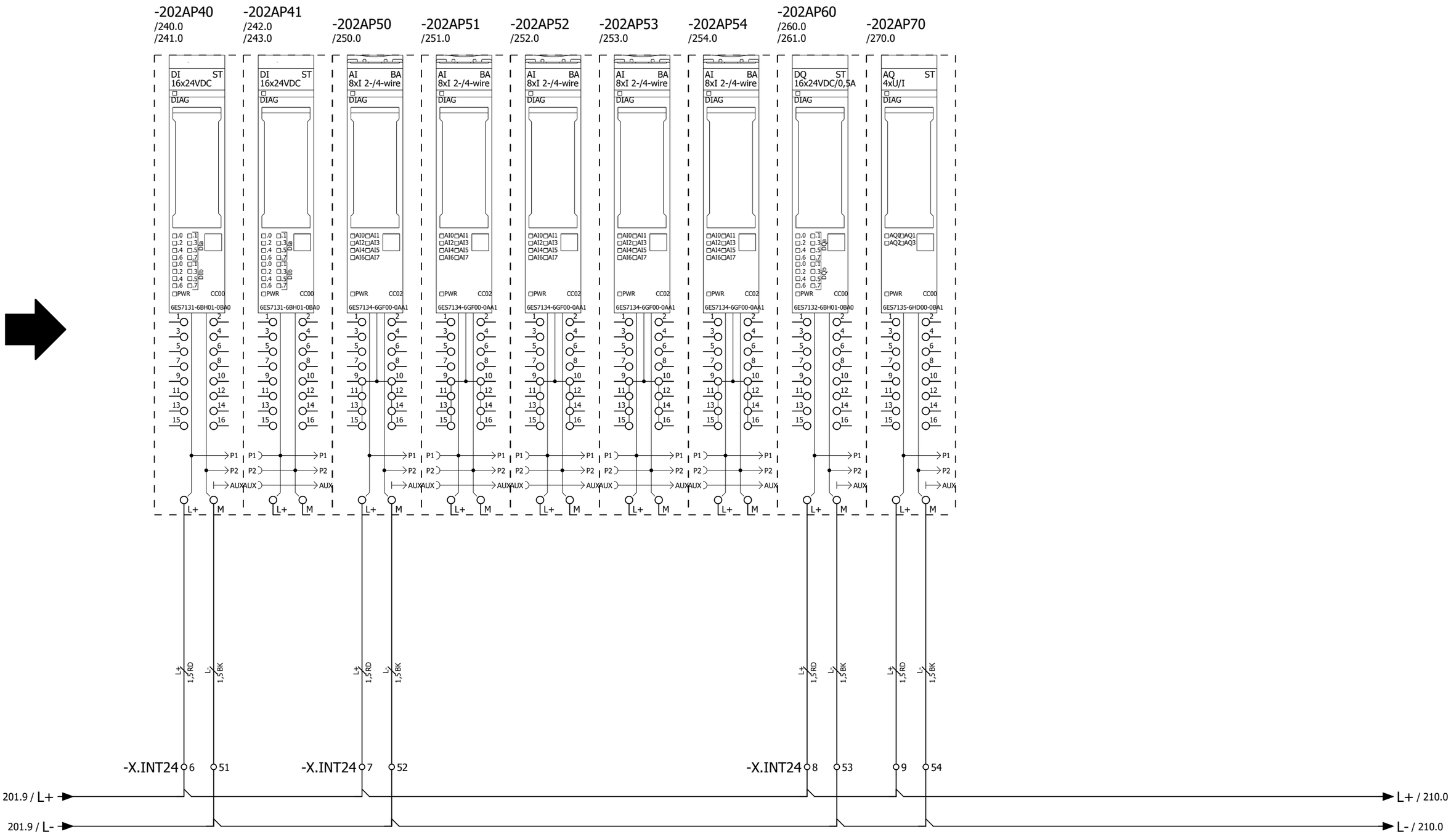
RIO 2 - 24Vdc converter - Power supply status to Control Cabinet

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716 File: D240934SCH03	Sheet: 150	Next: 201
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02								

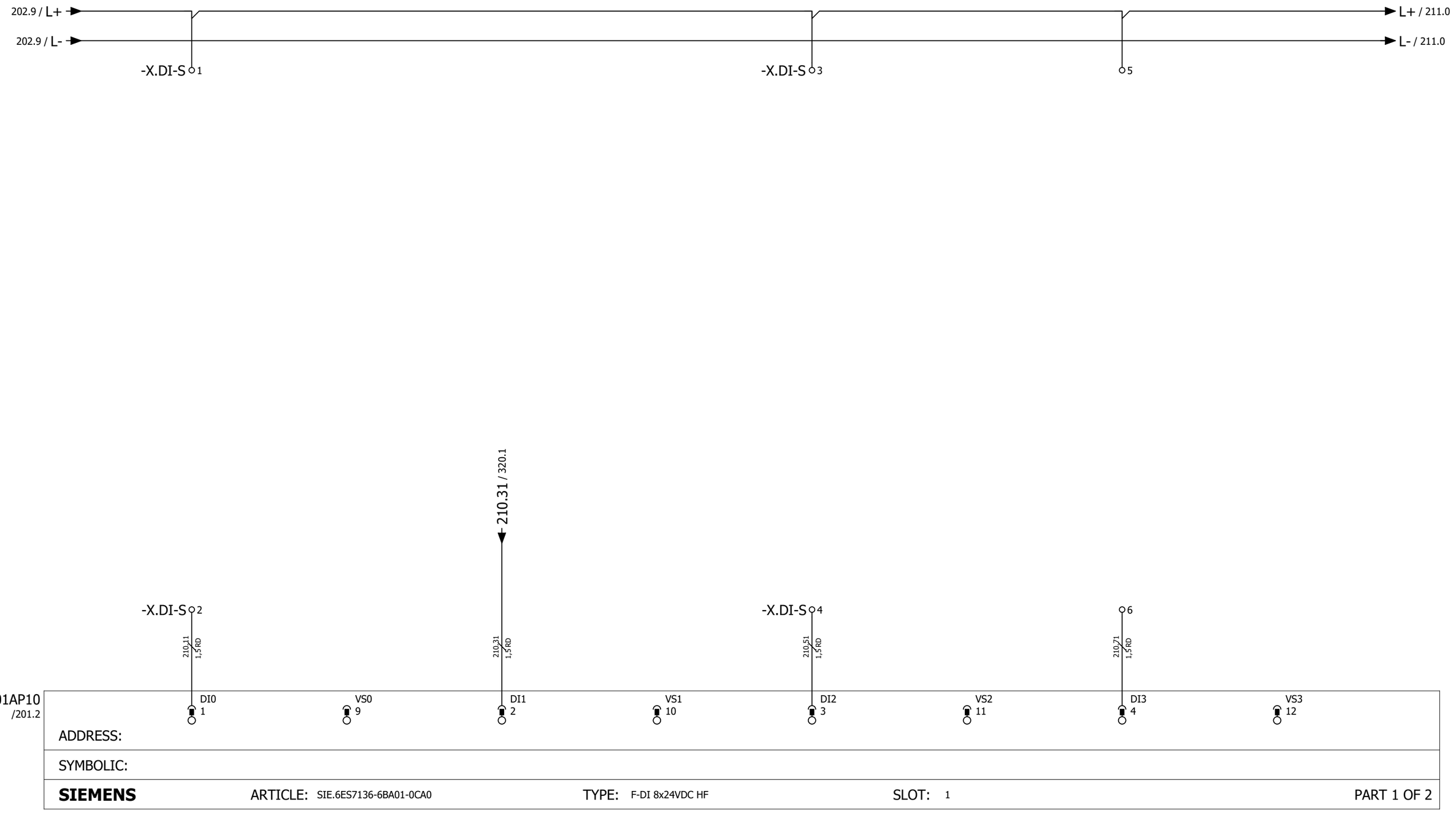


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02								

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Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 202	Next: 210
00	03				Page description: PLC LAYOUT	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								



ZIO-605
ZI-605
HV-605
VALVE
OPEN POSITION

FICV-610A
FALL-610A
ST-600 LOW
LOW FLOW SAMPLING
O2 TO VENT

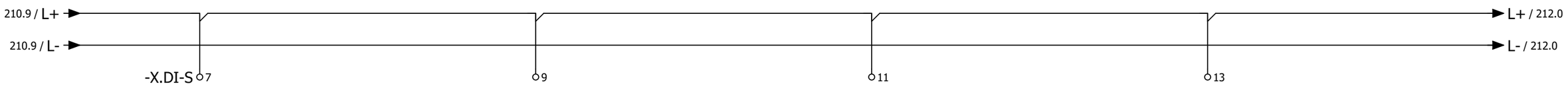
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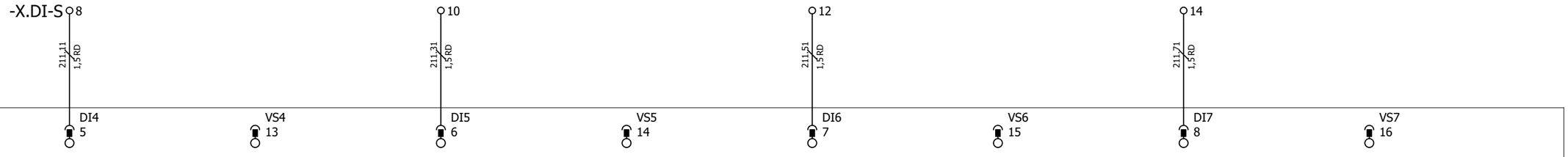
LSL-620
LOW
LOW LEVEL
ST-620

Release/Version:					
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01					Page description: SAFETY DIGITAL INPUT MODULE 1
02					

Order: W240716
File: D240934SCH03
Scheme: D240934SCH03

Sheet: 210 | Next: 211
Tot. Sheet: 60





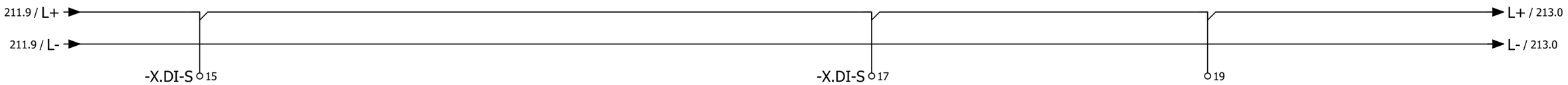
LSLL-500
LALL-500
LOW
LOW LEVEL
H2 HEADER

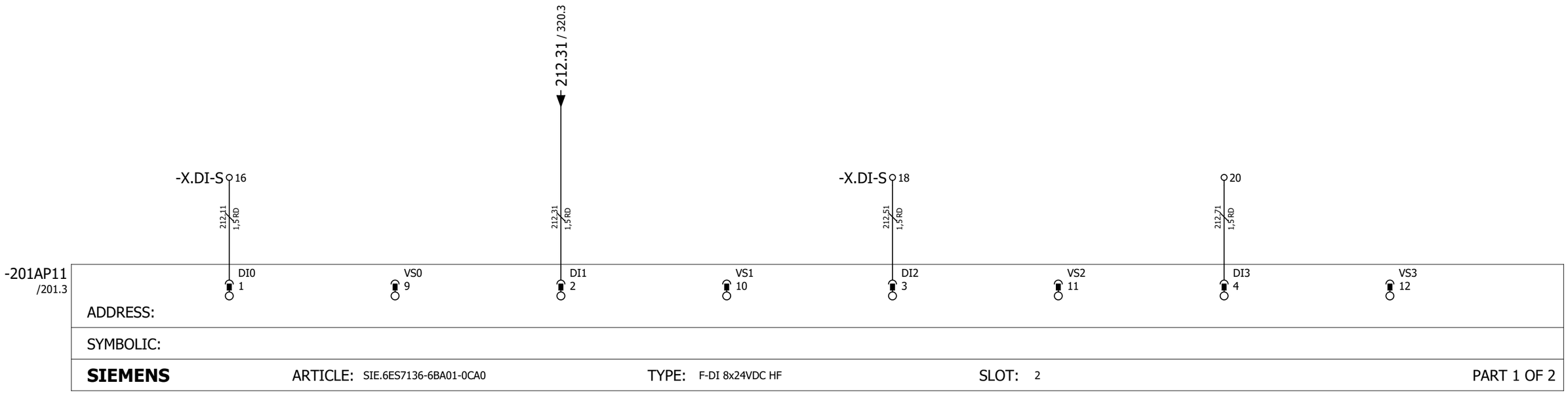
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SPARE

SPARE

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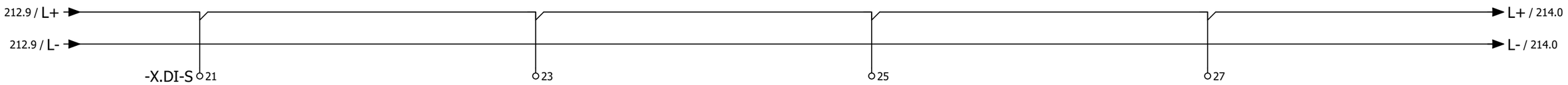
LSH-600
LSHH-600
HIGH
HIGH LEVEL
ST-600

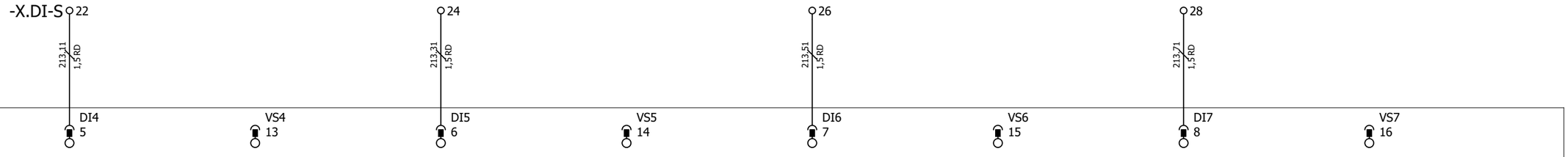
FICV-610B
FALL-610B
ST-600 LOW
LOW FLOW SAMPLING
O2 TO VENT

LSL-611
LAL-611
LOW CS-610

LSHH-631
LAHH-631
HIGH
HIGH LEVEL
CS-631

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 212	Next: 213
00	03			FORES ENGENEERING	Page description: SAFETY DIGITAL INPUT MODULE 2	File: D240934SCH03	Tot. Sheet: 60	
01						Scheme: D240934SCH03		
02								





LSL-641
LAL-641
LOW LEVEL
DG-640

SPARE

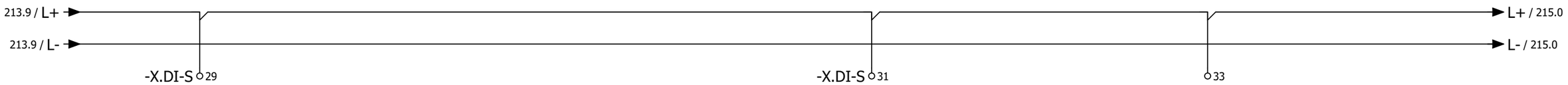
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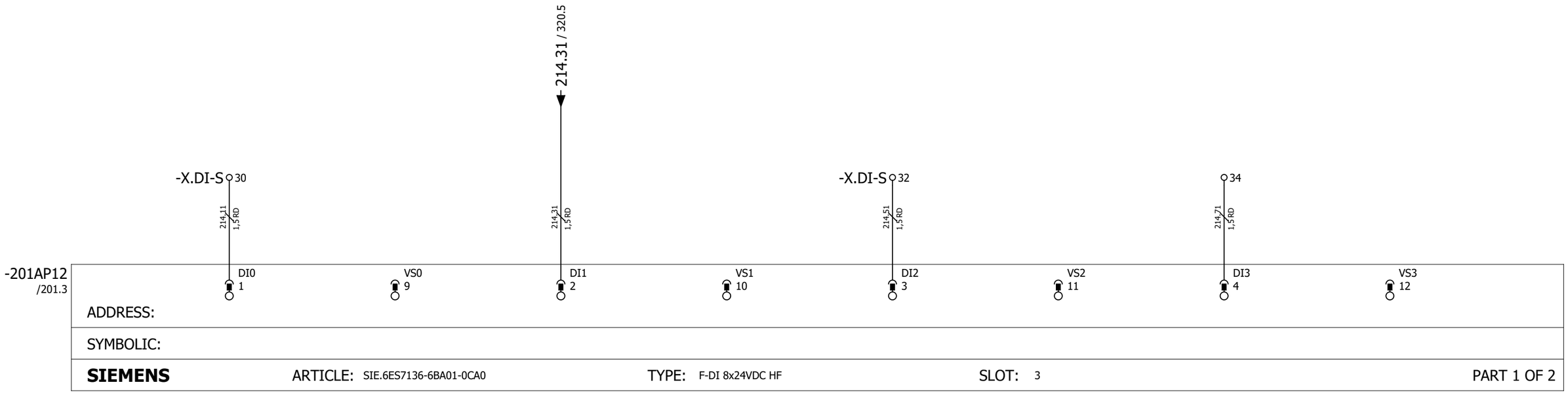
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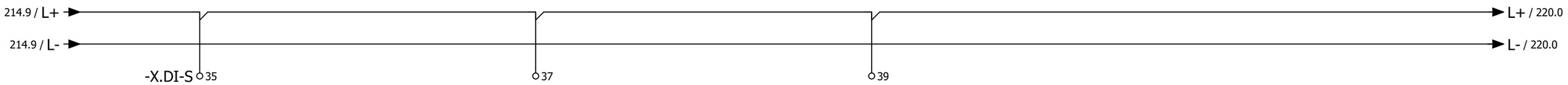
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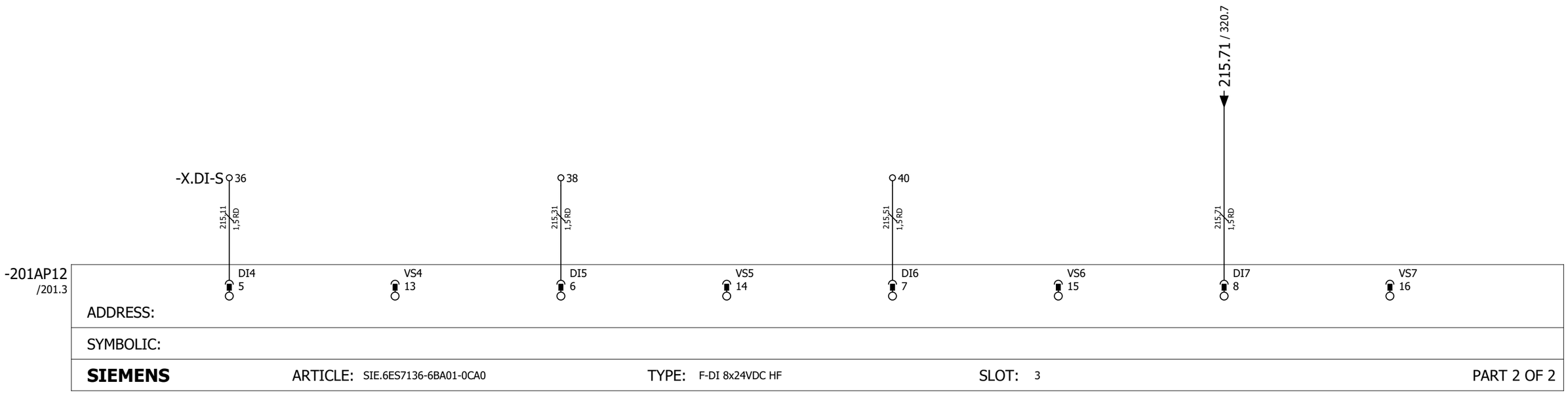




LSL-600	FICV-610C FALL-610C	ZIO-624 ZI-624	LSHH-500 LAHH-500
LOW LOW LEVEL ST-600	ST-600 LOW LOW FLOW SAMPLING O2 TO VENT	HV-624 VALVE OPEN POSITION	HIGH HIGH LEVEL H2 HEADER

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 214	Next: 215
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01								
02								





FSH-640
FAH-640
HIGH FLOW
PWH2 TO ST-600

SPARE

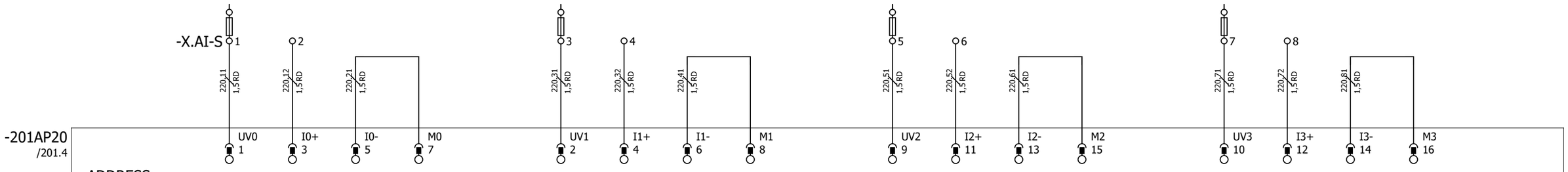
SPARE

FICV-800
FALL-800
LOW
LOW FLOW
HYDROGEN TO VENT
ANALISYS

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 215	Next: 220
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01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

215.9 / L+ → L+ / 221.0

215.9 / L- → L- / 221.0



PT-611
PSHH-611
OXYGEN OUT
ST-600

HIOD-610C
HYDROGEN IN OXYGEN
DETECTION ST-600
SAMPLING O2 TO VENT

AHD-1000
AMBIENT
HYDROGEN DETECTOR
LEVEL 1

SPARE

Release/Version:					
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02					

Order: W240716
File: D240934SCH03
Scheme: D240934SCH03

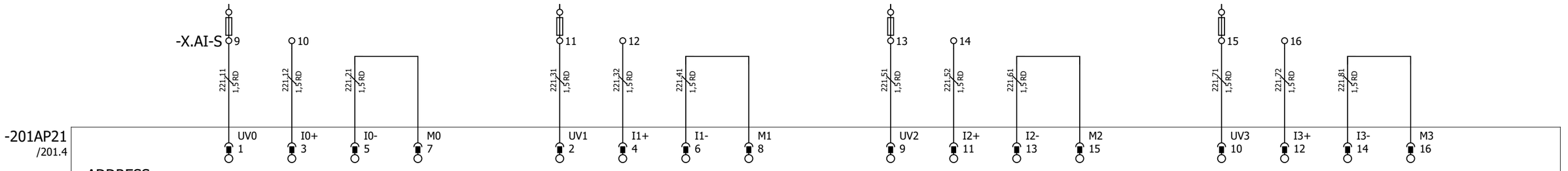
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Tot. Sheet: 60

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220.9 / L+ → L+ / 222.0

220.9 / L- → L- / 222.0



ADDRESS:

SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7136-6AA00-0CA1 TYPE: F-AI 4xI 0(4)..20mA 2-/4-wire HF SLOT: 5 PART 1 OF 1

HIOD-610A

HYDROGEN IN OXYGEN
DETECTION ST-600
SAMPLING O2 TO VENT

PT-631
PAHH-631

HIGH HIGH PRESSURE
HYDROGEN OUT ST-620
TO VENT

AHD-1003

AMBIENT
HYDROGEN DETECTOR
LEVEL 0

SPARE

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO2

Page description: ANALOGIC SAFETY INPUT MODULE 5

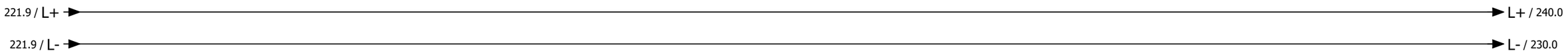
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File: D240934SCH03

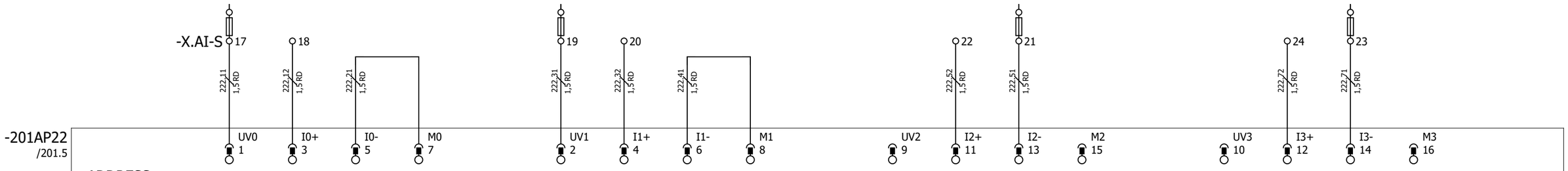
Scheme: D240934SCH03

Sheet:	Next:
221	222

Tot. Sheet: 60

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HIOD-610B

HYDROGEN IN OXYGEN
DETECTION ST-600
SAMPLING O2 TO VENT

PT-633
PI-633

HYDROGEN
TO PRODUCTION

MPV-630

MOTORIZED
PROPORTIONAL VALVE
POSITION

MPV-611

MOTORIZED
PROPORTIONAL VALVE
POSITION

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2
01					Page description: ANALOGIC SAFETY INPUT MODULE 6
02					

Order: W240716	Sheet: 222	Next: 230
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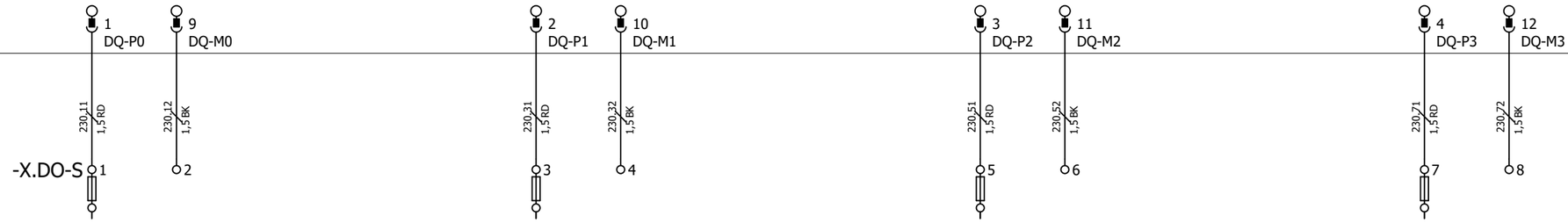
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-201AP30
/201.6

SIEMENS ARTICLE: SIE.6ES7136-6DB00-0CA0 TYPE: F-DQ 4x24 V DC/2A HF SLOT: 7 PART 1 OF 1

SYMBOLIC:

ADDRESS:



222.9 / L- → L- / 231.0

SV-500 SOLENOID VALVE COMMAND PV-500	SV-601 SOLENOID VALVE COMMAND SV-601	SV-641 SOLENOID VALVE COMMAND SV-641	SPARE

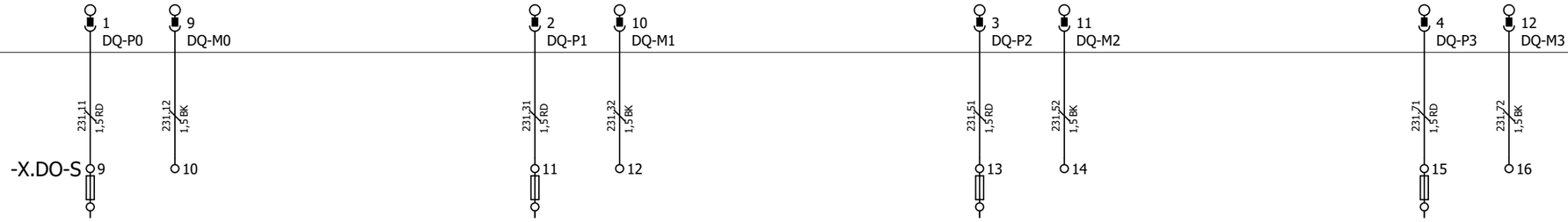
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00	03				Page description: SAFETY DIGITAL OUTPUT MODULE 7	Scheme: D240934SCH03	Tot. Sheet: 60
01							
02							

-201AP31
/201.6

SIEMENS ARTICLE: SIE.6ES7136-6DB00-0CA0 TYPE: F-DQ 4x24 V DC/2A HF SLOT: 8 PART 1 OF 1

SYMBOLIC:

ADDRESS:



230.9 / L-

L- / 232.0

SV-501

SOLENOID VALVE
COMMAND
PV-501

SV-610

SOLENOID VALVE
COMMAND
SV-610

SV-800

SOLENOID VALVE
COMMAND
SV-800

SPARE

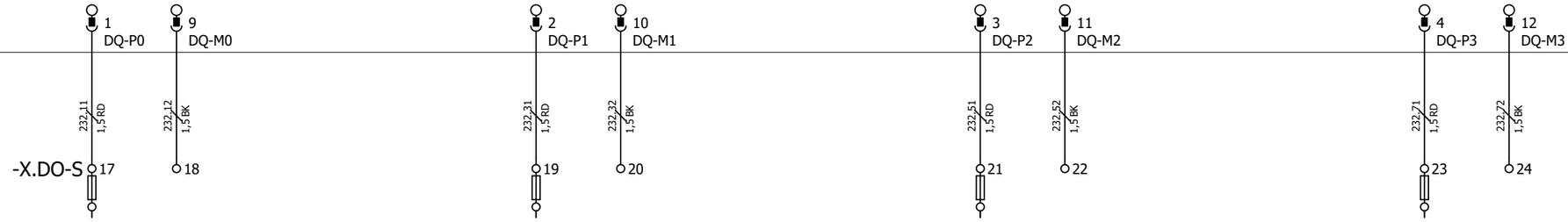
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01						Scheme: D240934SCH03		
02								

-201AP32
/201.7

SIEMENS ARTICLE: SIE.6ES7136-6DB00-0CA0 TYPE: F-DQ 4x24 V DC/2A HF SLOT: 9 PART 1 OF 1

SYMBOLIC:

ADDRESS:



231.9 / L-

L- / 233.0

SV-900	SV-630		
SOLENOID VALVE COMMAND SV-900	SOLENOID VALVE COMMAND SV-630	SPARE	SPARE

Release/Version: 00 03 / 01 / 02	PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2 Page description: SAFETY DIGITAL OUTPUT MODULE 9	Order: W240716 File: D240934SCH03 Scheme: D240934SCH03	Sheet: 232 / Next: 233 Tot. Sheet: 60

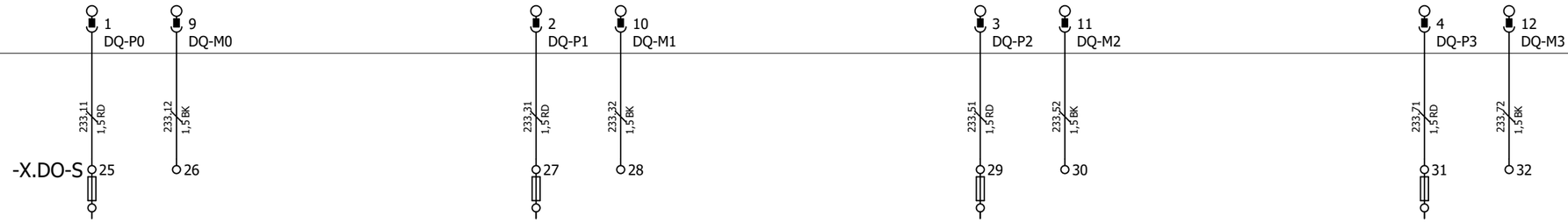
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-201AP33
/201.7

SIEMENS ARTICLE: SIE.6ES7136-6DB00-0CA0 TYPE: F-DQ 4x24 V DC/2A HF SLOT: 10 PART 1 OF 1

SYMBOLIC:

ADDRESS:



232.9 / L-

L- / 240.0

SV-920

SOLENOID VALVE
COMMAND
SV-920

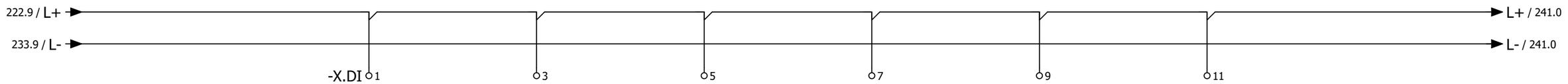
SV-635

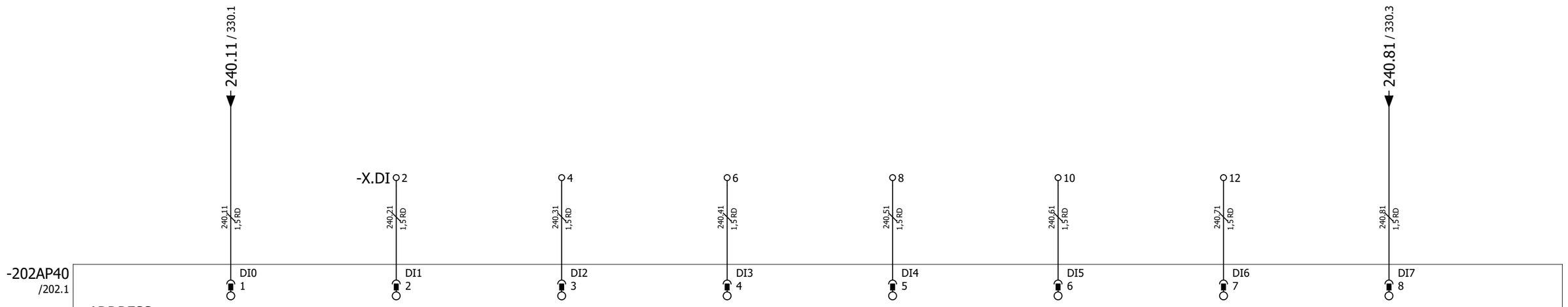
SOLENOID VALVE
COMMAND
SV-635

SPARE

SPARE

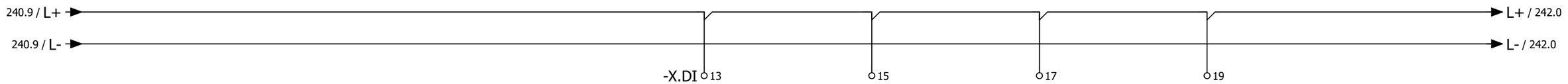
Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 233	Next: 240
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: SAFETY DIGITAL OUTPUT MODULE 10	File: D240934SCH03	Tot. Sheet: 60	
01						Scheme: D240934SCH03		
02								

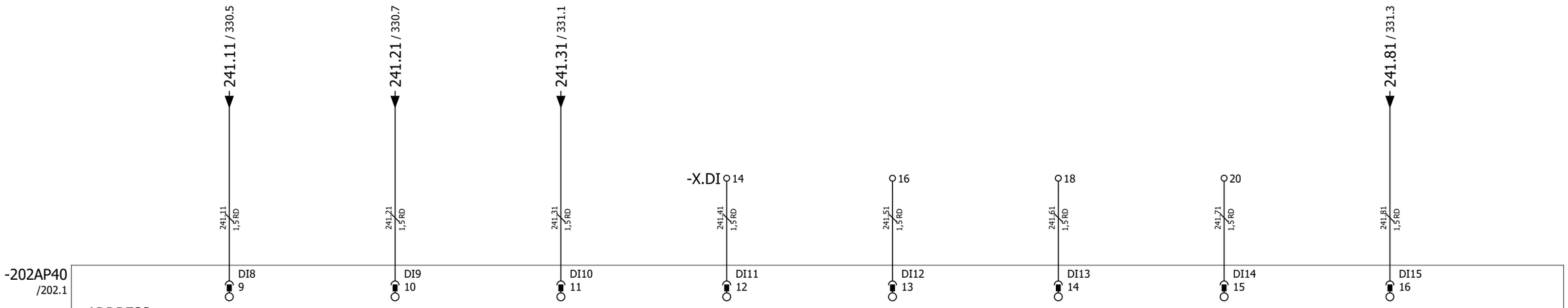




FICV-611 FALL-611 ST-600 LOW LOW FLOW O2 TO VENT	LSL-610 LAL-610 LOW LEVEL CS-610	LSL-630 LAL-630 LOW LEVEL CS-630	LSL-500 LAL-500 LOW LEVEL H2 HEADER	LSL-640 LAL-640 LOW LEVEL DG-640	DS-005 DOOR SWITCH OPEN / CLOSE LEVEL 1	DS-007 DOOR SWITCH OPEN / CLOSE LEVEL 1	HPP-700 ZSH-64.1.1 VALVE 64V4.1 OPEN

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 240	Next: 241
00	03			FORES ENGENEERING		File: D240934SCH03		
01					Page description: DIGITAL INPUT MODULE 11	Scheme: D240934SCH03	Tot. Sheet: 60	
02								





HPP-700 ZSH-64.1.2 VALVE 64V4.2 OPEN	HPP-700 ZSH-64.2 VALVE 64V5 OPEN	HPP-700 TSHH-64.3 HIGH HIGH TEMPERATURE	HPP-700 TSHH-64.2 HIGH HIGH TEMPERATURE HEATER HE64.1	SPARE	SPARE	SPARE	FICV-800 FAHH-800 HIGH HIGH FLOW HYDROGEN TO VENT ANALISYS

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO2

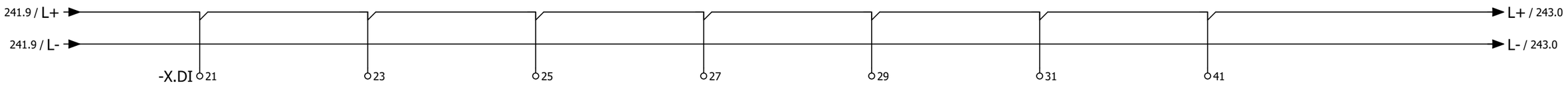
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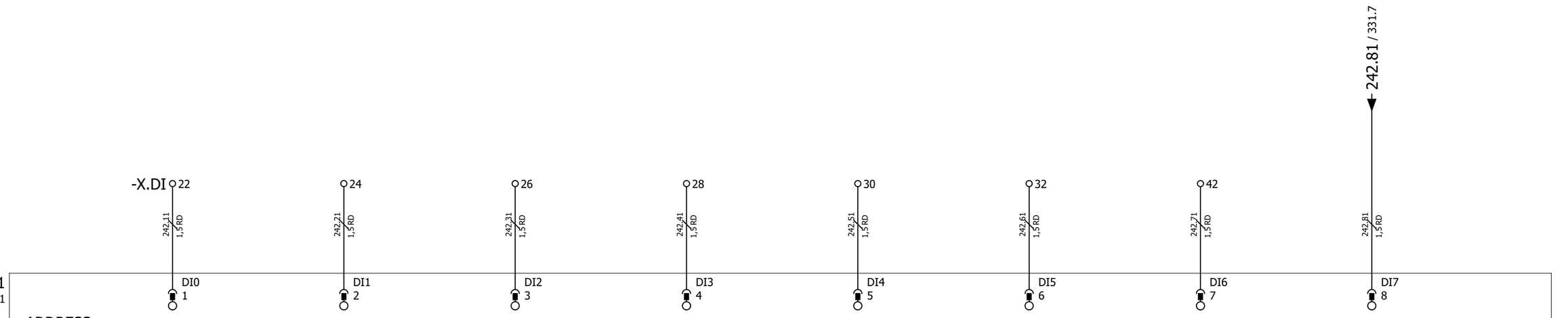
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File: D240934SCH03

Scheme: D240934SCH03

Sheet:	Next:
241	242

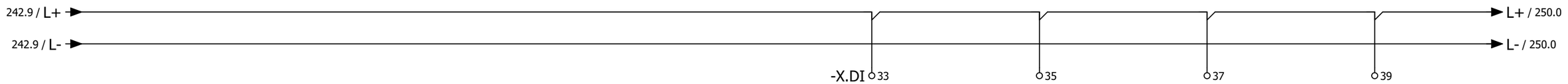
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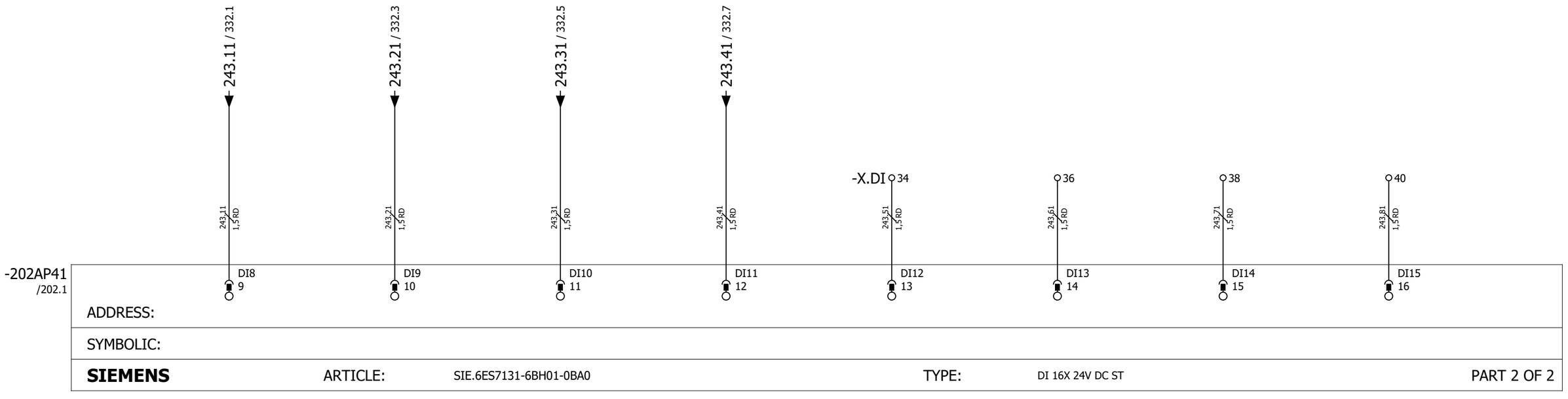




LSH-610 LAH-610	LSH-630 LAH-630	LSH-500 LAH-500	LSH-640 LAH-640	DS-004	DS-006	WLD-005	HPP-700 ZSH-64.1.3
HIGH LEVEL CS-610	HIGH LEVEL CS-630	HIGH LEVEL H2 HEADER	HIGH LEVEL DG-640	DOOR SWITCH OPEN / CLOSE LEVEL 1	DOOR SWITCH OPEN / CLOSE LEVEL 1	WATER LEAK DETECTOR LEVEL 1	VALVE 64V4.3 OPEN

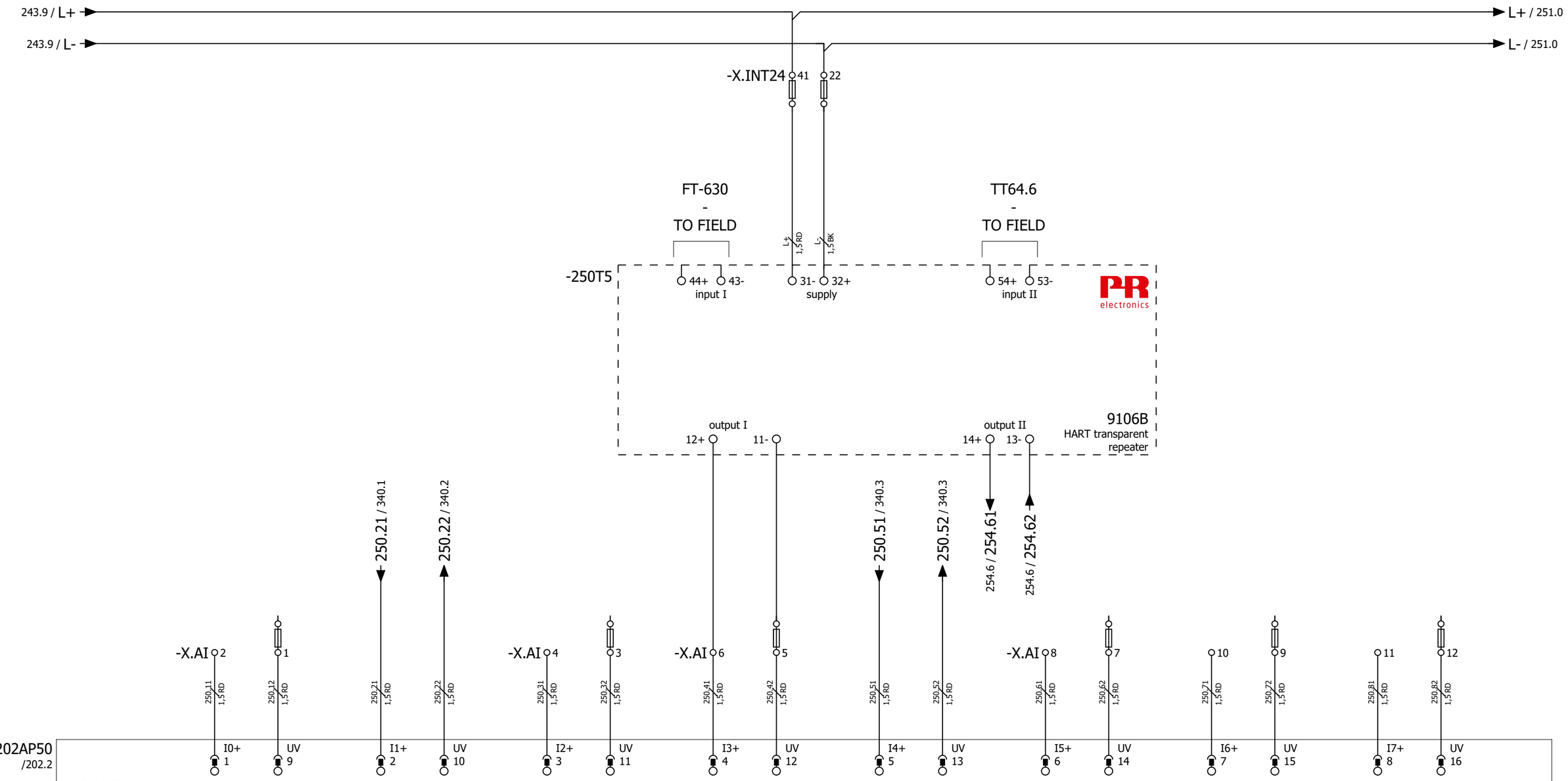
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00	03			FORES ENGENEERING		File: D240934SCH03		
01					Page description: DIGITAL INPUT MODULE 12	Scheme: D240934SCH03	Tot. Sheet: 60	
02								





HPP-700 ZSH-64.1.4 VALVE 64V4.4 OPEN	HPP-700 ZSH-64.3 VALVE 64V7 OPEN	HPP-700 ZSL-64.T2 VALVE 64Vxx CLOSED	HPP-700 TSHH-64.4 HIGH HIGH TEMPERATURE	HPP-700 TSHL-64.1 TEMPERATURE HEATER HE64.1	SPARE	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716 File: D240934SCH03	Sheet: 243 / Next: 250
00	03				Page description: DIGITAL INPUT MODULE 12	Scheme: D240934SCH03	Tot. Sheet: 60
01							
02							



-202AP50
/202.2

ADDRESS:

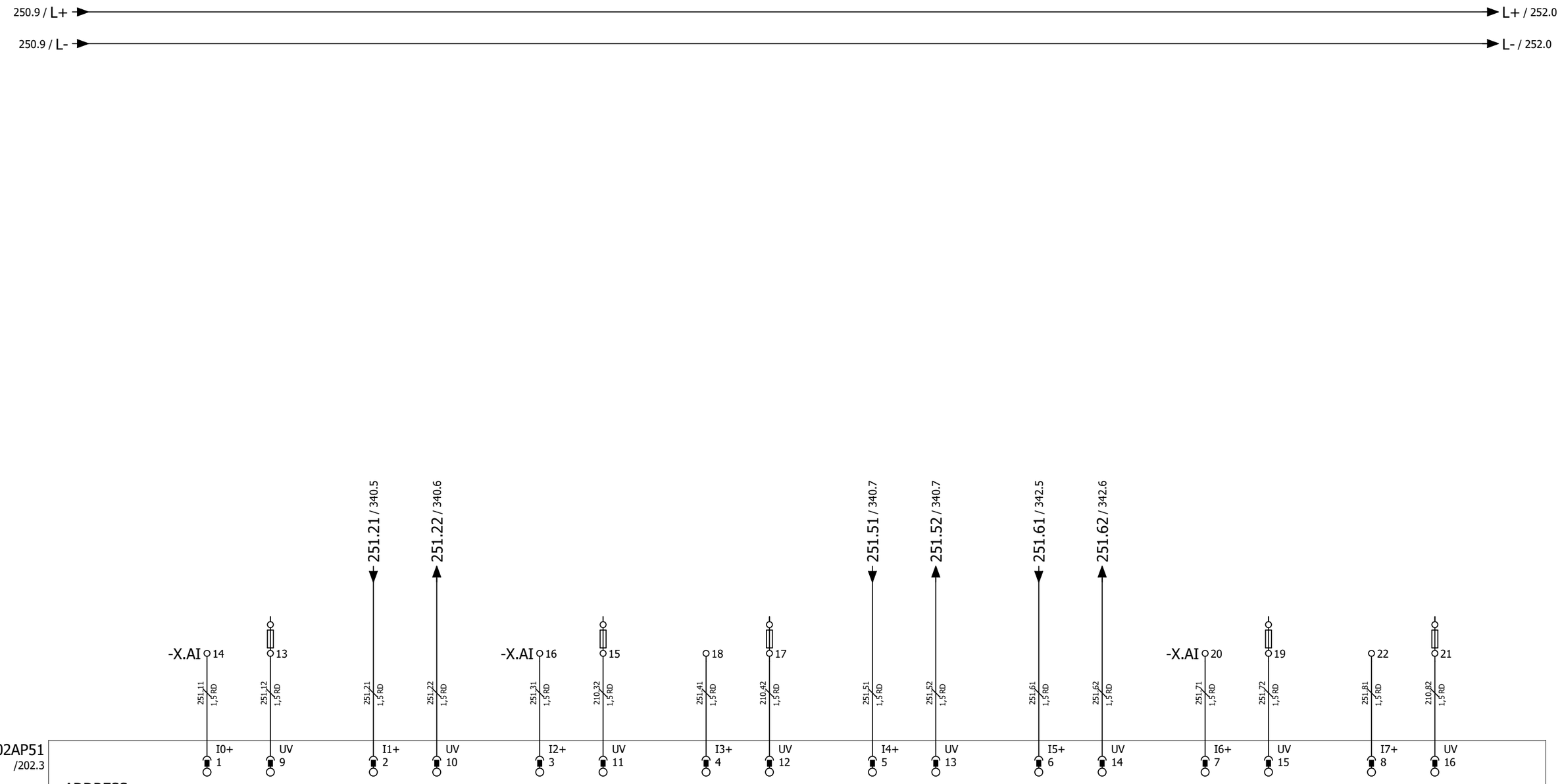
SYMBOLIC:

SIEMENS ARTICLE: SIE.6ES7134-6GF00-0AA1 TYPE: AI 8XI 2-/4-WIRE SLOT: 13 PART 1 OF 1

PT-610 PIC-610 OXYGEN OUT ST-600	HPP-700 TT60.1 TEMPERATURE TT60.1	PT-630 PIC-630 HYDROGEN OUT ST-620 TO VENT	FT-630 FI-630 HYDROGEN TO PRODUCTION	OIHA-800A AI-800A OXYGEN IN HYDROGEN TO PRODUCTION	PT-150 PI-150 COMPRESSED AIR TO SERVICES	SPARE	FT-920

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 250	Next: 251
00	03			FORES ENGENEERING	Page description: ANALOGIC INPUT MODULE 13	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

0	1	2	3	4	5	6	7	8	9



PT-900 PI-900 OXYGEN OUT ST-600	HPP-700 TT60.2 TEMPERATURE TT60.2	PT-920 PI-920 PRESSURE NITROGEN TO ST-620	DPT-800A DPI-800A DEW POINT IN HYDROGEN TO PRODUCTION	OIHA-800B AI-800B OXYGEN IN HYDROGEN TO PRODUCTION	SPARE	SPARE		FT-921

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO2

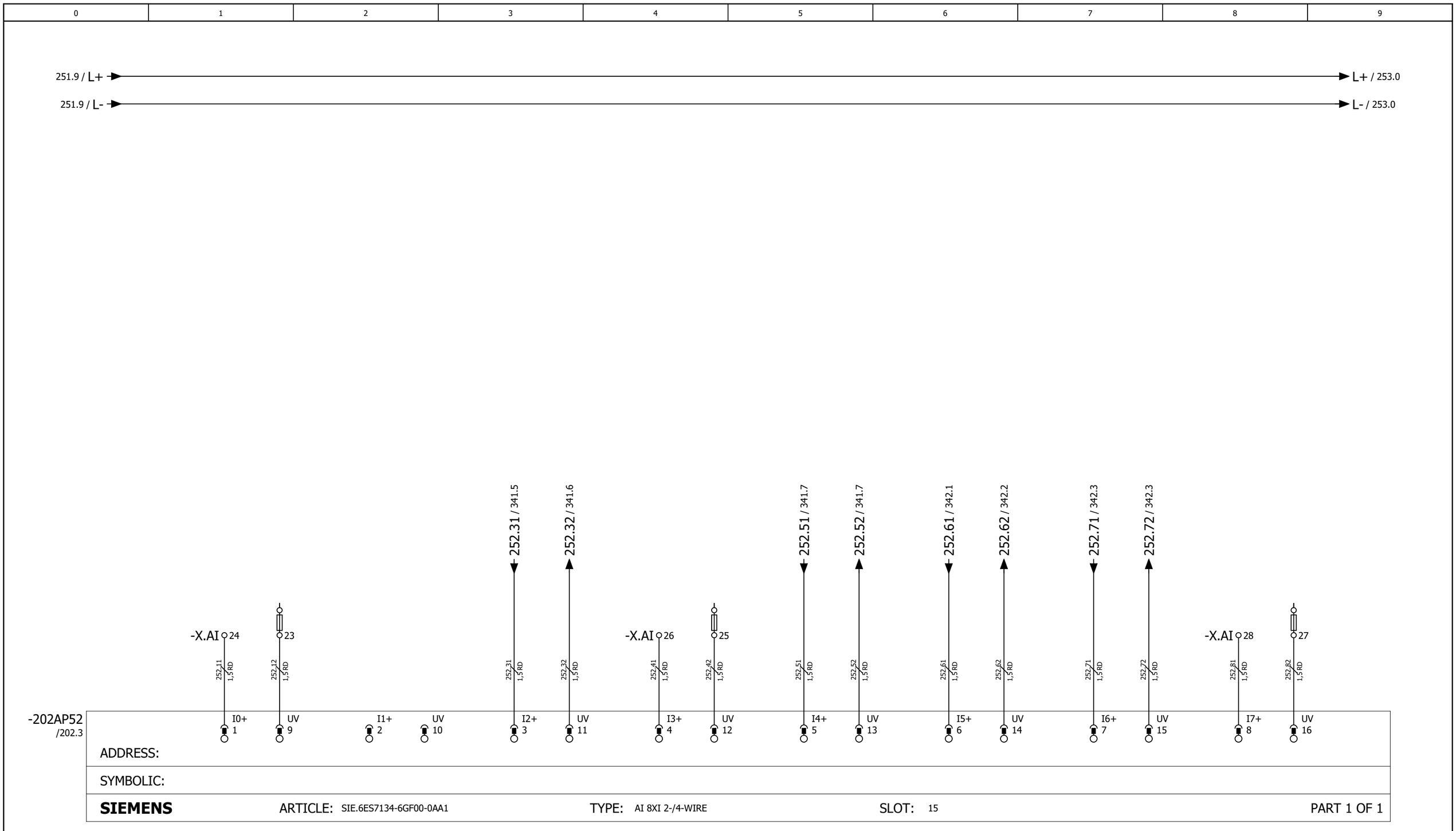
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Order: W240716
File: D240934SCH03

Scheme: D240934SCH03

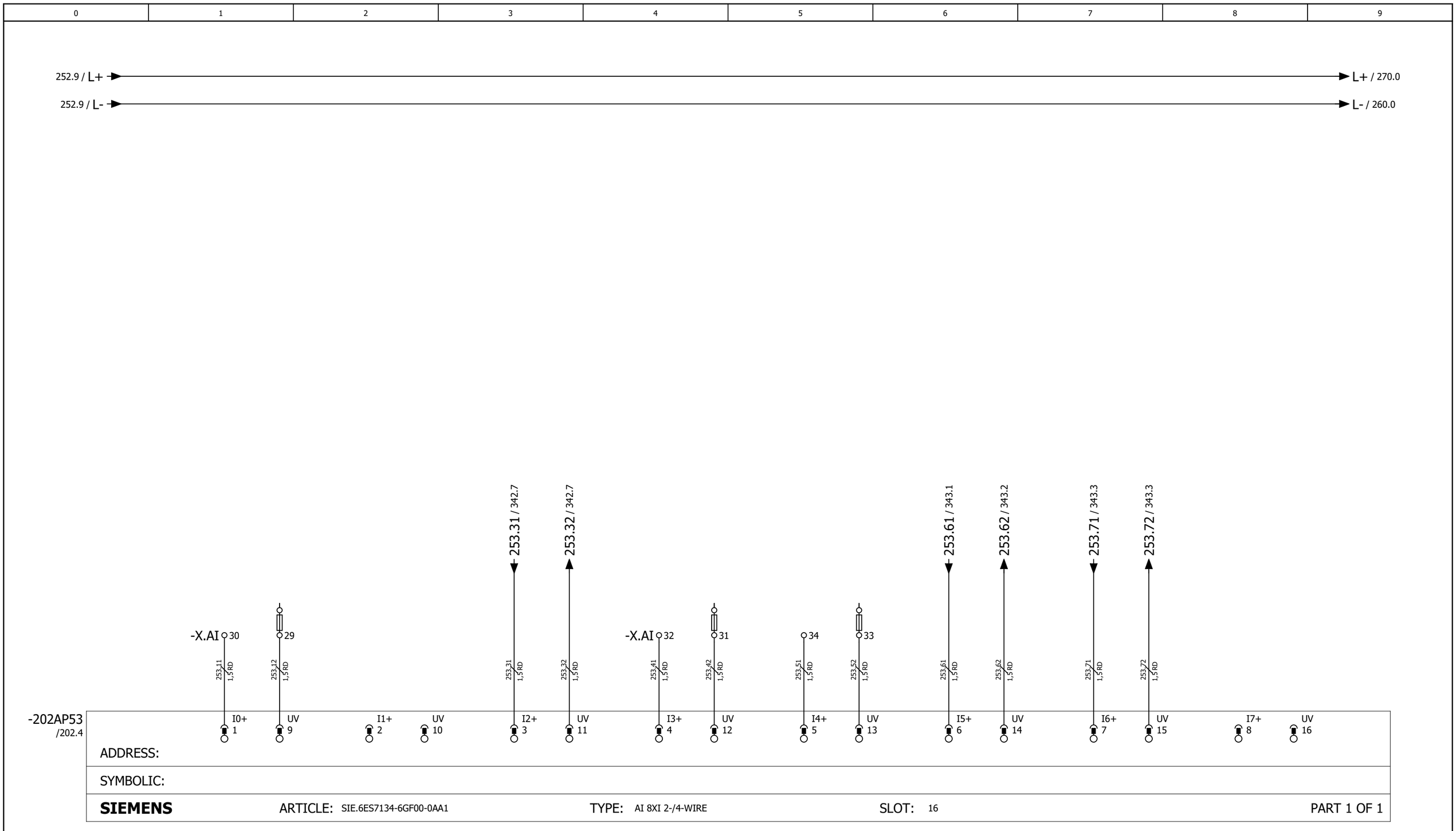
Sheet:	Next:
251	252

Tot. Sheet: 60



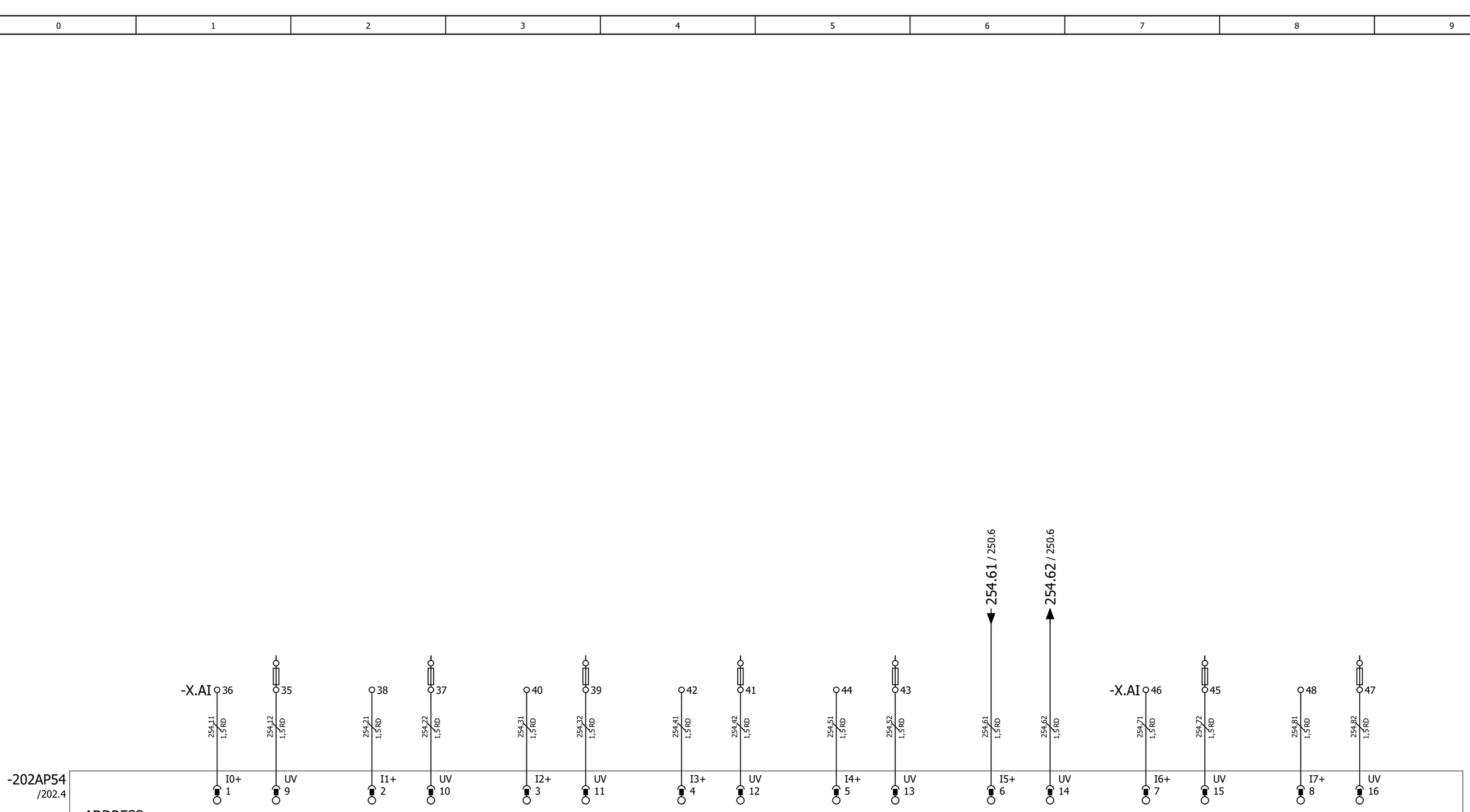
FT-900 FI-900 N2 TO ST-600	SPARE	HPP-700 TT61.1 TEMPERATURE TT61.1	DPT-800B DPI-800B DEW POINT IN HYDROGEN TO PRODUCTION	HPP-700 TT64.7 TEMPERATURE TT64.7	OIHA-800C AI-800C OXYGEN IN HYDROGEN TO PRODUCTION	SPARE	PT-612

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716 File: D240934SCH03	Sheet: 252 / Next: 253
00	03				Page description: ANALOGIC INPUT MODULE 15	Scheme: D240934SCH03	Tot. Sheet: 60
01							
02							



FT-901 FI-901 N2 TO ST-600	SPARE	HPP-700 TT64.5 TEMPERATURE TT64.5	PT-910 PI-910 NITROGEN TO SERVICES	SPARE	HPP-700 TT64.8 TEMPERATURE TT64.8	HPP-700 PT64.1 PRESSURE TT64.1	SPARE	

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716 File: D240934SCH03	Sheet: 253 / Next: 254
00	03				Page description: ANALOGIC INPUT MODULE 16	Scheme: D240934SCH03	Tot. Sheet: 60
01							
02							



LT-600 LIC-600 LEVEL INDICATION ST-600	SPARE	LT-620 LIC-620 LEVEL INDICATION ST-620	DPT-800C DPI-800C DEW POINT IN HYDROGEN TO PRODUCTION	PT-632 PIC-632 HYDROGEN OUT CS-630 TO VENT	HPP-700 TT64.6 TEMPERATURE TT64.6	SPARE	SPARE	

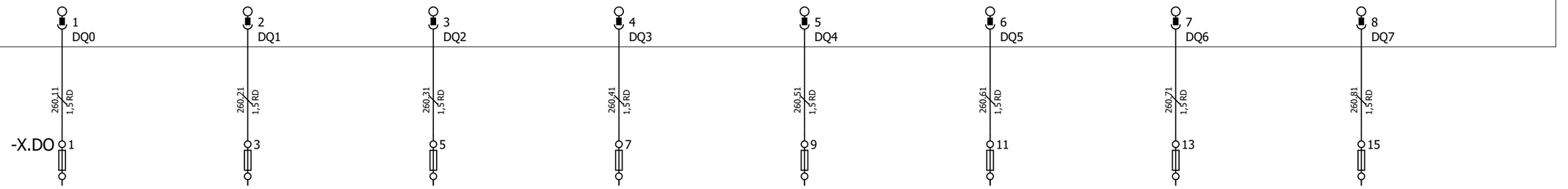
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00	03				Page description: ANALOGIC INPUT MODULE 17	Scheme: D240934SCH03	Tot. Sheet: 60
01							
02							

-202AP60
/202.5

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 18 PART 1 OF 2

SYMBOLIC:

ADDRESS:





SPARE	SPARE	SPARE	SPARE	SPARE	HPP-700 HC-6401 VALVE 64-V1 COMMAND	HPP-700 HC-6402 VALVE 64-V2 COMMAND	HPP-700 HC-6403 VALVE 64-V3 COMMAND

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 260	Next: 261
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: DIGITAL OUTPUT MODULE 18	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
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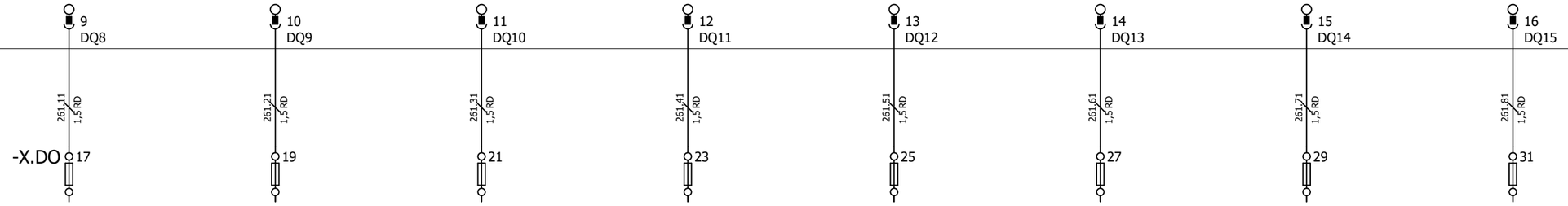
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-202AP60
/202.5

SIEMENS ARTICLE: SIE.6ES7132-6BH01-0BA0 TYPE: DQ 16X 24V DC/0,5A ST SLOT: 18 PART 2 OF 2

SYMBOLIC:

ADDRESS:





HPP-700 HC-6408 VALVE 64-V8 COMMAND	HPP-700 HC-6412 VALVE 64-V12 COMMAND	HPP-700 HC-6417 VALVE 64-V17 COMMAND	SPARE	SPARE	SPARE	SPARE	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716 File: D240934SCH03	Sheet: 261 / Next: 270
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02							

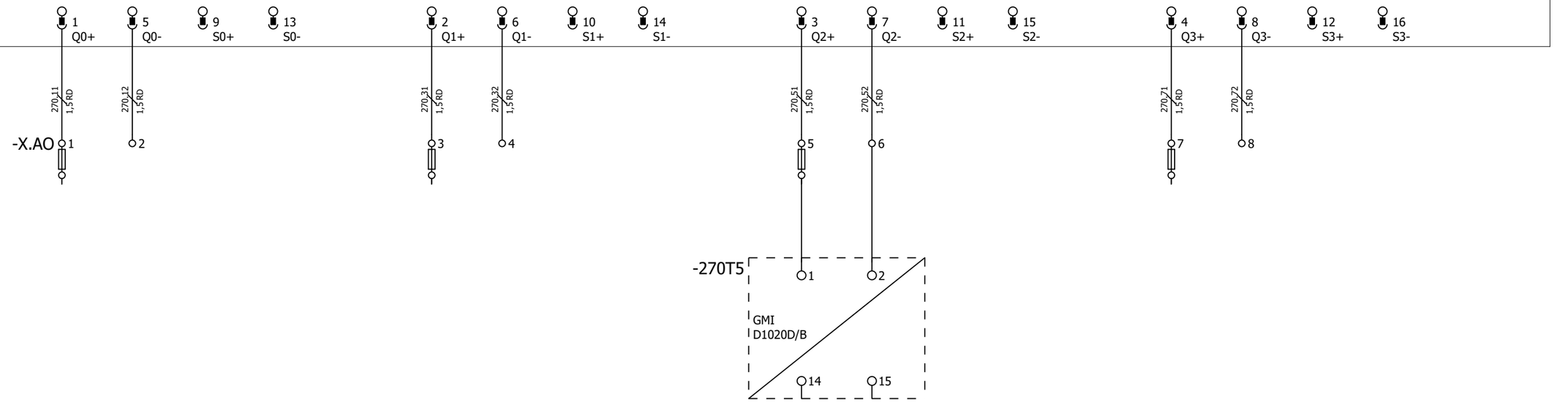
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-202AP70
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SIEMENS ARTICLE: SIE.6ES7135-6HD00-0BA1 TYPE: AQ 4XU/I ST SLOT: 19 PART 1 OF 1

SYMBOLIC:

ADDRESS:

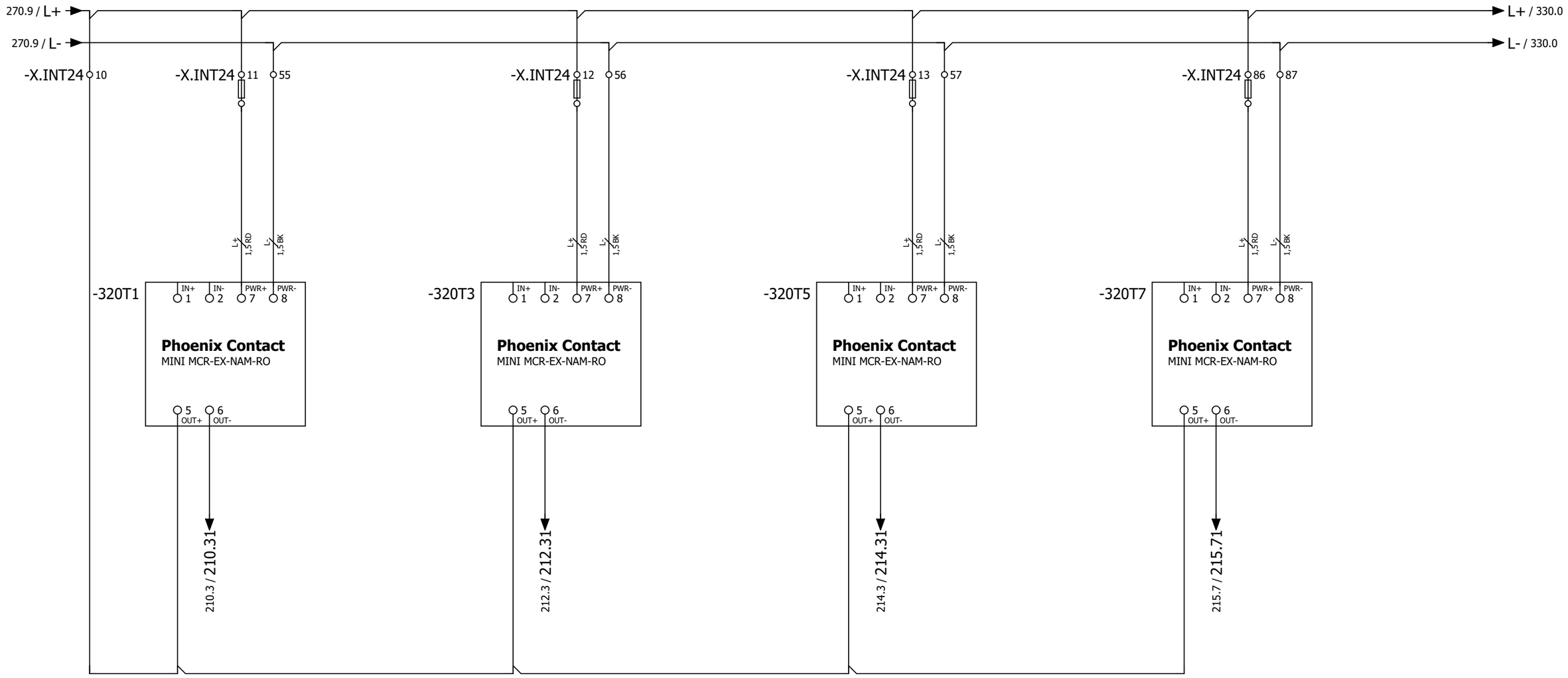


253.9 / L+ → L+ / 320.0

261.9 / L- → L- / 320.0

MPV-611	MPV-630	HPP-700 FC-64.1	
MOTORIZED PROPORTIONAL VALVE COMMAND	MOTORIZED PROPORTIONAL VALVE COMMAND	FLOW CONTROL VALVE FV-64-1 COMMAND	SPARE

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716 File: D240934SCH03	Sheet: 270 / Next: 320
00	03				Page description: ANALOGIC OUTPUT MODULE 19	Scheme: D240934SCH03	Tot. Sheet: 60
01							
02							



FICV-610A
FALL-610A
ST-600 LOW
LOW FLOW SAMPLING
O2 TO VENT

FICV-610B
FALL-610B
ST-600 LOW
LOW FLOW SAMPLING
O2 TO VENT

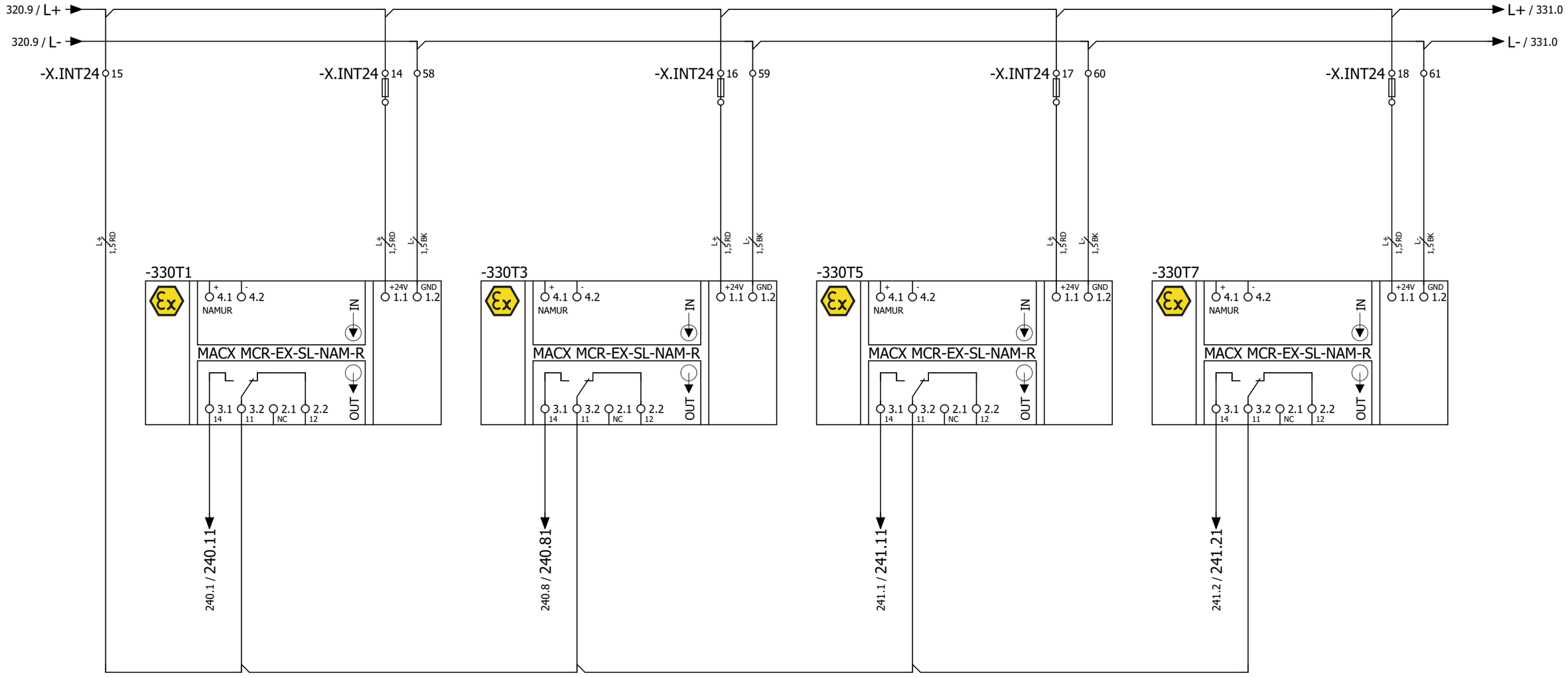
FICV-610C
FALL-610C
ST-600 LOW
LOW FLOW SAMPLING
O2 TO VENT

FICV-800
FALL-800
LOW
LOW FLOW HYDROGEN
TO VENT ANALISYS

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2
01					Page description: BARRIER RELAYS
02					

Order: W240716
File: D240934SCH03
Scheme: D240934SCH03

Sheet: 320 | Next: 330
Tot. Sheet: 60



FICV-611 FALL-611 ST-600 LOW LOW FLOW O2 TO VENT	HPP-700 ZSH-64.1.1 GS 64.1.1	HPP-700 ZSH-64.1.2 GS 64.1.2	HPP-700 ZSH-64.2 GS 64.2

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 330	Next: 331
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: BARRIER RELAYS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

330.9 / L+

330.9 / L-

-X.INT24 20

-X.INT24 19 62

-X.INT24 21 63

-X.INT24 64

-X.INT24 23 65

L+ / 332.0

L- / 332.0

L+ 1,5RD

L- 1,5BK

-331T1

-331T3

-331T7

+ 4.1 - 4.2 NAMUR

IN

+24V 1.1 GND 1.2

MACX MCR-EX-SL-NAM-R

3.1 14 3.2 11 2.1 NC 2.2 12

OUT

241.3 / 241.31

241.8 / 241.81

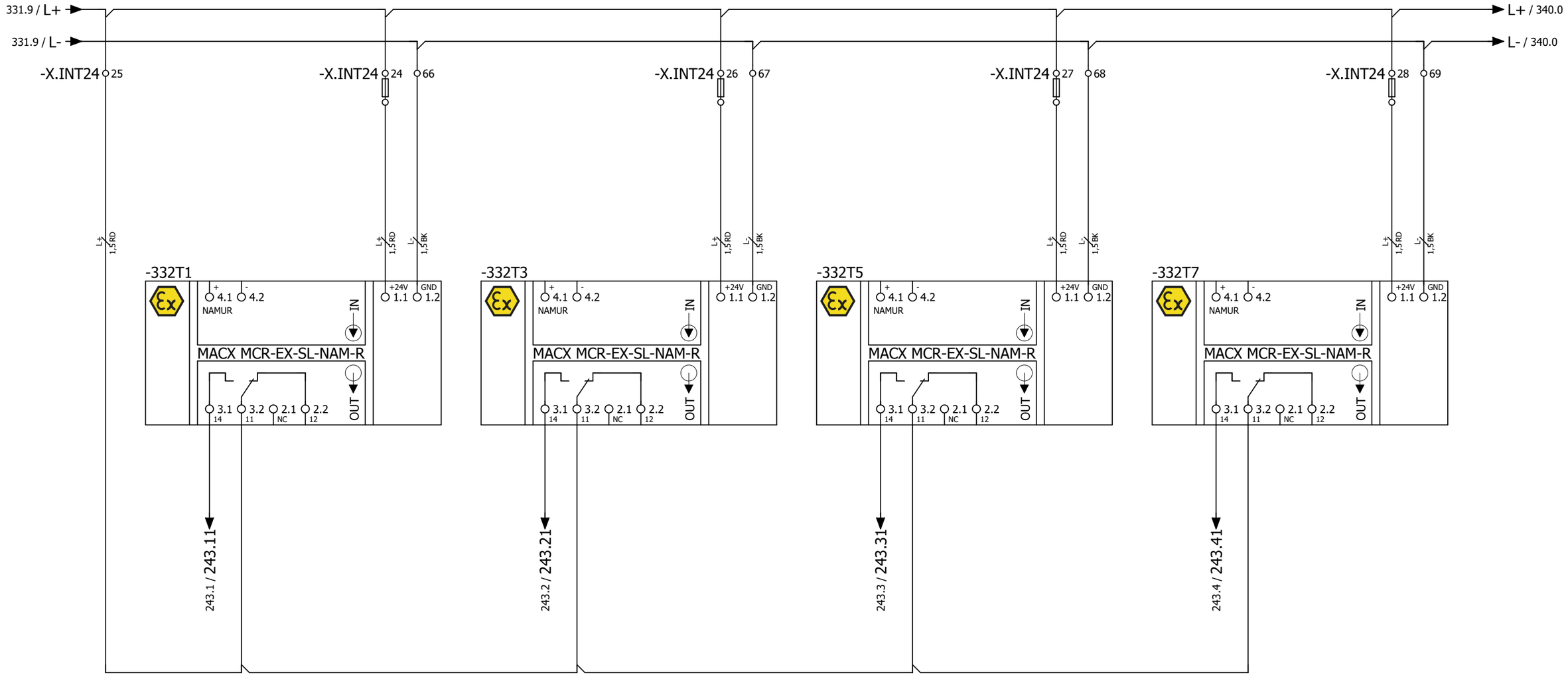
242.8 / 242.81

HPP-700
TSHH-64.3
HIGH
HIGH TEMPERATURE

FICV-800
FAHH-800
HIGH
HIGH FLOW HYDROGEN
TO VENT ANALISYS

HPP-700
ZSH-64.1.3
GS 64.1.3

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 331	Next: 332
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: BARRIER RELAYS	File: D240934SCH03		Tot. Sheet: 60
01						Scheme: D240934SCH03		
02								



HPP-700
ZSH-64.1.4
GS 64.1.4

HPP-700
ZSH-64.3
GS 64.3

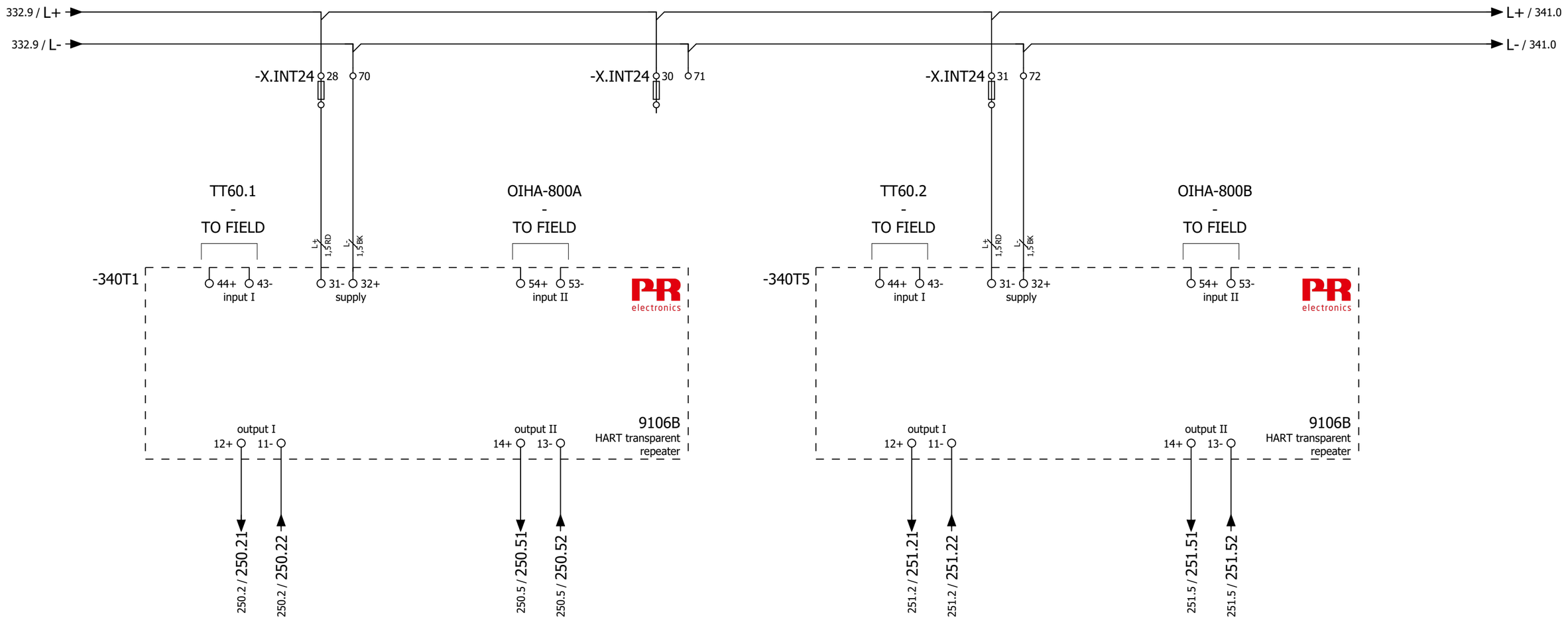
HPP-700
ZSL-64.T2
GS 64-T2

HPP-700
TSHH-64.4
HIGH
HIGH TEMPERATURE

Release/Version:					
00	03		PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2
01					Page description: BARRIER RELAYS
02					

Order: W240716
File: D240934SCH03
Scheme: D240934SCH03

Sheet: 332 | Next: 340
Tot. Sheet: 60



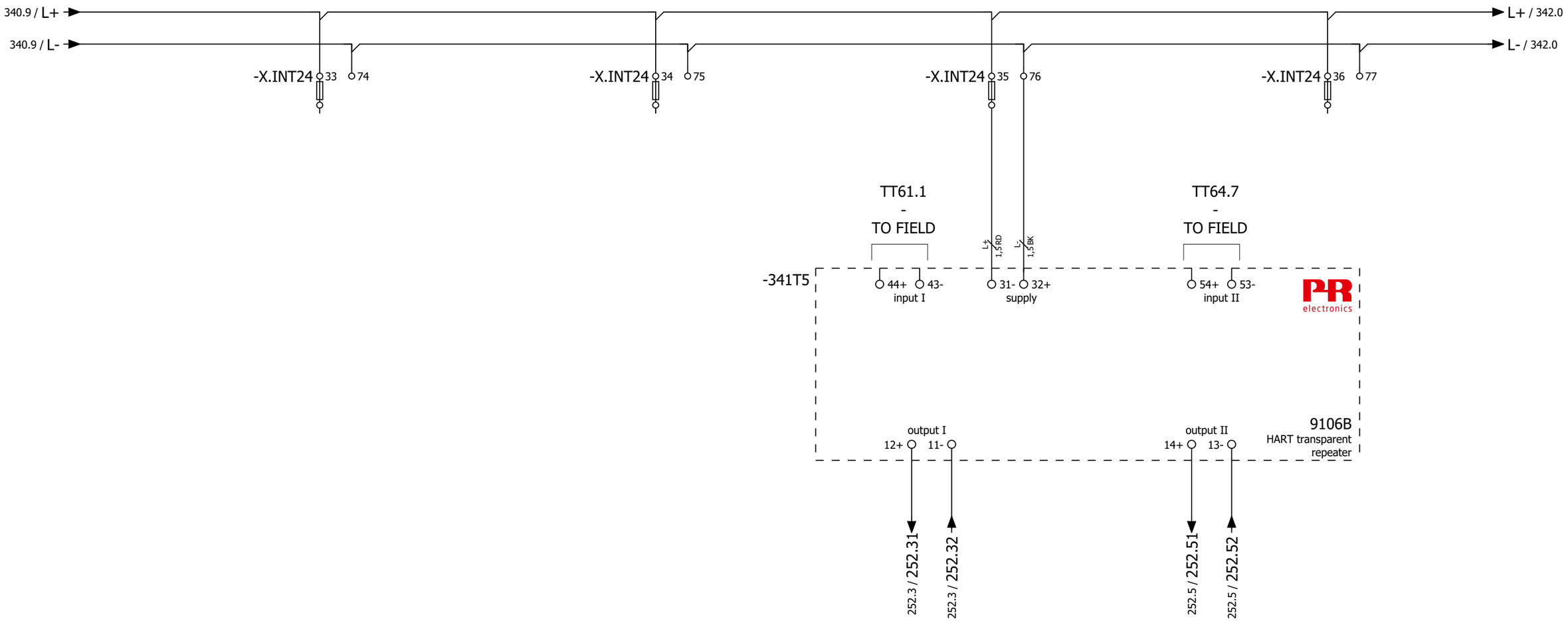
HPP-700
TT60.1
TEMPERATURE
TT60.1

OIHA-800A
AI-800A
OXYGEN IN HYDROGEN
TO PRODUCTION

HPP-700
TT60.2
TEMPERATURE
TT60.2

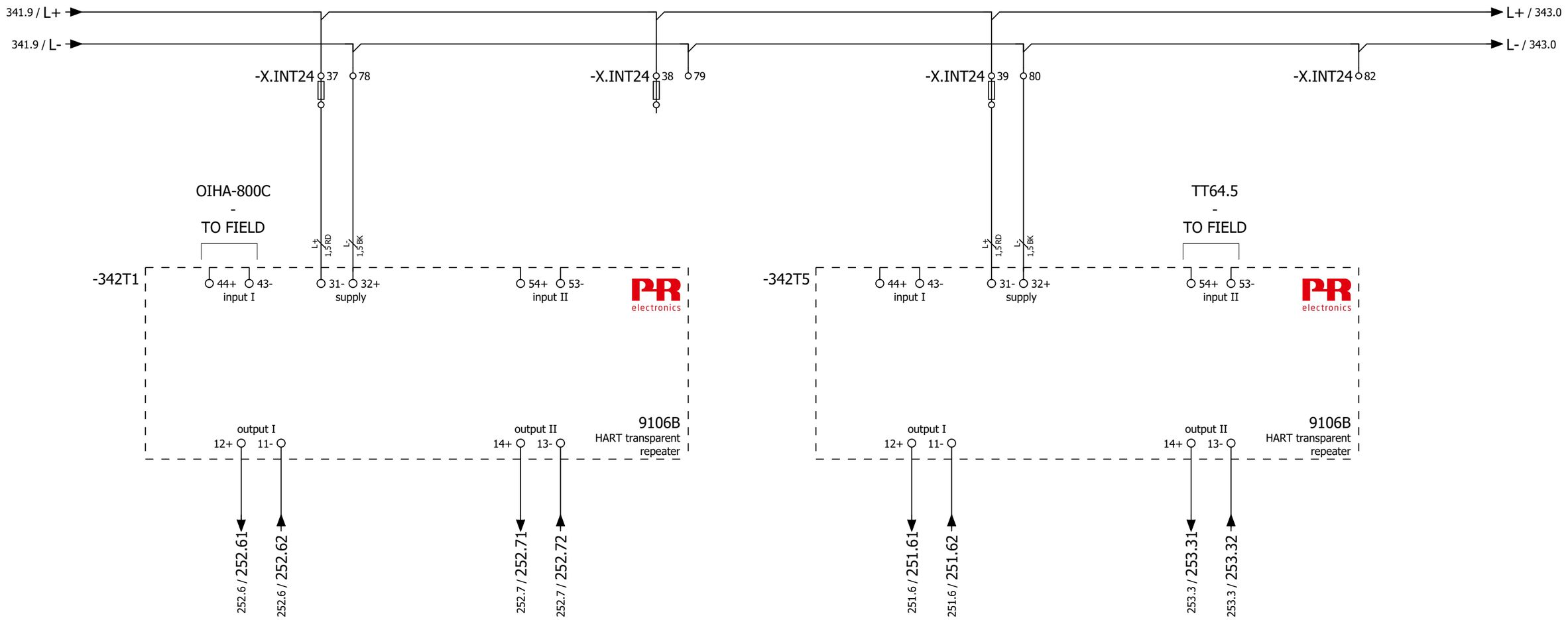
OIHA-800B
AI-800B
OXYGEN IN HYDROGEN
TO PRODUCTION

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 340	Next: 341
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: BARRIER RELAYS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								



HPP-700
TT61.1
TEMPERATURE
TT61.1

HPP-700
TT64.7
TEMPERATURE
TT64.7

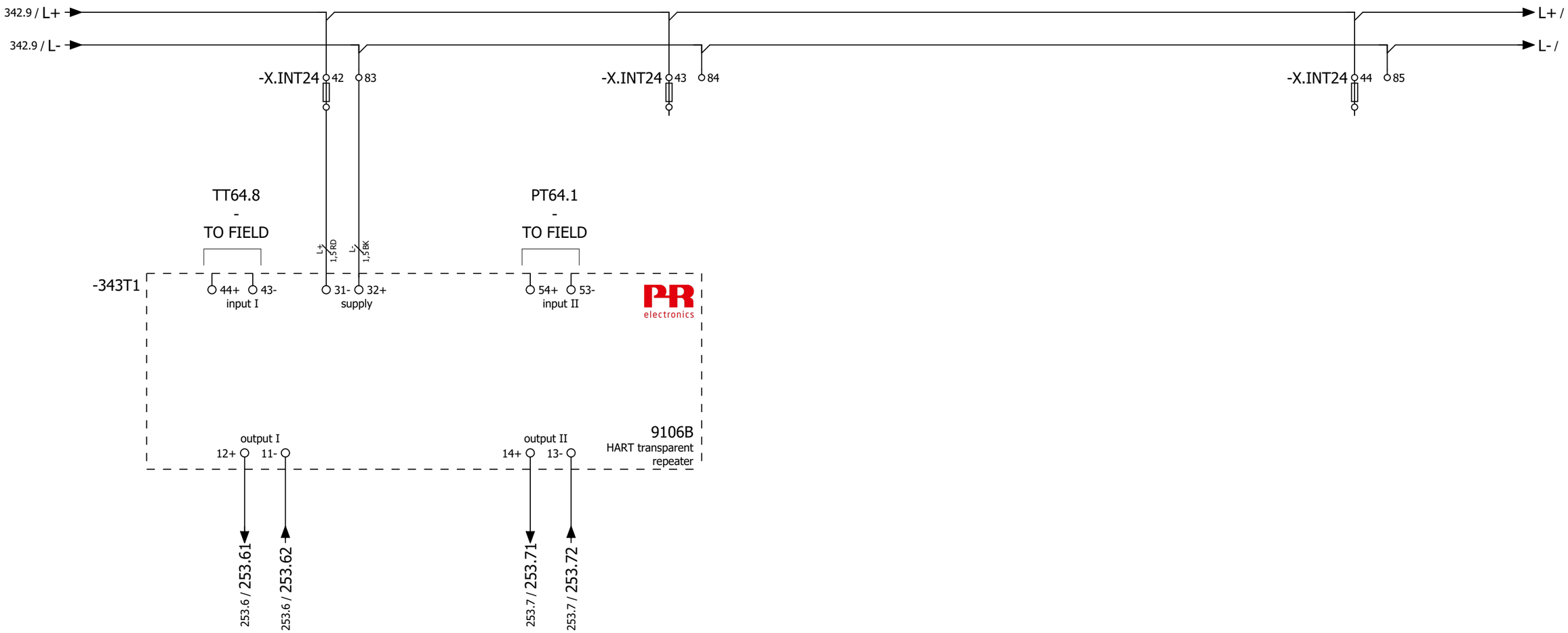


OIHA-800C
AI-800C
OXYGEN IN HYDROGEN
TO PRODUCTION

SPARE

SPARE

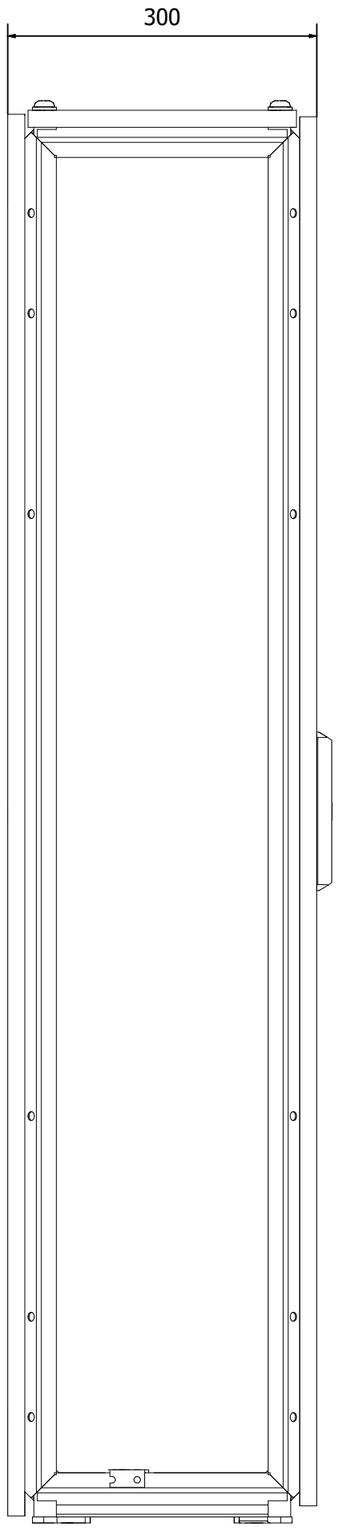
HPP-700
TT64.5
TEMPERATURE
TT64.5

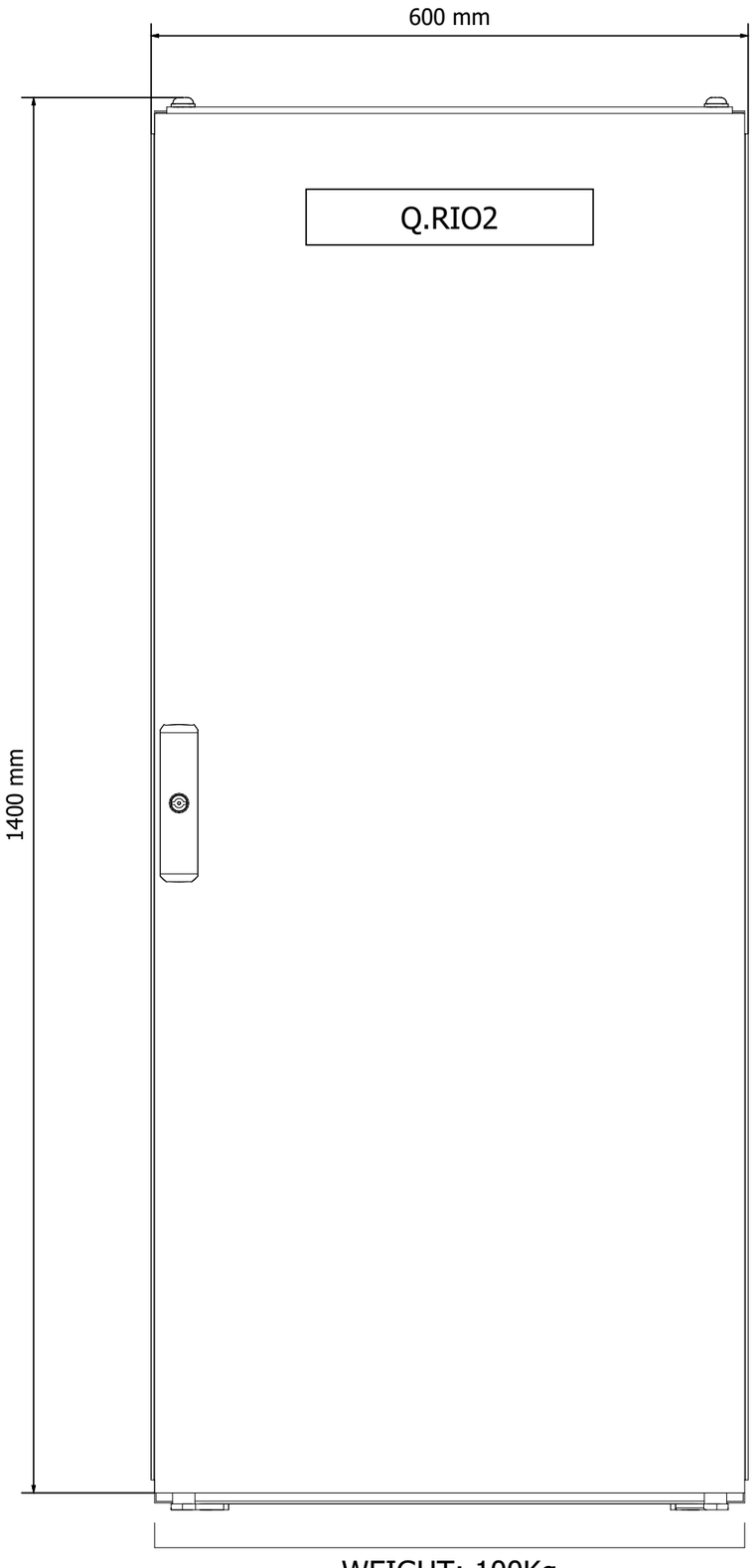


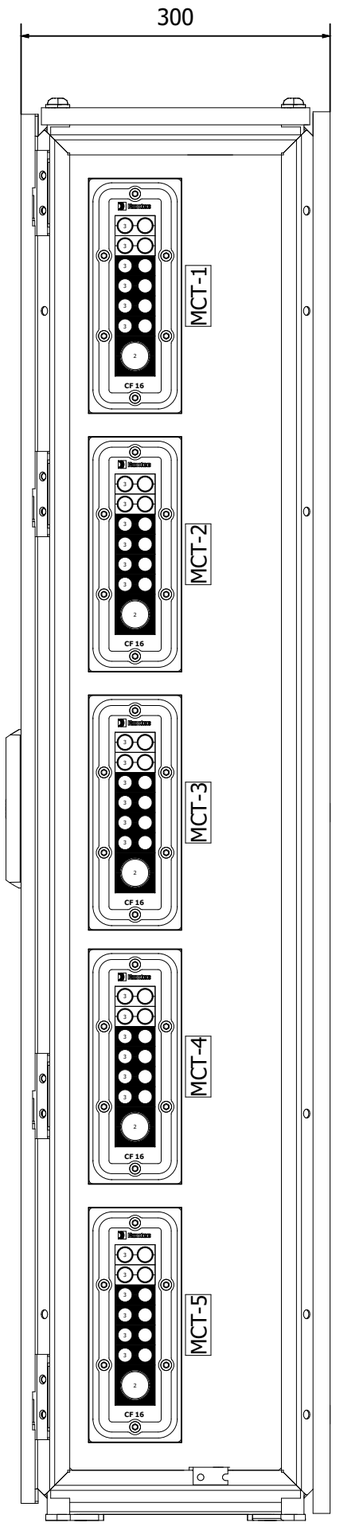
HPP-700
TT64.8
TEMPERATURE
TT64.8

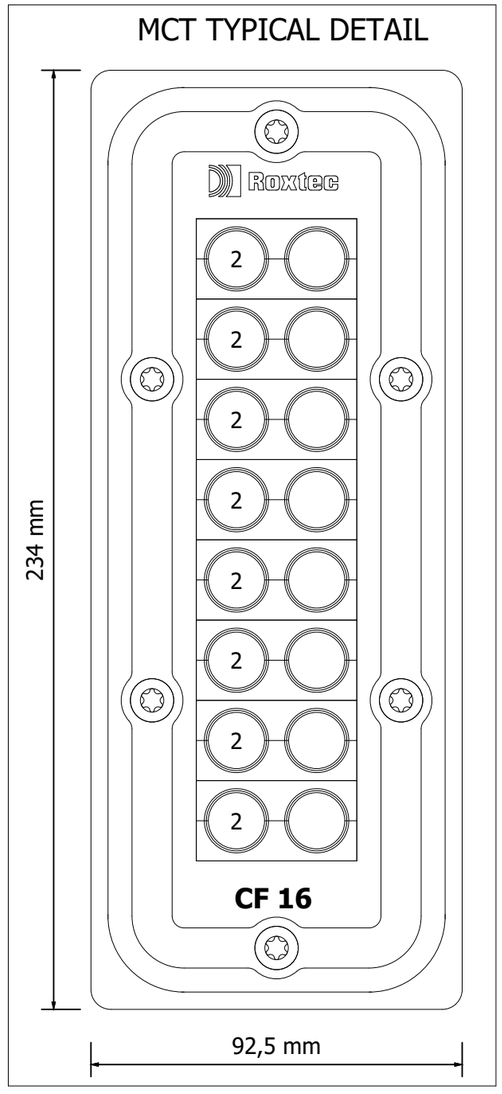
HPP-700
PT64.1
PRESSURE
TT64.1

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 343	Next: 500
00	03			FORES ENGENEERING		File: D240934SCH03		
01					Page description: BARRIER RELAYS		Tot. Sheet: 60	
02						Scheme: D240934SCH03		

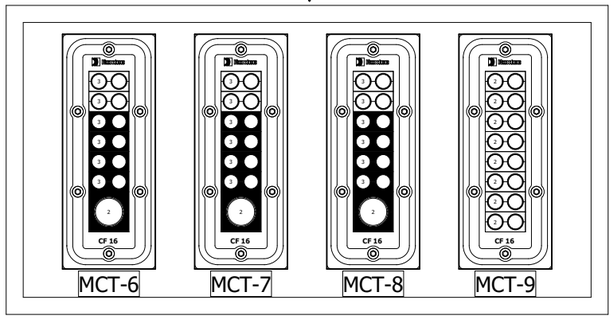








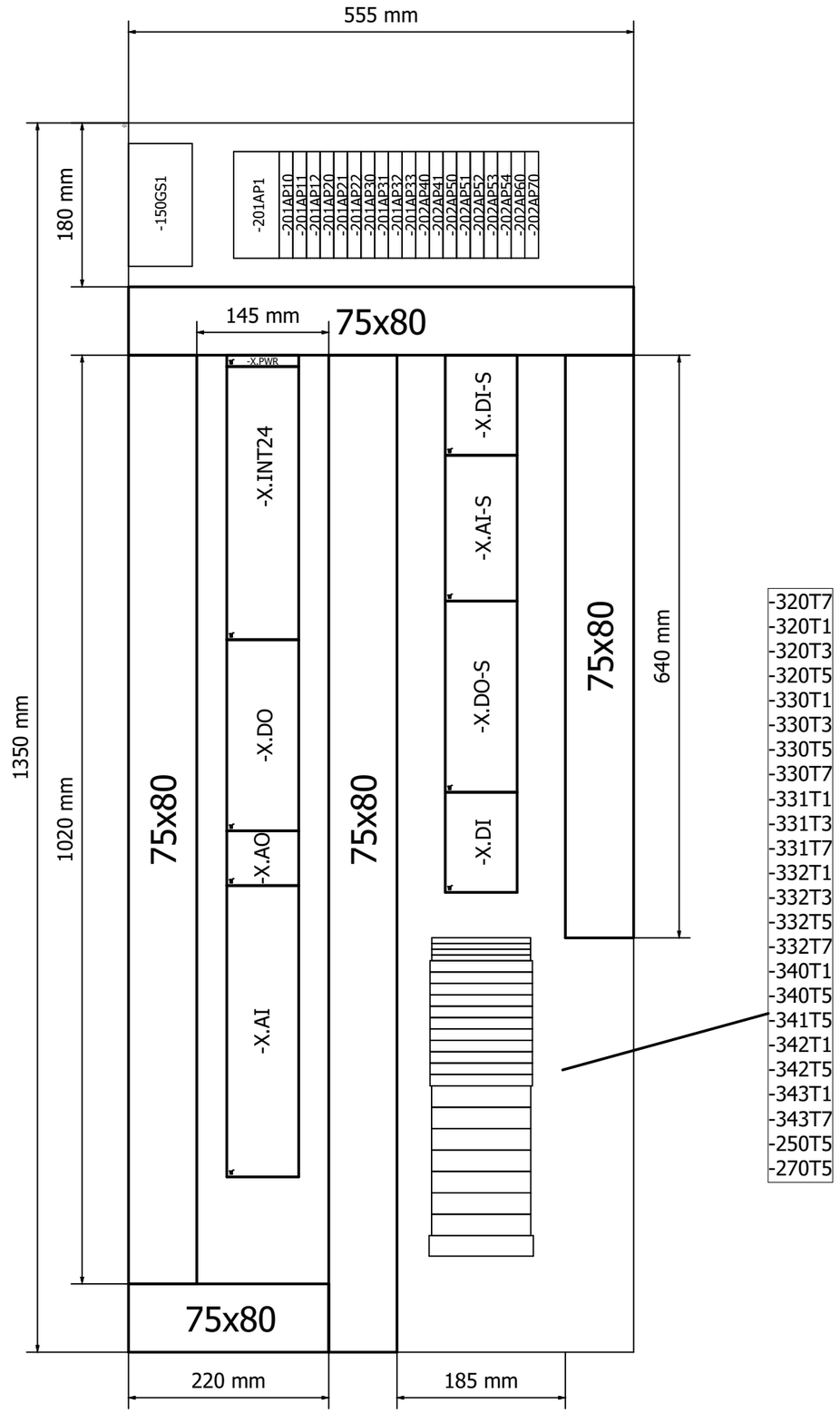
FRONT



BOTTOM VIEW

WEIGHT: 100Kg

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 500	Next: 505
00	03			FORES ENGENEERING		File: D240934SCH03		
01					Page description: MAIN CABINET EXTERNAL LAYOUT		Tot. Sheet: 60	
02						Scheme: D240934SCH03		



Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 505	Next: +SUMMARY/600
00	03			FORES ENGENEERING	Page description: MAIN CABINET INTERNAL LAYOUT	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.AI

ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
OXYGEN OUT ST-600					1		-202AP50	-X10:9			/250.1
=					2		-202AP50	-X10:1			/250.1
HYDROGEN OUT ST-620 TO VENT					3		-202AP50	-X10:11			/250.3
=					4		-202AP50	-X10:3			/250.3
HYDROGEN TO PRODUCTION			-250T5	11-	5		-202AP50	-X10:12			/250.4
=			-250T5	12+	6		-202AP50	-X10:4			/250.4
COMPRESSED AIR TO SERVICES					7		-202AP50	-X10:14			/250.6
=					8		-202AP50	-X10:6			/250.6
SPARE					9		-202AP50	-X10:15			/250.7
=					10		-202AP50	-X10:7			/250.7
=					11		-202AP50	-X10:8			/250.8
=					12		-202AP50	-X10:16			/250.8
OXYGEN OUT ST-600					13		-202AP51	-X10:9			/251.1
=					14		-202AP51	-X10:1			/251.1
PRESSURE NITROGEN TO ST-620					15		-202AP51	-X10:11			/251.3
=					16		-202AP51	-X10:3			/251.3
DEW POINT IN HYDROGEN TO PRODUCTION					17		-202AP51	-X10:12			/251.4
=					18		-202AP51	-X10:4			/251.4
SPARE					19		-202AP51	-X10:15			/251.7
=					20		-202AP51	-X10:7			/251.7
=					21		-202AP51	-X10:16			/251.8
=					22		-202AP51	-X10:8			/251.8
N2 TO ST-600					23		-202AP52	-X10:9			/252.1
=					24		-202AP52	-X10:1			/252.1
DEW POINT IN HYDROGEN TO PRODUCTION					25		-202AP52	-X10:12			/252.4
=					26		-202AP52	-X10:4			/252.4
SPARE					27		-202AP52	-X10:16			/252.8
=					28		-202AP52	-X10:8			/252.8
N2 TO ST-600					29		-202AP53	-X10:9			/253.1
=					30		-202AP53	-X10:1			/253.1
NITROGEN TO SERVICES					31		-202AP53	-X10:12			/253.4
=					32		-202AP53	-X10:4			/253.4
SPARE					33		-202AP53	-X10:13			/253.5
=					34		-202AP53	-X10:5			/253.5
LEVEL INDICATION ST-600					35		-202AP54	-X10:9			/254.1

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.AI

ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
LEVEL INDICATION ST-600					36	,	-202AP54	-X10:1			/254.1
SPARE					37		-202AP54	-X10:10			/254.2
=					38	,	-202AP54	-X10:2			/254.2
LEVEL INDICATION ST-620					39		-202AP54	-X10:11			/254.3
=					40	,	-202AP54	-X10:3			/254.3
DEW POINT IN HYDROGEN TO PRODUCTION					41		-202AP54	-X10:12			/254.4
=					42	,	-202AP54	-X10:4			/254.4
HYDROGEN OUT CS-630 TO VENT					43		-202AP54	-X10:13			/254.5
=					44	,	-202AP54	-X10:5			/254.5
SPARE					45		-202AP54	-X10:15			/254.7
=					46	,	-202AP54	-X10:7			/254.7
=					47		-202AP54	-X10:16			/254.8
=					48	,	-202AP54	-X10:8			/254.8

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 600.a	Next: 601
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.AI-S

SAFETY ANALOGIC INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
OXYGEN OUT ST-600					1		-201AP20	-X10:1			/220.1
=					2	,	-201AP20	-X10:3			/220.1
HYDROGEN IN OXYGEN DETECTION ST-600 SAMPLING O2 TO VENT					3		-201AP20	-X10:2			/220.3
=					4	,	-201AP20	-X10:4			/220.3
AMBIENT HYDROGEN DETECTOR LEVEL 1					5		-201AP20	-X10:9			/220.5
=					6	,	-201AP20	-X10:11			/220.5
SPARE					7		-201AP20	-X10:10			/220.7
=					8	,	-201AP20	-X10:12			/220.7
HYDROGEN IN OXYGEN DETECTION ST-600 SAMPLING O2 TO VENT					9		-201AP21	-X10:1			/221.1
=					10	,	-201AP21	-X10:3			/221.1
HIGH HIGH PRESSURE HYDROGEN OUT ST-620 TO VENT					11		-201AP21	-X10:2			/221.3
=					12	,	-201AP21	-X10:4			/221.3
AMBIENT HYDROGEN DETECTOR LEVEL 0					13		-201AP21	-X10:9			/221.5
=					14	,	-201AP21	-X10:11			/221.5
SPARE					15		-201AP21	-X10:10			/221.7
=					16	,	-201AP21	-X10:12			/221.7
HYDROGEN IN OXYGEN DETECTION ST-600 SAMPLING O2 TO VENT					17		-201AP22	-X10:1			/222.1
=					18	,	-201AP22	-X10:3			/222.1
HYDROGEN TO PRODUCTION					19		-201AP22	-X10:2			/222.3
=					20	,	-201AP22	-X10:4			/222.3
MOTORIZED PROPORTIONAL VALVE POSITION					21		-201AP22	-X10:13			/222.6
=					22	,	-201AP22	-X10:11			/222.5
=					23		-201AP22	-X10:14			/222.8
=					24	,	-201AP22	-X10:12			/222.7

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 601	Next: 602
00	03				Page description: TERMINAL BOARDS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.AO

ANALOGIC OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
MOTORIZED PROPORTIONAL VALVE COMMAND					1		-202AP70	1			/270.1
=					2	,	-202AP70	5			/270.1
=					3		-202AP70	2			/270.3
=					4	,	-202AP70	6			/270.3
FLOW CONTROL VALVE FV-64-1 COMMAND			-270T5	1	5		-202AP70	3			/270.5
=			-270T5	2	6	,	-202AP70	7			/270.5
SPARE					7		-202AP70	4			/270.7
=					8	,	-202AP70	8			/270.7

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 602	Next: 603
00	03				Page description: TERMINAL BOARDS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
LOW LEVEL CS-610					1		-X.DI-S	39			/240.2
=					2		-202AP40	2			/240.2
LOW LEVEL CS-630					3						/240.3
=					4		-202AP40	3			/240.3
LOW LEVEL H2 HEADER					5						/240.4
=					6		-202AP40	4			/240.4
LOW LEVEL DG-640					7						/240.5
=					8		-202AP40	5			/240.5
DOOR SWITCH OPEN / CLOSE LEVEL 1					9						/240.6
=					10		-202AP40	6			/240.6
=					11						/240.7
=					12		-202AP40	7			/240.7
HIGH HIGH TEMPERATURE HEATER HE64.1					13						/241.4
=					14		-202AP40	12			/241.4
SPARE					15						/241.5
=					16		-202AP40	13			/241.5
=					17						/241.6
=					18		-202AP40	14			/241.6
=					19						/241.7
=					20		-202AP40	15			/241.7
HIGH LEVEL CS-610					21						/242.1
=					22		-202AP41	1			/242.1
HIGH LEVEL CS-630					23						/242.2
=					24		-202AP41	2			/242.2
HIGH LEVEL H2 HEADER					25						/242.3
=					26		-202AP41	3			/242.3
HIGH LEVEL DG-640					27						/242.4
=					28		-202AP41	4			/242.4
DOOR SWITCH OPEN / CLOSE LEVEL 1					29						/242.5
=					30		-202AP41	5			/242.5
=					31						/242.6
=					32		-202AP41	6			/242.6
TEMPERATURE HEATER HE64.1					33						/243.5
=					34		-202AP41	13			/243.5
SPARE					35						/243.6

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.DI

DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					36		-202AP41	14			/243.6
=					37						/243.7
=					38		-202AP41	15			/243.7
=					39		-X.INT24	41			/243.8
=					40		-202AP41	16			/243.8
WATER LEAK DETECTOR LEVEL 1					41						/242.7
=					42		-202AP41	7			/242.7

Release/Version:		
00	03	
01		
02		

PROTEO ENGINEERING GROUP

Customer: FORES ENGENEERING

Installation: ELECTRICAL CABINET - RIO2

Page description: TERMINAL BOARDS

Order: W240716

File: D240934SCH03

Scheme: D240934SCH03

Sheet: 603.a

Next: 604

Tot. Sheet: 60

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.DI-S

SAFETY DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
HV-605 VALVE OPEN POSITION					1		-X.INT24	9			/210.1
=					2		-201AP10	1			/210.1
SPARE					3						/210.5
=					4		-201AP10	3			/210.5
LOW LOW LEVEL ST-620					5						/210.7
=					6		-201AP10	4			/210.7
LOW LOW LEVEL H2 HEADER					7						/211.1
=					8		-201AP10	5			/211.1
SPARE					9						/211.3
=					10		-201AP10	6			/211.3
=					11						/211.5
=					12		-201AP10	7			/211.5
=					13						/211.7
=					14		-201AP10	8			/211.7
HIGH HIGH LEVEL ST-600					15						/212.1
=					16		-201AP11	1			/212.1
LOW CS-610					17						/212.5
=					18		-201AP11	3			/212.5
HIGH HIGH LEVEL CS-631					19						/212.7
=					20		-201AP11	4			/212.7
LOW LEVEL DG-640					21						/213.1
=					22		-201AP11	5			/213.1
SPARE					23						/213.3
=					24		-201AP11	6			/213.3
=					25						/213.5
=					26		-201AP11	7			/213.5
=					27						/213.7
=					28		-201AP11	8			/213.7
LOW LOW LEVEL ST-600					29						/214.1
=					30		-201AP12	1			/214.1
HV-624 VALVE OPEN POSITION					31						/214.5
=					32		-201AP12	3			/214.5
HIGH HIGH LEVEL H2 HEADER					33						/214.7
=					34		-201AP12	4			/214.7
HIGH FLOW PWH2 TO ST-600					35						/215.1

Release/Version:				Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 604	Next: 604.a
00	03		PROTEO ENGINEERING GROUP	FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.DI-S

SAFETY DIGITAL INPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable type	Cable name	Page / column
HIGH FLOW PWH2 TO ST-600					36		-201AP12	5			/215.1
SPARE					37						/215.3
=					38		-201AP12	6			/215.3
=					39		-X.DI	1			/215.5
=					40		-201AP12	7			/215.5

Release/Version:			Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 604.a	Next: 605
00	03		FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH03		
01					Scheme: D240934SCH03	Tot. Sheet: 60	
02							

PROTEO ENGINEERING GROUP

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.DO

DIGITAL OUTPUT TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SPARE					1		-202AP60	1			/260.1
=					2		-X.INT24	22			/260.1
=					3		-202AP60	2			/260.2
=					4						/260.2
=					5		-202AP60	3			/260.3
=					6						/260.3
=					7		-202AP60	4			/260.4
=					8						/260.4
=					9		-202AP60	5			/260.5
=					10						/260.5
VALVE 64-V1 COMMAND					11		-202AP60	6			/260.6
=					12						/260.6
VALVE 64-V2 COMMAND					13		-202AP60	7			/260.7
=					14						/260.7
VALVE 64-V3 COMMAND					15		-202AP60	8			/260.8
=					16						/260.8
VALVE 64-V8 COMMAND					17		-202AP60	9			/261.1
=					18						/261.1
VALVE 64-V12 COMMAND					19		-202AP60	10			/261.2
=					20						/261.2
VALVE 64-V17 COMMAND					21		-202AP60	11			/261.3
=					22						/261.3
SPARE					23		-202AP60	12			/261.4
=					24						/261.4
=					25		-202AP60	13			/261.5
=					26						/261.5
=					27		-202AP60	14			/261.6
=					28						/261.6
=					29		-202AP60	15			/261.7
=					30						/261.7
=					31		-202AP60	16			/261.8
=					32		-X.INT24	55			/261.8
GENERAL 24VDC					33		-150GS1	13			/150.2
RIO 2 - 24Vdc converter -Power supply status to Control Cabinet					34		-150GS1	14			/150.2

Terminal diagram

F13_001

function text	Cable name	cable type	Strip =QW24071602+Q1-X.DO-S Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
SOLENOID VALVE COMMAND PV-500					1		-201AP30	1			/230.1
=					2	,	-201AP30	9			/230.1
SOLENOID VALVE COMMAND SV-601					3		-201AP30	2			/230.3
=					4	,	-201AP30	10			/230.3
SOLENOID VALVE COMMAND SV-641					5		-201AP30	3			/230.5
=					6	,	-201AP30	11			/230.5
SPARE					7		-201AP30	4			/230.7
=					8	,	-201AP30	12			/230.7
SOLENOID VALVE COMMAND PV-501					9		-201AP31	1			/231.1
=					10	,	-201AP31	9			/231.1
SOLENOID VALVE COMMAND SV-610					11		-201AP31	2			/231.3
=					12	,	-201AP31	10			/231.3
SOLENOID VALVE COMMAND SV-800					13		-201AP31	3			/231.5
=					14	,	-201AP31	11			/231.5
SPARE					15		-201AP31	4			/231.7
=					16	,	-201AP31	12			/231.7
SOLENOID VALVE COMMAND SV-900					17		-201AP32	1			/232.1
=					18	,	-201AP32	9			/232.1
SOLENOID VALVE COMMAND SV-630					19		-201AP32	2			/232.3
=					20	,	-201AP32	10			/232.3
SPARE					21		-201AP32	3			/232.5
=					22	,	-201AP32	11			/232.5
=					23		-201AP32	4			/232.7
=					24	,	-201AP32	12			/232.7
SOLENOID VALVE COMMAND SV-920					25		-201AP33	1			/233.1
=					26	,	-201AP33	9			/233.1
SOLENOID VALVE COMMAND SV-635					27		-201AP33	2			/233.3
=					28	,	-201AP33	10			/233.3
SPARE					29		-201AP33	3			/233.5
=					30	,	-201AP33	11			/233.5
=					31		-201AP33	4			/233.7
=					32	,	-201AP33	12			/233.7

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-201AP1	-X80:1	1		-X.PWR	1			/201.1
			-201AP10	L+	2						/201.2
			-201AP20	L+	3						/201.4
			-201AP30	L+	4						/201.6
			-201AP33	L+	5						/201.7
			-202AP40	L+	6						/202.1
			-202AP50	L+	7						/202.2
			-202AP60	L+	8						/202.5
			-202AP70	L+	9		-X.DI-S	1			/202.6
			-320T1	5	10						/320.0
ST-600 LOW LOW FLOW SAMPLING O2 TO VENT			-320T1	7	11						/320.1
=			-320T3	7	12						/320.3
=			-320T5	7	13						/320.5
ST-600 LOW LOW FLOW O2 TO VENT			-330T1	1.1	14						/330.2
			-330T1	3.2	15						/330.0
GS 64.1.1			-330T3	1.1	16						/330.4
GS 64.1.2			-330T5	1.1	17						/330.6
GS 64.2			-330T7	1.1	18						/330.8
HIGH HIGH TEMPERATURE			-331T1	1.1	19						/331.2
			-331T1	3.2	20						/331.0
HIGH HIGH FLOW HYDROGEN TO VENT ANALISYS			-331T3	1.1	21						/331.4
HYDROGEN TO PRODUCTION			-250T5	32+	22		-X.DO	2			/250.5
GS 64.1.3			-331T7	1.1	23						/331.8
GS 64.1.4			-332T1	1.1	24						/332.2
			-332T1	3.2	25						/332.0
GS 64.3			-332T3	1.1	26						/332.4
GS 64-T2			-332T5	1.1	27						/332.6
HIGH HIGH TEMPERATURE			-332T7	1.1	28						/332.8
TEMPERATURE TT60.1			-340T1	31-	28						/340.2
OXYGEN IN HYDROGEN TO PRODUCTION					30						/340.4
TEMPERATURE TT60.2			-340T5	31-	31						/340.6
					33						/341.2
					34						/341.4
TEMPERATURE TT61.1			-341T5	31-	35						/341.6
TEMPERATURE TT64.7					36						/341.8

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
OXYGEN IN HYDROGEN TO PRODUCTION			-342T1	31-	37						/342.2
SPARE					38						/342.4
=			-342T5	31-	39						/342.6
HYDROGEN TO PRODUCTION			-250T5	31-	41		-X.DI	39			/250.5
TEMPERATURE TT64.8			-343T1	31-	42						/343.2
PRESSURE TT64.1					43						/343.4
=					44						/343.8
			-201AP1	-X80:2	46		-X.PWR	2			/201.1
			-201AP10	M	47						/201.2
			-201AP20	M	48						/201.4
			-201AP30	M	49						/201.6
			-201AP33	M	50						/201.8
			-202AP40	M	51						/202.1
			-202AP50	M	52						/202.2
			-202AP60	M	53						/202.5
			-202AP70	M	54						/202.6
ST-600 LOW LOW FLOW SAMPLING O2 TO VENT			-320T1	8	55		-X.DO	32			/320.1
=			-320T3	8	56						/320.3
=			-320T5	8	57						/320.5
ST-600 LOW LOW FLOW O2 TO VENT			-330T1	1.2	58						/330.2
GS 64.1.1			-330T3	1.2	59						/330.4
GS 64.1.2			-330T5	1.2	60						/330.6
GS 64.2			-330T7	1.2	61						/330.8
HIGH HIGH TEMPERATURE			-331T1	1.2	62						/331.2
HIGH HIGH FLOW HYDROGEN TO VENT ANALISYS			-331T3	1.2	63						/331.4
=					64						/331.6
GS 64.1.3			-331T7	1.2	65						/331.8
GS 64.1.4			-332T1	1.2	66						/332.2
GS 64.3			-332T3	1.2	67						/332.4
GS 64-T2			-332T5	1.2	68						/332.6
HIGH HIGH TEMPERATURE			-332T7	1.2	69						/332.8
TEMPERATURE TT60.1			-340T1	32+	70						/340.2
OXYGEN IN HYDROGEN TO PRODUCTION					71						/340.4
TEMPERATURE TT60.2			-340T5	32+	72						/340.6
					74						/341.2

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 607.a	Next: 607.b
00	03			FORES ENGENEERING	Page description: TERMINAL BOARDS	File: D240934SCH03		Tot. Sheet: 60
01						Scheme: D240934SCH03		
02								

Terminal diagram

F13_001

Strip

=QW24071602+Q1-X.INT24

24VDC MC TERMINAL STRIP

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
					75						/341.4
TEMPERATURE TT61.1			-341T5	32+	76						/341.6
TEMPERATURE TT64.7					77						/341.8
OXYGEN IN HYDROGEN TO PRODUCTION			-342T1	32+	78						/342.2
SPARE					79						/342.4
=			-342T5	32+	80						/342.6
TEMPERATURE TT64.5					82						/342.8
TEMPERATURE TT64.8			-343T1	32+	83						/343.2
PRESSURE TT64.1					84						/343.4
=					85						/343.8
LOW LOW FLOW HYDROGEN TO VENT ANALISYS			-320T7	7	86						/320.7
=			-320T7	8	87						/320.7

Release/Version:			PROTEO ENGINEERING GROUP	Customer:	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 607.b	Next: 608
00	03			FORES ENGENEERING		File: D240934SCH03		
01					Page description: TERMINAL BOARDS		Tot. Sheet: 60	
02						Scheme: D240934SCH03		

Terminal diagram

F13_001

Strip
=QW24071602+Q1-X.PWR

function text	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
			-X.INT24	1	1	,	-150GS1	+1			/150.1
GENERAL 24VDC			-X.INT24	46	2	,	-150GS1	-1			/150.1

Release/Version:			PROTEO ENGINEERING GROUP	Customer: FORES ENGENEERING	Installation: ELECTRICAL CABINET - RIO2	Order: W240716	Sheet: 608	Next: 700
00	03				Page description: TERMINAL BOARDS	File: D240934SCH03		
01						Scheme: D240934SCH03	Tot. Sheet: 60	
02								

Parts list

F01_003

Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.6ES7155-6AU01-0CN0	1	ET 200SP, IM155-6PN/2 HF	6ES7155-6AU01-0CN0	SIE	201AP1	
SIE.6ES5710-8MA11	1	STAND.SECTIONAL RAIL 35MM, LENGTH 483MM	6ES5710-8MA11	SIE	201AP1	
SIE.6ES7193-6AR00-0AA0	1	ET 200SP, BA 2XRJ45	6ES7193-6AR00-0AA0	SIE	201AP1	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP10	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP10	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP11	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP11	
SIE.6ES7136-6BA01-0CA0	1	SIMATIC ET 200SP F-DI 8x24VDC HF	6ES7136-6BA01-0CA0	SIE	201AP12	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP12	
SIE.6ES7136-6AA00-0CA1	1	SIMATIC ET 200SP F-AI 4xI 0(4)..20mA 2-/4-wire HF	6ES7136-6AA00-0CA1	SIE	201AP20	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP20	
SIE.6ES7136-6AA00-0CA1	1	SIMATIC ET 200SP F-AI 4xI 0(4)..20mA 2-/4-wire HF	6ES7136-6AA00-0CA1	SIE	201AP21	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP21	
SIE.6ES7136-6AA00-0CA1	1	SIMATIC ET 200SP F-AI 4xI 0(4)..20mA 2-/4-wire HF	6ES7136-6AA00-0CA1	SIE	201AP22	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP22	
SIE.6ES7136-6DB00-0CA0	1	SIMATIC ET 200SP F-DQ 4x24 V DC/2A HF	6ES7136-6DB00-0CA0	SIE	201AP30	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP30	
SIE.6ES7136-6DB00-0CA0	1	SIMATIC ET 200SP F-DQ 4x24 V DC/2A HF	6ES7136-6DB00-0CA0	SIE	201AP31	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP31	
SIE.6ES7136-6DB00-0CA0	1	SIMATIC ET 200SP F-DQ 4x24 V DC/2A HF	6ES7136-6DB00-0CA0	SIE	201AP32	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	201AP32	
SIE.6ES7136-6DB00-0CA0	1	SIMATIC ET 200SP F-DQ 4x24 V DC/2A HF	6ES7136-6DB00-0CA0	SIE	201AP33	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	201AP33	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	202AP40	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP40	
SIE.6ES7131-6BH01-0BA0	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	SIE	202AP41	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP41	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP50	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP50	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP51	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP51	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP52	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP52	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP53	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP53	
SIE.6ES7134-6GF00-0AA1	1	SIMATIC ET 200SP AI 8xI 2-/4-wire BA	6ES7134-6GF00-0AA1	SIE	202AP54	
SIE.6ES7193-6BP00-0BA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2B	6ES7193-6BP00-0BA0	SIE	202AP54	
SIE.6ES7132-6BH01-0BA0	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	SIE	202AP60	

Parts list

F01_003

Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP60	
SIE.6ES7135-6HD00-0BA1	1	SIMATIC ET 200SP AQ 4xU/I ST	6ES7135-6HD00-0BA1	SIE	202AP70	
SIE.6ES7193-6BP00-0DA0	1	SIMATIC ET 200SP BU type A0 BU15-P16+A0+2D	6ES7193-6BP00-0DA0	SIE	202AP70	
SIE.6EP3336-7SC00-3AX0	1	SITOP PSU6200 1ph 24 V/20 A	6EP3336-7SC00-3AX0	SIE	150GS1	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-1	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-1	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-1	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-2	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-2	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-2	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-3	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-3	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-3	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-4	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-4	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-4	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-5	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-5	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-5	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-6	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-6	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-6	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-7	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-7	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-7	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-8	
RXT.EXC000120401000	6	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-8	
RXT.EXC000140101000	1	Module x1 cable Ø9.5 - 32.5mm	CM 40 10-32 Ex	RXT	MCT-8	
RXT.EXCSF0000160010	1	Square multi cable frame	CF 16 Ex	RXT	MCT-9	
RXT.EXC000120401000	8	Module x2 cables Ø3.5 - 16.5mm	CM 20w40 Ex	RXT	MCT-9	
IRINOX.E10601400300044	1	Enclosure system 600x1400x300 Aisi 316L	E10601400300044	IRINOX	Q1	
PAL.P202282EX	1	BIPOLAR SWITCH 16A 250V AND 10A 400V 2 INPUTS	202282EX	PAL	1QF3	TAIS-MIGNON-Ex
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	250T5	
GMI.D1020D/B	1	INTRINSIC SAFE GALVANIC ISOLATOR FOR ANALOG OUTPUTS	D1020D/B	GMI	270T5	D1020D/B
PXC.1157862	1	Isolating switch transformer	MINI MCR-EX-NAM-RO	PXC	320T1	
PXC.1157862	1	Isolating switch transformer	MINI MCR-EX-NAM-RO	PXC	320T3	
PXC.1157862	1	Isolating switch transformer	MINI MCR-EX-NAM-RO	PXC	320T5	
PXC.1157862	1	Isolating switch transformer	MINI MCR-EX-NAM-RO	PXC	320T7	

Parts list

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Part number	Quantity	Designation	Type number	Manufacturer	DT	Function text
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	330T1	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	330T3	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	330T5	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	330T7	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	331T1	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	331T3	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	331T7	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	332T1	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	332T3	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	332T5	
PXC.2865434	1	Isolation amplifier	MACX MCR-EX-SL-NAM-R	PXC	332T7	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	340T1	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	340T5	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	341T5	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	342T1	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	342T5	
PR.9106B	1	HART transparent repeater	9106B	PR. ELECTRONICS	343T1	
PXC.3214325	24	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.AI	
WEI.1020000000	24	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.AI	
PXC.3214325	12	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.AI-S	
WEI.1020000000	12	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.AI-S	
PXC.3214325	4	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.AO	
WEI.1020000000	4	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.AO	
WEI.1020000000	42	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DI	
WEI.1020000000	40	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DI-S	
PXC.3214325	16	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.DO	
WEI.1020000000	18	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DO	
PXC.3214325	16	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.DO-S	
WEI.1020000000	16	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.DO-S	
PXC.3214325	30	Fuse terminal block	UT 4-L/HESI (5X20)	PXC	X.INT24	
WEI.1020000000	52	Feed-through terminal block 2.5 mm²	WDU 2.5	WEI	X.INT24	
WEI.1020100000	2	Feed-through terminal 4 mm²	WDU 4	WEI	X.PWR	

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=QW24071602+Q1/1	MAIN LINE		04/03/2025	PROTEO	
=QW24071602+Q1/150	AUXILIARY DISTRIBUTION 24VDC		11/04/2025	Proteo	
=QW24071602+Q1/201	PLC LAYOUT		11/04/2025	Proteo	
=QW24071602+Q1/202	PLC LAYOUT		11/04/2025	Proteo	
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=QW24071602+Q1/231	SAFETY DIGITAL OUTPUT MODULE 8		05/02/2025	PROTEO	
=QW24071602+Q1/232	SAFETY DIGITAL OUTPUT MODULE 9		05/02/2025	PROTEO	
=QW24071602+Q1/233	SAFETY DIGITAL OUTPUT MODULE 10		05/02/2025	PROTEO	
=QW24071602+Q1/240	DIGITAL INPUT MODULE 11		05/02/2025	PROTEO	
=QW24071602+Q1/241	DIGITAL INPUT MODULE 11		13/03/2025	Proteo	
=QW24071602+Q1/242	DIGITAL INPUT MODULE 12		13/03/2025	Proteo	
=QW24071602+Q1/243	DIGITAL INPUT MODULE 12		11/04/2025	Proteo	
=QW24071602+Q1/250	ANALOGIC INPUT MODULE 13		11/04/2025	Proteo	
=QW24071602+Q1/251	ANALOGIC INPUT MODULE 14		13/03/2025	Proteo	
=QW24071602+Q1/252	ANALOGIC INPUT MODULE 15		13/03/2025	Proteo	
=QW24071602+Q1/253	ANALOGIC INPUT MODULE 16		13/03/2025	Proteo	
=QW24071602+Q1/254	ANALOGIC INPUT MODULE 17		18/03/2025	Proteo	
=QW24071602+Q1/260	DIGITAL OUTPUT MODULE 18		11/04/2025	Proteo	
=QW24071602+Q1/261	DIGITAL OUTPUT MODULE 18		11/04/2025	Proteo	
=QW24071602+Q1/270	ANALOGIC OUTPUT MODULE 19		05/02/2025	PROTEO	
=QW24071602+Q1/320	BARRIER RELAYS		11/04/2025	Proteo	
=QW24071602+Q1/330	BARRIER RELAYS		11/04/2025	Proteo	

Table of contents

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F06_001

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=QW24071602+Q1/331	BARRIER RELAYS		11/04/2025	Proteo	
=QW24071602+Q1/332	BARRIER RELAYS		11/04/2025	Proteo	
=QW24071602+Q1/340	BARRIER RELAYS		11/04/2025	Proteo	
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=QW24071602+Q1/500	MAIN CABINET EXTERNAL LAYOUT		11/04/2025	Proteo	
=QW24071602+Q1/505	MAIN CABINET INTERNAL LAYOUT		10/04/2025	Proteo	
=QW24071602+SUMMARY/600	TERMINAL BOARDS		11/04/2025	Proteo	
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=QW24071602+SUMMARY/700	ITEM LIST		05/02/2025	PROTEO	
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29

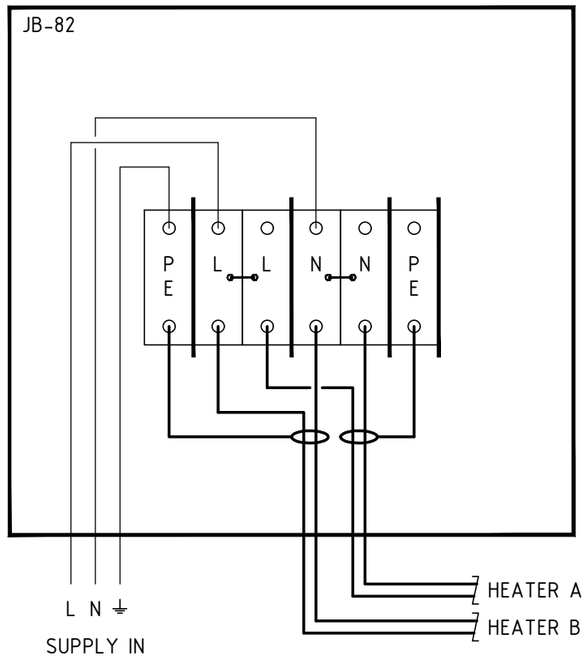
ATTACHMENT_3_C0063-FOR-DGM-EL-003_Rev.02_HeatTracingJB

GENERAL INFORMATION:

1. JB-82 IS DESIGNED TO CONNECT POWER TO UP TO THREE BTV, QTVR, XTV, KTV, HTV OR VPL EHT CABLES.

TECHNICAL BRIEF:

- 4 x M25 THREADED ENTRIES
- 4 x M25 STOPPING PLUGS
- 1 x M25 POWER CABLE GLAND



TYPICAL FOR:
- EHT-1007
- EHT-1008
- EHT-1009
- EHT-1010

REV.	DATE	DESCRIPTION	BY	CHK	APP
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
00	12/09/2024	ISSUED FOR INFORMATION	LJB	E-C	ZS

nVent RAYCHEM TRACER

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TITLE: TYPICAL CONNECTION OF A JB-82 JUNCTION BOX

PREPARED BY	B.Sultan	LANG. en	SCALE N/A
LEAD ENGINEER	I.Sidorenko		
PROJECT NO. PIT240026	DRAWING NO. QD07_2035	SHEET 1/1	REVISION 00

A3

CAD FILENAME: PIT240026_QD07_2036_001_00.dwg

30

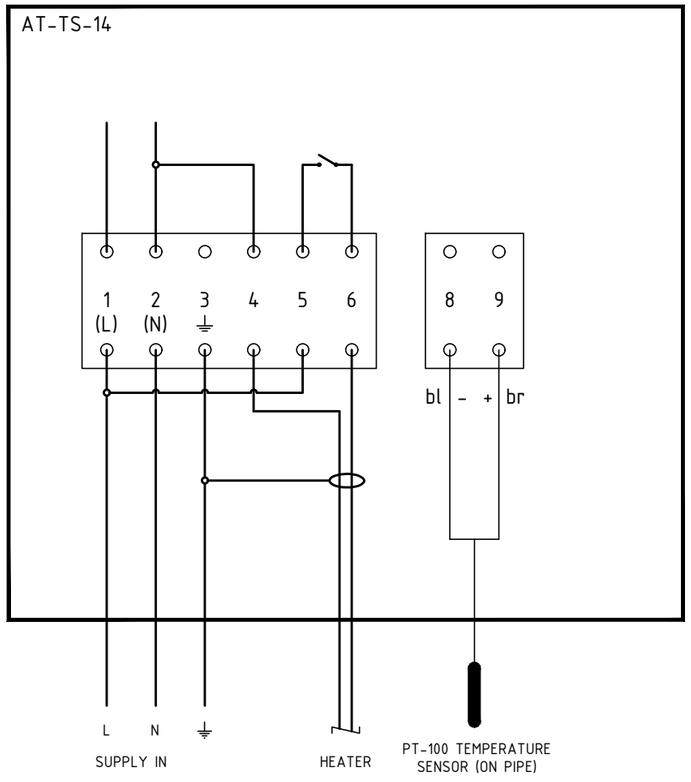
GENERAL INFORMATION:

1. THE ELECTRONIC SURFACE SENSING THEROMOSTAT PROVIDES ACCURATE TEMPERATURE CONTROL FOR HEATING CABLES.
2. THE UNIT CAN BE SUPPLIED AT NORMAL VOLTAGES OF 230V, 50/60Hz AND HAVE A DOUBLE-POLE SWITCH RATED AT 16A.
3. FOR PIPE TEMPERATURES UP TO 120°C, THE UNITS CAN BE MOUNTED ON THE PIPE USING A SUPPORT BRACKET.
4. THERMOSTAT SET-POINT RANGES BETWEEN 0°C TO 120°C.

TECHNICAL BRIEF:

- 1 x M20 FOR SUPPLY CABLE (Ø 8-13 mm)
- 1 x M25 FOR HEATING ELEMENT (Ø 11-17 mm)
- 1 x M16 FOR THE SENSOR
- 2 WIRE PT-100, SILICONE SENSOR, 3m.
- TERMINALS FOR 2.5mm² CORES.

AT-TS-14



TYPICAL FOR:
- EHT-1001
- EHT-1002
- EHT-1004
- EHT-1005
- EHT-1006

REV.	DATE	DESCRIPTION	BY	CHK	APP
--	--	--	--	--	--
--	--	--	--	--	--
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00	12/09/2024	ISSUED FOR INFORMATION	LJB	E-C	ZS

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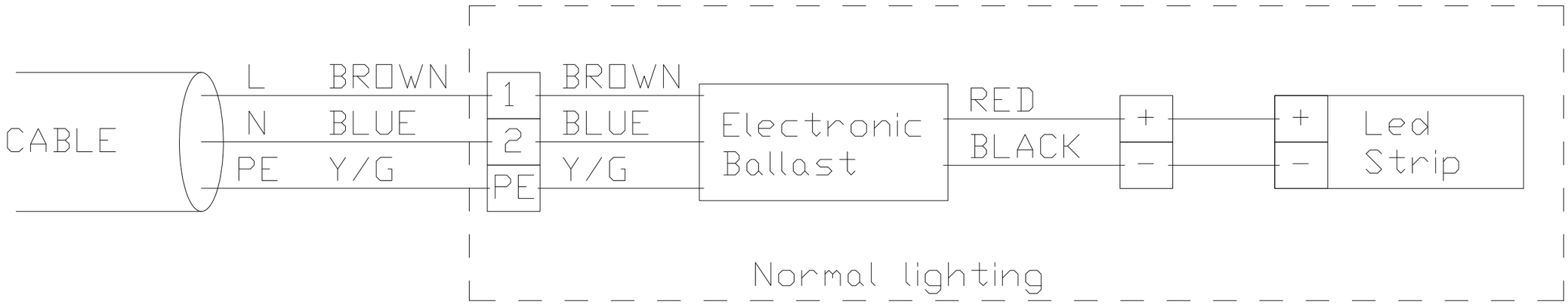
nVent.com

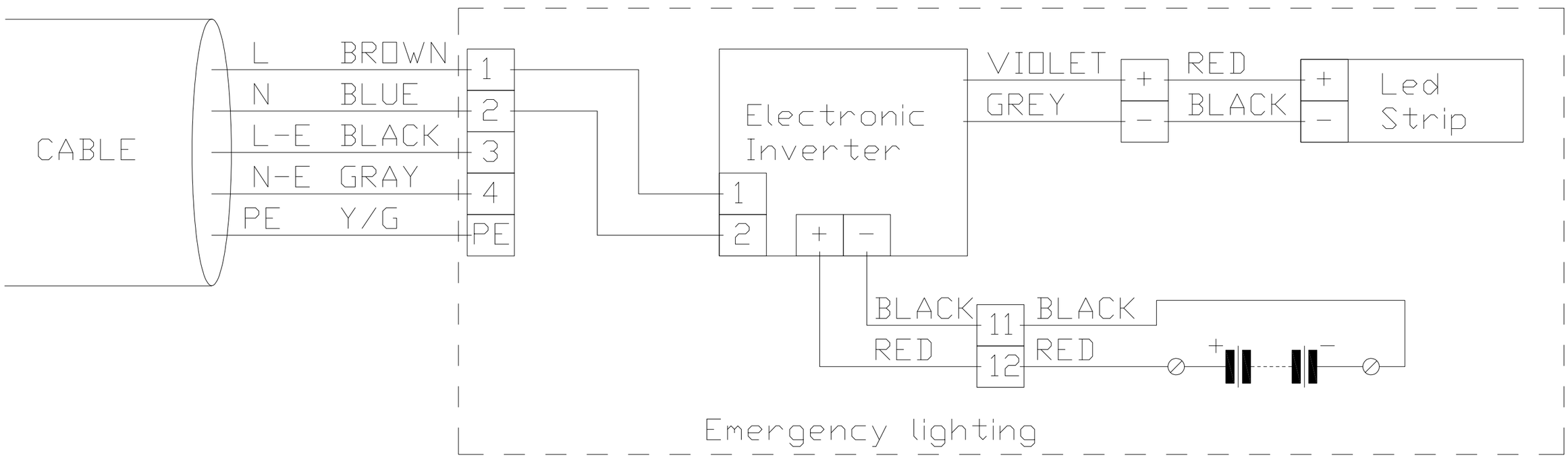
TITLE
TYPICAL CONNECTION OF A AT-TS-14
SURFACE SENSING ELECTRONIC THERMOSTAT

PREPARED BY	B.Sultan	LANG. en	SCALE N/A
LEAD ENGINEER	I.Sidorenko		
PROJECT NO. PIT240026	DRAWING NO. QD07_2036	SHEET 1/1	REVISION 00

A3

ATTACHMENT_4_C0063-FOR-DGM-EL-003_Rev.02_LightingWiring





	Customer:	Installation:	Order:	Sheet:	Next:
			File:		
		Page description:	Scheme:	Tot. Sheet:	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

ATTACHMENT_5_C0063-FOR-DGM-EL-003_Rev.02_WiringSSI1000

01	31/07/2024	ISSUE FOR APPROVAL FIRST EMISSION	M. SCANO	S.CAMESASCA	G.COPPO
Rev. Rev.	Data Date	Descrizione Description	Disegnato Drawn by	Controllato Checked by	Approvato Approved by

Honeywell

SCAME Sistemi s.r.l.
VIA LOMBARDIA N.5 - 20010 ARLUNO (MILANO) ITALY
TEL. (02) 903.79410- TELEFAX (02) 903.78574

CUSTOMER DOC REF
– –

PO N°
N.2724000850

CLIENT:
-

CUSTOMER
FORES_ENGINEERING_S.R.L.

SCAMESISTEMI JOB
2024C1288

SCALE
–

PROJECT
-

CODE
WD

SIZE
A3

TITLE
S81-HS\L Fire Alarm Control Panel
WIRING DRAWING

SHEET
1_OF_11

SCAME DOC REF
2024C1288-WD-001-R01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE.
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI S.R.L. AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT.

SH	DESCRIPTION	01	02	03	04	05
1	COVER	X				
2	SHEET & REVISION LIST	X				
3	SYMBOLS AND NOTES	X				
4	BLANK SHEET	X				
5	EARTH CONNECTION	X				
6	230VAC/24VDC POWER SUPPLY	X				
7	TERMINALS	X				
8	F&G SYS, CARD SLOT 1-4	X				
9	F&G SYS, CARD SLOT 5-8	X				
10	BLANK SHEET	X				
11	MATERIAL LIST	X				
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE* S81-HS\L Fire Alarm Control Panel WIRING DRAWING SHEET & REVISION LIST	Honeywell	SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 2/3
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L					DIS./DWG.2024C1288-WD-001-R01 FG./SH. 2 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850					REV. 01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE.
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT

WIRES COLOUR

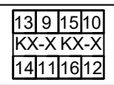
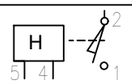
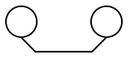
RED : POSITIVE 24VDC FEEDING
BLACK : NEGATIVE 24V FEEDING
GREY: INTERFACE SIGNAL
BLUE : NEUTRAL WIRE POWER SUPPLY 230VAC
BROWN : FASE WIRE POWER SUPPLY 230VAC
YELLOW/GREEN : SAFETY EARTH
GREEN : INSTRUMENT EARTH

WIRES SECTION (WIRE TYPE FS17)

1 -1,5- 2,5 - 4 - 6 - 16 mmq

IDENTIFICATION OF WIRES

INTERNAL CABINET
EXAMPLE [XX - YY]
XX : SHEET NUMBER
YY : PROGRESSIVE NUMBER

SYMBOLS LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	CIRCUIT BREAKER (RCCB)		CIRCUIT BREAKER (RCBO)
	FUSE BREAKER		SAFETY EARTH
	FAN	 SR	ALARM SIREN
 TAG	LAMP 230V	 BT	BATTERY
	SOCKET	 D	DIODE
 K	RELAY	 F	FUSE
 13 9 15 10 KX-X KX-X 14 11 16 12	SIL3 RELAYS	 R	RESISTOR
 AH	HEATING RESISTOR		BUZZER
 H 2 5 4 1	HYGROSTAT	 L	LAMP 24V
 T	THERMOSTAT		PUSH BUTTON
	NO CONTACT		SELECTOR SWITCH
	NC CONTACTC		TERMINAL THROUGH
	SPDT CONTACT		FIXED BRIDGE CROSS JUMP
	FUSE TERMINAL		
	TERMINAL SECTIONABLE		

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE* S81-HS\L Fire Alarm Control Panel WIRING DRAWING SYMBOLS AND NOTES		SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 3/4
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L		Honeywell			DIS./DWG.2024C1288-WD-001-R01 FG./SH. 3 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850					REV. 01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT

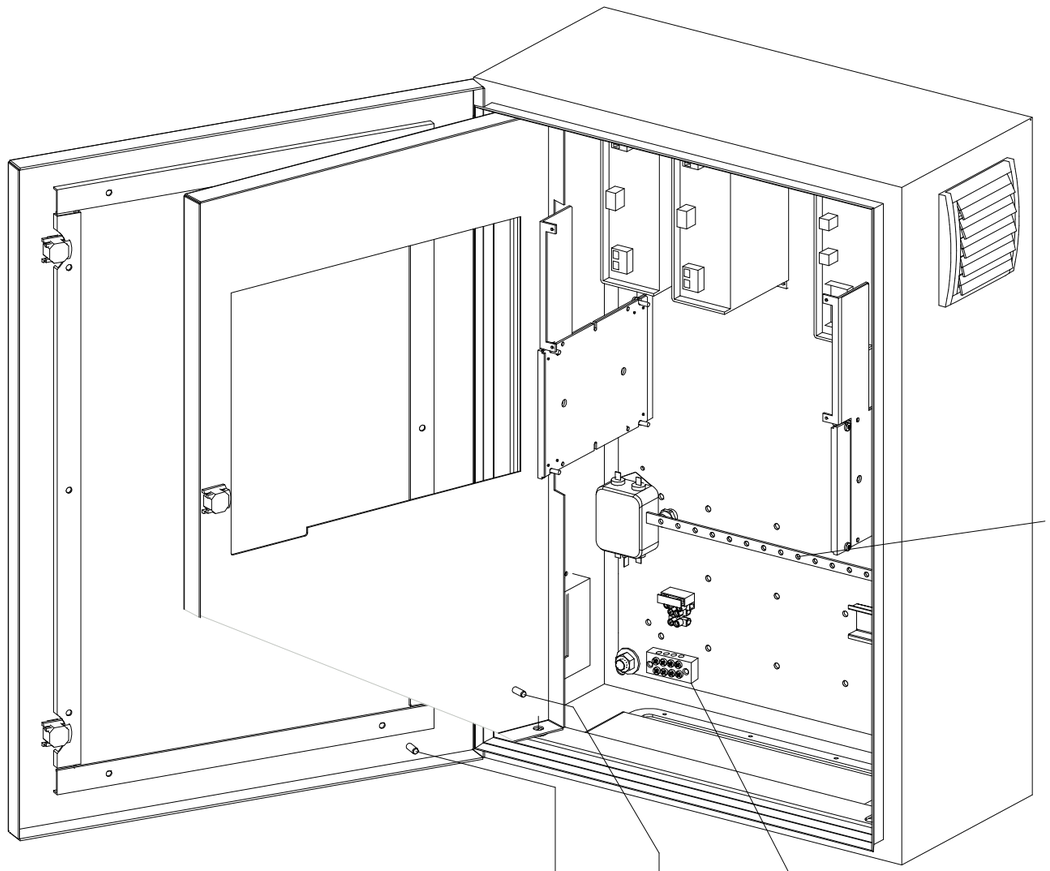
BLANK SHEET

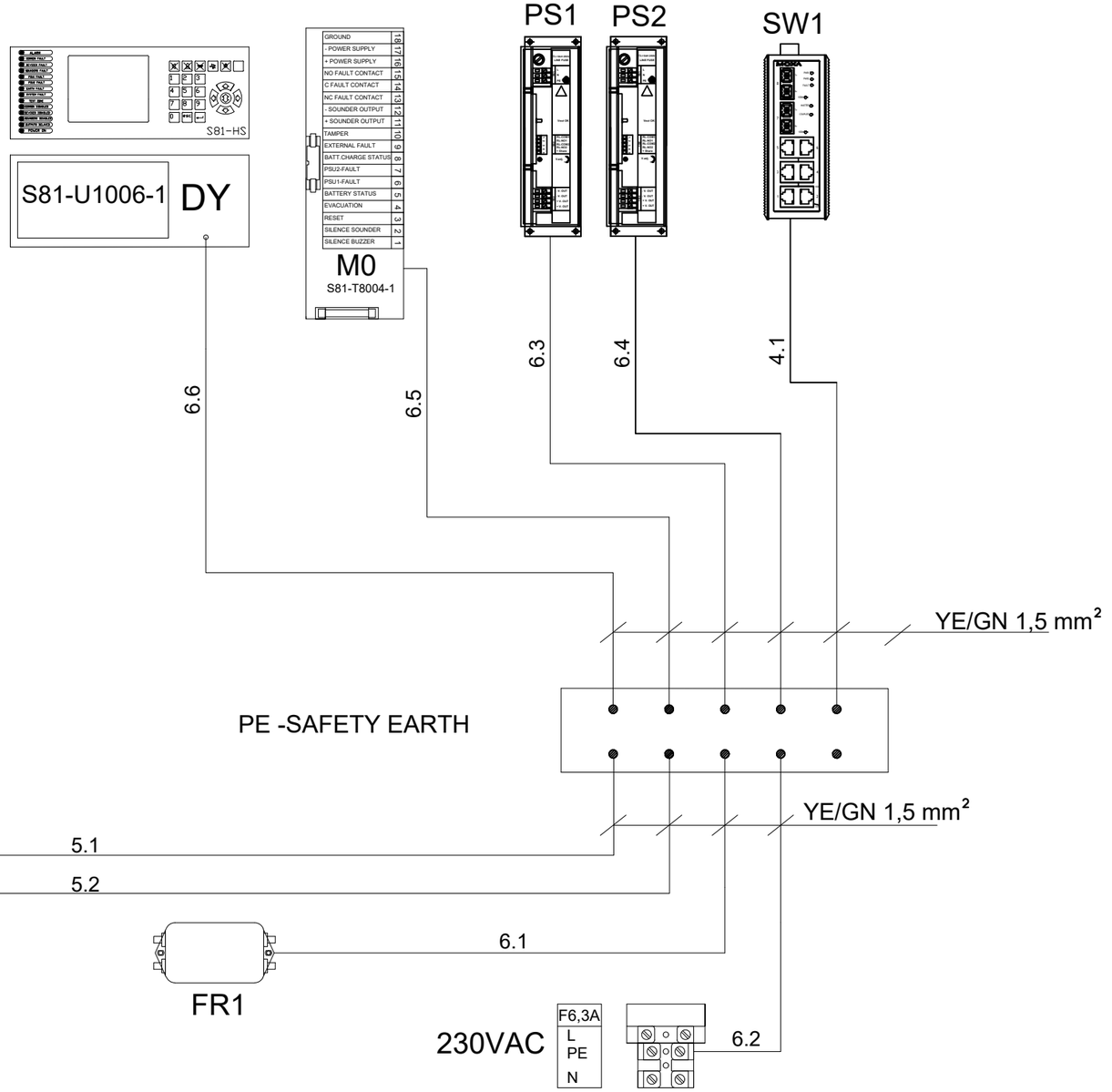
CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE*		SCALA SCALE	FORMATO SIZE	FOGLIO SHEET	DIS./DWG.2024C1288-WD-001-R01
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L	S81-HS\L Fire Alarm Control Panel WIRING DRAWING BLANK SHEET	Honeywell	––	A3	4/5	FG./SH. 4 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850						REV. 01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
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EARTH CONNECTIONS

SW1: SWITCH ETHERNET
230VAC : POWER SUPPLY 230 VAC
FR1 : FILTER 230VAC
PS1/2 : S81-PUA005-1 FEEDER 24VDC
M0 : S81-T8004-1 I/O DEFAULT CARD
DY : DISPLAY S81HS/L





CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE* S81-HS\L Fire Alarm Control Panel WIRING DRAWING EARTH CONNECTIONS		SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 5/6	DIS./DWG.2024C1288-WD-001-R01 FG./SH. 5 DI/OFF 11
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L		Honeywell				REV. 01
ORDINE No. *ORDER Nr.*	N. 2724000850						

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT

COLOR CODE FOR SYSTEM CABLE
ACCORDANCE WHIT DIN IEC 60757

BK BLACK
BN BROWN
RD RED
GN GREEN
BU BLUE
VT VIOLETT
GR GREY
WH WHITE
YE YELLOW
GY GREEN/YELLOW

BC
+VLOAD
-VLOAD
+VBAT
-VBAT
TB3
-VOUT
0R-FAIL
AND-FAIL
TB2
CH-status
PSU2-F
PSU1-F
TB1

PS1
+VOUT
+VOUT
-VOUT
-VOUT
TB4
+SHARE
RL-NO2
RL-COM2
RL-NO1
RL-COM1
TB3
PE
N
L
TB1

PS2
+VOUT
+VOUT
-VOUT
-VOUT
TB4
+SHARE
RL-NO2
RL-COM2
RL-NO1
RL-COM1
TB3
PE
N
L
TB1

RD 2,5 mm²
BK 2,5 mm²
BU
VT
GR
BN
WH
BU 0,25 mm²
GR 0,25 mm²
VT 0,25 mm²
VT 0,25 mm²
BK 2,5 mm²
RD 2,5 mm²
GN 0,25 mm²
GN
VT
BU
GR
BU
RD
RD
BK
BK
GN
VT
VT
GR
BU
RD 2,5 mm²
BK 2,5 mm²
BU
BN

XS-BATT
1
2
BATT1+
BATT1-
BATTERIES BOX
12VDC XXAh

NOTE: BACKUP BATTERIES SHALL BE PLACED OUTSIDE PANEL IN DEDICATED BOX

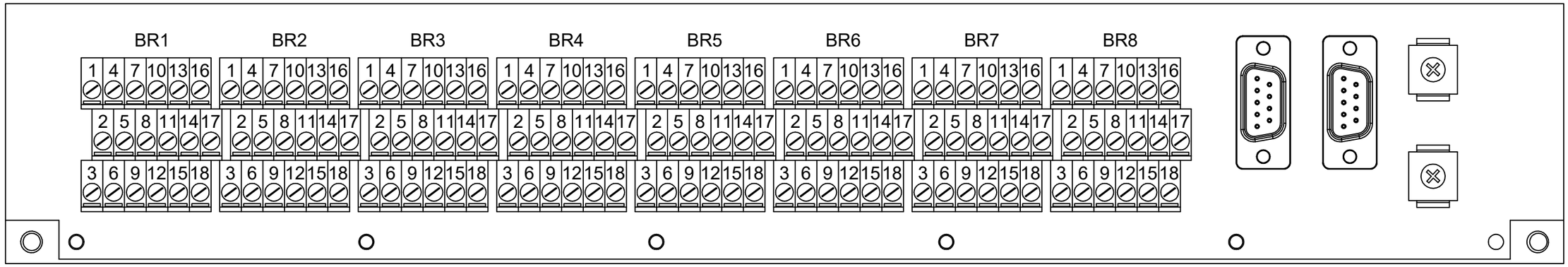
GY 1 mm²
BN 0,25 mm²
WH 0,25 mm²
BN
WH
RD
BK
TO SH.5
GY 6.5
5,6K
S81-T8004-1
18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
GROUND
- POWER SUPPLY
+ POWER SUPPLY
NO FAULT CONTACT
C FAULT CONTACT
NC FAULT CONTACT
- SOUNDER OUTPUT
+ SOUNDER OUTPUT
TAMPER
EXTERNAL FAULT
BATT.CHARGE STATUS
PSU2-FAULT
PSU1-FAULT
BATTERY STATUS
EVACUATION
RESET
SILENCE SOUNDER
SILENCE BUZZER
M0

RD 1,5 mm²
BK 1,5 mm²
BR2
-V
BK
BK
RD
RD
+V
BR1
S81-U1006-1
GY 6.6
TO SH.5
RD 1,5 mm²
BK 1,5 mm²
TB1
+V
RD
RD
BK
BK
-V
TB2
J1
J2
TB3
+V
-V
TB4
S81-E2004-1

GY 6.3
to SH.5
BU
BN
BN 1,5 mm²
BU 1,5 mm²
GY 6.4
to sh.5
BU
BN
BN
BU
LOAD
FR1
LINE
GY 6.1
BN
BU
GY 6.2
F:6,3A
TO SH.5
L
N
PE
POWER SUPPLY 230 VAC

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE* S81-HS\L Fire Alarm Control Panel WIRING DRAWING 230VAC/24VDC POWER SUPPLY	Honeywell	SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 6/7
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L					DIS./DWG.2024C1288-WD-001-R01 FG./SH. 6 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850					REV. 01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT



BR's	I/O CARDS TEMINATIONS									
Terminal No.	F3002	F4001	F4002	F4003	F5001	F5002	F5003	F5004	F7001/F7002 F7009/F7010 /F7007	F7006
1	+ Ch. 1 +	+ 4-20mA IN Ch1	+ 4-20mA IN Ch1	+ 4-20mA IN Ch1	+ Ch1 +	OC OUT 1	+ Ch. 1 +	+ Ch1 +	+ Loop + + OUT +	TX data RS232
4	- Ch. 1 -					OC OUT 2	- Ch. 1 -			
7	+ Ch. 2 +	-	-	+ 4-20mA IN Ch2	+ Ch2 +	OC OUT 3	+ Ch. 2 +	+ Ch2 +	- Loop - - OUT -	RX data RS232
10	- Ch. 2 -	-	-			OC OUT 4	- Ch. 2 -			
13	+ Ch. 3 +	-	+ 4-20mA IN Ch2	+ 4-20mA IN Ch3	+ Ch3 +	OC OUT 5	+ Ch. 3 +	+ Ch3 +	+ Loop + + IN +	GND RS232
16	- Ch. 3 -	-				OC OUT 6	- Ch. 3 -			
2	+ Ch. 4 +	-	-	+ 4-20mA IN Ch4	+ Ch4 +	OC OUT 7	+ Ch. 4 +	+ Ch4 +	- Loop - - IN -	+ RS485
5	- Ch. 4 -	-	-			OC OUT 8	- Ch. 4 -			
8	+ Ch. 5 +	+ 4-20mA OUT Ch1	+ 4-20mA OUT Ch1	+ 4-20mA IN Ch5	+ Ch5 +	OC OUT 9	+ Ch. 5 +	-	-	- RS485
11	- Ch. 5 -					OC OUT 10	- Ch. 5 -	-	-	
14	+ Ch. 6 +	-	-	+ 4-20mA IN Ch6	+ Ch6 +	OC OUT 11	+ Ch. 6 +	-	-	GND RS485
17	- Ch. 6 -	-	-			OC OUT 12	- Ch. 6 -	-	-	
3	+ Ch. 7 +	-	+ 4-20mA OUT Ch2	+ 4-20mA IN Ch7	+ Ch7 +	OC OUT 13	+ Ch. 7 +	-	-	-
6	- Ch. 7 -	-				OC OUT 14	- Ch. 7 -	-	-	-
9	+ Ch. 8 +	-	-	+ 4-20mA IN Ch8	+ Ch8 +	OC OUT 15	+ Ch. 8 +	-	-	-
12	- Ch. 8 -	-	-			OC OUT 16	- Ch. 8 -	-	-	-
15	24VDC - Individually Fused 0.5A with Resettable fuse									
18	0V									

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE* S81-HS\L Fire Alarm Control Panel WIRING DRAWING TERMINAL	Honeywell	SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 7/8	DIS./DWG.2024C1288-WD-001-R01 FG./SH. 7 DI/OFF 11 REV. 01
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L						
ORDINE No. *ORDER Nr.*	N. 2724000850						

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

CARD : S81-F7009-1
SLOT : 1
TERMINAL BLOCK: BR1

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

CARD : S81-F0000-1
SLOT : 2
TERMINAL BLOCK: BR2

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

CARD : S81-F0000-1
SLOT : 3
TERMINAL BLOCK: BR3

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

CARD : S81-F0000-1
SLOT : 4
TERMINAL BLOCK: BR4

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18



CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE*		SCALA SCALE	FORMATO SIZE	FOGLIO SHEET	DIS./DWG.2024C1288-WD-001-R01
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L	S81-HS\L Fire Alarm Control Panel WIRING DRAWING CARD SLOT 1-4	Honeywell	--	A3	8/9	FG./SH. 8 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850						REV. 01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

CARD : S81-F0000-1
SLOT : 5
TERMINAL BLOCK: BR5

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

CARD : S81-F5001-1
SLOT : 6
TERMINAL BLOCK: BR6

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8

A1 K1 A2 | A1 K2 A2 | A1 K3 A2 | A1 K4 A2 | A1 K5 A2 | A1 K6 A2 | A1 K7 A2 | A1 K8 A2

-VK

CARD : S81-F0000-1
SLOT : 7
TERMINAL BLOCK: BR7

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

CARD : S81-F0000-1
SLOT : 8
TERMINAL BLOCK: BR8

1	4	7	10	13	16	2	5	8	11	14	17	3	6	9	12	15	18

K1 K2 K3 K4 K5 K6 K7 K8

13 31 14

C NC NO

S81-HS/L

TO FIELD

SPARE - | SPARE - | SPARE - | SPARE - | SPARE - | SPARE - | SPARE - | SPARE -

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE*		Honeywell	SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 9/10
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L	S81-HS\L Fire Alarm Control Panel WIRING DRAWING CARD SLOT 5-8			DIS./DWG.2024C1288-WD-001-R01 FG./SH. 9 DI/OFF 11		
ORDINE No. *ORDER Nr.*	N. 2724000850				REV. 01		

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT

BLANK SHEET

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE*		SCALA SCALE	FORMATO SIZE	FOGLIO SHEET	DIS./DWG.2024C1288-WD-001-R01
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L	S81-HS\L Fire Alarm Control Panel WIRING DRAWING BLANK SHEET	Honeywell	––	A3	11/12	FG./SH. 10 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850						REV. 01

A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
THIS DRAWING IS LEGALLY EXCLUSIVE PROPERTY OF SCAME SISTEMI SRL AND CANNOT BE REPRODUCED NEITHER SHOWN TO A THIRD PARTY WITHOUT WRITTEN ASSENT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

S81 HS/L PANEL

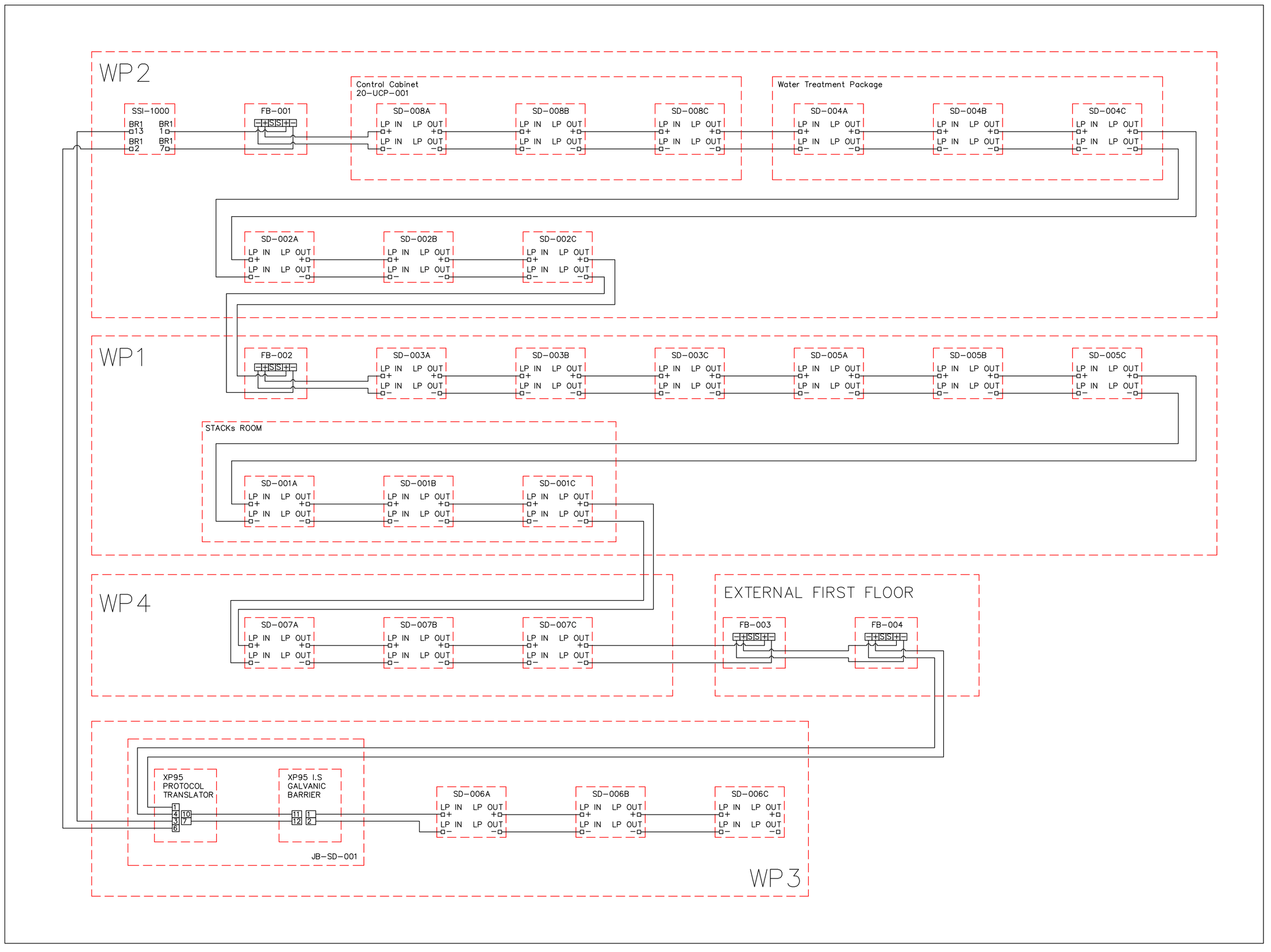
Item	QTY	DESCRIPTION	MANUFACTURER	TYPE
1	2	CPU CARD	SCAMESISTEMI	S81-U1002-1
2	1	DISPLAY CARD	SCAMESISTEMI	S81-U1006-1
3	1	RACK CONTROLLER CARD	SCAMESISTEMI	S81-E2002-1
4	-	-	-	-
5	1	ANALOG ADDRESSABLE LOOP - APOLLO PROTOCOL	SCAMESISTEMI	S81-F7009-1
6	-	-	-	-
7	-	-	-	-
8	1	8 MONITORED OUTPUTS	SCAMESISTEMI	S81-F5001-1
9	1	DEFAULT I/O CARD	SCAMESISTEMI	S81-T8004-1
10	1	MOTHERBOARD	SCAMESISTEMI	S81-E2004-1
11	6	SLOTS SPARE	SCAMESISTEMI	S81-F0000-1
12	2	SWITCHING FEEDER UNIT	SCAMESISTEMI	PU-A0005-1
13	1	BATTERY CHARGER UNIT	SCAMESISTEMI	PU-A0004-1
-	-	-	-	-
-	-	-	-	-

CABINET

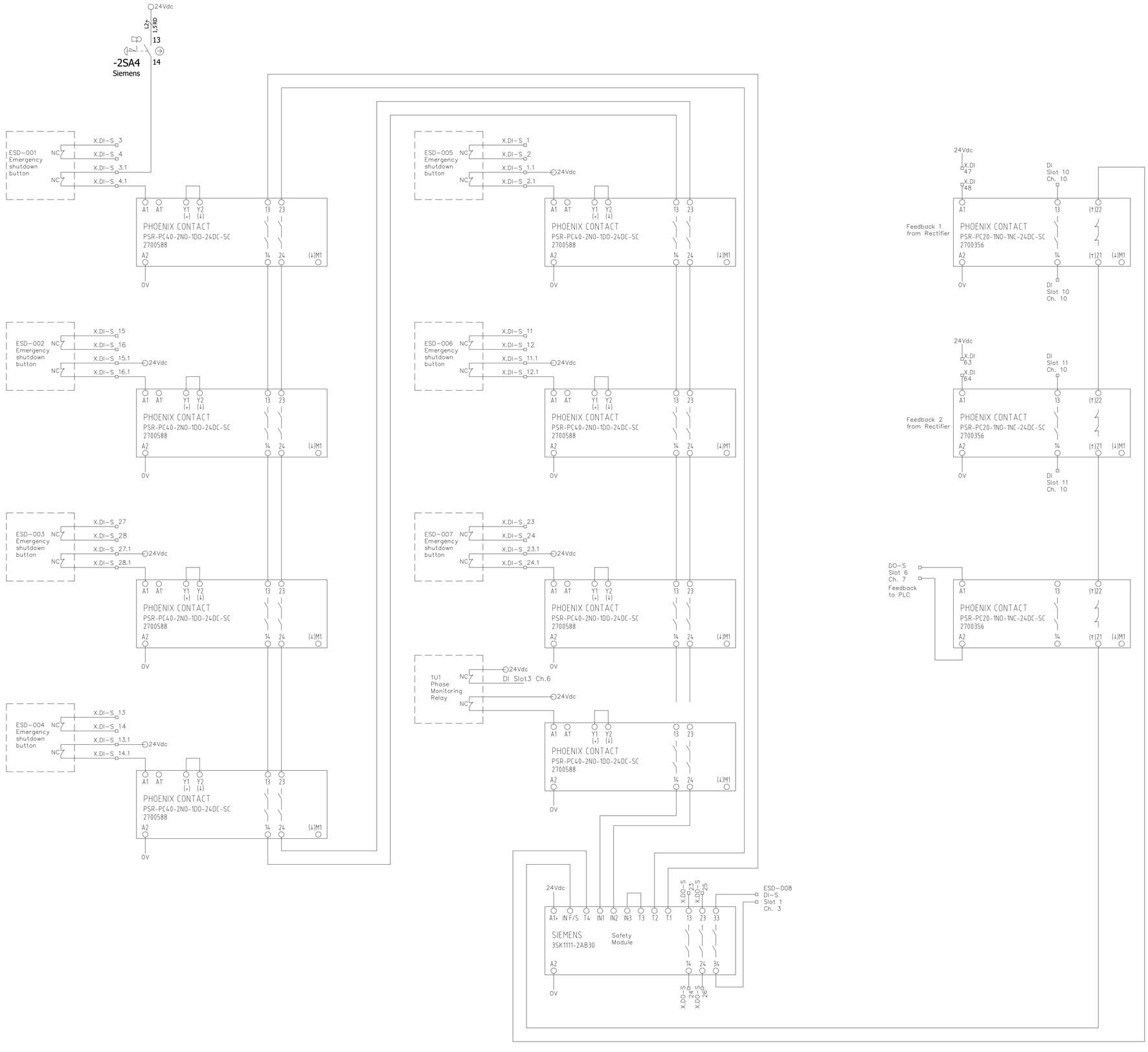
Item	QTY	DESCRIPTION	MANUFACTURER	TYPE
21	1	CABINET S81HS/L STANDARD 700X500X250	SCHNEIDER ELECTRIC	LEEBEXP1012538
22	1	PE TERMINALS	RS	283-0756
23	1	230VAC FILTER	SCHAFFNER	FN2090-4-06
24	1	230VAC TERMINALS	ERICO	M097
25	-	DOUBLE DECK TERMINALS	WEIDMULLER	WDK2,5
26	2	FUSED TERMINALS	WEIDMULLER	WSI6
27	1	BATTERIES CABINET	SCHNEIDER ELECTRIC	LEEBEXP1012595
28	8	RELE-WEID-24V	PHOENIX CONTACT	PSR-SCP
29	-	INSTRUMENT EARTH BAR	BOCCHIOTTI	12X2

CLIENTE *CLIENT*	FORES ENGINEERING S.R.L.	TITOLO– *TITLE* S81-HS\L Fire Alarm Control Panel WIRING DRAWING MATERIAL LIST		Honeywell	SCALA SCALE ––	FORMATO SIZE A3	FOGLIO SHEET 12/–
IMPIANTO *PLANT*	Fire Alarm Control Panel S81-HS\L						DIS./DWG.2024C1288-WD-001-R01 FG./SH. 11 DI/OFF 11
ORDINE No. *ORDER Nr.*	N. 2724000850						REV. 01

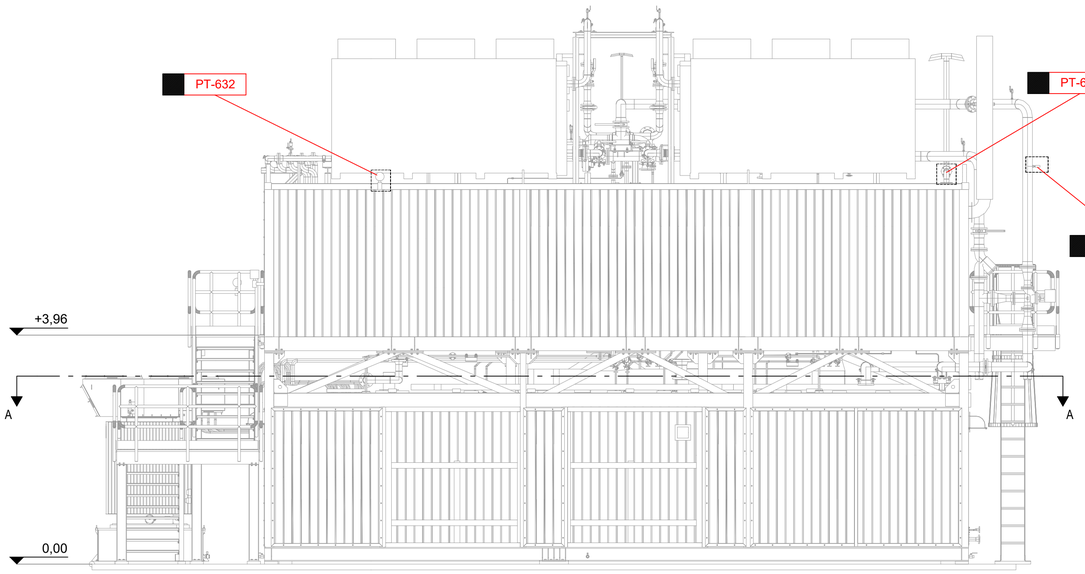
A TERMINE DI LEGGE LA SCAME SISTEMI S.R.L. SI RISERVA LA PROPRIETA' DEL PRESENTE DISEGNO E NE VIETA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA IL PROPRIO BENESTARE
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WP 2
Control Cabinet
20-UCP-001
Water Treatment Package
SSI-1000
BR1 13
BR1 2
BR1 1
BR1 7
FB-001
SD-008A
SD-008B
SD-008C
SD-004A
SD-004B
SD-004C
SD-002A
SD-002B
SD-002C
WP 1
FB-002
SD-003A
SD-003B
SD-003C
SD-005A
SD-005B
SD-005C
STACKs ROOM
SD-001A
SD-001B
SD-001C
WP 4
SD-007A
SD-007B
SD-007C
EXTERNAL FIRST FLOOR
FB-003
FB-004
XP95
PROTOCOL
TRANSLATOR
XP95 I.S
GALVANIC
BARRIER
SD-006A
SD-006B
SD-006C
JB-SD-001
WP 3
LP IN
LP OUT

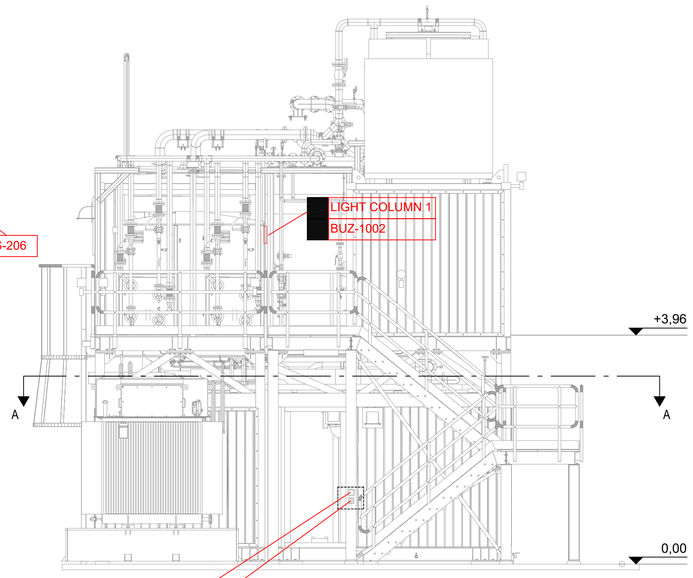
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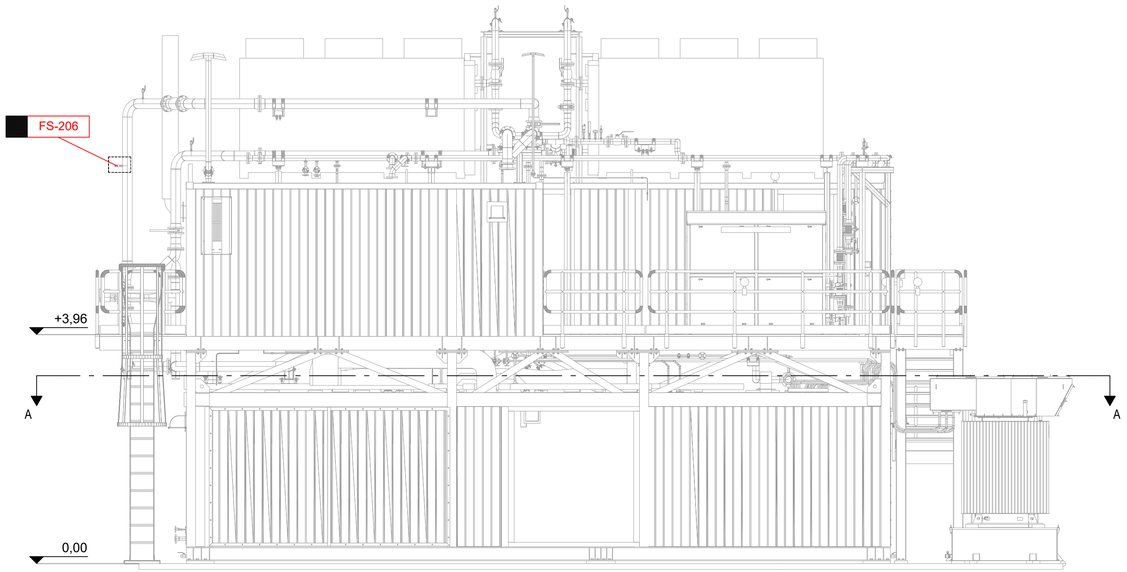
EXTERNAL AREA scale 1:50



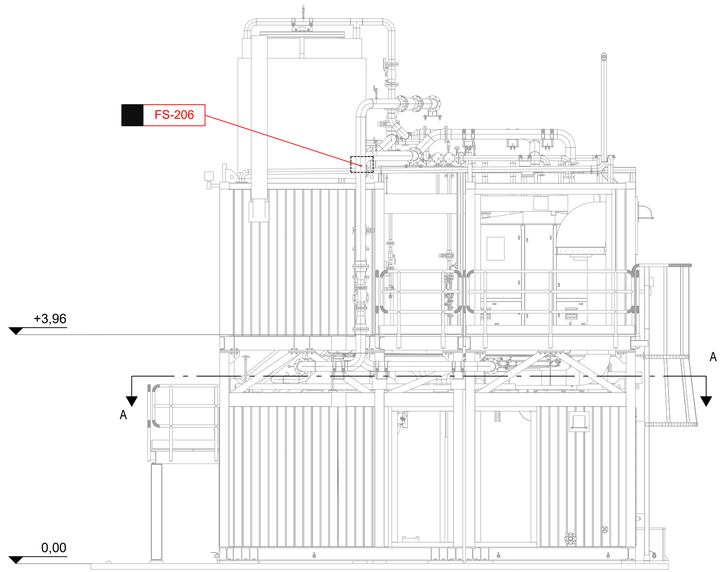
South View



West View



North View



East View

LEGEND	
	LOCAL INSTRUMENT
	SOLENOID VALVE
	ELECTRONIC INSTRUMENT
S	ELECTRONIC INSTRUMENT (SAFETY DEVICE)
	PNEUMATIC VALVE
	FIRE SAFETY PANEL
	JUNCTION BOX IN GRP MATERIAL MIN. IP56

HOLD

AS-BUILT

DATE 19/03/2025 | SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REFERENCE DOCUMETS	
C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

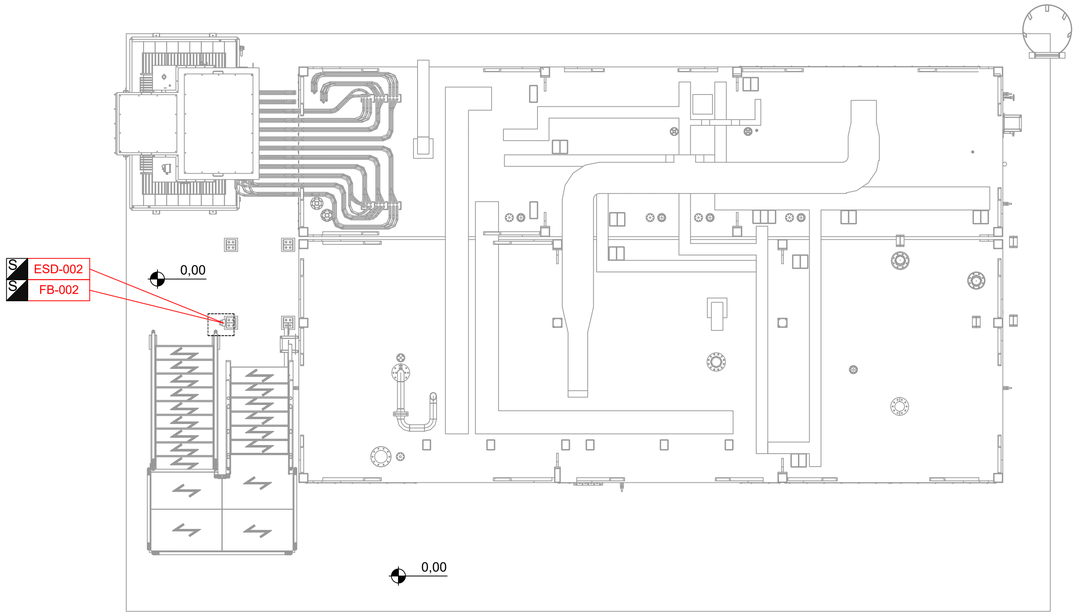
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	29-NOV-2024	ISSUE FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
00	11-OCT-2024	ISSUE FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
			By	Checked	Approved	

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE			
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003			
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING			
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031			
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1			
	FORMAT	A1	SHEET	01 of 12

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EXTERNAL AREA scale 1:50



Section A-A

Plan View

LEGEND	
●	LOCAL INSTRUMENT
▲	SOLENOID VALVE
■	ELECTRONIC INSTRUMENT
S	ELECTRONIC INSTRUMENT (SAFETY DEVICE)
	PNEUMATIC VALVE
⊠	FIRE SAFETY PANEL
	JUNCTION BOX IN GRP MATERIAL MIN. IP56

HOLD

REFERENCE DOCUMETS

C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

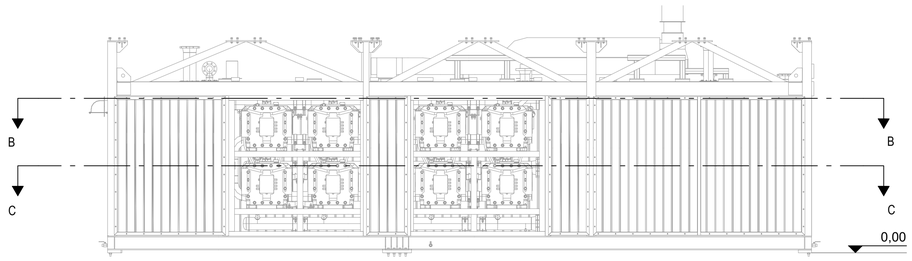
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00	11-OCT-2024	ISSUE FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	

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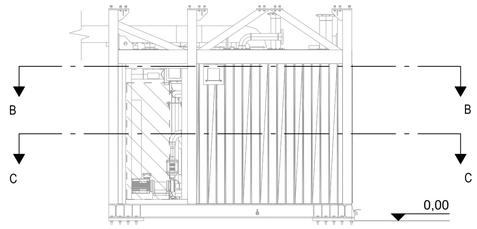
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1
FORMAT A1	SHEET 02 of 12

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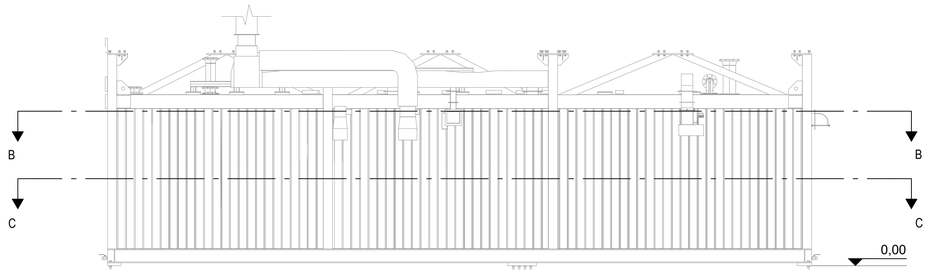
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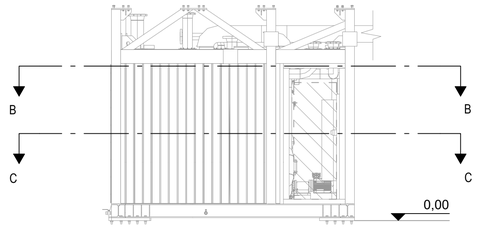
South View



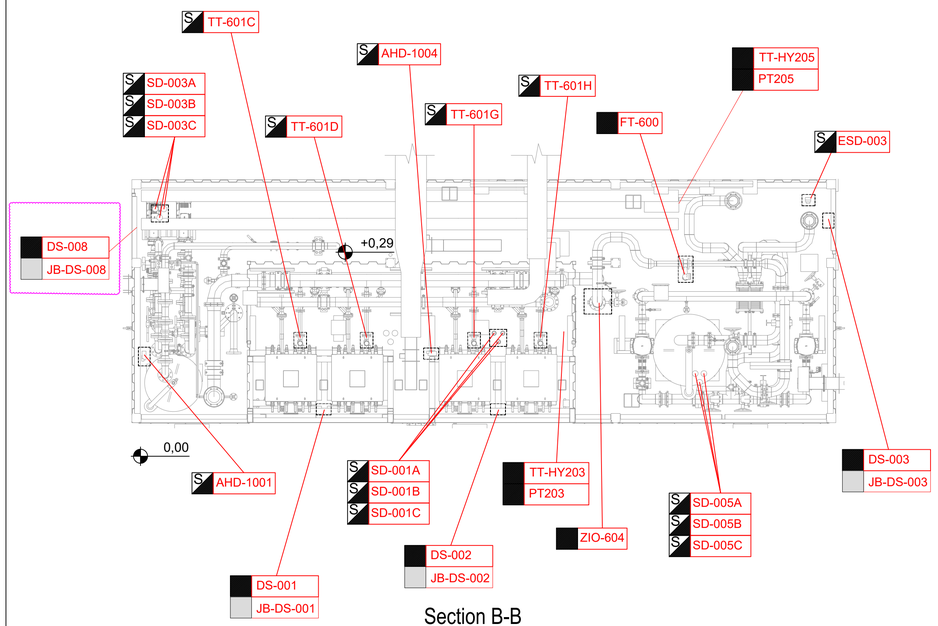
West View



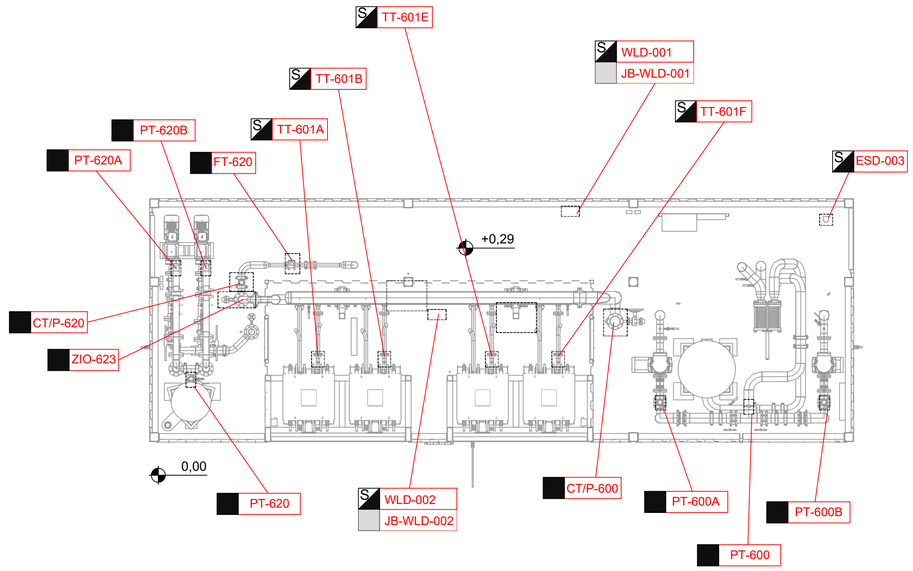
North View



East View



Section B-B



Section C-C

LEGEND	
	LOCAL INSTRUMENT
	SOLENOID VALVE
	ELECTRONIC INSTRUMENT
S	ELECTRONIC INSTRUMENT (SAFETY DEVICE)
	PNEUMATIC VALVE
	FIRE SAFETY PANEL
	JUNCTION BOX IN GRP MATERIAL MIN. IP56

HOLD

REFERENCE DOCUMETS	
C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

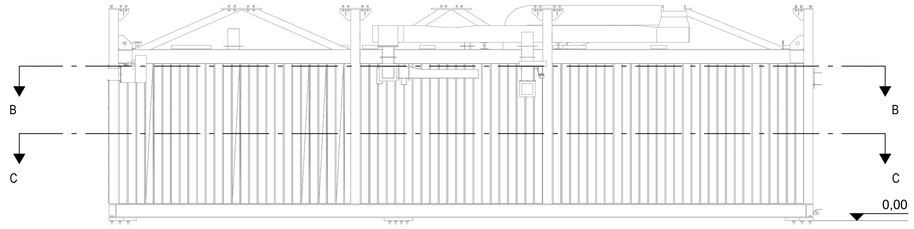
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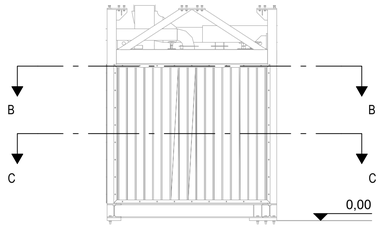
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1
FORMAT	A1
SHEET	03 of 12

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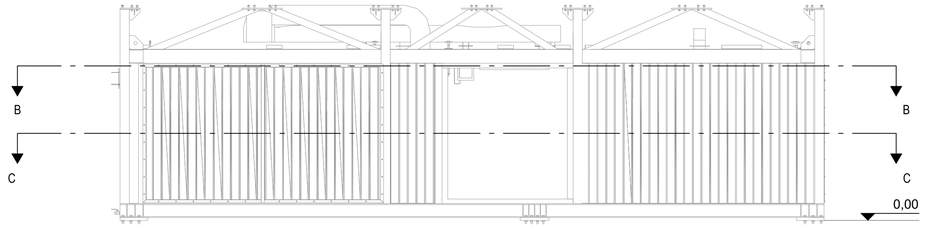
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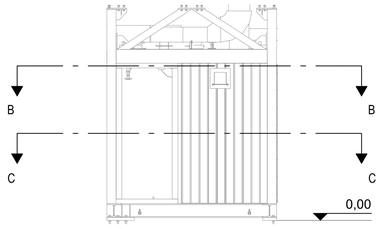
South View



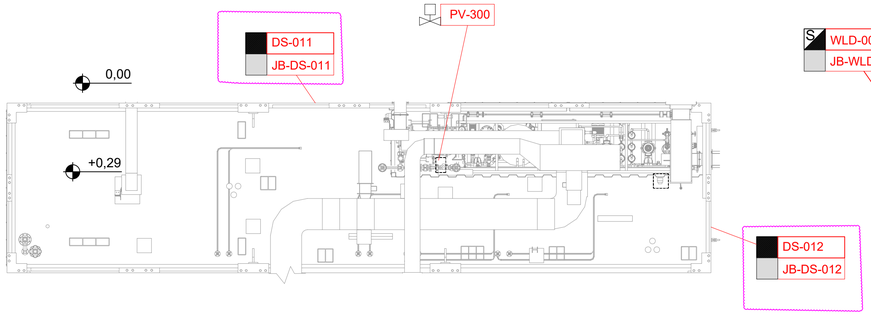
West View



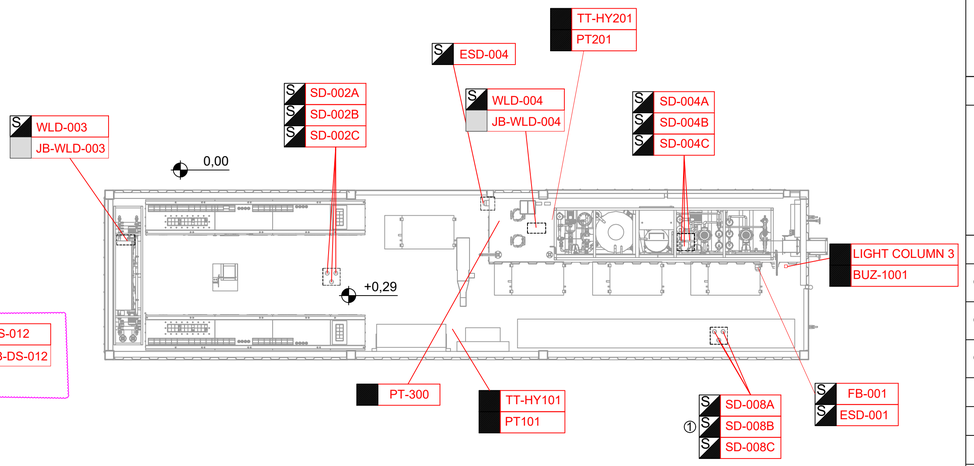
North View



East View



Section B-B



Section C-C

LEGEND

- LOCAL INSTRUMENT
- SOLENOID VALVE
- ELECTRONIC INSTRUMENT
- ELECTRONIC INSTRUMENT (SAFETY DEVICE)
- PNEUMATIC VALVE
- FIRE SAFETY PANEL
- JUNCTION BOX IN GRP MATERIAL MIN. IP56

NOTE

① SD-008A/B/C ARE INSIDE CONTROL CABINET

HOLD

REFERENCE DOCUMETS

C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

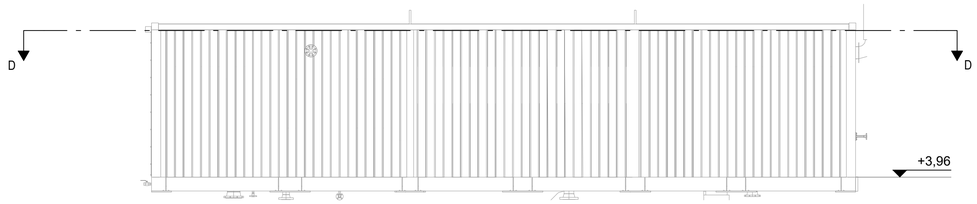
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00	11-OCT-2024	ISSUE FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	

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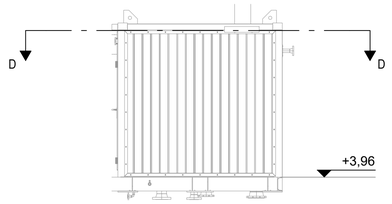
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1
FORMAT	A1
SHEET	04 of 12

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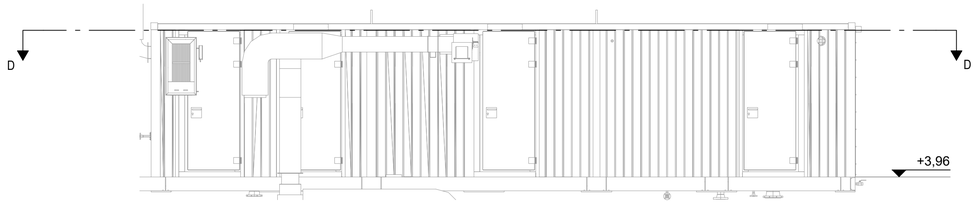
WP3 CONTAINER scale 1:50



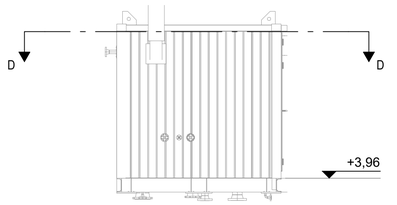
South View



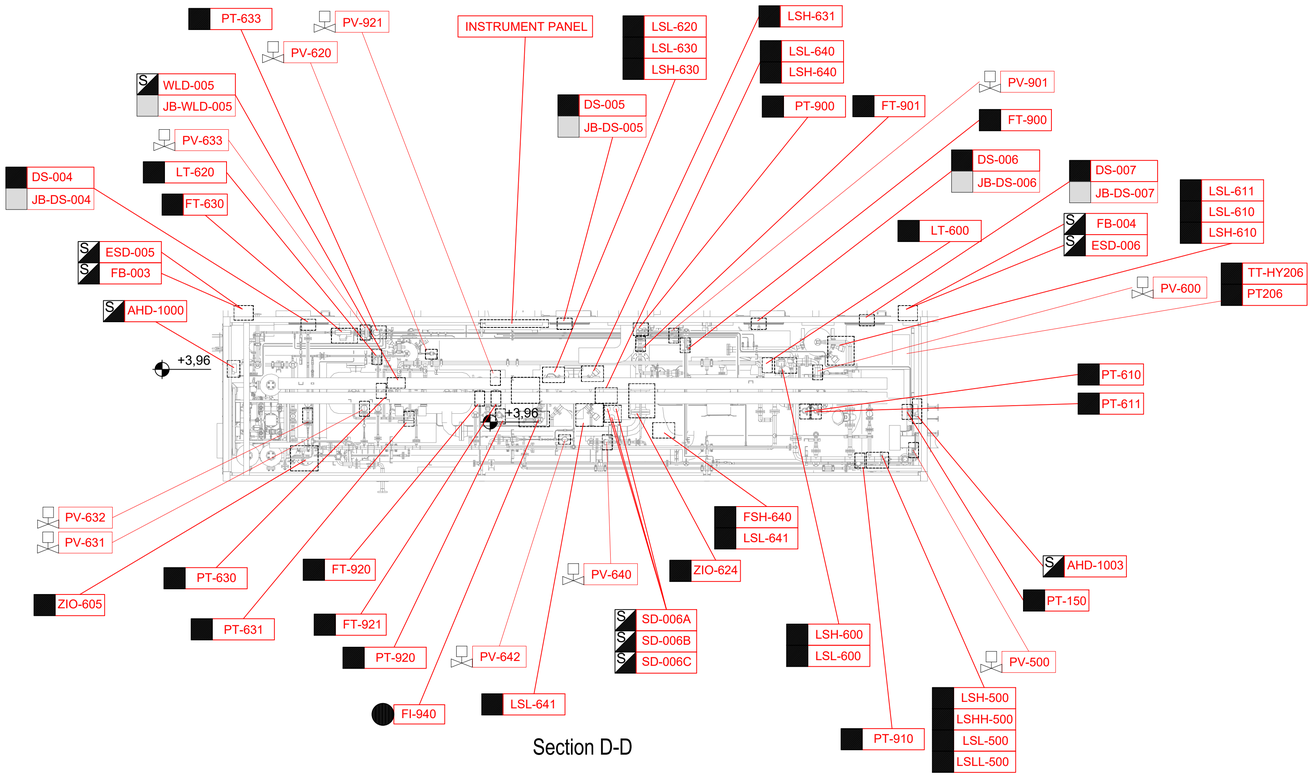
West View



North View



East View



Section D-D

INSTRUMENT PANEL

- DPT-800B
- DPT-800C
- PV-800
- PRV-800
- FICV-800
- OIHA-800A
- OIHA-800B
- OIHA-800C
- JB-OIHA-800A
- JB-OIHA-800B
- JB-OIHA-800C
- CV-800
- PVI-980
- PVI-900
- PVI-901
- HIOD-610A
- HIOD-610B
- HIOD-610C
- CV-611
- FICV-610A
- FICV-610B
- FICV-610C
- PRV-610
- HV-610D
- HV-615
- HV-616
- FICV-611
- F-610
- DPT-800A
- SV-631
- SV-632
- SV-600
- SV-300
- SV-901
- SV-921
- SV-620
- SV-642
- SV-633
- SV-640
- SV-500

LEGEND

- LOCAL INSTRUMENT
- SOLENOID VALVE
- ELECTRONIC INSTRUMENT
- ELECTRONIC INSTRUMENT (SAFETY DEVICE)
- PNEUMATIC VALVE
- FIRE SAFETY PANEL
- JUNCTION BOX IN GRP MATERIAL MIN. IP56

HOLD

REFERENCE DOCUMETS

C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

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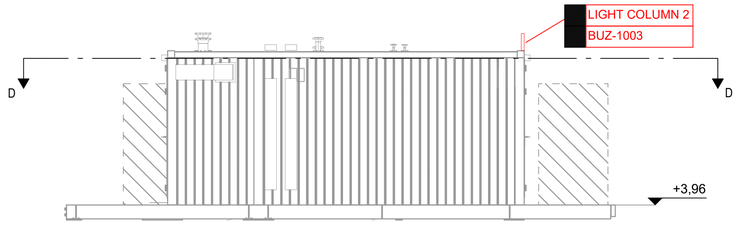
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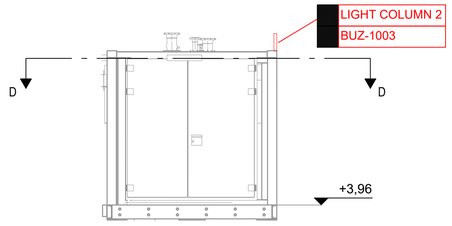
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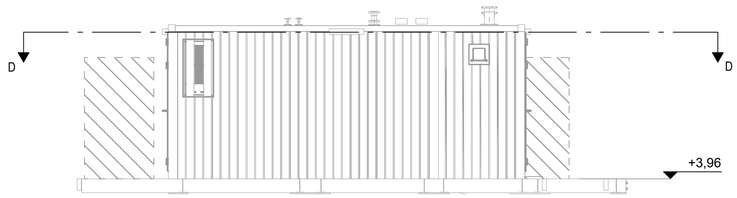
WP4 CONTAINER scale 1:50



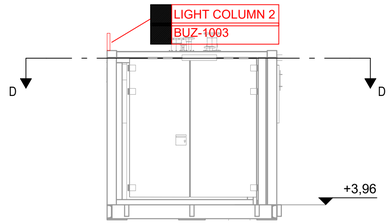
South View



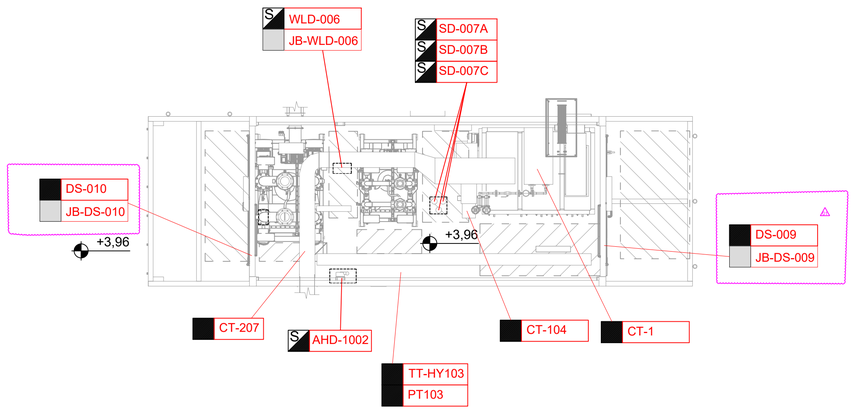
West View



North View



East View



Section D-D

LEGEND	
●	LOCAL INSTRUMENT
▲	SOLENOID VALVE
■	ELECTRONIC INSTRUMENT
S	ELECTRONIC INSTRUMENT (SAFETY DEVICE)
	PNEUMATIC VALVE
⊠	FIRE SAFETY PANEL
	JUNCTION BOX IN GRP MATERIAL MIN. IP56

HOLD

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C0063-FOR-LST-EL-001	CABLES LIST

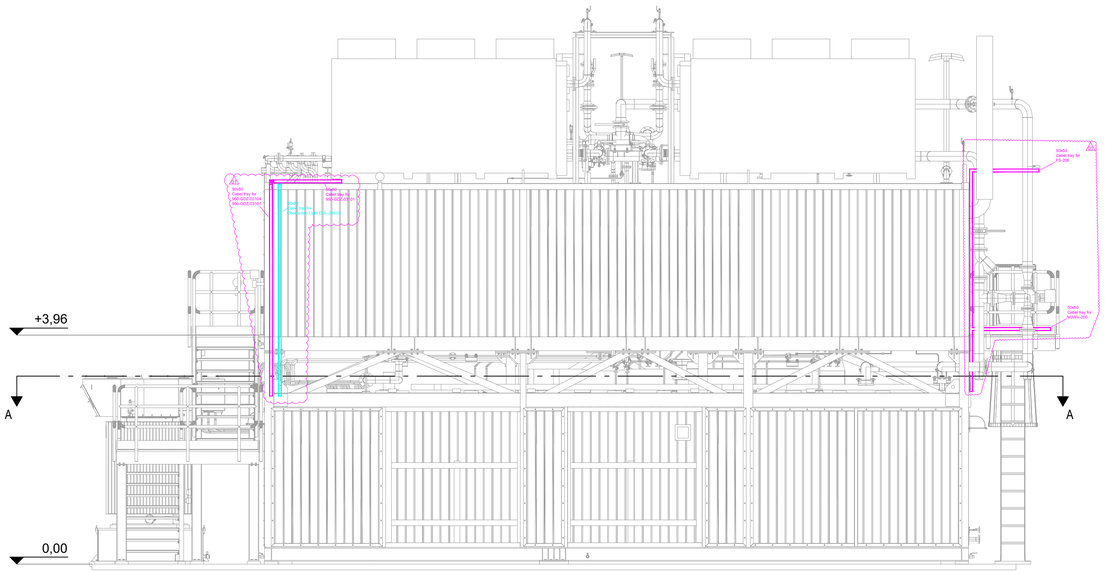
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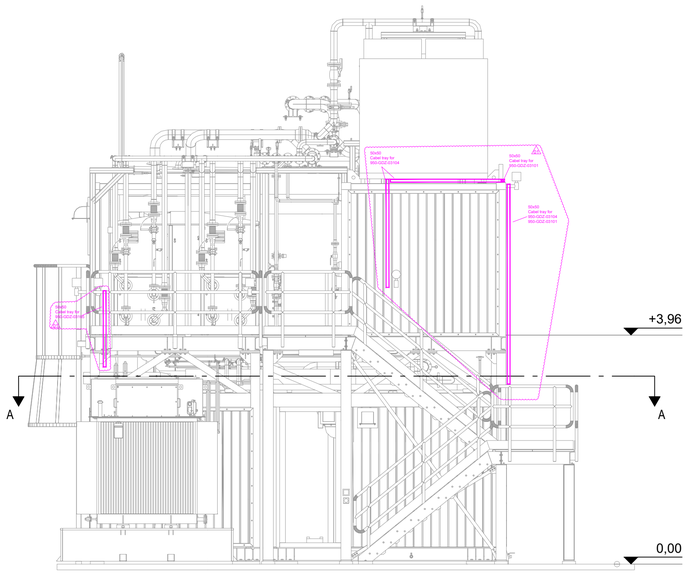
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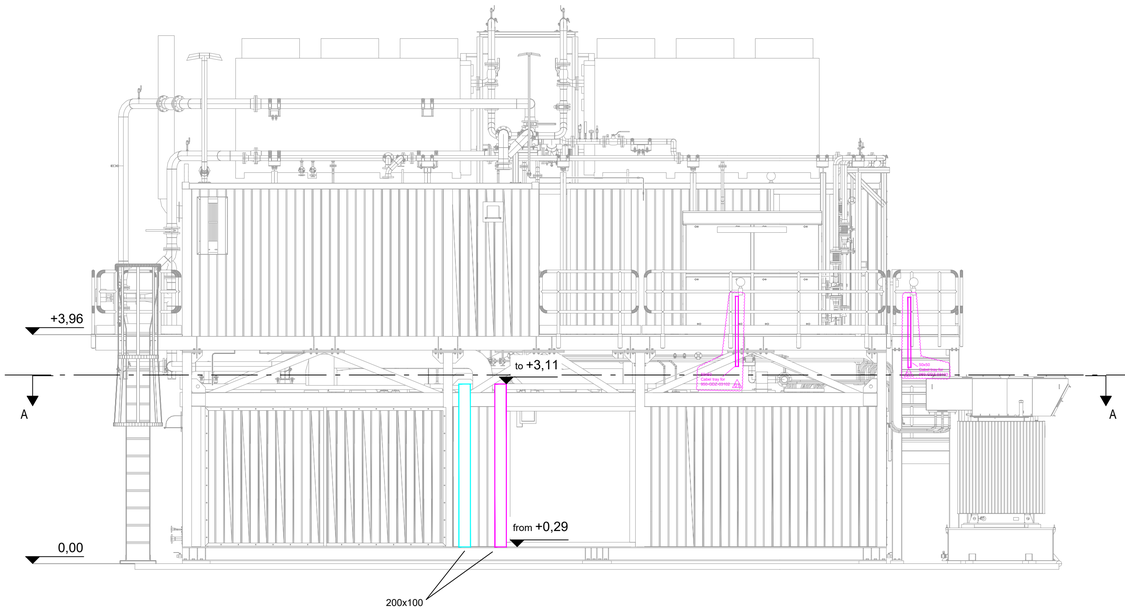
EXTERNAL AREA scale 1:50



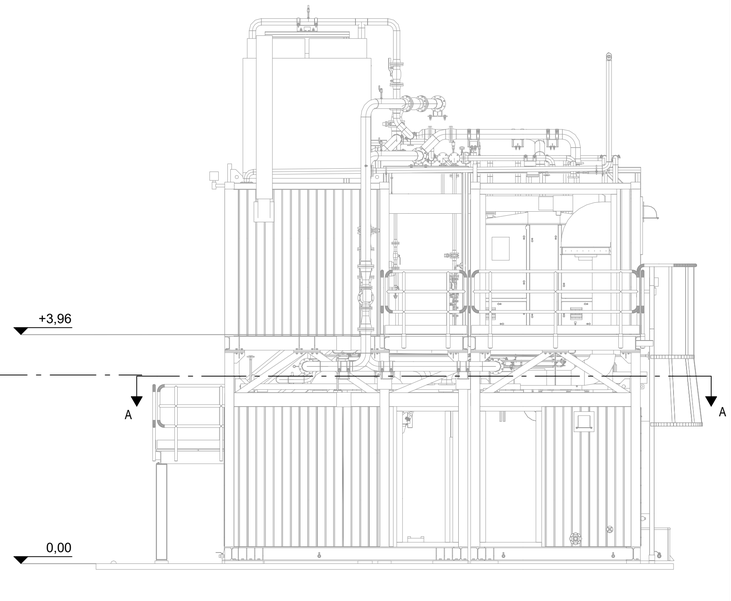
South View



West View



North View



East View

LEGEND

- MCT.n — MCT CABLE TRANSIT
- 600x125 VERTICAL ELECTRICAL CABLE TRAY
- VERTICAL INSTRUMENTAL CABLE TRAY
- VERTICAL ELECTRICAL CABLE TRAY
- MCT.n — MCT FROM CAVEDY TO UPPER SHELTHER
- OPENING FROM CAVEDY TO UPPER FLOOR
- ELECTRICAL CABLE TRAY
- INSTRUMENT CABLE TRAY
- IS INSTRUMENT CABLE TRAY
- CABLE TRAY FOR DC (direct current)
- CABLES CLEATS

MCT LIST

MCT.A.1	MCT for rectifiers AC side
MCT.A.2	MCT for rectifiers AC side
MCT.A.3	MCT for rectifiers DC side
MCT.A.4	MCT for rectifiers DC side
MCT.A.5	MCT for Stacks
MCT.A.6	MCT for Stacks
MCT.A.7	MCT for Stacks
MCT.A.8	MCT for Stacks
MCT.A.9	MCT for Stacks
MCT.A.10	MCT for Stacks
MCT.1	From Cavedy to WP3
MCT.2	Opening in the upper floor from Cavedy to external wall WP4
MCT.3	Opening in the upper floor from Cavedy to Chiller zone
MCT.4	Cavedy, Control Cabinet STRU, in-out-cables
MCT.5	Cavedy, Control Cabinet ELE, out-cables
MCT.6	From Cavedy to WP1 passage
MCT.7	From Cavedy to WTP-300
MCT.8	From Cavedy to WP2 (HVAC panel)
MCT.10	From Cavedy to WP1 (O2 room)
MCT.11	From Cavedy to WP1 passage
MCT.13	From Cavedy to WP2 (rectifier zone)
MCT.14	Cavedy, Control Cabinet ELE, in-cables

NOTE

1) ALL HEIGHTS ARE MEASURED FROM ZERO;
2) THE HEIGHT INDICATED FOR THE CABLE TRAY IS EQUAL TO THE INSTALLATION HEIGHT MEASURED FROM ZERO TO THE BOTTOM OF THIS ONE.

REFERENCE DOCUMETS

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C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

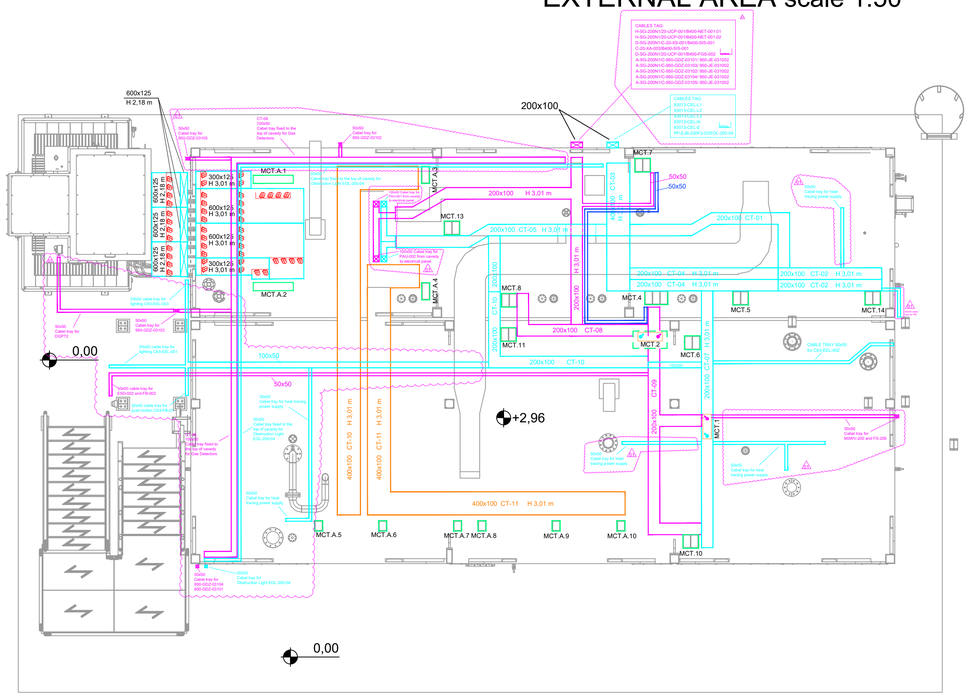
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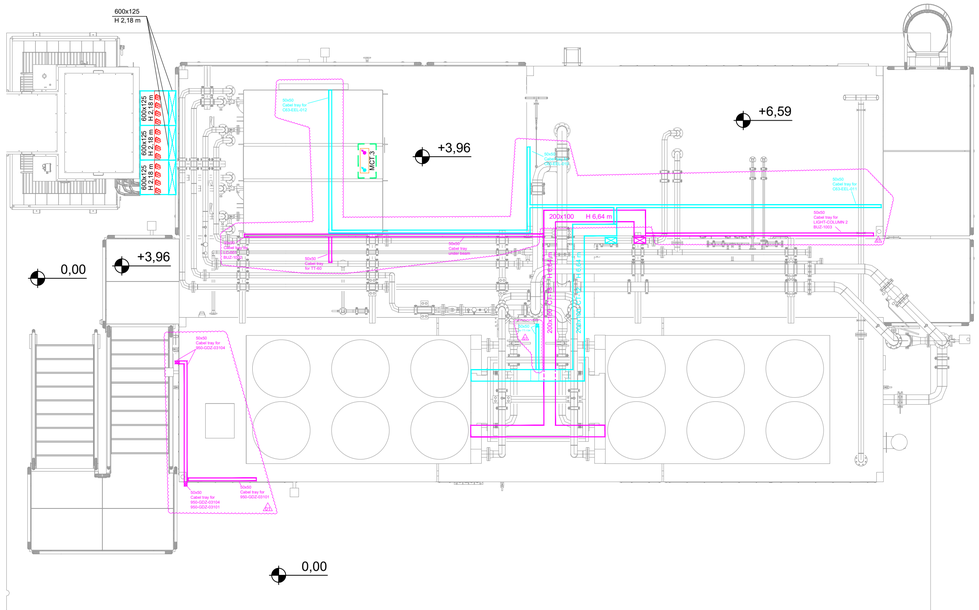
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EXTERNAL AREA scale 1:50

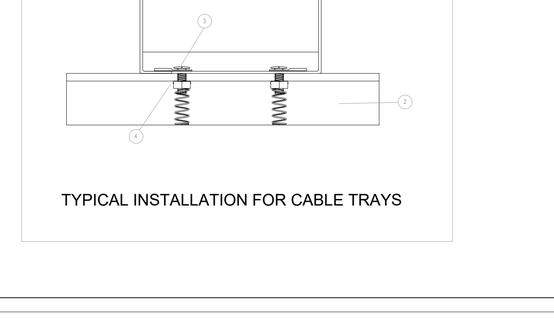


Section A-A



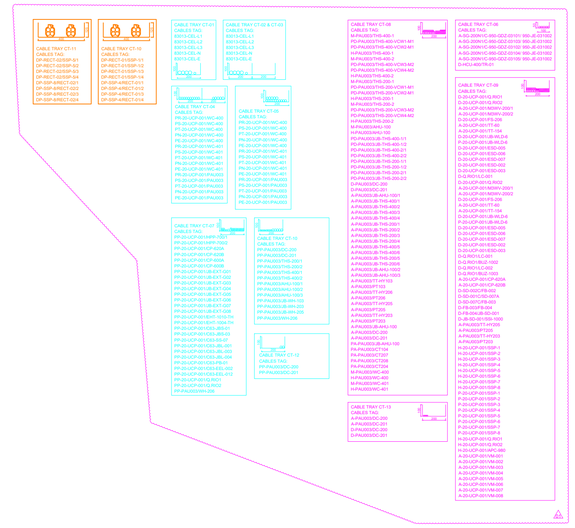
Plan View

HEIGHT DETAIL



POS.	DESCRIPTION	MATERIAL
1	CABLE TRAY	AISI 304
2	SINGLE U-CHANNEL PERFORATED	HOT DIP GAL. STEEL.
3	ROUND HEAD SCREW DOUBLE SLOT	HOT DIP GAL. STEEL.
4	NUT FOR CHANNEL WITH SPRING	HOT DIP GAL. STEEL.

TYPICAL INSTALLATTION FOR CABLE TRAYS



LEGEND

- MCT.n — MCT CABLE TRANSIT
- 600x125 VERTICAL ELECTRICAL CABLE TRAY
- VERTICAL INSTRUMENTAL CABLE TRAY
- VERTICAL ELECTRICAL CABLE TRAY
- MCT.n — MCT FROM CAVEDY TO UPPER SHELTHER
- OPENING FROM CAVEDY TO UPPER FLOOR
- ELECTRICAL CABLE TRAY
- INSTRUMENT CABLE TRAY
- IS INSTRUMENT CABLE TRAY
- CABLE TRAY FOR DC (direct current)
- CABLES CLEATS

MCT LIST

MCT.A.1	MCT for rectifiers AC side
MCT.A.2	MCT for rectifiers AC side
MCT.A.3	MCT for rectifiers DC side
MCT.A.4	MCT for rectifiers DC side
MCT.A.5	MCT for Stacks
MCT.A.6	MCT for Stacks
MCT.A.7	MCT for Stacks
MCT.A.8	MCT for Stacks
MCT.A.9	MCT for Stacks
MCT.A.10	MCT for Stacks
MCT.1	From Cavedy to WP3
MCT.2	Opening in the upper floor from Cavedy to external wall WP4
MCT.3	Opening in the upper floor from Cavedy to Chiller zone
MCT.4	Cavedy, Control Cabinet STRU, in-out-cables
MCT.5	Cavedy, Control Cabinet ELE, out-cables
MCT.6	From Cavedy to WP1 passage
MCT.7	From Cavedy to WP2 (top of WTP cover)
MCT.8	From Cavedy to WP2 (HVAC panel)
MCT.10	From Cavedy to WP1 (O2 room)
MCT.11	From Cavedy to WP1 passage
MCT.13	From Cavedy to WP2 (rectifier zone)
MCT.14	Cavedy, Control Cabinet ELE, in-cables
MCT.16	From WP2 (top of WTP cover) to WTP

NOTE

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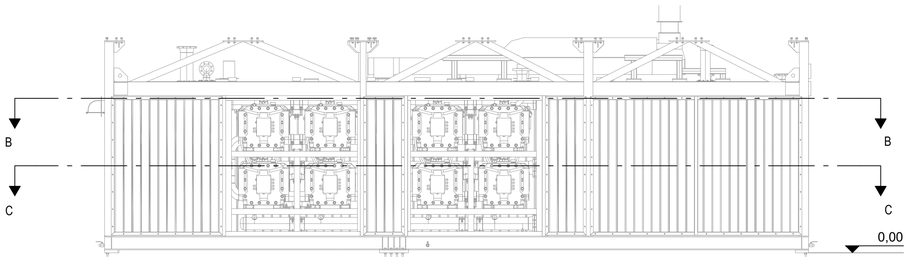
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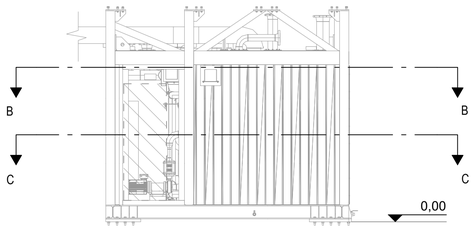
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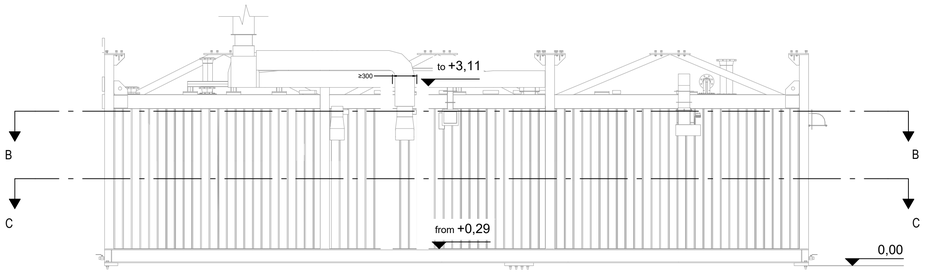
WP1 CONTAINER scale 1:50



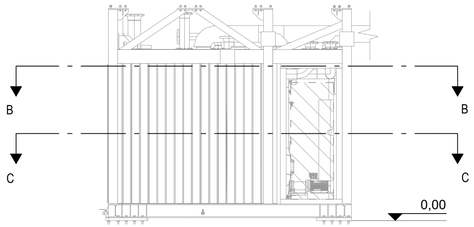
South View



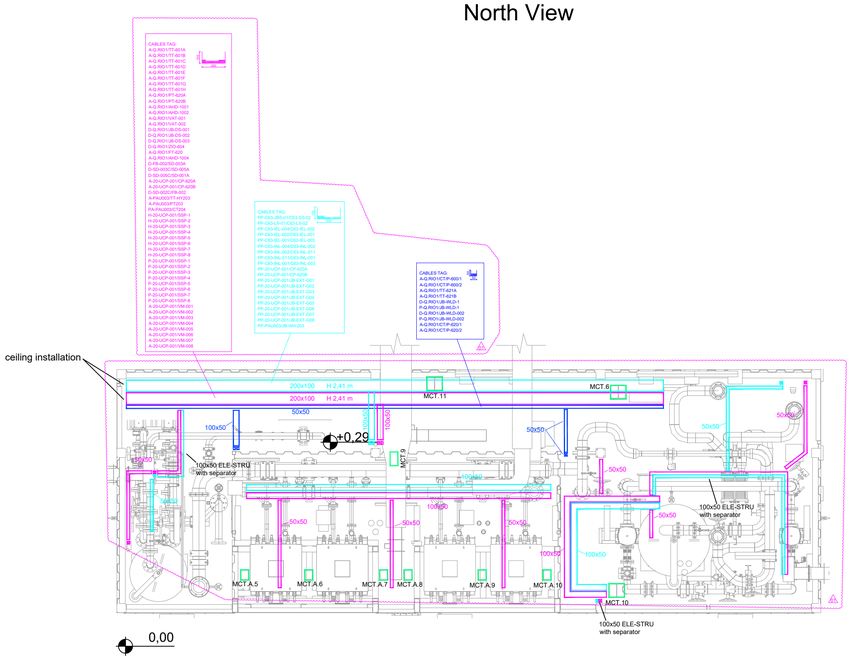
West View



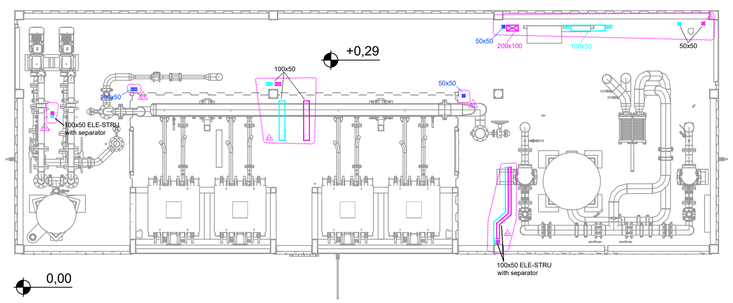
North View



East View



Section B-B



Section C-C

LEGEND

- MCT CABLE TRANSIT
- 600x125 VERTICAL ELECTRICAL CABLE TRAY
- VERTICAL INSTRUMENTAL CABLE TRAY
- VERTICAL ELECTRICAL CABLE TRAY
- MCT FROM CAVEDY TO UPPER SHELTHER
- OPENING FROM CAVEDY TO UPPER FLOOR
- ELECTRICAL CABLE TRAY
- INSTRUMENT CABLE TRAY
- IS INSTRUMENT CABLE TRAY
- CABLE TRAY FOR DC (direct current)
- CABLES CLEATS

MCT LIST

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MCT.A.2	MCT for rectifiers AC side
MCT.A.3	MCT for rectifiers DC side
MCT.A.4	MCT for rectifiers DC side
MCT.A.5	MCT for Stacks
MCT.A.6	MCT for Stacks
MCT.A.7	MCT for Stacks
MCT.A.8	MCT for Stacks
MCT.A.9	MCT for Stacks
MCT.A.10	MCT for Stacks
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MCT.7	From Cavedy to WP2 (top of WTP cover)
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MCT.14	Cavedy, Control Cabinet ELE, in-cables
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C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

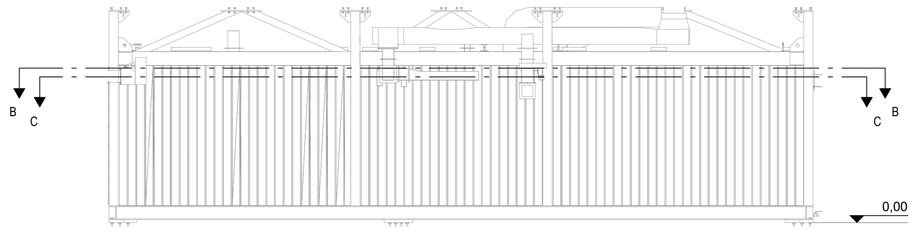
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01	29-NOV-2024	ISSUE FOR REVIEW	By	Checked	Approved	
			A. Monti	M. Chiarucci	L. Maioli	
00	11-OCT-2024	ISSUE FOR REVIEW	By	Checked	Approved	

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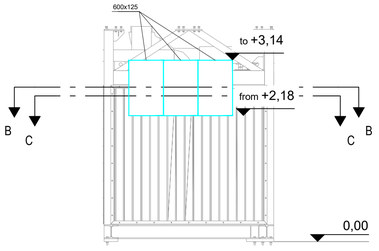
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1
FORMAT	A1
SHEET	09 of 12

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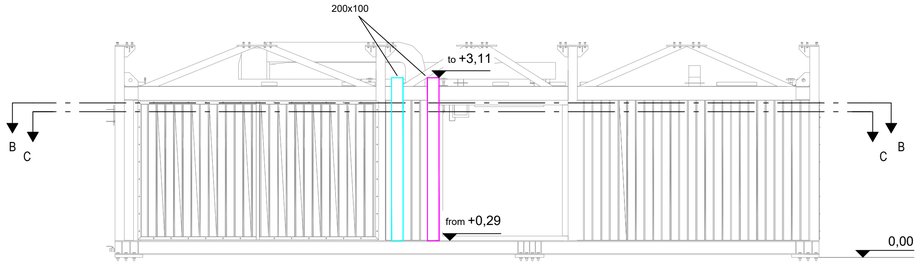
WP2 CONTAINER scale 1:50



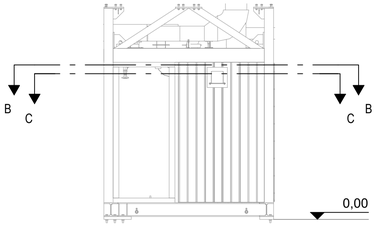
South View



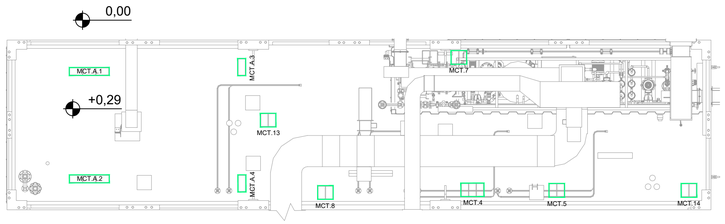
West View



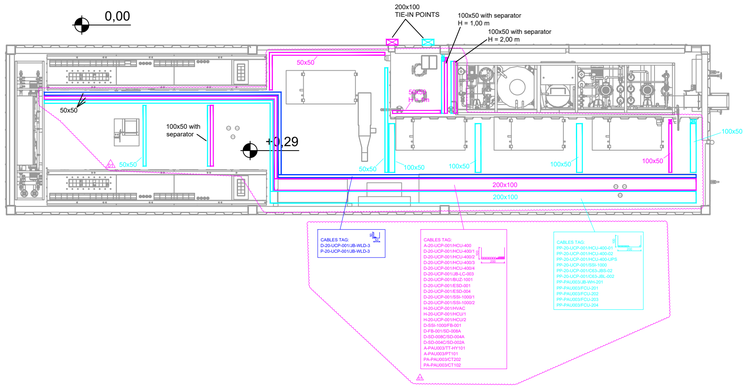
North View



East View



Section B-B



Section C-C

LEGEND

- MCT.n — MCT CABLE TRANSIT
- 600x125 VERTICAL ELECTRICAL CABLE TRAY
- VERTICAL INSTRUMENTAL CABLE TRAY
- VERTICAL ELECTRICAL CABLE TRAY
- MCT.n — MCT FROM CAVEDY TO UPPER SHELTHER
- OPENING FROM CAVEDY TO UPPER FLOOR
- ELECTRICAL CABLE TRAY
- INSTRUMENT CABLE TRAY
- IS INSTRUMENT CABLE TRAY
- CABLE TRAY FOR DC (direct current)
- CABLES CLEATS

MCT LIST

MCT.A.1	MCT for rectifiers AC side
MCT.A.2	MCT for rectifiers AC side
MCT.A.3	MCT for rectifiers DC side
MCT.A.4	MCT for rectifiers DC side
MCT.A.5	MCT for Stacks
MCT.A.6	MCT for Stacks
MCT.A.7	MCT for Stacks
MCT.A.8	MCT for Stacks
MCT.A.9	MCT for Stacks
MCT.A.10	MCT for Stacks
MCT.1	From Cavedy to WP3
MCT.2	Opening in the upper floor from Cavedy to external wall WP4
MCT.3	Opening in the upper floor from Cavedy to Chiller zone
MCT.4	Cavedy, Control Cabinet STRU, in-out-cables
MCT.5	Cavedy, Control Cabinet ELE, out-cables
MCT.6	From Cavedy to WP1 passage
MCT.7	From Cavedy to WP2 (top of WTP cover)
MCT.8	From Cavedy to WP2 (HVAC panel)
MCT.10	From Cavedy to WP1 (O2 room)
MCT.11	From Cavedy to WP1 passage
MCT.13	From Cavedy to WP2 (rectifier zone)
MCT.14	Cavedy, Control Cabinet ELE, in-cables
MCT.16	From WP2 (top of WTP cover) to WTP

NOTE

1) ALL HEIGHTS ARE MEASURED FROM ZERO;
2) THE HEIGHT INDICATED FOR THE CABLE TRAY IS EQUAL TO THE INSTALLATION HEIGHT MEASURED FROM ZERO TO THE BOTTOM OF THIS ONE.

REFERENCE DOCUMETS

C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

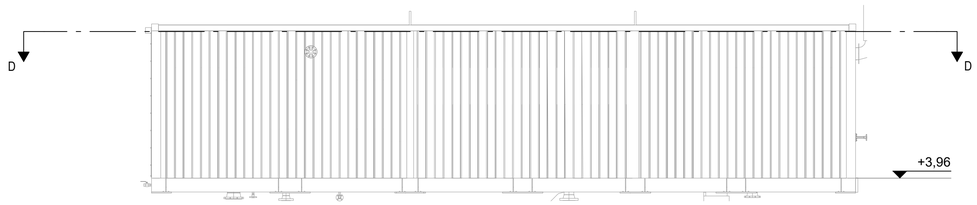
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00	11-OCT-2024	ISSUE FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	

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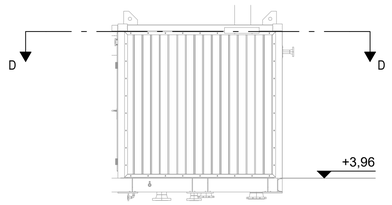
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1
FORMAT A1	SHEET 10 of 12

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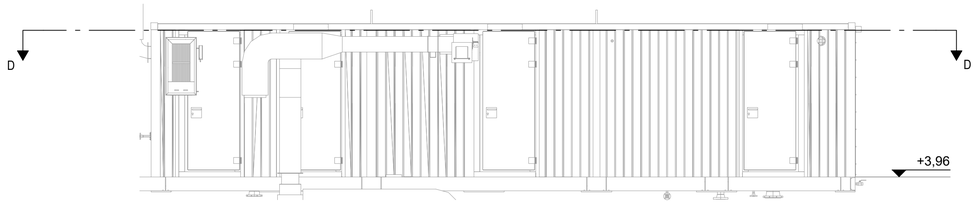
WP3 CONTAINER scale 1:50



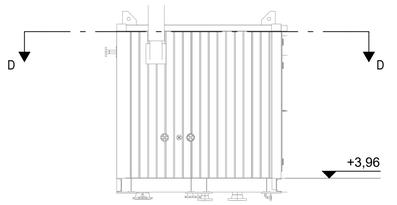
South View



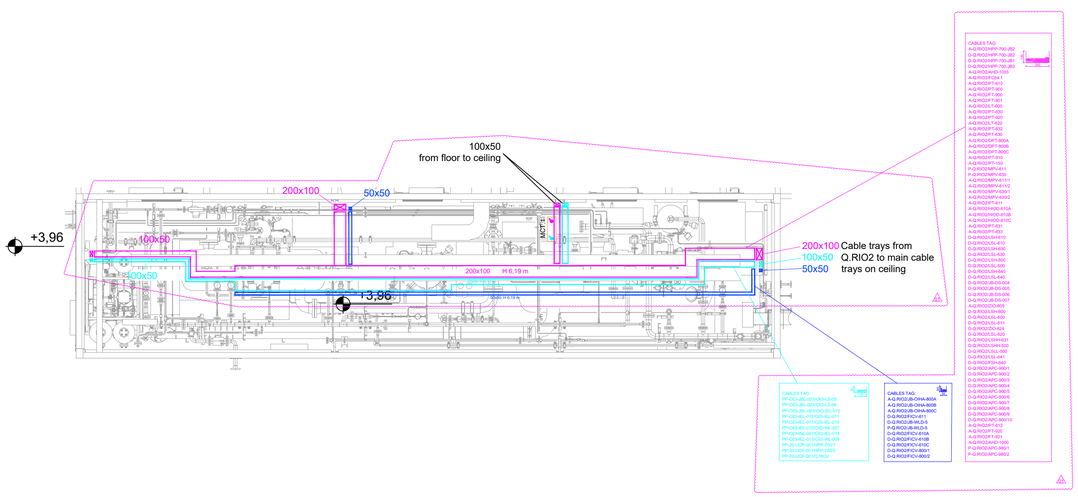
West View



North View



East View



Section D-D

LEGEND

- MCT CABLE TRANSIT (MCT.n)
- 600x125 VERTICAL ELECTRICAL CABLE TRAY
- VERTICAL INSTRUMENTAL CABLE TRAY
- VERTICAL ELECTRICAL CABLE TRAY
- MCT FROM CAVEDY TO UPPER SHELTHER (MCT.n)
- OPENING FROM CAVEDY TO UPPER FLOOR
- ELECTRICAL CABLE TRAY
- INSTRUMENT CABLE TRAY
- IS INSTRUMENT CABLE TRAY
- CABLE TRAY FOR DC (direct current)
- CABLES CLEATS

MCT LIST

MCT.A.1	MCT for rectifiers AC side
MCT.A.2	MCT for rectifiers AC side
MCT.A.3	MCT for rectifiers DC side
MCT.A.4	MCT for rectifiers DC side
MCT.A.5	MCT for Stacks
MCT.A.6	MCT for Stacks
MCT.A.7	MCT for Stacks
MCT.A.8	MCT for Stacks
MCT.A.9	MCT for Stacks
MCT.A.10	MCT for Stacks
MCT.1	From Cavedy to WP3
MCT.2	Opening in the upper floor from Cavedy to external wall WP4
MCT.3	Opening in the upper floor from Cavedy to Chiller zone
MCT.4	Cavedy, Control Cabinet STRU, in-out-cables
MCT.5	Cavedy, Control Cabinet ELE, out-cables
MCT.6	From Cavedy to WP1 passage
MCT.7	From Cavedy to WP2 (top of WTP cover)
MCT.8	From Cavedy to WP2 (HVAC panel)
MCT.10	From Cavedy to WP1 (O2 room)
MCT.11	From Cavedy to WP1 passage
MCT.13	From Cavedy to WP2 (rectifier zone)
MCT.14	Cavedy, Control Cabinet ELE, in-cables
MCT.16	From WP2 (top of WTP cover) to WTP

NOTE

1) ALL HEIGHTS ARE MEASURED FROM ZERO;
2) THE HEIGHT INDICATED FOR THE CABLE TRAY IS EQUAL TO THE INSTALLATION HEIGHT MEASURED FROM ZERO TO THE BOTTOM OF THIS ONE.

REFERENCE DOCUMETS

C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

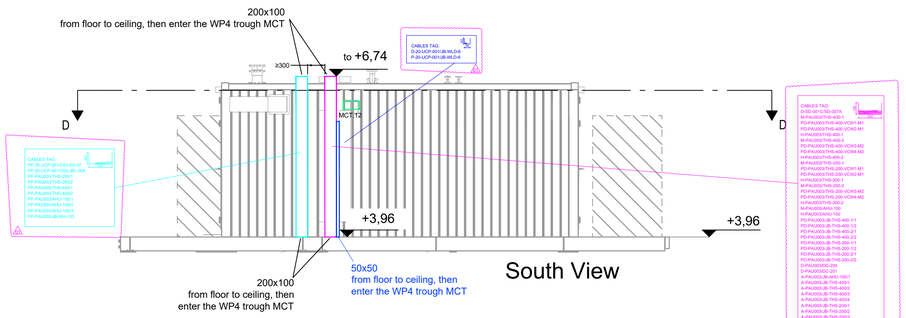
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			By	Checked	Approved	
00	11-OCT-2024	ISSUE FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
			By	Checked	Approved	

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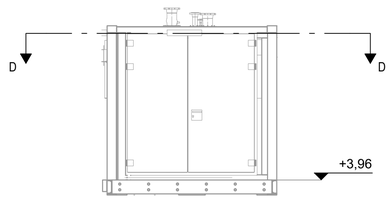
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003			
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING			
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031			
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1			
	FORMAT	A1	SHEET	11 of 12

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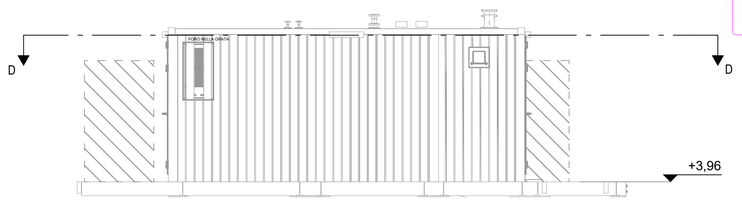
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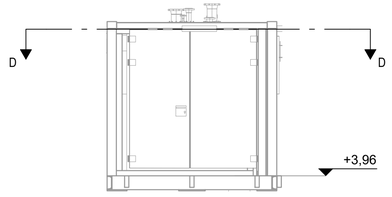
South View



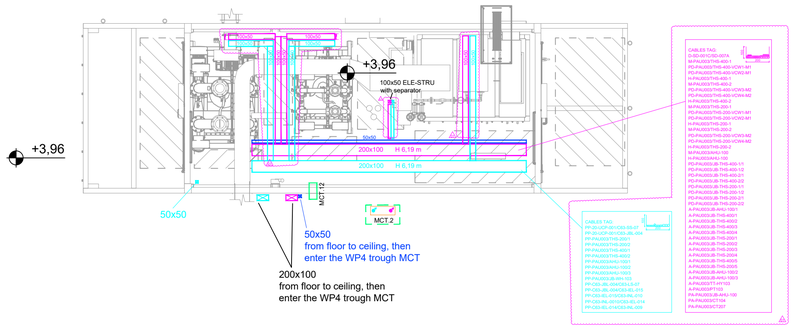
West View



North View



East View



Section D-D

LEGEND

- MCT.n — MCT CABLE TRANSIT
- 600x125 VERTICAL ELECTRICAL CABLE TRAY
- VERTICAL INSTRUMENTAL CABLE TRAY
- VERTICAL ELECTRICAL CABLE TRAY
- MCT.n — MCT FROM CAVEDY TO UPPER SHELTHER
- OPENING FROM CAVEDY TO UPPER FLOOR
- ELECTRICAL CABLE TRAY
- INSTRUMENT CABLE TRAY
- IS INSTRUMENT CABLE TRAY
- CABLE TRAY FOR DC (direct current)
- CABLES CLEATS

MCT LIST

MCT.A.1	MCT for rectifiers AC side
MCT.A.2	MCT for rectifiers AC side
MCT.A.3	MCT for rectifiers DC side
MCT.A.4	MCT for rectifiers DC side
MCT.A.5	MCT for Stacks
MCT.A.6	MCT for Stacks
MCT.A.7	MCT for Stacks
MCT.A.8	MCT for Stacks
MCT.A.9	MCT for Stacks
MCT.A.10	MCT for Stacks
MCT.1	From Cavedy to WP3
MCT.2	Opening in the upper floor from Cavedy to external wall WP4
MCT.3	Opening in the upper floor from Cavedy to Chiller zone
MCT.4	Cavedy, Control Cabinet STRU, in-out-cables
MCT.5	Cavedy, Control Cabinet ELE, out-cables
MCT.6	From Cavedy to WP1 passage
MCT.7	From Cavedy to WP2 (top of WTP cover)
MCT.8	From Cavedy to WP2 (HVAC panel)
MCT.10	From Cavedy to WP1 (O2 room)
MCT.11	From Cavedy to WP1 passage
MCT.13	From Cavedy to WP2 (rectifier zone)
MCT.14	Cavedy, Control Cabinet ELE, in-cables
MCT.16	From WP2 (top of WTP cover) to WTP

NOTE

1) ALL HEIGHTS ARE MEASURED FROM ZERO;
2) THE HEIGHT INDICATED FOR THE CABLE TRAY IS EQUAL TO THE INSTALLATION HEIGHT MEASURED FROM ZERO TO THE BOTTOM OF THIS ONE.

REFERENCE DOCUMETS

C0063-FOR-DWG-EL-001	INSTRUMENTAL HOOK-UP DRAWINGS
C0063-FOR-DTS-EL-001	INSTRUMENTAL DATASHEET
C0063-FOR-LST-EL-001	CABLES LIST

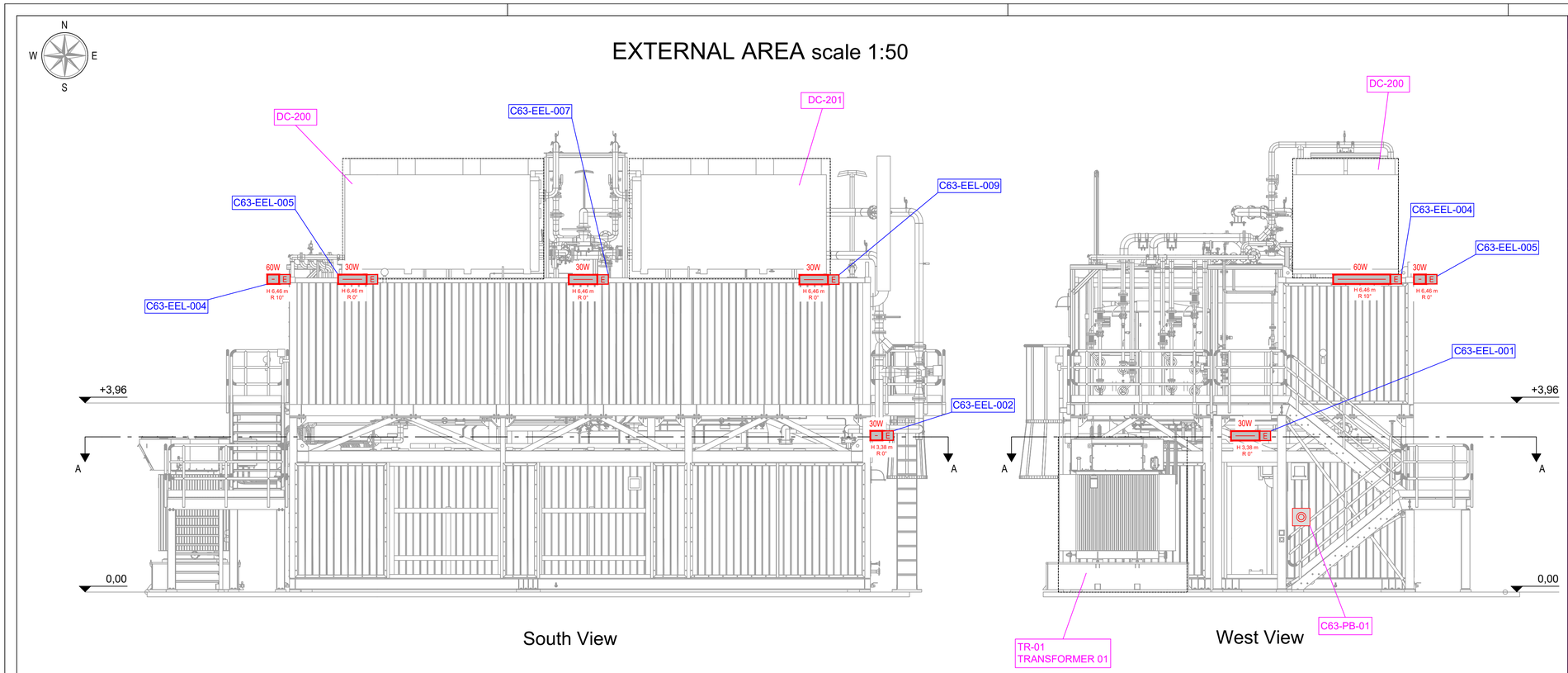
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE		
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-EL-003		
ELOGEN PROJECT DOCUMENT TITLE	E&I LAYOUT AND CABLE TRAYS ROUTING		
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00031		
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-DL-00001_1		
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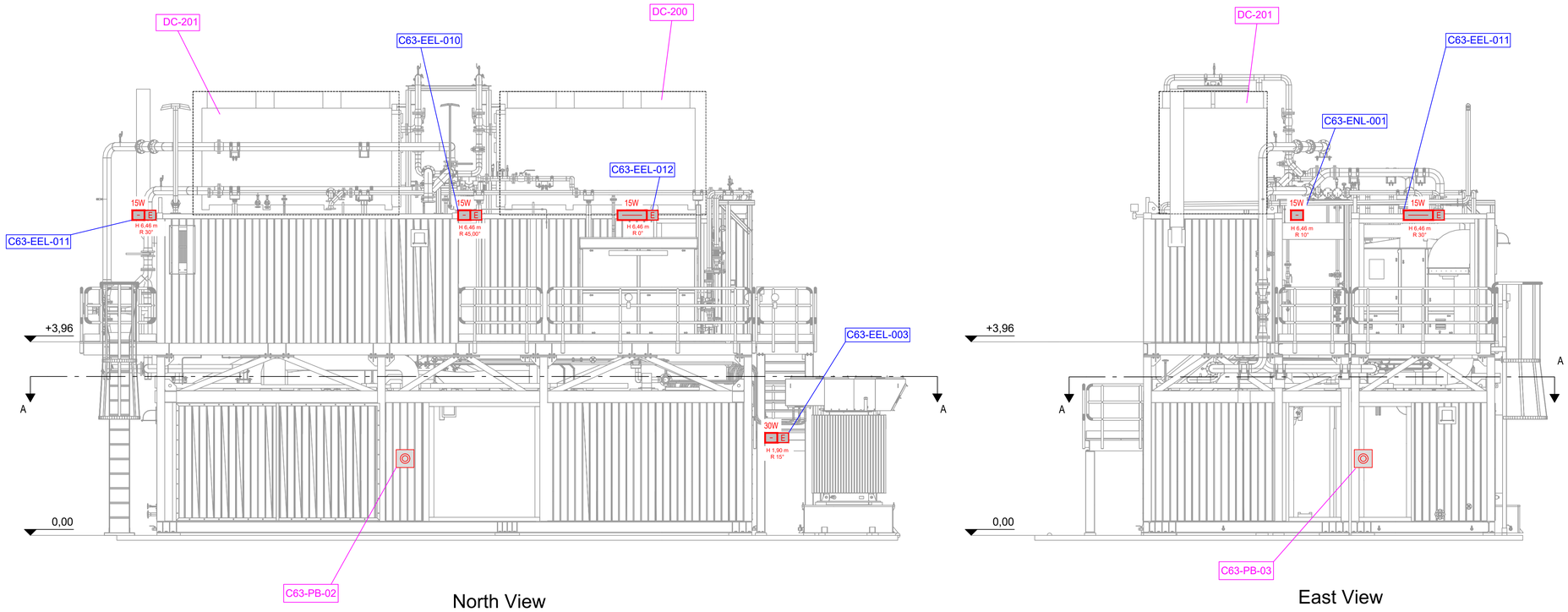
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EXTERNAL AREA scale 1:50



South View

West View



North View

East View

LEGEND

SYMBOL	DESCRIPTION
15W 15W	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
30W 30W	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
60W 60W	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
15W E 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
30W E 30W E	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
60W E 60W E	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
	SINGLE POLE 1 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE PUSH BUTTON IN GRP MATERIAL SAFE AREA IP56
ATEX	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL IP56 ATEX
M	1 PHASE ELECTRIC MOTOR
M	3 PHASE ELECTRIC MOTOR
	ELECTRICAL POWER SUPPLY
	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES SAFE AREA IP56 IN GRP MATERIAL
ATEX	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES ATEX IP56 IN GRP MATERIAL
	WALL HEATER
	JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56 WITH THERMOSTAT
	EMERGENCY EXIT SIGN ABOVE THE DOOR

REFERENCE DOCUMETS

C0063-FOR-CAL-EL-002	LIGHTING CALCULATION
C0063-FOR-DMG-EL-001	LV SINGLE LINE DIAGRAM
C0063-FOR-LST-EL-001	CABLES LIST

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

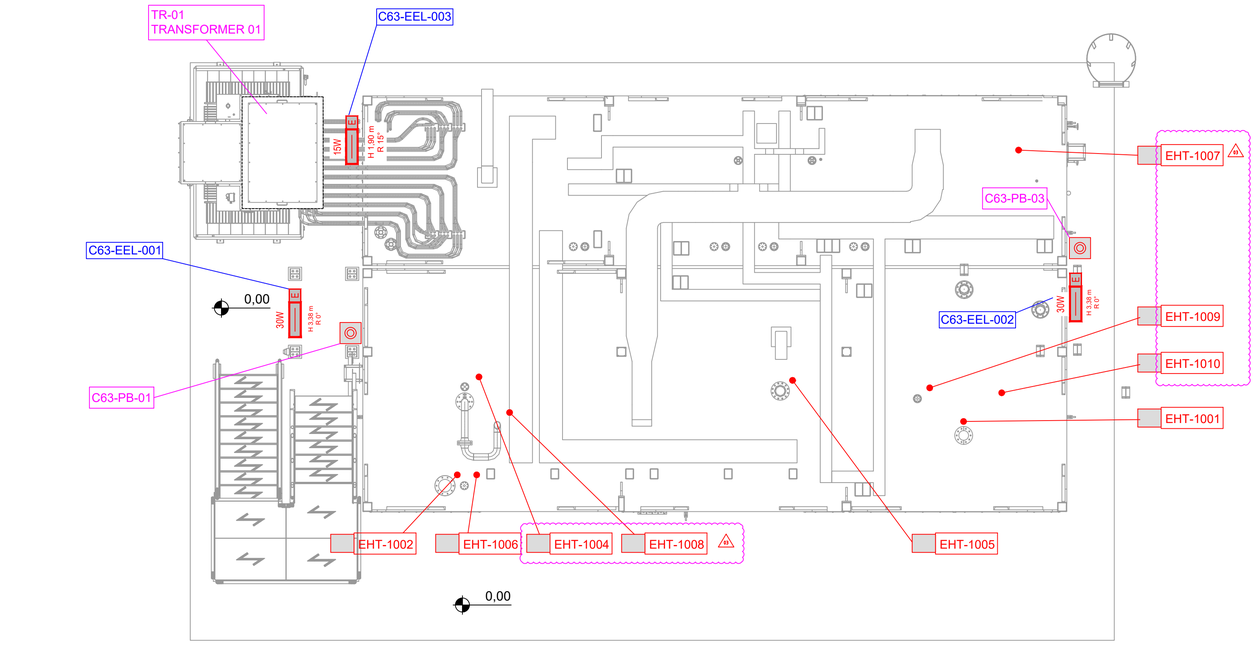
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02	29-NOV-2024	ISSUED FOR REVIEW	A. Monti / By	M. Chiarucci / Checked	L. Maioli / Approved	
01	07-OCT-2024	ISSUED FOR REVIEW	A. Monti / By	M. Chiarucci / Checked	L. Maioli / Approved	
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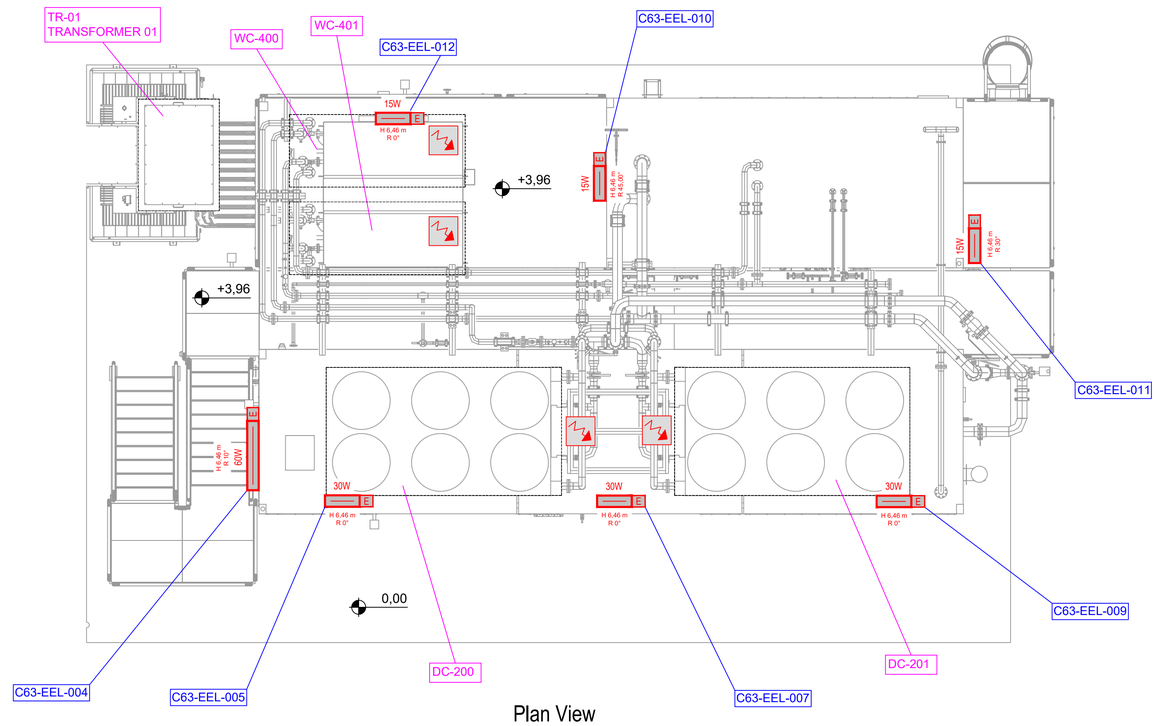
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-LAY-EL-002
ELOGEN PROJECT DOCUMENT TITLE	LIGHTING AND SMALL POWER LAYOUT
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-RPT-00010
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-CA-00002_3
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EXTERNAL AREA scale 1:50



Section A-A



Plan View

LEGEND

SYMBOL	DESCRIPTION
15W 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
30W 30W	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
60W 60W	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
15W E 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
30W E 30W E	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
60W E 60W E	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
	SINGLE POLE 1 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE PUSH BUTTON IN GRP MATERIAL SAFE AREA IP56
ATEX	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL IP56 ATEX
M	1 PHASE ELECTRIC MOTOR
M	3 PHASE ELECTRIC MOTOR
	ELECTRICAL POWER SUPPLY
	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES SAFE AREA IP56 IN GRP MATERIAL
ATEX	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES ATEX IP56 IN GRP MATERIAL
	WALL HEATER
	JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56 WITH THERMOSTAT
EXIT	EMERGENCY EXIT SIGN ABOVE THE DOOR

REFERENCE DOCUMETS

C0063-FOR-CAL-EL-002	LIGHTING CALCULATION
C0063-FOR-DMG-EL-001	LV SINGLE LINE DIAGRAM
C0063-FOR-LST-EL-001	CABLES LIST

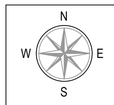
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
03	14-FEB-2025	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	
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00	05-AUG-2024	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	

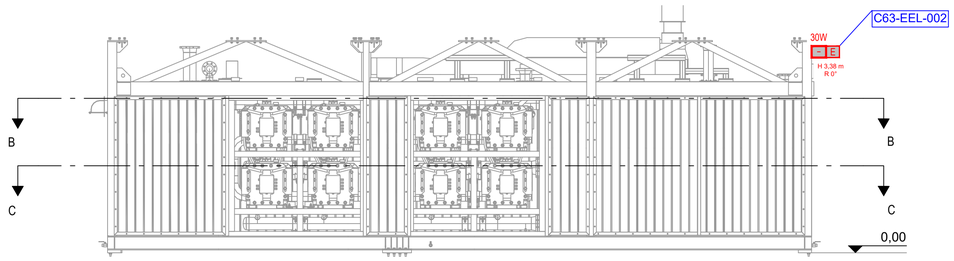
elogen

PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-LAY-EL-002
ELOGEN PROJECT DOCUMENT TITLE	LIGHTING AND SMALL POWER LAYOUT
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-RPT-00010
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-CA-00002_3
FORMAT	A1
SHEET	02 of 06

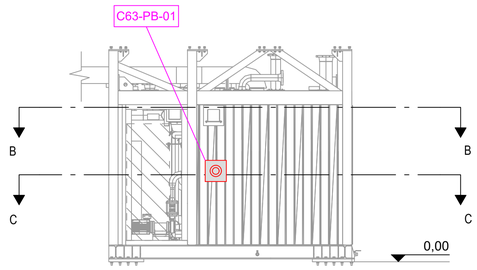
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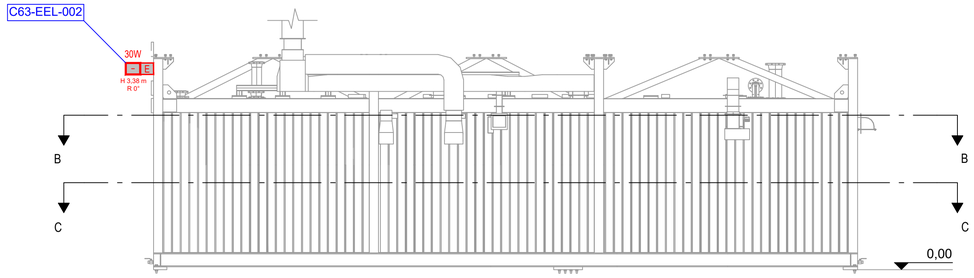




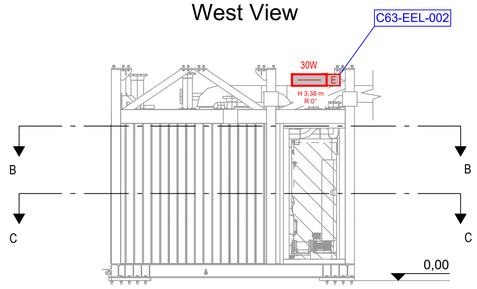
South View



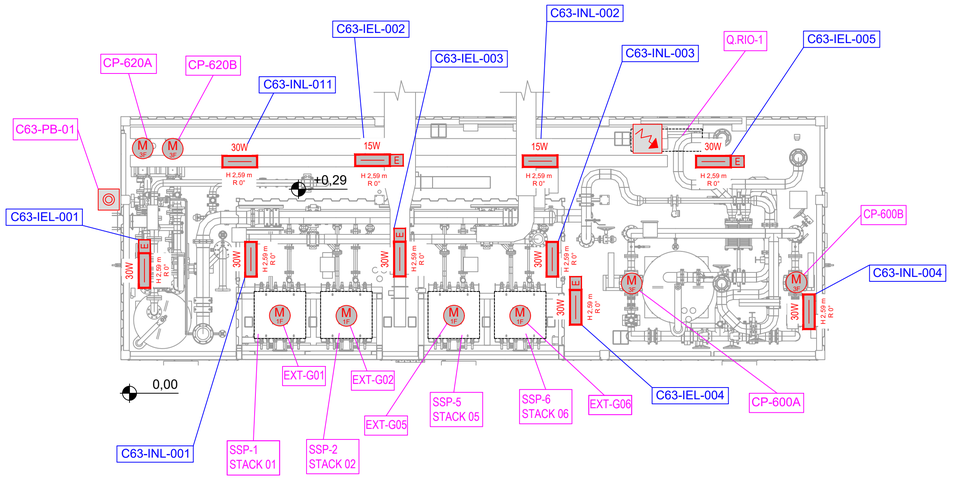
West View



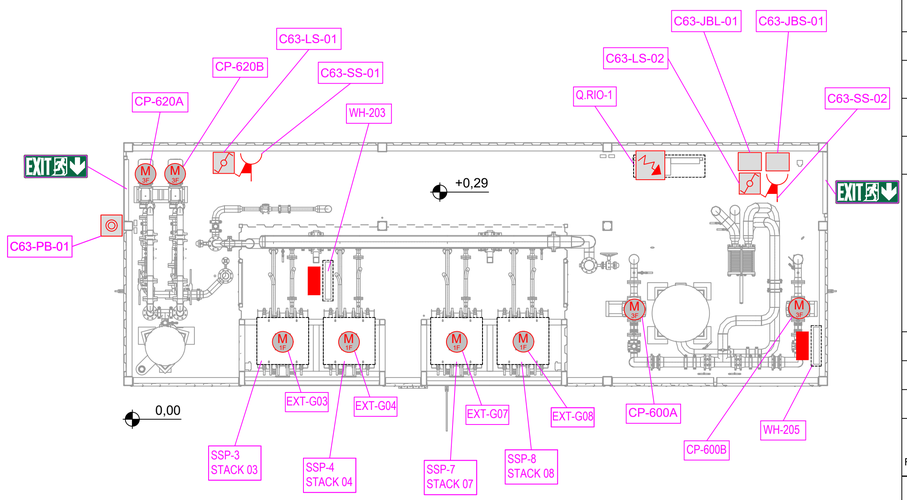
North View



East View



Section B-B



Section C-C

LEGEND	
SYMBOL	DESCRIPTION
15W 15W	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
30W 30W	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
60W 60W	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
15W E 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
30W E 30W E	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
60W E 60W E	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
	SINGLE POLE 1 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE PUSH BUTTON IN GRP MATERIAL SAFE AREA IP56
ATEX	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL IP56 ATEX
M	1 PHASE ELECTRIC MOTOR
M	3 PHASE ELECTRIC MOTOR
	ELECTRICAL POWER SUPPLY
	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES SAFE AREA IP56 IN GRP MATERIAL
ATEX	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES ATEX IP56 IN GRP MATERIAL
	WALL HEATER
	JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56 WITH THERMOSTAT
EXIT	EMERGENCY EXIT SIGN ABOVE THE DOOR

REFERENCE DOCUMETS	
C0063-FOR-CAL-EL-002	LIGHTING CALCULATION
C0063-FOR-DMG-EL-001	LV SINGLE LINE DIAGRAM
C0063-FOR-LST-EL-001	CABLES LIST

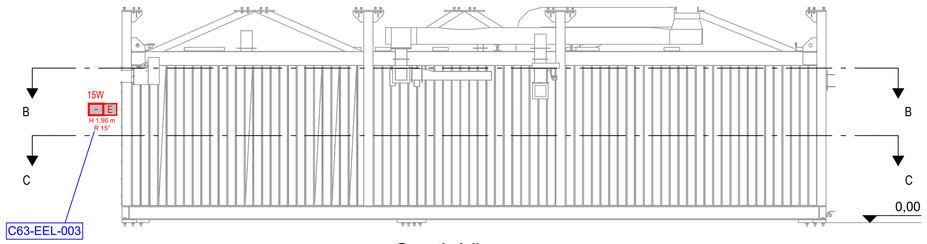
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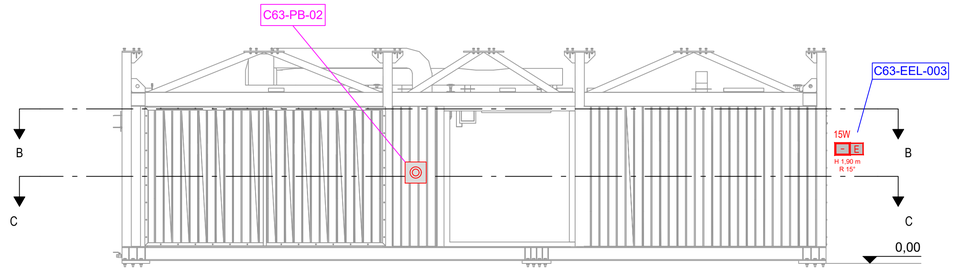
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ELOGEN PROJECT DOCUMENT TITLE	LIGHTING AND SMALL POWER LAYOUT
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-RPT-00010
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-CA-00002_3
FORMAT A1	SHEET 03 of 06

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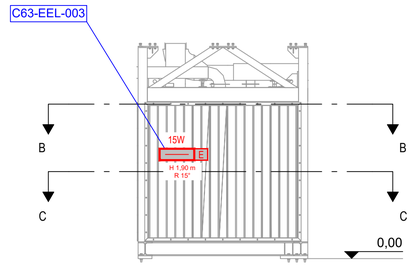
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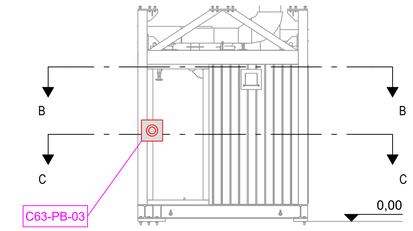
South View



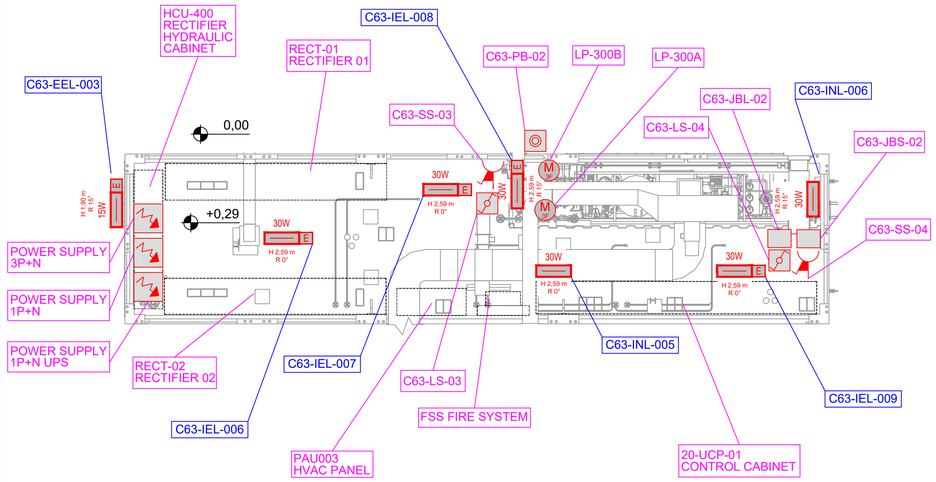
North View



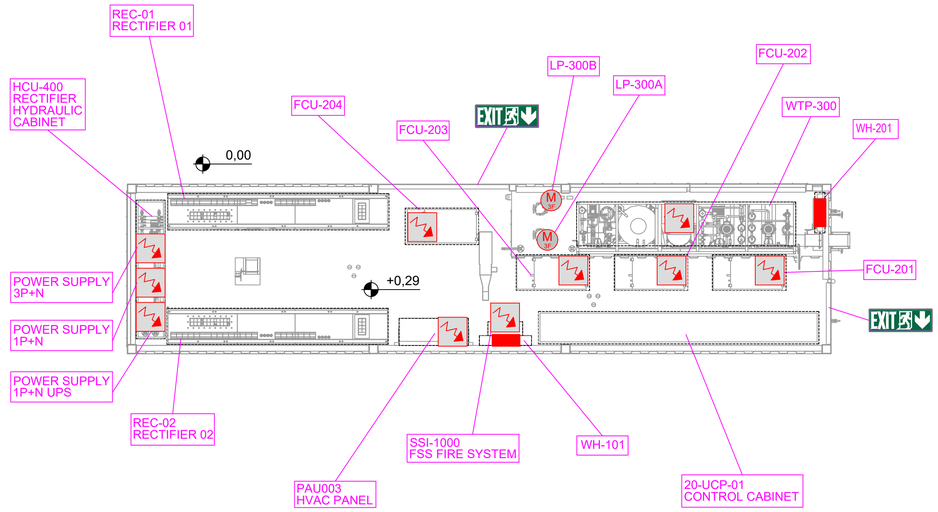
West View



East View



Section B-B



Section C-C

LEGEND	
SYMBOL	DESCRIPTION
15W 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
30W 30W	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
60W 60W	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
15W E 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
30W E 30W E	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
60W E 60W E	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
	SINGLE POLE 1 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE PUSH BUTTON IN GRP MATERIAL SAFE AREA IP56
ATEX	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL IP56 ATEX
M	1 PHASE ELECTRIC MOTOR
M	3 PHASE ELECTRIC MOTOR
	ELECTRICAL POWER SUPPLY
	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES SAFE AREA IP56 IN GRP MATERIAL
ATEX	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES ATEX IP56 IN GRP MATERIAL
	WALL HEATER
	JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56 WITH THERMOSTAT
EXIT	EMERGENCY EXIT SIGN ABOVE THE DOOR

REFERENCE DOCUMETS	
C0063-FOR-CAL-EL-002	LIGHTING CALCULATION
C0063-FOR-DMG-EL-001	LV SINGLE LINE DIAGRAM
C0063-FOR-LST-EL-001	CABLES LIST

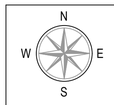
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
03	14-FEB-2025	ISSUED FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
02	29-NOV-2024	ISSUED FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
01	07-OCT-2024	ISSUED FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
00	05-AUG-2024	ISSUED FOR REVIEW	A. Monti	M. Chiarucci	L. Maioli	
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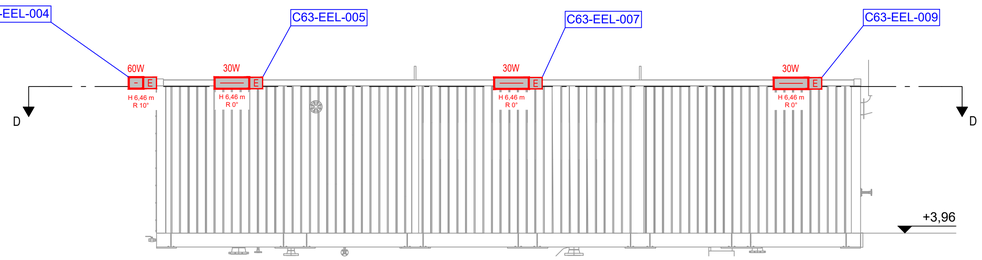
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-LAY-EL-002
ELOGEN PROJECT DOCUMENT TITLE	LIGHTING AND SMALL POWER LAYOUT
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-RPT-00010
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-CA-00002_3
FORMAT	A1
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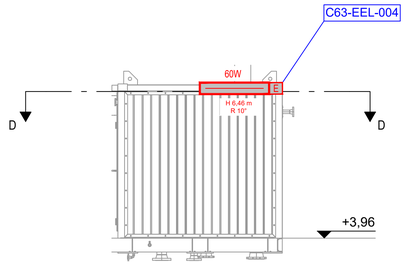
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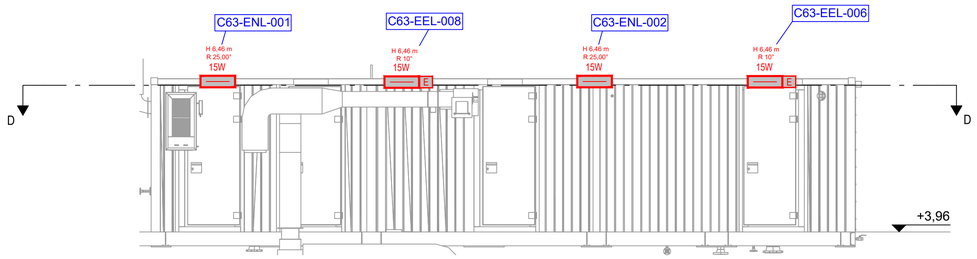




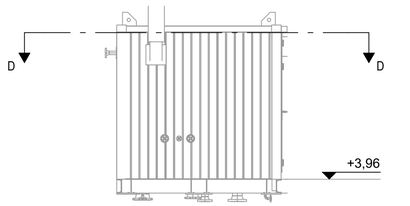
South View



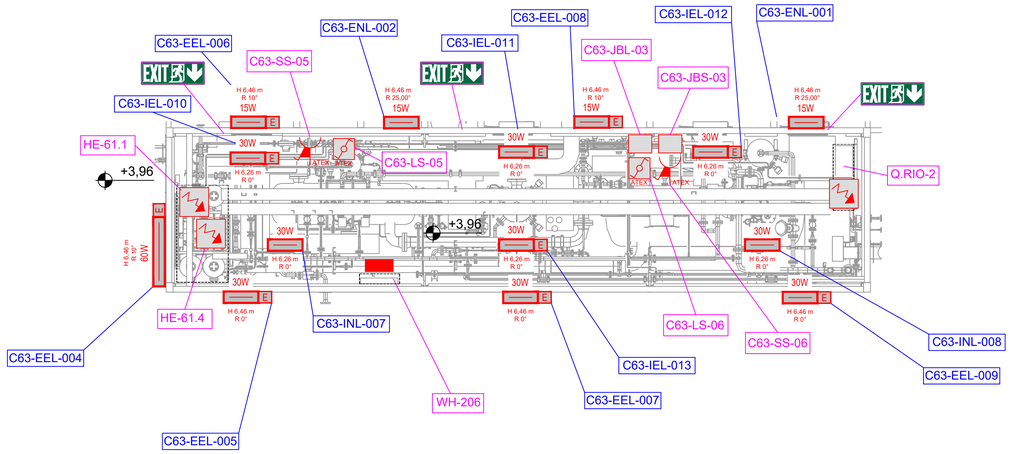
West View



North View



East View



Section D-D

LEGEND

SYMBOL	DESCRIPTION
15W 15W	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
30W 30W	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
60W 60W	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
15W E 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
30W E 30W E	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
60W E 60W E	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
	SINGLE POLE 1 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE PUSH BUTTON IN GRP MATERIAL SAFE AREA IP56
ATEX	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL IP56 ATEX
M	1 PHASE ELECTRIC MOTOR
M	3 PHASE ELECTRIC MOTOR
	ELECTRICAL POWER SUPPLY
	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES SAFE AREA IP56 IN GRP MATERIAL
ATEX	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES ATEX IP56 IN GRP MATERIAL
	WALL HEATER
	JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56 WITH THERMOSTAT
EXIT	EMERGENCY EXIT SIGN ABOVE THE DOOR

REFERENCE DOCUMETS

C0063-FOR-CAL-EL-002	LIGHTING CALCULATION
C0063-FOR-DMG-EL-001	LV SINGLE LINE DIAGRAM
C0063-FOR-LST-EL-001	CABLES LIST

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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01	07-OCT-2024	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	
00	05-AUG-2024	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	

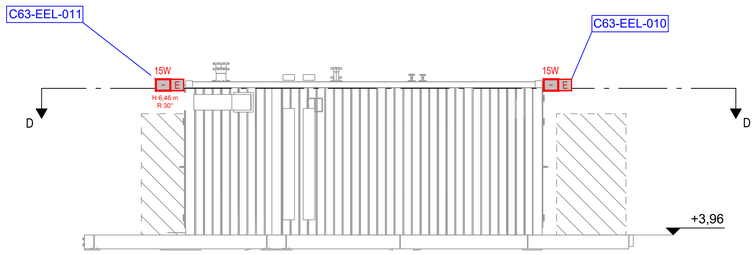
elogen

PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-LAY-EL-002
ELOGEN PROJECT DOCUMENT TITLE	LIGHTING AND SMALL POWER LAYOUT
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-RPT-00010
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-CA-00002_3
FORMAT	A1
SHEET	05 of 06

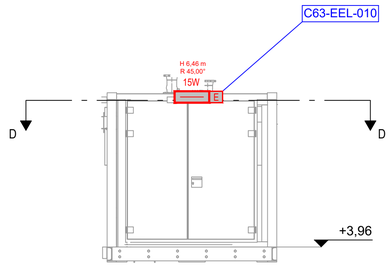
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WP4 CONTAINER scale 1:50

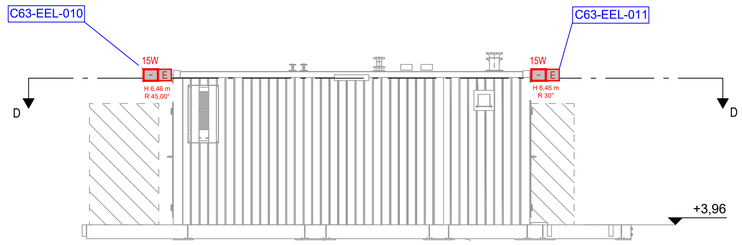




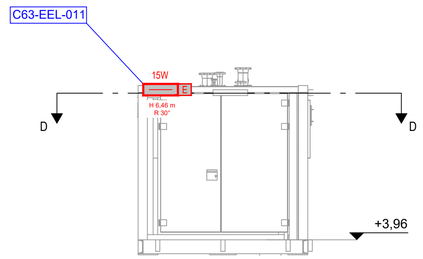
South View



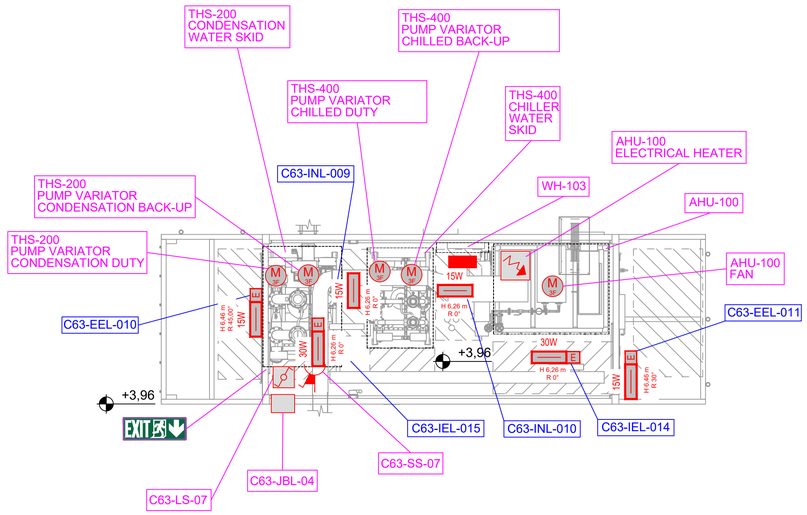
West View



North View



East View



Section D-D

LEGEND	
SYMBOL	DESCRIPTION
15W 15W	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
30W 30W	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
60W 60W	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL FRONTAL AND SIDE VIEW
15W E 15W E	LED LIGHTING FIXTURE 15W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T62°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
30W E 30W E	LED LIGHTING FIXTURE 30W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
60W E 60W E	LED LIGHTING FIXTURE 60W Ex II 2GD Ex db eb mb IIC T6 Gb Ex tb IIIC T85°C Db, IP66, NORMAL + EMERGENCY, 90 minutes autonomy FRONTAL AND SIDE VIEW
	SINGLE POLE 1 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL SAFE AREA IP56
	SINGLE POLE PUSH BUTTON IN GRP MATERIAL SAFE AREA IP56
ATEX	SINGLE POLE 2 WAY SWITCH IN GRP MATERIAL IP56 ATEX
M	1 PHASE ELECTRIC MOTOR
M	3 PHASE ELECTRIC MOTOR
	ELECTRICAL POWER SUPPLY
	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES SAFE AREA IP56 IN GRP MATERIAL
ATEX	CEE INDUSTRIAL SOCKET 1P+N+E 16A INTERLOCKED WITHOUT FUSES ATEX IP56 IN GRP MATERIAL
	WALL HEATER
	JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56
	HEAT TRACING JUNCTION BOX IN GRP MATERIAL MIN. IP56 WITH THERMOSTAT
EXIT	EMERGENCY EXIT SIGN ABOVE THE DOOR

REFERENCE DOCUMETS	
C0063-FOR-CAL-EL-002	LIGHTING CALCULATION
C0063-FOR-DMG-EL-001	LV SINGLE LINE DIAGRAM
C0063-FOR-LST-EL-001	CABLES LIST

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
03	14-FEB-2025	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	
02	29-NOV-2024	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	
01	07-OCT-2024	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	
00	05-AUG-2024	ISSUED FOR REVIEW	A. Monti By	M. Chiarucci Checked	L. Maioli Approved	

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE			
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-LAY-EL-002			
ELOGEN PROJECT DOCUMENT TITLE	LIGHTING AND SMALL POWER LAYOUT			
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-RPT-00010			
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-EL-CA-00002_3			
	FORMAT	A1	SHEET	06 of 06

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C0063-FOR-LST-EL-001

Cables List

C63- CrossWind Project

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
04	*AS BUILT*	*21/03/2025*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
03	*Issued for Approval*	*10-FEB-2025*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
02	*Issue for Review*	*04-DEC-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
01	*Issue for Review*	*12-SEP-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
00	*Issue for Review*	*22-MAY-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	**C0063-FOR-LST-EL-001**
Elogen Project Document Title	**Cables List**
Crosswind Project Document Number	**FORES-INN-BPH-REG-00011**
Vendor Document Number and Revision	**224J10-DDL-EL-LIS-00001_03**

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Review*
01	*Issue for Review*
02	*Issue for Review*
04	*AS BUILT*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

ELECTRICAL CABLE CODING

PR/PS/PT	AC Power Cable - Single Core - Phase L1/L2/L3
PN	AC Power Cable - Single Core - Phase N
PE	Protective Earth - Single Core
PP	AC/DC Power Cable - Multi Core
DN	DC Negative Pole - Single Core
DP	DC Positive Pole - Single Core

INSTRUMENTAL CABLES CODING

A	Analogue	**P**	Power
D	Digital	**M**	Multifunction
H	Communication	**Y**	Solenoid
D	Digital	**PD**	Miscellaneous (Power+Digital)
		PA	Miscellaneous (Power+Analog)

NOTES:

8) Cable out of Fores scope

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ELECTRICAL CABLES INTERCONNETIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
SG-100D1	6.6KV HV Switchgear	Column A1	L1	Black	SG100D1-MCT-A1	82004-CEM-1-L1	PR	Single Core, 6/10 (7.2) kV, Cu/EPR/CTS/LSZH/ CWB/LSZH outer sheath material,	1C X 150	Overall. 34 U.A. 28,3 (each)	30	N/A	Black	L1		TRANSFORMER 01	**TR-01**	**Transformer power supply (8)**	
			L2	Black		82004-CEM-1-L2	PS		1C X 150				Black	L2					
			L3	Black		82004-CEM-1-L3	PT		1C X 150				Black	L3					
TR-01	TRANSFORMER 01		2U	Black	M50	PR1-TR-01/RECT-01	PR1	FG16OM16 GREEN	1x300	33	10	MCT.A.1	Black	L1		RECTIFIER 01	**RECT-01**		400Vac
			2U	Black	M50	PR2-TR-01/RECT-01	PR2		1x300		10		Black	L1					
			2U	Black	M50	PR3-TR-01/RECT-01	PR3		1x300		10		Black	L1					
			2U	Black	M50	PR4-TR-01/RECT-01	PR4		1x300		10		Black	L1					
			2U	Black	M50	PR5-TR-01/RECT-01	PR5		1x300		10		Black	L1					
			2U	Black	M50	PR6-TR-01/RECT-01	PR6		1x300		10		Black	L1					
			2V	Black	M50	PS1-TR-01/RECT-01	PS1		1x300		10		Black	L2					
			2V	Black	M50	PS2-TR-01/RECT-01	PS2		1x300		10		Black	L2					
			2V	Black	M50	PS3-TR-01/RECT-01	PS3		1x300		10		Black	L2					
			2V	Black	M50	PS4-TR-01/RECT-01	PS4		1x300		10		Black	L2					
			2V	Black	M50	PS5-TR-01/RECT-01	PS5		1x300		10		Black	L2					
			2V	Black	M50	PS6-TR-01/RECT-01	PS6		1x300		10		Black	L2					
			2W	Black	M50	PT1-TR-01/RECT-01	PT1		1x300		10		Black	L3					
			2W	Black	M50	PT2-TR-01/RECT-01	PT2		1x300		10		Black	L3					
			2W	Black	M50	PT3-TR-01/RECT-01	PT3		1x300		10		Black	L3					
			2W	Black	M50	PT4-TR-01/RECT-01	PT4		1x300		10		Black	L3					
			2W	Black	M50	PT5-TR-01/RECT-01	PT5		1x300		10		Black	L3					
			2W	Black	M50	PT6-TR-01/RECT-01	PT6		1x300		10		Black	L3					
TR-01	TRANSFORMER 01		3U	Black	M50	PR1-TR-01/RECT-02	PR1	FG16OM16 GREEN	1x300	33	10	MCT.A.2	Black	L1		RECTIFIER 02	**RECT-02**		400Vac
			3U	Black	M50	PR2-TR-01/RECT-02	PR2		1x300		10		Black	L1					
			3U	Black	M50	PR3-TR-01/RECT-02	PR3		1x300		10		Black	L1					
			3U	Black	M50	PR4-TR-01/RECT-02	PR4		1x300		10		Black	L1					
			3U	Black	M50	PR5-TR-01/RECT-02	PR5		1x300		10		Black	L1					
			3U	Black	M50	PR6-TR-01/RECT-02	PR6		1x300		10		Black	L1					
			3V	Black	M50	PS1-TR-01/RECT-02	PS1		1x300		10		Black	L2					
			3V	Black	M50	PS2-TR-01/RECT-02	PS2		1x300		10		Black	L2					
			3V	Black	M50	PS3-TR-01/RECT-02	PS3		1x300		10		Black	L2					
			3V	Black	M50	PS4-TR-01/RECT-02	PS4		1x300		10		Black	L2					
			3V	Black	M50	PS5-TR-01/RECT-02	PS5		1x300		10		Black	L2					
			3V	Black	M50	PS6-TR-01/RECT-02	PS6		1x300		10		Black	L2					
			3W	Black	M50	PT1-TR-01/RECT-02	PT1		1x300		10		Black	L3					
			3W	Black	M50	PT2-TR-01/RECT-02	PT2		1x300		10		Black	L3					
			3W	Black	M50	PT3-TR-01/RECT-02	PT3		1x300		10		Black	L3					
			3W	Black	M50	PT4-TR-01/RECT-02	PT4		1x300		10		Black	L3					
			3W	Black	M50	PT5-TR-01/RECT-02	PT5		1x300		10		Black	L3					
			3W	Black	M50	PT6-TR-01/RECT-02	PT6		1x300		10		Black	L3					
RECT-01	RECTIFIER 01		+	Black	MCT.A.3	DP-RECT-01/SSP-1/1	DP	FG16OM16 GREEN	1x240	33	10	MCT.A.5	Black	+		STACK 1	**SSP-1**		0-250Vdc
			+	Black		DP-RECT-01/SSP-1/2	DP		1x240		10		Black	+					
			+	Black		DP-RECT-01/SSP-1/3	DP		1x240		10	MCT.A.6	Black	+					
			+	Black		DP-RECT-01/SSP-1/4	DP		1x240		10		Black	+					
HCU-400	HCU earth bar				MCT.A.3				1x95	19	15	MCT.A.5				STACK 1	**SSP-1**		
SSP-4	STACK 4		-	Black	MCT.A.6	DP-SSP-4/RECT-01/1	DN	FG16OM16 GREEN	1x240	33	10	MCT.A.3	Black	-		RECTIFIER 1	**RECT-01**		0-250Vdc
			-	Black		DP-SSP-4/RECT-01/2	DN		1x240		10		Black	-					
			-	Black	MCT.A.7	DP-SSP-4/RECT-01/3	DN		1x240		10		Black	-					
			-	Black		DP-SSP-4/RECT-01/4	DN		1x240		10		Black	-					
SSP-4	STACK 4				MCT.A.7				1x95	19	15	MCT.A.3				HCU earth bar	**HCU-400**		

elogen / FORES ENGINEERING	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
	Cables List	Revision	Rev.04
	C63- CrossWind Project		

ELECTRICAL CABLES INTERCONNETIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
RECT-02	RECTIFIER 02		+	Black	MCT.A.4	DP-RECT-02/SSP-5/1	DP	FG16OM16 GREEN	1x240	33	10	MCT.A.8	Black	+		STACK 5	**SSP-5**		0-250Vdc
			+	Black		DP-RECT-02/SSP-5/2	DP		1x240		10		Black	+					
			+	Black		DP-RECT-02/SSP-5/3	DP		1x240		10	MCT.A.9	Black	+					
			+	Black		DP-RECT-02/SSP-5/4	DP		1x240		10		Black	+					
HCU-400	HCU earth bar				MCT.A.4				1x95	19	15	MCT.A.8				STACK 5	**SSP-5**		
SSP-8	STACK 8		-	Black	MCT.A.9	DP-SSP-8/RECT-02/1	DN	FG16OM16 GREEN	1x240	33	10	MCT.A.4	Black	-		RECTIFIER 2	**RECT-02**		0-250Vdc
			-	Black		DP-SSP-8/RECT-02/2	DN		1x240		10		Black	-					
			-	Black	MCT.A.10	DP-SSP-8/RECT-02/3	DN		1x240		10		Black	-					
			-	Black		DP-SSP-8/RECT-02/4	DN		1x240		10		Black	-					
SSP-8	STACK 8				MCT.A.9				1x95	19	15	MCT.A.3				HCU earth bar	**HCU-400**		
EJB-200F2-02	Intermediate obstruction lights junction box			Black		PP-EJB-200F2-02/EOL-200-04	PP	LSZH Fire resistant Orange	3G2,5	15,5			Black			Intermediate obstruction lights	**EOL-200-04**	**(8)**	230Vac
				Blue									Blue						
			PE	Y/G									Y/G	PE					
SG-200N1	LV Switchgear	A1/08	L1	Black	SG200N1-MCT-A1b	83013-CEL-L1	PR	Single Core, 0.6/1kV, Cu Cl,2/EPR/LSZH, Unarmoured Cable, Flame Retardant	1x300	29,4 ±10%	72	MCT.14	Black	L1	MAIN SWITCH	CONTROL CABINET	**20-UCP-001**	**(8)**	400Vac
			L2	Black		83013-CEL-L2	PS		1x300				Black	L2					
			L3	Black		83013-CEL-L3	PT		1x300				Black	L3					
			N	Black		83013-CEL-N	PN		1x300				Black	N					
			PE	Y/G		83013-CEL-E	PE	450/750V, Cu Cl.2/EPR/LSZH, Unarmoured Cable, Flame Retardant	1x150	17,7 ±10%			Y/G	PE					
EQP-2	Earth Bar WP2								1x 35		10					CONTROL CABINET			
20-UCP-001	CONTROL CABINET	X.PWR220	5	brown	MCT.5 MCT.1	PP-20-UCP-001/HPP-700/1	PP	FG16OM16 GREEN	3G4	12	30	M25	brown	1	X1.1	HE-61.1 (HPP-700)	**HPP-700**	**JB.1.1**	230Vac
			6	blue									blue	2					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR400	9	Black	MCT.5 MCT.1	PP-20-UCP-001/HPP-700/2	PP	FG16OM16 GREEN	4G4	13	30	M25	Black	U	X1	HE-64.1 (HPP-700)	**HPP-700**	**JB3**	400Vac
			10	Brown									Brown	V					
			11	Grey									Grey	W					
			PE	Y/G									Y/G	PE					
EQP-3	Earth Bar WP3								1x35		20					HPP-700	**HPP-700**		
20-UCP-001	CONTROL CABINET	X.PWR400	22	Black	MCT.5	PR-20-UCP-001/WC-400	PR	FG16OM16 GREEN	1x70	18	20		Black	8		Chiller n.1	**PAU001**		400Vac
			23	Black		PS-20-UCP-001/WC-400	PS		1x70	18	20		Black	6					
			24	Black		PT-20-UCP-001/WC-400	PT		1x70	18	20		Black	4					
			25	Black		PN-20-UCP-001/WC-400	PN		1x70	18	20		Black	2					
			PE	Y/G		PE-20-UCP-001/WC-400	PE		1x70	18	20		Y/G	PE					
EQP-x	Earth Bar x								1x35		30					Chiller n.1	**PAU001**		
20-UCP-001	CONTROL CABINET	X.PWR400	27	Black	MCT.5	PR-20-UCP-001/WC-401	PR	FG16OM16 GREEN	1x70	18	20		Black	8		Chiller n.2	**PAU002**		400Vac
			28	Black		PS-20-UCP-001/WC-401	PS		1x70	18	20		Black	6					
			29	Black		PT-20-UCP-001/WC-401	PT		1x70	18	20		Black	4					
			30	Black		PN-20-UCP-001/WC-401	PN		1x70	18	20		Black	2					
			PE	Y/G		PE-20-UCP-001/WC-401	PE		1x70	18	20		Y/G	PE					
EQP-x	Earth Bar x								1x35		30					Chiller n.2	**PAU002**		
20-UCP-001	CONTROL CABINET	X.PWR400	46	Black	MCT.5 MCT.6	PP-20-UCP-001/CP-620A	PP	GAALFLEX 2YSLCH-J BLACK	4G4 +Sh	14	20	Missing cable gland info from datasheet	Black	L1		H2 loop pump	**CP-620A**		400Vac
			47	Brown									Brown	L2					
			48	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-1	Earth Bar 1								1x16		10								
20-UCP-001	CONTROL CABINET	X.PWR400	51	Black	MCT.5 MCT.6	PP-20-UCP-001/CP-620B	PP	GAALFLEX 2YSLCH-J BLACK	4G4 +Sh	14	20	Missing cable gland info from datasheet	Black	L1		H2 loop pump	**CP-620B**		400Vac
			52	Brown									Brown	L2					
			53	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-1	Earth Bar 1								1x16		10								

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
FORES ENGINEERING	Cables List	Revision	Rev.04
	C63- CrossWind Project		

ELECTRICAL CABLES INTERCONNETIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET	X.PWR400	56	Black	MCT.5 MCT.6	PP-20-UCP-001/CP-600A	PP	GAALFLEX 2YSLCH-J BLACK	4G10 + Sh	19	18	n.2xM40 n.1xM20 n.2xM40 PLUG n.1xM20 PLUG	Black	L1		O2 loop pump	**CP-600A**		400Vac
			57	Brown									Brown	L2					
			58	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-1	Earth Bar 1								1x16		10								
20-UCP-001	CONTROL CABINET	X.PWR400	61	Black	MCT.5 MCT.6	PP-20-UCP-001/CP-600B	PP	GAALFLEX 2YSLCH-J BLACK	4G10 + Sh	19	22	n.2xM40 n.1xM20 n.2xM40 PLUG n.1xM20 PLUG	Black	L1		O2 loop pump	**CP-600B**		400Vac
			62	Brown									Brown	L2					
			63	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-1	Earth Bar 1								1x16		10								
20-UCP-001	CONTROL CABINET	X.PWR220	9	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G01	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G01	**JB-EXT-G01**		230Vac
			10	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G01	Junction Socket EXT-G01		L		M12	PP-EXT-G01/EXT-G01	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G01	**EXT-G01**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	11	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G02	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G02	**JB-EXT-G02**		230Vac
			12	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G02	Junction Socket EXT-G02		L		M12	PP-EXT-G02/EXT-G02	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G02	**EXT-G02**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	13	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G03	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G03	**JB-EXT-G03**		230Vac
			14	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G03	Junction Socket EXT-G03		L		M12	PP-EXT-G03/EXT-G03	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G03	**EXT-G03**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	15	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G04	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G04	**JB-EXT-G04**		230Vac
			16	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G04	Junction Socket EXT-G04		L		M12	PP-EXT-G04/EXT-G04	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G04	**EXT-G04**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	17	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G05	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G05	**JB-EXT-G05**		230Vac
			18	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G05	Junction Socket EXT-G05		L		M12	PP-EXT-G05/EXT-G05	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G05	**EXT-G05**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	19	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G06	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G06	**JB-EXT-G06**		230Vac
			20	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G06	Junction Socket EXT-G06		L		M12	PP-EXT-G06/EXT-G06	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G06	**EXT-G06**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	21	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G07	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G07	**JB-EXT-G07**		230Vac
			22	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G07	Junction Socket EXT-G07		L		M12	PP-EXT-G07/EXT-G07	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G07	**EXT-G07**		230Vac
			N											N					
20-UCP-001	CONTROL CABINET	X.PWR220	23	Brown	MCT.5 MCT.6 MCT.9	PP-20-UCP-001/JB-EXT-G08	PP	FG16OM16 GREEN	3G2,5	12	26	M12	Brown	L		Junction Socket EXT-G08	**JB-EXT-G08**		230Vac
			24	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EXT-G08	Junction Socket EXT-G08		L		M12	PP-EXT-G08/EXT-G08	PP	pre-wired cable	pre-wired cable			pre-wired cable		L		EXT-G08	**EXT-G08**		230Vac
			N											N					

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ELECTRICAL CABLES INTERCONNETIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET	X.PWR220	29	Brown	MCT.5	PP-20-UCP-001/EHT-1010-TH	PP	FG16OM16 GREEN	3G2,5	12	15	From Supplier	Brown	L		Heat Tracing HR-503	**EHT-1010-TH**	**Heat Tracing Group 1**	230Vac
			30	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1010-TH	Heat Tracing JB		L	Brown	From Supplier	PP-EHT-1010-TH/EHT-1009-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-607B	**EHT-1009-TH**	**Heat Tracing Group 1**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1009-TH	Heat Tracing JB		L	Brown	From Supplier	PP-EHT-1009-TH/EHT-1001-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-600A	**EHT-1001-TH**	**Heat Tracing Group 1**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1001-TH	Heat Tracing JB		L	Brown	From Supplier	PP-EHT-1001-TH/EHT-1007-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-306	**EHT-1007-TH**	**Heat Tracing Group 1**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1007-TH	Heat Tracing JB		L	Brown	From Supplier	PP-EHT-1007-TH/EHT-1005-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-625	**EHT-1005-TH**	**Heat Tracing Group 1**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	31	Brown	MCT.5	PP-20-UCP-001/EHT-1004-TH	PP	FG16OM16 GREEN	3G2,5	12	15	From Supplier	Brown	L		Heat Tracing HR-620A	**EHT-1004-TH**	**Heat Tracing Group 2**	230Vac
			32	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1004-TH	Heat Tracing JB		L1	Brown	From Supplier	PP-EHT-1004-TH/EHT-1008-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-307	**EHT-1008-TH**	**Heat Tracing Group 2**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1008-TH	Heat Tracing JB		L1	Brown	From Supplier	PP-EHT-1008-TH/EHT-1006-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-640	**EHT-1006-TH**	**Heat Tracing Group 2**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EHT-1006-TH	Heat Tracing JB		L1	Brown	From Supplier	PP-EHT-1006-TH/EHT-1002-TH	PP	FG16OM16 GREEN	3G2,5	12	5	From Supplier	Brown	L		Heat Tracing HR-606	**EHT-1002-TH**	**Heat Tracing Group 2**	230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	39	Brown	MCT.5 MCT.6	PP-20-UCP-001/C63-JBS-01	PP	FG16OM16 GREEN	3G2,5	12	15	n.1xM25	Brown	L		Junction Box Sockets WP1	**C63-JBS-01**		230Vac
			40	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	43	Brown	MCT.5 MCT.1	PP-20-UCP-001/C63-JBS-03	PP	FG16OM16 GREEN	3G2,5	12	31	n.1xM25	Brown	L		Junction Box Sockets WP3	**C63-JBS-03**		230Vac
			44	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	45	Brown	MCT.5 MCT.2 MCT.12	PP-20-UCP-001/C63-SS-07	PP	FG16OM16 GREEN	3G2,5	12	20	n.1xM25	Brown	L		Sockets WP4	**C63-SS-07**		230Vac
			46	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	49	Brown	MCT.5 MCT.6	PP-20-UCP-001/C63-JBL-001	PP	FG16OM16 GREEN	3G2,5	12	15	n.1xM25	Brown	L		Junction Box Lighting WP1	**C63-JBL-001**		230Vac
			50	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	53	Brown	MCT.5 MCT.1	PP-20-UCP-001/C63-JBL-003	PP	FG16OM16 GREEN	3G2,5	12	31	n.1xM25	Brown	L		Junction Box Lighting WP3	**C63-JBL-003**		230Vac
			54	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	55	Brown	MCT.5 MCT.2 MCT.12	PP-20-UCP-001/C63-JBL-004	PP	FG16OM16 GREEN	3G2,5	12	30	n.1xM25	Brown	L		Junction Box Lighting WP4	**C63-JBL-004**		230Vac
			56	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	61	Brown	MCT.5	PP-20-UCP-001/C63-PB-01	PP	FG16OM16 GREEN	3G2,5	12	35	n.1xM25	Brown	L		Push Button for External Lights	**C63-PB-01**		230Vac
			62	Brown									Brown	L					
			PE	Y/G									Y/G	PE					

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FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET	X.PWR220	57	Brown	MCT.5	PP-20-UCP-001/C63-EEL-002	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-EEL-002	**C63-EEL-002**		230Vac
			58	Blue									Blue	2					
			57a	Black									Black	3					
			58a	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-002	C63-EEL-002		1	Brown	by supplier	PP-C63-EEL-002/C63-EEL-003	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-EEL-003	**C63-EEL-003**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-003	C63-EEL-003		1	Brown	by supplier	PP-C63-EEL-003/C63-EEL-001	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-EEL-001	**C63-EEL-001**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET		59	Brown	MCT.5 MCT.2	PP-20-UCP-001/C63-EEL-012	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-EEL-012	**C63-EEL-012**		230Vac
			60	Blue									Blue	2					
			59a	Black									Black	3					
			60a	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-012	C63-EEL-012		1	Brown	by supplier	PP-C63-EEL-012/C63-EEL-010	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-EEL-010	**C63-EEL-010**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-010	C63-EEL-010		1	Brown	by supplier	PP-C63-EEL-010/C63-EEL-011	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-EEL-011	**C63-EEL-011**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-011	C63-EEL-011		1	Brown	by supplier	PP-C63-EEL-011/C63-ENL-001	PP	FG16OM16 GREEN	5G2,5	14	20	by supplier	Brown	1		C63-ENL-001	**C63-ENL-001**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	-					
			4	Grey									Grey	-					
			PE	Y/G									Y/G	PE					
C63-ENL-001	C63-ENL-001		1	Brown	by supplier	PP-C63-ENL-001/C63-EEL-008	PP	FG16OM16 GREEN	5G2,5	14	5	by supplier	Brown	1		C63-EEL-008	**C63-EEL-008**		230Vac
			2	Blue									Blue	2					
			-	Black									Black	3					
			-	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-008	C63-EEL-008		1	Brown	by supplier	PP-C63-EEL-008/C63-ENL-002	PP	FG16OM16 GREEN	5G2,5	14	5	by supplier	Brown	1		C63-ENL-002	**C63-ENL-002**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	-					
			4	Grey									Grey	-					
			PE	Y/G									Y/G	PE					
C63-ENL-002	C63-ENL-002		1	Brown	by supplier	PP-C63-ENL-002/C63-EEL-006	PP	FG16OM16 GREEN	5G2,5	14	5	by supplier	Brown	1		C63-EEL-006	**C63-EEL-006**		230Vac
			2	Blue									Blue	2					
			-	Black									Black	3					
			-	Grey									Grey	4					
			PE	Y/G									Y/G	PE					

ELECTRICAL CABLES INTERCONNETIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
C63-EEL-006	C63-EEL-006		1	Brown	by supplier	PP-C63-EEL-006/C63-EEL-004	PP	FG16OM16 GREEN	5G2,5	14	5	by supplier	Brown	1		C63-EEL-004	**C63-EEL-004**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-004	C63-EEL-004		1	Brown	by supplier	PP-C63-EEL-004/C63-EEL-005	PP	FG16OM16 GREEN	5G2,5	14	5	by supplier	Brown	1		C63-EEL-005	**C63-EEL-005**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-005	C63-EEL-005		1	Brown	by supplier	PP-C63-EEL-005/C63-EEL-007	PP	FG16OM16 GREEN	5G2,5	14	9	by supplier	Brown	1		C63-EEL-007	**C63-EEL-007**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-EEL-007	C63-EEL-007		1	Brown	by supplier	PP-C63-EEL-007/C63-EEL-009	PP	FG16OM16 GREEN	5G2,5	14	7	by supplier	Brown	1		C63-EEL-009	**C63-EEL-009**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET - UPS	X.PWRUPS	5	Brown	MCT.5 MCT.6	PP-20-UCP-001/Q.RIO1	PP	FG16OM16 GREEN	3G2,5	12	15	MCT	Brown	L		RIO 1	**Q.RIO1**		230Vac
			6	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EQP-1	Earth Bar 1								1x16		10					RIO 1		**Power Earth Bar**	
EQP-2	Earth Bar 2				MCT.6 - 4				1x16		20					RIO 1		**Insulated Earth Bar**	
EQP-2	Earth Bar 2				MCT.6 - 4				1x16		20					RIO 1		**Intrinsic Safety Earth Bar**	
20-UCP-001	CONTROL CABINET - UPS	X.PWRUPS	7	Brown	MCT.5 MCT.1	PP-20-UCP-001/C63-QF-001	PP	FG16OM16 GREEN	3G2,5	12	30	M20	Brown	hold		Circuit Breaker, outside the Q.RIO2, connected to the Q.RIO2.	**C63-QF-001**	**For the cable from C63-QF-001 to Q.RIO2 see sheet ELE WP3**	230Vac
			8	Blue									Blue	hold					
			PE	Y/G									Y/G	PE					
EQP-3	Earth Bar 3								1x16		10					RIO 2		**Power Earth Bar**	
EQP-2	Earth Bar 2				MCT.2 - 4				1x16		30					RIO 2		**Insulated Earth Bar**	
EQP-2	Earth Bar 2				MCT.2 - 4				1x16		30					RIO 2		**Intrinsic Safety Earth Bar**	
PAU003	HVAC PANEL	XDC1	L1	Black	MCT.8 MCT.2	PP-PAU003/DC-200	PP	FG16OM16 GREEN	4G10	19	30		Black	1	XDC1	DRY COOLER 1	**DC-200**		400Vac
			L2	Brown									Brown	2					
			L3	Grey									Grey	3					
			PE	Y/G									Y/G	PE					
EQP-x	Earth Bar x								1x35		30					DRY COOLER 1			
PAU003	HVAC PANEL	XDC2	L1	Black	MCT.8 MCT.2	PP-PAU003/DC-201	PP	FG16OM16 GREEN	4G10	19	30		Black	1	XDC2	DRY COOLER 2	**DC-201**		400Vac
			L2	Brown									Brown	2					
			L3	Grey									Grey	3					
			PE	Y/G									Y/G	PE					
EQP-x	Earth Bar x								1x35		30					DRY COOLER 2			
PAU003	HVAC PANEL	XHP1	1	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/THS-200/1	PP	FG16OM16 GREEN	4G10	19	22	M32	Black	L1		Pump Variator Condensation Duty	**THS-200**		400Vac
			2	Brown									Brown	L2					
			3	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XHP2	1	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/THS-200/2	PP	FG16OM16 GREEN	4G10	19	22	M32	Black	L1		Pump Variator Condensation Back-up	**THS-200**		400Vac
			2	Brown									Brown	L2					
			3	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-4	Earth Bar WP4								1x35		1					Condensation Pump Skid			

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FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT / CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT / CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
PAU003	HVAC PANEL	XCP1	1	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/THS-400/1	PP	FG16OM16 GREEN	4G4	13	21	M25	Black	L1		Pump Variator Chilled Water Duty	**THS-400**		400Vac
			2	Brown									Brown	L2					
			3	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XCP2	1	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/THS-400/2	PP	FG16OM16 GREEN	4G4	13	21	M25	Black	L1		Pump Variator Chilled Water Backup	**THS-400**		400Vac
			2	Brown									Brown	L2					
			3	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-4	Earth Bar WP4								1x35		1					Chilled Pump Skid			
PAU003	HVAC PANEL	XAH1	1	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/AHU-100/1	PP	FG16OM16 GREEN	4G4	13	30	M25	Black	T1		AHU 100 FAN	**AHU-100**	**Inverter on skid**	400Vac
			2	Brown									Brown	T2					
			3	Grey									Grey	T3					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XAH1	4	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/AHU-100/2	PP	FG16OM16 GREEN	4G4	13	30	M25	Black	4	XAH1	AHU 100 ELECTRICAL HEATER1	**JB-AHU-100**	**HEATER 1**	400Vac
			5	Brown									Brown	5					
			6	Grey									Grey	6					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XAH1	7	Black	MCT.8 MCT.2 MCT.12	PP-PAU003/AHU-100/3	PP	FG16OM16 GREEN	4G10	19	30	M25	Black	7	XAH1	AHU 100 ELECTRICAL HEATER 2	**JB-AHU-100**	**HEATER 2**	400Vac
			8	Brown									Brown	8					
			9	Grey									Grey	9					
			PE	Y/G									Y/G	PE					
EQP-4	Earth Bar WP4								1x35		5								
PAU003	HVAC PANEL	XWH1	5	blue	MCT.8 MCT.2 MCT.12	PP-PAU003/JB-WH-103	PP	FG16OM16 GREEN	3G2,5	12	32	n.1xM20	blue	N		Junction Box Wall Heater 103	**JB-WH-103**		230Vac
			6	brown									brown	L					
			PE	Y/G									Y/G	PE					
JB-WH-103	Junction Box Wall Heater 103		N	Bue	n.1xM20	PP-JB-WH-103/WH-103	PP	VENDOR CABLE	3x2,5	12	0,5	pre-wired cable	Bue	N		Wall Heater 103	**WH-103**		230Vac
			L	Grey									Grey	L					
				Black									Black	L					
PAU003	HVAC PANEL	XWH1	9	blue	MCT.8 MCT.11 MCT.9	PP-PAU003/JB-WH-203	PP	FG16OM16 GREEN	3G2,5	12	32	n.1xM20	blue	N		Junction Box Wall Heater 203	**JB-WH-203**		230Vac
			10	brown									brown	L					
			PE	Y/G									Y/G	PE					
JB-WH-203	Junction Box Wall Heater 203		N	Bue	n.1xM20	PP-JB-WH-203/WH-203	PP	VENDOR CABLE	3x2,5		0,5	pre-wired cable	Bue	N		Wall Heater 203	**WH-203**		230Vac
			L	Grey									Grey	L					
				Black										L					
PAU003	HVAC PANEL	XWH1	13	blue	MCT.8 MCT.11	PP-PAU003/JB-WH-205	PP	FG16OM16 GREEN	3G2,5	12	28		blue	N		Junction Box Wall Heater 205	**JB-WH-205**		230Vac
			14	brown									brown	L					
			PE	Y/G									Y/G	PE					
JB-WH-205	Junction Box Wall Heater 205		N	Bue	n.1xM20	PP-JB-WH-205/WH-205	PP	VENDOR CABLE	3x2,5		0,5	pre-wired cable	Bue	N		Wall Heater 205	**WH-205**		230Vac
			L	Grey									Grey	L					
				Black									Black	PE					
PAU003	HVAC PANEL	XWH1	15	blue	MCT.8 MCT.1	PP-PAU003/WH-206	PP	FG16OM16 GREEN	3G2,5	12	25	M20	blue	N		Wall Heater 206	**WH-206**		230Vac
			16	brown									brown	L					
			PE	Y/G									Y/G	PE					

INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
SG-200N1	Low Voltage Switchboard					H-SG-200N1/20-UCP-001/B400-NET-001.01	H		Cat. 6a 4x2xAWG23	10.7	15 (Note 8)	MCT TOP OF CONTROL CABINET MCT.4			415K1	CONTROL CABINET - 24Vdc	**20-UCP-001/B400-NET-001.01**	**communication (Note 8)**	
SG-200N1	Low Voltage Switchboard					H-SG-200N1/20-UCP-001/B400-NET-001.02	H		Cat. 6a 4x2xAWG23	10.7	15 (Note 8)	MCT TOP OF CONTROL CABINET MCT.4			415K5	CONTROL CABINET - 24Vdc	**20-UCP-001/B400-NET-001.02**	**service (Note 8)**	
SG-200N1	Low Voltage Switchboard					D-SG-200N1/C-20-XS-001/B400-SIS-001 Shutdown command from Plant SIS	D		2x2,5	14.1	15 (Note 8)	MCT.4		17 18	X.DI-S	CONTROL CABINET - 24Vdc	**C-20-XS-001/B400-SIS-001 Shutdown command from Plant SIS**	**(Note8)**	24Vdc
SG-200N1	Low Voltage Switchboard					D-SG-200N1/Electrolyzer PLC Failure to plant SIS C-20-XA-003/B400-SIS-001	D		1x2x0,75	11.7	15 (Note 8)	MCT.4		11 12	X.DO-S	CONTROL CABINET - 24Vdc	**Electrolyzer PLC Failure to plant SIS C-20-XA-003/B400-SIS-001**	**(Note8)**	24Vdc
SG-200N1	Low Voltage Switchboard					D-SG-200N1/20-UCP-001/B400-FGS-002 Confirmed Gas and Smoke Alarm to plant F&G	D		2x2x0,75	19.3	15 (Note 8)	MCT.4		3 4 19 20	X.DO-S	CONTROL CABINET - 24Vdc	**20-UCP-001/B400-FGS-002 Confirmed Gas and Smoke Alarm to plant F&G**	**(Note8)**	24Vdc
SG-200N1	Low Voltage Switchboard					A-SG-200N1/C-950-GDZ-03101/ 950-JE-031002	A		3x2,5		20 (Note 8)					GAS DETECTOR	**C-950-GDZ-03101/ 950-JE-031002**	**2"-VL-003-01HSS-N - Vent Line H2 - Sud/Ovest (Note8)**	24Vdc
SG-200N1	Low Voltage Switchboard					A-SG-200N1/C-950-GDZ-03103/ 950-JE-031002	A		3x2,5		20 (Note 8)					GAS DETECTOR	**C-950-GDZ-03103/ 950-JE-031002**	**2"-VL-003-01HSS-N - Vent Line H2 - MV-002 – Sud/Ovest (Note 8)**	24Vdc
SG-200N1	Low Voltage Switchboard					A-SG-200N1/C-950-GDZ-03102/ 950-JE-031002	A		3x2,5		20 (Note 8)					GAS DETECTOR	**C-950-GDZ-03102/ 950-JE-031002**	**1"-HY-007-03HSS-N Nord (Note 8)**	24Vdc
SG-200N1	Low Voltage Switchboard					A-SG-200N1/C-950-GDZ-03104/ 950-JE-031002	A		3x2,5		20 (Note 8)					GAS DETECTOR	**C-950-GDZ-03104/ 950-JE-031002**	**(Note8)**	24Vdc
SG-200N1	Low Voltage Switchboard					A-SG-200N1/C-950-GDZ-03105/ 950-JE-031002	A		3x2,5		20 (Note 8)					GAS DETECTOR	**C-950-GDZ-03105/ 950-JE-031002**	**(Note8)**	24Vdc
HCU-400	rectifier control panel E500	X121	29 30 	1 2 3 4 5 6 7		20001-CEC	D		7Cx1,5			M25	1 2 3 4 5 6 7	25 26 	K94WT - XM	6.6kV HV Switchgear	**SG-100D1**	**Opening H.V. Cell (Note 8)**	24Vdc
HCU-400	rectifier control panel E500	X3.1	65 66 67 68 69 70 71 72 SPARE SPARE	1 2 3 4 5 6 7 8 9 10		D-HCU-400/TR-01	D		10x1,5 + Sh		30	M25	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 7 8 10 11 SPARE SPARE		TRANSFORMER	**TR-01**	**DGPT2**	24Vdc
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	5 6	blue brown	MCT.4 MCT.6	D-20-UCP-001/Q.RIO1	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-		blue brown	X.DO	RIO 1 - 24Vdc converter - Power supply status	**Q.RIO1**	**YS-105**	24Vdc
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	11 12	blue brown	MCT.4 MCT.1	D-20-UCP-001/Q.RIO2	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-		blue brown	X.DO	RIO 2 - 24Vdc converter - Power supply status	**Q.RIO2**	**YS-106**	24Vdc
20-UCP-001	CONTROL CABINET - 24Vdc	X.AO	1 2	blue brown	MCT.4	A-20-UCP-001/M3WV-200/2	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	(3)		blue brown		Motorized proportional Valve position	**JB-PWR-02**		24Vdc
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	9 10	blue brown	MCT.4	A-20-UCP-001/M3WV-200/1	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	(3)		blue brown		Motorized proportional Valve feedback	**JB-PWR-02**		24Vdc
Q.RIO1	RIO.1 - WP1	X.PWR24	+24Vdc 0Vdc PE	blue brown GY	MCT.4	P-Q.RIO1/JB-PWR-02	P	FG16OH2M16 GREEN	3G4	12	15	M20		blue brown GY		Motorized proportional Valve Power	**JB-PWR-02**		24Vdc
JB-PWR-02	power supply M3WV-200		1 2	1 2		P-JB-PWR-02/M3WV-200	P	CABLE 2-PIN	-	-	-	7-pin connector		1 2		Power supply	**M3WV-200**		24Vdc
JB-PWR-02	position and feedback for M3WV-200		3 4 5 6	1 2 3 4		A-JB-PWR-02/M3WV-200	A	CABLE 4-PIN	-	-	-	8-pin connector		1 2 3 4		Motorized proportional Valve position Motorized proportional Valve feedback	**M3WV-200**		24Vdc

INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	9	blue	MCT.4	D-20-UCP-001/JB-PWR-02	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	M20	blue	7		Flow Switch - signal	**JB-PWR-02**	**FS-206**	24Vdc
			10	brown									brown						
JB-PWR-02	Power and signals for for FS-206		1	1	MCT.4	PD-JB-PWR-02/FS-206	PD	CABLE 4-PIN	-	-	-	M20	1	1		Flow Switch	**FS-206**		24Vdc
				2									2						
			2	3									3	3					
			7	4									4	4					
PAU003	HVAC PANEL	XCW	3	blue	MCT.4	A-PAU003/TT-60	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M16	blue	1		Temperature Transmitter	**TT-60**		24Vdc
			4	brown									brown	2					
PAU003	HVAC PANEL	XCC	3	blue	MCT.4	A-PAU003/TT-154	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M16	blue	1		Temperature Transmitter	**TT-154**		24Vdc
			4	brown									brown	2					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-IS	11	blue	MCT.4 MCT.2 MCT.12	D-20-UCP-001/JB-WLD-6	D	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	35	n.1xM20	blue	4		Water leak detector_Level 1	**JB-WLD-6**		24Vdc
			12	blakc									blakc						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-IS	13	blue	MCT.4 MCT.2 MCT.12	P-20-UCP-001/JB-WLD-6	P	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	35	n.1xM20	blue	1		Power supply Water leak detector_Level 1	**JB-WLD-6**		24Vdc
			14	black									black	3					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	1	1	MCT.4 MCT.2	D-20-UCP-001/ESD-005	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	30	2xM20	1	1		Emergency shutdown button - Level 1	**ESD-005**		24Vdc
			2	2									2	2					
		X.DI-S	1.1	3									2	4		Emergency shutdown button - Level 1			
			2.1	4									3	5					
				5									4						
				6									5						
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	11	1	MCT.4 MCT.2	D-20-UCP-001/ESD-006	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	30	2xM20	1	1		Emergency shutdown button - Level 1	**ESD-006**		24Vdc
			12	2									2	2					
		X.DI-S	11.1	3									2	4		Emergency shutdown button - Level 1			
			12.1	4									3	5					
				5									4						
				6									5						
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	23	1	MCT.4 MCT.2	D-20-UCP-001/ESD-007	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	30	2xM20	1	1		Emergency shutdown button - Level 2	**ESD-007**		24Vdc
			24	2									2	2					
		X.DI-S	23.1	3									2	4		Emergency shutdown button - Level 2			
			24.1	4									3	5					
				5									4						
				6									5						
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	15	1	MCT.4	D-20-UCP-001/ESD-002	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	30	2xM20	1	1		Emergency shutdown button - Level 0	**ESD-002**		24Vdc
			16	2									2	2					
		X.DI-S	15.1	3									2	4		Emergency shutdown button - Level 0			
			16.1	4									3	5					
				5									4						
				6									5						
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	27	1	MCT.4 MCT.6	D-20-UCP-001/ESD-003	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	30	2xM20	1	1		Emergency shutdown button - Level 0	**ESD-003**		24Vdc
			28	2									2	2					
		X.DI-S	27.1	3									2	4		Emergency shutdown button - Level 0			
			28.1	4									3	5					
				5									4						
				6									5						
				7									7						
Q.RIO1	RIO WP1	X.DO	1	1	MCT.2 MCT.4	D-Q.RIO1/LC-001	D	FG16OHM16 GREEN	7x1,5 + Sh	14	40	M25	1	11		Light Column - Level 1 - Red - VE-005	**LC-001**	**LIGHT COLUMN 1**	24Vdc
			3	2									2	13		Light Column - Level 1 - Orange - VE-006			
			5	3									2	15		Light Column - Level 1 - Green VE-007			
			7	4									3	1		Light Column - Level 1 - Blue VE-008			
			2	5									4			Common			
				6									5	3		Spare			
				7									7			PE			
Q.RIO1	RIO WP1	X.DO	9	Blue	MCT.2 MCT.4	D-Q.RIO1/BUZ-1002	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40	M20	Blue	T3		Buzzer - Level 1	**BUZ-1002**		24Vdc
			10	Brown									Brown	T4					
Q.RIO1	RIO WP1	X.DO	11	1	MCT.2 MCT.4	D-Q.RIO1/LC-002	D	FG16OHM16 GREEN	7x1,5 + Sh	14	35	M25	1	11		Light Column - Level 2 - Red - VE-009	**LC-002**	**LIGHT COLUMN 2**	24Vdc
			13	2									2	13		Light Column - Level 2 - Orange - VE-010			
			15	3									2	15		Light Column - Level 2 - Green - VE-011			
			17	4									3	1		Light Column - Level 2 - Blue - VE-012			
			12	5									4			Common			
				6									5	3		Spare			
				7									7			PE			
Q.RIO1	RIO WP1	X.DO	19	Blue	MCT.2 MCT.6	D-Q.RIO1/BUZ-1003	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M20	Blue	T3		Buzzer - Level 2	**BUZ-1003**		24Vdc
			20	Brown									Brown	T4					
20-UCP-001	CONTROL CABINET - 24Vdc	106U1	14	Blue	MCT.6 MCT.4	A-20-UCP-001/CP-620A	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M20	Blue	12		H2 loop pump	**CP-620A**	**Motor PTC**	24Vdc
			15	Brown									Brown	13					
20-UCP-001	CONTROL CABINET - 24Vdc	107U1	14	Blue	MCT.6 MCT.4	A-20-UCP-001/CP-620B	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M20	Blue	12		H2 loop pump	**CP-620B**	**Motor PTC**	24Vdc
			15	Brown									Brown	13					
20-UCP-001	CONTROL CABINET - 24Vdc	108U1	14	Blue	MCT.6	A-20-UCP-001/CP-600A	A	FG16OH2M16	2x1,5 + Sh	10	30	M20	Blue		PTC	O2 loop pump	**CP-600A**	**Motor PTC**	24Vdc

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
FORES ENGINEERING	Cables List	Revision	Rev.04
	C63- CrossWind Project		

INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
[illegible]	[illegible]	[illegible]	15	Brown	MCT.4	[illegible]	[illegible]	GREEN	[illegible]	[illegible]	[illegible]	[illegible]	Brown		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
FORES ENGINEERING	Cables List	Revision	Rev.04
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INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET - 24Vdc	109U1	14	Blue	MCT.6 MCT.4	A-20-UCP-001/CP-600B	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M20	Blue		PTC	O2 loop pump	**CP-600B**	**Motor PTC**	24Vdc
			15	Brown									Brown						
SD-002C	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	MCT.4	D-SD-002C/FB-002	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	35	2xM20	Blue	+	LP IN	Fire button Weatherproof - Level 0	**FB-002**		24Vdc
			-	Brown									Brown	-					
SD-001C	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	MCT.9 / 11 /12 / 2	D-SD-001C/SD-007A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	19	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 1	**SD-007A**		24Vdc
			-	Brown									Brown	-					
SD-007C	Smoke detector Electrical cabinet_Level 1	OUT	+	Blue	MCT.12	D-SD-007C/FB-003	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	30	2xM20	Blue	+	LP IN	Fire button Weatherproof - Level 1	**FB-003**		24Vdc
			-	Brown									Brown	-					
FB-003	Fire button Weatherproof - Level 1	LP OUT	+	Blue		D-FB-003/FB-004	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	30	2xM20	Blue	+	LP IN	Fire button Weatherproof - Level 1	**FB-004**		24Vdc
			-	Brown									Brown	-					
FB-004	Fire button Weatherproof - Level 1	LP OUT	+	Blue	MCT.1 MCT.2	D-FB-004/JB-SD-001	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	30	2xM20	Blue	1	PROT. TRANSL	JB MARSHALLING F&G WP3 with barrier and loop relay	**JB-SD-001**		24Vdc
			-	Brown									Brown	4					
JB-SD-001	JB MARSHALLING F&G WP3 with barrier and loop relay	PROT. TRANSL	3	Blue	MCT.4 MCT.2	D-JB-SD-001/SSI-1000	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	30	2xM20	Blue	13	BR1	FSS FIRE SYSTEM	**SSI-1000**		24Vdc
			6	Brown									Brown	2					
PAU003	HVAC PANEL	XCP1	4	1	MCT.8 MCT.2 MCT.12	M-PAU003/THS-400-1	M	FG16OHM16 GREEN	10x1,5 + Sh	15	35	HOLE ø25mm M25 TO BE PROVIDED	1	12		Chilled Water Pump Duty	**THS-400-1**	**REMOTE CONTROL AND INFORMATION - INVERTER PUMP N.1**	24Vdc
			5	2									2	18					
			6	3									3	29					
			7	4									4	37					
			8	5									5	1					
			9	6									6	2					
			10	7									7	5					
			11	8									8	53					
			12	9									9	55					
				10									10						
PAU003	HVAC PANEL	XCW1	2	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-400-VCW1-M1	PD	FG16OH2M16 GREEN	4x1,5 + Sh	11	35	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Chilled Water Pump Duty	**THS-400-VCW1-M1**	**VCW1**	230Vac
			1	blue									blue	2					
			3	black									black	1					
			1A	grey									grey	4					
PAU003	HVAC PANEL	XCW1	8	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-400-VCW2-M1	PD	FG16OH2M16 GREEN	4x1,5 + Sh	11	35	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Chilled Water Pump Duty	**THS-400-VCW2-M1**	**VCW2**	230Vac
			7	blue									blue	2					
			9	black									black	1					
			7A	grey									grey	4					
PAU003	HVAC PANEL	X3	out		MCT.8 MCT.2	H-PAU003/THS-400-1	H	ETH Cat 6a	ETH Cat 6a	7	35	HOLE ø25mm M25/M20 adapter and M20 cable gland to be			Port1	Chilled Water Pump Duty	**THS-400-1**		
PAU003	HVAC PANEL	XCP2	4	1	MCT.8 MCT.2 MCT.12	M-PAU003/THS-400-2	M	FG16OHM16 GREEN	10x1,5 + Sh	15	35	HOLE ø25mm M25 TO BE PROVIDED	1	12		Chilled Water Pump Standby	**THS-400-2**	**REMOTE CONTROL AND INFORMATION - INVERTER PUMP N.2**	24Vdc
			5	2									2	18					
			6	3									3	29					
			7	4									4	37					
			8	5									5	1					
			9	6									6	2					
			10	7									7	5					
			11	8									8	53					
			12	9									9	55					
				10									10						
PAU003	HVAC PANEL	XCW2	2	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-400-'VCW3-M2	PD	FG16OH2M16 GREEN	4x1,5 + Sh	11	35	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Chilled Water Pump Standby	**THS-400-'VCW3-M2**	**VCW3**	230Vac
			1	blue									blue	2					
			3	black									black	1					
			1A	grey									grey	4					
PAU003	HVAC PANEL	XCW2	8	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-400-VCW4-M2	PD	FG16OH2M16 GREEN	4x1,5 + Sh	11	35	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Chilled Water Pump Standby	**THS-400-VCW4-M2**	**VCW4**	230Vac
			7	blue									blue	2					
			9	black									black	1					
			7A	grey									grey	4					
PAU003	HVAC PANEL	X4			MCT.8 MCT.2 MCT.12	H-PAU003/THS-400-2	H	ETH Cat 6a	ETH Cat 6a	7	35	HOLE ø25mm M25/M20 adapter and M20 cable gland to be provided			Port1	Chilled Water Pump Standby	**THS-400-2**	**Profinet**	
PAU003	HVAC PANEL	XHP1	4	1	MCT.8 MCT.2 MCT.12	M-PAU003/THS-200-1	M	FG16OHM16 GREEN	10x1,5 + Sh	15	30	HOLE ø32mm M32 TO BE PROVIDED	1	12		Condensation Water Pump Duty	**THS-200-1**	**REMOTE CONTROL AND INFORMATION - INVERTER PUMP N.1**	24Vdc
			5	2									2	18					
			6	3									3	29					
			7	4									4	37					
			8	5									5	1					
			9	6									6	2					
			10	7									7	5					
			11	8									8	53					
			12	9									9	55					
				10									10						
PAU003	HVAC PANEL	XCC1	2	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-200-VCW1-M1	PD	FG16OH2M16 GREEN	4x1,5 + Sh	11	35	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Condensation Water Pump Duty	**THS-200-VCW1-M1**	**VCW1**	230Vac
			1	blue									blue	2					
			3	black									black	1					
				grey									grey						
PAU003	HVAC PANEL	XCC1	8	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-200-VCW2-M1	PD	FG16OH2M16 GREEN	4x1,5 + Sh	11	35	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Condensation Water Pump Duty	**THS-200-VCW2-M1**	**VCW2**	230Vac
			7	blue									blue	2					
			9	black									black	1					
				grey									grey						
PAU003	HVAC PANEL	X5			MCT.8 MCT.2 MCT.12	H-PAU003/THS-200-1	H	ETH Cat 6a	ETH Cat 6a	7	35	HOLE ø25mm M25/M20 adapter and M20 cable gland to be provided			Port1	Condensation Water Pump Duty	**THS-200-1**		

INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
PAU003	HVAC PANEL	XHP2	4	1	MCT.8 MCT.2 MCT.12	M-PAU003/THS-200-2	M	FG16OHM16 GREEN	10x1,5 + Sh	15	30	HOLE ø32mm M32 TO BE PROVIDED	1	12		Condensation Water Pump Standby	**THS-200-2**	**REMOTE CONTROL AND INFORMATION - INVERTER PUMP N.2**	24Vdc
			5	2									2	18					
			6	3									3	29					
			7	4									4	37					
			8	5									5	1					
			9	6									6	2					
			10	7									7	5					
			11	8									8	53					
			12	9									9	55					
				10									10						
PAU003	HVAC PANEL	XCC2	2	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-200-VCW3-M2	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Condensation Water Pump Standby	**THS-200-VCW3-M2**	**VCW3**	230Vac
			1	blue									blue	2					
			3	black									black	1					
				grey									grey						
PAU003	HVAC PANEL	XCC2	8	brown	MCT.8 MCT.2 MCT.12	PD-PAU003/THS-200-VCW4-M2	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	N.2 PLUG M20 N.1xM20 to be provided	brown	3		Condensation Water Pump Standby	**THS-200-VCW4-M2**	**VCW4**	230Vac
			7	blue									blue	2					
			9	black									black	1					
				grey									grey						
PAU003	HVAC PANEL	X6			MCT.8 MCT.2 MCT.12	H-PAU003/THS-200-2	H	ETH Cat 6a	ETH Cat 6a	7	30	HOLE ø25mm M25/M20 adapter and M20 cable gland to be provided			Port1	Condensation Water Pump Standby	**THS-200-2**		
PAU003	HVAC PANEL	XAH1	10	1	MCT.8 MCT.2 MCT.12	M-PAU003/AHU-100	M	FG16OHM16 GREEN	10x1,5 + Sh	15	30	M25	1	12		AHU100	**AHU-100**	**REMOTE CONTROL AND INFORMATION - INVERTER AHU100**	24Vdc
			11	2									2	18					
			12	3									3	29					
			13	4									4	37					
			14	5									5	1					
			15	6									6	2					
			16	7									7	5					
			17	8									8	53					
			18	9									9	55					
				10									10						
PAU003	HVAC PANEL	X7			MCT.8 MCT.2 MCT.12	H-PAU003/AHU-100	H		ETH Cat 6a	7	30	HOLE ø25mm M25/M20 adapter and M20 cable gland to be provided			Port1	AHU100	**AHU-100**		24Vdc
PAU003	HVAC PANEL	XCW1	4	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-400-1/1	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CHILLED WATER VALVE INLET PUMP 1	**THS-400-VCW1-M1**		24Vdc
			5	brown									brown	25					
			6	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCW1	10	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-400-1/2	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CHILLED WATER VALVE OUTLET PUMP 1	**THS-400-VCW2-M1**		24Vdc
			11	brown									brown	25					
			12	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCW2	4	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-400-2/1	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CHILLED WATER VALVE INLET PUMP 2	**THS-400-'VCW3-M2**		24Vdc
			5	brown									brown	25					
			6	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCW2	10	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-400-2/2	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CHILLED WATER VALVE OUTLET PUMP 2	**THS-400-VCW4-M2**		24Vdc
			11	brown									brown	25					
			12	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCC1	4	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-200-1/1	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CONDENSATION WATER VALVE INLET PUMP 1	**THS-200-VCW1-M1**		24Vdc
			5	brown									brown	25					
			6	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCC1	10	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-200-1/2	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CONDENSATION WATER VALVE OUTLET PUMP 1	**THS-200-VCW2-M1**		24Vdc
			11	brown									brown	25					
			12	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCC2	4	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-200-2/1	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CONDENSATION WATER VALVE INLET PUMP 2	**THS-200-VCW3-M2**		24Vdc
			5	brown									brown	25					
			6	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XCC2	10	blue	MCT.8 MCT.2 MCT.12	PD-PAU003/JB-THS-200-2/2	PD	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	23		LIMIT SWITCH CONDENSATION WATER VALVE OUTLET PUMP 2	**THS-200-VCW4-M2**		24Vdc
			11	brown									brown	25					
			12	black									black	22					
				grey									grey						
PAU003	HVAC PANEL	XDC1	4	blue	MCT.8 MCT.2	D-PAU003/DC-200	D	FG16OHM16 GREEN	4x1,5 + Sh	11	30	(1)	blue	2002	X2	Dry Cooler n.1 Information Powered	**DC-200**		24Vdc
			5	brown									brown	2001					
			6	black									black	2003					
				grey									grey						
PAU003	HVAC PANEL	XDC2	4	blue	MCT.8 MCT.2	D-PAU003/DC-201	D	FG16OHM16 GREEN	4x1,5 + Sh	11	30	(1)	blue	2002	X2	Dry Cooler n.2 Information Powered	**DC-201**		24Vdc
			5	brown									brown	2001					
			6	black									black	2003					
				grey									grey						

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
FORES ENGINEERING	Cables List	Revision	Rev.04
	C63- CrossWind Project		

INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
PAU003	HVAC PANEL	XAH1	19	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-AHU-100/1	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	19	XAH1	AHU100 Thermostat Safety	**JB-AHU-100**	**THS1**	24Vdc
			20	brown									brown	20					
PAU003	HVAC PANEL	XCW1	13	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-400/1	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	13	XCW1	Water pressure inlet Chilled water pump n.1	**JB-THS-400**	**PT1**	24Vdc
			14	brown									brown	14					
PAU003	HVAC PANEL	XCW1	15	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-400/2	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	15	XCW1	Water pressure outlet Chilled water pump n.1	**JB-THS-400**	**PT2**	24Vdc
			16	brown									brown	16					
PAU003	HVAC PANEL	XCW2	13	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-400/3	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	13	XCW2	Water pressure inlet Chilled water pump n.2	**JB-THS-400**	**PT3**	24Vdc
			14	brown									brown	14					
PAU003	HVAC PANEL	XCW2	15	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-400/4	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	15	XCW2	Water pressure outlet Chilled water pump n.2	**JB-THS-400**	**PT4**	24Vdc
			16	brown									brown	16					
PAU003	HVAC PANEL	XCC1	13	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-200/1	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	13	XCC1	Water pressure inlet Condensation water pump n.1	**JB-THS-200**	**PT5**	24Vdc
			14	brown									brown	14					
PAU003	HVAC PANEL	XCC1	15	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-200/2	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	15	XCC1	Water pressure outlet Condensation water pump n.1	**JB-THS-200**	**PT6**	24Vdc
			16	brown									brown	16					
PAU003	HVAC PANEL	XCC2	13	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-200/3	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	13	XCC2	Water pressure inlet Condensation water pump n.2	**JB-THS-200**	**PT7**	24Vdc
			14	brown									brown	14					
PAU003	HVAC PANEL	XCC2	15	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-200/4	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	15	XCC2	Water pressure outlet Condensation water pump n.2	**JB-THS-200**	**PT8**	24Vdc
			16	brown									brown	16					
PAU003	HVAC PANEL	XCW	1	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-400/5	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	1	XCW	Temperature Chilled water to chiller unit 1 & 2	**JB-THS-400**	**TT1**	24Vdc
			2	brown									brown	2					
PAU001	Chiller Unit 1	XW1	2	blue		A-PAU003/JB-THS-400/6	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	1		Temperature Chilled water from chiller unit 1 & 2	**TT-34**	**Package Chiller**	24Vdc
			1	brown									brown	2					
PAU003	HVAC PANEL	XCC	1	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-THS-200/5	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	1	XCC	Temperature Condensation water to chiller unit 1 & 2	**JB-THS-200**	**TT1**	24Vdc
			2	brown									brown	2					
PAU003	Chiller Unit 2	XW1	2	blue		A-PAU003/JB-THS-200/6	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	1		Temperature Condensation water from chiller unit 1 & 2	**TT-44**	**Package Chiller**	24Vdc
			1	brown									brown	2					
PAU003	HVAC PANEL	XAH1	21	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-AHU-100/2	A	FG16OHM16 GREEN	4x1,5 + Sh	11	35	M16	blue	21	XAH1	Hygrometry Inlet AHU100 Temperature inlet AHU100	**JB-AHU-100**	**TT-HY1**	24Vdc
			22	brown									brown	22					
			23	black									black	23					
			24	grey									grey	24					
PAU003	HVAC PANEL	XAH1	25	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-AHU-100/3	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M16	blue	25	XAH1	Temperature Outlet AHU100	**JB-AHU-100**	**TT1**	24Vdc
			26	brown									brown	26					
PAU003	HVAC PANEL	XL2	1	blue	MCT.8 MCT.2 MCT.12	A-PAU003/TT-HY201	A	FG16OHM16 GREEN	4x1,5 + Sh	11	15	M16	blue	1		Hygrometry HY201 Temperature HY201	**TT-HY201**		24Vdc
			2	brown									brown	2					
			3	black									black	3					
			4	grey									grey	4					
PAU003	HVAC PANEL	XL2	5	blue	MCT.8 MCT.2 MCT.12	A-PAU003/PT201	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	M16	blue	1		Pressure PT201	**PT201**		24Vdc
			6	brown									brown	2					
PAU003	HVAC PANEL	XL3	1	blue	MCT.8 MCT.1	A-PAU003/TT-206	A	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	1		Temperature A10 TT206	**TT-206**	**Waiting for clarification from ELOGEN/PAUMIER**	24Vdc
			2	brown									brown	2					
			3	black									black	3					
			4	grey									grey	4					
PAU003	HVAC PANEL	XL3	5	blue	MCT.8 MCT.1	A-PAU003/HY206	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M16	blue	1		Hygrometry A10 HY206	**HY206**	**Waiting for clarification from ELOGEN/PAUMIER**	24Vdc
			6	brown									brown	2					
PAU003	HVAC PANEL	XL3	5	blue	MCT.8 MCT.1	A-PAU003/PT206	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M16	blue	1		Pressure A10 PT206	**PT206**	**Waiting for clarification from ELOGEN/PAUMIER**	24Vdc
			6	brown									brown	2					
PAU003	HVAC PANEL	XL5	1	blue	MCT.8 MCT.11	A-PAU003/TT-HY205	A	FG16OHM16 GREEN	4x1,5 + Sh	11	26	M16	blue	1		Hygrometry A03+A02 HY205 Temperature A03+A02 TT205	**TT-HY205**		24Vdc
			2	brown									brown	2					
			3	black									black	3					
			4	grey									grey	4					
PAU003	HVAC PANEL	XL5	5	blue	MCT.8 MCT.11	A-PAU003/PT205	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	18	M16	blue	1		Pressure A03+A02 PT205	**PT205**		24Vdc
			6	brown									brown	2					
PAU003	HVAC PANEL	XL6	1	blue	MCT.8 MCT.11 MCT.9	A-PAU003/TT-HY203	A	FG16OHM16 GREEN	4x1,5 + Sh	11	26	M16	blue	1		Hygrometry A01 HY203 Temperature A01 TT203	**TT-HY203**		24Vdc
			2	brown									brown	2					
			3	black									black	3					
			4	grey									grey	4					
PAU003	HVAC PANEL	XL6	5	blue	MCT.8 MCT.11 MCT.9	A-PAU003/PT203	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	18	M16	blue	1		Pressure A01 PT203	**PT203**		24Vdc
			6	brown									brown	2					
PAU003	HVAC PANEL	XAH1	31	blue	MCT.8 MCT.2 MCT.12	A-PAU003/JB-AHU-100	A	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	31	XAH1	COOLING VALVE AHU100 % Opening Cooling Valve	**JB-AHU-100**	**V1**	24Vdc
			32	brown									brown	32					
			33	black									black	33					
			34	grey									grey	34					
PAU003	HVAC PANEL	XDC1	7	blue	MCT.8 MCT.2	A-PAU003/DC-200	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M16	blue	16.GND	X3	Setpoint % Fan Dry Cooler 1	**DC-200**		24Vdc
			8	brown									brown	0-10V					
PAU003	HVAC PANEL	XDC2	7	blue	MCT.8 MCT.2	A-PAU003/DC-201	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M16	blue	16.GND	X3	Setpoint % Fan Dry Cooler 2	**DC-201**		24Vdc
			8	brown									brown	0-10V					
PAU003	HVAC PANEL	XAH1	27	blue	MCT.8 MCT.2 MCT.12	PA-PAU003/	PA	FG16OHM16 GREEN	4x1,5 + Sh	11	30	M16	blue	27	XAH1	Damper power & signals AHU100		**CT1**	24Vdc
			28	brown									brown	28					
			29	black									black	29					
			30	grey									grey	30					

INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
PAU003	HVAC PANEL	XL2	7	blue	MCT.8 MCT.2 MCT.12	PA-PAU003/CT104	PA	FG16OHM16 GREEN	4x1,5 + Sh	11	25	M20	blue	Black		Damper power & signals E01	**CT104**		24Vdc
			8	brown									brown	Red					
			9	black									black	White					
			10	grey									grey	Orange					
PAU003	HVAC PANEL	XL3	7	blue	MCT.8 MCT.2 MCT.12	PA-PAU003/CT207	PA	FG16OHM16 GREEN	4x1,5 + Sh	11	25	M20	blue	Black		Damper power & signals A10	**CT207**		24Vdc
			8	brown									brown	Red					
			9	black									black	White					
			10	grey									grey	Orange					
PAU003	HVAC PANEL	XL5	7	blue	MCT.8 MCT.11	PA-PAU003/CT208	PA	FG16OHM16 GREEN	4x1,5 + Sh	11	20	M20	blue	Black		Damper power & signals A03+A02	**CT208**		24Vdc
			8	brown									brown	Red					
			9	black									black	White					
			10	grey									grey	Orange					
PAU003	HVAC PANEL	XL6	7	blue	MCT.8 MCT.11 MCT.9	PA-PAU003/CT204	PA	FG16OHM16 GREEN	4x1,5 + Sh	11	20	M20	blue	Black		Damper power & signals A01	**CT204**		24Vdc
			8	brown									brown	Red					
			9	black									black	White					
			10	grey									grey	Orange					
PAU003	HVAC PANEL	XCWU1	1	1	MCT.8	M-PAU003/WC-400	M	FG16OH2M16 GREEN	10x1,5 + Sh	15	30	(1)	1	1	XE1		**PAU001**	**REMOTE INFORMATION FOR CHILLER WATER UNIT 1**	24Vdc
			2	2									2	2					
			3	3									3	3					
			4	4									4	4					
			5	5									5	5					
			6	6									6	6					
				7									7						
				8									8						
				9									9						
				10									10						
PAU003	HVAC PANEL	X8			MCT.3 MCT.8	H-PAU003/WC-400	H	ETH Cat 6a	ETH Cat 6a	7	30	MCT			SW1		**PAU001**	**ETHERNET FOR CHILLER WATER UNIT 1**	
PAU003	HVAC PANEL	XCWU2	1	1	MCT.8	M-PAU003/WC-401	M	FG16OH2M16 GREEN	10x1,5 + Sh	15	30	(1)	1	1	XE1		**PAU002**	**REMOTE INFORMATION FOR CHILLER WATER UNIT 2**	24Vdc
			2	2									2	2					
			3	3									3	3					
			4	4									4	4					
			5	5									5	5					
			6	6									6	6					
				7									7						
				8									8						
				9									9						
				10									10						
PAU003	HVAC PANEL	X9			MCT.3 MCT.8	H-PAU003/WC-401	H		ETH Cat 6a	7	30	MCT			SW1		**PAU002**	**ETHERNET FOR CHILLER WATER UNIT 2**	
20-UCP-001	CONTROL CABINET - 24Vdc	420K1 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-1	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-001	**SSP-1**	**PCA-001**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	420K4 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-2	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-002	**SSP-2**	**PCA-002**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	420K7 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-3	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-003	**SSP-3**	**PCA-003**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	421K1 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-4	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-004	**SSP-4**	**PCA-004**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	421K4 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-5	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-005	**SSP-5**	**PCA-005**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	421K7 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-6	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-006	**SSP-6**	**PCA-006**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	422K1 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-7	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-007	**SSP-7**	**PCA-007**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	422K4 CAN	7	White Blue	MCT.4 MCT.9 MCT.6	H-20-UCP-001/SSP-8	H		ETH Cat 6a	7	30	Not applicable	White Blue	A		Cell Voltage Monitoring STACK-008	**SSP-8**	**PCA-008**	
			2	Blue									Blue	B					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	1	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-1	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-001	**SSP-1**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	2	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-2	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-002	**SSP-2**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	3	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-3	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-003	**SSP-3**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	4	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-4	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-004	**SSP-4**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	5	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-5	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-005	**SSP-5**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	6	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-6	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-006	**SSP-6**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	7	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-7	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-007	**SSP-7**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.PWR24	8	blue	MCT.9 MCT.6 MCT.4	P-20-UCP-001/SSP-8	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	-	blue	+		Cell Voltage Monitoring STACK-008	**SSP-8**	**+24Vdc**	24Vdc
			0Vdc	brown									brown	-					

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INSTRUMENT CABLES INTERCONNECTIONS

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET - 24Vdc	401SW1	P5		MCT.4 MCT.6	H-20-UCP-001/Q.RIO1	H		ETH Cat 6a	7	33	MCT				RIO WP1	**Q.RIO1**		
20-UCP-001	CONTROL CABINET - 24Vdc	401SW1	P6		MCT.4 MCT.1	H-20-UCP-001/Q.RIO2	H		ETH Cat 6a	7	33	MCT				RIO WP3	**Q.RIO2**		
20-UCP-001	CONTROL CABINET - 24Vdc	401SW1	P4		MCT.4 MCT.1	H-20-UCP-001/APC-980	H		ETH Cat 6a	7	34	MCT				PVI-980 ethernet	**APC-980**	**PVI-980**	
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	11	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-001	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-001	**VM-001**		0-250Vdc
			12	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	13	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-002	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-002	**VM-002**		0-250Vdc
			14	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	15	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-003	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-003	**VM-003**		0-250Vdc
			16	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	17	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-004	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-004	**VM-004**		0-250Vdc
			18	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	19	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-005	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-005	**VM-005**		0-250Vdc
			20	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	23	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-006	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-006	**VM-006**		0-250Vdc
			24	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	25	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-007	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-007	**VM-007**		0-250Vdc
			26	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	27	Blue	MCT.4 MCT.6 MCT.9	A-20-UCP-001/VM-008	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	20	Not applicable	Blue	+	copper bar	Voltmeter STACK-008	**VM-008**		0-250Vdc
			28	Brown									Brown	-					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	23	Blue		D-20-UCP-001/JB-DS-009	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40		Blue	1		JB DOOR SWITCH DS-009	**JB-DS-009**		24Vdc
			24	Brown									Brown	2					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	25	Blue		D-20-UCP-001/JB-DS-010	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40		Blue	1		JB DOOR SWITCH DS-010	**JB-DS-010**		24Vdc
			26	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	X.AI-S		Blue	MCT.6 MCT.2 MCT.12	A-Q.RIO1/AHD-1002	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M25	Blue			Ambient Hydrogen detector Level 1	**AHD-1002**		24Vdc
			6	Brown									Brown	mA1					
Q.RIO1	RIO.1 - WP1	24Vdc	+24Vdc	Blue	MCT.6 MCT.2 MCT.12	P-Q.RIO1/AHD-1002	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	35	M25	Blue	+DC		Ambient Hydrogen detector Level 1	**AHD-1002**		24Vdc
			0Vdc	Brown									Brown	-DC					

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ELECTRICAL CABLES WP1

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
SSP-1	STACK 1		-	Black	N/A	DP-SSP-1/SSP-2/1	DP	FG16OM16	1x240	33	2	N/A	Black	+		STACK 2	**SSP-2**		0-250Vdc
			-	Black		DP-SSP-1/SSP-2/2	DP		1x240		2		Black	+					
			-	Black		DP-SSP-1/SSP-2/3	DP		1x240		2		Black	+					
			-	Black		DP-SSP-1/SSP-2/4	DP		1x240		2		Black	+					
SSP-1	STACK 1								1x95	19	2					STACK 2	**SSP-2**		
SSP-2	STACK 2		-	Black	N/A	DP-SSP-2/SSP-3/1	DP	FG16OM16	1x240	33	5	N/A	Black	+		STACK 3	**SSP-3**		0-250Vdc
			-	Black		DP-SSP-2/SSP-3/2	DP		1x240		5		Black	+					
			-	Black		DP-SSP-2/SSP-3/3	DP		1x240		5		Black	+					
			-	Black		DP-SSP-2/SSP-3/4	DP		1x240		5		Black	+					
SSP-2	STACK 2								1x95	19	5					STACK 3	**SSP-3**		
SSP-3	STACK 3		-	Black	N/A	DP-SSP-3/SSP-4/1	DP	FG16OM16	1x240	33	2	N/A	Black	+		STACK 4	**SSP-4**		0-250Vdc
			-	Black		DP-SSP-3/SSP-4/2	DP		1x240		2		Black	+					
			-	Black		DP-SSP-3/SSP-4/3	DP		1x240		2		Black	+					
			-	Black		DP-SSP-3/SSP-4/4	DP		1x240		2		Black	+					
SSP-3	STACK 3								1x95	19	2					STACK 4	**SSP-4**		
SSP-5	STACK 5		-	Black	N/A	DP-SSP-5/SSP-6/1	DP	FG16OM16	1x240	33	2	N/A	Black	+		STACK 6	**SSP-6**		0-250Vdc
			-	Black		DP-SSP-5/SSP-6/2	DP		1x240		2		Black	+					
			-	Black		DP-SSP-5/SSP-6/3	DP		1x240		2		Black	+					
			-	Black		DP-SSP-5/SSP-6/4	DP		1x240		2		Black	+					
SSP-5	STACK 5								1x95	19	2					STACK 6	**SSP-6**		
SSP-6	STACK 6		-	Black	N/A	DP-SSP-6/SSP-7/1	DP	FG16OM16	1x240	33	5	N/A	Black	+		STACK 7	**SSP-7**		0-250Vdc
			-	Black		DP-SSP-6/SSP-7/2	DP		1x240		5		Black	+					
			-	Black		DP-SSP-6/SSP-7/3	DP		1x240		5		Black	+					
			-	Black		DP-SSP-6/SSP-7/4	DP		1x240		5		Black	+					
SSP-6	STACK 6								1x95	19	5					STACK 7	**SSP-7**		
SSP-7	STACK 7		-	Black	N/A	DP-SSP-7/SSP-8/1	DP	FG16OM16	1x240	33	2	N/A	Black	+		STACK 8	**SSP-8**		0-250Vdc
			-	Black		DP-SSP-7/SSP-8/2	DP		1x240		2		Black	+					
			-	Black		DP-SSP-7/SSP-8/3	DP		1x240		2		Black	+					
			-	Black		DP-SSP-7/SSP-8/4	DP		1x240		2		Black	+					
SSP-7	STACK 7								1x95	19	2					STACK 8	**SSP-8**		
C63-JBS-01	Junction Box Sockets		L	Black	n.1xM25	PP-C63-JBS-01/C63-SS-01	PP	FG16OM16 GREEN	3G2,5	12	18	n.1xM25	Black	L		Sockets for Utilities Area	**C63-SS-01**		230Vac
			N	Grey									Grey	N					
			PE	Y/G									Y/G	PE					
C63-JBS-01	Junction Box Sockets		L	Brown	n.1xM25	PP-C63-JBS-01/C63-SS-02	PP	FG16OM16 GREEN	3G2,5	12	3	n.1xM25	Brown	L		Sockets for Utilities Area	**C63-SS-02**		230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
C63-JBL-01	Junction Box Lighting WP1		L	Black	n.1xM25	PP-C63-JBL-01/C63-LS-01	PP	FG16OM16 GREEN	3G2,5	12	18	n.1xM25	Black	14		Lighting switch WP1	**C63-LS-01**		230Vac
			1	Grey									Grey	13					
			2	Grey									Grey	21					
C63-JBL-01	Junction Box Lighting WP1		3	Black	n.1xM25	PP-C63-JBL-01/C63-LS-02	PP	FG16OM16 GREEN	3G2,5	12	18	n.1xM25	Black	14		Lighting switch WP1	**C63-LS-02**		230Vac
			1	Grey									Grey	13					
			2	Grey									Grey	21					

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ELECTRICAL CABLES WP1

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
C63-JBL-001	Junction Box Lighting WP1		3	Brown	n.1xM25	PP-C63-JBL-001/C63-IEL-005	PP	FG16OM16 GREEN	5G2,5	14	19	n.1xM25	Brown	1		C63-IEL-005	**C63-IEL-005**		230Vac
			N	Blue									Blue	2					
			L-E	Black									Black	3					
			N-E	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-005	C63-IEL-005		1	Brown	n.1xM25	PP-C63-IEL-005/C63-IEL-004	PP	FG16OM16 GREEN	5G2,5	14	18	n.1xM25	Brown	1		C63-IEL-004	**C63-IEL-004**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-004	C63-IEL-004		1	Brown	n.1xM25	PP-C63-IEL-004/C63-IEL-002	PP	FG16OM16 GREEN	5G2,5	14	14	n.1xM25	Brown	1		C63-IEL-002	**C63-IEL-002**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-002	C63-IEL-002		1	Brown	n.1xM25	PP-C63-IEL-002/C63-IEL-001	PP	FG16OM16 GREEN	5G2,5	14	9	n.1xM25	Brown	1		C63-IEL-001	**C63-IEL-001**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-001	C63-IEL-001		1	Brown	n.1xM25	PP-C63-IEL-001/C63-IEL-003	PP	FG16OM16 GREEN	5G2,5	14	13	n.1xM25	Brown	1		C63-IEL-003	**C63-IEL-003**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-JBL-001	Junction Box Lighting WP1		3	Brown	n.1xM25	PP-C63-JBL-001/C63-INL-004	PP	FG16OM16 GREEN	3G2,5	12	22	n.1xM25	Brown	1		C63-INL-004	**C63-INL-004**		230Vac
			N	Blue									Blue	2					
			PE	Y/G									Y/G	PE					
C63-INL-004	C63-INL-004		1	Brown	n.1xM25	PP-C63-INL-004/C63-INL-002	PP	FG16OM16 GREEN	3G2,5	12	18	n.1xM25	Brown	1		C63-INL-002	**C63-INL-002**		230Vac
			2	Blue									Blue	2					
			PE	Y/G									Y/G	PE					
C63-INL-002	C63-INL-002		1	Brown	n.1xM25	PP-C63-INL-002/C63-INL-011	PP	FG16OM16 GREEN	3G2,5	12	9	n.1xM25	Brown	1		C63-INL-011	**C63-INL-011**		230Vac
			2	Blue									Blue	2					
			PE	Y/G									Y/G	PE					
C63-INL-011	C63-INL-011		1	Brown	n.1xM25	PP-C63-INL-011/C63-INL-001	PP	FG16OM16 GREEN	3G2,5	12	14	n.1xM25	Brown	1		C63-INL-001	**C63-INL-001**		230Vac
			2	Blue									Blue	2					
			PE	Y/G									Y/G	PE					
C63-INL-001	C63-INL-001		1	Brown	n.1xM25	PP-C63-INL-001/C63-INL-003	PP	FG16OM16 GREEN	3G2,5	12	8	n.1xM25	Brown	1		C63-INL-003	**C63-INL-003**		230Vac
			2	Blue									Blue	2					
			PE	Y/G									Y/G	PE					

INSTRUMENT CABLES WP1

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO1	RIO.1 - WP1	X.RTD	1	Blue	MCT.9	A-Q.RIO1/TT-601A	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-001	**TT-601A**		24Vdc
			2	brown									brown	4					
			3	Black									Black	5					
			4	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	17	Blue	MCT.9	A-Q.RIO1/TT-601B	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-002	**TT-601B**		24Vdc
			18	brown									brown	4					
			19	Black									Black	5					
			20	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	33	Blue	MCT.9	A-Q.RIO1/TT-601C	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-003	**TT-601C**		24Vdc
			34	brown									brown	4					
			35	Black									Black	5					
			36	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	5	Blue	MCT.9	A-Q.RIO1/TT-601D	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-004	**TT-601D**		24Vdc
			6	brown									brown	4					
			7	Black									Black	5					
			8	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	21	Blue	MCT.9	A-Q.RIO1/TT-601E	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-005	**TT-601E**		24Vdc
			22	brown									brown	4					
			23	Black									Black	5					
			24	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	37	Blue	MCT.9	A-Q.RIO1/TT-601F	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-006	**TT-601F**		24Vdc
			38	brown									brown	4					
			39	Black									Black	5					
			40	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	9	Blue	MCT.9	A-Q.RIO1/TT-601G	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-007	**TT-601G**		24Vdc
			10	brown									brown	4					
			11	Black									Black	5					
			12	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.RTD	25	Blue	MCT.9	A-Q.RIO1/TT-601H	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	20	M20	Blue	6		PWO2 out STACK-008	**TT-601H**		24Vdc
			26	brown									brown	4					
			27	Black									Black	5					
			28	Grey									Grey	3					
Q.RIO1	RIO.1 - WP1	X.AI	5	Blue		A-Q.RIO1/PT-600	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	41	M20	Blue	2		PWO2 to HE600	**PT-600**		24Vdc
			6	Brown									Brown	1					
Q.RIO1	RIO.1 - WP1	330T3	4.1	Blue		A-Q.RIO1/CT/P-600/1	A	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	13	M20	Blue	133		Conductivity & Temperatyure transmitter	**CT/P-600**		24Vdc
			4.2	Black									Black	134					
Q.RIO1	RIO.1 - WP1	330T5	4.1	Blue		A-Q.RIO1/CT/P-600/2	A	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	13	M20	Blue	233		Conductivity & Temperatyure transmitter	**CT/P-600**		24Vdc
			4.2	Black									Black	234					
CT/P-600	Conductivity & Temperatyure transmitter		112	GN		A-CT/P-600/CT/P-600	A	supplier cable	supplier cable				GN	3		PWO2 conductivity to STACKS	**CT/P-600**		24Vdc
			113	WH									WH	4					
			111	YE									YE	4					
			220	Coax - BK									Coax - BK	1					
			219	Coax - Inner									Coax - Inner	2					
			GND	BN									BN	n.c.					
Q.RIO1	RIO.1 - WP1	X.AI	33	Blue		A-Q.RIO1/PT-620	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	22	M20	Blue	1		PWH2 to FH-620	**PT-620**	**"NO --> Normally Open COM --> GND"**	24Vdc
			34	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	X.DI-S	3	blue		D-Q.RIO1/ZIO-623	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	2xM20	blue	1		HV-623 Valve Open position PWH2 to STACKS	**ZIO-623**		24Vdc
			4	brown									brown	2					
Q.RIO1	RIO.1 - WP1	330T7	4.1	Blue		A-Q.RIO1/TT-621A	A	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	25	M20	Blue	+		Motor CP-620A windings Temperature	**TT-621A**		24Vdc
			4.2	Black									Black	-					
Q.RIO1	RIO.1 - WP1	330T1	4.1	Blue		A-Q.RIO1/TT-621B	A	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	25	M20	Blue	+		Motor CP-620B windings Temperature	**TT-621B**		24Vdc
			4.2	Black									Black	-					
Q.RIO1	RIO.1 - WP1	X.AI-S	1	Blue		A-Q.RIO1/PT-600A	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	14	M20	Blue	1		PWO2 outlet CP-600A	**PT-600A**		24Vdc
			2	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	X.AI-S	9	Blue		A-Q.RIO1/PT-600B	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	23	M20	Blue	1		PWO2 outlet CP-600B	**PT-600B**		24Vdc
			10	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	X.AI-S	17	Blue		A-Q.RIO1/FT-600	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	M20	Blue	1		PWO2 to STACKS	**FT-600**		24Vdc
			18	Brown									Brown	2					

INSTRUMENT CABLES WP1

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO1	RIO.1 - WP1	X.AI-S	3	Blue		A-Q.RIO1/PT-620A	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	16	M20	Blue	1		PWH2 outlet CP-620A	**PT-620A**		24Vdc
			4	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	X.AI-S	11	Blue		A-Q.RIO1/PT-620B	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	17	M20	Blue	1		PWH2 outlet CP-620A	**PT-620B**		24Vdc
			12	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	X.AI-S		Blue		A-Q.RIO1/AHD-1001	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	17	M25	Blue			Ambient Hydrogen detector Level 0	**AHD-1001**		24Vdc
			20	Brown									Brown	mA1					
Q.RIO1	RIO.1 - WP1	X.AI-S		blue		A-Q.RIO1/AHD-1004	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	17	M25	blue			Ambient Hydrogen detector Level 0	**AHD-1004**	**Stack room**	24Vdc
			8	brown									brown	mA1					
Q.RIO1	RIO.1 - WP1	X.AO	1	Blue	MCT.9	A-Q.RIO1/VAT-001	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	16	M20	Blue	+		Voltage Display	**VAT-001**		24Vdc
			2	Brown									Brown	-					
Q.RIO1	RIO.1 - WP1	X.AO	3	Blue	MCT.9	A-Q.RIO1/VAT-002	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	18	M20	Blue	+		Voltage Display	**VAT-002**		24Vdc
			4	Brown									Brown	-					
Q.RIO1	RIO.1 - WP1	X.DI	1	Blue		D-Q.RIO1/JB-DS-001	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40	n.2xM20	Blue	1		JB DOOR SWITCH DS-001	**JB-DS-001**	**NO configuration**	24Vdc
			2	Brown									Brown	2					
JB-DS-001	JB DOOR SWITCH DS-001	X.DI	4	Blue		D-JB-DS-001/DS-001	D	supplier cable	supplier cable				Blue	4		Door switch open/close_Level 0	**DS-001**		24Vdc
			5	Brown									Brown	5					
			2	Wh-Bk									Wh-Bk	2					
			1	Black									Black	1					
Q.RIO1	RIO.1 - WP1	X.DI	3	Blue		D-Q.RIO1/JB-DS-002	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40	n.2xM20	Blue	1		JB DOOR SWITCH DS-002	**JB-DS-002**	**NO configuration**	24Vdc
			4	Brown									Brown	2					
JB-DS-002	JB DOOR SWITCH DS-002	X.DI	4	Blue		D-JB-DS-002/DS-002	D	supplier cable	supplier cable				Blue	4		Door switch open/close_Level 0	**DS-002**		24Vdc
			5	Brown									Brown	5					
			2	Wh-Bk									Wh-Bk	2					
			1	Black									Black	1					
Q.RIO1	RIO.1 - WP1	X.DI	5	Blue		D-Q.RIO1/JB-DS-003	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40	n.2xM20	Blue	1		JB DOOR SWITCH DS-003	**JB-DS-003**	**NO configuration**	24Vdc
			6	Brown									Brown	2					
JB-DS-003	JB DOOR SWITCH DS-003	X.DI	4	Blue		D-JB-DS-003/DS-003	D	supplier cable	supplier cable				Blue	4		Door switch open/close_Level 0	**DS-003**		24Vdc
			5	Brown									Brown	5					
			2	Wh-Bk									Wh-Bk	2					
			1	Black									Black	1					
Q.RIO1	RIO.1 - WP1	320T1	A	Blue		D-Q.RIO1/JB-WLD-1	D	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	14	1xM20	Blue	4		Water leak detector_Level 0_signal	**JB-WLD-1**	**PNP wired: normally open**	24Vdc
			SPARE	Black									Black						
Q.RIO1	RIO.1 - WP1	320T1	C	Blue		P-Q.RIO1/JB-WLD-1	P	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	13	1xM20	Blue	1		Water leak detector_Level 0_power	**JB-WLD-1**		24Vdc
			B	Black									Black	3					
JB-WLD-1	JB WLD-001		1	Brown	1xM12	PD-JB-WLD-1/WLD-001	PD	SUPPLIER CABLE	SUPPLIER CABLE			M12	Brown	1		Water leak detector_Level 0	**WLD-001**		24Vdc
			2	White									White	2					
			3	Blue									Blue	3					
			4	Black									Black	4					
Q.RIO1	RIO.1 - WP1	320T3	A	Blue		D-Q.RIO1/JB-WLD-002	D	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	19	n.1xM20	Blue	4		Water leak detector_Level 0_signal	**JB-WLD-002**		24Vdc
			SPARE	Black									Black						
Q.RIO1	RIO.1 - WP1	320T3	C	Blue		P-Q.RIO1/JB-WLD-002	P	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	16	n.1xM20	Blue	1		Water leak detector_Level 0_power	**JB-WLD-002**		24Vdc
			B	Black									Black	3					
JB-WLD-2	JB WLD-002		1	Brown	1xM12	PD-JB-WLD-2/WLD-002	PD	SUPPLIER CABLE	SUPPLIER CABLE			M12	Brown	1		Water leak detector_Level 0	**WLD-002**		24Vdc
			2	White									White	2					
			3	Blue									Blue	3					
			4	Black									Black	4					
Q.RIO1	RIO.1 - WP1	X.DI-S	1	Blue		D-Q.RIO1/ZIO-604	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	23	2xM20	Blue	NO		HV-604 Valve Open position PWO2 to STACKS	**ZIO-604**	**"NO --> Normally Open COM --> GND"**	24Vdc
			2	Brown									Brown	COM					
Q.RIO1	RIO.1 - WP1	240T1	4.1	Blue		A-Q.RIO1/FT-620	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	18	M20	Blue	1		PWH2 to STACKS	**FT-620**		24Vdc
			4.2	Brown									Brown	2					
Q.RIO1	RIO.1 - WP1	331T1	4.1	Blue		A-Q.RIO1/CT/P-620/1	A	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	21	M20	Blue	133		PWH2 temperature to STACKS	**CT/P-620**		24Vdc
			4.2	Black									Black	134					
Q.RIO1	RIO.1 - WP1	342T5	4.1	Blue		A-Q.RIO1/CT/P-620/2	A	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	21	M20	Blue	233		PWH2 conductivity to STACKS	**CT/P-620**		24Vdc
			4.2	Black									Black	234					

INSTRUMENT CABLES WP1

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
CT/P-620	Conductivity & Temperatyure transmitter		112	GN		A-CT/P-620/CT/P-620	A	supplier cable	supplier cable				GN	3		PWO2 conductivity to STACKS	**CT/P-620**		24Vdc
			113	WH									WH	4					
			111	YE									YE	4					
			220	Coax - BK									Coax - BK	1					
			219	Coax - Inner									Coax - Inner	2					
			GND	BN									BN	n.c.					
FB-002	Fire button Weatherproof - Level 0	LP OUT	+		MCT.11	D-FB-002/SD-003A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	35			+	IN	Smoke detector Electrical cabinet_Level 0	**SD-003A**		24Vdc
			-											-					
SD-003A	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-003A/SD-003B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-003B**		24Vdc
			-	Brown									Brown	-					
SD-003B	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-003B/SD-003C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-003C**		24Vdc
			-	Brown									Brown	-					
SD-003C	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-003C/SD-005A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	25	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-005A**		24Vdc
			-	Brown									Brown	-					
SD-005A	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-005A/SD-005B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-005B**		24Vdc
			-	Brown									Brown	-					
SD-005B	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-005B/SD-005C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-005C**		24Vdc
			-	Brown									Brown	-					
SD-005C	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	MCT.9 1xM20	D-SD-005C/SD-001A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	38	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-001A**		24Vdc
			-	Brown									Brown	-					
SD-001A	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-001A/SD-001B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-001B**		24Vdc
			-	Brown									Brown	-					
SD-001B	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	1xM20	D-SD-001B/SD-001C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1	1xM20	Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-001C**		24Vdc
			-	Brown									Brown	-					
Q.RIO1	RIO.1 - WP1	X.DI	7	Blue		D-Q.RIO1/JB-DS-008	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	40		Blue	1		JB DOOR SWITCH DS-003	**JB-DS-008**		24Vdc
			8	Brown									Brown	2					
JB-DS-008	JB DOOR SWITCH DS-008	X.DI	4	Blue		D-JB-DS-008/DS-008	D	supplier cable	supplier cable				Blue	4		Door switch open/close	**DS-008**		24Vdc
			5	Brown									Brown	5					
			2	Wh-Bk									Wh-Bk	2					
			1	Black									Black	1					
Q.RIO1	RIO.1 - WP1	24Vdc	+24Vdc	Blue		P-Q.RIO1/AHD-1001	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	17		Blue	+DC		Ambient Hydrogen detector Level 0	**AHD-1001**		24Vdc
			0Vdc	Brown									Brown	-DC					
Q.RIO1	RIO.1 - WP1	24Vdc	+24Vdc	Blue		P-Q.RIO1/AHD-1004	P	FG16OH2M16 GREEN	2x1,5 + Sh	10	17		Blue	+DC		Ambient Hydrogen detector Level 0	**AHD-1004**		24Vdc
			0Vdc	Brown									Brown	-DC					

ELECTRICAL CABLES WP2

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET	X.PWR400	1	Black		PP-20-UCP-001/HCU-400-01	PP	FG16OM16 GREEN	5G4	14	20	by supplier	Black	1	X1.0	rectifier control panel E500	**HCU-400**		400Vac
			2	Brown									Brown	2					
			3	Grey									Grey	3					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	1	Brown		PP-20-UCP-001/HCU-400-02	PP	FG16OM16 GREEN	3G4	12	25	by supplier	Brown	1	X2.0	rectifier control panel E500	**HCU-400**		230Vac
			2	Blue									Blue	2					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET - UPS	X.PWRUPS	1	Brown		PP-20-UCP-001/HCU-400-UPS	PP	FG16OM16 GREEN	3G4	12	25	by supplier	Brown	3	X2.0	rectifier control panel E500	**HCU-400**		230Vac
			2	Blue									Blue	4					
			PE	Y/G									Y/G	PE					
EQP-2	Earth Bar WP2								1x185		12					Rectifier Hydraulic Cabinet	**HCU-400**		
20-UCP-001	CONTROL CABINET - UPS	X.PWRUPS	3	Brown		PP-20-UCP-001/SSI-1000	PP	FG16OM16 GREEN	3G2,5	12	20	n.1xM25	Brown	L		FSS Fire System	**SSI-1000**		230Vac
			4	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR400	13	Black	MCT.5 MCT.8	PR-20-UCP-001/PAU003	PR	FG16OM16 GREEN	1x120	21	20	by supplier	Black	L1		HVAC PANEL	**PAU003**		400Vac
			14	Black		PS-20-UCP-001/PAU003	PS		1x120	21	20		Black	L2					
			15	Black		PT-20-UCP-001/PAU003	PT		1x120	21	20		Black	L3					
			16	Black		PN-20-UCP-001/PAU003	PN		1x120	21	20		Black	N					
			PE	Y/G		PE-20-UCP-001/PAU003	PE		1x70	21	20		Y/G	PE					
EQP-2	Earth Bar WP2								1x35		2					HVAC PANEL			
20-UCP-001	CONTROL CABINET	X.PWR400	18	Black	MCT.5 MCT.7	PP-20-UCP-001/WTP-300	PP	FG16OM16 GREEN	5G10	19	23	MCT supplier	Black	L1		Water Treatment Package	**WTP-300**		400Vac
			19	Brown									Brown	L2					
			20	Grey									Grey	L3					
			21	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
EQP-x	Earth Bar x								1x35		10					Water Treatment Package	**WTP-300**		
20-UCP-001	CONTROL CABINET	X.PWR400	36	Black	MCT.5 MCT.7	PP-20-UCP-001/LP-300A	PP	GAALFLEX 2YSLCH-J BLACK	4G2,5 + Sh	11	15	M20 (n.4 cable gland and n.2 plug)	Black	L1			**LP-300A**		400Vac
			37	Brown									Brown	L2					
			38	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-x	Earth Bar x								1x16		10						**LP-300A**		
20-UCP-001	CONTROL CABINET	X.PWR400	41	Black	MCT.5 MCT.7	PP-20-UCP-001/LP-300B	PP	GAALFLEX 2YSLCH-J BLACK	4G2,5 + Sh	11	15	M20 (n.4 cable gland and n.2 plug)	Black	L1			**LP-300B**		400Vac
			42	Brown									Brown	L2					
			43	Grey									Grey	L3					
			PE	Y/G									Y/G	PE					
EQP-x	Earth Bar x								1x16		10						**LP-300A**		
20-UCP-001	CONTROL CABINET	X.PWR220	63	Brown	MCT.5	PP-20-UCP-001/C63-PB-02	PP	FG16OM16 GREEN	3G2,5	12	24	n.1xM25	Brown	L		Push Button for External Lights	**C63-PB-02**		230Vac
			64	Brown									Brown	L					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	65	Brown	MCT.5	PP-20-UCP-001/C63-PB-03	PP	FG16OM16 GREEN	3G2,5	12	26	n.1xM25	Brown	L		Push Button for External Lights	**C63-PB-03**		230Vac
			66	Brown									Brown	L					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	41	Brown		PP-20-UCP-001/C63-JBS-02	PP	FG16OM16 GREEN	3G2,5	12	12	n.1xM25	Brown	L		Junction Box Sockets	**C63-JBS-02**		230Vac
			42	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
C63-JBS-02	Junction Box Sockets		L1	Brown	n.1xM25	PP-C63-JBS-02/C63-SS-03	PP	FG16OM16 GREEN	3G2,5	12	14	n.1xM25	Brown	L		Sockets for Utilities Area	**C63-SS-03**		230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
C63-JBS-02	Junction Box Sockets		L1	Brown	n.1xM25	PP-C63-JBS-02/C63-SS-04	PP	FG16OM16 GREEN	3G2,5	12	3	n.1xM25	Brown	L		Sockets for Utilities Area	**C63-SS-04**		230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
20-UCP-001	CONTROL CABINET	X.PWR220	51	Brown		PP-20-UCP-001/C63-JBL-002	PP	FG16OM16 GREEN	3G2,5	12	11	n.1xM25	Brown	L		Junction Box Lighting WP2	**C63-JBL-002**		230Vac
			52	Blue									Blue	N					
			PE	Y/G									Y/G	PE					

elogen / FORES ENGINEERING	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
	Cables List	Revision	Rev.04
	C63- CrossWind Project		

ELECTRICAL CABLES WP2

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
C63-JBL-002	Junction Box Lighting WP2		L	Black	N/A	PP-C63-JBL-002/C63-LS-03	PP	FG16OM16 GREEN	3G2,5	12	14	n.1xM25	Black	14		Lighting switch WP2	**C63-LS-03**		230Vac
			1	Grey									Grey	13					
			2	Grey									Grey	21					
C63-JBL-002	Junction Box Lighting WP2		3	Black	n.1xM25	PP-C63-JBL-002/C63-LS-04	PP	FG16OM16 GREEN	3G2,5	12	15	n.1xM25	Black	14		Lighting switch WP2	**C63-LS-04**		230Vac
			1	Grey									Grey	13					
			2	Grey									Grey	21					
C63-JBL-002	Junction Box Lighting WP2		3	Brown	n.1xM25	PP-C63-JBL-002/C63-IEL-009	PP	FG16OM16 GREEN	5G2,5	14	6	n.1xM25	Brown	1		C63-IEL-009	**C63-IEL-009**		230Vac
			N	Blue									Blue	2					
			L-E	Black									Black	3					
			N-E	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-009	C63-IEL-009		1	Brown	n.1xM25	PP-C63-IEL-009/C63-INL-005	PP	FG16OM16 GREEN	5G2,5	14	7	n.1xM25	Brown	1		C63-INL-005	**C63-INL-005**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-INL-005	C63-INL-005		1	Brown	n.1xM25	PP-C63-INL-005/C63-IEL-007	PP	FG16OM16 GREEN	5G2,5	14	9	n.1xM25	Brown	1		C63-IEL-007	**C63-IEL-007**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-007	C63-IEL-007		1	Brown	n.1xM25	PP-C63-IEL-007/C63-IEL-006	PP	FG16OM16 GREEN	5G2,5	14	9	n.1xM25	Brown	1		C63-IEL-006	**C63-IEL-006**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-006	C63-IEL-006		1	Brown	n.1xM25 MCT.13 MCT.7	PP-C63-IEL-006/C63-IEL-008	PP	FG16OM16 GREEN	5G2,5	14	11	n.1xM25	Brown	L		C63-IEL-008	**C63-IEL-008**		230Vac
			2	Blue									Blue	N					
			3	Black									Black	L-E					
			4	Grey									Grey	N-E					
			PE	Y/G									Y/G	PE					
C63-IEL-006	C63-IEL-008		1	Brown	n.1xM25	PP-C63-IEL-006/C63-INL-006	PP	FG16OM16 GREEN	5G2,5	14	25	n.1xM25	Brown	L		C63-INL-006	**C63-INL-006**		230Vac
			2	Blue									Blue	N					
			3	Black									Black	L-E					
			4	Grey									Grey	N-E					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XWH1	1	Brown		PP-PAU003/JB-WH-101	PP	FG16OM16 GREEN	3G2,5	12	5	M25	Brown	L		Junction Box Wall Heater 101	**JB-WH-101**		230Vac
			2	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
JB-WH-101	Junction Box Wall Heater 101		L	Grey	M25	PP-JB-WH-101/WH-101	PP	FG16OM16 GREEN	3G2,5	12	5	pre-wired cable	Grey	L		Wall Heater 101	**WH-101**		230Vac
			N	Blue									Blue	N					
			PE	Black									Black	PE					
PAU003	HVAC PANEL	XWH1	7	Brown	mct.8 mct.7	PP-PAU003/JB-WH-201	PP	FG16OM16 GREEN	3G2,5	12	9	M25	Brown	L		Junction Box Wall Heater 201	**JB-WH-201**		230Vac
			8	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
JB-WH-201	Junction Box Wall Heater 201		L	Grey	M25	PP-JB-WH-201/WH-201	PP		3Gx,5	12	0,5	pre-wired cable	Grey	L		Wall Heater 201	**WH-201**		230Vac
			N	Blue									Blue	N					
			PE	Black									Black	PE					

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
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ELECTRICAL CABLES WP2

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
PAU003	HVAC PANEL	XFC1	1	Black		PP-PAU003/FCU-201	PP	FG16OM16 GREEN	4G2,5	12.5	14	M25	Black	N		FCU-201	**FCU-201**		230Vac
			2	Brown									Brown	V3					
			3	Grey									Grey	YV					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XFC2	1	Black		PP-PAU003/FCU-202	PP	FG16OM16 GREEN	4G2,5	12.5	11	M25	Black	N		FCU-202	**FCU-202**		230Vac
			2	Brown									Brown	V3					
			3	Grey									Grey	YV					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XFC3	1	Black		PP-PAU003/FCU-203	PP	FG16OM16 GREEN	4G2,5	12.5	8	M25	Black	N		FCU-203	**FCU-203**		230Vac
			2	Brown									Brown	V3					
			3	Grey									Grey	YV					
			PE	Y/G									Y/G	PE					
PAU003	HVAC PANEL	XFC4	1	Black		PP-PAU003/FCU-204	PP	FG16OM16 GREEN	4G2,5	12.5	10	M25	Black	N		FCU-204	**FCU-204**		230Vac
			2	Brown									Brown	V3					
			3	Grey									Grey	YV					
			PE	Y/G									Y/G	PE					

elogen ENGINEERING / FORES ENGINEERING	Electrolyzer Package	Document Code	C0063-FOR-LST-EL-001
	Cables List	Revision	Rev.04
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INSTRUMENT CABLES WP2

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	21	1		A-20-UCP-001/HCU-400	A	FG16OH2M16 GREEN	10x1,5 + Sh	15	25	M32	1	63	X12.1	Current Meter IM-001	**HCU-400**	**rectifier control panel E500**	24Vdc
			22	2									2	64					
		X.AI	37	3									3	67		Current Meter IM-002			
			38	4									4	68					
		X.AI	39	5									5	65		Voltmeter stack VM-101			
			40	6									6	66					
		X.AI	55	7									7	69		Voltmeter stack VM-102			
			56	8									8	70					
				9									9						
				10									10						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	47	1		D-20-UCP-001/HCU-400/1	D	FTG18OM18 BLACK	7x1,5 + Sh fireproof	16	25	M25	1	25	X12.1	Emergency Stop feedback 1	**HCU-400**	**rectifier control panel E500**	24Vdc
			48	2									2	26					
		X.DI	63	3									3	27		Emergency Stop feedback 2			
			64	4									4	28					
		X.DO-S	1	5									5	1		Rectifier Emergency Stop 1 Channel 1			
			2	6									6	2					
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DO-S	23	1		D-20-UCP-001/HCU-400/2	D	FTG18OM18 BLACK	7x1,5 + Sh fireproof	16	25	M25	1	3	X12.1	Rectifier Emergency Stop 1 Channel 2	**HCU-400**	**rectifier control panel E500**	24Vdc
			24	2									2	4					
		X.DO-S	9	3									3	5		Rectifier Emergency Stop 2 Channel 1			
			10	4									4	6					
		X.DO-S	25	5									5	7		Rectifier Emergency Stop 2 Channel 2			
			26	6									6	8					
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc			1		D-20-UCP-001/HCU-400/3	D	FG16OHM16 GREEN	1x(19x0,75) + Sh	17	25	M32	1		X12.1		**HCU-400**	**rectifier control panel E500**	24Vdc
				2									2						
				3									3						
				4									4						
				5									5						
				6									6						
				7									7						
				8									8						
		X.DI	35	9									9	39		Rectifier-2 Fault			
			36	10									10	40					
		X.DI	49	11									11	41		Rectifier-2 In Operation			
			50	12									12	42					
		X.DO	1	13									13	13		Electrolyzer 1 System Healthy			
			2	14									14	14					
		X.DO	19	15									15	15		Electrolyzer 2 System Healthy			
			20	16									16	16					
		X.DO	21	17									17	17		Rectifiers Start/Stop command			
			22	18									18	18					
				19									19						

20-UCP-001	CONTROL CABINET - 24Vdc	X.DO	67	1		D-20-UCP-001/JB-LC-003	D	FG16OH2M16 GREEN	7x1,5 + Sh	14	15	M25	1	11	BOTTOM UNIT	Light Column - Level 0 - Red - VE-001	**JB-LC-003**		24Vdc
			69	2									2	13		Light Column - Level 0 - Orange - VE-002			
			61	3									2	15		Light Column - Level 0 - Green - VE-003			
			68	4									3	1		Light Column - Level 0 - Blue - VE-004			
				5									4			Spare			
			75	6									5	3		Common			
				7									7			PE			
20-UCP-001	CONTROL CABINET - 24Vdc	104U1	14	Blue	MCT.7 MCT.4	A-20-UCP-001/LP-300A	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M20	Blue		PTC		**LP-300A**	**Motor PTC**	24Vdc
			15	Brown									Brown						
20-UCP-001	CONTROL CABINET - 24Vdc	104U1	14	Blue	MCT.7 MCT.4	A-20-UCP-001/LP-300B	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	30	M20	Blue		PTC		**LP-300B**	**Motor PTC**	24Vdc
			15	Brown									Brown						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DO	70	blue		D-20-UCP-001/BUZ-1001	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	M20	blue	T3		Buzzer - Level 0	**BUZ-1001**		24Vdc
			76	brown									brown	T4					
20-UCP-001	CONTROL CABINET - 24Vdc	X.AI	1	blue	MCT.4 MCT.7	A-20-UCP-001/PT-300	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	25	M20	blue	1		Pure water out WTP to Services	**PT-300**		24Vdc
			2	brown									brown	2					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-IS	1	Blue		D-20-UCP-001/JB-WLD-3	D	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	22	n.1xM20	Blue	4		Water leak detector_Level 0	**JB-WLD-3**		24Vdc
			2	Black									Black						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-IS	3	Blue		P-20-UCP-001/JB-WLD-3	P	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	22	n.1xM20	Blue	1		Power supply Water leak detector_Level 0	**JB-WLD-3**		24Vdc
			4	Black									Black	3					
JB-WLD-3	JB WLD-003		1	Blue	N/A	PD-JB-WLD-3/WLD-003	PD	SUPPLIER CABLE	SUPPLIER CABLE		0,5	M12	Blue	1		Water leak detector_Level 0	**WLD-003**		24Vdc
			2	brown									brown	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-IS	5	Blue	MCT.4 MCT.7	D-20-UCP-001/JB-WLD-4	D	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	20	n.1xM20	Blue	4		Water leak detector_Level 0	**JB-WLD-4**		24Vdc
			6	Black									Black						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-IS	9	Blue	MCT.4 MCT.7	P-20-UCP-001/JB-WLD-4	P	FG16OHM16 BLUE	2x1,5 + Sh light blue	10	20	n.1xM20	Blue	1		Power supply Water leak detector_Level 0	**JB-WLD-4**		24Vdc
			10	Black									Black	3					
JB-WLD-4	JB WLD-004		1	Blue	N/A	PD-JB-WLD-4/WLD-004	PD	SUPPLIER CABLE	SUPPLIER CABLE		0,5	M12	Blue	1		Water leak detector_Level 0	**WLD-004**		24Vdc
			2	brown									brown	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	3	1		D-20-UCP-001/ESD-001	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	15	2xM20	1	1		Emergency shutdown button - Level 0	**ESD-001**		24Vdc
			4	2									2	2					
		X.DI-S	3.1	3									2	4					
			4.1	4									3	5					
				5									4						
				6									5						
				7									7						
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	13	1		D-20-UCP-001/ESD-004	D	FTG18OHM16 BLACK	7x1,5 + Sh fireproof	16	25	2xM20	1	1		Emergency shutdown button - Level 0	**ESD-004**		24Vdc
			14	2									2	2					
		X.DI-S	13.1	3									2	4					
			14.1	4									3	5					
				5									4						
				6									5						
				7									7						

20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	5	Blue		D-20-UCP-001/SSI-1000/1	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	10	-	Blue	13	K1	Fire Alarm System General Failure	**SSI-1000**	**from F&G panel**	24Vdc
			6	Brown									Brown	14					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI-S	25	Blue		D-20-UCP-001/SSI-1000/2	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	10	-	Blue	13	K2	Confirmed Fire Alarm	**SSI-1000**	**from F&G panel**	24Vdc
			26	Brown									Brown	14					
20-UCP-001	CONTROL CABINET - 24Vdc	402SW1	P11	Blue	MCT.4 MCT.7	H-20-UCP-001/WTP-300	H		ETH Cat 6a	7	22	-		8	145A1	Water purification modbus	**WTP-300**		
				Brown															
20-UCP-001	CONTROL CABINET - 24Vdc	402SW1	P12	Blue		H-20-UCP-001/HVAC	H		ETH Cat 6a	7	22	-		OUT	X8	HVAC panel modbus	**HVAC**		
				Brown															
20-UCP-001	CONTROL CABINET - 24Vdc	402SW1	P13	Blue		H-20-UCP-001/HCU/1	H		ETH Cat 6a	7	25	-		P1/X1	150P1	ETH Cat 6a	**HCU**		
				Brown															
SSI-1000	FIRE SYSTEM PANEL	BR1	1	Blue		D-SSI-1000/FB-001	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	16	2xM20	Blue	+	LP IN	Fire button Weatherproof - Level 0	**FB-001**		24Vdc
			7	Brown									Brown	-					
FB-001	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue		D-FB-001/SD-008A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	13		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-008A**		24Vdc
			-	Brown									Brown	-					
SD-008A	Fire button Weatherproof - Level 0	OUT	+	Blue		D-SD-008A/SD-008B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-008B**		24Vdc
			-	Brown									Brown	-					
SD-008B	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue		D-SD-008B/SD-008C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-008C**		24Vdc
			-	Brown									Brown	-					
SD-008C	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	MCT.4 MCT.7	D-SD-008C/SD-004A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	20		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-004A**		24Vdc
			-	Brown									Brown	-					
SD-004A	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue		D-SD-004A/SD-004B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-004B**		24Vdc
			-	Brown									Brown	-					
SD-004B	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue		D-SD-004B/SD-004C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-004C**		24Vdc
			-	Brown									Brown	-					
SD-004C	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue	MCT.7	D-SD-004C/SD-002A	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	20		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-002A**		24Vdc
			-	Brown									Brown	-					
SD-002A	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue		D-SD-002A/SD-002B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-002B**		24Vdc
			-	Brown									Brown	-					
SD-002B	Smoke detector Electrical cabinet_Level 0	OUT	+	Blue		D-SD-002B/SD-002C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		Blue	+	IN	Smoke detector Electrical cabinet_Level 0	**SD-002C**		24Vdc
			-	Brown									Brown	-					

PAU003	HVAC PANEL	XL4	1	Blue	MCT.8 MCT.7	A-PAU003/TT-HY103	A	FG16OHM16 GREEN	4x1,5 + Sh	11	25	M16	Blue	1		Hygrometry HY103 Temperature TT103	**TT-HY103**		24Vdc
			2	brown									brown	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
PAU003	HVAC PANEL	XL4	5	Blue	MCT.8 MCT.7	A-PAU003/PT103	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	25	M16	Blue	1		Pressure A20 PT201	**PT103**		24Vdc
			6	Brown									Brown	2					
PAU003	HVAC PANEL	XL1	1	Blue	N/A	A-PAU003/TT-HY101	A	FG16OH2M16 GREEN	4x1,5 + Sh	11	15	M16	Blue	1		Hygrometry B01 HY101 Temperature B01 TT01	**TT-HY101**		24Vdc
			2	brown									brown	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
PAU003	HVAC PANEL	XL1	5	Blue	N/A	A-PAU003/PT101	A	FG16OH2M16 GREEN	2x1,5 + Sh	10	15	M16	Blue	1		Pressure B01 PT101	**PT101**		24Vdc
			6	Brown									Brown	2					
PAU003	HVAC PANEL	XL4	7	Blue	N/A	PA-PAU003/CT202	PA	FG16OHM16 GREEN	4x1,5 + Sh	11	15	M20	Blue	Black		Damper power & signals A20	**CT202**		24Vdc
			8	brown									brown	Red					
			9	Black									Black	White					
			10	Grey									Grey	Orange					
PAU003	HVAC PANEL	XL1	7	Blue	N/A	PA-PAU003/CT102	PA	FG16OH2M16 GREEN	4x1,5 + Sh	11	8	M20	Blue	Black		Damper power & signals B01	**CT102**		24Vdc
			8	brown									brown	Red					
			9	Black									Black	White					
			10	Grey									Grey	Orange					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	27	Blue		D-20-UCP-001/JB-DS-011	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	20		Blue	1		JB DOOR SWITCH DS-011	**JB-DS-011**		24Vdc
			28	Brown									Brown	2					
JB-DS-011	JB DOOR SWITCH DS-011	X.DI	4	Blue		D-JB-DS-011/DS-011	D	supplier cable	supplier cable				Blue	4		Door switch 011	**DS-011**		24Vdc
			5	Brown									Brown	5					
			2	Wh-Bk									Wh-Bk	2					
			1	Black									Black	1					
20-UCP-001	CONTROL CABINET - 24Vdc	X.DI	29	Blue		D-20-UCP-001/JB-DS-012	D	FG16OH2M16 GREEN	2x1,5 + Sh	10	10		Blue	1		JB DOOR SWITCH DS-012	**JB-DS-012**		24Vdc
			30	Brown									Brown	2					
JB-DS-012	JB DOOR SWITCH DS-012	X.DI	4	Blue		D-JB-DS-012/DS-012	D	supplier cable	supplier cable				Blue	4		Door switch 012	**DS-012**		24Vdc
			5	Brown									Brown	5					
			2	Wh-Bk									Wh-Bk	2					
			1	Black									Black	1					

ELECTRICAL CABLES WP3

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
C63-QF-001	Circuit Breaker, outside the Q.RIO2, connected to the Q.RIO2.		hold	Black	M20	PP-C63-QF-001/Q.RIO2	PP	FG16OM16 GREEN	3G2,5	12	5	MCT	Black	L1/+	150GS1	wired to the 230/24V converter (TAG: 150GS1)	**Q.RIO2**		230Vac
			hold	Blue									Blue	N/L2/-					
			PE	Y/G									Y/G	PE					
C63-JBS-03	Junction Box Sockets		L1	Black	n.1xM25	PP-C63-JBS-03/C63-SS-05	PP	FG16OM16 GREEN	3G2,5	12	15	n.1xM25	Black	L1		Sockets for Utilities Area	**C63-SS-05**		230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
C63-JBS-03	Junction Box Sockets		L1	Black	n.1xM25	PP-C63-JBS-03/C63-SS-06	PP	FG16OM16 GREEN	3G2,5	12	5	n.1xM25	Black	L1		Sockets for Utilities Area	**C63-SS-06**		230Vac
			N	Blue									Blue	N					
			PE	Y/G									Y/G	PE					
C63-JBL-003	Junction Box Lighting WP3		L	Black	n.1xM25	PP-C63-JBL-003/C63-LS-05	PP	FG16OM16 GREEN	3G2,5	12	19	n.1xM25	Black	14		Lighting switch WP3	**C63-LS-05**		230Vac
			1	Grey									Grey	13					
			2	Grey									Grey	21					
C63-JBL-003	Junction Box Lighting WP3		3	Black	n.1xM25	PP-C63-JBL-003/C63-LS-06	PP	FG16OM16 GREEN	3G2,5	12	30	n.1xM25	Black	14		Lighting switch WP3	**C63-LS-06**		230Vac
			1	Grey									Grey	13					
			2	Grey									Grey	21					
C63-JBL-003	Junction Box Lighting WP3		3	Brown	n.1xM25	PP-C63-JBL-003/C63-IEL-012	PP	FG16OM16 GREEN	5G2,5	14	10	n.1xM25	Brown	1		C63-IEL-012	**C63-IEL-012**		230Vac
			N	Blue									Blue	2					
			L-E	Black									Black	3					
			N-E	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-012	C63-IEL-012		1	Brown	n.1xM25	PP-C63-IEL-012/C63-IEL-011	PP	FG16OM16 GREEN	5G2,5	14	15	n.1xM25	Brown	1		C63-IEL-011	**C63-IEL-011**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-011	C63-IEL-011		1	Brown	n.1xM25	PP-C63-IEL-011/C63-IEL-010	PP	FG16OM16 GREEN	5G2,5	14	16	n.1xM25	Brown	1		C63-IEL-010	**C63-IEL-010**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-010	C63-IEL-010		1	Brown	n.1xM25	PP-C63-IEL-010/C63-INL-007	PP	FG16OM16 GREEN	5G2,5	14	10	n.1xM25	Brown	1		C63-INL-007	**C63-INL-007**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-INL-007	C63-INL-007		1	Brown	n.1xM25	PP-C63-INL-007/C63-IEL-013	PP	FG16OM16 GREEN	5G2,5	14	12	n.1xM25	Brown	1		C63-IEL-013	**C63-IEL-013**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-013	C63-IEL-013		1	Brown	n.1xM25	PP-C63-IEL-013/C63-INL-008	PP	FG16OM16 GREEN	5G2,5	14	11	n.1xM25	Brown	1		C63-INL-008	**C63-INL-008**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					

INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	340T1	4.1	1	A-Q.RIO2/HPP-700-JB2	A	1	1	X2	Temperature TT60.1	**HPP-700-JB2**	**HPP-700 JB2**	24Vdc
			4.3	2			2	2					
		340T5	4.1	3			3	3		Temperature TT60.2			
			4.3	4			4	4					
		341T5	4.1	5			5	5		Temperature TT61.1			
			4.3	6			6	6					
		342T7	4.1	7			7	7		Temperature TT64.5			
			4.3	8			8	8					
		343T7	4.1	9			9	9		Temperature TT64.6			
			4.3	10			10	10					
		341T7	4.1	11			11	11		Temperature TT64.7			
			4.3	12			12	12					
		343T1	4.1	13			13	13		Temperature TT64.8			
			4.3	14			14	14					
		343T3	4.1	15			15	15		Pressure PT64.1			
			4.3	16			16	16					
				17			17			SPARE			
				18			18						
				19			19	Sh		Shield			
Q.RIO2	RIO.2 - WP3	330T3	4.1	1	D-Q.RIO2/HPP-700-JB2	D	1	17	X2	Valve 64V4.1 Open GS 64.1.1	**HPP-700-JB2**	**HPP-700 JB2**	24Vdc
			4.2	2			2	18					
		330T5	4.1	3			3	19		Valve 64V4.2 Open GS 64.1.2			
			4.2	4			4	20					
		331T7	4.1	5			5	21		Valve 64V4.3 Open GS 64.1.3			
			4.2	6			6	22					
		332T1	4.1	7			7	23		Valve 64V4.4 Open GS 64.1.4			
			4.2	8			8	24					
		330T7	4.1	9			9	25		Valve 64V5 Open GS 64.2			
			4.2	10			10	26					
		332T3	4.1	11			11	27		Valve 64V7 Open GS 64.3			
			4.2	12			12	28					
		332T5	4.1	13			13	29		Valve 64Vxx Closed GS 64-T2			
			4.2	14			14	30					
		331T1	4.1	15			15	31		High High Temperature TS 64.3			
			4.2	16			16	32					
		332T7	4.1	17			17	33		High High Temperature TS 64.4			
			4.2	18			18	34					
				19			19	Sh		Shield			
			11	1			1	1		Valve 64-V1 command			

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FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	X.DO	12	2	D-Q.RIO2/HPP-700-JB1	D	2	2	X1	64 V1	HPP-700-JB1	HPP-700 JB1	24Vdc
			13	3			3	3		Valve 64-V2 command 64 V2			
			14	4			4	4					
			15	5			5	5		Valve 64-V3 command 64 V3			
			16	6			6	6					
			17	7			7	7		Valve 64-V8 command 64 V8			
			18	8			8	8					
			19	9			9	9		Valve 64-V12 command 64 V12			
			20	10			10	10					
			21	11			11	11		Valve 64-V17 command 64 V17			
			22	12			12	12					
				13			13			SPARE			
				14			14						
				15			15			SPARE			
				16			16						
				17			17			SPARE			
				18			18						
				19			19	Sh		Shield			

INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO WP3	X.DI	33	1	D-Q.RIO2/HPP-700-JB3	D	1	3	X2	Temperature Heater HE64.1 TS 64.1	**HPP-700-JB3**	**HPP-700 JB3**	24Vdc
			34	2			2	4					
				3			3						
			13	4			4	1		High High Temperature Heater HE64.1 TS 64.2			
			14	5			5	2					
				6			6						
				7			7						
Q.RIO2	RIO.2 - WP3	X.AI-S		Blue	A-Q.RIO2/AHD-1003	A	Blue			Ambient Hydrogen detector Level 1	**AHD-1003**		24Vdc
			14	Brown			Brown	MA1					
Q.RIO2	RIO.2 - WP3	270T5	14	blue	A-Q.RIO2/FC 64.1	A	blue	1		Flow Control Valve FV-64-1 command	**FC 64.1**	**HPP-700**	24Vdc
			15	brown			brown	2					
Q.RIO2	RIO.2 - WP3	X.AI	1	blue	A-Q.RIO2/PT-610	A	blue	2		Oxygen out ST-600	**PT-610**	**Cable gland on equipment to be sealed**	24Vdc
			2	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	13	blue	A-Q.RIO2/PT-900	A	blue	2		Oxygen out ST-600	**PT-900**	**Cable gland on equipment to be sealed**	24Vdc
			14	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	23	blue	A-Q.RIO2/FT-900	A	blue	2		N2 to ST 600	**FT-900**	**Cable gland on equipment to be sealed**	24Vdc
			24	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	29	blue	A-Q.RIO2/FT-901	A	blue	2		N2 to ST 600	**FT-901**	**Cable gland on equipment to be sealed**	24Vdc
			30	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	35	blue	A-Q.RIO2/LT-600	A	blue			Level indication ST-600	**LT-600**		24Vdc
			36	brown			brown						
Q.RIO2	RIO.2 - WP3	X.AI	3	blue	A-Q.RIO2/PT-630	A	blue	2		Hydrogen out ST-620 to Vent	**PT-630**		24Vdc
			4	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	15	blue	A-Q.RIO2/PT-920	A	blue	2		Pressure Nitrogen to ST-620	**PT-920**	**Cable gland on equipment to be sealed**	24Vdc
			16	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	39	blue	A-Q.RIO2/LT-620	A	blue			Level indication ST-620	**LT-620**		24Vdc
			40	brown			brown						
Q.RIO2	RIO.2 - WP3	X.AI	43	blue	A-Q.RIO2/PT-632	A	blue	2		Hydrogen out CS-630 to Vent	**PT-632**	**Cable gland on equipment to be sealed**	24Vdc
			44	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	17	blue	A-Q.RIO2/DPT-800A	A	blue	-VE		Dew Point in Hydrogen to Production	**DPT-800A**	**Cable gland on equipment to be sealed**	24Vdc
			18	brown			brown	+VE					
Q.RIO2	RIO.2 - WP3	X.AI	25	blue	A-Q.RIO2/DPT-800B	A	blue	-VE		Dew Point in Hydrogen to Production	**DPT-800B**	**Cable gland on equipment to be sealed**	24Vdc
			26	brown			brown	+VE					
Q.RIO2	RIO.2 - WP3	X.AI	41	blue	A-Q.RIO2/DPT-800C	A	blue	-VE		Dew Point in Hydrogen to Production	**DPT-800C**	**Cable gland on equipment to be sealed**	24Vdc
			42	brown			brown	+VE					
Q.RIO2	RIO.2 - WP3	340T3	4.1	blue	A-Q.RIO2/JB-OIHA-800A	A	blue	+VE		JB-OIHA-800A	**JB-OIHA-800A**		24Vdc
			4.3	Black			Black	-VE					
JB-OIHA-800A	JB-OIHA-800A		+VE	blue	A-JB-OIHA-800A/OIHA-800A	A	blue	+VE		Oxygen in Hydrogen to Production	**OIHA-800A**		24Vdc

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FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
~~JB-OIHA-800A~~	~~JB-OIHA-800A~~		-VE	brown	~~A-JB-OIHA-800A/OIHA-800A~~	~~A~~	brown	-VE		~~Oxygen in Hydrogen to Production~~	~~OIHA-800A~~		~~24Vdc~~
Q.RIO2	RIO.2 - WP3	340T7	4.1	blue	A-Q.RIO2/JB-OIHA-800B	A	blue	+VE		JB-OIHA-800B	**JB-OIHA-800B**		24Vdc
			4.3	Black			Black	-VE					
JB-OIHA-800B	JB-OIHA-800B		+VE	blue	A-JB-OIHA-800B/OIHA-800B	A	blue	+VE		Oxygen in Hydrogen to Production	**OIHA-800B**		24Vdc
			-VE	brown			brown	-VE					
Q.RIO2	RIO.2 - WP3	342T1	4.1	blue	A-Q.RIO2/JB-OIHA-800C	A	blue	+VE		JB-OIHA-800C	**JB-OIHA-800C**		24Vdc
			4.3	Black			Black	-VE					
JB-OIHA-800C	JB-OIHA-800C		+VE	blue	A-JB-OIHA-800C/OIHA-800C	A	blue	+VE		Oxygen in Hydrogen to Production	**OIHA-800C**		24Vdc
			-VE	brown			brown	-VE					
Q.RIO2	RIO.2 - WP3	X.AI	31	blue	A-Q.RIO2/PT-910	A	blue	2		Nitrogen to services	**PT-910**	**Cable gland on equipment to be sealed**	24Vdc
			32	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	7	blue	A-Q.RIO2/PT-150	A	blue	2		Compressed air to services	**PT-150**	**Cable gland on equipment to be sealed**	24Vdc
			8	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.INT24	+	blue	P-Q.RIO2/MPV-611	P	blue	1		24Vdc Power Supply	**MPV-611**	**Cable gland on equipment to be sealed**	24Vdc
			-	brown			brown	2					
Q.RIO2	RIO.2 - WP3	X.INT24	+	blue	P-Q.RIO2/MPV-630	P	blue	1		24Vdc Power Supply	**MPV-630**	**Cable gland on equipment to be sealed**	24Vdc
			-	brown			brown	2					
Q.RIO2	RIO.2 - WP3	X.AO	1	blue	A-Q.RIO2/MPV-611/1	A	blue	7		Motorized proportional Valve command	**MPV-611**	**Cable gland on equipment to be sealed**	24Vdc
			2	brown			brown	8					
Q.RIO2	RIO.2 - WP3	X.AI	0Vdc	blue	A-Q.RIO2/MPV-611/2	A	blue	8		Motorized proportional Valve position	**MPV-611**	**Cable gland on equipment to be sealed**	24Vdc
			9	brown			brown	6					
Q.RIO2	RIO.2 - WP3	X.AI	0Vdc	blue	A-Q.RIO2/MPV-630/1	A	blue	8		Motorized proportional Valve position	**MPV-630**	**Cable gland on equipment to be sealed**	24Vdc
			19	brown			brown	6					

INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	X.AO	3	blue	A-Q.RIO2/MPV-630/2	A	blue	7		Motorized proportional Valve command	**MPV-630**	**Cable gland on equipment to be sealed**	24Vdc
			4	brown			brown	8					
Q.RIO2	RIO.2 - WP3	X.AI-S	1	blue	A-Q.RIO2/PT-611	A	blue	1		Oxygen out ST-600	**PT-611**	**Cable gland on equipment to be sealed**	24Vdc
			2	brown			brown	2					
Q.RIO2	RIO.2 - WP3	X.AI-S		blue	A-Q.RIO2/HIOD-610A	A	blue			Hydrogen in Oxygen detection ST-600 sampling O2 to vent	**HIOD-610A**	**Cable gland on equipment to be sealed**	24Vdc
			4	brown			brown	MA1					
Q.RIO2	RIO.2 - WP3	X.AI-S		blue	A-Q.RIO2/HIOD-610B	A	blue			Hydrogen in Oxygen detection ST-600 sampling O2 to vent	**HIOD-610B**	**Cable gland on equipment to be sealed**	24Vdc
			10	brown			brown	MA1					
Q.RIO2	RIO.2 - WP3	X.AI-S		blue	A-Q.RIO2/HIOD-610C	A	blue			Hydrogen in Oxygen detection ST-600 sampling O2 to vent	**HIOD-610C**	**Cable gland on equipment to be sealed**	24Vdc
			18	brown			brown	MA1					
Q.RIO2	RIO.2 - WP3	X.AI-S	11	blue	A-Q.RIO2/PT-631	A	blue	1		High High pressure Hydrogen out ST-620 to Vent	**PT-631**	**Cable gland on equipment to be sealed**	24Vdc
			12	brown			brown	2					
Q.RIO2	RIO.2 - WP3	X.AI-S	19	blue	A-Q.RIO2/PT-633	A	blue	1		Hydrogen to Production	**PT-633**	**Cable gland on equipment to be sealed**	24Vdc
			20	brown			brown	2					
Q.RIO2	RIO.2 - WP3	330T1	4.1	blue	D-Q.RIO2/FICV-611	D	blue	2		ST-600 low low flow O2 to vent	**FICV-611**	**Cable gland on equipment to be sealed**	24Vdc
			4.2	Black			Black	1					
Q.RIO2	RIO.2 - WP3	X.DI	21	blue	D-Q.RIO2/LSH-610	D	blue	4		High Level CS-610	**LSH-610**	**Cable gland on equipment to be sealed**	24Vdc
			22	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	1	blue	D-Q.RIO2/LSL-610	D	blue	4		Low Level CS-610	**LSL-610**	**Cable gland on equipment to be sealed**	24Vdc
			2	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	23	blue	D-Q.RIO2/LSH-630	D	blue	4		High Level CS-630	**LSH-630**	**Cable gland on equipment to be sealed**	24Vdc
			24	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	3	blue	D-Q.RIO2/LSL-630	D	blue	4		Low Level CS-630	**LSL-630**	**Cable gland on equipment to be sealed**	24Vdc
			4	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	25	blue	D-Q.RIO2/LSH-500	D	blue	4		High Level H2 header	**LSH-500**	**Cable gland on equipment to be sealed**	24Vdc
			26	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	5	blue	D-Q.RIO2/LSL-500	D	blue	4		Low Level H2 header	**LSL-500**	**Cable gland on equipment to be sealed**	24Vdc
			6	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	27	blue	D-Q.RIO2/LSH-640	D	blue	4		High Level DG-640	**LSH-640**	**Cable gland on equipment to be sealed**	24Vdc
			28	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	7	blue	D-Q.RIO2/LSL-640	D	blue	4		Low Level DG-640	**LSL-640**	**Cable gland on equipment to be sealed**	24Vdc
			8	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI	29	blue	D-Q.RIO2/JB-DS-004	D	blue	1		JB DOOR SWITCH DS-004	**JB-DS-004**	**NO configuration**	24Vdc
			30	brown			brown	2					
JB-DS-004	JB DOOR SWITCH DS-004		4	Blue	D-JB-DS-004/DS-004	D	Blue	4		Door switch open/close_Level 1	**DS-004**		24Vdc
			5	Brown			Brown	5					
			2	Wh-Bk			Wh-Bk	2					
			1	Black			Black	1					

INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	X.DI	9	blue	D-Q.RIO2/JB-DS-005	D	blue	1		JB DOOR SWITCH DS-005	**JB-DS-005**	**NO configuration**	24Vdc
			10	brown			brown	2					
JB-DS-005	JB DOOR SWITCH DS-005		4	Blue	D-JB-DS-005/DS-005	D	Blue	4		Door switch open/close_Level 1	**DS-005**		24Vdc
			5	Brown			Brown	5					
			2	Wh-Bk			Wh-Bk	2					
			1	Black			Black	1					
Q.RIO2	RIO.2 - WP3	X.DI	31	blue	D-Q.RIO2/JB-DS-006	D	blue	1		JB DOOR SWITCH DS-006	**JB-DS-006**	**NO configuration**	24Vdc
			32	brown			brown	2					
JB-DS-006	JB DOOR SWITCH DS-006		4	Blue	D-JB-DS-006/DS-006	D	Blue	4		Door switch open/close_Level 1	**DS-006**		24Vdc
			5	Brown			Brown	5					
			2	Wh-Bk			Wh-Bk	2					
			1	Black			Black	1					
Q.RIO2	RIO.2 - WP3	X.DI	11	blue	D-Q.RIO2/JB-DS-007	D	blue	1		JB DOOR SWITCH DS-007	**JB-DS-007**	**NO configuration**	24Vdc
			12	brown			brown	2					
JB-DS-007	JB DOOR SWITCH DS-007		4	Blue	D-JB-DS-007/DS-007	D	Blue	4		Door switch open/close_Level 1	**DS-007**		24Vdc
			5	Brown			Brown	5					
			2	Wh-Bk			Wh-Bk	2					
			1	Black			Black	1					

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FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	X.DI	41	blue	D-Q.RIO2/JB-PWR-03	D	blue	COM		Zener Barrier_signal	**JB-PWR-03**		24Vdc
			42	Black			Black	SPARE					
Q.RIO2	RIO.2 - WP3	X.INT24	+24V	blue	P-Q.RIO2/JB-PWR-03	P	blue	N		Zener Barrier_power supply	**JB-PWR-03**		24Vdc
			+0V	Black			Black	L					
JB-PWR-03	Zener Barrier_signal		A	blue	D-JB-PWR-03/JB-WLD-5	D	blue	4		Water leak detector_Level 1_signal	**JB-WLD-5**		24Vdc
			SPARE	Black			Black						
JB-PWR-03	Zener Barrier_power supply		C	blue	P-JB-PWR-03/JB-WLD-5	P	blue	1		Water leak detector_Level 1_power supply	**JB-WLD-5**		24Vdc
			B	Black			Black	3					
JB-WLD-5	JB WLD-005		1		PD-JB-WLD-5/WLD-005	PD		1		Water leak detector_Level 1	**WLD-005**		24Vdc
			2					2					
			3					3					
			4					4					
Q.RIO2	RIO.2 - WP3	X.DI-S	1	blue	A-Q.RIO2/ZIO-605	A	blue	4		HV-605 Valve Open position	**ZIO-605**	**Cable gland on equipment to be sealed**	24Vdc
			2	brown			brown	6					
Q.RIO2	RIO.2 - WP3	X.DI-S	15	blue	D-Q.RIO2/LSH-600	D	blue	4		High High Level ST-600	**LSH-600**	**Cable gland on equipment to be sealed**	24Vdc
			16	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	29	blue	D-Q.RIO2/LSL-600	D	blue	4		Low Low Level ST-600	**LSL-600**	**Cable gland on equipment to be sealed**	24Vdc
			30	brown			brown	3					
Q.RIO2	RIO.2 - WP3	320T1	1	blue	D-Q.RIO2/FICV-610A	D	blue	2		ST-600 low low flow sampling O2 to vent	**FICV-610A**		24Vdc
			2	Black			Black	1					
Q.RIO2	RIO.2 - WP3	320T3	1	blue	D-Q.RIO2/FICV-610B	D	blue	2		ST-600 low low flow sampling O2 to vent	**FICV-610B**		24Vdc
			2	Black			Black	1					
Q.RIO2	RIO.2 - WP3	320T5	1	blue	D-Q.RIO2/FICV-610C	D	blue	4		ST-600 low low flow sampling O2 to vent	**FICV-610C**		24Vdc
			2	Black			Black	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	17	blue	D-Q.RIO2/LSL-611	D	blue	4		Low CS-610	**LSL-611**	**Cable gland on equipment to be sealed**	24Vdc
			18	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	31	blue	D-Q.RIO2/ZIO-624	D	blue	4		HV-624 Valve Open position	**ZIO-624**	**Cable gland on equipment to be sealed**	24Vdc
			32	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	5	blue	D-Q.RIO2/LSL-620	D	blue	4		Low Low Level ST-620	**LSL-620**	**Cable gland on equipment to be sealed**	24Vdc
			6	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	19	blue	D-Q.RIO2/LSHH-631	D	blue	4		High High Level CS-630	**LSHH-631**	**Cable gland on equipment to be sealed**	24Vdc
			20	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	33	blue	D-Q.RIO2/LSHH-500	D	blue	4		High High Level H2 header	**LSHH-500**	**Cable gland on equipment to be sealed**	24Vdc
			34	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	7	blue	D-Q.RIO2/LSLL-500	D	blue	4		Low Low Level H2 header	**LSLL-500**	**Cable gland on equipment to be sealed**	24Vdc
			8	brown			brown	3					
Q.RIO2	RIO.2 - WP3	X.DI-S	21	blue	D-Q.RIO2/LSL-641	D	blue	4		Low Level DG-640	**LSL-641**	**Cable gland on equipment to be sealed**	24Vdc
			22	brown			brown	3					

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INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	X.DI-S	35	blue	D-Q.RIO2/FSH-640	D	blue	11		High flow PWH2 to ST-600	**FSH-640**		24Vdc
			36	brown			brown	12					
Q.RIO2	RIO.2 - WP3	331T3	4.1	blue	D-Q.RIO2/JB-FICV-800/1	D	blue	1		High High flow Hydrogen to Vent Analisys	**JB-FICV-800**		24Vdc
			4.2	Black			Black	2					
Q.RIO2	RIO.2 - WP3	320T7	1	blue	D-Q.RIO2/JB-FICV-800/2	D	blue	3		Low Low flow Hydrogen to Vent Analisys	**JB-FICV-800**		24Vdc
			2	Black			Black	4					
JB-FICV-800	Junction Box FICV-800		3	green	D-JB-FICV-800/FICV-800	D	green	2		High High and Low Low flow Hydrogen to Vent Analisys	**FICV-800**		24Vdc
			1	white			white	4					
			2	yellow			yellow	3					
			n/a	Coax - BK			Coax - BK	n/a					
			n/a	Coax - Inner			oax - Inn	n/a					
			4	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.DO-S	1	blue	D-Q.RIO2/APC-900/1	D	blue	19	XV	Solenoid Valve command PV-500	**APC-900/1**		24Vdc
			2	brown			brown	20					
Q.RIO2	RIO.2 - WP3	X.DO-S	9	blue	D-Q.RIO2/APC-900/2	D	blue	17	XV	Solenoid Valve command PV-501	**APC-900/2**		24Vdc
			10	brown			brown	18					
Q.RIO2	RIO.2 - WP3	X.DO-S	17	blue	D-Q.RIO2/APC-900/3	D	blue	1	XV	Solenoid Valve command SV-900	**APC-900/3**		24Vdc
			18	brown			brown	2					
Q.RIO2	RIO.2 - WP3	X.DO-S	25	blue	D-Q.RIO2/APC-900/4	D	blue	3	XV	Solenoid Valve command SV-920	**APC-900/4**		24Vdc
			26	brown			brown	4					
Q.RIO2	RIO.2 - WP3	X.DO-S	3	blue	D-Q.RIO2/APC-900/5	D	blue	15	XV	Solenoid Valve command SV-601	**APC-900/5**		24Vdc
			4	brown			brown	16					
Q.RIO2	RIO.2 - WP3	X.DO-S	11	blue	D-Q.RIO2/APC-900/6	D	blue	13	XV	Solenoid Valve command SV-610	**APC-900/6**		24Vdc
			12	brown			brown	14					
Q.RIO2	RIO.2 - WP3	X.DO-S	19	blue	D-Q.RIO2/APC-900/7	D	blue	11	XV	Solenoid Valve command SV-630	**APC-900/7**		24Vdc
			20	brown			brown	12					
Q.RIO2	RIO.2 - WP3	X.DO-S	27	blue	D-Q.RIO2/APC-900/8	D	blue	9	XV	Solenoid Valve command SV-635	**APC-900/8**		24Vdc
			28	brown			brown	10					
Q.RIO2	RIO.2 - WP3	X.DO-S	5	blue	D-Q.RIO2/APC-900/9	D	blue	7	XV	Solenoid Valve command SV-641	**APC-900/9**		24Vdc
			6	brown			brown	8					
Q.RIO2	RIO.2 - WP3	X.DO-S	13	blue	D-Q.RIO2/APC-900/10	D	blue	5	XV	Solenoid Valve command SV-800	**APC-900/10**		24Vdc
			14	brown			brown	6					
JB-SD-001	JB MARSHALLING F&G WP3 with barrier and loop relay	GALV BARR	1	blue	D-JB-SD-001/SD-006A	D	blue	L1		Smoke detector Electrical cabinet_Level 1	**SD-006A**		24Vdc
			2	Black			Black	L2					
SD-006A	Smoke detector Electrical cabinet_Level 1		L1	blue	D-SD-006A/SD-006B	D	blue	L1		Smoke detector Electrical cabinet_Level 1	**SD-006B**		24Vdc
			L2	Black			Black	L2					
SD-006B	Smoke detector Electrical cabinet_Level 1		L1	blue	D-SD-006B/SD-006C	D	blue	L1		Smoke detector Electrical cabinet_Level 1	**SD-006C**		24Vdc
			L2	Black			Black	L2					

INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
Q.RIO2	RIO.2 - WP3	X.AI	27	blue	A-Q.RIO2/PT-612	A	blue	2		Oxygen header to Vent	**PT-612**	**Cable gland on equipment to be sealed**	24Vdc
			28	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	11	blue	A-Q.RIO2/FT-920	A	blue	2		N2 to ST 620	**FT-920**		24Vdc
			12	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI	21	blue	A-Q.RIO2/FT-921	A	blue	2		N2 to ST 620	**FT-921**		24Vdc
			22	brown			brown	1					
Q.RIO2	RIO.2 - WP3	X.AI-S		blue	A-Q.RIO2/AHD-1000	A	blue			Ambient Hydrogen detector Level 1	**AHD-1000**	**Cable gland on equipment to be sealed**	24Vdc
			6	brown			brown	MA1					
Q.RIO2	RIO.2 - WP3	+24Vdc	13	blue	P-Q.RIO2/APC-980/1	P	blue	AUX 24	XP	PVI-980 Power supply	**APC-980/1**		24Vdc
			14	brown			brown	AUX GND					
Q.RIO2	RIO.2 - WP3	+24Vdc	13	blue	P-Q.RIO2/APC-980/2	P	blue	24V	XP	PVI-980 Power supply	**APC-980/2**		24Vdc
			14	brown			brown	GND					
Q.RIO2	RIO.2 - WP3	+24Vdc		blue	P-Q.RIO2/JB-PWR-01/1	P	blue	24V	XP	JB for 24Vdc	**JB-PWR-01**		24Vdc
				brown			brown	0V					
Q.RIO2	RIO.2 - WP3	+24Vdc		blue	P-Q.RIO2/JB-PWR-01/2	P	blue	24V	XP	JB for 24Vdc	**JB-PWR-01**		24Vdc
				brown			brown	0V					
JB-PWR-01	JB for 24Vdc	XP	1	blue	P-JB-PWR-01/AHD-1000	P	blue	+DC		Ambient Hydrogen detector Level 1	**AHD-1000**		24Vdc
			2	brown			brown	-DC					
JB-PWR-01	JB for 24Vdc	XP	3	blue	P-JB-PWR-01/AHD-1003	P	blue	+DC		Ambient Hydrogen detector Level 1	**AHD-1003**		24Vdc
			4	brown			brown	-DC					
JB-PWR-01	JB for 24Vdc	XP	5	blue	P-JB-PWR-01/HIOD-610A	P	blue	+DC		Hydrogen in Oxygen detection ST-600 sampling O2 to vent	**HIOD-610A**		24Vdc
			6	brown			brown	-DC					
JB-PWR-01	JB for 24Vdc	XP	7	blue	P-JB-PWR-01/HIOD-610B	P	blue	+DC		Hydrogen in Oxygen detection ST-600 sampling O2 to vent	**HIOD-610B**		24Vdc
			8	brown			brown	-DC					
JB-PWR-01	JB for 24Vdc	XP	9	blue	P-JB-PWR-01/HIOD-610C	P	blue	+DC		Hydrogen in Oxygen detection ST-600 sampling O2 to vent	**HIOD-610C**		24Vdc
			10	brown			brown	-DC					
JB-PWR-01	JB for 24Vdc	XP	11	blue	P-JB-PWR-01/LSH-610	P	blue	1		High Level CS-610	**LSH-610**		24Vdc
			12	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	13	blue	P-JB-PWR-01/LSL-610	P	blue	1		Low Level CS-610	**LSL-610**		24Vdc
			14	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	15	blue	P-JB-PWR-01/LSH-630	P	blue	1		High Level CS-630	**LSH-630**		24Vdc
			16	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	17	blue	P-JB-PWR-01/LSL-630	P	blue	1		Low Level CS-630	**LSL-630**		24Vdc
			18	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	19	blue	P-JB-PWR-01/LSH-500	P	blue	1		High Level H2 header	**LSH-500**		24Vdc
			20	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	21	blue	P-JB-PWR-01/LSL-500	P	blue	1		Low Level H2 header	**LSL-500**		24Vdc
			22	brown			brown	2					

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INSTRUMENT CABLES WP3

FROM					CABLE					TO		NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	TAG	TYPE	CORE	TERM.	T.B.	DESCRIPTION	TAG		
JB-PWR-01	JB for 24Vdc	XP	23	blue	P-JB-PWR-01/LSH-640	P	blue	1		High Level DG-640	**LSH-640**		24Vdc
			24	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	25	blue	P-JB-PWR-01/LSL-640	P	blue	1		Low Level DG-640	**LSL-640**		24Vdc
			26	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	27	blue	P-JB-PWR-01/LSH-600	P	blue	1		High High Level ST-600	**LSH-600**		24Vdc
			28	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	29	blue	P-JB-PWR-01/LSL-600	P	blue	1		Low Low Level ST-600	**LSL-600**		24Vdc
			30	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	31	blue	P-JB-PWR-01/LSL-611	P	blue	1		Low CS-610	**LSL-611**		24Vdc
			32	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	33	blue	P-JB-PWR-01/LSL-641	P	blue	1		Low Level DG-640	**LSL-641**		24Vdc
			34	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	35	blue	P-JB-PWR-01/LSL-620	P	blue	1		Low Low Level ST-620	**LSL-620**		24Vdc
			36	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	37	blue	P-JB-PWR-01/LSHH-500	P	blue	1		High High Level H2 header	**LSHH-500**		24Vdc
			38	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	39	blue	P-JB-PWR-01/LSLL-500	P	blue	1		Low Low Level H2 header	**LSLL-500**		24Vdc
			40	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	41	blue	P-JB-PWR-01/LSH-631	P	blue	1		High High Level CS-630	**LSH-631**		24Vdc
			42	brown			brown	2					
JB-PWR-01	JB for 24Vdc	XP	43	blue	P-JB-PWR-01/FT-630	P	blue	1		Hydrogen to Production	**FT-630**	**Cable gland on equipment to be sealed**	24Vdc
			44	brown			brown	2					
Q.RIO2	RIO.2 - WP3	250T1	5.1	blue	A-Q.RIO2/FT-630	A	blue	26		Hydrogen to Production	**FT-630**	**Cable gland on equipment to be sealed**	24Vdc
			5.2	brown			brown	27					

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ELECTRICAL CABLES WP4

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	DIAMETER EXT / INT (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
C63-JBL-004	Junction Box Lighting WP4		L	Black	1xM20	PP-C63-JBL-004/C63-LS-07	PP	FG16OM16	3G2,5	12	1	n.1xM25	Black	14		Lighting switch WP4	**C63-LS-07**		230Vac
			1	Grey									Grey	13					
			PE	Y/G									Y/G	PE					
C63-JBL-004	Junction Box Lighting WP4		1	Brown	n.1xM25	PP-C63-JBL-004/C63-IEL-015	PP	FG16OM16	5G2,5	14	8	n.1xM25	Brown	1		C63-IEL-015	**C63-IEL-015**		230Vac
			N	Blue									Blue	2					
			L-E	Black									Black	3					
			N-E	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-015	C63-IEL-015		1	Brown	n.1xM25	PP-C63-IEL-015/C63-INL-010	PP	FG16OM16	5G2,5	14	8	n.1xM25	Brown	1		C63-INL-010	**C63-INL-010**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-INL-0010	C63-INL-0010		1	Brown	n.1xM25	PP-C63-INL-0010/C63-IEL-014	PP	FG16OM16	5G2,5	14	8	n.1xM25	Brown	1		C63-IEL-014	**C63-IEL-014**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					
C63-IEL-014	C63-IEL-014		1	Brown	n.1xM25	PP-C63-IEL-014/C63-INL-009	PP	FG16OM16	5G2,5	14	8	n.1xM25	Brown	1		C63-INL-009	**C63-INL-009**		230Vac
			2	Blue									Blue	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
			PE	Y/G									Y/G	PE					

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INSTRUMENT CABLES WP4

FROM						CABLE						TO						NOTES	Nominal Voltage of connection
TAG	DESCRIPTION	T.B.	TERM.	CORE	MCT./ CABLE GLAND	TAG	TYPE	CABLE STANDARD	SIZE (mm2)	Outer diameter (mm)	LENGHT (m)	MCT./ CABLE GLAND	CORE	TERM.	T.B.	DESCRIPTION	TAG		
JB-WLD-6	JB WLD-006		1	Blue		PD-JB-WLD-6/WLD-006	PD	SUPPLIER CABLE	SUPPLIER CABLE		5		Blue	1		Water leak detector_Level 1	**WLD-006**		24Vdc
			2	brown									brown	2					
			3	Black									Black	3					
			4	Grey									Grey	4					
SD-007A	Smoke detector Electrical cabinet_Level 1	OUT	+	blue		D-SD-007A/SD-007B	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		blue	+	IN	Smoke detector Electrical cabinet_Level 1	**SD-007B**		24Vdc
			-	brown									brown	-					
SD-007B	Smoke detector Electrical cabinet_Level 1	OUT	+	blue		D-SD-007B/SD-007C	D	FTG18OHM16 BLACK	2x1,5 + Sh fireproof	10	1		blue	+	IN	Smoke detector Electrical cabinet_Level 1	**SD-007C**		24Vdc
			-	brown									brown	-					
JB-DS-009	JB DOOR SWITCH DS-009	X.DI	1	Blue		D-JB-DS-009/DS-009	D	supplier cable	supplier cable				Blue			Door switch 009	**DS-009**		24Vdc
			2	Brown									Brown						
			3	Wh-Bk									Wh-Bk						
			4	Black									Black						
JB-DS-010	JB DOOR SWITCH DS-010	X.DI	1	Blue		D-JB-DS-010/DS-010	D	supplier cable	supplier cable				Blue			Door switch 010	**DS-010**		24Vdc
			2	Brown									Brown						
			3	Wh-Bk									Wh-Bk						
			4	Black									Black						

C0063-FOR-SAF-EL-002

Intrinsic safety loops

C63- CrossWind Project

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
04	*As Built*	*19-mar-25*	*E. BALESTRI*	*M. CHIARUCCI*	*L. MAIOLI*
03	*Issue for Approval*	*26-feb-25*	*E. BALESTRI*	*M. CHIARUCCI*	*L. MAIOLI*
02	*Issue for Approval*	*12-feb-25*	*E. BALESTRI*	*M. CHIARUCCI*	*L. MAIOLI*
01	*Issue for Approval*	*10-gen-25*	*E. BALESTRI*	*M. CHIARUCCI*	*L. MAIOLI*
00	*Issue for Review*	*31-ott-24*	*E. BALESTRI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	C0063-FOR-SAF-EL-002
Elogen Project Document Title	Intrinsic safety loops
Crosswind Project Document File Number	FORES-INN-BPH-RPT-00009
Fores Project Document Number and Revision	224J10-DDL-AUT-CA-00001-00

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REVISION LIST

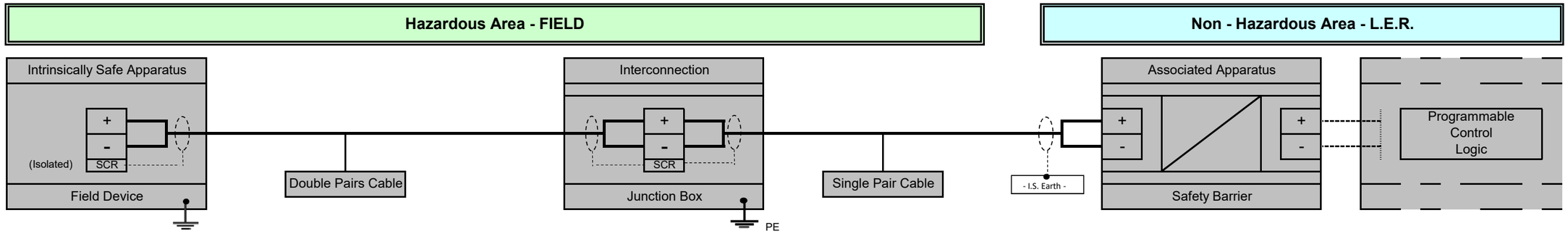
REV.	DESCRIPTION
00	*Issue for Review*
01	*Issue for Approval*
02	*Issue for Approval*
03	*Issue for Approval*
04	*As Built*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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LEVEL SWITCH



Field Device	
Field Device Type	KRONHE / OPTISWITCH 6600C
Approved Certificate	TUV 16 ATEX 182791X
Rating	Ex ia IIC T5/T4 Ga
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	100 [mA]
Max Allowed Power - Pi	750 [mW]
Resistance - R3	300 [ohm]
Inductance - L3	0,01 [mH]
Capacitance - C3	43 [nF]

Double Pairs Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	4x0,75 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

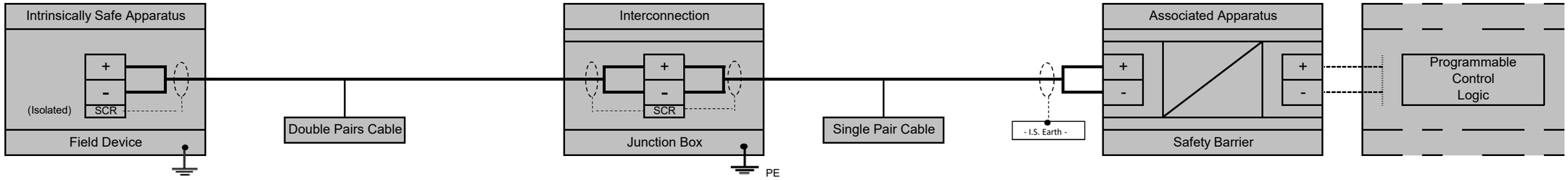
Safety Barrier (Galvanic Type)	
Limiting Device Type	BAUMER - APPROFSIS3-B25100
Approved Certificate	LCIE 03ATEX 6078X
Rating	-
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	99 [mA]
Max Allowed Power - P_0	623 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

	Device TAG	Cable Length Check													Entity Matching			Equipment
		Double Pair Cable Length	Double Pair TOT Resist.	Double Pair TOT Induct.	Double Pair TOT Capacit.	Single Pairs Cable Length	Single Pairs TOT Resist.	Single Pairs TOT Induct.	Single Pairs TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	WLD-001	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	14 [m]	0,1862 [Ω]	0,0126 [mH]	2,8 [nF]	0,1996 [Ω]	0,0131 [mH]	2,9 [nF]	65,397144 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
2	WLD-002	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	19 [m]	0,2527 [Ω]	0,0171 [mH]	3,8 [nF]	0,2661 [Ω]	0,0176 [mH]	3,9 [nF]	65,965044 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
3	WLD-003	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	22 [m]	0,2926 [Ω]	0,0198 [mH]	4,4 [nF]	0,306 [Ω]	0,0203 [mH]	4,5 [nF]	66,187286 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
4	WLD-004	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	20 [m]	0,266 [Ω]	0,018 [mH]	4 [nF]	0,2794 [Ω]	0,0185 [mH]	4,1 [nF]	66,046179 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
5	WLD-006	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	5 [m]	0,0665 [Ω]	0,0045 [mH]	1 [nF]	0,0799 [Ω]	0,005 [mH]	1,1 [nF]	61,991234 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
6																			
7																			
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LEVEL SWITCH

Hazardous Area - FIELD

Hazardous Area - JB-PWR-03 (WP3)



Field Device	
Field Device Type	KRONHE / OPTISWITCH 6600C
Approved Certificate	TUV 16 ATEX 182791X
Rating	Ex ia IIC T5/T4 Ga
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	100 [mA]
Max Allowed Power - Pi	750 [mW]
Resistance - R3	300 [ohm]
Inductance - L3	0,01 [mH]
Capacitance - C3	43 [nF]

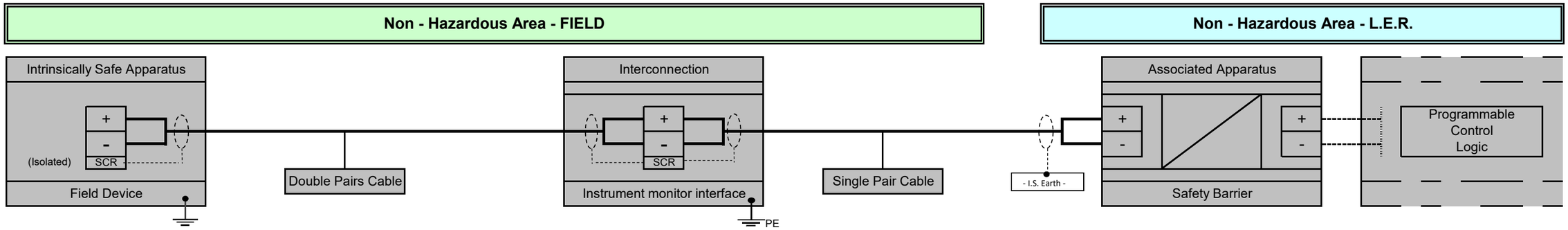
Double Pairs Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	4x0,75 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	BAUMER - APPROFSIS3-B25100
Approved Certificate	LCIE 03ATEX 6078X
Rating	-
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	99 [mA]
Max Allowed Power - P_0	623 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Double Pair Cable Length	Double Pair TOT Resist.	Double Pair TOT Induct.	Double Pair TOT Capacit.	Single Pairs Cable Length	Single Pairs TOT Resist.	Single Pairs TOT Induct.	Single Pairs TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	WLD-005	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	24 [m]	0,3192 [Ω]	0,0216 [mH]	4,8 [nF]	0,3326 [Ω]	0,0221 [mH]	4,9 [nF]	66,305819 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2																			
3																			
4																			
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CONDUCTIVITY TRANSMITTER



Field Device	
Field Device Type	E+H / CM42-CEA100EAF00
Approved Certificate	TUV 13 ATEX 7459X
Rating	Ex ib [ia Ga] IIC T6/T4 Gb
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	100 [mA]
Max Allowed Power - Pi	800 [mW]
Resistance - R3	300 [ohm]
Inductance - L3	0,0012 [mH]
Capacitance - C3	0,029 [nF]

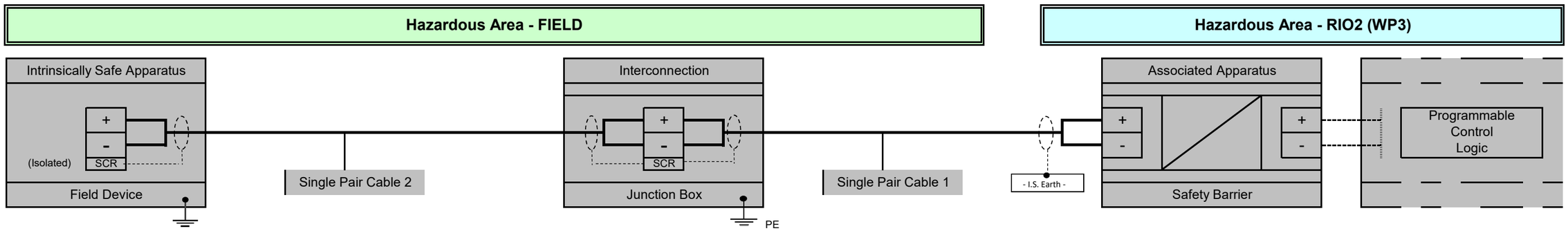
Double Pairs Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	4x0,75 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-RPSSI-I-UP
Approved Certificate	BVS 08 ATEX E094 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	93 [mA]
Max Allowed Power - P_0	587 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Double Pair Cable Length	Double Pair TOT Resist.	Double Pair TOT Induct.	Double Pair TOT Capacit.	Single Pairs Cable Length	Single Pairs TOT Resist.	Single Pairs TOT Induct.	Single Pairs TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	CT/P-600 (YI)	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	13 [m]	0,1729 [Ω]	0,0117 [mH]	2,6 [nF]	0,1863 [Ω]	0,0122 [mH]	2,7 [nF]	65,234899 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
2	CT/P-600 (TI)	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	13 [m]	0,1729 [Ω]	0,0117 [mH]	2,6 [nF]	0,1863 [Ω]	0,0122 [mH]	2,7 [nF]	65,234899 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
3	CT/P-620 (YI)	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	21 [m]	0,2793 [Ω]	0,0189 [mH]	4,2 [nF]	0,2927 [Ω]	0,0194 [mH]	4,3 [nF]	66,119938 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
4	CT/P-620 (TI)	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	21 [m]	0,2793 [Ω]	0,0189 [mH]	4,2 [nF]	0,2927 [Ω]	0,0194 [mH]	4,3 [nF]	66,119938 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
5																			
6																			
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OXIGEN IN HYDROGEN TRANSMITTER



Field Device	
Field Device Type	GE/ oxy.IQ Oxigen Transmitter
Approved Certificate	IECEx FMG 14.0016X
Rating	Ex ia IIC T4 Ga
Max Allowed Voltage - V_i	28 [V]
Max Allowed Current - Ii	150 [mA]
Max Allowed Power - Pi	1050 [mW]
Resistance - R3	187 [ohm]
Inductance - L3	0 [mH]
Capacitance - C3	0 [nF]

Single Pair Cable 2		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	1x1x1,5 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Single Pair Cable 1		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

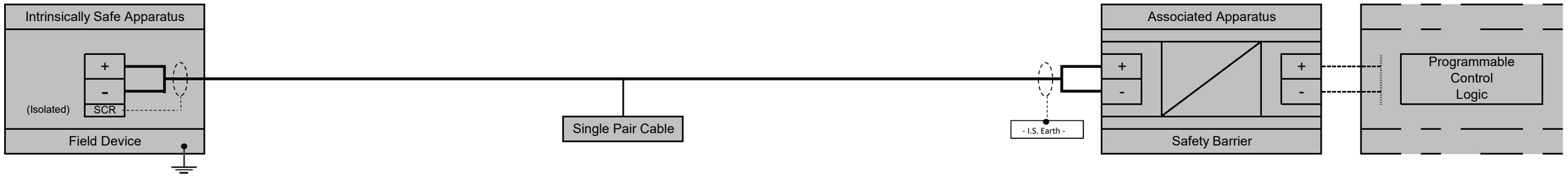
Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-RPSSI-I-UP
Approved Certificate	BVS 08 ATEX E094 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	93 [mA]
Max Allowed Power - P_0	587 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair 2 Cable Length	Single Pair 2 TOT Resist.	Single Pair 2 TOT Induct.	Single Pair 2 TOT Capacit.	Single Pair 1 Cable Length	Single Pair 1 TOT Resist.	Single Pair 1 TOT Induct.	Single Pair 1 TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	OIHA-800A	0,5 [m]	0,0067 [Ω]	0,0005 [mH]	0,1 [nF]	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]	0,3392 [Ω]	0,023 [mH]	5,1 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2	OIHA-800B	0,5 [m]	0,0067 [Ω]	0,0005 [mH]	0,1 [nF]	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]	0,3392 [Ω]	0,023 [mH]	5,1 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
3	OIHA-800C	0,5 [m]	0,0067 [Ω]	0,0005 [mH]	0,1 [nF]	11 [m]	0,1463 [Ω]	0,0099 [mH]	2,2 [nF]	0,153 [Ω]	0,0104 [mH]	2,3 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
4																			
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TEMPERATURE TRANSMITTER

Non - Hazardous Area - FIELD

Non - Hazardous Area - L.E.R.



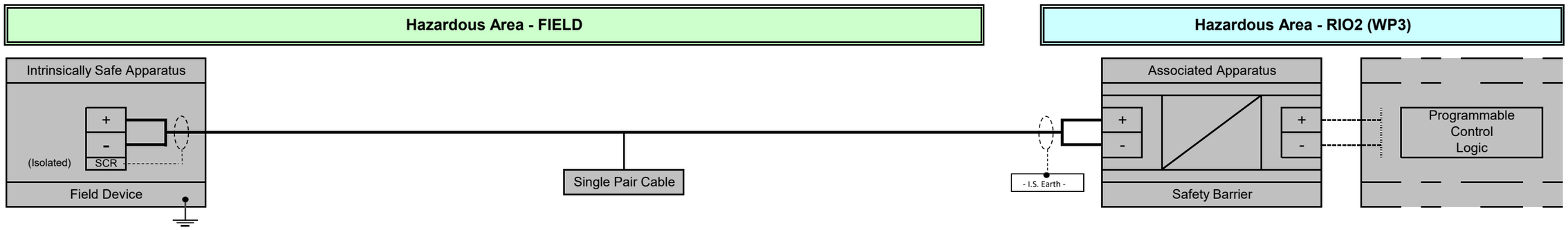
Field Device	
Field Device Type	WIKA TR55+ T15.01
Approved Certificate	IECEx BVS 19.0022X
Rating	Ex ia IIC T6…T4 Ga
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	130 [mA]
Max Allowed Power - Pi	800 [mW]
Resistance - R3	231 [ohm]
Inductance - L3	0,0184 [mH]
Capacitance - C3	0,02 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-RPSSI-I-UP
Approved Certificate	BVS 08 ATEX E094 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	93 [mA]
Max Allowed Power - P_0	587 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair Cable Length	Single Pair TOT Resist.	Single Pair TOT Induct.	Single Pair TOT Capacit.					TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	TT-621A	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]					0,3325 [Ω]	0,0225 [mH]	5 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
2	TT-621B	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]					0,3325 [Ω]	0,0225 [mH]	5 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 1
3																			
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HPP-700 - FLOW SWITCH SAFETY



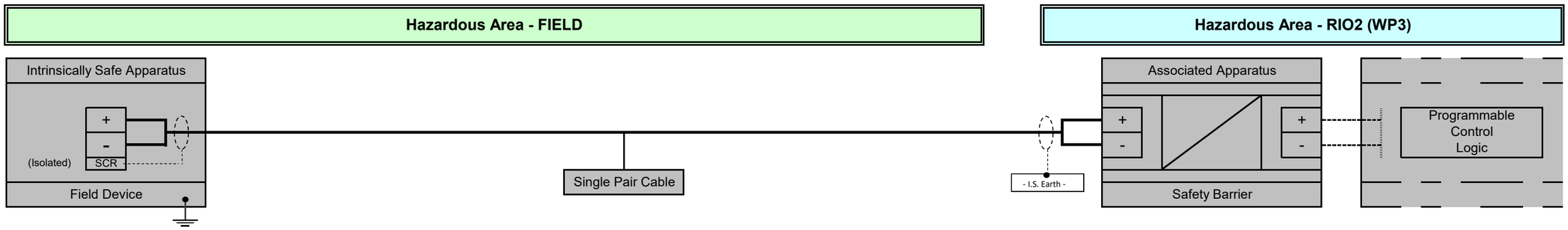
Field Device	
Field Device Type	KROHNE - DK32/K1/S-Ex
Approved Certificate	KIWA 18ATEX0008 X
Rating	II 2G Ex-ia IIC T6…T1 Gb
Max Allowed Voltage - V_i	16 [V]
Max Allowed Current - Ii	52 [mA]
Max Allowed Power - Pi	169 [mW]
Resistance - R2	308 [ohm]
Inductance - L2	0 [mH]
Capacitance - C2	152 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MINI MCR-EX-NAM-RO
Approved Certificate	IBExU 21 ATEX 1061 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	10,1 [V]
Max Short Circuit - I_0	10,9 [mA]
Max Allowed Power - P_0	28 [mW]
Max Allowed Inductance - L_0	300 [mH]
Max Allowed Capacitance - C_0	2870 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair Cable Length	Single Pair TOT Resist.	Single Pair TOT Induct.	Single Pair TOT Capacit.					TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	FICV-610A	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]					0,3325 [Ω]	0,0225 [mH]	5 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2	FICV-610B	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]					0,3325 [Ω]	0,0225 [mH]	5 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
3	FICV-610C	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]					0,3325 [Ω]	0,0225 [mH]	5 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
4																			
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HPP-700 - FLOW SWITCH



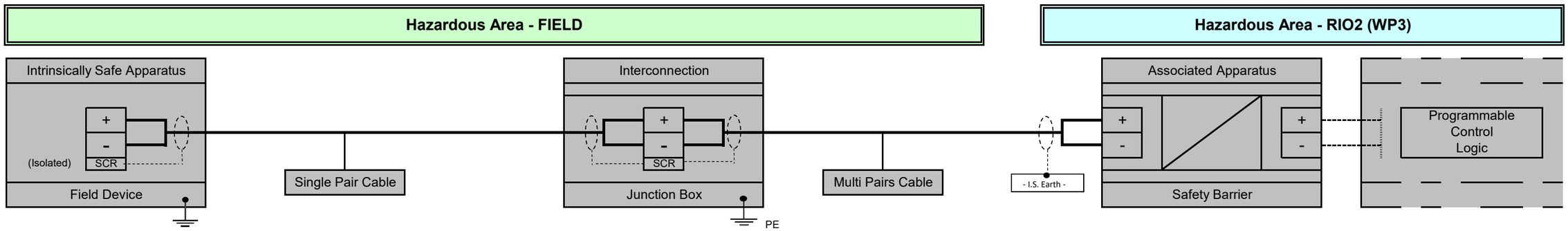
Field Device	
Field Device Type	KROHNE - DK32/K1/S-Ex
Approved Certificate	KIWA 18ATEX0008 X
Rating	II 2G Ex-ia IIC T6…T1 Gb
Max Allowed Voltage - V_i	16 [V]
Max Allowed Current - Ii	52 [mA]
Max Allowed Power - Pi	169 [mW]
Resistance - R2	308 [ohm]
Inductance - L2	0 [mH]
Capacitance - C2	152 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-NAM-R
Approved Certificate	IBExU 07 ATEX 1069 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	9,6 [V]
Max Short Circuit - I_0	10 [mA]
Max Allowed Power - P_0	25 [mW]
Max Allowed Inductance - L_0	300 [mH]
Max Allowed Capacitance - C_0	3600 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair Cable Length	Single Pair TOT Resist.	Single Pair TOT Induct.	Single Pair TOT Capacit.					TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	FICV-611	12 [m]	0,1596 [Ω]	0,0108 [mH]	2,4 [nF]					0,1596 [Ω]	0,0108 [mH]	2,4108 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2																			
3																			
4																			
5																			
6																			
7																			
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14																			
15																			
16																			
17																			

HPP-700 - POSITION AND TEMPERATURE SWITCH



Field Device	
Field Device Type	SRBG-C1-N-20N-ZC-M12-EX5
Approved Certificate	TUV 16 ATEX 174269 X
Rating	Ex ia IIC T1...T6 Ga
Max Allowed Voltage - V_i	15 [V]
Max Allowed Current - Ii	52 [mA]
Max Allowed Power - Pi	169 [mW]
Resistance - R3	288 [ohm]
Inductance - L3	0,02 [mH]
Capacitance - C3	10 [nF]

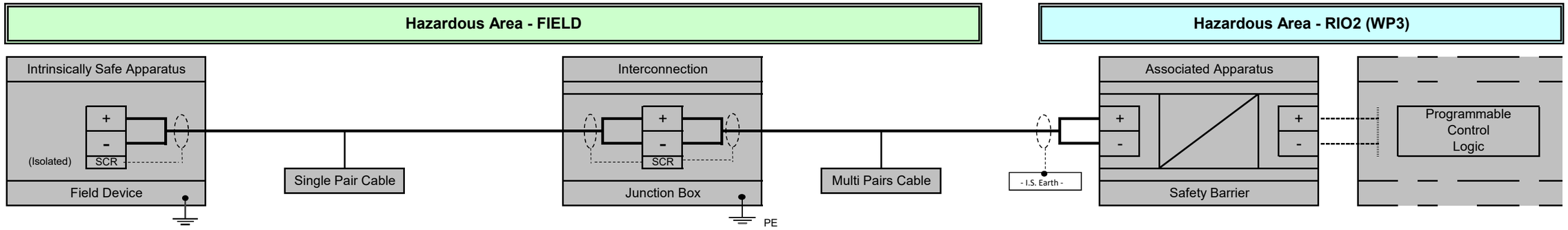
Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	1x1x0,75 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Multi Pairs Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	1x(19x0,75) + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-NAM-R
Approved Certificate	IBExU 07 ATEX 1069 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	9,6 [V]
Max Short Circuit - I_0	10 [mA]
Max Allowed Power - P_0	25 [mW]
Max Allowed Inductance - L_0	300 [mH]
Max Allowed Capacitance - C_0	3600 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pairs Cable Length	Single Pairs TOT Resist.	Single Pairs TOT Induct.	Single Pairs TOT Capacit.	Multi Pairs Cable Length	Multi Pairs TOT Resist.	Multi Pairs TOT Induct.	Multi Pairs TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	GS-64.1.1	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2	GS-64.1.2	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
3	GS-64.1.3	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
4	GS-64.1.4	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
5	GS-64.2	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
6	GS-64.3	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
7	GS-64.T2	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
8	TS-64.3	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
9	TS-64.4	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

HPP-700 - TEMPERATURE AND PRESSURE TRANSMITTER



Field Device	
Field Device Type	PR electronics 5333D
Approved Certificate	KEMA 03ATEX1535 X
Rating	Ex ia IIC T4...T6 Ga
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	120 [mA]
Max Allowed Power - Pi	840 [mW]
Resistance - R3	250 [ohm]
Inductance - L3	0,01 [mH]
Capacitance - C3	1 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	1x1x0,75 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Multi Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	1x(19x0,75) + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-RPSSI-I-UP
Approved Certificate	BVS 08 ATEX E094 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	93 [mA]
Max Allowed Power - P_0	587 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pairs Cable Length	Single Pairs TOT Resist.	Single Pairs TOT Induct.	Single Pairs TOT Capacit.	Multi Pairs Cable Length	Multi Pairs TOT Resist.	Multi Pairs TOT Induct.	Multi Pairs TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	TT60.1	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2	TT60.2	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
3	TT61.1	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
4	TT64.7	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
5	TT64.5	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
6	TT.64.8	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
7	TT64.6	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
8	PT64.1	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	23 [m]	0,6141 [Ω]	0,0207 [mH]	4,6 [nF]	0,6275 [Ω]	0,0212 [mH]	4,72115 [nF]	33,707865 [μH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
9																			
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HPP-700 - FLOW CONTROL VALVE FV-64-1 COMMAND



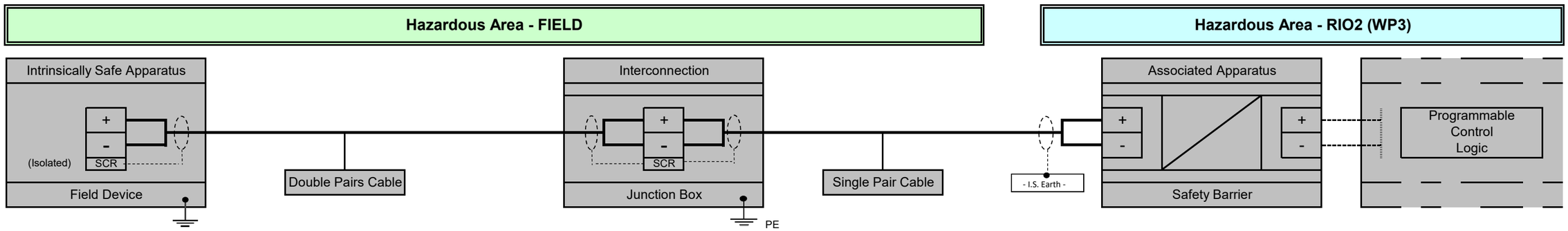
Field Device	
Field Device Type	WIKA PE 81.58
Approved Certificate	INERIS 12ATEX0030X
Rating	Ex ia IIC T6 Ga
Max Allowed Voltage - V_i	28 [V]
Max Allowed Current - Ii	100 [mA]
Max Allowed Power - Pi	1000 [mW]
Resistance - R3	280 [ohm]
Inductance - L3	0,002 [mH]
Capacitance - C3	0 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	GMI D1020D
Approved Certificate	IMQ 09 ATEX 013 X
Rating	II 3G Ex ec IIC T4 Gc
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	87 [mA]
Max Allowed Power - P_0	548 [mW]
Max Allowed Inductance - L_0	4,6 [mH]
Max Allowed Capacitance - C_0	105 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair Cable Length	Single Pair TOT Resist.	Single Pair TOT Induct.	Single Pair TOT Capacit.					TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	FC-64.1	31 [m]	0,4123 [Ω]	0,0279 [mH]	6,2 [nF]					0,4123 [Ω]	0,0279 [mH]	6,2279 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2																			
3																			
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FICV-800 FLOW SWITCH



Field Device	
Field Device Type	KROHNE DK32/K2/S-Ex
Approved Certificate	GYB20.2472X
Rating	Ex ia IIC T6 Gb
Max Allowed Voltage - V_i	16 [V]
Max Allowed Current - Ii	52 [mA]
Max Allowed Power - Pi	169000 [mW]
Resistance - R3	308 [ohm]
Inductance - L3	0,15 [mH]
Capacitance - C3	0,152 [nF]

Double Pairs Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	4x0,75 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	26,7	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0337079	[mH/Ω]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1,5 + Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-NAM-R
Approved Certificate	IBExU 07 ATEX 1069 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	9,6 [V]
Max Short Circuit - I_0	10 [mA]
Max Allowed Power - P_0	25 [mW]
Max Allowed Inductance - L_0	300 [mH]
Max Allowed Capacitance - C_0	3600 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Double Pair Cable Length	Double Pair TOT Resist.	Double Pair TOT Induct.	Double Pair TOT Capacit.	Single Pairs Cable Length	Single Pairs TOT Resist.	Single Pairs TOT Induct.	Single Pairs TOT Capacit.	TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	FAHH-800	0,5 [m]	0,0134 [Ω]	0,0005 [mH]	0,1 [nF]	25 [m]	0,3325 [Ω]	0,0225 [mH]	5 [nF]	0,3459 [Ω]	0,023 [mH]	5,12295 [nF]	66,358248 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2	FALL-800	0,5 [m]	0,0005 [Ω]	0,1 [mH]	2E-05 [nF]	25 [m]	0,0225 [Ω]	5 [mH]	0,0017 [nF]	0,023 [Ω]	5,1 [mH]	5,1017086 [nF]	222222,22 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
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FT-620 - PWH2 TO STACKS



Field Device	
Field Device Type	E+H PROLINE PROWIRL D200
Approved Certificate	KEMA 10ATEX0072
Rating	Ex ia IIC T6 … T1
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	300 [mA]
Max Allowed Power - Pi	1000 [mW]
Resistance - R3	100 [ohm]
Inductance - L3	0 [mH]
Capacitance - C3	5 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-RPSSI-I-UP
Approved Certificate	BVS 08 ATEX E094 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	93 [mA]
Max Allowed Power - P_0	587 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair Cable Length	Single Pair TOT Resist.	Single Pair TOT Induct.	Single Pair TOT Capacit.					TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	FT-620	18 [m]	0,2394 [Ω]	0,0162 [mH]	3,6 [nF]					0,2394 [Ω]	0,0162 [mH]	3,6162 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
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3																			
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FT-630 - HYDROGEN TO PRODUCTION



Field Device	
Field Device Type	E+H PROLINE PROMASS F300
Approved Certificate	Sira 16ATEX2219X
Rating	Ex ia IIC T6 … T1
Max Allowed Voltage - V_i	30 [V]
Max Allowed Current - Ii	100 [mA]
Max Allowed Power - Pi	1250 [mW]
Resistance - R3	300 [ohm]
Inductance - L3	0 [mH]
Capacitance - C3	6 [nF]

Single Pair Cable		
Manufacturer	Sensitherm	
Code	FG16OHM16	
Composition	2x1.5+Sh	
Insulation Voltage	0,6/1 [kV]	
Resistance - R	13,3	[Ω/Km]
Inductance - L	0,9	[mH/Km]
Capacitance - C	200	[nF/Km]
L/R Ratio	0,0676692	[mH/Ω]

Safety Barrier (Galvanic Type)	
Limiting Device Type	PHOENIX MACX MCR-EX-SL-RPSSI-I-UP
Approved Certificate	BVS 08 ATEX E094 X
Rating	II 3 (1) G Ex ec [ia Ga] IIC T4
Max Output Voltage - V_0	25,2 [V]
Max Short Circuit - I_0	93 [mA]
Max Allowed Power - P_0	587 [mW]
Max Allowed Inductance - L_0	3 [mH]
Max Allowed Capacitance - C_0	107 [nF]

Device TAG		Cable Length Check													Entity Matching			Equipment
		Single Pair Cable Length	Single Pair TOT Resist.	Single Pair TOT Induct.	Single Pair TOT Capacit.					TOTAL Resist. R2	TOTAL Inductance L2	TOTAL Capacit. C2	TOTAL L2/R2 Ratio	Induct.Check $L_0 \geq L2+L3$	Capac.Check $C_0 \geq C2+C3$	Voltage $V_0 \leq V_i$	Current $I_0 \leq I_i$	Power $P_0 \leq P_i$	
1	FT-630	21 [m]	0,2793 [Ω]	0,0189 [mH]	4,2 [nF]					0,2793 [Ω]	0,0189 [mH]	4,2189 [nF]	67,669173 [µH/Ω]	PASSED	PASSED	PASSED	PASSED	PASSED	RIO 2
2																			
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C0063-FOR-DWG-EL-001

Instrumental Hook-Up Drawings

C63- CrossWind Project

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
00	*Issue for Review*	*31-MAY-2024*	*M. FABBRI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	C0063-FOR-DWG-EL-001
Elogen Project Document Title	Instrumental Hook-Up Drawings
Crosswind Project Document Number	FORES-INN-BPH-DWG-00034_Rev.00
Fores Project Document Number and Revision	224J10-DDL-IN-HD-00001_0

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REVISION LIST

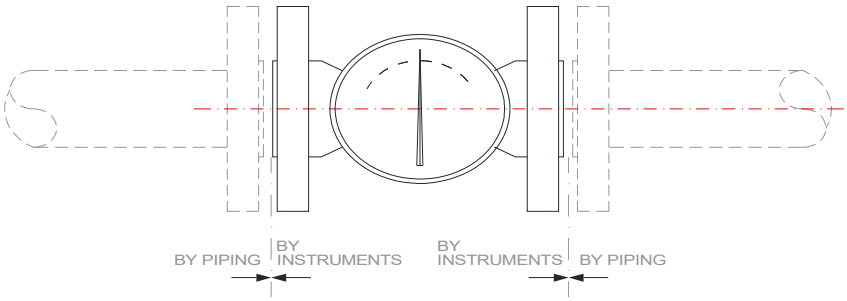
REV.	DESCRIPTION
00	*Issue for Review*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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FLOW SWITCH



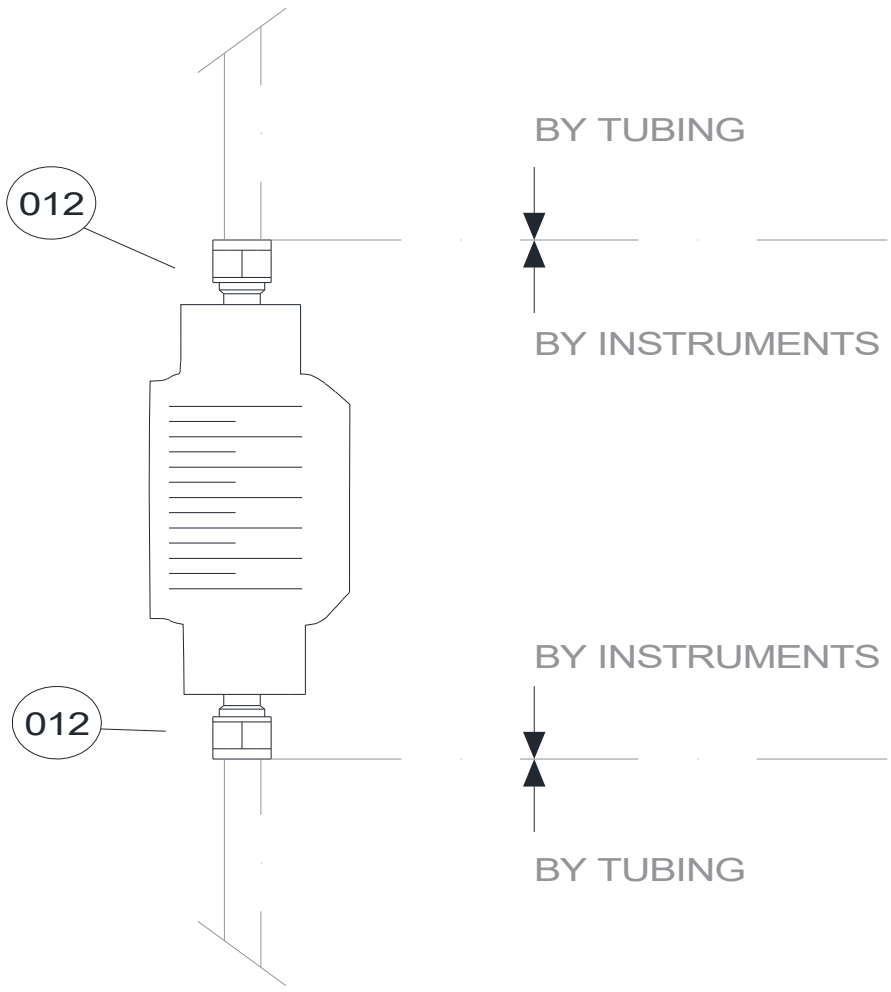
TAGS	
1	**FSH-640**
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TOTAL:	1

NOTES:

1. H250H Variable Area Flow Meter are installed horizontally.
   H250H flowmeters for horizontal installation are to be installed in the pipeline so that the indicator is located on the side of the measuring tube.
2. Process connection: 2 x Flanged DN25 ASME B16.5 CL300 RF

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
-	-	m	-	m	-	-	-
-	-	m	-	m	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

VARIABLE AREA FLOWMETER



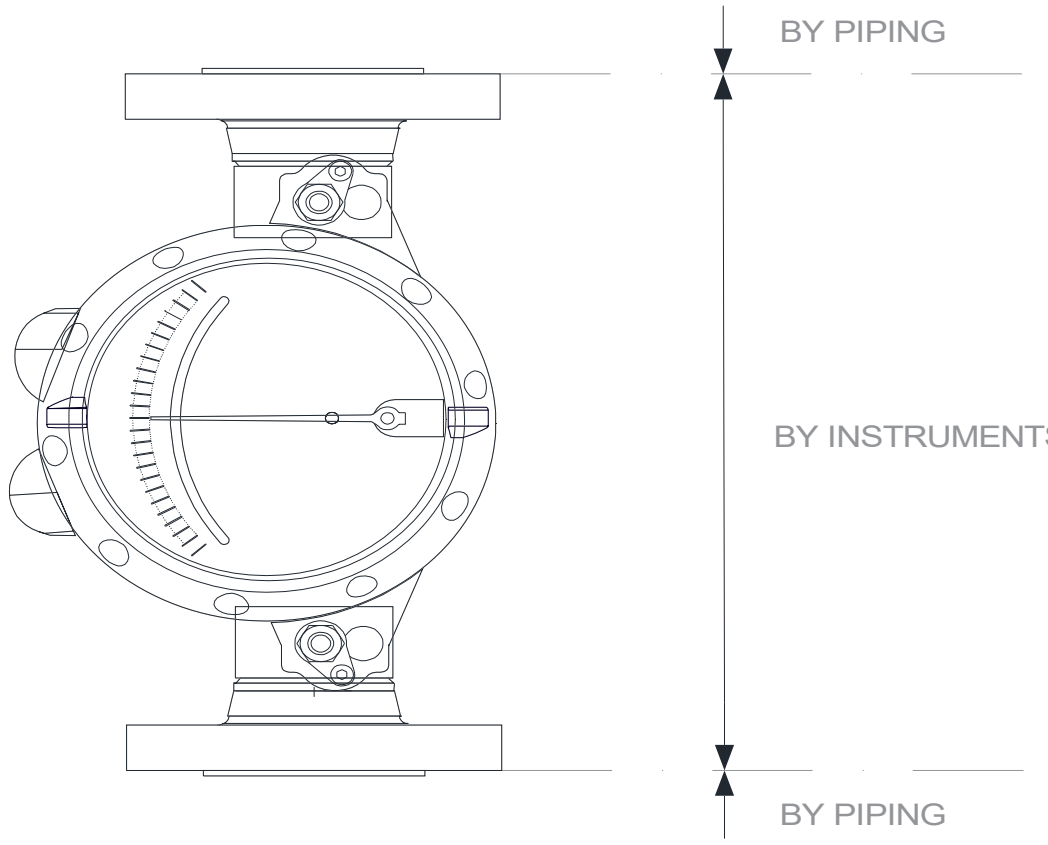
TAGS	
1	**FICV-611**
2	**FICV-610A**
3	**FICV-610B**
4	**FICV-610C**
5	**FICV-800**
6	
7	
8	
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TOTAL:	5

NOTES:

1.

012	2	N	10	N	1/4" OD x 1/4 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
-	-	m	-	m	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL

VARIABLE AREA FLOWMETER



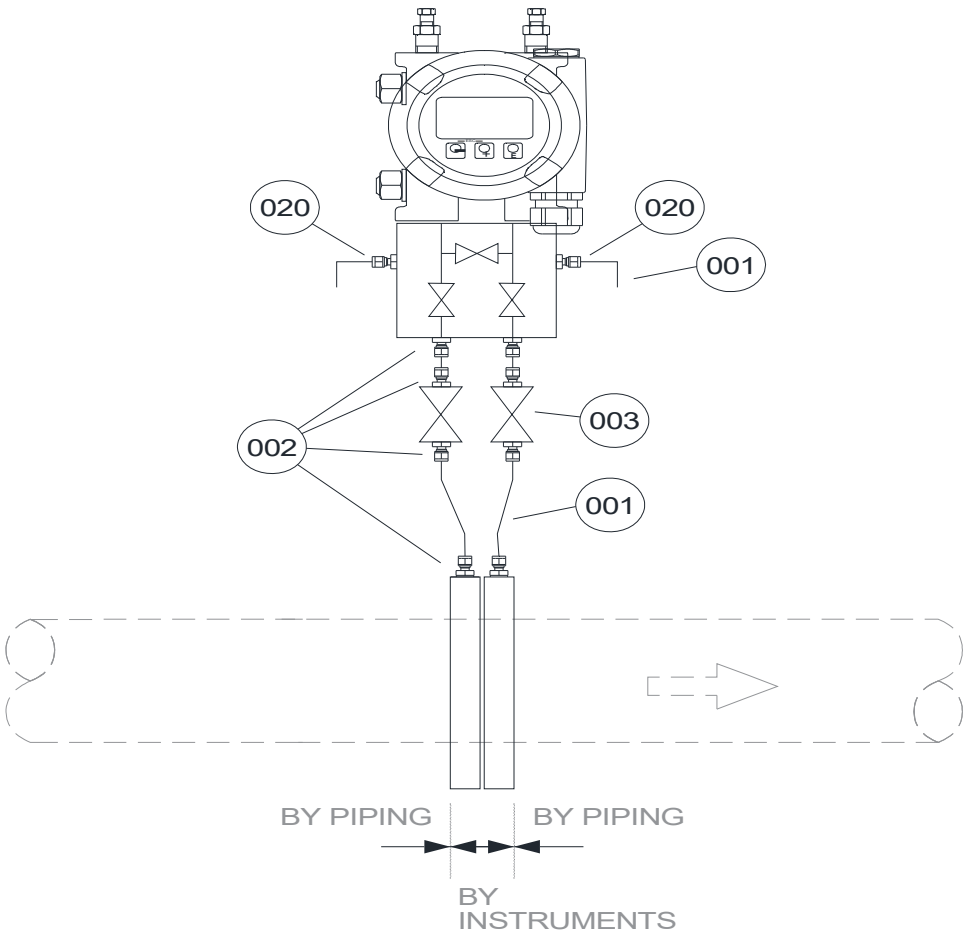
TAGS	
1	**FI-940**
2	
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29	
30	
TOTAL:	1

NOTES:

1. Process connection: Flanged 1"ASME B16.5 CL300 RF
2. The variable area flowmeter must be installed vertically (measuring principle). Flow direction from bottom to top

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
012	2	N	2	N	1/4" OD x 1/4 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
-	-	m	-	m	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

FLOW TRANSMITTER DIFFERENTIAL PRESSURE WITH CALIBRATED FLANGE



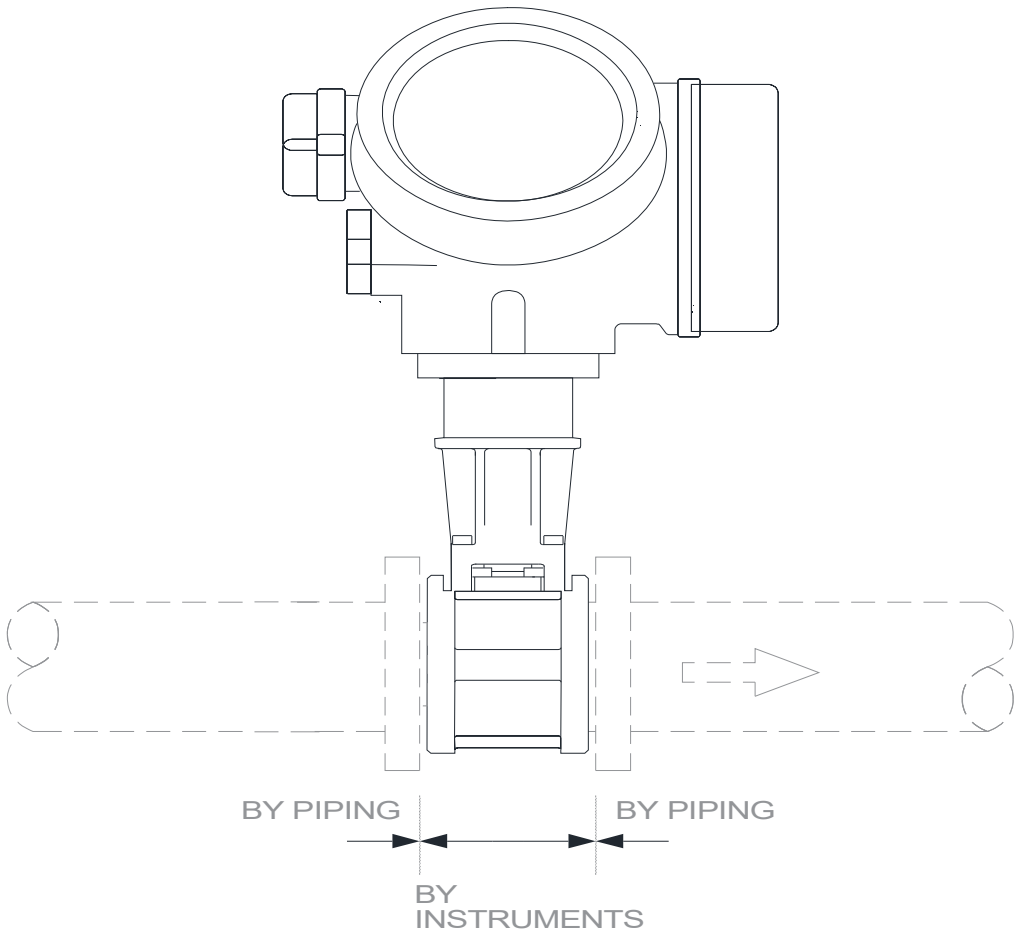
TAGS	
1	**FT-900**
2	**FT-901**
3	**FT-920**
4	**FT-921**
5	
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10	
11	
12	
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TOTAL:	4

NOTES:

1. ELOGEN scope of supply. Please confirm and provide details.

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL	
001	4	M	16	M	1/2" OD x 0,049" Thk.	SEAMLESS TUBING	SS316 / SS316 L	
002	8	N	32	N	1/2" OD x 1/2 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L	
003	2	N	8	N	-	BALL VALVE	SS316 / SS316 L	(Note 1)
002	2	N	8	N	1/2" OD x 1/4 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L	
-	-	N	-	N	-	-	-	

FLOW TRANSMITTER VORTEX



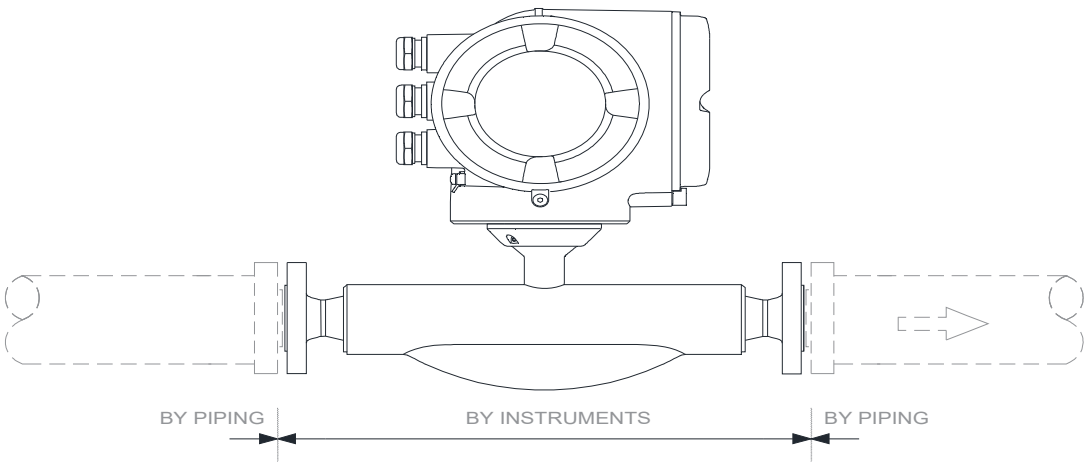
TAGS	
1	**FT-600 (1)**
2	**FT-620 (2)**
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TOTAL:	2

NOTES:

1. 2 x Flange DN80 ASME B16.5 Class 150 RF
2. 2 x Flange DN50 ASME B16.5 Class 300 RF

ITEM	SINGLE Q.TY	TOTAL Q.TY	SIZE	DESCRIPTION	MATERIAL

FLOW TRANSMITTER CORIOLIS



TAGS	
1	**FT-630**
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29	
30	
TOTAL:	1

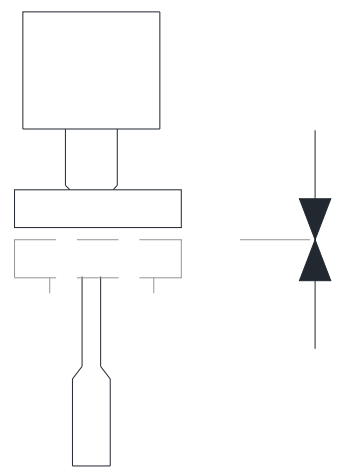
NOTES:

1. 2 x Flange DN80 ASME B16.5 Class 150 RF

ITEM	SINGLE Q.TY	TOTAL Q.TY	SIZE	DESCRIPTION	MATERIAL

LEVEL SWITCH

LEVEL SWITCH



BY INSTRUMENTS

BY PIPING

INSTALLED ON TANK OR PIPE

TAGS	
1	**LSH-500**
2	**LSH-600**
3	**LSH-610**
4	**LSH-630**
5	**LSH-631**
6	**LSH-640**
7	**LSHH-500**
8	**LSL-500**
9	**LSL-600**
10	**LSL-610**
11	**LSL-611**
12	**LSL-620**
13	**LSL-630**
14	**LSL-640**
15	**LSL-641**
16	**LSLL-500**
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TOTAL:	16

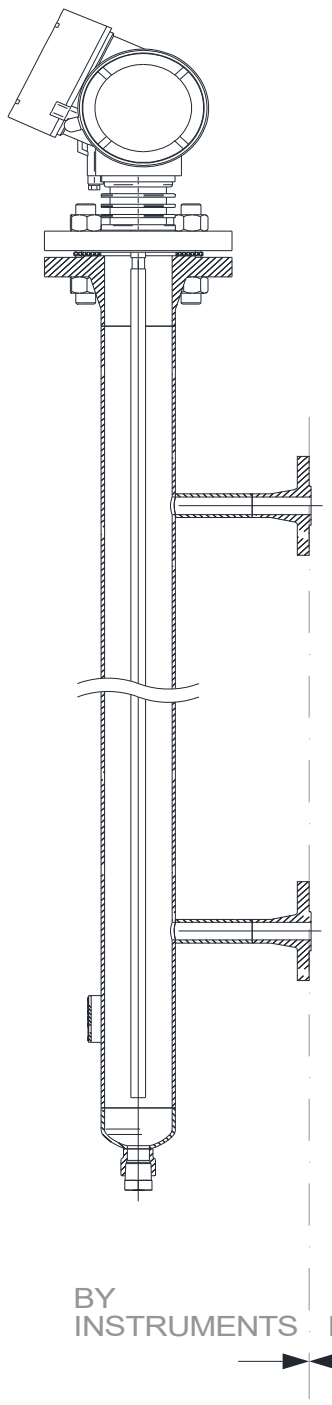
NOTES:

1. Process connection: Flanged DN 25 ASME B16.5 CL 150/300 RF

ITEM	SINGLE Q.TY	TOTAL Q.TY	SIZE	DESCRIPTION	MATERIAL
-	- m	- m	-	-	-
-	- m	- m	-	-	-
-	- N	- N	-	-	-
-	- N	- N	-	-	-
-	- N	- N	-	-	-

elogen	Electrolyzer Package					Document Code	C0063-FOR-DWG-EL-001
	Instrumental Hook-Up Drawings					Revision	Rev.00
	C63- CrossWind Project					Page Number	10 of 21

LEVEL TRANSMITTER



TAGS	
1	**LT-600**
2	**LT-620**
3	
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30	
TOTAL:	2

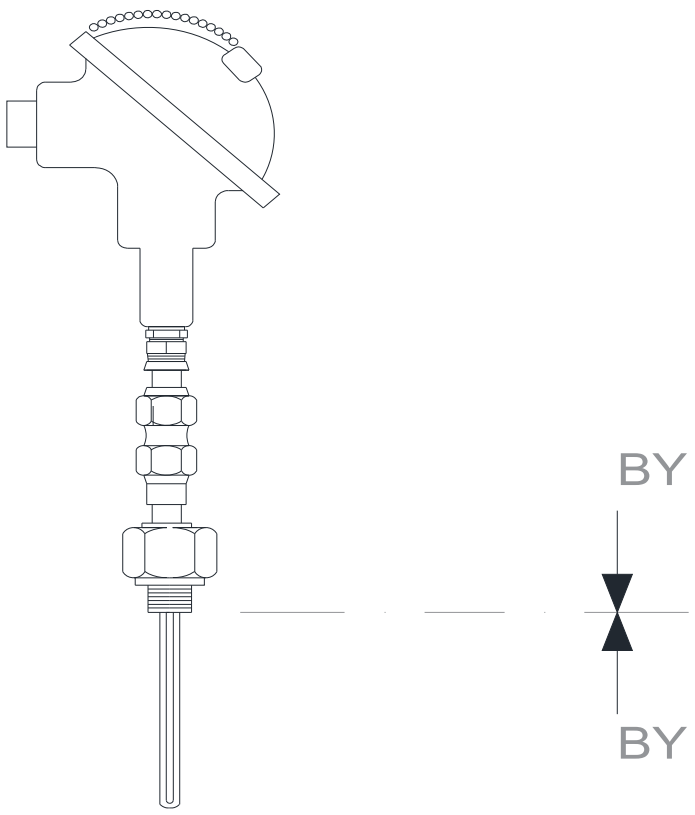
NOTES:

1. Process connection 150# 1/2" RF
   Visual indicator shall be oriented in such way that an operator clud easily read it.

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
-	-	m	-	m	-	-	-
-	-	m	-	m	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

elogen	Electrolyzer Package					Document Code	C0063-FOR-DWG-EL-001
	Instrumental Hook-Up Drawings					Revision	Rev.00
	C63- CrossWind Project					Page Number	11 of 21

TEMPERATURE TRANSMITTER (PIPE MOUNTED)



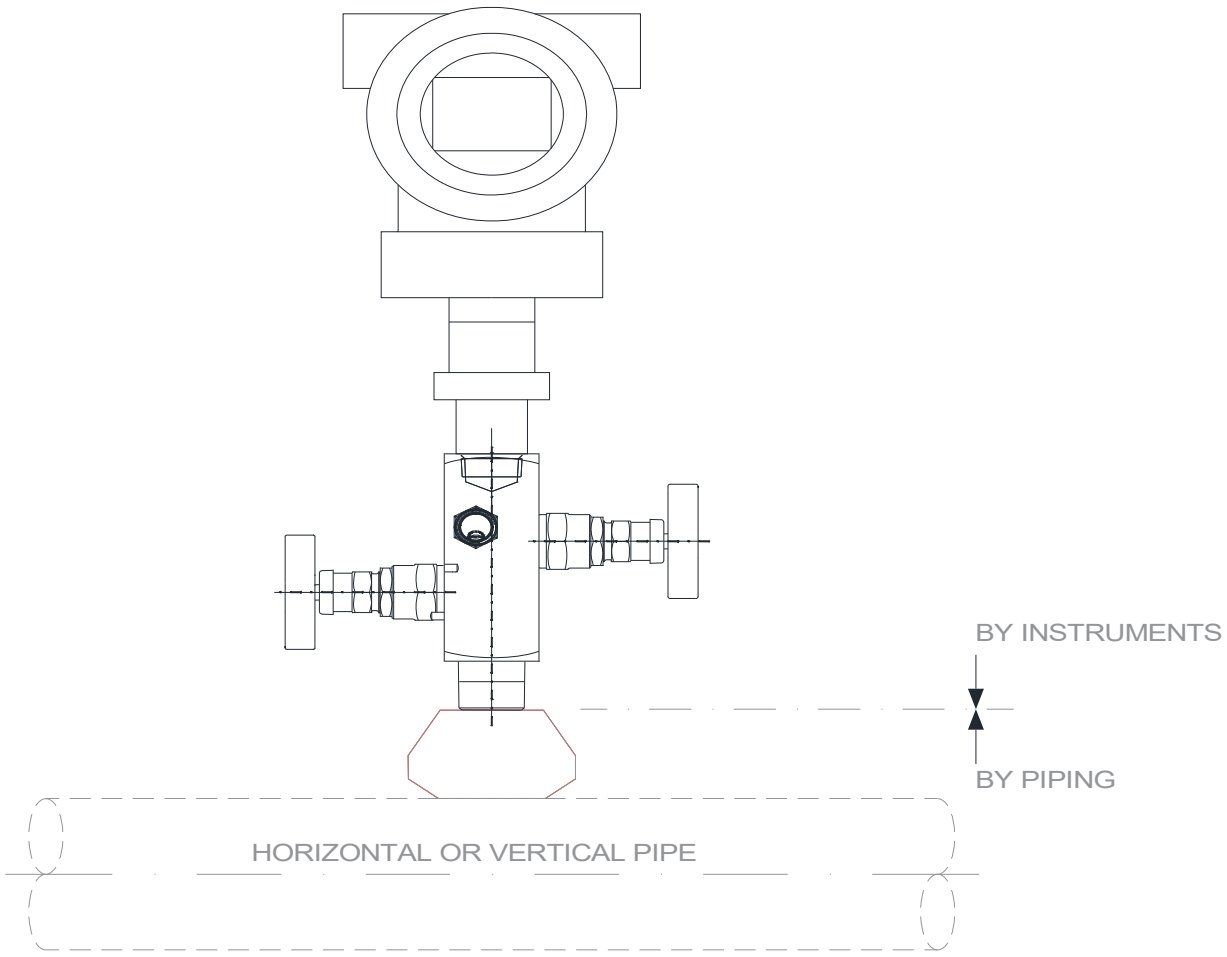
TAGS	
1	**TT-601 (1)**
2	**TT-602 (1)**
3	**TT-603 (1)**
4	**TT-604 (1)**
5	**TT-605 (1)**
6	**TT-606 (1)**
7	**TT-607 (1)**
8	**TT-608 (1)**
9	**TT-621A (2)**
10	**TT-621B (2)**
11	
12	
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TOTAL:	10

NOTES:

1. U = 100 mm, process connection 1/2" NPTM
2. Mounted on H2 Loop Pumps

ITEM	SINGLE Q.TY	TOTAL Q.TY	SIZE	DESCRIPTION	MATERIAL
-	- m	- m	-	-	-
-	- m	- m	-	-	-
-	- N	- N	-	-	-
-	- N	- N	-	-	-
-	- N	- N	-	-	-

PRESSURE TRANSMITTER (PIPING MOUNTED)



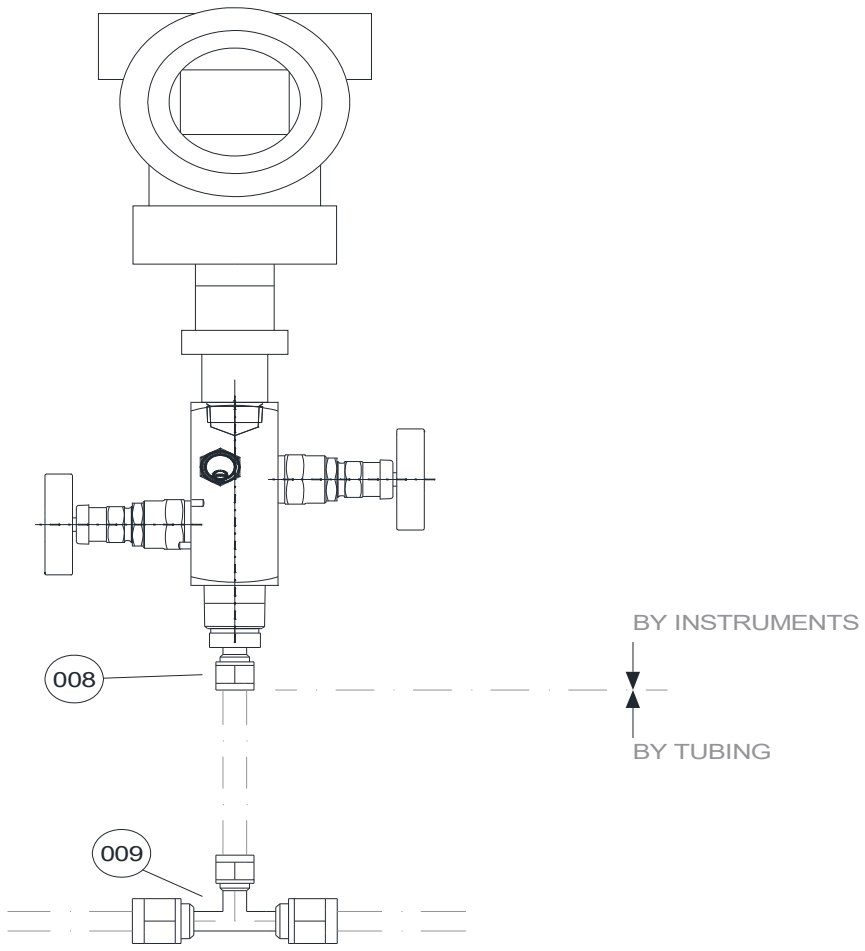
TAGS	
1	**PT-612**
2	**PT-632**
3	**PT-633**
4	**PT-900**
5	**PT-910**
6	**PT-920**
7	**PT-300 (2)**
8	**PT-600 (2)**
9	**PT-600A (2)**
10	**PT-600B (2)**
11	**PT-620 (2)**
12	**PT-620A (2)**
13	**PT-620B (2)**
14	
15	
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TOTAL:	13

NOTES:

1. BLOCK AND BLEED VALVE: 1/2" GM
2. NON PRESENT IN BOM C63-BOM-001-_05, BUT PRESENT IN P&ID C63-PID-001_06
3. RELATED FLAT GASKET EN837 TO BE PROVIDED

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
-	-	N	-	N	-	-	-
-	-	m	-	m	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

PRESSURE TRANSMITTER (TUBING MOUNTED)



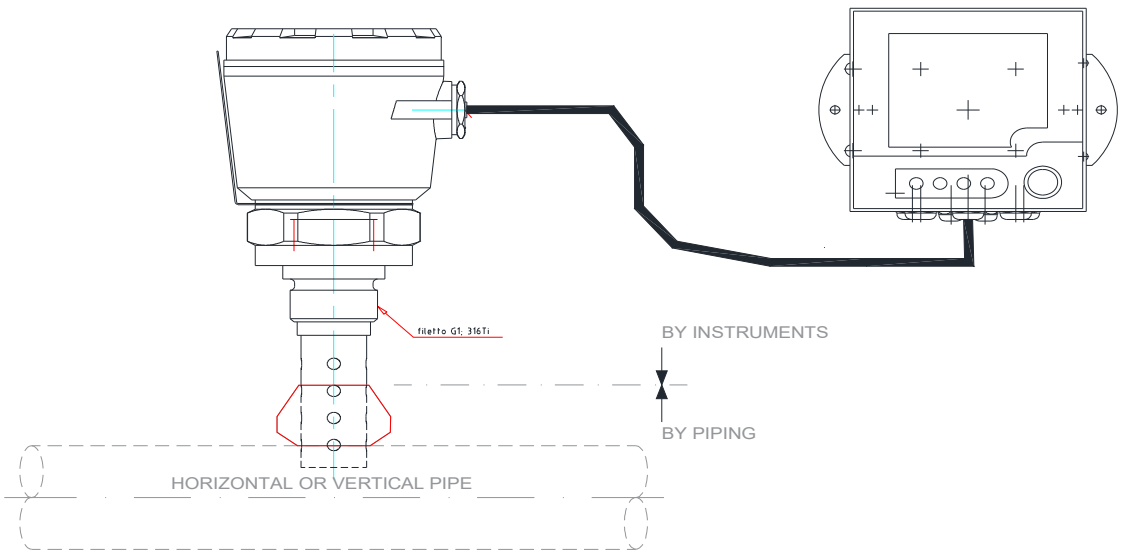
TAGS	
1	**PT-150**
2	**PT-610**
3	**PT-611**
4	**PT-630**
5	**PT-631**
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8	
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TOTAL:	5

NOTES:

1. BLOCK AND BLEED VALVE: 1/2" GM
2. RELATED FLAT GASKET EN837 TO BE PROVIDED

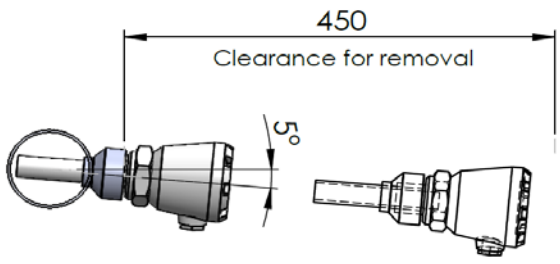
ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL	
008	1	N	5	N	1/2" OD x 1/2" BSPP F	FEMALE COMPRESSION FITTING	SS316	(Note 2)
009	1	N	5	N	1" OD x 1" OD x 1/2" OD	TEE COMPRESSION FITTING	SS316	
-	-	N	-	N	-	-	-	
-	-	N	-	N	-	-	-	
-	-	N	-	N	-	-	-	

CONDUCTIVITY AND TEMPERATURE TRANSMITTER



TAGS	
1	**CT/P-600**
2	**CT/P-620**
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TOTAL:	2

Orientation detail:

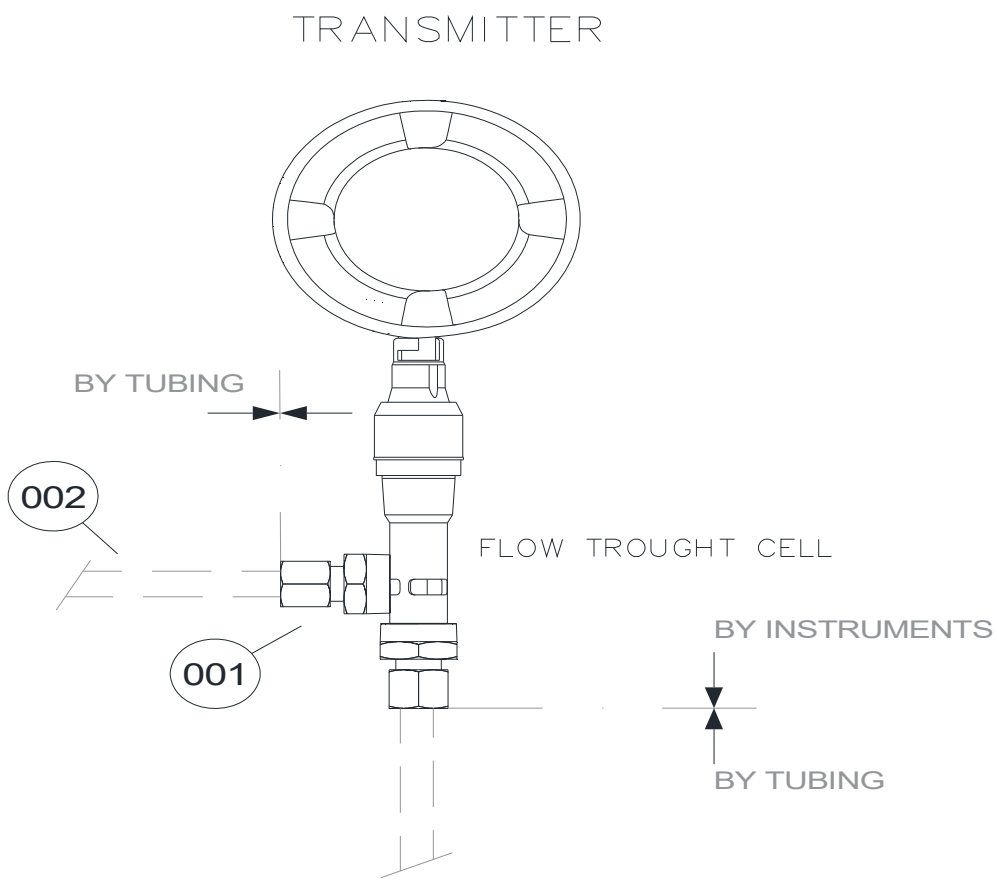


NOTES:

1. Sensor process connection : 1" GM
2. Conductivity transmitter must be installed near sensor location. Transmitter screen shall be visible for the operator.
3. Connection cable supplied with instrument.

ITEM	SINGLE Q.TY	TOTAL Q.TY	SIZE	DESCRIPTION	MATERIAL
-	- m	- m	-	-	-
-	- m	- m	-	-	-
-	- N	- N	-	-	-
-	- N	- N	-	-	-
-	- N	- N	-	-	-

DEW POINT FLOW THROUGHT TRANSMITTER



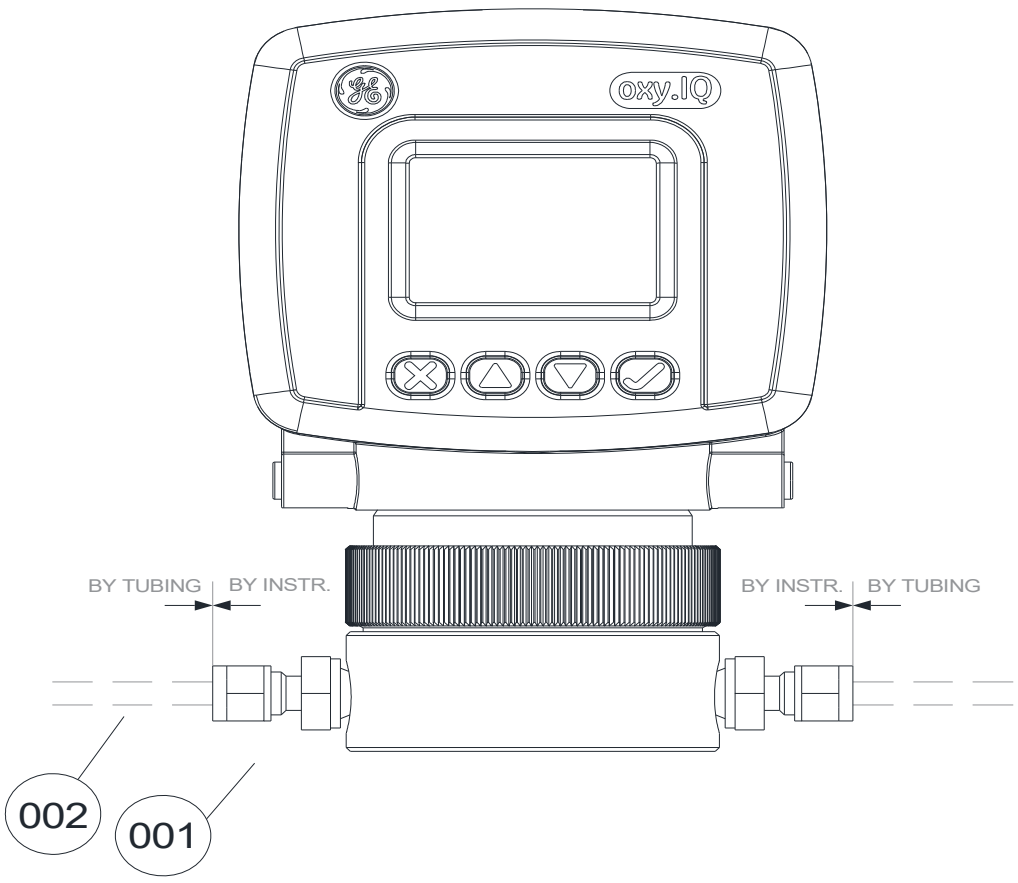
TAGS	
1	**DPT-800A**
2	**DPT-800B**
3	**DPT-800C**
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TOTAL:	3

NOTES:

1. Process connection: 2 x 1/8" NPT F

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
001	2	N	6	N	1/4" OD x 1/8 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
002	2	M	6	M	1/4" OD x 0,028" Thk.	SEAMLESS TUBING	SS316 / SS316 L
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

OXYGEN IN HYDROGEN ANALYZER



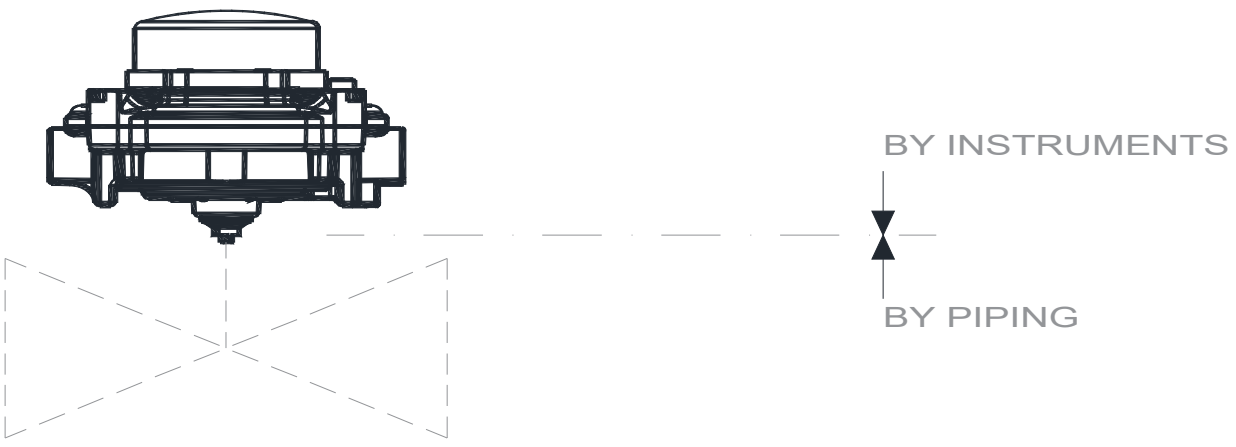
TAGS	
1	**OIHA-800A**
2	**OIHA-800B**
3	**OIHA-800C**
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9	
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TOTAL:	3

NOTES:

1. Sensor process connection : 2 x 1/8" NPT F
2. OIHA supplied with precabled connector (2 m)

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
001	2	N	6	N	1/4" OD x 1/8 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
002	2	M	6	M	1/4" OD x 0,028" Thk.	SEAMLESS TUBING	SS316 / SS316 L
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

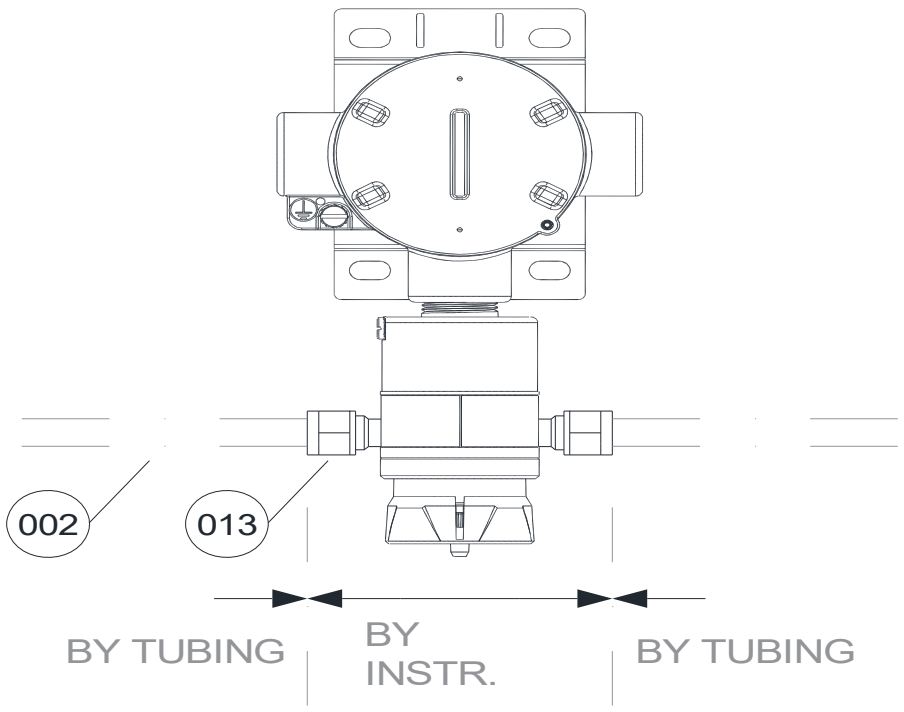
LIMIT SWITCH



TAGS	
1	**ZIO-604**
2	**ZIO-605**
3	**ZIO-623**
4	**ZIO-624**
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6	
7	
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28	
29	
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TOTAL:	4

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

HIDROGEN IN OXIGEN ANALYZER



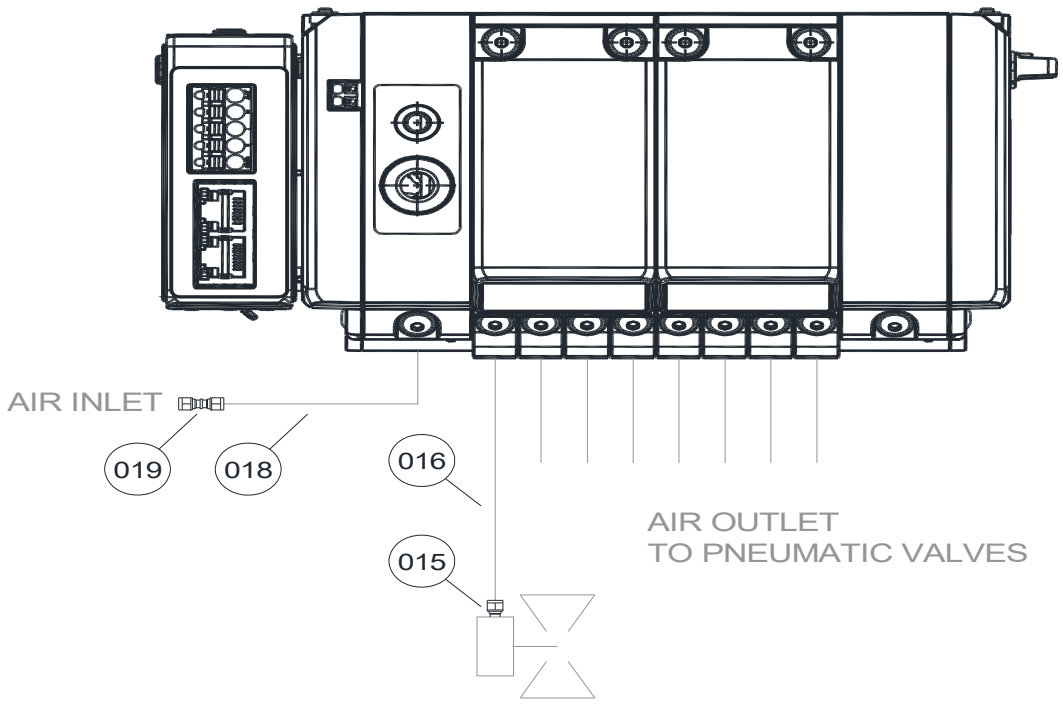
TAGS	
1	**HIOD-610A**
2	**HIOD-610B**
3	**HIOD-610C**
4	
5	
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9	
10	
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TOTAL:	3

NOTES:

1. HIOD should be installed verticaly with the probe facing downwards.

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
013	2	N	6	N	1/4" OD x 1/8 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
002	2	M	6	M	1/4" OD x 0,028" Thk.	SEAMLESS TUBING	SS316 / SS316 L
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

PNEUMATIC VALVE ISLAND_PVI-980



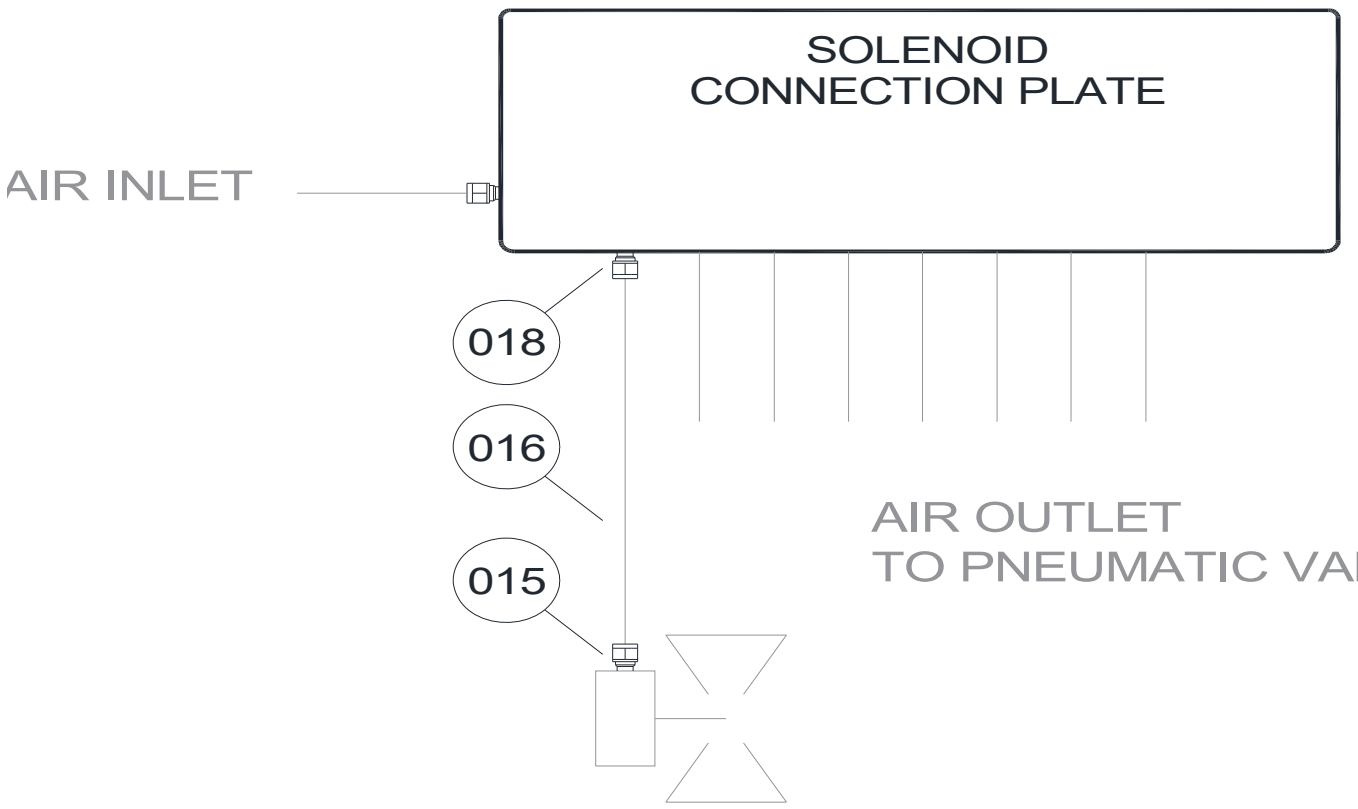
TAGS	
1	**PV-631**
2	**PV-632**
3	**PV-600**
4	**PV-300**
5	**PV-901**
6	**PV-921**
7	**PV-620**
8	**PV-642**
9	**PV-633**
10	**PV-640**
11	**PV-500**
12	
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27	
28	
29	
30	
TOTAL:	11

NOTES:

1.

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
015	2	N	22	N	6mm x 1/8 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
016	4	M	44	M	6mm x 0,8mm Thk.	SEAMLESS TUBING	SS316 / SS316 L
018	4	M	4	M	10mm x 1mm Thk.	SEAMLESS TUBING	SS316 / SS316 L
019	1	N	1	N	6mm to 1/2 OD	ADAPTER COMPRESSION FITTING	SS316 / SS316 L
-	-	N	-	N	-	-	-

PNEUMATIC VALVE ISLAND_PVI-900 / PVI-901



TAGS	
1	**PV-900**
2	**PV-920**
3	**PV-601**
4	**PV-610**
5	**PV-630**
6	**PV-635**
7	**PV-641**
8	**PV-800**
9	**PV-501**
10	
11	
12	
13	
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23	
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27	
28	
29	
30	
TOTAL:	9

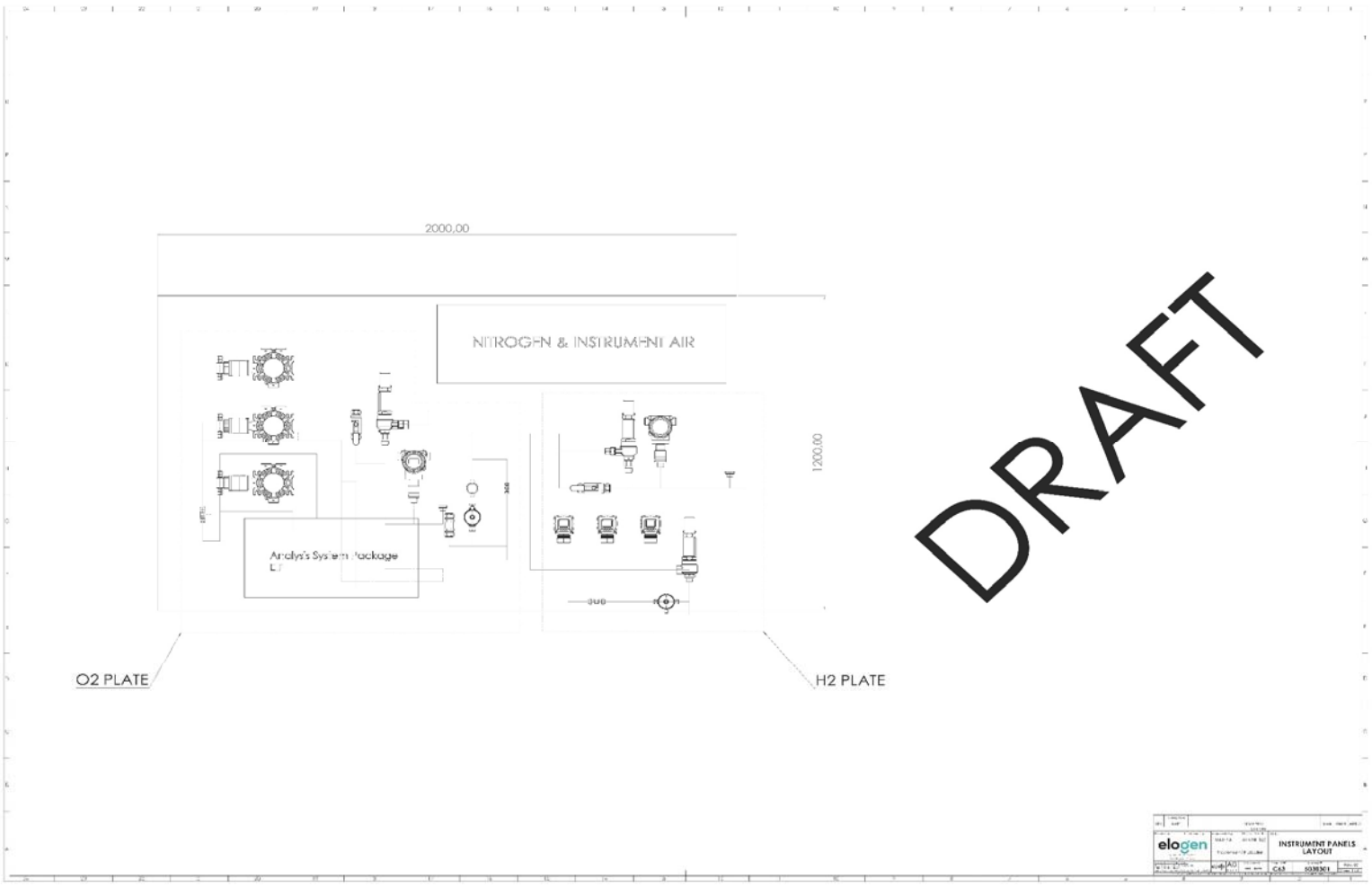
NOTES:

1.

ITEM	SINGLE Q.TY		TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL
015	1	N	9	N	6mm x 1/8 NPT M	MALE COMPRESSION FITTING	SS316 / SS316 L
016	3	M	27	M	6mm x 0,8mm Thk.	SEAMLESS TUBING	SS316 / SS316 L
018	1	N	9	N	6mm x 1/8"G M	MALE COMPRESSION FITTING	SS316 / SS316 L
-	-	N	-	N	-	-	-
-	-	N	-	N	-	-	-

elogen	Electrolyzer Package					Document Code	C0063-FOR-DWG-EL-001
	Instrumental Hook-Up Drawings					Revision	Rev.00
	C63- CrossWind Project					Page Number	21 of 21

INSTRUMENTATION PANEL



TAGS
1
2
3
4
5
6
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8
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10
11
12
13
14
15
16
17
18
19
20
21
22
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24
25
26
27
28
29
30
TOTAL:

NOTES:

1. Elogen to please define Instrument panel layout and connections.

-	- N	-	N	-	-	-
-	- N	-	N	-	-	-
-	- N	-	N	-	-	-
-	- N	-	N	-	-	-
-	- N	-	N	-	-	-
ITEM	SINGLE Q.TY	TOTAL Q.TY		SIZE	DESCRIPTION	MATERIAL

C0063-FOR-DGM-EL-001

LV Single Line Diagram

C63- CrossWind Project

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
03	*Issue for Approval*	*13-FEB-2025*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
02	*Issue for Review*	*22-NOV-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
01	*Issue for Review*	*11-OCT-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*
00	*Issue for Revision*	*22-MAY-2024*	*A. MONTI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	**C0063-FOR-DGM-EL-001**
Elogen Project Document Title	**Overall Single Line Diagram**
Crosswind Project Document Number	**FORES-INN-BPH-DWG-00028**
Vendor Document Number	**224J10-DDL-EL-DG-00001_3**

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Revision*
01	*Issue for Review*
02	*Issue for Review*
03	*Issue for Approval*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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Switchboard Tag No. is SG-100D1
Drawings reference 1723002197-EL-DG-00010
Sheet 04 – Electrical SLD - Column A1 Electrolyser Package

6,6kV network
From Customer

CLIENT

Limit of Scope

ELOGEN

6.6 kV Open Command (Note 13)

Transformer
TR-01

Transformer Dy11y11 KNAN
6,6kV+/-2x2,5% off load
2x 360V / 2x270V
2x 1,6MVA / 2x 1,2MVA
UCC 7%

P1
S1
S2
DGPT2

From 20-UCP-001

I/O to PLC
230Vac UPS
230Vac Aux.
400Vac Aux.

To rectifier Safety relay (Note 12)

HCU-400
Rectifier Control Panel E500

REC-01
Rectifier Cabinet 01

REC-02
Rectifier Cabinet 02

3x(6x300) (Note 11)

3x(6x300) (Note 11)

Internal wiring between HCU and Rectifiers not shown in this document. Please refer to C63-NID-ELO-SLD01

E500
1478A
610-1027V
Stack 01 to 04
Series connection
(Note 12)

E500
1478A
610-1027V
Stack 05 to 08
Series connection
(Note 12)

1. All circuit breakers equipped with auxiliary status contact.

2. All inverters equipped with STO function and Profinet.

3. MN coil powered by UPS

4. The main busbars will be protected by a plexiglass.

5. Main incomers CB (MCCB/ACB) shall be provided with adjustable overcurrent protection.

6. PQ-001 and PQ-002 hardwired to PLC, as per document C0063-FOR-DGM-EL-003

7. For details refer to document C0063-FOR-DGM-EL-003

8. Control Cabinet with form "2b"

9. PTC hardwired to its own VFD inside Control Cabinet

11. Cables supplied by Fores, sized by Elogen

12. Cable supplied and sized by Fores

13. Cable out of Fores scope

LEGEND:

F	FUSE
K	CONTACTOR
	THREE CONDUCTORS
	THREE PHASE &NEUTRAL CONDUCTOR
PE	PROTECTION CONDUCTOR
	3 PHASE WINDING, DELTA/STAR WITH NEUTRAL BROUGHT OUT
	POWER TRANSFORMER
CT	CURRENT TRANSFORMER
DM	DIGITAL POWER METERING UNIT
	CIRCUIT BREAKER
	GROUNDING CONNECTION
M	AC MOTOR
	TERMINATION
	LIGHTING ARRESTER OR SURGE ARRESTER
DGPT2	GAS, PRESSURE, TEMPERATURE DETECTION RELAY
PLC	PROGRAMMABLE LOGIC CONTROLLER
	MOTOR TEMPERATURE MONITORING DEVICE
	TEMPERATURE SENTOR (PT-100 RTD)
LCS	MOTOR LOCAL CONTROL STATION
	EARTHING SWITCH
	VARIABLE SPEED DRIVER
	LIGHT INDICATOR
	Skid Panel
OF/SD	CB AXILIARIE CONTACTS (ON/OFF/Trip)
	EMERGENCY PUSH BUTTON
	RELAY
	ELECTRICAL JUNCTION BOX
230VAC 24VDC	CONVERTER FROM 230Vac TO 24Vdc
	REDUNDANCY MODULE
	MANUAL SWITCH
	RECTIFIER

REFERENCE DOCUMENTS:

1. TS Control Cabinet & Electrical wiring C0063-ELE-004

2. Bill Off Material (BOM) C0063-BOM-001

3. Balance of Power C0063-ELE-003

4. NIDEC SLD C63-ELO-SLD01 (Transformer Rectifier for E500 Electrolyzer)

REV	DATE	DESCRIPTION	DRAFT	CHKD	APPR
03	13/02/2025	Issue For Approval	AM	AM	MC
02	22/11/2024	Issue For Review	AM	AM	MC
01	11/10/2024	Issue For Review	AM	AM	MC
00	23/05/2024	Issue For Review	AM	AM	MC

elogen

JOB	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
OBJECT	LV SINGLE LINE DIAGRAM
Fores No.	224215-DDL-EL-DG-00001_3
Elogen No.	C0063-FOR-DGM-EL-001
Crosswind No.	FORES-INN-BPH-DWG-00028
FORMAT	A2
SHEET	03 of 04

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CLIENT

Limit of Scope

ELOGEN

Main Power supply
400Vac 50Hz TN-S 3P+N+PE
from Low Voltage Switchboard
Tag No. SG-200N1
Reference dwg No.
123A90-DDL-EL-DG-20159 Sheet 01
Icc,rms = 30kA

Control Cabinet
TAG: 20-UCP-001
Pu = 221,7kW
Ib = 373,6A
Icc,max = 36kA
Voltage: 400Vac

L1 L2 L3 Voltage presence lamps

1U1
Phase monitoring relay

1QF3
4P
630A

MN

2SA4
EM Push Button
Front Panel, wired in safety loop within ESD-001 loop

Red Yellow Green Front panel light indicator for process status

Lenght < 500mm

Surge arrestor 1RF8

PQ-002
5U1
Digital Power Meter
(Note 6)

F

ETH cable (Note 13)
ETH cable (Note 13)
Shutdown command from Plant SIS (Note 13)
Electrolyzer PLC Failure to plant SIS (Note 13)
Confirmed Gas and Smoke Alarm to plant F&G (Note 13)

In=630A Icc,max=36kA Vn=400Vac

In=32A Icc,max=6kA Vn=230Vac

100QF5
2P
32

100GS5
UPS Pn=5kW
At least 1h of autonomy at 5kW

130QF1 2Px10A
130QF3 2Px10A
130QF5 2Px16A
130QF7 2Px10A
131QF1 2Px10A
131QF3 2Px10A

150GS5
230VAC / 24VDC
150GS1
230VAC / 24VDC

150U1
Max. Output 40A

151QF1
2Px125A

For 24Vdc utilities refer to doc. C63-FOR-DGM-EL-003

HCU-400
2 kVA
(Note 12)
Rectifier Control Panel E500

SSI-1000
FSS Fire sys.
0,5 kW
(Note 12)

Q.RIO1
WP1
0,3 kW
(Note 12)

Q.RIO2
WP3
0,3 kW
(Note 12)

100QF1 2Px25A
100QF3 4Px20A
101QF3 2Px20A Id=30mA
101QF7 4Px16A Id=30mA
102QM1 4Px200A
102QF3 4Px32A
102QM5 4Px125A
102QM7 4Px125A

HCU-400 4,4kW (Note 12)
HCU-400 8,8kW (Note 12)
Rectifier Control Panel E500

HE-61.1 (HPP-700) 3 kW (Note 12)
HE-64.1 (HPU-700) 6 kW (Note 12)

HVAC PANEL PAU003
82,5 kW (Note 12)

WTP-300
13 kW (Note 12)

WC-400 CHILLER PAU001
36,5 kW (Note 12)

WC-401 CHILLER PAU002
36,5 kW (Note 12)

Auxiliary equipments type 1

In=630A Icc,max=36kA Vn=400Vac

104QM1 3Px6A
105QM1 3Px6A
106QM1 3Px16A
107QM1 3Px16A
108QM1 3Px32A
109QM1 3Px32A
101QF5 4Px20A
103QF1 4Px20A
103QF3 2Px16A
101QF1 2Px63A
120QM1 4Px50A

(Note 9) on each motor

LP-300A 1,6 kW (Note 12)
LP-300B 1,6 kW (Note 12)
CP-620A 6 kW (Note 12)
CP-620B 6 kW (Note 12)
CP-600A 12 KW (Note 12)
CP-600B 12 KW (Note 12)

SPARE SPARE SPARE SPARE

PQ-001
120U3
Digital Power Meter
(Note 6)

F

DM

KM type 2 auxiliary equipment

Auxiliary equipments type 2

In=80A Icc,max=20kA Vn=400Vac

264KM2 2P 20A
260KM3 2P 20A
262KM3 2P 20A
264KM3 2P 20A
260KM4 2P 20A
262KM4 2P 20A
264KM4 2P 20A
260KM5 2P 6A

EXT-G01 15 W (Note 12)
EXT-G02 15 W (Note 12)
EXT-G03 15 W (Note 12)
EXT-G04 15 W (Note 12)
EXT-G05 15 W (Note 12)
EXT-G06 15 W (Note 12)
EXT-G07 15 W (Note 12)
EXT-G08 15 W (Note 12)

121QF1 2P 6A
121QF5 2P 6A
122QF5 2Px10A Id=30mA
122QF7 2Px10A Id=30mA

JB Heat tracing EHT-1010 HR-503
JB Heat tracing EHT-1009 HR-607B
JB Heat tracing EHT-1001 HR-600A
JB Heat tracing EHT-1007 HR-306
JB Heat tracing EHT-1005 HR-625
Heat Tracing Circuit 1 390W

JB Heat tracing EHT-1004 HR-620A
JB Heat tracing EHT-1008 HR-307
JB Heat tracing EHT-1006 HR-640
JB Heat tracing EHT-1002 HR-606
Heat Tracing Circuit 2 400W

125QF1 2Px6A Id=30mA
125QF3 2Px6A Id=30mA
125QF5 2Px6A Id=30mA
125QF7 2Px6A Id=30mA

JB Lighting WP1 270W
Normal Lighting
Emergency Lighting

JB Lighting WP2 180W
Normal and Emergency Lighting

JB Lighting WP3 180W
Normal and Emergency Lighting

JB Lighting WP4 90W
Normal and Emergency Lighting

126QF1 2Px6A Id=30mA
126QF3 2Px6A Id=30mA

External Lighting Ground Floor 75W
External Lighting First Floor 255W

123QF7 2Px20A Id=30mA
124QF1 2Px20A Id=30mA
124QF3 2Px20A Id=30mA
124QF5 2Px20A Id=30mA
122QF1 2Px10A Id=30mA
122QF3 2Px10A Id=30mA
123QF1 2Px10A Id=30mA
123QF3 2Px10A Id=30mA
123QF5 2Px10A Id=30mA
124QF7 2Px20A Id=30mA

Socket WP1 C63-JBS-01 900W (Note 12)
Socket WP2 C63-JBS-02 900W (Note 12)
Socket WP3 C63-JBS-03 900W (Note 12)
Socket WP4 C63-SS-07 900W (Note 12)

SPARE SPARE SPARE SPARE SPARE SPARE

1. All circuit breakers equipped with auxiliary status contact.

2. All inverters equipped with STO function and Profinet.

3. MN coil powered by UPS

4. The main busbars will be protected by a plexiglass.

5. Main incomers CB (MCCB/ACB) shall be provided with adjustable overcurrent protection.

6. PQ-001 and PQ-002 hardwired to PLC, as per document C0063-FOR-DGM-EL-003

7. For details refer to document C0063-FOR-DGM-EL-003

8. Control Cabinet with form "2b"

9. PTC hardwired to its own VFD inside Control Cabinet

11. Cables supplied by Fores, sized by Elogen

12. Cable supplied and sized by Fores

13. Cable out of Fores scope

LEGEND:

F	FUSE
K	CONTACTOR
	THREE CONDUCTORS
	THREE PHASE &NEUTRAL CONDUCTOR
PE	PROTECTION CONDUCTOR
	3 PHASE WINDING, DELTA/STAR WITH NEUTRAL BROUGHT OUT
	POWER TRANSFORMER
CT	CURRENT TRANSFORMER
DM	DIGITAL POWER METERING UNIT
	CIRCUIT BREAKER
	GROUNDING CONNECTION
M	AC MOTOR
	TERMINATION
	LIGHTING ARRESTER OR SURGE ARRESTER
DGPT2	GAS, PRESSURE, TEMPERATURE DETECTION RELAY
PLC	PROGRAMMABLE LOGIC CONTROLLER
	MOTOR TEMPERATURE MONITORING DEVICE
	TEMPERATURE SENTOR (PT-100 RTD)
LCS	MOTOR LOCAL CONTROL STATION
	EARTHING SWITCH
	VARIABLE SPEED DRIVER
	LIGHT INDICATOR
	Skid Panel
OF/SD	CB AXILIARIE CONTACTS (ON/OFF/Trip)
	EMERGENCY PUSH BUTTON
	RELAY
	ELECTRICAL JUNCTION BOX
230VAC / 24VDC	CONVERTER FROM 230Vac TO 24Vdc
	REDUNDANCY MODULE
	MANUAL SWITCH
	RECTIFIER

REFERENCE DOCUMENTS:

1. TS Control Cabinet & Electrical wiring C0063-ELE-004

2. Bill Off Material (BOM) C0063-BOM-001

3. Balance of Power C0063-ELE-003

4. NIDEC SLD C63-ELO-SLD01 (Transformer Rectifier for E500 Electrolyzer)

REV	DATE	DESCRIPTION	DRFT	CHKD	APPR
03	13/02/2025	Issue For Approval	AM	AM	MC
02	22/11/2024	Issue For Review	AM	AM	MC
01	11/10/2024	Issue For Review	AM	AM	MC
00	22/05/2024	Issue For Revision	AM	AM	MC

elogen

JOB	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
OBJECT	LV SINGLE LINE DIAGRAM
Fores No.	22A10-DDL-EL-DG-00001_3
Elogen No.	C0063-FOR-DGM-EL-001
Crosswind No.	FORES-INN-BPH-DWG-00026
FORMAT	A2
SHEET	04 of 04

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Section 4.3 Instrumentation functional test sheets index

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 20-00 & discipline : I

Instrumental	20-00 Electrolyser Package (A-20000)

ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
20-XA-001	A-20000 Electrolyser PKG confirmed gas alarm	ONSHORE	C10003772	FJ01D	100	2025-03-26	RFO 3
20-XA-002	A-20000 Electrolyser PKG confirmed fire alarm	ONSHORE	C10003773	FJ01D	100	2025-03-26	RFO 3
20-XA-003	A-20000 Electrolyser PKG UCP fault	ONSHORE	C10003741	FJ01D	100	2025-04-06	RFO 3
20-XS-001	SHUT-DOWN A-20000 Electrolyser PKG	ONSHORE	C10003742	FJ01D	100	2025-04-06	RFO 3
A-20000	Electrolyser Auxiliary Load	ONSHORE	C10004884	FJ05	100	2025-03-28	RFO 3

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	20-XA-003	: A-20000 Electrolyser PKG UCP fault	Dwg	123A90-DDL-PR-PID-80011		
	S/Sys	20-00	: Electrolyser Package (A-20000)	Module			
TASK	code	C10003741	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Instrumental	Form	FJ01D		Digital Loop

LOOP DATA

Loop TAG	20-XA-003			TSLD	123A90-FDL-IN-DG-40014 rev 1_A		
IO Type	Input	Yes	Output	No	Energy by transmitter	No	Energy by system	Yes
Marshalling	B400-SIS-001	Terminal	06A/06B	Slot	01	Rack	03	Chanel	06

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No		Yes		OK	OK
7	Loop not energized	Yes		Yes		OK	OK
8	Checking of line monitoring	No		No		OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar	ESD-1D					NA
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	OK
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE	AW1/018 17140769	7715/24	10/07/2025

Comments:

Page 1/1	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ROSETTI COMM	RM COMM	CW
Name	Alejandro Sasia	Giandonato Delmissier	David Musgrove
Date	2025-03-27	2025-04-03	2025-04-06

PROVERLIS Digitaly signed by Alejandro Sasia 2025-03-27T15:23:01.268Z

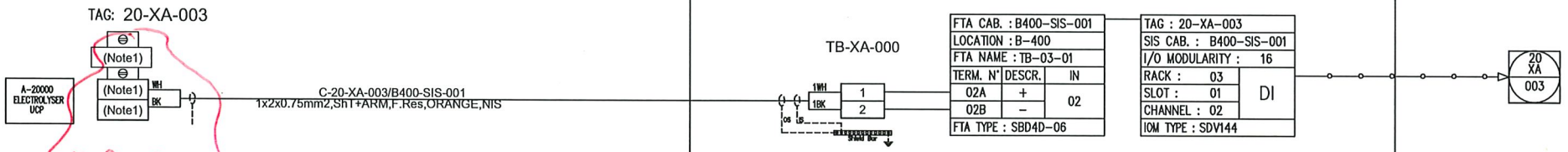
PROVERLIS Digitaly signed by Giandonato Delmissier 2025-04-03T04:59:41.899Z

PROVERLIS Digitaly signed by David Musgrove 2025-04-06T11:05:31.180Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 00

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	SAFETY INSTRUMENTED SYSTEM	OPERATOR CONSOLE



X.Do-S

11

12

26/02/25

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV.: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
20-XA-003
A-20000 ELECTROLYSER PKG UCP FAULT

CONTRACT NO./TITLE CONTRACT_NO.			SCALE 1:1
DRAWN: VBA	CHECKED: LCA	APPROVED: DLO	DATE 23/10/2024

A3	DRAWING NO. 123A90-DDL-IN-DG-40014	SHEET 129	REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	20-XS-001	: SHUT-DOWN A-20000 Electrolyser PKG			Dwg	123A90-DDL-PR-PID-80011
	S/Sys	20-00	: Electrolyser Package (A-20000)			Module	
TASK	code	C10003742		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Instrumental	Form	FJ01D Digital Loop

LOOP DATA

Loop TAG	20-XS-001			TSLD	123A90-FDL-IN-DG-40014 rev 1_A		
IO Type	Input	No	Output Yes	Energy by transmitter	No	Energy by system	Yes
Marshalling	B400-SIS-001	Terminal	04A/04B	Slot	05	Rack 01	Chanel 04

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control		Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No		Yes		OK	OK
7	Loop not energized	Yes		Yes		OK	OK
8	Checking of line monitoring	No		No		OK	OK
9	Checking of Maintenance Inhibition	NA		NA		NA	NA
10	Associated safety Level / bar						
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE	AW1/018 17140769	7715/24	10/07/2025

Comments:

Page 1/1	Performed by	WITNESS ☐ REVIEW	WITNESS ☐ REVIEW
Company	ROSETTI COM	RM COMM	CW
Name	Alejandro Sasia	Giandonato Delmissier	David Musgrove
Date	2025-03-19	2025-04-03	2025-04-06

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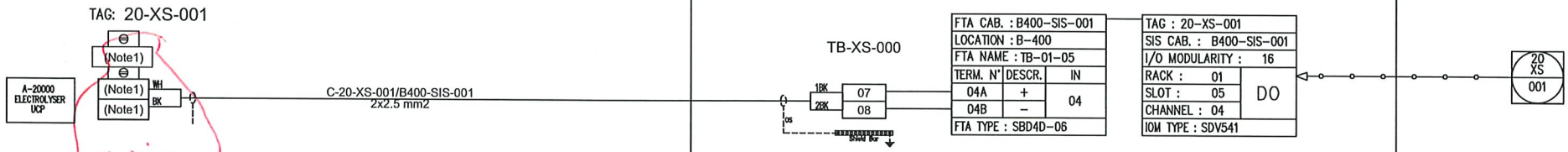
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PROVERLIS Digitaly signed by David Musgrove 2025-04-06T11:09:16.617Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	SAFETY INSTRUMENTED SYSTEM	OPERATOR CONSOLE



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18

26/02/25

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
20-XS-001
SHUT-DOWN A-20000 ELECTROLYSER PKG

CONTRACT NO./TITLE CONTRACT_NO.			SCALE 1:1
DRAWN: VBA	CHECKED: LCA	APPROVED: DLO	DATE 23/10/2024

A3	DRAWING NO. 123A90-DDL-IN-DG-40014	SHEET 144	REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	20-XA-001	: A-20000 Electrolyser PKG confirmed gas alarm	Dwg	123A90-DDL-PR-PID-80011		
	S/Sys	20-00	: Electrolyser Package (A-20000)	Module			
TASK	code	C10003772	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity FTS	Discipline	Instrumental	Form FJ01D	Digital Loop

LOOP DATA

Loop TAG	20-XA-001			TSLD	123A90-FDL-IN-DG-40014 rev 1_A		
IO Type	Input Yes	Output No		Energy by transmitter	No	Energy by system	Yes
Marshalling	B400-FGS-001	Terminal 03A/03B		Slot 05	Rack 05	Chanel 03	

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No		Yes		OK	OK
7	Loop not energized	Yes		Yes		OK	OK
8	Checking of line monitoring	No		No		OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar	ESD-1D					OK
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE	AW1/018 17140769	7715/24	10/07/2025

Comments:

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ROSETTI COM	RM COMM	CROSSWIND
Name	Alejandro Sasia	Giandonato Delmissier	Gerry McCann
Date	2025-03-19	2025-03-20	2025-03-26

PROVERLIS Digitaly signed by Alejandro Sasia 2025-03-19T08:19:47.501Z

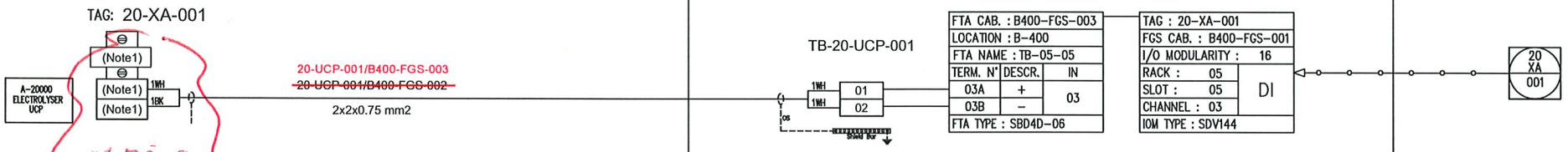
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Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	FIRE AND GAS SYSTEM	OPERATOR CONSOLE



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3/4

26/02/25

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
20–XA–001
A–20000 ELECTROLYZER PKG CONFIRMED GAS ALARM

CONTRACT NO./TITLE CONTRACT_NO.			SCALE 1:1
DRAWN: VBA	CHECKED: LCA	APPROVED: DLO	DATE 23/10/2024

A3	DRAWING NO. 123A90–DDL–IN–DG–40014	SHEET 296	REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	20-XA-002	: A-20000 Electrolyser PKG confirmed fire alarm	Dwg	123A90-DDL-PR-PID-80011		
	S/Sys	20-00	: Electrolyser Package (A-20000)	Module			
TASK	code	C10003773	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Instrumental	Form	FJ01D	Digital Loop

LOOP DATA

Loop TAG	20-XA-002			TSLD	123A90-FDL-IN-DG-40014 rev 1_A		
IO Type	Input	Yes	Output	No	Energy by transmitter	No	Energy by system	Yes
Marshalling	B400-FGS-001	Terminal	04A/04B	Slot	05	Rack	05	Chanel	04

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action		Alarm / Control		Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No		Yes		OK	OK
7	Loop not energized	Yes		Yes		OK	OK
8	Checking of line monitoring	No		No		OK	OK
9	Checking of Maintenance Inhibition	NA		NA		OK	NA
10	Associated safety Level / bar	ESD-1D					OK
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE	AW1/018 17140769	7715/24	10/07/2025

Comments:

	Performed by	WITNESS ☐ REVIEW	WITNESS ☐ REVIEW
Company	ROSETTI COM	RM COMM	CROSSWIND
Name	Alejandro Sasia	Giandonato Delmissier	Gerry McCann
Date	2025-03-19	2025-03-20	2025-03-26

PROVERLIS Digitaly signed by Alejandro Sasia 2025-03-19T09:19:52.124Z

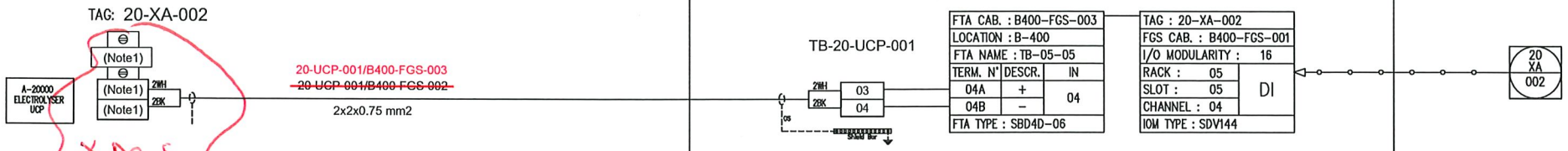
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PROVERLIS Digitaly signed by Gerry McCann 2025-03-26T09:49:25.330Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	FIRE AND GAS SYSTEM	OPERATOR CONSOLE



X.DO-S
19
20

L.Grazian
26/02/25

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
20-XA-002
A-20000 ELECTROLYSER PKG CONFIRMED FIRE ALARM

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CONTRACT NO./TITLE CONTRACT_NO. | SCALE 1:1
DRAWN: VBA | CHECKED: LCA | APPROVED: DLO | DATE 23/10/2024

A3 | DRAWING NO. 123A90-DDL-IN-DG-40014 | SHEET 297 | REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ITEM	Tag	A-20000	: Electrolyser Auxiliary Load			Dwg	123A90-DDL-PR-PID-80011
	S/Sys	20-00	: Electrolyser Package (A-20000)			Module	UD
TASK	code	C10004884		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity FTS	Discipline	Instrumental Form FJ05		Serial Communication Test

SERIAL COMMUNICATION TEST

Reference document number: C63-AUT-002_07_Communication table

Associated subsystems: 20-00

Completion date: 26/03/2025

Comments/Remarks:

Page 1/1	Performed by	☉ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	Rosetti Marino	CrossWind	
Name	Fabio Sirigu	David Musgrove	
Date	2025-03-27	2025-03-28	
Signature	PROVERLIS Digitaly signed by Fabio Sirigu 2025-03-27T16:30:26.798Z	PROVERLIS Digitaly signed by David Musgrove 2025-03-28T19:48:42.138Z	

C63-AUT-002_V7.0 Communication table

COMMUNICATION TABLE

FROM MASTER TO ELECTROLYSER

PROFINET COMMUNICATION

VARIABLE NAME	RANGE		UNIT	TYPE	LENGTH	BYTE	Bit	COMMENTS	Tests
Power setpoint (KW)	250-2500		Kw	REAL	32	0-3		Power Setpoint	OK
FLOW SETPONIT	50-500		NM3/H	REAL	32	4-7		FLOW H2 Setpoint	OK
WATCHDOG	0-300		N/A	INT	16	8-9		Communication control	OK
YEAR	N/A		N/A	BYTE	8	10		Date Synchronisation btw Elogen PLC & SHELL control system	OK
MONTH	N/A		N/A	BYTE	8	11		Date Synchronisation btw Elogen PLC & SHELL control system	OK
DAY	N/A		N/A	BYTE	8	12		Date Synchronisation btw Elogen PLC & SHELL control system	OK
HOUR	N/A		N/A	BYTE	8	13		Date Synchronisation btw Elogen PLC & SHELL control system	OK
MIN	N/A		N/A	BYTE	8	14		Date Synchronisation btw Elogen PLC & SHELL control system	OK
SECONDES	N/A		N/A	BYTE	8	15		Date Synchronisation btw Elogen PLC & SHELL control system	OK
Electrolyser Command	1 - 4		N/A	INT	16	16-17		1 : MODE STOP (STOP) 2 : MODE IDLE (IDLE) 3 : MODE STANDBY (STANDY BY) 4 : MODE PRODUCTION	OK OK
Setpoint_Choise	0-1		N/A	BOOL	1	18	0	Bit = 0 : Power Setpoint Bit= 1 : Flow H2 Setpoint	OK
Transformer DGPT2 REED Fault	0-1		N/A	BOOL	1	18	1	Transformer DGPT2 REED Fault	OK
Transformer DGPT2 PRESSURE Fault	0-1		N/A	BOOL	1	18	2	Transformer DGPT2 PRESSURE Fault	OK
Transformer DGPT2 Temperature (T1) ALARM	0-1		N/A	BOOL	1	18	3	Transformer DGPT2 Temperature (T1) ALARM	OK
Transformer DGPT2 Temperature (T2) FAULT	0-1		N/A	BOOL	1	18	4	Transformer DGPT2 Temperature (T2) FAULT	OK
RECTIFIER 1 MAIN CB ' TRIP'	0-1		N/A	BOOL	1	18	5	RECTIFIER 1 MAIN CB ' TRIP'	OK
RECTIFIER 2 MAIN CB ' TRIP'	0-1		N/A	BOOL	1	18	6	RECTIFIER 2 MAIN CB ' TRIP'	OK
RECTIFIER 1 MAIN CB OPEN	0-1		N/A	BOOL	1	18	7	RECTIFIER 1 MAIN CB OPEN	OK
RECTIFIER 1 MAIN CB CLOSED	0-1		N/A	BOOL	1	19	0	RECTIFIER 1 MAIN CB CLOSED	OK
RECTIFIER 2 MAIN CB OPEN	0-1		N/A	BOOL	1	19	1	RECTIFIER 2 MAIN CB OPEN	OK
RECTIFIER 2 MAIN CB CLOSED	0-1		N/A	BOOL	1	19	2	RECTIFIER 2 MAIN CB CLOSED	OK
H.V CB STATUS OPEN	0-1		N/A	BOOL	1	19	3	H.V CB STATUS OPEN	OK
H.V CB STATUS CLOSED	0-1		N/A	BOOL	1	19	4	H.V CB STATUS CLOSED	OK
SPARE	0-1		N/A	BOOL	1	19	5	SPARE	OK
SPARE	0-1		N/A	BOOL	1	19	6	SPARE	OK
SPARE	0-1		N/A	BOOL	1	19	7	SPARE	OK
50-AT-027	0-14		PH	REAL	32	20-23		Fresh water outlet pH	Not Implemented
50-TT-024	0-50		°C	REAL	32	24-27		Fresh water outlet temperature	Not Implemented
50-AT-026	0-25		ppm CaCO3	REAL	32	28-31		Fresh water outlet total hardness	Not Implemented
50-AT-024	0-1000		uS/cm	REAL	32	32-35		Fresh water conductivity from A-50007A/B	Not Implemented

FROM ELECTROLYSER TO MASTER

PROFINET COMMUNICATION

VARIABLE NAME	RANGE	SCALE	UNIT	TYPE	LENGTH	BYTE	Bit	COMMENTS	Tests
STATUS_ELECTROLYSER									
MINOR_FAULT	0-1	1	N/A	BOOL	1	0-1	0	AT LEAST ONE "MINOR_FAULT" PRESENT (Warning) ; 1= Fault exist	OK
MAJOR_FAULT	0-1	1	N/A	BOOL	1		1	AT LEAST ONE "DEFAUT MAJEUR" PRESENT ; 1= Fault exist	OK
SAFETY_FAULT	0-1	1	N/A	BOOL	1		2	AT LEAST ONE "DEFAUT DE SECURITE" PRESENT ; 1= Fault exist	OK
SSI	0-1	1	N/A	BOOL	1		3	FIRE CENTRAL alarm ; 1= Aalrm exist	OK
SPARE	-	1	-	-	-		4	SPARE	OK
SPARE	-	1	-	-	-		5	SPARE	OK
SPARE	-	1	-	-	-		6	SPARE	OK
SPARE	-	1	-	-	-		7	SPARE	OK
STATUS_ELECTROLYSER	0-19	1 1	N/A	INT	16	2-3		LOCAL MODE 0 : MISE POWER ON (POWER ON) 1 : MODE STOP (STOP) 2 : MODE IDLE (IDLE) 3 : MODE STAND BY 4 : MODE PRODUCTION 5 : MODE SAFETY 6 : MODE Maintenance 7 : MODE Stop in progress 8. MODE Start in progress 9. MODE IDLE in progress 10.MODE STAND BY in progress 11.MODE SAFETY in progress DISTANT MODE +100	OK
WATCHDOG	0-300	1	N/A	INT	16	4-5		COMMUNICATION CONTROL	OK
Process Signals									
Process_CODE_01				**INT**	**16**	**TBD**		**Each Bit of INT Code represent one process signal**	
FSH-640		1	N/A	BOOL	1	6	0	FLOW SWITCH HIGH DN50 CL300 ATEX SIL DEGREASED	ok
GS-64-T2		1	N/A	BOOL	1	6	1	TBD-Limit switch	ok
GS-64.1.1		1	N/A	BOOL	1	6	2	TBD-Limit switch	ok
GS-64.1.2		1	N/A	BOOL	1	6	3	TBD-Limit switch	ok
GS-64.1.3		1	N/A	BOOL	1	6	4	TBD-Limit switch	ok
GS-64.1.4		1	N/A	BOOL	1	6	5	TBD-Limit switch	ok
GS-64.2		1	N/A	BOOL	1	6	6	TBD-Limit switch	ok
GS-64.3		1	N/A	BOOL	1	6	7	TBD-Limit switch	ok
LSH-600		1	N/A	BOOL	1	7	0	High level in ST600	ok
LSH-610		1	N/A	BOOL	1	7	1	Water level CS610 HH	ok
LSH-630		1	N/A	BOOL	1	7	2	Water level CS630 H	ok
LSH-631		1	N/A	BOOL	1	7	3	Water level CS 630 HH	ok
LSH-640		1	N/A	BOOL	1	7	4	DG640 Level Switch - HH	ok
LSL-600		1	N/A	BOOL	1	7	5	Low level ST-600	ok
LSL-610		1	N/A	BOOL	1	7	6	Water level CS610 L	ok
LSL-611		1	N/A	BOOL	1	7	7	Water level CS610 LL	ok
Process_CODE_02				**INT**	**16**	**TBD**		**Each Bit of INT Code represent one process signal**	
LSL-620		1	N/A	BOOL	1	8	0	Vey low level ST-620	OK
LSL-630		1	N/A	BOOL	1	8	1	Vey low level ST-630	OK
LSL-640		1	N/A	BOOL	1	8	2	level ST-640 Low	OK
LSL-641		1	N/A	BOOL	1	8	3	level ST-640 LL	OK
SPARE		1	N/A	BOOL	1	8	4	SPARE	OK
SPARE		1	N/A	BOOL	1	8	5	SPARE	OK
SPARE		1	N/A	BOOL	1	8	6	SPARE	OK
SPARE		1	N/A	BOOL	1	8	7	SPARE	OK
SPARE		1	N/A	BOOL	1	9	0	SPARE	OK
SPARE		1	N/A	BOOL	1	9	1	SPARE	OK
SPARE		1	N/A	BOOL	1	9	2	SPARE	OK
SPARE		1	N/A	BOOL	1	9	3	SPARE	OK
SPARE		1	N/A	BOOL	1	9	4	SPARE	OK
SPARE		1	N/A	BOOL	1	9	5	SPARE	OK
SPARE		1	N/A	BOOL	1	9	6	SPARE	OK
SPARE		1	N/A	BOOL	1	9	7	SPARE	OK
RETURN FLOW SETPOINT	50-500	1	NM3/H	INT	16	12-13	-	VALUE FLOW SETPOINT CLIENT (FLOW SETPOINT)	OK
FT630	0-500	100	%	INT	16	14-15	-	ELECTROLYSE OUTLET HYDROGENE FLOW	OK
PT630		100	BARG	INT	16	16-17	-	PRESSURE IN THE ELECTROLYZER (H2)	OK
PT610		100	BARG	INT	16	18-19	-	PRESSURE IN THE ELECTROLYSER (O2)	OK
CT/P-600		100	µS/cm	INT	16	20-21	-	CONDUCTIVITIMER WATER O2 SIDE	OK
CT/P-620		100	µS/cm	INT	16	22-23	-	CONDUCTIVITIMER WATER H2 SIDE	OK
IM-001		100	A	INT	16	24-25	-	CURRENT output of Rectifer 1	OK
VM-100		100	V	INT	16	26-27	-	VOLTAGE OUTPUT of Rectifier 1	OK
IM-002		100	A	INT	16	28-29	-	CURRENT output of Rectifer 2	OK
VM-102		100	V	INT	16	30-31	-	VOLTAGE OUTPUT of Rectifier 2	OK
TT200		100	°C	INT	16	32-33	-	TEMPERATURE TRANSMITTER THERMAL SKID	OK
TT201		100	°C	INT	16	34-35	-	TEMPERATURE TRANSMITTER THERMAL SKID	OK
TT-202A		100	°C	INT	16	36-37	-	TEMPERATURE TRANSMITTER -20/80 DEG, ATEX DEGREASED	OK
TT-202B		100	°C	INT	16	38-39	-	TEMPERATURE TRANSMITTER -20/80 DEG, ATEX DEGREASED	OK
TT400		100	°C	INT	16	40-41	-	TEMPERATURE TRANSMITTER WATER CHILLER	OK
TT401		100	°C	INT	16	42-43	-	TEMPERATURE TRANSMITTER WATER CHILLER	OK
TT1000		100	°C	INT	16	44-45	-	TEMPERATURE TRANSMITTER -20/80 DEG	OK
TT1001		100	°C	INT	16	46-47	-	TEMPERATURE TRANSMITTER -20/80 DEG	OK
TT1002		100	°C	INT	16	48-49	-	TEMPERATURE TRANSMITTER -20/80 DEG	OK

MOVED

DAVE MUSWILONE 26/03/2025

FABIO SORIGA

SYED ALI 27/03/2025

TT1003		100	°C	INT	16	50-51	-	TEMPERATURE TRANSMITTER -20/80 DEG	OK
LT300		100	%	INT	16	52-53	-	Level Transmitter,Package PWT-300	OK
LT600		100	%	INT	16	54-55	-	SEPARATOR TANK WATER LEVEL O2 SIDE	OK
LT620		100	%	INT	16	56-57	-	SEPARATOR TANK WATER LEVEL SIDE H2	OK
PT900		100	BARG	INT	16	58-59	-	NITROGEN NETWORK PRESSURE	OK
AHD1000		100	%	INT	16	60-61	-	QUANTITY OF HYDROGEN IN THE AMBIENT	OK
AHD1001		100	%	INT	16	62-63	-	QUANTITY OF HYDROGEN IN THE AMBIENT	OK
AHD-1002		100	% LIE	INT	16	64-65	-	AMBIENT HYDROGEN DETECTOR 0.01KG/S 28M H2	OK
AHD-1003		100	% LIE	INT	16	66-67	-	AMBIENT HYDROGEN DETECTOR	OK
HIOD610A		100	%	INT	16	68-69	-	HYDROGEN MEASUREMENT IN OXYGEN	OK
DPT800		100	ppmV	INT	16	70-71	-	DEW POINT MEASUREMENT H2	OK
OIHA800		100	ppmV	INT	16	72-73	-	OXYGEN MEASUREMENT IN HYDROGEN	OK
Stack operating hours (h)		1	h	INT	16	74-75	-	Stack operating hours (h)	OK
Full load hours stack (h)		1	h	INT	16	76-77	-	Full load hours stack (h)	OK
Total power consumption (W)		1	W	INT	16	78-79	-	Total power consumption (W)	OK
Total system energy consumption (Wh)		1	Wh	INT	16	80-81	-	Total system energy consumption (Wh)	OK
Energy consumption stack (Wh)		1	Wh	INT	16	82-83	-	Energy consumption stack (Wh)	OK
TT600		100	°C	INT	16	84-85	-	O2 SIDE STACKS INLET TEMPERATURE	OK
TT601_A		100	°C	INT	16	86-87	-	O2 SIDE STACK 1 OUTLET TEMPERATURE	OK
TT601_B		100	°C	INT	16	88-89	-	O2 SIDE STACK 2 OUTLET TEMPERATURE	OK
TT601_C		100	°C	INT	16	90-91	-	O2 SIDE STACK 3 OUTLET TEMPERATURE	OK
TT601_D		100	°C	INT	16	92-93	-	O2 SIDE STACK 4 OUTLET TEMPERATURE	OK
TT601_E		100	°C	INT	16	94-95	-	O2 SIDE STACK 5 OUTLET TEMPERATURE	OK
TT601_F		100	°C	INT	16	96-97	-	O2 SIDE STACK 6 OUTLET TEMPERATURE	OK
TT601_G		100	°C	INT	16	98-99	-	O2 SIDE STACK 7 OUTLET TEMPERATURE	OK
TT601_H		100	°C	INT	16	100-101	-	O2 SIDE STACK 8 OUTLET TEMPERATURE	OK
TT620		100	°C	INT	16	102-103	-	H2 SIDE STACKS INLET TEMPERATURE	OK
TT621		100	°C	INT	16	104-105	-	TEMPERATURE TRANSMITTER 0/120 DEG	OK
FT600		100	NM3/H	INT	16	106-107	-	FLOW TRANSMITTER 200 M3/H H2O+O2 ATEX SIL DEGREASED	OK
FT620		100	NM3/H	INT	16	108-109	-	FLOW TRANSMITTER 80 M3/H H2O+H2 ATEX DEGREASED	OK
PT611		100	BARG	INT	16	110-111	-	PRESSURE TRANSMITTER 16 BARG O2 ATEX SIL DEGREASED	OK
PT612		100	BARG	INT	16	112-113	-	PRESSURE TRANSMITTER 16 BARG O2 ATEX SIL DEGREASED	OK
PT631		100	BARG	INT	16	114-115	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED	OK
PT632		100	BARG	INT	16	116-117	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED	OK
PT633		100	BARG	INT	16	118-119	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED	OK
PT910		100	BARG	INT	16	120-121	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED	OK
PT920		100	BARG	INT	16	122-123	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED	OK
DPRT-1000		100	BARG	INT	16	124-125	-	DIFFERENTIAL PRESSURE TRANSMITTER	OK
PT-64.1		100	BARG	INT	16	126-127	-	HPU AQUAGAS Pressure transmitter , Package HPP-700	OK
TT-60.1		100	°C	INT	16	128-129	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
TT-60.2		100	°C	INT	16	130-131	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
Spare		100	°C	INT	16	132-133	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
TT-61.1		100	°C	INT	16	134-135	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
TT-64.5		100	°C	INT	16	136-137	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
TT-64.6		100	°C	INT	16	138-139	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
TT-64.7		100	°C	INT	16	140-141	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
TT-64.8		100	°C	INT	16	142-143	-	HPU AQUAGAS Temperature transmitter,Package HPP-700	OK
VM001		100	V	INT	16	144-145	-	Voltage sensor of stack 1	OK
VM002		100	V	INT	16	146-147	-	Voltage sensor of stack 2	OK
VM003		100	V	INT	16	148-149	-	Voltage sensor of stack 3	OK
VM004		100	V	INT	16	150-151	-	Voltage sensor of stack 4	OK
VM005		100	V	INT	16	152-153	-	Voltage sensor of stack 5	OK
VM006		100	V	INT	16	154-155	-	Voltage sensor of stack 6	OK
VM007		100	V	INT	16	156-157	-	Voltage sensor of stack 7	OK
VM008		100	V	INT	16	158-159	-	Voltage sensor of stack 8	OK
Selector Swtch mode	0-2	1	N/A	INT	16	160-161	-	Selector Swith mode 0: Local 1 : Remote 2 : Maintenance	OK
HIOD610B		100	%	INT	16	162-163	-	HYDROGEN MEASUREMENT IN OXYGEN	OK
HIOD610C		100	%	INT	16	164-165	-	HYDROGEN MEASUREMENT IN OXYGEN	OK
SPARE			V	INT	16	166-167	-	SPARE	OK
SPARE			N/A	INT	16	168-169	-	SPARE	OK
SPARE			N/A	INT	16	170-171	-	SPARE	OK
SPARE			N/A	INT	16	172-173	-	SPARE	OK
SPARE			N/A	INT	16	174-175	-	SPARE	OK
SPARE			N/A	INT	16	176-177	-	SPARE	OK
SPARE			N/A	INT	16	178-179	-	SPARE	OK
SPARE			N/A	INT	16	180-181	-	SPARE	OK
SPARE			N/A	INT	16	182-183	-	SPARE	OK
SPARE			N/A	INT	16	184-185	-	SPARE	OK
Intelock Safety Faults									
AQA-1010 (ISO22)			N/A	BOOL	1	188	0	FIRE AND GAS DETECTION - FIRE - SSI-1000	OK
BZ-001 (ISO22)			N/A	BOOL	1	188	1	PLC FAULT - ERR - PLC-001	OK
CAHH-610 (C63)			N/A	BOOL	1	188	2	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3	OK
CAHH-1000 (ISO22)			N/A	BOOL	1	188	3	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000	OK
CAHH-1001 (ISO22)			N/A	BOOL	1	188	4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001	OK
CAHH-1002 (C63)			N/A	BOOL	1	188	5	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002	OK
CAHH-1003 (ISO22)			N/A	BOOL	1	188	6	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003	OK
CAHH-1004 (ISO22)			N/A	BOOL	1	188	7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004	OK
FAHH-640 (ISO22-500)			N/A	BOOL	1	189	0	DEBIT EQUILIBRAGE ELEVEE - FSH-640 - HH	OK
FAHH-800 (ISO22)			N/A	BOOL	1	189	1	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800	OK
FALL-600 (ISO22-500)			N/A	BOOL	1	189	2	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600	OK
FALL-610 (ISO22)			N/A	BOOL	1	189	3	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610A/B/C 2oo3	OK
SPARE			N/A	BOOL	1	189	4	SPARE	OK
SPARE			N/A	BOOL	1	189	5	SPARE	OK
SPARE			N/A	BOOL	1	189	6	SPARE	OK
SPARE			N/A	BOOL	1	189	7	SPARE	OK
LAHH-631 (ISO22)			N/A	BOOL	1	190	0	VERY HIGH LEVEL CS-630 - HH - LSH-631	OK
LALL-611 (ISO22)			N/A	BOOL	1	190	1	VERY LOW LEVEL CS-610 - LL - LSL-611	OK
LASHH-600 (ISO22)			N/A	BOOL	1	190	2	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600	OK
LASLL-600 (C63)			N/A	BOOL	1	190	3	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600	OK
LASLL-620 (C63)			N/A	BOOL	1	190	4	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620	OK
LASLL-500 (C63)			N/A	BOOL	1	190	5	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT -LSLL-500	OK
OAR-001 (ISO22)			N/A	BOOL	1	190	6	CUSTOMER EMERGENCY STOP - AUC-001	OK
OAZ-001 (ISO22)			N/A	BOOL	1	190	7	EMERGENCY SHUTDOWN BUTTON - ESD-001	OK
OAZ-002 (ISO22)			N/A	BOOL	1	191	0	EMERGENCY SHUTDOWN BUTTON - ESD-002	OK
OAZ-003 (ISO22)			N/A	BOOL	1	191	1	EMERGENCY SHUTDOWN BUTTON - ESD-003	OK
OAZ-004 (ISO22)			N/A	BOOL	1	191	2	EMERGENCY SHUTDOWN BUTTON - ESD-004	OK
OAZ-005 (ISO22)			N/A	BOOL	1	191	3	EMERGENCY SHUTDOWN BUTTON - ESD-005	OK
OAZ-006 (ISO22)			N/A	BOOL	1	191	4	EMERGENCY SHUTDOWN BUTTON - ESD-006	OK
OAZ-007 (ISO22)			N/A	BOOL	1	191	5	EMERGENCY SHUTDOWN BUTTON - ESD-007	OK
PAHH-600A (C63)			N/A	BOOL	1	191	6	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A	OK
PAHH-600B (C63)			N/A	BOOL	1	191	7	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B	OK
PAHH-611 (ISO22)			N/A	BOOL	1	192	0	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS)- HH - PT-611	OK
PAHH-620A (C63)			N/A	BOOL	1	192	1	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A	OK
PAHH-620B (C63)			N/A	BOOL	1	192	2	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B	OK
PAHH-631 (ISO22)			N/A	BOOL	1	192	3	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631	OK
PALL-611 (ISO22)			N/A	BOOL	1	192	4	LOW PRESSURE ON ANODIC SIDE - LL - PT-611	OK
PALL-631 (ISO22)			N/A	BOOL	1	192	5	LOW PRESSURE ON CATHODIC SIDE - LL - PT-631	OK
PDAHH-002 (ISO22)			N/A	BOOL	1	192	6	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611	OK
PDALL-002 (ISO22)			N/A	BOOL	1	192	7	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611	OK
PKA-633 (C63)			N/A	BOOL	1	193	0	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633	OK
360KA1 (C63)			N/A	BOOL	1	193	1	85F1 SAF MODULE	OK
PZAH-611 (C63)			N/A	BOOL	1	193	2	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS) OPENING PV-610 - H - PT-611	OK
PZAH-631 (C63)			N/A	BOOL	1	193	3	HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS) OPENING PV-630 - H - PT-631	OK
LALL-641 (ISO22)			N/A	BOOL	1	193	4	VERY LOW LEVEL DG-640 (SIS) - LL - LSL-641	OK
SPARE			N/A	BOOL	1	193	5	SPARE	OK
SPARE			N/A	BOOL	1	193	6	SPARE	OK
SPARE			N/A	BOOL	1	193	7	SPARE	OK
SAFETY_FAULT_ALARM_CODE_4				INT	16	**194-195**		SPARE	OK
SAFETY_FAULT_ALARM_CODE_5				INT	16	**196-197**		SPARE	OK
Intelock process faults (IP1-IP9)									
JGA-007 (C63)			N/A	BOOL	1	198	0	TRANSFORMER GAS PRESSURE TEMPERATURE DETECTION FAULT	OK
ACA-001 (ISO22)			N/A	BOOL	1	198	1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001	OK
ACA-002 (ISO22)			N/A	BOOL	1	198	2	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002	OK
AQA-1005			N/A	BOOL	1	198	3	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER	OK
AQA-1006			N/A	BOOL	1	198	4	COMMUNICATION FAULT PLC ELOGEN / HVAC	OK
AQA-001 (ISO22)			N/A	BOOL	1	198	5	RECTIFIER FAULT - ERR - REC-001	OK
AQA-002 (ISO22)			N/A	BOOL	1	198	6	RECTIFIER FAULT - ERR - REC-002	OK
AQA-052			N/A	BOOL	1	198	7	CUSTOMER/ELOGEN COMMUNICATION SWITCH FAULT,REMOTE MODE	OK

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AQA-1001 (ISO22)			N/A	BOOL	1	199	0	FIRE CONTROL PANEL FAULT - ERR - SSI-1000	OK
AQA-1003			N/A	BOOL	1	199	1	COMMUICATION FAULT PLC ELOGEN / WTP	OK
EJAHH-001 (C63)			N/A	BOOL	1	199	2	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001	OK
EJAHH-002 (C63)			N/A	BOOL	1	199	3	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002	OK
AQA-1001 (ISO22)			N/A	BOOL	1	199	4	FIRE CONTROL PANEL FAULT - ERR - SSI-1000	OK
ZIO-604			N/A	BOOL	1	199	5	HV-604 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-604	OK
ZIO-623			N/A	BOOL	1	199	6	HV-623 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-623	OK
ZIO-605			N/A	BOOL	1	199	7	HV-605 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-605	OK
ZIO-624			N/A	BOOL	1	200	0	HV-624 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-624	OK
SPARE			N/A	BOOL	1	200	1	SPARE	OK
FALL-620 (ISO22-500)			N/A	BOOL	1	200	2	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620	OK
FSA 64.1			N/A	BOOL	1	200	3	FC 64.1 non alimenté par courant 4-20 mA	OK
FSA 64.1 LL			N/A	BOOL	1	200	4	Débit entrée HPU FC 64.1 - LL	OK
GSA 64.1.1 HH			N/A	BOOL	1	200	5	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1	OK
GSA 64.1.1 LL			N/A	BOOL	1	200	6	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1	OK
GSA 64.1.2 HH			N/A	BOOL	1	200	7	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2	OK
GSA 64.1.2 LL			N/A	BOOL	1	201	0	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2	OK
GSA 64.1.3 HH			N/A	BOOL	1	201	1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3	OK
GSA 64.1.3 LL			N/A	BOOL	1	201	2	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3	OK
GSA 64.1.4 HH			N/A	BOOL	1	201	3	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4	OK
GSA 64.1.4 LL			N/A	BOOL	1	201	4	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4	OK
GSA 64.2 HH			N/A	BOOL	1	201	5	VALVE 64-V5 NOT CLOSED - HH - GS 64.2	OK
GSA 64.2 LL			N/A	BOOL	1	201	6	VALVE 64-V5 NOT OPEN - LL - GS 64.2	OK
GSA 64.3 HH			N/A	BOOL	1	201	7	VALVE 64-V7 NOT CLOSED - HH - GS 64.3	OK
GSA 64.3 LL			N/A	BOOL	1	202	0	VALVE 64-V7 NOT OPEN - LL - GS 64.3	OK
GSA 64.T2 HH			N/A	BOOL	1	202	1	VALVE 64-T2 NOT OPEN - HH - GS 64.T2	OK
GSA 64.T2 LL			N/A	BOOL	1	202	2	VALVE 64-T2 NOT CLOSED - LL - GS 64.T2	OK
IAHH-001 (ISO22)			N/A	BOOL	1	202	3	HIGH CURRENT RECTIFIER - HH - IM-001	OK
IAHH-002 (ISO22)			N/A	BOOL	1	202	4	HIGH CURRENT RECTIFIER - HH - IM-002	OK
IDAHH-001 (ISO22)			N/A	BOOL	1	202	5	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001	OK
IDAHH-002 (ISO22)			N/A	BOOL	1	202	6	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002	OK
JGA-001 (ISO22)			N/A	BOOL	1	202	7	LOSS OF 400 VAC POWER SUPPLY - ERR	OK Duplicated
KSA K01 HH			N/A	BOOL	1	203	0	Dryer heater HE 64.1, K01 Not deactivated	OK
KSA K01 LL			N/A	BOOL	1	203	1	Dryer heater HE 64.1, contactor K01 Not activated	OK
KSA K02 HH			N/A	BOOL	1	203	2	Dryer heater HE 64.1, K02 Not deactivated	OK
KSA K02 LL			N/A	BOOL	1	203	3	Dryer heater HE 64.1, K02 Not activated	OK
KSA K03 HH			N/A	BOOL	1	203	4	Deoxo Trace heater HE 61.1, K03 Not deactivated	OK
KSA K03 LL			N/A	BOOL	1	203	5	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03	OK
KSA K04 HH			N/A	BOOL	1	203	6	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04	OK
KSA K04 LL			N/A	BOOL	1	203	7	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04	OK
LAHH-001 (ISO22)			N/A	BOOL	1	204	0	WATER LEAK DETECTION - HH - WLD-001	OK
LAHH-002 (ISO22)			N/A	BOOL	1	204	1	WATER LEAK DETECTION - HH - WLD-002	OK
LAHH-003 (ISO22)			N/A	BOOL	1	204	2	WATER LEAK DETECTION - HH - WLD-003	OK
LAHH-004 (ISO22)			N/A	BOOL	1	204	3	WATER LEAK DETECTION - HH - WLD-004	OK
LAHH-005 (ISO22)			N/A	BOOL	1	204	4	WATER LEAK DETECTION - HH - WLD-005	OK
LAHH-006 (ISO22)			N/A	BOOL	1	204	5	WATER LEAK DETECTION - HH - WLD-006	OK
LAHH-600 (C63)			N/A	BOOL	1	204	6	VERY HIGH LEVEL ST-600 - HH - LT-600	OK
LAHH-620 (C63)			N/A	BOOL	1	204	7	VERY HIGH LEVEL ST-620 - HH - LT-620	OK
LALL-300 (C63)			N/A	BOOL	1	205	0	VERY LOW LEVEL WTP-300 - LL - LT-300	OK
LASHH-500 (C63)			N/A	BOOL	1	205	1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500	OK
OAS-001 (ISO22)			N/A	BOOL	1	205	2	ELECTROLYSER DOOR OPENED - DS-001	OK
OAS-002 (ISO22)			N/A	BOOL	1	205	3	ELECTROLYSER DOOR OPENED - DS-002	OK
OAS-003 (ISO22)			N/A	BOOL	1	205	4	ELECTROLYSER DOOR OPENED - DS-003	OK
OAS-004 (ISO22)			N/A	BOOL	1	205	5	ELECTROLYSER DOOR OPENED - DS-004	OK
OAS-005 (ISO22)			N/A	BOOL	1	205	6	ELECTROLYSER DOOR OPENED - DS-005	OK
OAS-006 (ISO22)			N/A	BOOL	1	205	7	ELECTROLYSER DOOR OPENED - DS-006	OK
OAS-007 (ISO22)			N/A	BOOL	1	206	0	ELECTROLYSER DOOR OPENED - DS-007	OK
OAS-008 (ISO22)			N/A	BOOL	1	206	1	ELECTROLYSER DOOR OPENED - DS-008	OK
OAS-009 (ISO22)			N/A	BOOL	1	206	2	ELECTROLYSER DOOR OPENED - DS-009	OK
OAS-010 (ISO22)			N/A	BOOL	1	206	3	ELECTROLYSER DOOR OPENED - DS-0010	OK
OAS-011 (ISO22)			N/A	BOOL	1	206	4	ELECTROLYSER DOOR OPENED - DS-0011	OK
OAS-012 ISO22)			N/A	BOOL	1	206	5	ELECTROLYSER DOOR OPENED - DS-0012	OK
SPARE			N/A	BOOL	1	206	6	SPARE	OK
SPARE			N/A	BOOL	1	206	7	SPARE	OK
SPARE			N/A	BOOL	1	207	0	SPARE	OK
SPARE			N/A	BOOL	1	207	1	SPARE	OK
SPARE			N/A	BOOL	1	207	2	SPARE	OK
SPARE			N/A	BOOL	1	207	3	SPARE	OK
SPARE			N/A	BOOL	1	207	4	SPARE	OK
SPARE			N/A	BOOL	1	207	5	SPARE	OK
PAHH-150 (ISO22)			N/A	BOOL	1	207	6	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150	OK
PAHH-610 (ISO22)			N/A	BOOL	1	207	7	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610	OK
PAHH-630 (ISO22)			N/A	BOOL	1	208	0	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630	OK
PAHH-900 (ISO22)			N/A	BOOL	1	208	1	LEAK ON OXYGEN INERTING LINE - HH - PT-900	OK
PAHH-910 (ISO22)			N/A	BOOL	1	208	2	VERY HIGH NITROGEN PRESSURE - HH - PT-910	OK
PAHH-920 (ISO22)			N/A	BOOL	1	208	3	LEAK ON HYDROGEN INERTING LINE - HH - PT-920	OK
PALL-150 (ISO22)			N/A	BOOL	1	208	4	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150	OK
PALL-910 (ISO22)			N/A	BOOL	1	208	5	VERY LOW NITROGEN PRESSURE - LL - PT910	OK
PDAHH-001 (ISO22)			N/A	BOOL	1	208	6	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610	OK
PDALL-001 (ISO22)			N/A	BOOL	1	208	7	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	OK
TAHH-600 (ISO22)			N/A	BOOL	1	209	0	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600	OK
TAHH-601A (ISO22)			N/A	BOOL	1	209	1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601A	OK
TAHH-601B (ISO22)			N/A	BOOL	1	209	2	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601B	OK
TAHH-601C (ISO22)			N/A	BOOL	1	209	3	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601C	OK
TAHH-601D (ISO22)			N/A	BOOL	1	209	4	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601D	OK
TAHH-601E (ISO22)			N/A	BOOL	1	209	5	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601E	OK
TAHH-601F (ISO22)			N/A	BOOL	1	209	6	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601F	OK
TAHH-601G (ISO22)			N/A	BOOL	1	209	7	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601G	OK
TAHH-601H (ISO22)			N/A	BOOL	1	210	0	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601H	OK
TAHH-620 (ISO22)			N/A	BOOL	1	210	1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620	OK
TDAHH-600 (ISO22)			N/A	BOOL	1	210	2	ANODE DT VERY HIGH - HH - TDY-600	OK
TDALL-600 (ISO22)			N/A	BOOL	1	210	3	ANODE DT VERY LOW - LL - TDY-600	OK
TSA 60.1			N/A	BOOL	1	210	4	NO SIGNAL - ERR - TT 60.1	OK
TSA 60.1 HH			N/A	BOOL	1	210	5	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1	OK
TSA 60.1 LL			N/A	BOOL	1	210	6	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1	OK
TSA 60.2			N/A	BOOL	1	210	7	NO SIGNAL - ERR - TT 60.2	OK
TSA 60.2 HH			N/A	BOOL	1	211	0	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2	OK
TSA 60.2 LL			N/A	BOOL	1	211	1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2	OK
TSA 61.1			N/A	BOOL	1	211	2	NO SIGNAL - ERR - TT 61.1	OK
TSA 61.1 HH			N/A	BOOL	1	211	3	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1	OK
TSA 64.2 HH			N/A	BOOL	1	211	4	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2	OK
TSA 64.3 HH			N/A	BOOL	1	211	5	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3	OK
TSA 64.4 HH			N/A	BOOL	1	211	6	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4	OK
TSA 64.5			N/A	BOOL	1	211	7	NO SIGNAL - ERR - TT 64.5	OK
TSA 64.5 HH A			N/A	BOOL	1	212	0	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.5	OK
TSA 64.5 HH R			N/A	BOOL	1	212	1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5	OK
TSA 64.6			N/A	BOOL	1	212	2	NO SIGNAL - ERR - TT 64.6	OK
TSA 64.6 HH A			N/A	BOOL	1	212	3	DRYER TOWER 64A, TOP ADS. TEMPERATURE VERY HIGH -HH - 64.6	OK
TSA 64.6 HH C			N/A	BOOL	1	212	4	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6	OK
TSA 64.6 HH R			N/A	BOOL	1	212	5	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6	OK
TSA 64.7			N/A	BOOL	1	212	6	NO SIGNAL - ERR - TT 64.7	OK
TSA 64.7 HH A			N/A	BOOL	1	212	7	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.7	OK
TSA 64.7 HH R			N/A	BOOL	1	213	0	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7	OK
TSA 64.8			N/A	BOOL	1	213	1	NO SIGNAL - ERR - TT 64.8	OK
TSA 64.8 HH A			N/A	BOOL	1	213	2	DRYER TOWER 64B, TOP ADS. TEMPERATURE VERY HIGH - HH - 64.8	OK
TSA 64.8 HH C			N/A	BOOL	1	213	3	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8	OK
TSA 64.8 HH R			N/A	BOOL	1	213	4	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8	OK
VAHH-001 (ISO22)			N/A	BOOL	1	213	5	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001	OK
VAHH-101 (C63)			N/A	BOOL	1	213	6	REC-001 VERY HIGH VOLTAGE - HH - VM-101	OK
VAHH-102 (C63)			N/A	BOOL	1	213	7	REC-002 VERY HIGH VOLTAGE - HH - VM-102	OK
VALL-001 (ISO22)			N/A	BOOL	1	214	0	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001	OK
VKA-001 (ISO22)			N/A	BOOL	1	214	1	STACK-001 VOLTAGE DROP - PCA-001 - DROP	OK
VKA-002 (ISO22)			N/A	BOOL	1	214	2	STACK-002 VOLTAGE DROP - PCA-002 - DROP	OK
VKA-003 (ISO22)			N/A	BOOL	1	214	3	STACK-003 VOLTAGE DROP - PCA-003 - DROP	OK
VKA-004 (ISO22)			N/A	BOOL	1	214	4	STACK-004 VOLTAGE DROP - PCA-004 - DROP	OK
VKA-005 (ISO22)			N/A	BOOL	1	214	5	STACK-005 VOLTAGE DROP - PCA-005 - DROP	OK
VKA-006 (ISO22)			N/A	BOOL	1	214	6	STACK-006 VOLTAGE DROP - PCA-006 - DROP	OK
VKA-007 (ISO22)			N/A	BOOL	1	214	7	STACK-007 VOLTAGE DROP - PCA-007 - DROP	OK

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VKA-008 (ISO22)			N/A	BOOL	1	215	0	STACK-008 VOLTAGE DROP - PCA-008 - DROP	OK
VQAHH-001 (ISO22)			N/A	BOOL	1	215	1	VOLTAGE DEVIATION BETWEEN PCA-001 AND VM-001 - HH	OK
VQAHH-002 (ISO22)			N/A	BOOL	1	215	2	VOLTAGE DEVIATION BETWEEN PCA-002 AND VM-002 - HH	OK
VQAHH-003 (ISO22)			N/A	BOOL	1	215	3	VOLTAGE DEVIATION BETWEEN PCA-003 AND VM-003 - HH	OK
VQAHH-004 (ISO22)			N/A	BOOL	1	215	4	VOLTAGE DEVIATION BETWEEN PCA-004 AND VM-004 - HH	OK
VQAHH-005 (ISO22)			N/A	BOOL	1	215	5	VOLTAGE DEVIATION BETWEEN PCA-005 AND VM-005 - HH	OK
VQAHH-006 (ISO22)			N/A	BOOL	1	215	6	VOLTAGE DEVIATION BETWEEN PCA-006 AND VM-006 - HH	OK
VQAHH-007 (ISO22)			N/A	BOOL	1	215	7	VOLTAGE DEVIATION BETWEEN PCA-007 AND VM-007 - HH	OK
VQAHH-008 (ISO22)			N/A	BOOL	1	216	0	VOLTAGE DEVIATION BETWEEN PCA-008 AND VM-008 - HH	OK
YAHH-600 (ISO22)			N/A	BOOL	1	216	1	VERY HIGH CONDUCTIVITY CT600 - HH	OK
YAHH-620 (ISO22)			N/A	BOOL	1	216	2	VERY HIGH CONDUCTIVITY CT620 - HH	OK
YALL-600 (ISO22)			N/A	BOOL	1	216	3	CALIBRATION FAULT - CT600	OK
YALL-620 (ISO22)			N/A	BOOL	1	216	4	CALIBRATION FAULT - CT620	OK
SPARE			N/A	BOOL	1	216	5	SPARE	OK Duplicated
JGA-002 (C63)			N/A	BOOL	1	216	6	OVERVOLTAGE - SURGE PROTECTION - RF8	OK
JGA-003 (C63)			N/A	BOOL	1	216	7	FAULT - UPS CIRCUIT BREAKER AUXILIARY CONTACT - QF5	OK
JGA-004 (C63)			N/A	BOOL	1	216	0	BREAKER - AUXILIARY TYPE 2 - 120QM1	OK Duplicate
JGA-008 (C63)			N/A	BOOL	1	216	1	FAULT - HCU RECTIFIER 400Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF3	OK
JGA-302 (C63)			N/A	BOOL	1	217	2	BREAKER WTP300 - 102QF3	OK
SJGA-010 (C63)			N/A	BOOL	1	217	3	HVAC PANEL CIRCUIT BREAKER AUXILIARY CONTACT - 102QM1	OK
JGA-014 (C63)			N/A	BOOL	1	217	4	FAULT - RECTIFIER UPS POWER SUPPLY 1 CIRCUIT BREAKER AUXILIARY CONTACT - 130QF5	OK
JGA-1000 (C63)			N/A	BOOL	1	217	5	SSI-1000 POWER FAILURE - 130QF7	OK
JGA-015 (C63)			N/A	BOOL	1	217	6	RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF1	OK
JGA-016 (C63)			N/A	BOOL	1	217	7	RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF3	OK
JGA-005 (C63)			N/A	BOOL	1	218	0	FAULT - RECTIFIER 230Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF1	OK Duplicate
JGA-006 (ISO22)			N/A	BOOL	1	218	1	REC_MAIN_BREK_DEF	OK
PSA-001 (C63)			N/A	BOOL	1	218	2	RECTIFIER COOLING NETWORK PRESSURE SWITCH - PS001	OK
AQA-005 (ISO22)			N/A	BOOL	1	218	3	LOSS OF COMMUNICATION RIO MAIN - ERR	OK
AQA-006 (ISO22)			N/A	BOOL	1	218	4	LOSS OF COMMUNICATION RIO 1 - ERR	OK
AQA-007 (ISO22)			N/A	BOOL	1	218	5	LOSS OF COMMUNICATION RIO 2 - ERR	OK
AQA-018 (C63)			N/A	BOOL	1	218	6	LOSS OF COMMUNICATION RIO BURKERT - ERR	OK
LAH-630 (C63)			N/A	BOOL	1	218	7	HIGH LEVEL CS-630 - HH - LSH-630	OK
LALL-600 (C63)			N/A	BOOL	1	219	0	VERY LOW LEVEL ST-600 - LL - LT-600	OK
LALL-620 (C63)			N/A	BOOL	1	219	1	VERY LOW LEVEL ST-620 - LL - LT-620	OK
LASLL-600 (C63)			N/A	BOOL	1	219	2	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600	OK
LASLL-620 (C63)			N/A	BOOL	1	219	3	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620	OK
SPARE			N/A	BOOL	1	219	4	SPARE	OK
SPARE			N/A	BOOL	1	219	5	SPARE	OK
SPARE			N/A	BOOL	1	219	6	SPARE	OK
SPARE			N/A	BOOL	1	219	7	SPARE	OK
MAJOR_FAULT_ALARM_CODE_12				**INT**	**16**	**220-221**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_13				**INT**	**16**	**222-223**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_14				**INT**	**16**	**224-225**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_15				**INT**	**16**	**226-227**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_16				**INT**	**16**	**228-229**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_17				**INT**	**16**	**230-231**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_18				**INT**	**16**	**232-233**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_19				**INT**	**16**	**234-235**		**SPARE**	OK
MAJOR_FAULT_ALARM_CODE_20				**INT**	**16**	**236-237**		**SPARE**	OK
Intelock process faults (Warning)									
AAH-800 (ISO22)			N/A	BOOL	1	238	0	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800	OK
ACA-300A (C63)			N/A	BOOL	1	238	1	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-80	OK
JGA-306 (C63)			N/A	BOOL	1	238	2	HEAT RIBBON 306 CIRCUIT BREAKER AUXILIARY CONTACT - 122QF7	OK
ACA-600A (ISO22)			N/A	BOOL	1	238	3	STARTING MALFUNCTION CP-600A - ERR - CP-600A	OK
JGA-307 (C63)			N/A	BOOL	1	238	4	FAULT - HEAT RIBBON 307 CIRCUIT BREAKER AUXILIARY CONTACT - 123QF1	OK
ACA-620A (ISO22)			N/A	BOOL	1	238	5	STARTING MALFUNCTION CP-620A - ERR - CP-620A	OK
JGA-503 (C63)			N/A	BOOL	1	238	6	FAULT - HEAT RIBBON 503 CIRCUIT BREAKER AUXILIARY CONTACT	OK
CAH-610 (C63)			N/A	BOOL	1	238	7	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3	OK
CAH-1000 (ISO22)			N/A	BOOL	1	239	0	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000	OK
CAH-1001 (ISO22)			N/A	BOOL	1	239	1	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001	OK
CAH-1002 (C63)			N/A	BOOL	1	239	2	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002	OK
CAH-1003 (ISO22)			N/A	BOOL	1	239	3	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003	OK
CAH-1004 (ISO22)			N/A	BOOL	1	239	4	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004	OK
CAHH-300 (C63)			N/A	BOOL	1	239	5	VERY HIGH CONDUCTIVITY LP300 - HH	OK
CAHH-800 (ISO22)			N/A	BOOL	1	239	6	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800	OK
EJALL-001 (C63)			N/A	BOOL	1	239	7	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001	OK
EJALL-002 (C63)			N/A	BOOL	1	240	0	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002	OK
JGA-600A (C63)			N/A	BOOL	1	240	1	FAULT - HEAT RIBBON 600A CIRCUIT BREAKER AUXILIARY CONTACT	OK
JGA-606 (C63)			N/A	BOOL	1	240	2	FAULT - HEAT RIBBON 606 CIRCUIT BREAKER AUXILIARY CONTACT	OK
JGA-607B (C63)			N/A	BOOL	1	240	3	FAULT - HEAT RIBBON 607B CIRCUIT BREAKER AUXILIARY CONTACT	OK
JGA-620A (C63)			N/A	BOOL	1	240	4	FAULT - HEAT RIBBON 620A CIRCUIT BREAKER AUXILIARY CONTACT	OK
EGA-1101 (ISO22)			N/A	BOOL	1	240	5	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001	OK
EGA-1102 (ISO22)			N/A	BOOL	1	240	6	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002	OK
EGA-1103 (ISO22)			N/A	BOOL	1	240	7	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003	OK
EGA-1104 (ISO22)			N/A	BOOL	1	241	0	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004	OK
EGA-1105 (ISO22)			N/A	BOOL	1	241	1	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005	OK
EGA-1106 (ISO22)			N/A	BOOL	1	241	2	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006	OK
EGA-1107 (ISO22)			N/A	BOOL	1	241	3	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007	OK
EGA-1108 (ISO22)			N/A	BOOL	1	241	4	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008	OK
FAL-600 (ISO22-500)			N/A	BOOL	1	241	5	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600	OK
FAL-620 (ISO22-500)			N/A	BOOL	1	241	6	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620	OK
FAL-900 (ISO22)			N/A	BOOL	1	241	7	LOW N2 FLOWRATE FOR PURGE - L - FT-900	OK
FAL-901 (ISO22)			N/A	BOOL	1	242	0	LOW N2 FLOWRATE FOR PURGE - L - FT-901	OK
FAL-920 (ISO22)			N/A	BOOL	1	242	1	LOW N2 FLOWRATE FOR PURGE - L - FT-920	OK
FAL-921 (ISO22)			N/A	BOOL	1	242	2	LOW N2 FLOWRATE FOR PURGE - L - FT-921	OK
FALL-611 (ISO22)			N/A	BOOL	1	242	3	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611	OK
FALL-800 (ISO22)			N/A	BOOL	1	242	4	VERY LOW H2 FLOW ANALYSIS - LL - FICV-800	OK
FDAH-630 (ISO22)			N/A	BOOL	1	242	5	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630	OK
GDA-611 (ISO22)			N/A	BOOL	1	242	6	POSITION DEVIATION OF MPV-611 - ERR - MPV-611	OK
GDA-630 (ISO22)			N/A	BOOL	1	242	7	POSITION DEVIATION OF MPV-630 - ERR - MPV-630	OK
JGA-300A (C63)			N/A	BOOL	1	243	0	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A	OK
JGA-300B (C63)			N/A	BOOL	1	243	1	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B	OK
JGA-600A (ISO22)			N/A	BOOL	1	243	2	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A	OK
JGA-600B (ISO22)			N/A	BOOL	1	243	3	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B	OK
JGA-620A (ISO22)			N/A	BOOL	1	243	4	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A	OK
JGA-620B (ISO22)			N/A	BOOL	1	243	5	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B	OK
JGA-1001 (ISO22)			N/A	BOOL	1	243	6	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001	OK
JGA-1002 (ISO22)			N/A	BOOL	1	243	7	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002	OK
JGA-1003 (ISO22)			N/A	BOOL	1	244	0	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003	OK
JGA-1004 (ISO22)			N/A	BOOL	1	244	1	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004	OK
JGA-1006 (ISO22)			N/A	BOOL	1	244	2	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006	OK
JGA-1007 (ISO22)			N/A	BOOL	1	244	3	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007	OK
JGA-1121			N/A	BOOL	1	244	4	MALFUNCTION MAIN CIRCUIT BREAKER FOR 4 FANS STACK - ERR - BREAKER STACK 001/002/003/004	OK
JGA-1122			N/A	BOOL	1	244	5	MALFUNCTION COMMON CIRCUIT BREAKER OF 4 FANS STACKS - ERR - BREAKER STACK 005/ 006/ 007/ 008	OK
LAH-600 (C63)			N/A	BOOL	1	244	6	HIGH LEVEL ST-600 - H - LT-600	OK
LAH-610 (ISO22)			N/A	BOOL	1	244	7	HIGH LEVEL CS-610 - H - LSH-610	OK
LAH-620 (C63)			N/A	BOOL	1	245	0	HIGH LEVEL ST-620 - H - LT-620	OK
ODA-001 (C63)			N/A	BOOL	1	245	1	DIVERGENCE REMOTE / LOCAL	OK
LAHH-640 (ISO22)			N/A	BOOL	1	245	2	HIGH LEVEL DG-640 - HH - LSH-640	OK
LAL-600 (C63)			N/A	BOOL	1	245	3	LOW LEVEL ST-600 - L	OK
LAL-610 (ISO22)			N/A	BOOL	1	245	4	Low Level CS-610 - L- LSL-610	OK
LAL-620 (C63)			N/A	BOOL	1	245	5	LOW LEVEL ST-620 - L - LT-620	OK
LAL-630 (ISO22)			N/A	BOOL	1	245	6	LOW LEVEL CS-630 - L - LSL-630	OK
JGA-625 (C63)			N/A	BOOL	1	245	7	FAULT - HEAT RIBBON 625 CIRCUIT BREAKER AUXILIARY CONTACT	OK
JGA-640 (C63)			N/A	BOOL	1	246	0	FAULT - HEAT RIBBON 640 CIRCUIT BREAKER AUXILIARY CONTACT	OK
PA 64.1 L			N/A	BOOL	1	246	1	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1	OK
PAH-150 (ISO22)			N/A	BOOL	1	246	2	HIGH INSTRUMENT AIR PRESSURE - H - PT-150	OK
PAH-300 (ISO22)			N/A	BOOL	1	246	3	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300	OK
PAH-600 (ISO22)			N/A	BOOL	1	246	4	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600	OK
PAH-610 (ISO22)			N/A	BOOL	1	246	5	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- H - PT-610	OK
PAH-612 (ISO22)			N/A	BOOL	1	246	6	HIGH OXYGEN VENT PRESSURE - H - PT-612	OK
PAH-620 (ISO22)			N/A	BOOL	1	246	7	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620	OK
PAH-630 (ISO22)			N/A	BOOL	1	247	0	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630	OK
PAH-910 (ISO22)			N/A	BOOL	1	247	1	HIGH NITROGEN PRESSURE - H - PT-910	OK

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PAHH-300 (C63)			N/A	BOOL	1	247	2	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300	OK
PAHH-632 (C63)			N/A	BOOL	1	247	3	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632	OK
PAHH-633 (C63)			N/A	BOOL	1	247	4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633	OK
PAL-150 (ISO22)			N/A	BOOL	1	247	5	LOW INSTRUMENT AIR PRESSURE - L - PT-150	OK
PAL-300 (C63)			N/A	BOOL	1	247	6	LP300 PUMP PRESSURE LOSS - L - PT300	OK
PAL-600 (C63)			N/A	BOOL	1	247	7	CP-600 PUMP PRESSURE LOSS - L - PT600	OK
PAL-620 (C63)			N/A	BOOL	1	248	0	CP-620 PRESSURE LOSS - L - PT-620	OK
PAL-910 (ISO22)			N/A	BOOL	1	248	1	LOW NITROGEN PRESSURE - L - PT-910	OK
PALL-300 (C63)			N/A	BOOL	1	248	2	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300	OK
PALL-600 (C63)			N/A	BOOL	1	248	3	CP- 600 CHANGEOVER UNFORESEEN - LL - PT-600	OK
PALL-620 (C63)			N/A	BOOL	1	248	4	CP-620 CHANGEOVER UNFORESEEN - LL - PT-620	OK
PALL-1001 (C63)			N/A	BOOL	1	248	5	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT-1001	OK
PALL-1002 (C63)			N/A	BOOL	1	248	6	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002	OK
PALL-1003 (C63)			N/A	BOOL	1	248	7	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003	OK
PALL-1004 (C63)			N/A	BOOL	1	249	0	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004	OK
PALL-1005 (C63)			N/A	BOOL	1	249	1	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005	OK
PALL-1006 (C63)			N/A	BOOL	1	249	2	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006	OK
PDAH-001 (ISO22)			N/A	BOOL	1	249	3	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610	OK
PDAH-610 (ISO22)			N/A	BOOL	1	249	4	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610	OK
PDAH-630 (ISO22)			N/A	BOOL	1	249	5	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630	OK
PDAL-001 (ISO22)			N/A	BOOL	1	249	6	REVERSE DIFFERENTIAL PRESSURE - L - PT630-PT610	OK
TA 60.1 H			N/A	BOOL	1	249	7	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1	OK
TA 60.1 L			N/A	BOOL	1	250	0	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1	OK
TA 60.2 H			N/A	BOOL	1	250	1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2	OK
TA 60.2 L			N/A	BOOL	1	250	2	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2	OK
TA 61.1 H			N/A	BOOL	1	250	3	DEOXO TOWER 61, GAS UTLET TEMPERATURE HIGH - H - TT 61.1	OK
TA 64.5 H			N/A	BOOL	1	250	4	Température liquide de refroidissement sécheur 64A TT 64.5 - H	OK
TA 64.5 H A			N/A	BOOL	1	250	5	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5	OK
TA 64.5 H R			N/A	BOOL	1	250	6	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5	OK
TA 64.5 L			N/A	BOOL	1	250	7	Température bas sécheur 64A régénération TT 64.5 - L	OK
TA 64.6 H A			N/A	BOOL	1	251	0	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6	OK
TA 64.6 H R			N/A	BOOL	1	251	1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6	OK
TA 64.6 L			N/A	BOOL	1	251	2	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6	OK
TA 64.7 H			N/A	BOOL	1	251	3	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7	OK
TA 64.7 H A			N/A	BOOL	1	251	4	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7	OK
TA 64.7 H R			N/A	BOOL	1	251	5	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7	OK
TA 64.7 L			N/A	BOOL	1	251	6	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7	OK
TA 64.8 H A			N/A	BOOL	1	251	7	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8	OK
TA 64.8 H R			N/A	BOOL	1	252	0	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8	OK
TA 64.8 L			N/A	BOOL	1	252	1	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8	OK
TAH-601A (ISO22)			N/A	BOOL	1	252	2	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601A	OK
TAH-601B (ISO22)			N/A	BOOL	1	252	3	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601B	OK
TAH-601C (ISO22)			N/A	BOOL	1	252	4	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601C	OK
TAH-601D (ISO22)			N/A	BOOL	1	252	5	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601D	OK
TAH-601E (ISO22)			N/A	BOOL	1	252	6	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601E	OK
TAH-601F (ISO22)			N/A	BOOL	1	252	7	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601F	OK
TAH-601G (ISO22)			N/A	BOOL	1	253	0	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601G	OK
TAH-601H (ISO22)			N/A	BOOL	1	253	1	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601H	OK
TAHH-1001 (C63)			N/A	BOOL	1	253	2	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001	OK
TAHH-1002 (C63)			N/A	BOOL	1	253	3	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002	OK
TAHH-1003 (C63)			N/A	BOOL	1	253	4	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003	OK
TAHH-1004 (C63)			N/A	BOOL	1	253	5	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004	OK
TAHH-1005 (C63)			N/A	BOOL	1	253	6	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005	OK
TAHH-1006 (C63)			N/A	BOOL	1	253	7	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006	OK
TAL-601A (ISO22)			N/A	BOOL	1	254	0	ANODE TEMPERATURE LOW - L - TT-601A	OK
TAL-601B (ISO22)			N/A	BOOL	1	254	1	ANODE TEMPERATURE LOW - L - TT-601B	OK
TAL-601C (ISO22)			N/A	BOOL	1	254	2	ANODE TEMPERATURE LOW - L - TT-601C	OK
TAL-601D (ISO22)			N/A	BOOL	1	254	3	ANODE TEMPERATURE LOW - L - TT-601D	OK
TAL-601E (ISO22)			N/A	BOOL	1	254	4	ANODE TEMPERATURE LOW - L - TT-601E	OK
TAL-601F (ISO22)			N/A	BOOL	1	254	5	ANODE TEMPERATURE LOW - L - TT-601F	OK
TAL-601G (ISO22)			N/A	BOOL	1	254	6	ANODE TEMPERATURE LOW - L - TT-601G	OK
TAL-601H (ISO22)			N/A	BOOL	1	254	7	ANODE TEMPERATURE LOW - L - TT-601H	OK
TAL-1003 (ISO22)			N/A	BOOL	1	255	0	AMBIENT TEMPERATURE LOW - L - TT-1003	OK
TALL-600 (ISO22)			N/A	BOOL	1	255	1	ANODE TEMPERATURE VERY LOW - LL - TT-600	OK
TALL-601A (ISO22)			N/A	BOOL	1	255	2	ANODE TEMPERATURE VERY LOW - LL - TT-601A	OK
TALL-601B (ISO22)			N/A	BOOL	1	255	3	ANODE TEMPERATURE VERY LOW - LL - TT-601B	OK
TALL-601C (ISO22)			N/A	BOOL	1	255	4	ANODE TEMPERATURE VERY LOW - LL - TT-601C	OK
TALL-601D (ISO22)			N/A	BOOL	1	255	5	ANODE TEMPERATURE VERY LOW - LL - TT-601D	OK
TALL-601E (ISO22)			N/A	BOOL	1	255	6	ANODE TEMPERATURE VERY LOW - LL - TT-601E.	OK
TALL-601F (ISO22)			N/A	BOOL	1	255	7	ANODE TEMPERATURE VERY LOW - LL - TT-601F.	OK
TALL-601G (ISO22)			N/A	BOOL	1	256	0	ANODE TEMPERATURE VERY LOW - LL - TT-601G.	OK
TALL-601H (ISO22)			N/A	BOOL	1	256	1	ANODE TEMPERATURE VERY LOW - LL - TT-601H	OK
TALL-620 (ISO22)			N/A	BOOL	1	256	2	ANODE TEMPERATURE VERY LOW - LL - TT-620	OK
TALL-1001 (C63)			N/A	BOOL	1	256	3	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001	OK
TALL-1002 (C63)			N/A	BOOL	1	256	4	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002	OK
TALL-1003 (C63)			N/A	BOOL	1	256	5	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003	OK
TALL-1005 (C63)			N/A	BOOL	1	256	6	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005	OK
TALL-1006 (C63)			N/A	BOOL	1	256	7	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006	OK
TALL-1003 (ISO22)			N/A	BOOL	1	257	0	AMBIENT TEMPERATURE VERY LOW - LL - TT-1004	OK
TDAH-600 (ISO22)			N/A	BOOL	1	257	1	ANODE DT HIGH - H - TDY-600	OK
TDAL-600 (ISO22)			N/A	BOOL	1	257	2	ANODE DT LOW - L - TDY-600	OK
TSAHH-621A (ISO22)			N/A	BOOL	1	257	3	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A	OK
TSAHH-621B (ISO22)			N/A	BOOL	1	257	4	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B	OK
VAH-001 (ISO22)			N/A	BOOL	1	257	5	STACK-001-008 VERY HIGH CELL VOLTAGE - H - PCA-001	OK
VAH-101 (C63)			N/A	BOOL	1	257	6	REC-001 HIGH VOLTAGE - H - VM-101	OK
VAH-102 (C63)			N/A	BOOL	1	257	7	REC-002 HIGH VOLTAGE - H - VM-102	OK
VAL-001 (ISO22)			N/A	BOOL	1	258	0	STACK-001 LOW CELL VOLTAGE - L - PCA-001	OK
YAH-600 (ISO22)			N/A	BOOL	1	258	1	CONDUCTIVITE ELEVEE CT600 - H	OK
YAH-620 (ISO22)			N/A	BOOL	1	258	2	CONDUCTIVITE ELEVEE CT620 - H	OK
SCA-300A (C63)			N/A	BOOL	1	258	3	ERROR VSD LP-300A - ERR - VAR-300A	OK
SCA-300B (C63)			N/A	BOOL	1	258	4	ERROR VSD LP-300B - ERR - VAR-300B	OK
SCA-600A			N/A	BOOL	1	258	5	ERROR VSD CP-600A - ERR - VAR-600A	OK
SCA-600B			N/A	BOOL	1	258	6	ERROR VSD CP-600B - ERR - VAR-600B	OK
SCA-620A			N/A	BOOL	1	258	7	ERROR VSD CP-620A - ERR - VAR-620A	OK
SCA-620B			N/A	BOOL	1	259	0	ERROR VSD CP-620B - ERR - VAR-620B	OK
SPARE			N/A	BOOL	1	259	1	SPARE	OK
AQA-200 (C63)			N/A	BOOL	1	259	2	DRY COOLER FAULT - ERR - DC-200	OK
AQA-201 (C63)			N/A	BOOL	1	259	3	DRY COOLER FAULT - ERR - DC-201	OK
AQA-400 (C63)			N/A	BOOL	1	259	4	WATER CHILLER DEFAULT - ERR - WC-400	OK
AQA-401 (C63)			N/A	BOOL	1	259	5	WATER CHILLER DEFAULT - ERR - WC-401	OK
JGA-400 (C63)			N/A	BOOL	1	259	6	BREAKER WC-400 - CHILLER 1 - 102QM5	OK
JGA-401 (C63)			N/A	BOOL	1	259	7	BREAKER WC-401 - CHILLER 2 - 102QM7	OK
JGA-012 (C63)			N/A	BOOL	1	260	0	BREAKER DC ALIM1 24VDC - 130QF1	OK
JGA-013 (C63)			N/A	BOOL	1	260	1	BREAKER DC ALIM2 24VDC - 130QF3	OK
AQA-008 (ISO22)			N/A	BOOL	1	260	2	LOSS OF COMMUNICATION CAN/PN001 - ERR	OK
AQA-009 (ISO22)			N/A	BOOL	1	260	3	LOSS OF COMMUNICATION CAN/PN002 - ERR	OK
AQA-010 (ISO22)			N/A	BOOL	1	260	4	LOSS OF COMMUNICATION CAN/PN003 - ERR	OK
AQA-011 (ISO22)			N/A	BOOL	1	260	5	LOSS OF COMMUNICATION CAN/PN004 - ERR	OK
AQA-012 (ISO22)			N/A	BOOL	1	260	6	LOSS OF COMMUNICATION CAN/PN005 - ERR	OK
AQA-013 (ISO22)			N/A	BOOL	1	260	7	LOSS OF COMMUNICATION CAN/PN006 - ERR	OK
AQA-014 (ISO22)			N/A	BOOL	1	261	0	LOSS OF COMMUNICATION CAN/PN007 - ERR	OK
AQA-015 (ISO22)			N/A	BOOL	1	261	1	LOSS OF COMMUNICATION CAN/PN008 - ERR	OK
AQA-016 (ISO22)			N/A	BOOL	1	261	2	LOSS OF COMMUNICATION PQ001 - ERR	OK
AQA-017 (ISO22)			N/A	BOOL	1	261	3	LOSS OF COMMUNICATION PQ002 - ERR	OK
ACA-300A (C63)			N/A	BOOL	1	261	4	LP-300A STARTING FAULT - LP-300A	
ACA-300B (C63)			N/A	BOOL	1	261	5	LP-300B STARTING FAULT - LP-300B	

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DAVE MUSGROVE CWS 26/03/2025

FABIO FARIGU for SYED ALI BAX/YOKO 27/03/2025

4.2 ITR
(02 Digital Input)

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH	
Type	XCWD210215	
Serial Number	N.A	
Range	TOR	

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off DOOR CLOSED	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	NLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-005
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	EX-TECH
Type	XC WD210225
Serial Number	N. A.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	VA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off) DOOR CLOSED	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSARINO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	EX-TECH?
Type	XCWD210215
Serial Number	N.A.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off) DOOR CLOSE	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-007
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	EX-TECH
Type	XCWD2102L5
Serial Number	N.A
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off) DOOR CLOSE	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Teste sur HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCOIS CASSIANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	LORIZO	MLP	
DATE	21-02-2025	21-02-25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSL)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE.	
DATE	17/02/2025	17/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	
Serial Number	N A
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	2021220	MLE.	
DATE	21-02-2025	21/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
x		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSH-500
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	~~H~~ ENDRESS HAUSER	
Type	FTL51B-7A1P1/0	
Serial Number	W6043E01192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSH-600
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1N3/0	
Serial Number	W510101192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCES CO CAJIAO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSH-630**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS + HAUSER	
Type	4X6P END	
Serial Number	W6043F01132	
Range	1A 55VDC	TOR
ELECTRICAL CHECK		
Wiring Check	✓	
Voltage Measurement	✓	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / (NC)	N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		(Open - On) / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSIANO	NLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSH-631
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS + HAUSER	
Type	4 x 6 P END	
Serial Number	W6044001132	
Range	19 A 55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLG	
DATE	22/02/2025	22/02/25	
SIGNATURE			

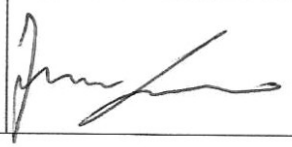
elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSH-640**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS + HAUSER	
Type	4X6P END	
Serial Number	W604410192	
Range	19 A 55 VDC	TOR
ELECTRICAL CHECK		
Wiring Check	✓	
Voltage Measurement	24 VDC ✓	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / (NC) / N/A	
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		Open - On / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSIANO	MLG	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSHH-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H2R6/0	
Serial Number	W602F321192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSL-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1P1/0	
Serial Number	X602440192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

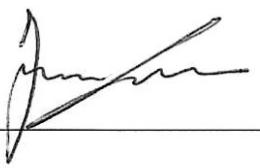
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASJA	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSL-600**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1N3/0	
Serial Number	W510120192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI..

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE.	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSL-610
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_5

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL 51B-7H1M6/0	
Serial Number	WB09E60-1192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off)	
Reset		(Open - On) / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	NLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSL-611
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_5

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL 51B-7H1N3/0	
Serial Number	W510130-1192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSL-630
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1P1/0	
Serial Number	W602450-1192	
Range	19=35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLF	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSLL-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL 51B-7H1R6/0	
Serial Number	W 602 F401192	
Range	19-55 VDC	TOR
ELECTRICAL CHECK		
Wiring Check	V	
Voltage Measurement	V	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / NC / N/A	
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / Closed - Off
Reset		Open - On / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-001A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000 - 600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X	X	

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-001B**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	58000-600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	NA

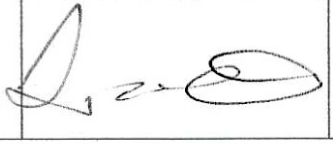
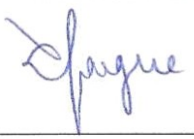
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
✗		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-001C**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000-600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
~~Fluke~~. NA		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

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	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE.	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-003A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	58000 - 600 SIL.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

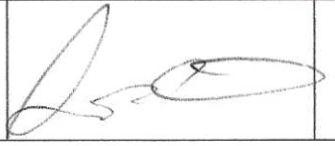
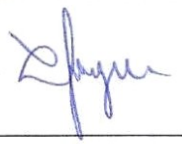
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
α		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lopez	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-003B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	58000 - 600
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

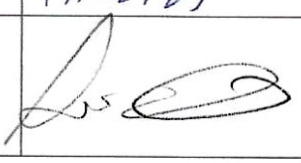
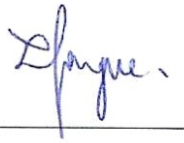
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LoRizzo	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-003C**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	~~Appe~~ Apollo (9/23.
Type	xP 35. 58008-600 SIL. 6.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
~~4~~		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Sope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-005A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000-600 SIL
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

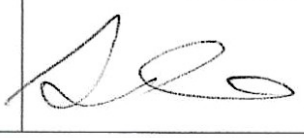
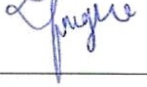
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
x		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Foto SSI.

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE.	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-005B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apple
Type	58000 C00 SIL.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

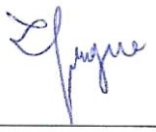
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLF	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-005C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000 - 600 SIL
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

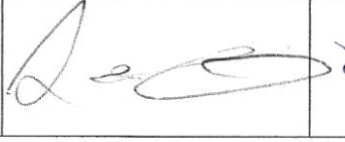
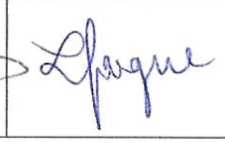
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
x		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-006C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS

Manufacturer	Apollo
Type	5500-6404PO
Serial Number	NA
Range	TOR

ELECTRICAL CHECK

Wiring Check	V
Voltage Measurement	NA.

LOOP CHECK

Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK

Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA

Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE.	
DATE	18/02/2025	18/02/2025.	
SIGNATURE			

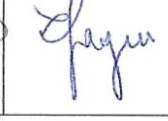
elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-006B**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_13**

ITEM CHARACTERISTICS		
Manufacturer	Apb	
Type	5500 - 640 APO.	
Serial Number	NA	
Range	TOR	
ELECTRICAL CHECK		
Wiring Check	V	
Voltage Measurement	NA	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / NC / N/A	
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / Closed - Off
Reset		Open - On / Closed - Off
OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE.	
DATE	18/02/2025	18/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-007A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58 000 - 600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
✓		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Flow (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	~~[illegible]~~ MLE	
DATE	17/02/25.	~~MLE~~ 17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-007B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58 000 - 600 SIL
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

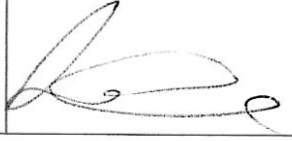
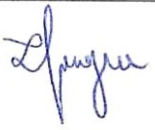
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-007C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58 000 - 600 SIL
Serial Number	N.A.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	N.A.

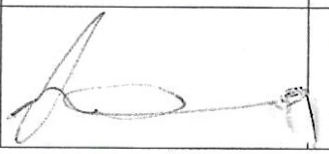
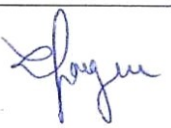
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
✗		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK N.A	
Field Device Off Status	On / Open / ... / Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)	
Field Device Status Change	On / Open / ... / Off / Closed / ...
HMI Feedback Display	Yes / No

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**VE-011**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 03
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1
P250

	FORES	ELOGEN	CROSSWIND
NAME	FIHTi	MOUFOUMA	
DATE	20-02-25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**ZIO-605**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS	
Manufacturer	SOLDO CONTROLS
Type	SK01200-10X23L3
Serial Number	IT03B0125716
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	5A - 250VAC 3A (24 VDC)

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Valve close → Contact close.

Valve open → Contact open

	FORES	ELOGEN	CROSSWIND
NAME	~~FRANCO~~ CASSANO	MLE.	
DATE	21/02/2025	21/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ZIO-624
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS	
Manufacturer	SOLDO · CONTROLS
Type	SK 01200 - 10X2323
Serial Number	IT 03B0123927
Range	5A - 250 VAC 3A24VDC TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	24 VDC

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Valve Close → contact close

Valve Open → contact open.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSITTO	M L F	
DATE	21/02/2025	21/02/25.	
SIGNATURE			

4.3 Instrument ITRs

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	SV-900
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9

CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	2504
Valve Type	W2 ZAQ
Fail Position (Closed / Open)	open.

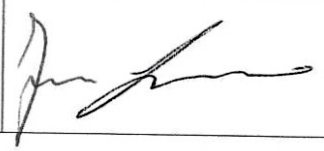
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

RIO 2 OK
p232

Tested by forcing output from HMI

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	SV-920
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	2503
Valve Type	W2ZAG
Fail Position (Closed / Open)	open
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

RIO2 OK
pL38

Tested by forcing from HMI.

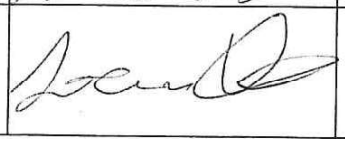
	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CASADEMONT	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	64 V1
System / Subsystem Number	Hydrogen Purification Package / BLPH 2501
P&ID Number	C63-PID-001_11
CHARACTERISTICS	
Manufacturer	FESTO
Serial Number	N.A
Valve Type	MFH-3-1/6-EX
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI		OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	LORIZO DITO	MOUFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE		~~NG~~	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	64 V2
System / Subsystem Number	Hydrogen Purification Package / BLPH 2501
P&ID Number	C63-PID-001_11
CHARACTERISTICS	
Manufacturer	HABONIM
Serial Number	[illegible] GH8h099
Valve Type	C1SS2-1B2
Fail Position (Closed / Open)	NC
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI		OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	ECH CHAFAJI D	MOUFOUMA FRAY	
DATE	06/03/25	26/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	64 V3
System / Subsystem Number	Hydrogen Purification Package / BLPH 2501
P&ID Number	C63-PID-001_11
CHARACTERISTICS	
Manufacturer	FESTO
Serial Number	N.A
Valve Type	MTH - 3 - 1/6 - EX
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME		MOUFOUMA	
DATE		11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	64 V8
System / Subsystem Number	Hydrogen Purification Package / BLPH 2501
P&ID Number	C63-PID-001_11

CHARACTERISTICS	
Manufacturer	FESTO
Serial Number	N.A
Valve Type	MFH-3-1/6-EX
Fail Position (Closed / Open)	

PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	Lorenzo Viso	MOUFOUMA	
DATE	11.03.2025	11/03/2025	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	64 V12
System / Subsystem Number	Hydrogen Purification Package / BLPH 2501
P&ID Number	C63-PID-001_11
CHARACTERISTICS	
Manufacturer	FESTO
Serial Number	N.A
Valve Type	MFH-3-1/6-EX...
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI	MOUFOUMA	
DATE	11-03-25	11/03/2025	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	64 V17
System / Subsystem Number	Hydrogen Purification Package / BLPH 2501
P&ID Number	C63-PID-001_11
CHARACTERISTICS	
Manufacturer	FESTO
Serial Number	N.A
Valve Type	MFH-3-1/6-EX
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI	MOUFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	FC-64.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	POWER GENEX
Type	EPR-IMZSN4NTR
Serial Number	23092296
Range	4-20 ma 1,4 - 7 bar

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25 %	50 %	75 %	100 %	75	50	25	0
Input Signal NA	20	16	12	8	4				
HMI Indication	27648	20736	13824	6912	0				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

BARRIER ? ! ? ~~27675~~

~~Barriere ne marche pas~~ OK BARRIER

	FORES	ELOGEN	CROSSWIND
NAME	FRANCOIS	SDF	
DATE	21/03/2025	27/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	GS-64.1.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	FORGERBERG / FESTO
Type	APM2 DA
Serial Number	8200 3866
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	(Off / Closed) / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	Echchatouni B.	MOUFOUMA	
DATE	06/03/25	06/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	GS-64.1.2
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	FESTO
Type	SASF-S2-B-F-A3G
Serial Number	N.A
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI	MOUFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	GS-64.1.3
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	FESTO
Type	SASF-S2-B-F-A34
Serial Number	N.A
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / (Open) ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI	MOUFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	GS-64.1.4
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	FESTO
Type	SASF-S2-B-F-A34
Serial Number	N.A
Range	TOR

ELECTRICAL CHECK

Wiring Check	
Voltage Measurement	

LOOP CHECK

Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK

Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK

Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	BISCAGLIA	MOUFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	GS-64-T2
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	HABONIM
Type	C15 SR 1B2 MET
Serial Number	6h87262
Range	MAX 8 BAR (TOR)

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	(Off / Closed) / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	ECH CHAFANI B.	MOUFOUMA	
DATE	06/03/25	06/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	GS-64.2
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	FESTO
Type	SASR-S2-B-F-A3H
Serial Number	4046092
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off)	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO VITO	MOUFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	GS-64.3
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	FESTO
Type	SASF-S2-B-F-A34
Serial Number	N.A.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo Vito	MONFOUMA	
DATE	11-03-2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	CROSSWIND

Tag Number	HE 61.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

CHARACTERISTICS	
Manufacturer	~~Inconnu~~ Vindac. Nvent
Serial Number	
Power (kW)	

PRELIMINARY CHECKS		
Verify the Wiring & Earthing	✓	
Verify the Correct Installation	✓	
Check the Resistance	15.9_Ω.	
Bump Check: Motor Rotation Direction	NA	OK / NOK

TEST		
Activation		OK / NOK
Intensity (U)		
Intensity (V)		
Intensity (W)		
Voltage		
Thermal Ajustement		

NA

NOTES

300 KM3
101 QF3

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo V Tm	MLG	
DATE	21-03-2025	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	CROSSWIND

Tag Number	HE 64.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

CHARACTERISTICS	
Manufacturer	ELMESS
Serial Number	24-0450-001
Power (kW)	6,0

PRELIMINARY CHECKS	
Verify the Wiring & Earthing	✓
Verify the Correct Installation	✓
Check the Resistance	26,6 / 26,45 / 26,5 Ω.
Bump Check: Motor Rotation Direction	NA OK / NOK

TEST	
Activation	OK / NOK
Intensity (U)	
Intensity (V)	
Intensity (W)	
Voltage	
Thermal Ajustement	

NOTES

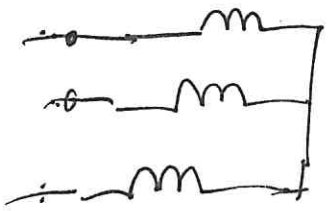
300 kW @
101 RFI

2R.

R_{eq1} : 26,6Ω

R_{eq2} : 26,45Ω

R_{eq3} : 26,5Ω



53.2 / 2 = 26,6.
52.9 / 2 = 26,45
53 / 2 = 26,5

	FORES	ELOGEN	CROSSWIND
NAME	FRANCK CASTELLA	MLE	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-64.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	ROSEMOUNT
Type	2088G3S22I32K1
Serial Number	235HP5D221217
Range	0-55 bar 10 - 30 V_{DC}

ELECTRICAL CHECK

Wiring Check	V
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
NA		

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Tested by manipulation of Nitrogen on HMI

En °C à l'affichage, modifié par Set le 21/03/25

Repeat a condition multiple >

	FORES	ELOGEN	CROSSWIND
NAME	Slimane ABISSY	MLF	
DATE	21/03/2025	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	TS-64.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	~~Hoerbiger~~ ~~See DCF~~
Type	
Serial Number	
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V.
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger	To Tune by Agnaggo.		Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Doesn't exists on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CATENO	MLE	
DATE	21/03/2025	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	TS-64.2
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	NA
Type	NA
Serial Number	NA
Range	(TOR)

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
NA*	/	/

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

*

	FORES	ELOGEN	CROSSWIND
NAME	LEONARDO FANTI	MOUFOUMIT	
DATE	22/03/25	22/03/25	
SIGNATURE	Leonardo		

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	TS-64.3
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	BARKSDALE
Type	MLH-H2035-EX1
Serial Number	WN10261.2 / 001
Range	28 V TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / (Closed) / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	ZORIZO VITO	MOUFOUMA	
DATE	12-03-2025	12/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	TS-64.4
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS		
Manufacturer	BARKSDALE	
Type	ML1H-H2035-EX1	
Serial Number	WN10261.1/ 001	
Range	28 V	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO VITO	MOUFOUMA	
DATE	12.03.2025	18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-60.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	IR ELECTRONICS
Type	PT100 5333N
Serial Number	/
Range	0/300 °C

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK 24 Vdc

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RS PRO 136	24100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,0	75,0	150.0	225.0	300.0		150,0		0
HMI Indication	0.1	75,1	150.0	225	300.0		150,0		0,1

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Inside HE.

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA	
DATE	21/03/25	21/03/25	
SIGNATURE		NGL	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	TT-60.2
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	PR ELECTRONICS
Type	PT100 5333D
Serial Number	NA
Range	0/300 °C

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK 24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RS PRO 136	24100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0.0	75.0	150.0	225	300		150.0		0
HMI Indication	0.1	75.1	150.14	225.02	300.01		150.13		0.1

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Inside AE.

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA	
DATE	21/03/25	21/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-61.1
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	PR ELECTRONICS
Type	PT100 5333D
Serial Number	/
Range	0 / 300 °C

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK 24 VDC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RS PRO 136	24100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	75	150	225	300		150		0
HMI Indication	0,2	75,2	150,3	225,3	300,4		150,3		0,2

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PANI	MAVFOUMA	
DATE	21/03/25	21/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	TT-64.5
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	~~NA~~ PR ELECTRONICS
Type	PT100 5333D
Serial Number	NA
Range	0 ÷ 300°C

ELECTRICAL CHECK

Wiring Check	COMPLIANT
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RS PRO 136	24100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	75	150	225	300		150		0
HMI Indication	0,1	75,1	150,1	225,1	300,1		150,1		0,1

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMAT	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-64.6
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS

Manufacturer	~~N/A~~ PR ELECTRONICS
Type	PT100 5333 D
Serial Number	N/A
Range	0 ÷ 300 °C

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	~~N/A~~ OK 24 Vdc

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RS PRO 136	24100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	~~75~~	150	225	300		150		0
HMI Indication	0,2	~~75,0~~	149,8	224,3	299,9		149,8		0,2

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

~~Don't work not accepted~~

	FORES	ELOGEN	CROSSWIND
NAME	SIMONE ABISRANI	MONTOUNET	
DATE	21/03/25	21/03/25	
SIGNATURE		~~NG~~	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-64.7
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	PR ELECTRONICS
Type	PT100 5337A
Serial Number	/
Range	0/300 °C

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK 24 VDC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RSPRO 136	24100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	75	150	225	300		150		0
HMI Indication	0,1	75,1	150,1	225,0	300,0		150,1		0,1

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONFOURNAT	
DATE	21/03/25	21/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-64.8
System / Subsystem Number	Hydrogen Purification Package / BLPH 25-01
P&ID Number	C63-PID-001_11

ITEM CHARACTERISTICS	
Manufacturer	PR ELECTRONICS
Type	PT100 5333 D
Serial Number	/
Range	0 / 300 °C

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK 24 VDC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
RS PRO 136	21100687	

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	75	150	225	300		150		0
HMI Indication	0,0	75,0	150,0	225,0	300,1		150,0		0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAU	MONTOUMET	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	AHD-1000
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_013

ITEM CHARACTERISTICS

Manufacturer	MSA
Type	XS000
Serial Number	000100200185028B8
Range	0 / 100 % LEL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: | Indication Range Unit:

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RTD2 Simulation.

P22c

Comparison of the value on the sensor digital display and on the Hmi feedback OK

Resin Zener

	FORES	ELOGEN	CROSSWIND
NAME	PAM	SDE	
DATE	26/03/25	26/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	AHD-1001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_012

ITEM CHARACTERISTICS	
Manufacturer	MSA
Type	PN A-X5000-2-A-0-1-0-64-00-0
Serial Number	SN 000100200018502BB
Range	11-30VDc 1,5A

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	30 VDC 5A

LOOP CHECK		
Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit				Indication Range Unit					
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO1 - p222 Simulation.

comparision of the value on the sensor digital display and on the Hmi feedback OK

	FORES	ELOGEN	CROSSWIND
NAME	PAU	SDE	
DATE	26/03/25	26/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	AHD-1002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_013

ITEM CHARACTERISTICS

Manufacturer	MSA
Type	PN A-X5000-2-A-0-1-0-64-00-0
Serial Number	SN 0001002001850 2BA
Range	11-30 VDC 1,5A

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	30 VDC 5A

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIo 1.
P 220

(Insert done le WIA).

Comparison of the value on the sensor digital display and on the HMI feedback OK

	FORES	ELOGEN	CROSSWIND
NAME	PARI	SDE	
DATE	26/03/25	26/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	AHD-1003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_013

ITEM CHARACTERISTICS

Manufacturer	MSA
Type	X5000
Serial Number	000100200017103 1 A
Range	0 – 100% LEL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit				Indication Range Unit					
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Comparison of the value on the sensor digital display and on the HMI feedback OK

	FORES	ELOGEN	CROSSWIND
NAME	PARI	SDE	
DATE	07/03/2023	07/04/2023	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	AHD-1004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_012

ITEM CHARACTERISTICS	
Manufacturer	MSA
Type	X5000
Serial Number	00010020018502BA
Range	0 / 100 % LEL

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

? Comparision of the value on the sensor digital display and on the HMI feedback

besoin Zener.

	FORES	ELOGEN	CROSSWIND
NAME	26/03/25	26/03/25	
DATE	IAN	SDI	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**BUZ-1001**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS		
Manufacturer	~~MEDC~~ EATON MEDC	
Type	DB3B ~~MEDC~~	
Serial Number	225567824 20 03	
Range	TOR	
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	OK	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / NC / (N/A)	
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / Closed - Off
Reset		Open - On / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

Nein Gelöst

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	19/02/25	19/02/25	
SIGNATURE		~~NG~~	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	BUZ-1002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_14

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	DB3B
Serial Number	225567824 20 02
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1

	FORES	ELOGEN	CROSSWIND
NAME	Fanti	MOUFOUMA Foay	
DATE	19.02.25	19/02/25	
SIGNATURE	Fanti	NCf	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**BUZ-1003**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	DB3B
Serial Number	2255678246 20 01
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO1
PZS1

	FORES	ELOGEN	CROSSWIND
NAME	JACOPO FANTI	MOUFOUMA Foay	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0003 – PUMP MOTOR	

Tag Number	CP-600A +108 U1 (VAR 600A)
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

CHARACTERISTICS	
Manufacturer	SIEMENS
Type	3~MOT 1AV4162A
Serial Number	39120649-001-002
Insulation Class	IP 65
Nominal Power	400/690V 11 KW
Nominal Intensity	13.1 A 16,8
Supply Voltage	400
Speed	2955 / 3560
Motor Connection (Star / Delta)	400 Y 690 Δ

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	Lucken			
Measurement Tool	FLUKE 1503			
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	(U/V = 1417) (U/W = 1360) (V/W = 1498)			MΩ
Earth Insulation (U * V * W) / GND	(U/GND = 1687) (V/GND = 1315) (W/GND = 1253)			MΩ
Magnetic Fuse Rating (Magnetic Protection)	23			A
PTC Value	189			Ω
Bump Check: Motor Rotation Direction	OK / NOK			

NOTES

A RIo 1.
Bump test to be performed in fluid

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA	
DATE	04/03/2025	04/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0003 – PUMP MOTOR	

Tag Number	CP-600B + 10901 (VAR600B)
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

CHARACTERISTICS	
Manufacturer	SIEMENS
Type	3~MOT1AV4462A
Serial Number	9120649-001-001
Insulation Class	IP65
Nominal Power	400/690V 11kW
Nominal Intensity	19.1 A 16.8
Supply Voltage	400
Speed	2955/3560
Motor Connection (Star / Delta)	400Y 690Δ

PRELIMINARY TESTS

LUBRICATION SYSTEM & SHAFT FREE ROTATION

Test Fluid	Water			
Measurement Tool	FLUKE 1503 (23/02/26)			
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	(U/V=1204) (V-W=1164) (U-W=1194)			MΩ
Earth Insulation (U * V * W) / GND	U-GND=1420 / V-GND=1540 / W-GND=1408			MΩ
Magnetic Fuse Rating (Magnetic Protection)	23			A
PTC Value	173			Ω
Bump Check: Motor Rotation Direction	OK / NOK			

NOTES

RIo1.

Bump test when in fluid.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MONTOUNA	
DATE	4/03/2025	04/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0003 – PUMP MOTOR	

Tag Number	CP-620A +106V1 (VAR (20A)
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

CHARACTERISTICS	
Manufacturer	HEW
Type	3~MOT 132SAP/2K
Serial Number	20231321A
Insulation Class	
Nominal Power	400V/690V
Nominal Intensity	10,9A 6,3A
Supply Voltage	400
Speed	2940/2490
Motor Connection (Star / Delta)	400Y/690Δ

PRELIMINARY TESTS

LUBRICATION SYSTEM & SHAFT FREE ROTATION

Test Fluid	Water			
Measurement Tool	Fluke 1503 Valid up to 23/02/26			
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	U-V = 2200	U-W = 2200	V-W = 2200	MΩ
Earth Insulation (U * V * W) / GND	U-GND = 2200	V-GND = 2200	W-GND >2200	MΩ
Magnetic Fuse Rating (Magnetic Protection)	10			A
PTC Value	197			Ω
Bump Check: Motor Rotation Direction	(OK) / NOK			

NOTES

RIO 1.
Remaining bump check when in fluid.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA Fray	
DATE	04/03/2025	04/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0003 – PUMP MOTOR	

Tag Number	CP-620B + 10701 (VAR C20B)
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

CHARACTERISTICS	
Manufacturer	HEW
Type	3 ~ HOT 132SA P/2K
Serial Number	20231 3212
Insulation Class	
Nominal Power	400 V / 690 V
Nominal Intensity	10,9A / 6,3A
Supply Voltage	400
Speed	2940/2490
Motor Connection (Star / Delta)	400Y/690Δ

PRELIMINARY TESTS

LUBRICATION SYSTEM & SHAFT FREE ROTATION

Test Fluid	Water			
Measurement Tool	Fluke 1503 (23/02/26)			
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	U-V = 2200	U-W = 2200	V-W = 2200	MΩ
Earth Insulation (U * V * W) / GND	U-GND = 2200	V-GND = 2200	W-GND = 2200	MΩ
Magnetic Fuse Rating (Magnetic Protection)	10			A
PTC Value	0,238 KΩ			Ω
Bump Check: Motor Rotation Direction	(OK) / NOK			

NOTES

R101.
Bump test to be done with fluid

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUNAA	
DATE	04/03/2025	04/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	CT/P-600
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_4

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	LIQUICIME M
Serial Number	W 502F505600
Range	0,1 µS 20 µS

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	mA			Indication Range Unit	µS/cm				
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal mA	4 mA	8 mA	12 mA	16 mA	20 mA				
HMI Indication µS/cm	0	4,99	9,99	15	20				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	SIMONE ABISSI	MONTOUNA	
DATE	10/03/2025	10/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	CT/P-620
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_4

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	LIQUILINE M
Serial Number	V/502F4056-00
Range	0,1 Ms 20 Ms

ELECTRICAL CHECK

Wiring Check	
Voltage Measurement	

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	mA			Indication Range Unit		mS/cm			
		Rising %					Falling %		
		0	25	50	75	100	75	50	25	0
Input Signal	mA	4mA	8mA	12mA	16mA	20mA				
HMI Indication	mS/cm	0mS/cm	05mS/cm	10	15	20				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	SIMONE ABISSI	MOUFOUMA	
DATE	10/03/2025	10/03/25	
SIGNATURE		NG	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	DPT-800A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

ITEM CHARACTERISTICS

Manufacturer	MICKELL INSTRUMENTS
Type	EASIDEW PROXF
Serial Number	1FEB-070 03-24
Range	0-3000 PPM

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	28 VDC 1W

LOOP CHECK

Test Equipment Used	FLUKE 715	Serial Number	6346077
		Calibration Expiry Date	26/02/26
Input Range Unit	mA	Indication Range Unit	ppm

		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	mA	4	8	12	16	20		12		
HMI Indication	ppm	0,5	752,3	1500,0	2249,7	2999,2		1500,0		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

H2O2.
iP251

Injection 4-20 mA.

	FORES	ELOGEN	CROSSWIND
NAME	Jacopo Fanti	Montanari Fray	
DATE	27.02.25	27/02/25	
SIGNATURE	Fanti Jacopo	NC	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**DPT-800B**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_8**

ITEM CHARACTERISTICS

Manufacturer	MIELL INSTRUMENTS
Type	EASIDEW PRO XP
Serial Number	1FEB-075 03-24
Range	0-3000 ppm

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	28 VDC 1W

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 715	6346077	26/02/26

Input Range Unit	mA			Indication Range Unit	ppm					
		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	mA	4	8	12	16	20		12		
HMI Indication	ppm	0,3	750,22	1500,0	2249,78	2999,46		1500,0		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO 2 Injection 4-20 mA.
P252

	FORES	ELOGEN	CROSSWIND
NAME	Jacopo Fanti	Marfavma Foay	
DATE	27-02-25	27/02/25	
SIGNATURE	Fanti Jacopo		

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	DPT-800C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

ITEM CHARACTERISTICS

Manufacturer	MICKGLL INSTRUMENTS
Type	EASIDEW PRO XP
Serial Number	2ARO-072 07-24
Range	0-3000 ppm

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	28 VDC 1W

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 715	6346077	26/02/26

Input Range Unit: mA — Indication Range Unit: ppm

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4mA	8mA	12mA	16mA	20mA		12mA		
HMI Indication ppm	0	750.11	1499.78	2249.67	2999.46		1499.78		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO 2 pLG4 Injection 4-20 mA.

	FORES	ELOGEN	CROSSWIND
NAME	JACOPO FANTI	MOUFOUMA Fray	
DATE	27-02-25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD2102L5	
Serial Number	N/A	
Range	AC 15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TANE FRANCESCO	MOUFOUNA FOLY	
DATE	15/02/25	15/02/25	
SIGNATURE	Tane	NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	DS-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD210215	
Serial Number	N/A	
Range	AC 15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TANE FRANCESCO	MANFOUMA Foay	
DATE	15/02/25	15/02/25	
SIGNATURE	Tane	NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD2102L5	
Serial Number	N/A	
Range	AC 15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / ~~Closed - Off~~
Reset			~~Open - On~~ / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TANE FRANCESCO	MOUTOUMA Fray	
DATE	15/02/25	15/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH	
Type	XCWD210215	
Serial Number	N.A	
Range	TOR	

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off DOOR CLOSED	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSIANO	NLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-005
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	EX-TECH
Type	XE WD210215
Serial Number	N. A.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	VA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off) DOOR (CLOSED)	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	EX-TECH?
Type	XCWD210215
Serial Number	N.A.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off) DOOR CLOSE	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CASSANO	MLE	
DATE	22/02/2025	22/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-007
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	EX-TECH
Type	XCWD2102L5
Serial Number	N.A
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts DOOR OPEN	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off) DOOR CLOSE	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Teste sur HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCOIS CASSIANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-008
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD210ZLS	
Serial Number	N/A	
Range	AC 15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / ~~Closed - Off~~
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TANE FRANCESCO	MOUFOUMA Fray	
DATE	15/02/25	15/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-009
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD2102L5	
Serial Number	N/A	
Range	AC 15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	JAIME FRANCESCO	MOUFOUMA Fray	
DATE	15/02/25	15/02/25	
SIGNATURE	Jaime	NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	DS-010
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCW0210LS	
Serial Number	N/A	
Range	AC 15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	Jane FRANCESCO	Fray MOUFOUMA	
DATE	15/02/25	15/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**DS-011**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD210225	
Serial Number	~~AC15 240V~~ N/A	
Range	AC15 240V	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	IANE FRANCESCO	Foay Moufounia	
DATE	15/02/25	15/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**DS-012**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS		
Manufacturer	EX-TECH SOLUTION	
Type	XCWD2102L5	
Serial Number	N/A	
Range	AC 15 240V	TOR
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	24V	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	(NO)	NC / N/A
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / (Closed - Off)
Reset		(Open - On) / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TANE FRANCESCO	MOUFOUMA Fray	
DATE	15/02/25	15/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ESD-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	EATON
Type	PBW
Serial Number	22556782430001
Range	30VDC 50VDC TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		(Open - On) / Closed - Off	
Reset		Open - On / (Closed - Off)	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MONTOUMA Fray	
DATE	14/02/2025	14/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ESD-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EATON	
Type	PRW	
Serial Number	2755678243002	
Range	30VDC 50VDC	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TAVE FRANCESCO	FRAY MOUFOUMA	
DATE	14/02/25	14/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	ESD-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	EATON	
Type	PBIW	
Serial Number	22556782A 3003	
Range	30VDC 50 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	JAVE FRANCESCO	FRAY MANFOUMA	
DATE	14/02/25	14/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ESD-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	EATON
Type	PBW
Serial Number	22556782430014
Range	30 VDC 50 VDC TOR

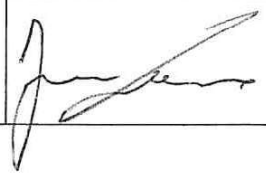
ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA FRAY	
DATE	14/02/2025	14/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	ESD-005
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS		
Manufacturer	EATON	
Type	PBW	
Serial Number	22596782430 05	
Range	30 VDC 50 VDC	TOR
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	24V	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / (NC)	N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		Open - On / (Closed - Off)
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUTOUMA FRAN	
DATE	14/02/2025	14/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	ESD-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS		
Manufacturer	EATON	
Type	PBW	
Serial Number	2259617824 3006	
Range	30VDC 50VDC	TOR
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	24V	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO	(NC) / N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		Open - On / (Closed - Off)
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TAMI FRANCESCO	MOUTOUMA Fray	
DATE	14/02/25	14/02/25	
SIGNATURE	TAM	NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	ESD-007
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_14

ITEM CHARACTERISTICS		
Manufacturer	EATON	
Type	PBW	
Serial Number	22556/7924 30 07	
Range	30 VDC 50 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	TANC FRANCESCO	MOUFOUMA Fray	
DATE	14/02/25	14/02/25	
SIGNATURE	Tanc	NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	**EXT-001**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OA172e-UA-1 WBI P68A
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK
NOTES	

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	FORES	ELOGEN	CROSSWIND
NAME	Boccanelli Cosimo	Moufouma	
DATE	13/03/2025	13/03/2025	
SIGNATURE	Boccanelli	NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0006 – AIR EXTRACTOR	

Tag Number	**EXT-003**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N. A
Type	OA 172C-UR-1 WB1P68A

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	Boccardi Cosimo	Moufouma	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0006 – AIR EXTRACTOR	

Tag Number	EXT-004
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OAT72C-UA-1 WBi 76BA

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	BOCCANELLI COSIMO	MOUFOUMA	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	**EXT-005**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OA172C-UA-1 WB1868A
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	Boccarelli Cosimo	Montonna	
DATE	13/03/2025	13/03/2025	
SIGNATURE	Boccarelli	NC	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	**EXT-006**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OA172C-VR-1 WB1P60A
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI COSIMO	MONTONNA	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	EXT-007
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N. A
Type	OA172C-UR-1 WBI P68A

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI COSIMO	MOUFOUMA	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	EXT-008
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	DA 172C-UR-1 WB1868A

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QF5.

	FORES	ELOGEN	CROSSWIND
NAME	Boccanelli Cosimo	Montonna	
DATE	13/03/2025	13/03/2025	
SIGNATURE	Boccanelli Cosimo	N G	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	**EXT-001**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OA172e-UA-1 WBI P68A
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK
NOTES	

12 1 QF1

	FORES	ELOGEN	CROSSWIND
NAME	Boccanelli Cosimo	Moufouma	
DATE	13/03/2025	13/03/2025	
SIGNATURE	Boccanelli	NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	EXT-002
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2
CHARACTERISTICS	
Manufacturer	
Serial Number	
Type	
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	
Verify the Electrical Insulation	V
Verify the Earth Connection	V
Verify the Cable Gland (Ex/Nex)	
Motor Rotation Direction	OK / NOK
Feedback on HMI	OK / NOK
NOTES	

Changed Today.

	FORES	ELOGEN	CROSSWIND
NAME	[illegible]	MLE	
DATE	17/04/25	17/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0006 – AIR EXTRACTOR	

Tag Number	**EXT-003**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N. A
Type	OA 172C-UR-1 WB1P68A

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QF1

	FORES	ELOGEN	CROSSWIND
NAME	Boccardi Cosimo	Moufouma	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0006 – AIR EXTRACTOR	

Tag Number	EXT-004
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OAT72C-UA-1 WBi 76BA

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QF1.

	FORES	ELOGEN	CROSSWIND
NAME	BOCCANELLI COSIMO	MOUFOUMA	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	**EXT-005**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OA172C-UA-1 WB1868A
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QF5

	FORES	ELOGEN	CROSSWIND
NAME	Boccarelli Cosimo	Montonna	
DATE	13/03/2025	13/03/2025	
SIGNATURE	Boccarelli	NC	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	**EXT-006**
System / Subsystem Number	**Electrolyser Stacks & BOP**
P&ID Number	**C63-PID-001_2**

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	OA172C-VR-1 WB1P60A
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QF5

	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI COSIMO	MONTONNA	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	EXT-007
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N. A
Type	OA172C-UR-1 WBI P68A

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QFS

	FORES	ELOGEN	CROSSWIND
NAME	BOCCARELLI COSIMO	MOUFOUMA	
DATE	13/03/2025	13/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0006 – AIR EXTRACTOR	CROSSWIND

Tag Number	EXT-008
System / Subsystem Number	Electrolyser Stacks & BOP
P&ID Number	C63-PID-001_2

CHARACTERISTICS	
Manufacturer	ORION FANS
Serial Number	N.A
Type	DA 172C-UR-1 WB1868A

CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	OK
Verify the Electrical Insulation	OK
Verify the Earth Connection	OK
Verify the Cable Gland (Ex/Nex)	OK
Motor Rotation Direction	(OK) / NOK
Feedback on HMI	(OK) / NOK

NOTES

121 QF5.

	FORES	ELOGEN	CROSSWIND
NAME	Boccanelli Cosimo	Montonna	
DATE	13/03/2025	13/03/2025	
SIGNATURE	Boccanelli Cosimo	N G	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	[illegible]	MLF	
DATE	21-02-2025	21-02-25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE.	
DATE	17/02/2025	17/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-003		
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11		
P&ID Number	C63-PID-001_13		
ITEM CHARACTERISTICS			
Manufacturer	Apollo.		
Type			
Serial Number	NA		
Range	TOR		
ELECTRICAL CHECK			
Wiring Check			
Voltage Measurement			
LOOP CHECK			
Input / Output function	Process	Safety	
Test Equipment Used	Serial Number	Calibration Expiry Date	
INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	
OUTPUT CHECK			
Field Device Off Status	On / Open / ...	Off / Closed / ...	
Output Signal to On-Position (activation by setting or forcing)			
Field Device Status Change	On / Open / ...	Off / Closed / ...	
HMI Feedback Display	Yes / No		
NOTES			
Scope Fores (SSI)			

	FORES	ELOGEN	CROSSWIND
NAME	2025220	MLE.	
DATE	21-02-2025	21/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FB-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
x		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	[illegible]	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FICV-610A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	DK32/KA/S-EX-SK
Serial Number	D2400000013614 20
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	ok
Voltage Measurement	ok 8 VDC

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
/	/	/

INPUT CHECK			
Switch Contacts	(NO)		(NC) N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	RED => ALARM GREEN => OK	(Yes) / No

NOTES

RIO 2
P210
besoin azote.

réglé à ~~5~~ 4 NVl/l
~~5~~ 4 - NC

	FORES	ELOGEN	CROSSWIND
NAME	RAM	MOUFOUMA	
DATE	20/03/25	20/03/25	
SIGNATURE		~~NC~~	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	FICV-610B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	DK32/K1/S-EX-SK
Serial Number	D24000000136142 1
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	8 V_{DC}

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
/	/	/

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	RED => ALARM GREEN => OK	(Yes) / No

NOTES

RIO 2
p 112
besoin Azote.

Réglé à 40 Nl/h
~~NG~~

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA	
DATE	20/03/25	20/03/25	
SIGNATURE		~~NG~~	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**FICV-610C**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	DK32/K1/S-EX-SK
Serial Number	D2400000013614 22
Range	~~0 3 BAR~~ ~~0 15~~ BAR TOR
ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	~~24 VDC~~ 8 VDC

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
/	/	/

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	RED => ALARM GREEN => OK	(Yes) / No

NOTES

RIO L
p214.

besoin azote

Reglé à 40 Nl/h
40 -

	FORES	ELOGEN	CROSSWIND
NAME	PANI	MOUFOUMA	
DATE	20/03/25	20/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FICV-611
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	DK32/K1/S-EX
Serial Number	D240000001349709
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK 8 VDC

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
/	/	/

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	RED => ALARM GREEN => OK	Yes / No

NOTES

RIO2
p140
besoin Agzt.

Reglé à 800 Nl/h.
660 NG

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTFOORT	
DATE	20/03/25	20/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	FICV-800
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	DK32/K2/5-EX
Serial Number	D2400000013590 45
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK 8 VDC

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
/	/	/

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	LL RED => ALARM GREEN => OK (Yes) / No	HH RED => ALARM GREEN => OK

NOTES

RIO2
p211.+p213
brun azote

! 2 signals.
Non à l'azote.

L : 4~~0~~ mA/A
H : ~~3~~70 mA/A.
370 NG

	FORES	ELOGEN	CROSSWIND
NAME	20/03/25 PAM	MONTOUMET	
DATE		20/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FSH-640
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	H250
Serial Number	D2400000136123
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
NA		

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset	NA		Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	GREEN => OK RED => HIGH FLOW	(Yes) / No

NOTES

RIO 2

~~Blow Agate~~

	FORES	ELOGEN	CROSSWIND
NAME	18/03/25 PAPI	MOUFOUMA	
DATE		18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	FT-600
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_4

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	7D2C80
Serial Number	W50CF219000
Range	

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,0	25,0	50,0	75,0	100,0		50,0		0,0
HMI Indication	0,00	25,00	50,00	75,00	100,00		50,00		0,00

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAM	MOUFOUMA Fray	
DATE	18/02/25	18/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	FT-620
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_4

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	PROWIRL 200
Serial Number	W50CF 319000
Range	0 - 331 M3H DC 13 T 35 V

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

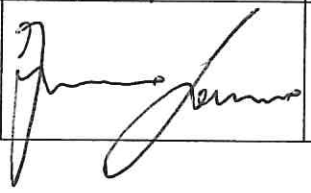
Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	mA	Indication Range Unit	m3/h

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal mA	4	8	12	16	20				
HMI Indication m3/h	0	10	20	30	40				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA	
DATE	10/03/2025	10/03/25	
SIGNATURE		NG	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**FT-630**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_8**

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PROMASS 300
Serial Number	W11C8C02000
Range	

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
NA		

Input Range Unit: mA — Indication Range Unit: m^3/h

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal mA	4	8	12	16	20		12		
HMI Indication m^3/h	-0,17	186,9	374	561,9	749,1		374		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO 2
P150

1.03.25 : wiring new barrier 18/03 OK

Attente MeT stft + Boorrier

	FORES	ELOGEN	CROSSWIND
NAME	RANI	MOUFOUMA	
DATE	18/03/25	18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	FT-900
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMD75B
Serial Number	W701B00119A
Range	0 / 500 mbar 0 / 164,814 (Kg/h)

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,0				500 mbar				
HMI Indication	0				165 (Kg/h)				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO2
P252

~~[illegible]~~ OK.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSIANO	MLE	
DATE	28/02/2025	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	FT-901
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMD75B
Serial Number	W701B2011 9A
Range	0 - 500 MBAR / 0 - 236,845

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal					500 MBAR				
HMI Indication	0				~~500 MBAR~~ 236				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO2
1253.

~~Attente Pay soft~~ OK.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	TILE	
DATE	28/02/2025	28/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	FT-920
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMD75B
Serial Number	W701B1011 9A
Range	0-500 MBAR / 0-71,3422 kg/h

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270636h	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0				500				
HMI Indication	0				71,40				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

AI02
P250

~~Attente Mes soft~~ OK.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCOS CASIAS	MLE	
DATE	28/02/2025	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	FT-921
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMD75B
Serial Number	W701B30119A
Range	0 - 500 MBAR 0 / 68.5572 (Kg/h)

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	ok

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270 6364	11/07 / 25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0				500				
HMI Indication	0				68				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO2
P251

~~Neg Soft~~ Ok.

	FORES	ELOGEN	CROSSWIND
NAME	[illegible] CASINO	28/02/25	
DATE	28/02/2025	MLE	
SIGNATURE		D Fargue	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**HIOD-610B**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS

Manufacturer	MSA
Type	X 5000
Serial Number	000100200 1850200
Range	0 / 100 % LEL

ELECTRICAL CHECK

Wiring Check	
Voltage Measurement	

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO2 Simulation
1222

com prova on the value on digital sensor and HMI feedback

Besim Zeneli

	~~FORES~~ elogen	ELOGEN	CROSSWIND
NAME	MLE	SDE	
DATE	17/04/25	17/04/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**HIOD-610C**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS

Manufacturer	MSA
Type	ULTIMA X 5000
Serial Number	0001002001B502BF
Range	0/100 % LEL

ELECTRICAL CHECK

Wiring Check	
Voltage Measurement	

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit				Indication Range Unit					
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO2 P210 Simulation.

Comparaison of the value on digital sensor and HMI feedback

besoin Zener.

	~~FORES~~ eLogen	ELOGEN	CROSSWIND
NAME	MLE	SDE	
DATE	17/04/25	17/04/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	HIOD-610A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	MSA
Type	X5000
Serial Number	000100200185021C8
Range	0/100 % LEL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit				Indication Range Unit					
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RTO2. p224

Simulation

Comparison of the value on digital sensor and HMI feedback

Beam Laser

	~~FORES~~ Elogen	ELOGEN	CROSSWIND
NAME	LMLE	SDE	
DATE	17/04/2025.	7/10/2025	
SIGNATURE			

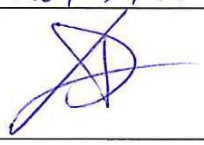
elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0007 – HEATING RIBBON	

Tag Number	**HR-306**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**
CHARACTERISTICS	
Manufacturer	NVENT
Type	5BTV2-CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	45.3 Ω
TEST	
Activation	OK/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PROIETTI Luc	
DATE	18/03/2025	18/03/2025	
SIGNATURE			

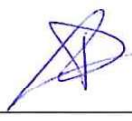
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0007 – HEATING RIBBON	CROSSWIND

Tag Number	**HR-307**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_6**
CHARACTERISTICS	
Manufacturer	N VENT
Type	5BTV2-CT
Serial Number	N.A.
Operating Ambient Temperature	12°C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	46 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luc	
DATE	18/03/2025	18/03/25	
SIGNATURE			

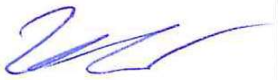
elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0007 – HEATING RIBBON	

Tag Number	**HR-503**
System / Subsystem Number	**Electrolyser Water Treatment Package WTP-300 / BLPH 56-03**
P&ID Number	**C63-PID-001_1**
CHARACTERISTICS	
Manufacturer	NVENT
Type	3BTV2-CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	45,2 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luc	
DATE	18/03/2025	18/03/25	
SIGNATURE			

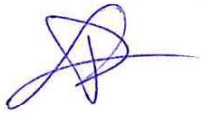
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0007 – HEATING RIBBON	CROSSWIND

Tag Number	**HR-600A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**
CHARACTERISTICS	
Manufacturer	NVENT
Type	20 QTVR2-CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	60,5 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luca	
DATE	18/03/2025	18/03/25	
SIGNATURE			

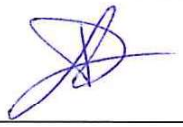
elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0007 – HEATING RIBBON	

Tag Number	**HR-606**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**
CHARACTERISTICS	
Manufacturer	N VENT
Type	20 QTV R2 - CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	59 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luca	
DATE	18/03/2025	18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0007 – HEATING RIBBON	

Tag Number	**HR-607B**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**
CHARACTERISTICS	
Manufacturer	NVENT
Type	3BTV2-CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	45,3 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luc	
DATE	18/03/2025	18/03/25	
SIGNATURE			

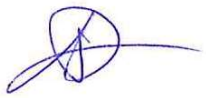
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0007 – HEATING RIBBON	CROSSWIND

Tag Number	**HR-620A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**
CHARACTERISTICS	
Manufacturer	NVENT
Type	WQTVR2-CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	49 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luc	
DATE	18/03/25	18/03/25	
SIGNATURE			

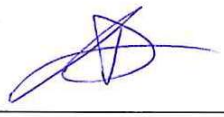
elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0007 – HEATING RIBBON	

Tag Number	**HR-624**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**
CHARACTERISTICS	
Manufacturer	NVENT
Type	20 QTV R2
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	26 Ω
TEST	
Activation	OK/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luc	
DATE	18/03/2025	18/03/25	
SIGNATURE			

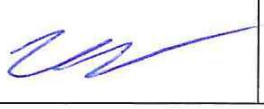
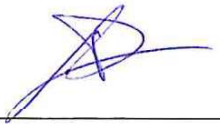
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0007 – HEATING RIBBON	CROSSWIND

Tag Number	**HR-625**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**
CHARACTERISTICS	
Manufacturer	NVENT
Type	20 RTV R 2 - CT
Serial Number	N.A.
Operating Ambient Temperature	12° C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	28 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luc	
DATE	18/03/2025	18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0007 – HEATING RIBBON	

Tag Number	**HR-640**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_4**
CHARACTERISTICS	
Manufacturer	NVENT
Type	ZONE TV RE CT
Serial Number	N.A.
Operating Ambient Temperature	12°C
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	99 Ω
TEST	
Activation	~~OK~~/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME	ZANELLATO MATTEO	PAOLETTI Luca	
DATE	18/03/25	19/03/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**IM-001**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS

Manufacturer	SIEMENS
Type	S7 SIRATIC
Serial Number	RNA 11TFW
Range	4 - 20MA 24VDC

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Calibrateur Fluke 715	FT-0007	26/02/26

Input Range Unit	mA	Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4MA	8MA	12MA	16MA	20MA				
HMI Indication	0.1	249	499	750	1000				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Methode de test : clarifier.
Main Cabinet p 251.
Rectifier

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSANO	MOU FOUMA	
DATE	10/03/2025	10/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	IM-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS

Manufacturer	SIEMENS
Type	S7 SIMATIC
Serial Number	RNA 11TFW
Range	4-20 mA 24 VDC

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Calibrateur Fluke 715	ET-0007	26/02/26

Input Range Unit	mA	Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4mA	8 mA	12 mA	16mA	20 mA				
HMI Indication	0.6	249	493	743	999				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Méthode de test à Clarifier
Main Cabinet p 252.
Rectifier

	FORES	ELOGEN	CROSSWIND
NAME	CASSANO FRANCESCO	MONFOUMA	
DATE	10/03/2025	FRAY	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0003 – PUMP MOTOR	

Tag Number	LP-300B
System / Subsystem Number	Electrolyser Water Treatment Package WTP-300 / BLPH 56-03
P&ID Number	C63-PID-001_1

CHARACTERISTICS	
Manufacturer	Grundfos
Type	3MOT
Serial Number	99605789 1000-1380
Insulation Class	IP55
Nominal Power	1,5 KW
Nominal Intensity	3,30 A
Supply Voltage	380 V
Speed	2890 min
Motor Connection (Star / Delta)	STar

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	Water			
Measurement Tool	FLUKE 1503			
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	U/V=2200	U/W=2200	V/W=2200	MΩ
Earth Insulation (U * V * W) / GND	U/GND=2200	V/GND=2200	W/GND=2200	MΩ
Magnetic Fuse Rating (Magnetic Protection)	4,5			A
PTC Value	183			Ω
Bump Check: Motor Rotation Direction	(OK) / NOK			

NOTES

Bump test to be performed with fluid

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA	
DATE	04/03/2025	04/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0003 – PUMP MOTOR	CROSSWIND

Tag Number	LP-300A
System / Subsystem Number	Electrolyser Water Treatment Package WTP-300 / BLPH 56-03
P&ID Number	C63-PID-001_1

CHARACTERISTICS	
Manufacturer	Grundfos /
Type 3MOT	(CRN 1-25 EX-FG) - A - E - HQUE)
Serial Number	99605789 1000 1381
Insulation Class	IP 55
Nominal Power	1,5 KW
Nominal Intensity	3,30 A
Supply Voltage	380 V
Speed	2890 min.
Motor Connection (Star / Delta)	Star

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	Water			
Measurement Tool	FLUKE 1503			
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	U-V = 2200 // U-W = 2200 // V-W: 2200			MΩ
Earth Insulation (U * V * W) / GND	U-GND = // V- GND = 2200 // W-GND: 2200			MΩ
Magnetic Fuse Rating (Magnetic Protection)	2200 4,5			A
PTC Value	189			Ω
Bump Check: Motor Rotation Direction	(OK) / NOK			

NOTES

Bump test to be performed with fluid.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA	
DATE	04/03/2025	04/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSH-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	~~H~~ ENDRESS HAUSER	
Type	FTL51B-7H1P1/0	
Serial Number	~~W~~ 6043E01192	
Range	19-55 VDC	TOR
ELECTRICAL CHECK		
Wiring Check	✓	
Voltage Measurement	✓	

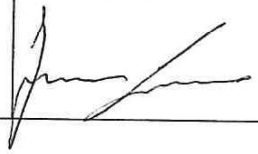
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CAJSAMO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSHH-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H2R6/0	
Serial Number	W602F321192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

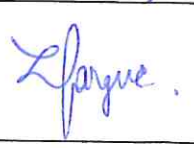
elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSH-600**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1N3/0	
Serial Number	W510101192	
Range	19-55 VDC	TOR
ELECTRICAL CHECK		
Wiring Check	V	
Voltage Measurement	V	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / (NC) / N/A	
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		(Open - On) / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	LSH-610
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_5

ITEM CHARACTERISTICS	
Manufacturer	Endress+Hauser
Type	FEL64
Serial Number	W511380192
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA

INPUT CHECK		
Switch Contacts	NO	NC (N/A)
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / Closed - Off
Reset		Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PSRU	MONTOUMAT	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSH-630
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS + HAUSER	
Type	4X6P END	
Serial Number	W6043F01132	
Range	13A 55VDC	TOR
ELECTRICAL CHECK		
Wiring Check	✓	
Voltage Measurement	✓	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / (NC)	N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		(Open - On) / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASIANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSH-631
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS + HAUSER	
Type	4 x 6 P END	
Serial Number	W6044001132	
Range	19 A 55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLG	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	LSH-640
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS + HAUSER	
Type	4X6P END	
Serial Number	W604410192	
Range	19 A 55 VDC	TOR

ELECTRICAL CHECK		
Wiring Check	✓	
Voltage Measurement	24 VDC ✓	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSIANO	MLG	
DATE	22/01/2025	22/01/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSL-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1P1/0	
Serial Number	X602440192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

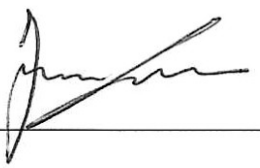
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASJA	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSLL-500**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL 51B-7H1R6/0	
Serial Number	W 602 F401192	
Range	19-55 VDC	TOR
ELECTRICAL CHECK		
Wiring Check	V	
Voltage Measurement	V	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / NC / N/A	
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / Closed - Off
Reset		Open - On / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSL-600**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS		
Manufacturer	EMERSON HAVER	
Type	FTL51B-7H1N3/0	
Serial Number	W510120192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

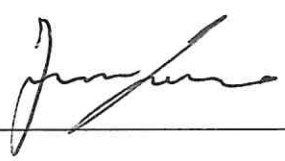
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI..

	FORES	ELOGEN	CROSSWIND
NAME	~~FRANCESCO~~ CASSANO	MLE.	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSL-610
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_5

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL 51B-7H1M6/0	
Serial Number	WB09E60-1192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off)	
Reset		(Open - On) / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	NLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSL-611**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_5**

ITEM CHARACTERISTICS		
Manufacturer	EMD ENDRESS HAUSER	
Type	FTL 51B-7H1N3/0	
Serial Number	W510130-1192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	LSL-620
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS	
Manufacturer	ENDRESS + HAUSER
Type	4X6PEND
Serial Number	W602F501132
Range	~~1B1A55VDC~~ NA TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
FORCING SIGNAL INTERNAL SWITCH	NA	NA

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open) - On / Closed - Off
Reset	NA		Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / (Closed) / ...
HMI Feedback Display	Yes / No	

NOTES

Sur la carte d'DI. 201AP10
Bit DI3 ok.
Sur soft → pas de mouvement (Main screen et Rack panel).

Not OK
& OK 27/02/25
NG

- Software problem 27-02-25 : Problem solved ✓ 27.02.25

	FORES	ELOGEN	CROSSWIND
NAME	Fdvil:	Fray Mbouounda	
DATE	27.02.25	27/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	LSL-630
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1P1/0	
Serial Number	W602450-1192	
Range	19-35 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	√

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off)	
Reset		(Open - On) / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Teledon HMI

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLF	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	LSL-640
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS	
Manufacturer	E+H
Type	FTL51B
Serial Number	X6024601192
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
/	/	/

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

CHANGE TERMINAL N.7. IT'S NOT CLOSING PROPERLY. => REPAIR OK

	FORES	ELOGEN	CROSSWIND
NAME	PAILI	MOUFOUMA	
DATE	03/03/25	03/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**LSL-641**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_7**

ITEM CHARACTERISTICS		
Manufacturer	ENDRESS HAUSER	
Type	FTL51B-7H1R6/0	
Serial Number	W602F601192	
Range	19-55 VDC	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Wiring fixed in JB-PWR-01. NOT OK

Tested on HMI.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	22/02/2025	ok 22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	LT-600
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	ENDILESS HAUSER
Type	FMP51-RARW8/0
Serial Number	W900FF0112C
Range	~~1355-35 NDC~~ 0/100 %

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 715	6346077	26/02/26

Input Range Unit	%	Indication Range Unit	%

		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	mA	4	8	12	16	20		12		
HMI Indication	%	0%	25,1	50.1	75.1	100		50.1		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	52	52	OK
HI Alarm	50	50	OK
LO Alarm	~~38~~ 32	32	OK
LO LO Trip	26	26	OK

NOTES

RIO2 Need Fluid (pure water) - No need.
P254

- Software problem. 27-02-25 Solved 01.03.25 NG

Passer le capteur en mode "Test Rapide".

	FORES	ELOGEN	CROSSWIND
NAME	FANTI	FRAY MOUFOUMA	
DATE	1.03.25	01.03.25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**LT-620**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_6**

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	4X16PENCL.
Serial Number	W900FE0112C
Range	~~4 ÷ 20 mA~~ 0 ÷ 100 %

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 715	6346077	26/02/26

Input Range Unit	mA	Indication Range Unit	%

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~~4~~	8	12	16	20		12		
HMI Indication	0,0	25,0	50,1	75,1	100,1		50,1		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

RIO2 Need Fluid (Pure Water) –
p254. SOFTWARE PROBLEM (12 mA => 59 % NOT 50 %)
↓
SOLVED NOW OK 27/02/25
NC

Passer le capteur en mode "Très rapide"

	FORES	ELOGEN	CROSSWIND
NAME	PARI	Fray Mouvovna	
DATE	27/02/25	27/02/25	
SIGNATURE		NC	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0005 – PROPORTIONAL VALVE	

Tag Number	MPV-630
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

CHARACTERISTICS	
Manufacturer	PS ATOMATION
Serial Number	388817
Valve Type	PSF-402-SE
Trim (Linear, Square, =%,...)	4-20 mA
Fail Position (Closed / Open)	CLOSED

PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with ~~handwheel~~ (if any) BUTTONS	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	ok

LOOP CHECK

Valve Failure Action On Loss of Air supply NA	FO	FC	Stay put	
Valve Failure Action On Loss of Electrical Signal	FO	(FC) OK	~~Stay put~~	
Valve 'Open' Time (s)	73	Valve 'Close' Time (s)	69	

	Rising %					Falling %			
Command Value	0	25	50	75	100	75	50	25	0
Physical Status (Stroke on Positioner)	0	25	50	75,08	100		50		
HMI feedback	-0,07	24,68	49,58	74,33	99,1		49,92		

NOTES

RIO2
P25-1

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTOYA	
DATE	18/03/25	18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0005 – PROPORTIONAL VALVE	CROSSWIND

Tag Number	MPV-611
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_5
CHARACTERISTICS	
Manufacturer	PS AUTOMATION
Serial Number	395643
Valve Type	PSF-401-SE-EX
Trim (Linear, Square, =%,...)	4 - 20 mA
Fail Position (Closed / Open)	CLOSED
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with ~~handwheel~~ (if any) BUTTONS	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / (NA)
Check Power / Air Supply Setting	OK POWER 24 VDC

LOOP CHECK

Valve Failure Action On Loss of Air supply NA	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	(FC) ON	(Stay put)

Valve 'Open' Time (s)	55			Valve 'Close' Time (s)		52			
	Rising %					Falling %			
Command Value	0	25	50	75	100	75	50	25	0
Physical Status (Stroke on Positioner)	0	25	50	75	100		50		
HMI feedback	-0,03	24,78	49,82	74,85	99,74		50,20		

NOTES

RIO2.
P150

	FORES	ELOGEN	CROSSWIND
NAME	PAU	MONTOUMA	
DATE	18/03/25	18/03/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**OIHA-800A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_8**

ITEM CHARACTERISTICS

Manufacturer	PANAMETRICS
Type	OXY. IQ-131-000
Serial Number	416230949 64
Range	0 - 100 PPMV

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	mA			Indication Range Unit	PPMV				
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20				
HMI Indication PPMV	0	25	50	75	100				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	5 6.		
LO Alarm			
LO LO Trip			

NOTES

RIO2
P340

Simulation ?
Injection 4-20 mA?

Boron Zener

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CUSUMANO	MOUFOUMA	
DATE	11/03/2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	OIHA-800B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

ITEM CHARACTERISTICS

Manufacturer	PANAMETRICS
Type	OXY. IQ-131-000
Serial Number	416-23096093
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit				Indication Range Unit						
		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	mA	4	8	12	16	20				
HMI Indication	PPMV	0	25	50	75	100				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	6		
HI Alarm	5		
LO Alarm			
LO LO Trip			

NOTES

RIO2 p340

Simulation? Injection 4-20 mA?

Design Zener.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CARRANO	MOUFOUMA	
DATE	11/3/2025	11/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	OIHA-800C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

ITEM CHARACTERISTICS

Manufacturer	PANAMETRICS
Type	OXY.IQ 131-000
Serial Number	416-231206 36
Range	28 V

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 715	ET-0007	26/02/2026

Input Range Unit	mA	Indication Range Unit	PPMV

		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	mA	4	8	12	16	20				
HMI Indication	PPMV	0	250	493	75	1000				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CASTRO	MONFORMA	
DATE	12/03/2025	12/03/2025	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**PCA-001**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**

ITEM CHARACTERISTICS	
Manufacturer	Kolibrik
Type	
Serial Number	757402
Range	N/A

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	N/A

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	N/A	N/A
	N/A	N/A

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~0	NA	NA	NA	NA				
HMI Indication	~0	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watchdog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2025	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**PCA-002**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**

ITEM CHARACTERISTICS

Manufacturer	Kolibrik
Type	
Serial Number	157354
Range	NA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit: | Indication Range Unit:

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	≃0	NA	NA	NA	NA				
HMI Indication	≃0	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watchdog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PCA-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	Kolibrik
Type	
Serial Number	157343
Range	NA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit | Indication Range Unit

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	≈0	NA	NA	NA	NA				
HMI Indication	≈0	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watchdog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PCA-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS	
Manufacturer	Kolibrik
Type	
Serial Number	757399
Range	NA

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	20	NA	NA	NA	NA				
HMI Indication	20	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

watch dog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2023	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**PCA-005**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**

ITEM CHARACTERISTICS

Manufacturer	Kolibrik
Type	
Serial Number	157346
Range	NA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit: | Indication Range Unit:

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~0	NA	NA	NA	NA				
HMI Indication	~0		NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watch dog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PCA-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	Kolibrik
Type	
Serial Number	757340
Range	NA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	≃0	NA	NA	NA	NA				
HMI Indication	≃0	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watchdog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**PCA-007**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**

ITEM CHARACTERISTICS	
Manufacturer	Kolibrik
Type	
Serial Number	75739
Range	NA

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~0	NA	NA	NA	NA				
HMI Indication	~0	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watchdog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	**PCA-008**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**

ITEM CHARACTERISTICS	
Manufacturer	Kolibrik
Type	
Serial Number	156397
Range	NA

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	NA
	NA	NA

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	20	NA	NA	NA	NA				
HMI Indication	20	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Watch dog working as expected

	FORES	ELOGEN	CROSSWIND
NAME		SDE	
DATE		20/03/2023	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PQ-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS

Manufacturer	SIEMENS
Type	PAC3220
Serial Number	LQN24 121683 0648
Range	NA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit					Indication Range Unit				
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	NA	NA	NA	NA	NA				
HMI Indication	NA	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Communication tested with PLC

	~~FORES~~	ELOGEN	CROSSWIND
NAME	MLE	SDE	
DATE	21/03/25	21/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PQ-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Siemens
Type	PAC 3220
Serial Number	~~Not Visible~~. LQN24.121683.0942.
Range	NA

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	NA	NA	NA	NA	NA				
HMI Indication	NA	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Communication tested with PLC

	~~FORES~~	ELOGEN	CROSSWIND
NAME	MLE	SDE	
DATE	21/03/25	27/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PQ-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	~~SIEMENS~~ Lovato
Type	DMG6
Serial Number	000210087
Range	NA

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	
	NA	

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	NA	NA	NA	NA	NA				
HMI Indication	NA	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Communication tested with VIDE

	~~FORES~~	ELOGEN	CROSSWIND
NAME	MLE	SDE	
DATE	21/03/25	27/03/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PQ-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS

Manufacturer	Lovato
Type	DMG6
Serial Number	00021097
Range	NA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
	NA	
	NA	

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	NA	NA	NA	NA	NA				
HMI Indication	NA	NA	NA	NA	NA				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			NA
HI Alarm			NA
LO Alarm			NA
LO LO Trip			NA

NOTES

Test following the User Manual ref XXXX-XXXX according the steps :

Communication tested with NIDEC

	~~FORES~~	ELOGEN	CROSSWIND
NAME	MLE	SDE	
DATE	21/03/25	27/03/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**PT-150**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_9**

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B 8F0411 9B
Serial Number	W701
Range	0/40 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1706364	11/07/25

Input Range Unit		Indication Range Unit	

		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	bar	0	10,4	20,1	30,0			20,0		
HMI Indication	bar	0	10,4	20,2	30,0			20,0		

	Trip or Alarm Setting	Actual Trip or Alarm Point	(OK) / NOK / NA
HI HI Trip	9,0 bar	9.0	
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Need to change Range,
Leak on instrument
Gasket to find.

	FORES	ELOGEN	CROSSWIND
NAME	Pari	FRAY MOUFOUMA	
DATE 1.03.25	~~26~~ [redacted]	01/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-300
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_01

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W702AB01138
Range	0/16 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270 6364	11/07/25

Input Range Unit	BAR	Indication Range Unit	BAR

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,02	4,02	8,02	12,02	16,02		8,02		0,01
HMI Indication	0	4,0	8,0	12,0	16,0		8,0		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	16	16	OK
HI Alarm	14	14	OK
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA	
DATE	18/02/25	18/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**PT-600**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_3**

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	PMP 71B
Serial Number	W702AA01198
Range	10,5 - 35VDC 1 - 40BAR

ELECTRICAL CHECK

Wiring Check	V
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Druck DPI 610E.	127 06 364.	11/07/25

Input Range Unit				Indication Range Unit					
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~~3,98~~ 4	4,07	8	12	16	12	8	4	
HMI Indication	4	4,03	8,02.	12,02	16,02	12,01.	8,03	4,01.	

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

1153 PT600H

28514 pts.
16,5L
Druck: 20L.
20bar l'ecran.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSANI	Maxime Lafargue	
DATE	17/02/2025	17/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-600A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	PMP71B
Serial Number	W702 A80138
Range	10.5 35 VDC 1 - 40 BAR

ELECTRICAL CHECK

Wiring Check	√
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Druck DPI 610 E	127 GC 364.	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	4	8	12	16	12	8	4	
HMI Indication	0	4.	8	12.	16.	12.2	8.1	4.	

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

bloque a 16 bar.
Pas d'alarme.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CASSANYES	Maxime Lafarge.	
DATE	17/02/2025	17/02/2025	
SIGNATURE		Lafarge.	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-600B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	PMP 71B
Serial Number	W702A801188
Range	10.5 - 35 Vdc 1 - 40 BAR

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Druck DPI 610 E	12C 08364.	11/07/25.

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	6	41.	8	12	16	12	7,3	4	
HMI Indication	6	4/1	7,9.	12.	16.	12	8.	4.	

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

3069 apparait à 13h. (PT600 BHH)
après 16h ne bouge plus, est bloqué à 16.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCO CASIANO	Maxime Lafargue	
DATE	17/02/2025	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-610
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W707570198
Range	0/16 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	4	8	12					
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	12 BAR		
HI Alarm	11.8		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	PT-611
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W202899011 9B
Range	0/16 BAR REL

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI610E	1270 6364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		3	6	8	13				
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	12.5		
HI Alarm	12.3		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE		Lfongue	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**PT-612**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_5**

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W 707580 1198
Range	0/16 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270 636 4	11/07/25

Input Range Unit	BAR			Indication Range Unit	BAR				
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,0	4,00	8,00	12,00	16,00		8,00		0,0
HMI Indication	0,09	4,01	8,01	12,01	16,01		8,01		0,01

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm ✓	0,5	0,5	OK
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	27/02/PARI	MONTOUMA FRAY	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-620
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	ENDRESS HAUSER
Type	PMP71B
Serial Number	W707E001188
Range	10.5 35 VDC 1 - 40 BAR

ELECTRICAL CHECK

Wiring Check	√
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DPI 610E Druck.	12706364.	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MK LAFARGUE.	
DATE	17/02/2025	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-620A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	PMP71B
Serial Number	W709F301198
Range	0-40 bar (rel)

ELECTRICAL CHECK

Wiring Check	~~OK~~ OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270636	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,02	10,01	20,01	30,01		30,01	20,01	10,01	0,01
HMI Indication	0	10	20	30		30	20	10	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	38	38	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA FRAY	
DATE	17/02/25	17/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-620B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	PMP71B
Serial Number	W709F401198
Range	0/40 BAR REL.

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,01	10,01	20,01	30,01		30,01		10,01	0,01
HMI Indication	0	10	20	30		30		10	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	38 BAR	38 BAR	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA FRAY	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-630
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP 71B
Serial Number	W707DE01198
Range	0/40 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270 6364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		5 BAR	16	25	34 BAR				
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	33.5		
HI Alarm	33		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASIELLO	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**PT-631**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_6**

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W 3022601198
Range	0/40 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270 6364	11/07/25

Input Range Unit	BAR	Indication Range Unit	BAR

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,0	10,02	20,01	30,00				10,04	
HMI Indication	0,0	10,0	20,0	30,0				10,0	

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAR1	MOUFOUMA Fray	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	PT-632
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_7

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W707E101193
Range	0-40 bar Rel

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270 6364	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		1	2	3	4 BAR				
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	N.A		
HI Alarm	3.6		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CASTRO	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-633
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_8

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP 71B
Serial Number	W3022701198
Range	0/40 BAR REL

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit	BAR	Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		10 BAR	20 BAR	30 BAR	34 BAR				
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	33 BAR 3,3 BAR		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASTAINO	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	PT-900
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS

Manufacturer	E+H
Type	PMP71B
Serial Number	W707590 1198
Range	0-16 bar

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	ok

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	1270636 4	11/07/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal bar	0,0		4	8	10				
HMI Indication bar	0.0								

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	9.0		
HI Alarm	N.A		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-910
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9

ITEM CHARACTERISTICS

Manufacturer	EUDRESS HAUSER
Type	W 701
Serial Number	W 701 DF01198
Range	0-40 BAR

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/25

Input Range Unit		Indication Range Unit	

		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	bar	0,0	2	4.5	6.5	9 BA				
HMI Indication	bar	0,0	2	4.5	6.5	9 BAR				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	9 BAR		
HI Alarm	NA		
LO Alarm	6 BAR		
LO LO Trip	5.5. BAR		

NOTES

need To change Range from software

	FORES	ELOGEN	CROSSWIND
NAME	Francesco	MLE	
DATE	26/02/2025	26/02/25	
SIGNATURE		Lfargle.	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PT-920
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	EH
Type	PHP71B
Serial Number	703F201198
Range	0-40 BAR

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
DRUCK DPI 610E	12706364	11/07/2025

Input Range Unit		Indication Range Unit	

		Rising %					Falling %			
		0	25	50	75	100	75	50	25	0
Input Signal	bar		10.2	20.5	30.4			20.5		
HMI Indication	bar		10.2	20.5	30.4			20.6		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	9.0		
HI Alarm	N.A		
LO Alarm	N.A		
LO LO Trip	N.A		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CAIXAL	MLE	
DATE	26/02/2025	26/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	PV-300
System / Subsystem Number	Electrolyser Water Treatment Package WTP-300 / BLPH 56-03
P&ID Number	C63-PID-001_1

ITEM CHARACTERISTICS

Manufacturer	SECTORIEL
Type	515IIT
Serial Number	692491
Range	PS 8bar (TOR)

ELECTRICAL CHECK

Wiring Check	NA
Voltage Measurement	NA

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Instrument Air	/	/

Input Range Unit	/	Indication Range Unit	/

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Pneumatic valve (ON/OFF)

	FORES	ELOGEN	CROSSWIND
NAME	~~ANGELO~~ PAPI	MONTOUNAT	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	PV 900
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Valve Type	
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / ~~NOK~~
Check the conformity to the data sheet	OK / ~~NOK~~
Check free movement of valve with handwheel (if any)	~~OK~~ / ~~NOK~~ / NA
Check the installation of heating & insulation (if any)	~~OK~~ / ~~NOK~~ / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	SDE	MLE.	
DATE	12/03/25	12/03/25	
SIGNATURE			

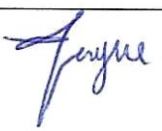
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	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	PV 901
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Valve Type	
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / ~~NOK~~
Check the conformity to the data sheet	OK / ~~NOK~~
Check free movement of valve with handwheel (if any)	~~OK~~ / ~~NOK~~ / NA
Check the installation of heating & insulation (if any)	~~OK~~ / ~~NOK~~ / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	SDE	MLE	
DATE	12/03/25	12/03/25	
SIGNATURE			

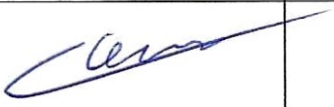
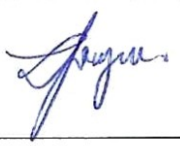
elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	PV 920
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Valve Type	
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / ~~NOK~~
Check the conformity to the data sheet	OK / ~~NOK~~
Check free movement of valve with handwheel (if any)	~~OK~~ / ~~NOK~~ / NA
Check the installation of heating & insulation (if any)	~~OK~~ / ~~NOK~~ / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	SDE	MLE	
DATE	12/03/25	12/03/25	
SIGNATURE			

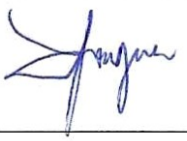
elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	PV 921
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Valve Type	
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / ~~NOK~~
Check the conformity to the data sheet	OK / ~~NOK~~
Check free movement of valve with handwheel (if any)	~~OK~~ / ~~NOK~~ / NA
Check the installation of heating & insulation (if any)	~~OK~~ / ~~NOK~~ / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	SDE	MLE	
DATE	12/03/25	12/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-001A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000 - 600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	✓
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
✓	X	

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-001B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	58000-600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

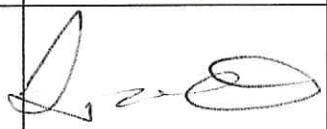
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-001C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000-600 SIL.
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
~~Vision~~. NA		

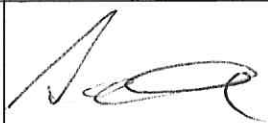
INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

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	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE.	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-002A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMO
Serial Number	58000 -600 SIL
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE F SCARLAT + MILITARU		
DATE	25/02/2025	MOUFOUMA Fray 25/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-002B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMA
Serial Number	58000-600 SIL
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

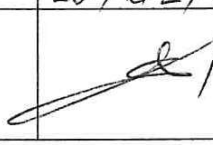
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE +	SCARLAT + MILITARU	
DATE	25/02/2025	MOUFOUMA Foray 25/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-002C		
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11		
P&ID Number	C63-PID-001_12		
ITEM CHARACTERISTICS			
Manufacturer	APOLLO		
Type	FUMO		
Serial Number	58000 - 600 - SIL		
Range	TOR		
ELECTRICAL CHECK			
Wiring Check	OK		
Voltage Measurement	OK		
LOOP CHECK			
Input / Output function	Process	Safety	
Test Equipment Used	Serial Number	Calibration Expiry Date	
INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	
OUTPUT CHECK			
Field Device Off Status	On / Open / ...	Off / Closed / ...	
Output Signal to On-Position (activation by setting or forcing)			
Field Device Status Change	On / Open / ...	Off / Closed / ...	
HMI Feedback Display	Yes / No		
NOTES			

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE + SCARLAT +	MOUFOUMA Foray	MILITARU
DATE	25/02/2025	25/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-003A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	58000 - 600 SIL.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

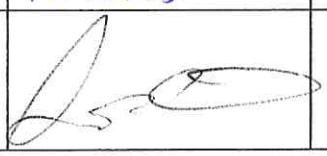
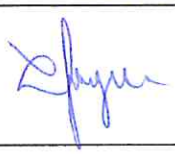
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
α		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Loriza	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-003B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo.
Type	58000 - 600
Serial Number	NA.
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LoRizzo	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-003C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	~~Appe~~ Apollo (11213.
Type	xP 35. 58006-600 SIL. 6.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
q		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Sope Fotas (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	SD-004A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMO
Serial Number	58000 - 600 - SIL
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	O/C

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORET	SCARLAT + MOUFOUMA Foray	MILITARU
DATE	25/02/2025	25/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-004B**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMO
Serial Number	58000 - 600 SIL
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE +	SCARLAT +	MILITARU
DATE	25/02/2025	MOUFOUMA Fray 25/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-004C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMO
Serial Number	58000 - 6E0 SIL
Range	TOR

ELECTRICAL CHECK	
Wiring Check	Ok
Voltage Measurement	Ok

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE +	SCARLAT + MILITARU	
DATE	25/02/2025	MOUFOUMA Fray 25/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-005A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000-600 SIL
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

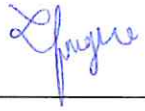
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
x		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fdbk SSI.

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE.	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-005B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000 600 SIL.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
x		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLF	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-005C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58000 - 600 SIL
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA.

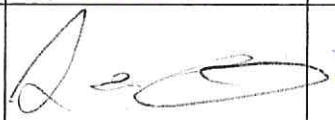
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
α		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-006A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	5500 - C40 APO
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE.	
DATE	18/02/2025	18/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-006B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	5500-640 APD.
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	MLE.	
DATE	18/02/2025	18/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-006C**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_13**

ITEM CHARACTERISTICS		
Manufacturer	Apollo	
Type	5500-6040PO	
Serial Number	NA	
Range	TOR	
ELECTRICAL CHECK		
Wiring Check	V	
Voltage Measurement	NA.	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off
OUTPUT CHECK NA			
Field Device Off Status	On / Open / ...		Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)			
Field Device Status Change	On / Open / ...		Off / Closed / ...
HMI Feedback Display	Yes / No		

NOTES

Scope Edoo (SS I)

	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE.	
DATE	18/02/2025	18/02/2025.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**SD-007A**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_13**

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58 000 - 600 SIL
Serial Number	NA.
Range	TOR
ELECTRICAL CHECK	
Wiring Check	V
Voltage Measurement	NA

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
✓		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Flow (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	Lorizzo	~~[illegible]~~ MLE	
DATE	17/02/25.	~~[illegible]~~ 17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-007B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_13

ITEM CHARACTERISTICS	
Manufacturer	Apollo
Type	58 000 - 600 SIL
Serial Number	NA
Range	TOR

ELECTRICAL CHECK	
Wiring Check	√
Voltage Measurement	NA

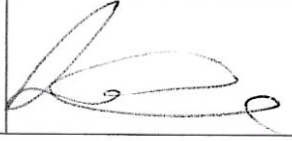
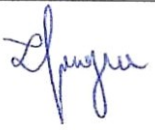
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
X		

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK NA		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Scope Fores (SSI)

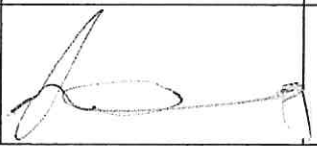
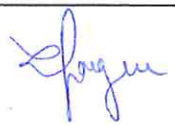
	FORES	ELOGEN	CROSSWIND
NAME	LORIZZO	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-007C		
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11		
P&ID Number	C63-PID-001_13		
ITEM CHARACTERISTICS			
Manufacturer	Apollo		
Type	58000 - 600 SIL		
Serial Number	N.A.		
Range	TOR		
ELECTRICAL CHECK			
Wiring Check	✓		
Voltage Measurement	N.A.		
LOOP CHECK			
Input / Output function	Process	Safety	
Test Equipment Used	Serial Number	Calibration Expiry Date	
✗			
INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	
OUTPUT CHECK N/A			
Field Device Off Status	On / Open / ...	Off / Closed / ...	
Output Signal to On-Position (activation by setting or forcing)			
Field Device Status Change	On / Open / ...	Off / Closed / ...	
HMI Feedback Display	Yes / No		

NOTES

Scope Fores (SSI)

	FORES	ELOGEN	CROSSWIND
NAME	LO.R.222	MLE	
DATE	17/02/25	17/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-008A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMA
Serial Number	580610-6010 S/L
Range	0 TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE +	SCARLATH MILITARU	
DATE	25/02/2025	MOUFOUMA Fray 25/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-008B		
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11		
P&ID Number	C63-PID-001_12		
ITEM CHARACTERISTICS			
Manufacturer	APOLLO		
Type	ELIMO		
Serial Number	58000 - 600 SIL		
Range	TOR		
ELECTRICAL CHECK			
Wiring Check	OK		
Voltage Measurement	OK		
LOOP CHECK			
Input / Output function	Process	Safety	
Test Equipment Used	Serial Number	Calibration Expiry Date	
INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	
OUTPUT CHECK			
Field Device Off Status	On / Open / ...	Off / Closed / ...	
Output Signal to On-Position (activation by setting or forcing)			
Field Device Status Change	On / Open / ...	Off / Closed / ...	
HMI Feedback Display	Yes / No		
NOTES			

	FORES	ELOGEN	CROSSWIND
NAME	MERCORE + SCARLAT + MILITARU		
DATE	25/02/2025	MOUFOUMA Foay 25/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	SD-008C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	APOLLO
Type	FUMO
Serial Number	58000 - 600 SIL
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MERCORET + SCARLAT + MILITARU		
DATE	25/02/2025	MOUFOUMA Fouly 25/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-500
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	Burkert
Serial Number	2551
Valve Type	W2ZAG
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	24 VDC

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)	N C	Valve 'Close' Time (s)	N.C

NOTES

RIO 2
P270

NOK

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSIANO	MLE	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-501
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	NOT ACCESS
Valve Type	W 2 2A4
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	24 VDC

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)	N C	Valve 'Close' Time (s)	N. C

NOTES

AI02
p231.

Not OK.

	FORES	ELOGEN	CROSSWIND
NAME	CASSANO FRANCESCO	MLE.	
DATE	24/02/2025	24/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-601
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	NOT ACCESS
Valve Type	W2 2AG
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	24 VDC

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)		Valve 'Close' Time (s)	

NOTES

RIO2
pL30

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESC CASSANO	NLE	
DATE	27/02/2023	27/02/23	
SIGNATURE			

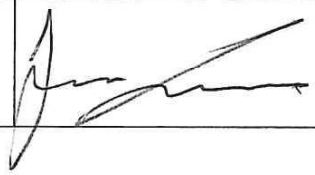
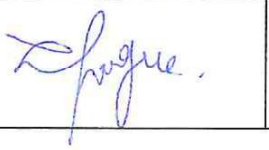
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	SV-610			
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11			
P&ID Number	C63-PID-001_9			
CHARACTERISTICS				
Manufacturer	BURKERT			
Serial Number	NOT ACCESS			
Valve Type	W2 2 AG			
Fail Position (Closed / Open)				
PRELIMINARY CHECKS				
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK			
Check the conformity to the data sheet	OK / NOK			
Check free movement of valve with handwheel (if any)	OK / NOK / NA			
Check the installation of heating & insulation (if any)	OK / NOK / NA			
Check Power / Air Supply Setting	24 VDC			
LOOP CHECK				
Valve Failure Action On Loss of Air supply	FO	FC	Stay put	
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put	
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK	
Valve 'Open' Time (s)	N.O	Valve 'Close' Time (s)	N.O	

NOTES

AI02
p231

~~Vbk~~
OK

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASTAGNA	MLE	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	SV-630
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	NOT ACCESS
Valve Type	W2 ZAG
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	24 VDC

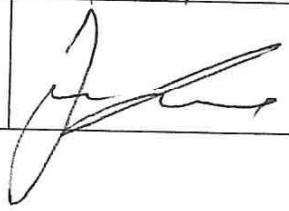
LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)	N.O	Valve 'Close' Time (s)	N.O

NOTES

RIO2
p232.

~~NA~~
OK.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCOIS CASSIM	MLE	
DATE	27/02/2025	27/02/25.	
SIGNATURE		Lfargue.	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-635
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	NOT ACCESS
Valve Type	W2 2AG
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	24 VDC

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI		OK / NOK
Valve 'Open' Time (s)	N C	Valve 'Close' Time (s)		N. C

NOTES

RIO 2
P 233

Nok

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	24/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-641
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKET
Serial Number	NOT ACCESS
Valve Type	W2 2AG
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	24 VDC

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI		OK / NOK
Valve 'Open' Time (s)	NC	Valve 'Close' Time (s)		NC

NOTES

RI02
P230

Test
ok.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MLE	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-800
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9

CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	NOT ACCESS
Valve Type	W2ZAG
Fail Position (Closed / Open)	?

PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI		OK / NOK
Valve 'Open' Time (s)	N.C	Valve 'Close' Time (s)		N.C

NOTES

NIO 2
p 231

~~Not~~
Ok.

	FORES	ELOGEN	CROSSWIND
NAME	[illegible]	MLE	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-900
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	2504
Valve Type	W2 2A9
Fail Position (Closed / Open)	open.
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI	OK / NOK
Valve 'Open' Time (s)	NC	Valve 'Close' Time (s)	NC

NOTES

RIO 2 OK
p232

Tested by forcing output from HMI
Rechech. de 27/02/25.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCISCO CASSADO	MLE	
DATE	22/02/2025	22/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	SV-920
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_9
CHARACTERISTICS	
Manufacturer	BURKERT
Serial Number	2503
Valve Type	W2ZAG
Fail Position (Closed / Open)	open
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	Stay put
Verify Correct 'Open' Limit Switch on HMI	OK / NOK	Verify Correct 'Closed' Limit Switch HMI		OK / NOK
Valve 'Open' Time (s)	N C	Valve 'Close' Time (s)		N. C

NOTES

RIO2 OK
pL33

Tested by forcing from HMI.

Recheck le 27/02/25

	FORES	ELOGEN	CROSSWIND
NAME	FRANCOIS CASSAMO	MLE	
DATE	22/02/2025	22/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	TT-601A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	TM 131 - DVPC
Serial Number	W503541448A
Range	

ELECTRICAL CHECK

Wiring Check	√
Voltage Measurement	√

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX CS	25517372 (LTS29) + LTS32	21/06/2025

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		25,10		74,98					
HMI Indication		25,0		74,9					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUMA	
DATE	15/04/25	16/04/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601B
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	TM131-DVPL/101
Serial Number	W503521448A
Range	

ELECTRICAL CHECK

Wiring Check	V
Voltage Measurement	V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX C5	25517372 (LTS29) + LTS32	21/06/2025

Input Range Unit	°C				Indication Range Unit	°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~~0,13~~	25,01		74,73					
HMI Indication	~~2,0~~	24,9		74,7					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUMA	
DATE	16/04/25	16/04/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601C
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS+HAUSER
Type	TM131-DVPC
Serial Number	W5034E1445A
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX C5	25517372 (LTS 29) + LTS 32	21/06/25

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		25,06		74,85					
HMI Indication		25.0		74.9					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUMA	
DATE	15/04/25	16/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601D
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	TM 131 - DVPL 1 / 101
Serial Number	W 50 3531 1448 A
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX C5	E5517372 (LTS 29) + LTS 32	21/06/2025

Input Range Unit	°C				Indication Range Unit	°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0,13	25,03		74,83					
HMI Indication	0,6	24,9		74,7					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MONTEMA	
DATE	16/04/25	16/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601E
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	TM 131 - DVPL
Serial Number	W 503511 448 A
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX C5	25517372 (LTS29) + LTS32	21/06/2025

Input Range Unit	°C				Indication Range Unit	°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		25,05		75,01					
HMI Indication		24,9		74,9					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUNA	
DATE	16/04/25	16/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601F
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS + HAUSER
Type	TM131-DVPC
Serial Number	W503501448A
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX C5	25517372 (CTS20) + CTS32	21/06/2025

Input Range Unit	°C				Indication Range Unit	°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		25,08		74,96					
HMI Indication		25,0		74,9					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUMA	
DATE	16/04/25	16/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601G
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS+HAUSER
Type	TM131-DVPC
Serial Number	W503401448A
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
T Calibrator Beamex C5	25517372 (LTS29) + LTS32	21/06/2025

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0.05	25.07	49.95	74.75					
HMI Indication	0.6	24.7	49.9	74.7					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / (NA)
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

Alarms will be checked with alarm list.

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUMA	
DATE	16/04/25	16/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT-601H
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	ENDRESS+HAUSER
Type	TM 131-DVPL
Serial Number	W503477448A
Range	

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
BEAMEX C5	25517372 (LTS29) + LTS52	21/06/2025

Input Range Unit	°C	Indication Range Unit	°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		25,12		74,91					
HMI Indication		25,0		74,8					

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	80		
HI Alarm	70		
LO Alarm	10		
LO LO Trip	5		

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MARCO	MOUFOUMA	
DATE	16/04/25	16/04/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	TT-621A
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS

Manufacturer	WIKA
Type	TR55 - AIC
Serial Number	1A0377CYDIG
Range	0 – 120°C

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK 24 VDC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit				Indication Range Unit					
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	30	60	90	120		60		0
HMI Indication	0,2	30,1	60,1	90,1	120,1		60,1		0,2

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	80	80	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAPI	MOUFOUMA	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**VAT-001**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_2**

ITEM CHARACTERISTICS

Manufacturer	E+H Endress Hauser
Type	RIA14
Serial Number	W5000D043F8
Range	0/1000 VOLT DC 4/20 mA

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK 24 VDC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Simulation mode	NA	NA

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	250	500	750	1000		500		0
HMI Indication	-1,6	248,4	498,7	748,9	999,1		498,8		-1,6

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	BARI	MONTORNAT	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VAT-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS	
Manufacturer	E+H Endress Hauser
Type	PMA14
Serial Number	W100820437F8
Range	0/1000 V_{DC} 4/20 mA

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK 24 V_{DC}

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Simulation Mode	NA	NA

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	250	500	750	1000		500		0
HMI Indication	-0,5	249,3	499,4	749,5	999,4		499,4		-0,3

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	RAMI	MONTOYA	
DATE	21/03/25	21/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**VE-001**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 01
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

Main Cabinet
p 262

	FORES	ELOGEN	CROSSWIND
NAME	Jesus Fonll	MOUFOUMA Fray	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**VE-002**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 01
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

Main Cabinet.
P264.

	FORES	ELOGEN	CROSSWIND
NAME	Jesus Ferri	FRAN MONTOYA	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	VE-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 01
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

Main cabinet.
Schéma p260.

	FORES	ELOGEN	CROSSWIND
NAME	JACOPO FANTI	FRAY MOUFOUNA	
DATE	19.02.25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	VE-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 01
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Nein Cabinet.
p 262

	FORES	ELOGEN	CROSSWIND
NAME	JACOPO FANTI	MOUFOUMA FOAY	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**VE-005**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 02
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RI01.
P250

	FORES	ELOGEN	CROSSWIND
NAME	Jacop Faull	Foay MOUFOUMA	
DATE	13-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	VE-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_14

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 02
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIC 1
P250

	FORES	ELOGEN	CROSSWIND
NAME	Fernando Jacob	FRAN NAVARRO	
DATE	18·02·25	18/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	VE-007
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_14

ITEM CHARACTERISTICS	
Manufacturer	~~[redacted]~~ EATON MEDC
Type	SL5/4
Serial Number	22556782L 10 02
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

RIO1
P250

	FORES	ELOGEN	CROSSWIND
NAME	Jacopo FANTI	Fray MOUFOUMA	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	**VE-008**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	225567824 10 02
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1
P250

	FORES	ELOGEN	CROSSWIND
NAME	Jacopo Fanzi	FRAN MOUFOUNA	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**VE-009**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SL5/4
Serial Number	2255G7824 10 03
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1
PLSO

	FORES	ELOGEN	CROSSWIND
NAME	Jacopo Fonti	MOUFOUNIA Fouy	
DATE	19-02-25	19/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**VE-010**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SLS/4
Serial Number	2255617824 10 03
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1
p250

	FORES	ELOGEN	CROSSWIND
NAME	Jacopo Tondi	Fray MOUFOUMA	
DATE	18-02-25	19/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	**VE-011**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_14**

ITEM CHARACTERISTICS		
Manufacturer	EATON MEDC	
Type	SL5/4	
Serial Number	2255 67824 10 03	
Range	TOR	
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	OK	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / NC / (N/A)	
	Setting (unit)	Switch Contact
Switch Trigger		Open - On / Closed - Off
Reset		Open - On / Closed - Off
OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1
P250

	FORES	ELOGEN	CROSSWIND
NAME	FINTI	MOUFOUMA	
DATE	20-02-25	20/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	VE-012
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_14

ITEM CHARACTERISTICS	
Manufacturer	EATON MEDC
Type	SLS/4
Serial Number	225567824 10 03
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	(N/A)
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / Closed - Off	
Reset		Open - On / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / (Open) / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / (Closed) / ...
HMI Feedback Display	(Yes) / No	

NOTES

RIO 1
p251.

	FORES	ELOGEN	CROSSWIND
NAME	Jesus Fonti	Montserrat Foy	
DATE	19.02.25	19/02/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	VM-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	8R6L0119
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	275 VDC	523 VDC		275 VDC		
HMI Indication	0	58 VDC	110 VDC	276 VDC	526 VDC		276 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~470~~ VDC	245 ~~472~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	8R6L0120
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		56 VDC	110 VDC	274 VDC	523 VDC		274 VDC		
HMI Indication		56 VDC	110 VDC	277 VDC	527 VDC		277 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 VDC	245 VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA FOMU	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202 - LP
Serial Number	8R6L0084
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	274 VDC	523 VDC		274 VDC		
HMI Indication	0	56 VDC	110 VDC	276 VDC	527 VDC		276 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~650~~ VDC	245 ~~479~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTOVANA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	~~ET00276KB~~ 8R6L0109
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	275 VDC	523 VDC		275 VDC		
HMI Indication	0	56 VDC	111 VDC	278 VDC	529 VDC		278 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~420~~ VDC	245 ~~420~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAPI	MONTOUMA Foty	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-005
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202 - LP
Serial Number	ET002 ~~7618~~ SRGL 0118
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~420~~ VDC	245 ~~420~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE		~~NG~~	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-006
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	Seneca
Type	Z 202 - LP
Serial Number	~~ET001 1613~~ 8R6L0081
Range	0/ 500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal		56Vdc	110Vdc	274Vdc	523Vdc		274Vdc		
HMI Indication		56Vdc	111Vdc	277Vdc	528Vdc		277Vdc		

	Trip or Alarm Setting	Actual Trip or Alarm Point	(OK) / NOK / NA
HI HI Trip	245 ~~230~~ VDC	245 ~~240~~ VDC	
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTOYA Foay	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-007
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	Seneca
Type	Z-202 - LP
Serial Number	~~E1002461B~~ BR6L0083
Range	0/500 Vdc

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	274 VDC	522 VDC	274 VDC			
HMI Indication	0	56 VDC	110,8 VDC	277 VDC	528 VDC	277 VDC			

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~[illegible]~~ VDC	245 ~~[illegible]~~ VDC	
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-008
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_2

ITEM CHARACTERISTICS

Manufacturer	SENECA
Type	Z202-LP
Serial Number	~~[illegible]~~ SR01 0115
Range	0/500 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
FLUKE 1507	50510363WS	

Input Range Unit	VDC	Indication Range Unit	VDC

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	0	56 VDC	110 VDC	274 VDC	522 VDC		274 VDC		
HMI Indication	0	56 VDC	110,9 VDC	277 VDC	528 VDC		277 VDC		

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	245 ~~[illegible]~~ VDC	245 ~~[illegible]~~ VDC	OK
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAU	MONTSOUMIA Josep	
DATE	20/02/25	20/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	**VM-101**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_12**

ITEM CHARACTERISTICS

Manufacturer	SIEMENS
Type	SIMATIC S7
Serial Number	RNA 11TFW
Range	4-20mA 24 VDC

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Calibrateur Fluke 715	ET-0007	26/02/26

Input Range Unit	mA	Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20				
HMI Indication	0.5	243	493	743	993				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANÇOIS CASSAN	MOUFOUMA	
DATE	10/03/2025	10/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	VM-102
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS

Manufacturer	SIEMENS
Type	S7 SIMATIC
Serial Number	RNA 11TFW
Range	4-20mA 24 VDC

ELECTRICAL CHECK

Wiring Check	✓
Voltage Measurement	✓

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date
Calibrateur FLUKE 715	ET-0007	26/02/25

Input Range Unit	mA	Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4mA	8	12	16	20				
HMI Indication	0.1	249	498	748	999				

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MONTOLIVA	
DATE	10/03/2025	10/03/25	
SIGNATURE		NG	

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	WLD-001
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	OPTISWITCH VGPA413130006
Serial Number	649499
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC (NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PAN	MOUFOUMA Fray	
DATE	18/02/25	18/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	WLD-002
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	KROHNE
Type	VGPA413130000 OPTISWITCH
Serial Number	[redacted] 649495
Range	TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			(Open - On) / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONTSERRAT FRAY	
DATE	18/02/25	18/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	WLD-003
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS	
Manufacturer	KRONE
Type	VGRA 41313000 OPTISWITCH
Serial Number	649498
Range	/ TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	OK

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MONFOUMA Fouy	
DATE	18/02/25	18/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	WLD-004
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_12

ITEM CHARACTERISTICS		
Manufacturer	KROHNE	
Type	VGPA 4131 30000 OPTISWITCH	
Serial Number	649496	
Range	/	TOR
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	OK	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO	(NC) N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On / Closed - Off)
Reset		Open - On / (Closed - Off)
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PARI	MOUFOUMA Fray	
DATE	18/02/25	18/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**WLD-005**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_13**

ITEM CHARACTERISTICS		
Manufacturer	KROHNE	
Type	OPTISWITCH	
Serial Number	651076	
Range	/	TOR
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	OK	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO	(NC) N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		Open - On / (Closed - Off)
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PANI	MOUFOUMA	
DATE	24/02/25	24/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	**WLD-006**
System / Subsystem Number	**Electrolyser Stacks & BOP / BLPH 25-11**
P&ID Number	**C63-PID-001_13**

ITEM CHARACTERISTICS		
Manufacturer	KRO HNE	
Type	OPTI SWITCH	
Serial Number	649497	
Range	/	TOR
ELECTRICAL CHECK		
Wiring Check	OK	
Voltage Measurement	OK	
LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date
INPUT CHECK		
Switch Contacts	NO / (NC)	N/A
	Setting (unit)	Switch Contact
Switch Trigger		(Open - On) / Closed - Off
Reset		Open - On / (Closed - Off)
OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	PANI	MOUFOUMA	
DATE	24/02/25	24/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ZIO-604
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_4

ITEM CHARACTERISTICS	
Manufacturer	ELEMEC
Type	SPDT
Serial Number	iT03B0110056
Range	5A 250VAC 3A-24VDC TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger		Open - On / (Closed - Off)	
Reset		(Open - On) / Closed - Off	

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUMA Fray	
DATE	15/02/2025	15/02/2025	
SIGNATURE		NG	

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ZIO-605
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_3

ITEM CHARACTERISTICS	
Manufacturer	SOLDO CONTROLS
Type	SK01200-10X23L3
Serial Number	IT03B0125716
Range	TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	5A - 250VAC 3A (24 VDC)

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Valve close → Contact close.

Valve open → Contact open

	FORES	ELOGEN	CROSSWIND
NAME	~~ERAN~~ FRANCESCO CASSANO	MLE.	
DATE	21/02/2025	21/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ZIO-623
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_4

ITEM CHARACTERISTICS	
Manufacturer	ELZNEC
Type	SPDT
Serial Number	ITO3B01/10056
Range	5A 250 VAC 3A-24 VDC TOR

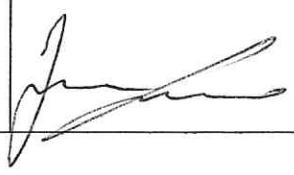
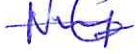
ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / (Closed - Off)
Reset			(Open - On) / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSANO	MOUFOUNLA Fray	
DATE	15/02/2025	15/02/2025	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	ZIO-624
System / Subsystem Number	Electrolyser Stacks & BOP / BLPH 25-11
P&ID Number	C63-PID-001_6

ITEM CHARACTERISTICS	
Manufacturer	SOLDO · CONTROLS
Type	SK01200-10X2323
Serial Number	IT03B0123927
Range	5A - 250 VAC 3A24 VDC TOR

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	24 VDC

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	(NC)	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	Off / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / ...	Off / Closed / ...
HMI Feedback Display	Yes / No	

NOTES

Valve Close → contact close

Valve Open → contact open.

	FORES	ELOGEN	CROSSWIND
NAME	FRANCESCO CASSITTO	MLF	
DATE	21/02/2025	21/02/25.	
SIGNATURE			

Paumier

AHU TEST SHEET

Customer	ELOGEN
Business numer	P.0608871.L.02.602

Site	C63
Equipment	AHU

Test conditions	ext. T° :

Local	Locaux techniques
Local T°	N.C
Plan number	P.0608871.L.02.100
Type	AHU
Fluid	AIR / MPG 40%
Brand	PAUMIER
Serial number	7449
Voltage (V) / single or Triphase	400 V (Tri)
Heating power	22,5 kW
Refrigerating power	36,9 kW

VENTILATEUR	Fan(s)	Fan 1		
	Rotational direction control	horaire		
	Fans plaqued nominal current. (A)			
	Thermal circuit breaker fans settings. (A)	Q7 16A		
	Phase(s)	Ph1	Ph2	Ph3
	fans measured current. (A)	4,15	4,13	4,19
	Fans starting current. (A)	VAR	VAR	VAR
	Fans insulation. (MΩ) *see nota	550	550	550
	Speed variation	~~NO~~		YES.
	Values (Hz)	205 V	~~400V~~	32,6 Hz
	Intended air flow (m3/h)	3362		
	Measured air flow (m3/h)	3391		
	T° settings	~~3362~~ 20°C		
	T° measured	21,3°C		

BATTERIE			
	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		
	Control open / close V3V (10V => 100% / 0V => 0%)		

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ. Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date : 27/09/25

Comments :

Name et Visa

PAUMIER : DAXIDAL ESTEBAN

Customer : PAOLETTI

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. : 10

Local	A20 - Rectifier Room
Reference number	FCU 201
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7424
Voltage (V)	230V / MONO

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control	Horaire	Horaire
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6A	6A
	Phase(s)	Ph1	Ph1
	fans measured current. (A)	0.99A	1A
	Fans starting current. (A)	1,04 A	1,05
	Fans insulation. (MΩ) *see nota	550mΩ	550mΩ
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)	1235	
	T° settings		
	T° measured		

BATT	T° Air entry (°C)	
	T° Air exit (°C)	
	T° Fluid entry (°C)	
	T° Fluid exit (°C)	

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ. Otherwise 1kΩ/V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	25/02/25

Comments :

PAU 003 Disjoncteur Q10
VITESSE 1

Name et Visa

DAOUDAL ESTEBAN

(PAUMIER)	Customer : PAOLETTI

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. : 10

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control	Horaire ok	Horaire ok
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6A	6A
	Phase(s)	Ph1	Ph1
	fans measured current. (A)	0,95A	0,92A
	Fans starting current. (A)	0,99A	0,96
	Fans insulation. (MΩ) *see nota	550mΩ	550mΩ
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)	1283	
	T° settings		
	T° measured		
B	T° Air entry (°C)		
A	T° Air exit (°C)		
T	T° Fluid entry (°C)		
T	T° Fluid exit (°C)		

Local	A20 - Rectifier Room
Reference number	FCU 202
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7425
Voltage (V)	230V / MONO

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	23/02/23

Comments :

PAU 003 disjoncteur Q11 vitesse 1

Name et Visa

DAOUDAL ESTEBAN

(PAUMIER)	Customer : PAOLETTI

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. : 10

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control	Horaire ok	Horaire ok
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6A	6A
	Phase(s)	Ph1	Ph1
	fans measured current. (A)	0,98A	0,97A
	Fans starting current. (A)	1,03A	1,01A
	Fans insulation. (MΩ) *see nota	550MΩ	550MΩ
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)	1258	
	T° settings		
	T° measured		
B A T T	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Local	A20 - Rectifier Room
Reference number	FCU 203
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7426
Voltage (V)	230V / MONO

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	25/02/25
Comments :	PAU 003, Disjoncteur Q12, vitesse 1
Name et Visa	DAOUDAL ESTEBAN
(PAUMIER)	Customer : PAOLETTI

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. : 10

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control	Horaire ok	Horaire ok
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6A	6A
	Phase(s)	Ph1	Ph1
	fans measured current. (A)	0,93A	0,94A
	Fans starting current. (A)	0,96A	0,97A
	Fans insulation. (MΩ) *see nota	550MΩ	550MΩ
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)	1326	
	T° settings		
	T° measured		
BATT	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Local	A20 - Rectifier Room
Reference number	FCU 204
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	74247
Voltage (V)	230V / MONO

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	25/02/25

Comments :

PAU 003, Disjoncteur Q13, vitesse 1.

Name et Visa

DAOUDAL ESTEBAN

(PAUMIER)	Customer : DAOUDAL

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FS 33
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS	
Manufacturer	IFM electronic
Type	SA 5000
Serial Number	XOAHL106247
Range	18-30 V DC TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V DC

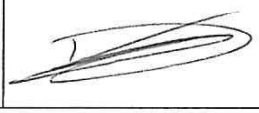
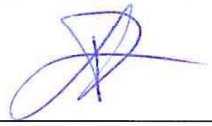
LOOP CHECK		
Input / Output function	(Process)	~~Safety~~
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit) L-MIN		Switch Contact
Switch Trigger	20		Open - On / Closed - Off
Reset	6		Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	19/3/25	19/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FS 43
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS	
Manufacturer	IFM electronic
Type	SA5000
Serial Number	X01421062L47
Range	18-30 VDC TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V

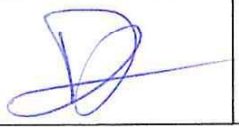
LOOP CHECK		
Input / Output function	(Process)	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit) L-MIN		Switch Contact
Switch Trigger	20		(Open - On / Closed - Off)
Reset	6		Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	(On / Open / ...)	(Off / Closed / ...)
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On / Open / ...)	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PROCETTI	
DATE	19 / 3 / 25	19 / 03 / 25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FS 141
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS	
Manufacturer	IFM electronic
Type	SA5000
Serial Number	X0142106247
Range	18-30 V DC TOR

ELECTRICAL CHECK	
Wiring Check	On
Voltage Measurement	24 V DC

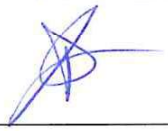
LOOP CHECK		
Input / Output function	(Process)	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit) L-MIN		Switch Contact
Switch Trigger	40		(Open - On / Closed - Off)
Reset	24		Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	19 / 3 / 25	19/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	CROSSWIND

Tag Number	FS 149		
System / Subsystem Number			
P&ID Number			
ITEM CHARACTERISTICS			
Manufacturer	IFM electronic		
Type	SA 5000		
Serial Number	x 0942106247		
Range	18-30V DC TOR		
ELECTRICAL CHECK			
Wiring Check	OK		
Voltage Measurement	24 V		
LOOP CHECK			
Input / Output function	(Process)	Safety	
Test Equipment Used	Serial Number	Calibration Expiry Date	
INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit)	Switch Contact	
Switch Trigger	40	(Open - On / Closed - Off)	
Reset	24	Open - On / (Closed - Off)	
OUTPUT CHECK			
Field Device Off Status	On / Open / ...	(Off / Closed / ...)	
Output Signal to On-Position (activation by setting or forcing)			
Field Device Status Change	(On / Open / ...)	Off / Closed / ...	
HMI Feedback Display	(Yes / No)		
NOTES			

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	19/03/25	19/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	101
System / Subsystem Number	HY101
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	AETF-I TYR2
Serial Number	120.1-7112-1000-000
Range	15 .. 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

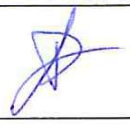
Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	73	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/2025	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	103
System / Subsystem Number	HY 103
P&ID Number	TT - HY - 1005

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	120.1-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

PAumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	201
System / Subsystem Number	HY 201
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

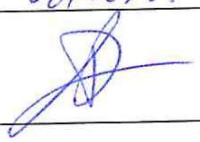
Input Range Unit: 4 - 20 mA — Indication Range Unit: 0% 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	203
System / Subsystem Number	HY 203
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	205
System / Subsystem Number	HV20S
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15-36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DACUDAC	PAOLETTI	
DATE	28/09/25	29/09/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	206
System / Subsystem Number	HY 206
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SCHISCHER
Type	FFR-2G
Serial Number	057·1000·24390002
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

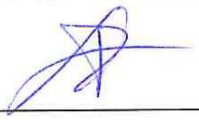
Input Range Unit: 4-20 mA — Indication Range Unit: 0-100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	73	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	73	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

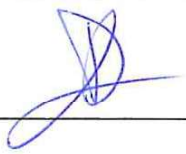
PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/2025	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	4			
System / Subsystem Number	THS - 400 - VCW1 - M1			
P&ID Number	M2 WV - 04			
CHARACTERISTICS				
Manufacturer	Bernard Controls			
Serial Number	22A37338-058			
Valve Type	AQ 7L			
Fail Position (Closed / Open)	Closed			
PRELIMINARY CHECKS				
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK			
Check the conformity to the data sheet	(OK) / NOK			
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA			
Check the installation of heating & insulation (if any)	(OK) / NOK / NA			
Check Power / Air Supply Setting	–			
LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	(Stay put)
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)	15 S	Valve 'Close' Time (s)		15 S
NOTES				

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

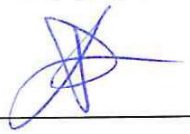
Tag Number	13
System / Subsystem Number	THS-400-VCW2-M1
P&ID Number	M2WV-13
CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	22A37338-053
Valve Type	AO7L
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	–

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 S	Valve 'Close' Time (s)	15 S

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	14
System / Subsystem Number	THS-400-VCW8-M2
P&ID Number	M2 WV-14
CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	22A37338.0.60
Valve Type	AQ7L
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 S	Valve 'Close' Time (s)	15 S

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	23
System / Subsystem Number	THS-400-VCW4-M2
P&ID Number	M2WV-23
CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	22A37338.038
Valve Type	AQ7L
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	-

LOOP CHECK

Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 s	Valve 'Close' Time (s)	15 s

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	104		
System / Subsystem Number	THS-200-VCW1-M1		
P&ID Number	M2WV-1004		
CHARACTERISTICS			
Manufacturer	Bernard Controls		
Serial Number	23L30359.009		
Valve Type	A015		
Fail Position (Closed / Open)	CLOSED		
PRELIMINARY CHECKS			
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK		
Check the conformity to the data sheet	(OK) / NOK		
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA		
Check the installation of heating & insulation (if any)	(OK) / NOK / NA		
Check Power / Air Supply Setting	—		
LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	30 Second	Valve 'Close' Time (s)	30 Second
NOTES			

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

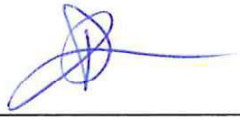
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	113
System / Subsystem Number	THS-200-VCW2-M1
P&ID Number	M2WV-113
CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	23L30359.017
Valve Type	AQ15
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	–

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	(Stay put)
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)	30 S	Valve 'Close' Time (s)		30 S

NOTES

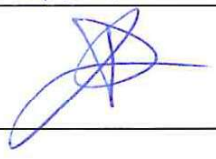
Pavonier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0004 – ON/OFF VALVE	CROSSWIND

Tag Number	114			
System / Subsystem Number	THS-200-VCW3-M2			
P&ID Number	M2WV-114			
CHARACTERISTICS				
Manufacturer	Benard Controls			
Serial Number	23L30359.015			
Valve Type	AQ15			
Fail Position (Closed / Open)	Closed			
PRELIMINARY CHECKS				
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK			
Check the conformity to the data sheet	(OK) / NOK			
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA			
Check the installation of heating & insulation (if any)	(OK) / NOK / NA			
Check Power / Air Supply Setting	—			
LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	(Stay put)
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)	30S	Valve 'Close' Time (s)		30S
NOTES				

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PALETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	123
System / Subsystem Number	THS - 200 - VCW4 - M2
P&ID Number	M2WV - 123
CHARACTERISTICS	
Manufacturer	Benard Controls
Serial Number	23L30359.006
Valve Type	AQ 15
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	30 Sec	Valve 'Close' Time (s)	30 Sec

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0005 – PROPORTIONAL VALVE	CROSSWIND

Tag Number	V1								
System / Subsystem Number									
P&ID Number	PSV-01								
CHARACTERISTICS									
Manufacturer	Belimo								
Serial Number	10173-00001								
Valve Type	NR24A-SR								
Trim (Linear, Square, =%,...)									
Fail Position (Closed / Open)	closed								
PRELIMINARY CHECKS									
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK								
Check the conformity to the data sheet	(OK) / NOK								
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA								
Check the installation of heating & insulation (if any)	(OK) / NOK / NA								
Check Power / Air Supply Setting	ok 24Vdc.								
LOOP CHECK									
Valve Failure Action On Loss of Air supply NA	FO	FC	Stay put						
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)						
Valve 'Open' Time (s)	90s	Valve 'Close' Time (s)	90s						
	Rising %					Falling %			
Command Value	0	25	50	75	100	75	50	25	0
Physical Status (Stroke on Positioner)	0	25	50	75	100	75	50	25	0
HMI feedback NA									

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL		
DATE	27/02/25		
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	05
System / Subsystem Number	PT05
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGELtechnik
Type	SHD
Serial Number	520.99634
Range	24V DC

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	12
System / Subsystem Number	PT 12
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	SHD
Serial Number	520-99634
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	5	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9	2,9	Ok
LO Alarm	0,5	0,5	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	15
System / Subsystem Number	PT15
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	
LO Alarm	0,5 bar	0,5 bar	
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	PT 22
System / Subsystem Number	22
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	JACUDAC	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	101
System / Subsystem Number	PT101
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	Premaus-Gard 1121-1
Serial Number	130.1 - 1172 - 0010 - 000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: -300 ÷ 300 Pa

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	180	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAOLETTI

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/2025	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	103
System / Subsystem Number	PT103
P&ID Number	PT - 1005

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	PrimaGard 1121-1
Serial Number	1301 - 1172 - 0010 - 000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: -300 +300 Pa

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/23	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	105
System / Subsystem Number	PT-105
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS REGELTECHNIK
Type	SHD
Serial Number	520.990.34
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~~4~~	8	12	16	~~20~~	16	12	8	0
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DACCAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	119
System / Subsystem Number	PT 112
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGELTECHNIK
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,3 bar	2,9 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	1.15
System / Subsystem Number	PT 1.15
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGELTECHNIK
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	122
System / Subsystem Number	PT 122
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Pavimier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	27/02/2025	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	201
System / Subsystem Number	PT 201
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	Premaxgard 1121-1
Serial Number	1301-1172-0010-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: -300 ÷ 300 PA

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAGUDAL	PALETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	203
System / Subsystem Number	PT 205
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	Premmasgard 1121-1
Serial Number	1301-1172-0010-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

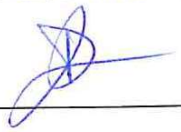
Input Range Unit: 4 - 20 mA — Indication Range Unit: -300 ÷ 300 PA

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PALETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	206
System / Subsystem Number	PT 206
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SCHICHER
Type	ECCOS - P - 250
Serial Number	056.3005 · 24390049
Range	19,2 ... 28,8 V AC/DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

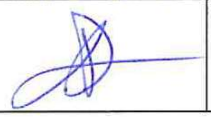
Input Range Unit	4 - 20 mA	Indication Range Unit	- 250 + 250

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-250	-125	0	125	250	125	0	-125	-250

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

Paumier

Condesation pump test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.601

Site	C63
Equipment	Condensation pump

Test conditions	T° fluid : 12,1	T° ext. :

PAUMIER	Condensation pump n°1 (Service)			Condensation pump n°2 (Safety)		
Usage	CONDENSATION circulation			CONDENSATION circulation		
Type	Centrifugal			Centrifugal		
Brand	GRUNDFOSS			GRUNDFOSS		
Référence	NB 80-160/151 AASF2KESBQQEOW1			NB 80-160/151 AASF2KESBQQEOW1		
Serial number	87420029.1000 2856.			87420029.1000 2854.		
Rotational direction	horaire			horaire		
voltage (V) (Precise single or Triphase)	380-415D / 50Hz (Tri)			380-415D / 50Hz (Tri)		
Plated nominal current (A)	28,0-26,0 A			28,0-26,0 A		
Circuit Breaker settings (A)	Q3 40A			Q4 40A		
	Ph1	Ph2	Ph3	Ph1	Ph2	Ph3
Mesured intensity (A)	23,18	23,17	22,88	23,36	23,52	22,70
Starting intensity (A)	VAR	VAR	VAR	VAR	VAR	VAR
Insulation (MΩ) * see Nota	550	550	550	550	550	550

Variable speed YES / NO	YES	YES
Valeurs (Hz)	50 Hz	50 Hz
Expected flow (m3/h)	122,3	122,3
Noted flow (m3/h)		
Upstream pressure (bar)	2,55	2,55
Downstream pressure (bar)	0	0

* vue de l'arrière de la pompe

Nota (insulation) : if BT/A (50 à 500V) : Z ≥ 500 kΩ, otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ

Date : 27/09/25

Observations : TAG- pump 1 : 109
pump 2 : 119

Name :

(PAUMIER) DAOUDAI ESTEBAN

CLIENT PAOLETTI Luc

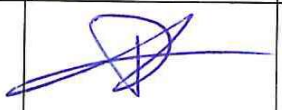
elogen	PRECOMMISSIONING C063-ELO-REP-CO-0003 – PUMP MOTOR	CROSSWIND

Tag Number	119 CP200A
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	Grundfoss
Type	Centrifugal
Serial Number	87420019 10002854
Insulation Class	IP55
Nominal Power	15 kW
Nominal Intensity	28.50
Supply Voltage	400V
Speed	2930 rpm
Motor Connection (Star / Delta)	Delta

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	MpG 40% - 23°C			
Measurement Tool				
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	550			MΩ
Earth Insulation (U * V * W) / GND	550			MΩ
Magnetic Fuse Rating (Magnetic Protection)	400 V			A
PTC Value				Ω
Bump Check: Motor Rotation Direction	(OK) NOK			

NOTES
Paunier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	18/03/25	18/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0003 – PUMP MOTOR	

Tag Number	109 - CP200 B
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	GRUNDFOSS
Type	Centrifugal
Serial Number	87420029100028856
Insulation Class	IP55
Nominal Power	15 kW
Nominal Intensity	28,50 A
Supply Voltage	400V
Speed	2950 rpm
Motor Connection (Star / Delta)	Delta

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	MEG 40% - 23°C			
Measurement Tool				
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	550			MΩ
Earth Insulation (U * V * W) / GND	550			MΩ
Magnetic Fuse Rating (Magnetic Protection)	40A			A
PTC Value				Ω
Bump Check: Motor Rotation Direction	(OK) / NOK			

NOTES

Pannier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	18/03/25	18/03/25	
SIGNATURE			

Paumier

Chilled water test sheet

Customer	ELOGEN
Business number	P.0608871.L02.601

Site	C63
Equipment	Chilled water pump

Test conditions	T° fluid : 19,1	T° ext. :

TAG n° 9 - CP100B n° 20 - CP100A

PAUMIER	Chilled water pump n°1 (Service)			Chilled water pump n°2 (Safety)		
Usage	Chilled water circulation			Chilled water circulation		
Type	Centrifugal			Centrifugal		
Brand	GRUNDFOSS			GRUNDFOSS		
Référence	NB 32-160/177 AASF2KESBQQELW1			NB 32-160/177 AASF2KESBQQELW1		
Serial number	98505679 1000005			98505679 1000006		
Rotational direction	horaire			horaire		
voltage (V) (Precise single or Triphase)	380-415D / 50Hz (Tri)			380-415D / 50Hz (Tri)		
Plated nominal current (A)	11,0 A			11,0 A		
Circuit Breaker settings (A)	Q1 16A			Q2 16A		
	Ph1	Ph2	Ph3	Ph1	Ph2	Ph3
Mesured intensity (A)	9,35	9,94	10	10,26	10,24	10,71
Starting intensity (A)	VAR	VAR	VAR	VAR	VAR	VAR
Insulation (MΩ) * see Nota	550	550	550	550	550	550
Variable speed YES / NO	YES			YES		
Valeurs (Hz)	50 Hz			50 Hz		
Expected flow (m3/h)	29,7			29,7		
Noted flow (m3/h)						
Upstream pressure (bar)	4,2			4,10		
Downstream pressure (bar)	1,5			1,32		

* Vue de l'arrière de la pompe

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date :	
Observations :	
Name :	
(PAUMIER)	CLIENT
	PAOLETTI

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0003 – PUMP MOTOR	CROSSWIND

Tag Number	~~210~~ - CP400 A
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	GRUNDFOS
Type	MEI ≥ 0.59
Serial Number	98505679.10000006
Insulation Class	IP55
Nominal Power	5,50 kW
Nominal Intensity	12,7
Supply Voltage	400 V
Speed	2930 r min
Motor Connection (Star / Delta)	Delta

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	MPG 40% - 23°C			
Measurement Tool				
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	550 MΩ			MΩ
Earth Insulation (U * V * W) / GND	550 MΩ			MΩ
Magnetic Fuse Rating (Magnetic Protection)	16A			A
PTC Value				Ω
Bump Check: Motor Rotation Direction	(OK) / NOK			

NOTES

Pompe à chilled water circulation

	FORES	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	15/03/2025	15/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0003 – PUMP MOTOR	CROSSWIND

Tag Number	9 - CP400 B
System / Subsystem Number	
P&ID Number	

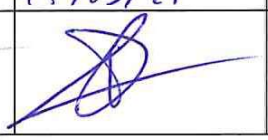
CHARACTERISTICS	
Manufacturer	GRUNDFOS
Type	MET ≥ 0.59
Serial Number	873222E9100113385
Insulation Class	IP55
Nominal Power	5,50 kW
Nominal Intensity	12,2 A
Supply Voltage	400 V
Speed	2930 rmin
Motor Connection (Star / Delta)	Delta

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid	MPG 40% - 23°C			
Measurement Tool				
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)	550 MΩ			MΩ
Earth Insulation (U * V * W) / GND	550 MΩ			MΩ
Magnetic Fuse Rating (Magnetic Protection)	16A			A
PTC Value				Ω
Bump Check: Motor Rotation Direction	(OK) NOK			

NOTES

Pompe 1 : chilled water circulation

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	15/03/2025	15/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT 25
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regel technik
Type	TM65-1 100mm
Serial Number	1101-7122-0029-900
Range	15 - 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA				Indication Range Unit	-50°C + 50°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	25	50	25	0	-25	-50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumiers

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	19/03/2025	19/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	TT34 ~~FT 32~~
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGEL Technik
Type	TH6S-I 100mm
Serial Number	110.1-7122-0029-900
Range	15-36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4-20mA — Indication Range Unit: -50°C + 50°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	25	50	25	0	-25	50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	19/3/2025	19/03/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	TT 44 ~~TT 42~~
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGEL technik
Type	M01-7122-0029-900
Serial Number	TM65-I 100mm
Range	15-36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: -50 °C + 50 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-30	-25	0	25	50	25	0	-25	50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paunier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	19/3/25	19/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	60
System / Subsystem Number	TT-60
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS REGEL TECHNIK
Type	TM65-1 100MM
Serial Number	1101-7122-0029-900
Range	15-36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

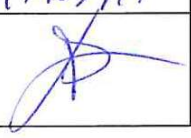
Input Range Unit: 4-20 mA | Indication Range Unit: -50°C +50°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	+25	+50	+25	0	-25	-50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

DAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	17/03/25	17/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	
System / Subsystem Number	101
P&ID Number	TT 101

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: -35°C ÷ 35°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

PAUMiers

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	TT 103
System / Subsystem Number	103
P&ID Number	TT-HY - 1005
ITEM CHARACTERISTICS	
Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7212-1000-000
Range	15 ... 36 V DC
ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA				Indication Range Unit		- 35 ÷ 75 °C			
	Rising %					Falling %				
	0	25	50	75	100	75	50	25	0	
Input Signal	4	8	12	16	20	16	12	8	4	
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35	
	Trip or Alarm Setting			Actual Trip or Alarm Point			OK / NOK / NA			
HI HI Trip	47,5			47,5			OK			
HI Alarm	45			45			OK			
LO Alarm	5			5			OK			
LO LO Trip	2,5			2,5			OK			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/2025	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	TT 126 ~~TT - 126~~
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SHS REGEL technik
Type	TM 65-1 100mm
Serial Number	1101-7122-0029-900
Range	15-36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4-20mA				Indication Range Unit	0°C		100°C	
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	19/3/2025	19/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	154
System / Subsystem Number	TT 154
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SIS Regel technik
Type	TM65-1 100MM
Serial Number	1101-7122-029-900
Range	15-36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA				Indication Range Unit	+0°C - +100°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	73	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	17/03/25	17/03/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	201
System / Subsystem Number	TT 201
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	AFTF-I TYR 2
Serial Number	1201-7112-1000-000
Range	15...36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

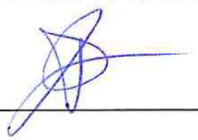
Input Range Unit: 4 - 20mA | Indication Range Unit: -35°C + 75°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-18.5	20	52.5	75	52.5	20	-18.5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47.5	47.5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2.5	2.5	OK

NOTES

Paumier

	~~EORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/04/2025	28/02/25	
SIGNATURE			

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	203
System / Subsystem Number	TT 203
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: - 35 + 75 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	205
System / Subsystem Number	TT 205
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 bis 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: -35 + 75 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	206
System / Subsystem Number	TT 206
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SCHISCHER
Type	TFR - 26
Serial Number	057 . 1200 24160072
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 1000 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	32,5	32,5	OK
HI Alarm	30	30,5	OK
LO Alarm	10	10	OK
LO LO Trip	3,5	3,5	OK

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 101
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824.18L300998
Power (kW)	1000 w
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 Ω
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	OK / NOK
Intensity (U)	4,24 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	6 A
NOTES	

Depart PAU003 : Disjoncteur Q.14.

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	CROSSWIND

Tag Number	WH 103
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	ATANTIC
Serial Number	100824181300667
Power (kW)	500W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 MΩ
Bump Check: Motor Rotation Direction	(OK) NOK
TEST	
Activation	(OK) NOK
Intensity (U)	2A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	3A
NOTES	

Depart PAU003 : Disjoncteur Q16.

Paumier

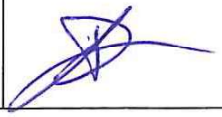
	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 201
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824181300997
Power (kW)	1000 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 MΩ
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	(OK) / NOK
Intensity (U)	4.25 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	6A
NOTES	

Depart PAU003 : Disjoncteur Q17

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	27/02/25	27/02/25	
DATE	DAOUDAL	PAOLETTI	
SIGNATURE			

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	CROSSWIND

Tag Number	WH 203
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824AQL300650
Power (kW)	500 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 Ω
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	(OK) / NOK
Intensity (U)	2,06A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	3A
NOTES	

Depart PAU003 : Disjoncteur Q18.

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 205
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824181300649
Power (kW)	500 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	Ok
Check the Resistance	550 MΩ
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	(OK) / NOK
Intensity (U)	2,12 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	6A

NOTES

Depart PAV 003 : Disjoncteur @ 20

Daumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	DALETTI	
DATE	27/02/25	27/02/25	
SIGNATURE			

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 206
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	A.E.I.B
Serial Number	202109/4510
Power (kW)	1000 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	55 Ω
Bump Check: Motor Rotation Direction	~~OK~~ / ~~NOK~~
TEST	
Activation	(OK) / NOK
Intensity (U)	3,68 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	8A
NOTES	

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	Daoudal	PAOLETTI	
DATE	27/02/2025	27/02/25	
SIGNATURE			

Section 4.4 Instrumentation “As-Commissioned” interconnection diagrams

NOT APPLICABLE

Section 4.5 Telecommunication functional test sheets index

NOT APPLICABLE

Section 4.6 Telecommunication
“As-Commissioned” I.C.D. / TSLD's

NOT APPLICABLE

Section 5 SITE / OPERATIONAL

Section 5.1 Operational Test Procedure

Section 5.2 Operational Test Certificates

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 20-00

Miscellaneous	20-00 Electrolyser Package (A-20000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
123A90-PML-COM-PRO-03061	OTP – Electrolyser Package	ONSHORE	C10004612	5300	100	2025-06-27	RFO 3

ITEM	Tag	123A90-PML-COM-PRO-03061 : OTP – Electrolyser Package				Dwg	123A90-PML-COM-PRO-03061
	S/Sys	20-00 : Electrolyser Package (A-20000)				Module	
TASK	code	C10004612		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity OTS	Discipline	Miscellaneous Form 5300		Operational Test Procedure

OTP - OPERATIONAL TEST PROCEDURE

Attached procedure number:

Associated subsystems:

Completion date:

Comments/Remarks:

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
	COMMISSIONING DISCIPLINE LEAD	RM COMMISSIONING MANAGER	CPY COMMISSIONING MANAGER
Name	Giuseppe Bruno	Anthony Iveson	Martin Taylor
Date	2025-06-26	2025-06-26	2025-06-27
Signature	PROVERLIS Digitaly signed by Giuseppe Bruno 2025-06-26T11:45:49.628Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-06-26T11:47:16.266Z	PROVERLIS Digitaly signed by Martin Taylor 2025-06-27T07:39:18.981Z

Base Load Power Hub (BLPH)

OTP - Electrolyser Package

Document Number: 123A90-PML-COM-PRO-03061

Document Class: 2

			Daniela Picon		
02	28/02/2024	Second Issue	DPI	MSA	HRO
01	04/02/2024	Issue with CWD Inputs	DPI	MSA	DWA
Rev.	Date	Description	Prepared	Reviewed	Approved

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File: 123A90-PML-COM-PRO-03047

Revision / Change Log

Rev.	Description
01	Issue with CWD Inputs
02	Second issue: Cross-references updated. Sections 3.1, 5.3.1, 4.1.6, and 4.1.1, 5.4.1.10 updated.

HOLD LIST

No.	Description
1	
2	
3	

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1 INTRODUCTION

1.1 Project Overview

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.



Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

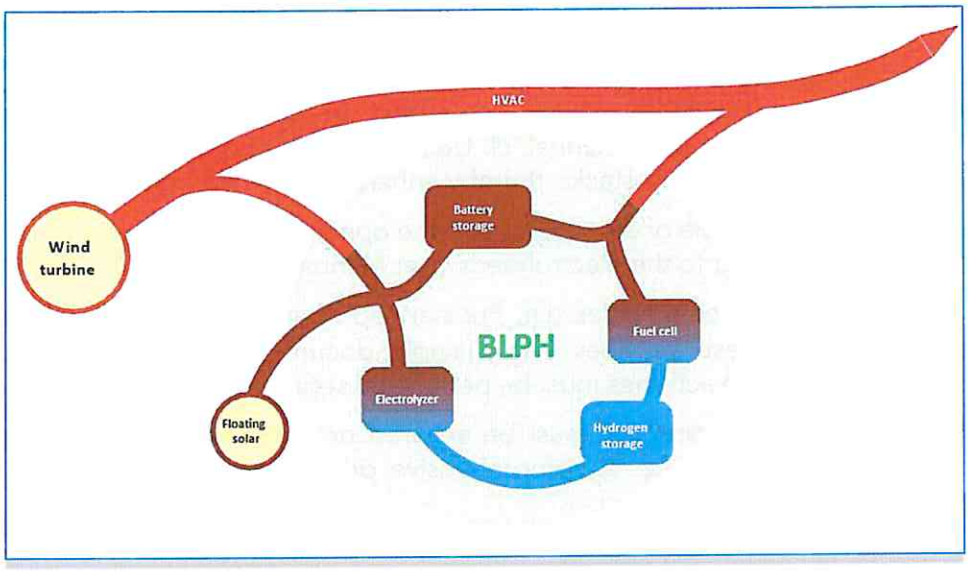


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

This procedure encompasses the Pre-start-up, Start-up, and Ramp-up activities of the BLPH Electrolyser. These activities include the electrolyser's Start-Up and Operation in automatic mode (referred to as 'Start mode' in the User Manual, cf. C63-PMO-001) and the progressive increase in current supplied by the rectifiers to the stacks, thereby enhancing the hydrogen flow rate produced.

For more details about the principle of electrolysis and the operation of the process through the HMI (Human Machine Interfaces) refer to the electrolyser's User Manual (cf. C63-PMO-001).

Despite the distinct categories of activities (i.e. Pre-start up, Start-up and Ramp-up), it has been decided to consolidate all these activities into a single document for practical purposes. This approach is taken because these activities must be performed sequentially, and their scopes overlap.

The prerequisites outlined in Section 3.4 must be ensured prior to initiating the machine in start mode, as specified in Section 6.4.1.2. A comprehensive description of the required activities is provided in Section 6.4.

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3 OTP SUMMARY

3.1 Test Objective

The operating test of the Electrolyser system is executed to ensure that the system is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

Aim of this document is to provide the sequence and appropriate actions to verify the safety systems of the Electrolyser system along with proving the design intent of the system to produce hydrogen gas (H2).

Prerequisites for proceeding with the OTP:

- The UPS is charged at 100%.
- All Utilities are operational.
- The electrolyser is stopped, depressurized and cold (T < 40 °C).
- Written authorization has been obtained to send hydrogen through the client's installation (**Figure 4** piping highlighted in turquoise, PV-633 open and PV-632 close). In the absence of such authorization, the hydrogen will be directed through the designated hydrogen vent (**Figure 4** piping highlighted in yellow, PV-633 close and PV-632 open).

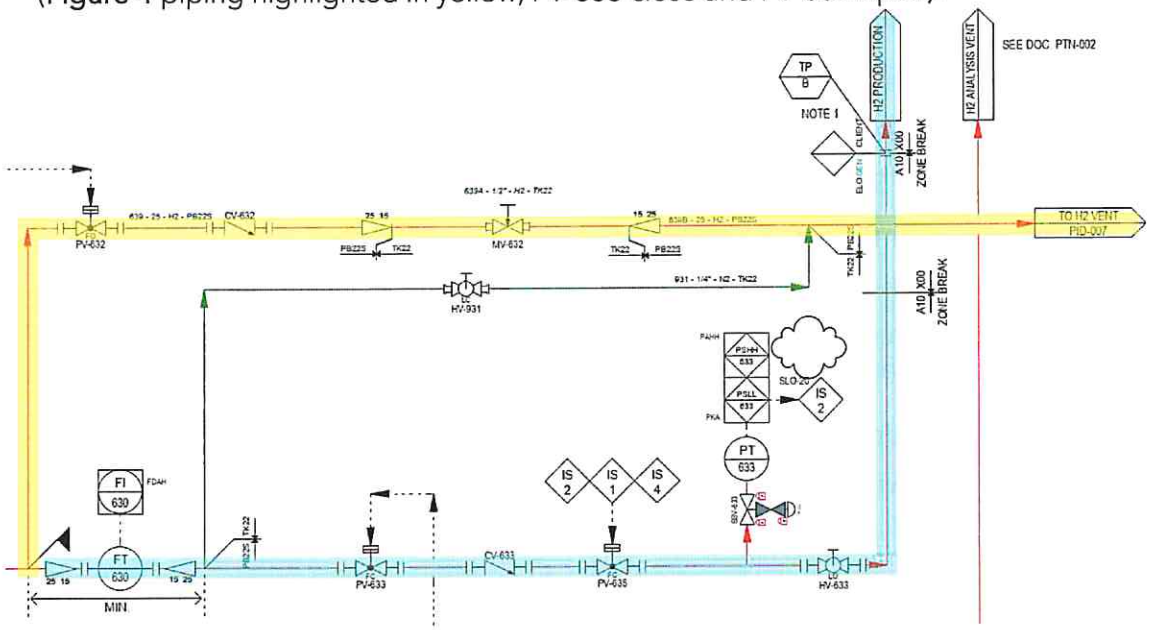


Figure 4. Hydrogen production routing

- All design documentation is approved or relevant TQ / CQ approved to proceed with introduction of combustible gas.
- It is mandatory to have the written authorization to send the hydrogen to the vent during

these activities.

- Onshore pre-commissioning and commissioning activities at Contractor site (WORKSITE)
  a. PHASE 1: Pre-commissioning (powered) activities listed in C063-ELO-PRO-CO- 0003 (NOT PART OF THIS OTP)
  b. PHASE 2: Commissioning (powered) activities listed in C063-ELO-PRO-CO- 0004 (NOT PART OF THIS OTP).
  c. PHASE 3: Vendor SAT & Integrated function test of Electrolyser package including:
     - Confirming Unit Settings on the START mode
     - Stack polarization
     - Hydrogen Setpoint Achievement
     - Functionality of electrolyser's Sequences during Operation
     - Hydrogen Leak Detection
     - Safety Stops at 10%
     - Increasing current by 10% up to 100%
     - Production Settings at 100%

       HPP Start-Up
- Offshore commissioning (SITE)

  PHASE 4: Integrated function test of Electrolyser package (OFFSHORE).

PHASES 1 – 2 are covered by and contained within the vendor documents. PHASES 3 - 4 are included within this OTP document, and the Vendor SAT procedure.

3.2 System Boundary Limits

Please refer to the relevant systems and subsystems outlined below on the Overall Single Line Diagram.

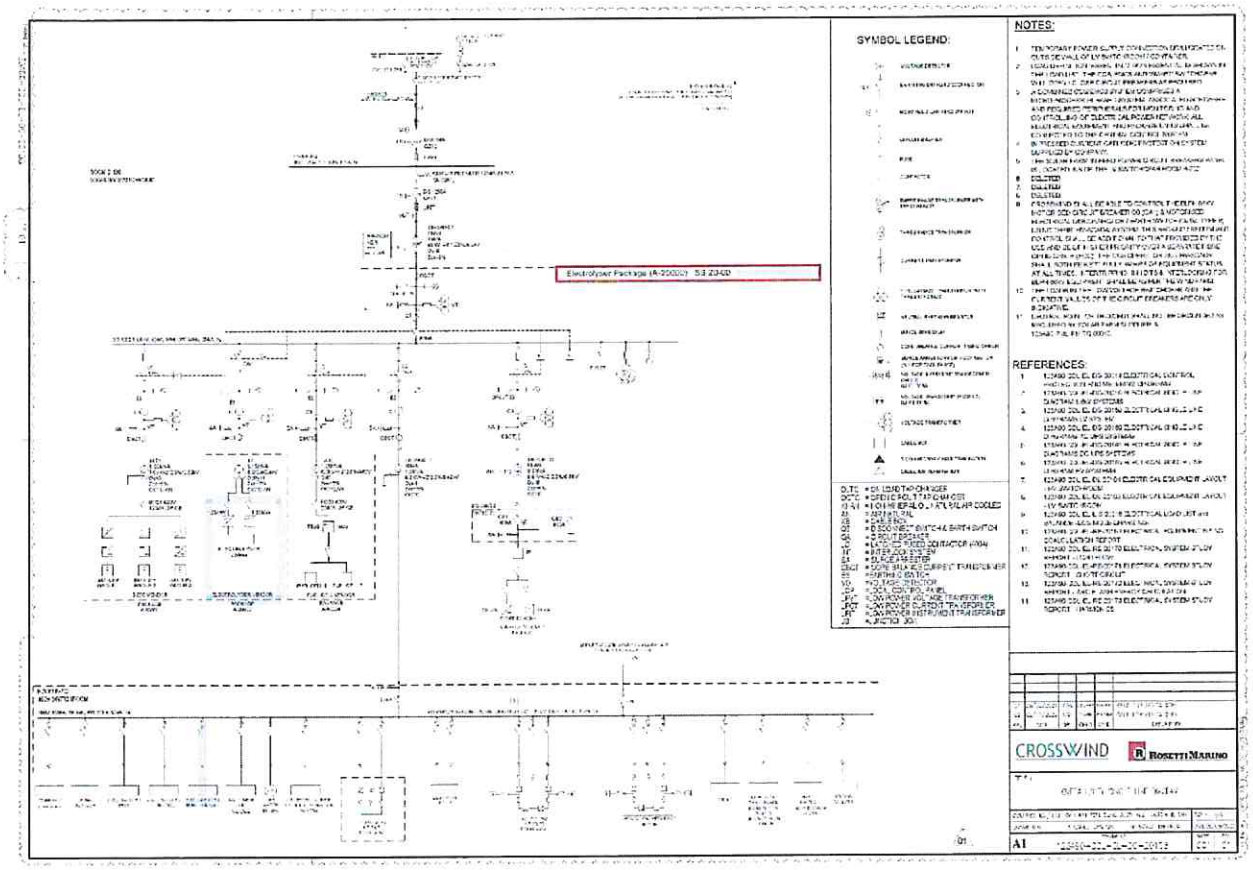


Figure 5. System Boundary Limits in Overall Single Line Diagram

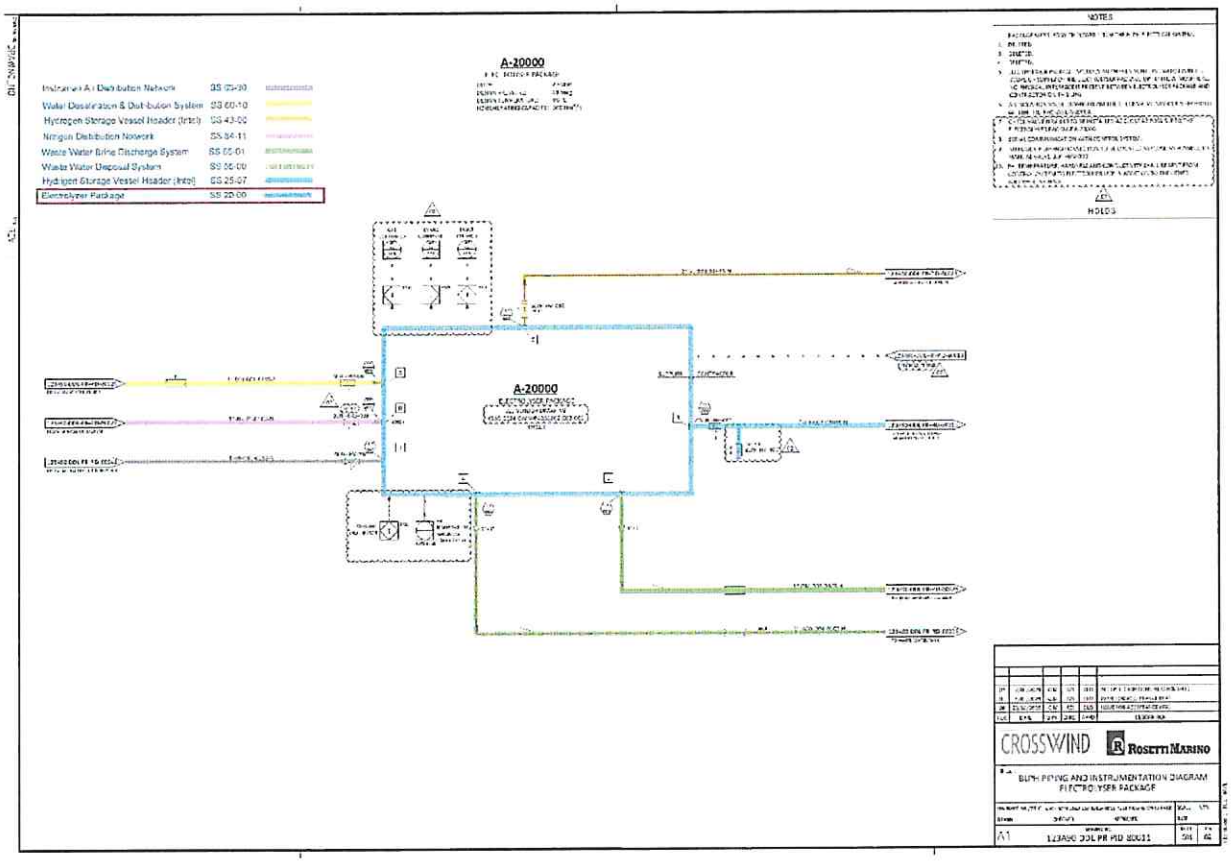


Figure 6. OTP System Boundary Limits

3.3 Test and System Description

Proceeding with this OTP is confirmation that for the following system:

- 20-00 Electrolyser Package (A-20000)

All equipment is installed in accordance with the following vendor documents:

- ELO-INN-BPH-DWG-00008 Process Flow Diagrams
- ELO-INN-BPH-DWG-00009 AQUAGAS Wiring diagram
- ELO-INN-BPH-DWG-00010 NIDEC Detailed Electrical Drawing of PCS units
- ELO-INN-BPH-DWG-00011 OVIVO Electrical Instrument Detailed Drawing Wiring Diagram
- ELO-INN-BPH-DWG-00012 PAUMIER PAU001 & PAU002 Chiller electrical wiring
- ELO-INN-BPH-DWG-00013 PAUMIER PAU003 HVAC electrical cabinet
- ELO-INN-BPH-DWG-00014 NIDEC Mechanical drawing of skid HCU

- ELO-INN-BPH-DWG-00015 NIDEC Rectifier Mechanical Drawing
- ELO-INN-BPH-DWG-00016 NIDEC - SINGLE LINE DIAGRAM
- ELO-INN-BPH-MAN-00007 Handling and Installation Guidance for finalized stacks
- ELO-INN-BPH-OTH-00005 Lines List
- ELO-INN-BPH-OTH-00017 Interfaces and Utility list
- ELO-INN-BPH-PLN-00010 AQUAGAS Electrical Panel & Connections / Wiring Diagram
- ELO-INN-BPH-PLN-00011 NIDEC Detailed Electrical Drawing
- ELO-INN-BPH-REG-00006 CABLE LIST AND INTERCONNECTING DIAGRAM
- ELO-INN-BPH-RPT-00005 Electrical function & protection philosophy
- ELO-INN-BPH-RPT-00008 Safety Loop Design
- ELO-INN-BPH-RPT-00010 Explosion Protection Document
- ELO-INN-BPH-SPC-00006 Technical specification Control cabinet & Electrical wiring
- ELO-INN-BPH-SPC-00008 O2 and H2 Vent Technical specification (Phase 2)
- ELO-INN-BPH-SPC-00010 Electrolyser Network Architecture

3.4 Safety Devices

These defining rules shall be applied from the initial (total or partial) energizing of the instrumented systems, until the end of the commissioning activities.

- Appropriate PPE must be always worn during loop testing.
- A permit to work has been delivered.
- No equipment will be definitively energized without the subsystem Mechanical Completion.
- As soon as a panel is energized (Relay Panel, cabinets, PLC cabinets or local PLC) a sticker "Panel energized - Commissioning in progress" will be suitably displayed on the door in different languages, indicating that it is available for loop checking.
- Testing of electrical/instrumentation interfaces (i.e. I/O serving electrical switchboards for motors control) will be done in conjunction with the power distribution systems lead engineer.
- The on-site equipment area must be visibly marked with a "Test in Progress" sign.
- In any case this procedure shall not conflict with, or supersede, the electrical lock-out procedure. Only electrical system leaders will be authorized to remove padlocks in electrical cabinets.
- Safety rules in accordance with the risk must be applied (e.g. Calibration Gas, Fluids, Pressure, Electrical Power, etc.)
- Risk assessment must be done prior to any test activity.

3.4.1 HSE Management

- All necessary safety precautions must be taken to avoid any risk of personnel injury.
- All personnel involved in this operational test shall be competent for the tasks they will be required to undertake

- Place safety / warning signs and segregate the entire area with barrier tapes (safety barriers) of a colour distinguished (blue and white) from those used for construction activities
- Restrict access into area only to authorized personnel
- Conduct "Toolbox Talk" with all personnel prior to starting test work
- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g. safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements
- All activities carried out on the project shall be performed in accordance with the "Permit to Work" system Doc. PRO-HSE-23
- Electrical and mechanical isolations are to be assured as per Doc. PRO-HSE-08 and "Commissioning and start-up operation" procedure.
- Observe and enforce all international codes and regulations to safeguard personnel, plant and environment.
- Ensure that the working area is clean, tidy, well illuminated and that access and escape routes are free from obstructions.

Before starting work on any of the activities in this OTP it is the responsibility of the persons performing the work to:

- Familiarize themselves with the plant/equipment to be worked on
- Ensure they are aware of all other work activities that are taking place, or due to take place
- If necessary, re-plan any situation/activity
- Ensure proper communications between parties involved in the execution of the OTP
- Read the relevant Vendor documentation for the equipment covered by this OTP and observe any special requirements and limitations recommended or imposed by Vendor
- Verify that all personnel involved in the implementation of this procedure are familiar with its content as well as the associated safety requirements (Toolbox Talk)

3.5 Acceptance Criteria

- Before Power ON:

Visual inspection and verification are a crucial step to identify any obvious issues with the installation, such as loose connections, missing components, or damage to the equipment.

Crosschecking the installation with engineering documentation ensures that the installation is done correctly and according to the manufacturer's guidelines. These steps can help identify any missing or incorrect components, and wrong connections.

All package ITRs to be completed & RFC issued for sub-system 20-00.

Apply padlocks on all necessary Breakers per LoTo Procedure (if required)

Phase 1 (Not in the OTP) will prove basic function of individual instruments and equipment which may or may not be on final power supplies.

Phase 2 (Not in the OTP) will prove correct function of auxiliary systems or packages and close out of any punch list A activities prior to unit startup phase.

Phase 3 will prove correct:

- Completion of the Vendor SAT procedures.
- Functionality of the Electrolyser package in coordination with Required Associated Subsystems packages on BLPH. (ONSHORE)

Phase 4 will prove correct:

- Functionality of the Electrolyser package in coordination with the other packages on BLPH (OFFSHORE).

Performing the steps in this OTP as per engineering documents is crucial to ensure that the equipment is operating correctly and that it meets the desired design specifications. Observing the results will help identify any issues that may arise during the operation.

Overall, following these steps shall provide a comprehensive and effective way to verify the equipment installation and functionality.

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4 DOCUMENTS REFERENCES AND ABBREVIATIONS

4.1 Reference Documents

4.1.1 Elogen Commissioning Specific Deliverables

Table 1. Elogen Reference Documents

Document ID	Document Title
1. 123A90-PML-COM-PRO-03007	BLPH Commissioning Strategy
2. 123A90-PML-QHSE-PRO-00117 Rev.01	Punch List Management Procedure
3. 123A90-PML-QHSE-PL-00001	Project HSE Management Plan
4.	Base Load Power Hub – Electrolyser Workflows
5. C063-ELO-PRO-CO-0002	BLPH Electrolyser CSU Method Statements
6. C063-ELO-PRO-CO-0003	BLPH Electrolyser Pre-Commissioning Manual
7. C063-ELO-PRO-CO-0004	BLPH Electrolyser Commissioning Manual
8. C063-ELO-PRO-CO-0005	BLPH Electrolyser Operational Test Procedure
9. C063-ELO-PRO-CO-0006	BLPH Electrolyser Performance Test Procedure
10. C063-ELO-PRO-CO-0007	BLPH Electrolyser O&M Training
11. C063-ELO-LST-CO-0001	BLPH Electrolyser - General Item list
12. 123A90-PML-COM-PRO-03007	BLPH Commissioning Strategy
13. 123A90-PML-QHSE-PRO-00117 Rev.01	Punch List Management Procedure
14. 123A90-PML-QHSE-PL-00001	Project HSE Management Plan

4.1.2 Project Documents

Table 2. Reference Project Deliverables

Document ID	Document Title
1. 123A90-PML-PM-LIS-01001	Master Document Register
2. 123A90-PML-PM-PL-00001	Project Execution Plan
3. 123A90-PML-QHSE-PL-00001	Project HSE Plan

Document ID		Document Title
4.	123A90-PRO-HSE-23	RM Yard Permit to Work Procedure
5.	123A90-PML-COM-PL-03002	Mechanical Completion & Commissioning Execution Plan
6.	123A90-PML-COM-PRO-03007	Commissioning Strategy
7.	123A90-PML-COM-LIS-03011	System/Sub-Systems List
8.	123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
9.	123A90-PML-COM-PRO-03038	Leak Test Procedure
10.	123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
11.	123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
12.	123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
13.	123A90-PML-COM-LIS-03034	Inhibit-Override Register
14.	123A90-PML-COM-LIS-03035	PSV Calibration Register
15.	123A90-PML-COM-PRO-03036	OTP - Black Start Procedure
16.	123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
17.	123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
18.	123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
19.	123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
20.	123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
21.	123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
22.	123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
23.	123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
24.	123A90-PML-QHSE-PRO-00117	Punch list Management Procedure

Document ID	Document Title
25. 123A90- 123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
26. 123A90- 123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Systems
27. 123A90- 123A90-PML-COM-PRO-03043	OTP - Instrument Air System
28. 123A90- 123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
29. 123A90- 123A90-PML-COM-PRO-03044	OTP - HVAC Systems
30. 123A90- 123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
31. 123A90- 123A90-PML-COM-PRO-03046	OTP - MV Switchgear & 6.6 kV Transformer Systems
32. 123A90- 123A90-PML-COM-PRO-03047	OTP - LV Switch Boards & LV Distribution Board Systems
33. 123A90- 123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
34. 123A90- 123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
35. 123A90- 123A90-PML-COM-PRO-03050	OTP - UPS Systems
36. 123A90- 123A90-PML-COM-PRO-03051	OTP - Data Network Systems
37. 123A90- 123A90-PML-COM-PRO-03052	OTP - Telecom & Surveillance Systems
38. 123A90- 123A90-PML-COM-PRO-03053	OTP - Navaid System
39. 123A90- 123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics
40. 123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
41. 123A90-PML-COM-PRO-03056	OTP – Document Template
42. 123A90-DDL-IN-RE-40095	Process Control Logics Description

4.1.3 Vendor Documents

Table 3. Vendor documents

Document ID	Document Title
1. C63-NID-ELO-SAT04	SAT Low Voltage & High Voltage Tests Procedure
2. C63-NID-ELO-SAT07	SAT Functional and Performance Tests procedure
3. C63-PAU-SAT-001	HVAC SAT Procedure
4. SWL0841/Elogen/CP/001	Commissioning Plan for OVIVO WTP
5. SWL0841/MS01	Method Statement for OVIVO WTP
6. 20230443 DEDR-500_36	DEDR-500_36 P&I Diagram Offshore
7. N/A	DEDR 500/36 Installation, Commissioning, O&M Manual
8. C63-OVI-QIX-002_01	Site Acceptance Test (SAT) Ovivo
9.	

4.2 Acronyms and Abbreviations

Table 4. Abbreviations

Document ID	Document Title
BLPH	Base Load Power Hub
BOP	Balance of plant
CM	Commissioning
CO	Carbon monoxide
CSU	Commissioning & Start-Up
DEDR	Deoxo & Dryer
E&I	Electrical & Instrumentation
EMCS	Electrical Monitoring & Control System
ESD	Emergency Shut Down

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Document ID	Document Title
F&G	Fire and Gas
FAT	Factory Acceptance Test
FT	Functional Test
FTE	Full Time Employees
GALT	Gross Air Leak Test
HMI	Human Machine Interface
HPP	Hydrogen Purification Package[1]
HSE	Health, Safety, & Environment
HVAC	Heating Ventilation and Air Conditioning
ICSS	Integrated Control and Safety System
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
LOTO	Lock-Out / Tag-Out
LR	Low regulation point
MC	Mechanical Completion
OTP	Operation Test Procedure (Commissioning)
PC&C	Pre-Commissioning & Commissioning
PCA	Performance Cell Analyser
PCS	Process Control System

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Document ID	Document Title
PID	Proportional, Integral, Derivative
P&ID	Piping and Instrumentation Diagram
PL	Punchlist
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PSU	Pre-Start-Up
PSV	Pressure Safety Valve
PTW	Permit to Work
PVP	Piping and Vessels Preparation
RFC	Ready for Commissioning
RFO	Ready for Operation
RFSA	Ready For Sail Away
RFSU	Ready For Start-Up
RU	Ramp-Up
SAT	Site Acceptance test
SIS	Safety Instrumented System
SLD	Single Line Diagram
SOC	State Of Charge
SU	Start-Up
UPS	Uninterruptible Power Supply

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5 OTP AT ONSHORE WORKSITE

This chapter refer to the activities on the Contractor worksite (construction yard).

5.1 Planning and Manpower

5.1.1 Planned tasks with estimated manpower

Estimated manpower for the different phases of the OTP are:

Table 5. Estimated manpower ONSHORE Worksite

Activity	Staff qualifications	Advised presence
Unit Settings on the START mode	1 site supervisor, 2 electrical technicians	1 automation engineer
Stack's polarization	1 engineer and 1 automation engineer	1 rectifier specialist from NIDEC
Hydrogen Setpoint Achievement	1 automation engineer	
Functionality of electrolyser's		
Sequences during Operation	1 automation engineer	
Hydrogen Leak Detection	2 piping & mechanical technicians	2 helpers
Safety Stops at 10%	1 engineer and 1 automation engineer	
Increasing current by 10% up to 100%	1 automation engineer	
Production Settings at 100%	1 automation engineer	
HPP Start-Up	1 automation engineer	1 technician from Aquagas

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5.1.2 Pre-Commissioning & Commissioning duration estimate prior to Start-Up:

Table 6. Estimated duration for Pre-Commissioning & Commissioning activities

Document ID	Duration [h]
Electrical Transformer SAT	4
Energization Transformer	2
Pre-Commissioning 6.6kV Electrical Supply	4
Pre-Commissioning 400V Electrical Supply	8
Electrolyser Rectifier SAT	8
Electrolyser UCP Electrical Pre-Commissioning	8
Electrolyser HVAC UCP Electrical Pre-Commissioning	8
Electrolyser Water Treatment UCP Electrical Pre-Commissioning	8
Electrolyser VSD Electrical Pre-Commissioning	8
F&G Detector SAT	4
Instrument Air – check HV	1
Non Hazardous Drains – check HV	1
Water Supply – check HV	1
Nitrogen Package Pre-Commissioning / Commissioning	2
Electrolyser HVAC Package SAT	156
Electrolyser Water Treatment Package SAT	214
Electrolyser Hydrogen Purification Package Pre-Commissioning	60
Electrolyser Stacks and BOP Pre-Commissioning & Commissioning	819

5.1.3 Start-Up phases duration estimation

Table 7. Estimated duration for Start-Up activities ONSHORE Worksite

Document ID	Duration [h]
Unit Settings on the START mode	24
Stack's polarization	8
Hydrogen Setpoint Achievement	4
Functionality of electrolyser's Sequences during Operation	46
Hydrogen Leak Detection	40

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Document ID	Duration [h]
Safety Stops at 10%	8
Increasing current by 10% up to 100%	54
Production Settings at 100%	4
HPP Start-Up	48

5.1.4 Vendor Assistance

Vendor Elogen will lead and/or supervise the onshore commissioning activities. For offshore commissioning Elogen will provide remote support.

5.1.5 Summary of interface signals to be tested:

Please refer to the following documents:

- ELO-INN-BPH-OTH-00009 – Communication table
- ELO-INN-BPH-SPC-00010 - Electrolyser Network Architecture

5.2 OTP Test Requirements – Onshore WORKSITE

5.2.1 Pre-Commissioning Achievement

Prior to commencement of commissioning activities, the relevant pre-commissioning documentation be fully signed.

5.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the Electrolyser package installed on BLPH.

5.2.3 Status of Required Associated Subsystems

- PHASE 3

Subsystems required RFC for Commissioning of the Electrolyser Package

- 25-01 to 25-08 (Partial): Hydrogen Storage Vessels & Header
- 43-00: Hydrogen Vent Header and Drum System
- 50-10: Water Desalination Package & Distribution
- 50-11: Non-Oxidant Biocide
- 55-00: Waste Water Disposal
- 55-01: Waste Water Brine Discharge System
- 63-00: Instrument Air Package (A-63000)
- 63-30: Instrument Air Distribution Network

- 64-00: Nitrogen Generator Package (U64000)
- 64-10: Nitrogen Distribution Network
- 70-00: F&G Control System
- 70-11: F&G Devices FZ-02 (Hydrogen Storage Area)
- 70-12: F&G Devices FZ-03 (Electrolyser Area)
- 79-00: Emergency Shutdown Systems (SIS)
- 79-12: Emergency Shutdown Systems (SIS) – Devices FZ-03 (Electrolyser Area)
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-20: Power Transformer 3.15 MVA
- 82-99: MV 6.6 kV Temporary Yard Supply Integrated Test
- 83-00 400V Switchboard SG200N1
- 83-20 Distribution board
- 83-99: Temporary Yard 400/230V Main and auxiliary power supplies
- 87-00: EMCS
- 87-10: PCS
- 88-00: Earthing System

5.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches.
- ATEX Field telephone or Walkie-Talkie.
- Leak detector sprays.
- VARIOTEC°460 Tracer gas.
- Chronometer.
- Personal hydrogen detectors for each people on site, calibrated up to date.

All equipment used must have a serial number and a valid calibration certificate up to date (if applicable).

Table 8. Test equipment register ONSHORE activities

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2.5 Commissioning Spare Parts

- See reference document ELO-CMM-BPH-PRD-00006 - BLPH Electrolyser Commissioning Start-Up (CSU) Execution Plan.

5.2.6 Temporary Facilities

Phase 3: Temporary emergency stop and/or fire and gas detection may be required if deemed necessary after suitable risk assessment. This will depend on the availability of interacting sub-systems.

5.3 OTP Description – Onshore WORKSITE

5.3.1 OTP Test Preparation

Table 9. OTP requirements Onshore Worksite

Step	Description	Result	Verified by	Date
1	System Ready for Commissioning Certificate (RFC) is issued and approved.			
2	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
3	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the system to be commissioned.			
4	All personnel involved in the implementation of this procedure are familiar with its content as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
5	A final walkdown of the system has been completed, to ensure that the system and the area are ready for commissioning.			
6	Check that areas are free for work and escape routes are clear of any obstructions.			
7	All safety barriers and warning signs have been installed.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			

Step	Description	Result	Verified by	Date
9	Verify availability of test equipment and spares as per Section 5.2.4.			
10	With reference to Commissioning Temporary equipment & Facilities (refer on Doc. 123A90-PML-COM-SP-03014), check that power is available to any temporary equipment or test equipment (if any).			
11	System(s) isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved			
12	All yard personnel have been duly notified by dedicated LUN (Livening Up Notification) that the system(s) is ready for commissioning.			

5.3.2 Electrical Preparation

Table 10. Electrical requirements OTP Onshore Worksite

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are completed.			
3	Check that grounding and bonding are in accordance with applicable documents.			
4	Verify and confirm the correct circuit breaker protection settings according to latest documentation.			
5	Verify and confirm the completion of the final connections between the LV 400V Switchboard and the Electrolyser, the MV 6.6kV and Electrolyser, and the EMCS.			
6	Assess the need for additional temporary F&G or E-Stop protection during ONSHORE phases and implement necessary changes.			

5.3.3 Mechanical Preparation

Table 11. Mechanical requirements OTP Onshore Worksite

Step	Description	Result	Verified by	Date
1	Check the correct flow direction of the valves.			
2	Confirm leak testing is complete and documented.			
3	Confirm mechanical alignment of all package pumps & equipment.			
4	Ensure package PSV setpoints are correct for the designed operating pressure.			
5	Ensure all unnecessary isolations are removed and vent system is ready to receive hydrogen.			

5.3.4 Instrument Preparation

Table 12. Instrument OTP requirements Onshore Worksite

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are ready.			
3	Check Inhibit and Override register has been prepared and validated.			
4	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			
5	Verify availability of test equipment as per Section 5.2.4.			

5.3.5 Piping Preparation

Table 13. Piping OTP requirements Onshore Worksite

Step	Description	Result	Verified by	Date
1	Ensure Treated Water supply connection is correctly connected to the Rosetti system at TP-001			
2	Ensure Nitrogen supply connection is correctly connected to the Rosetti system at TP-046			
3	Ensure Instrument Air supply connection is correctly connected to the Rosetti system at TP-047			
4	Ensure Hydrogen Vent connection is correctly connected to the Rosetti system at TP-003			
5	Ensure Hydrogen Storage connection is correctly connected to the Rosetti system at TP-006			
6	Ensure Waste Water output connection is correctly connected to the Rosetti system at TP-004			
7	Ensure Brine Discharge output connection is correctly connected to the Rosetti system at TP-005			
8	Review Rosetti flange management and confirm all interface connections have been torqued and leak tested with details recorded and signed for.			
9	Ensure Blind flange/ positive isolation is in place at test boundary.			

5.3.6 Additional Discipline Preparation

Not applicable.

5.4 Test Steps – Onshore WORKSITE - PHASES 1-2 (NOT PART OF THIS OTP)

The previous chapters must be successfully performed prior to commissioning of the Electrolyser Package.

Pre-commissioning (powered) activities listed in ELO-CMM-BPH-PRD-00008 (NOT PART OF THIS OTP).

Commissioning (powered) activities listed in ELO-CMM-BPH-PRD-00010 (NOT PART OF THIS OTP).

5.4.1 OTP Steps WORKSITE - PHASE 3

It is foreseen that previous sections are successfully performed.

In the following steps the functionality of the Electrolyser package shall be tested for operation in all BLPH operating modes.

5.4.1.1 Electrolyser Integrated Testing ONSHORE

This section outlines all the steps required to perform the Unit Start-Up. The Unit Start-Up Test Report Table in Section 7.1 provides the steps that must be followed sequentially. During the procedure, please complete the columns labelled 'Completed by,' 'Witnessed by,' and 'Date.

During the follow-up of the Start-Up Procedure, the current supplied to the electrolysis stacks is gradually increased from 10% to 100%, reaching the maximum hydrogen production capacity of 500 Nm^3/h. The successful execution of this procedure also depends on the correct application of the O&M vendors' package.

Despite the pre-settings established on the valves previously, some tunings can be performed during the ramp-up.

5.4.1.2 Setting the machine at START mode

Put the unit in Local mode via the button displayed on the Main view of the HMI.

Log into the HMI as "Expert": See below an example of pop-up displayed for log into the HMI:



Figure 7. Login popup Electrolyser HMI

⚠	Only Elogen staff is responsible for commissioning and maintenance is allowed to use the "Expert" mode. Elogen cannot be held responsible for any malfunctions resulting from unauthorized access to this operating mode.

Acknowledge all the alarms. Check that the area is clear, and all personnel are ready and in position.

Upon powering on the installation, the user must log in. The electrolyser will automatically be set to 'STOP' mode.

⚠	If a "Major" or Safety" fault is present, do not operate the system until troubleshooting the source of the fault and resetting the systems into its normal status.

The presence of "Minor" faults does not restrain the electrolysis process to start.

To start the hydrogen production the electrolyser must be switched into the "**START**" mode. To do so, enter a desire hydrogen flowrate on the indicated area (See point 1 in below picture). For the first start enter 10% of the nominal flowrate, hence **50 Nm³/h**.

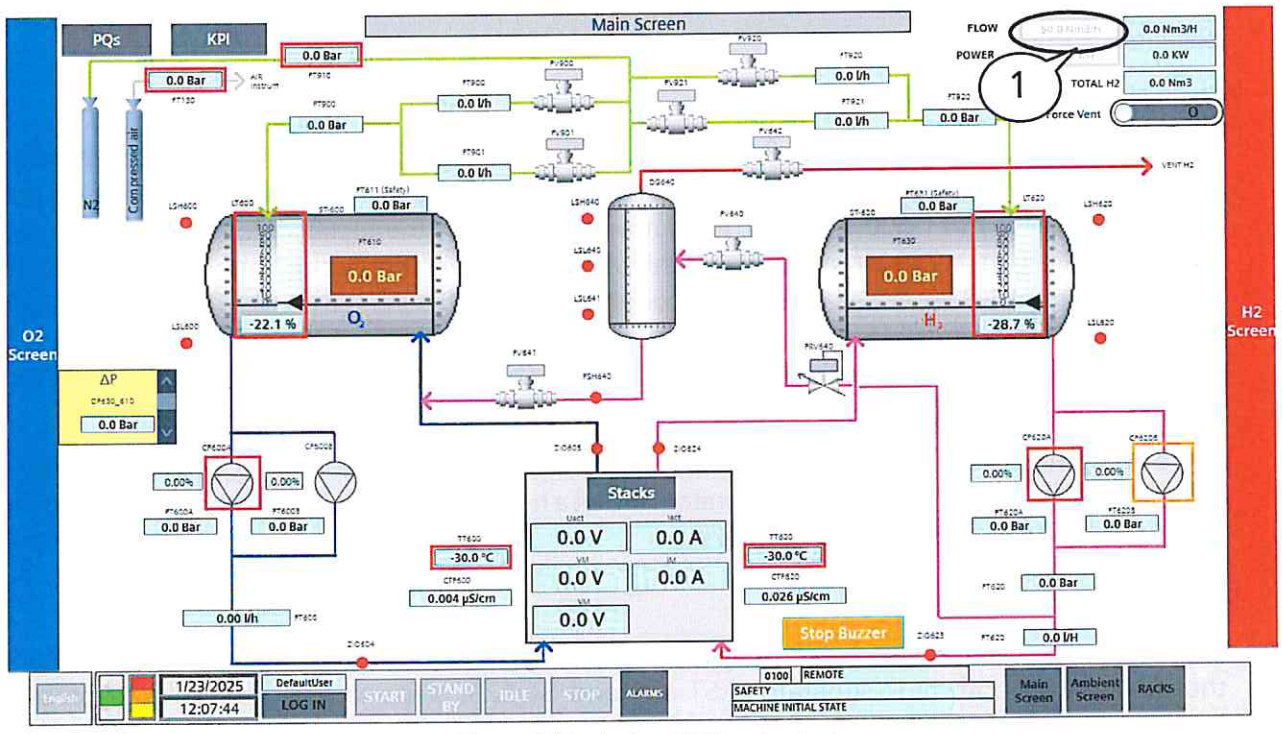


Figure 8. Electrolyser HMI main view

Set admissible pressure range for the hydrogen buffer tank downstream of the hydrogen purification unit (if applicable).

Push the "**START**" button on the HMI display.

At this point the available oxygen and hydrogen loop pumps (**CP-600A** or **CP-600B** and **CP-620A** or **CP-620B**) start running automatically according to the regulating function set in the Electrolyser's PLC.

5.4.1.3 Stack's Polarization

Within the start-up sequence, the HVAC system will automatically start-up. The stacks will be polarized as soon as the temperature of 3°C is achieved in the HVAC Loop (HVAC subsystem is used to cool the water passing through the heat exchangers HE-630/631 and HE-600 below its setpoint TT-60X LR). When HVAC Loop is ready, the stacks are polarized at 132.5V (1.25V per cell x 106 cells).

Note: From previous observations, in regard of the possible fluctuations of stacks voltage, it is considered that the polarization point can be achieved once the voltage per stacks is above **119.25 V** (so **530 V** per rectifier).

5.4.1.4 Hydrogen Production

With the stacks polarised and the 3 °C in the cooling loop reached, the stacks start to produce hydrogen up to the selected setpoint (previously set at 50 Nm^3/h in 10.1). Since the stacks are cold (temperature at inlet TT-600 < 50 °C), the current supplied by the rectifiers to the stacks follows a ramp up limited up to **763 V** (and **423 A**) at this stage to protect the stacks. This value corresponds to a maximum of **1.8 V** per cell (checked through the PCA-00X with X as A, B, C… H). Fluctuations of this value are admissible up to **2.1 V** per cell at this stage (**890.4 V** per rectifier). In case of exceeding the set point stacks inlet temperature (TT-600/TT-620 > 50 °C), the voltage ramp-up is stopped until the temperature goes below 50°C.

Once the temperature of 50 °C is reached (TT-600/TT-620), the electrolyser goes automatically to the "hot start" step. At this stage the operator can set a new hydrogen flowrate set point. During "hot start", the current is incremented by **20A/s**.

5.4.1.5 Functional Tests at 10%

From the first molecules produced of hydrogen and oxygen (i.e. current above polarization point), the pressure of both tank separators (ST-600 and ST-620) starts to rise. The delta of pressure between both tanks is managed automatically via a regulation function R-DPC-001. Fill the Check sheet in 11.2. Check the conformity of the control function while the pressure fluctuates (cf. Table in section 7.2). Observe if the corresponding valves open (PV- 631 and MPV-611), and the speed variator VAR-600 is set at the corresponding value, according to the delta pressure.

The regulation of delta pressure keeps on until the pressure at both tank separators reaches the nominal values, **31 barg** at hydrogen side (cathodic side), and **11 barg** at oxygen side (anodic side). Check the execution of the regulating function R-DPC-001 and take note of the pressurisation time (elapsed from selecting START mode on the HMI until reaching 11 and 31 barg).

While the tank separators are being pressurised, the hydrogen produced on the water / hydrogen loop is sent to the HPP, where the remaining oxygen and water are removed, and this flow is then routed to the vent. In normal operation, the treated hydrogen is then sent to the limit of battery.

Once the operation is stabilised at 10% of nominal flowrate (50 Nm^3/h), some sequences functional test and regulating functions can be achieved. In the Check Sheet, the functions in **bold** required special attention and need to be checked in START mode at 10% of the hydrogen production capacity.

As usual at this stage of Unit Start-Up, some PID (proportional, integral, derivative) tunings can be performed by the automation engineer.

Note: The duration to reach the nominal pressure depends on the flowrate setpoint. The higher the setpoint is, faster is the pressurisation.

5.4.1.6 Leak Checks

While the sequence and regulating functions are being tested, check that there are no leaks on the pipes, vessels, flanges or equipment. Use the hydrogen tracer gas device (Variotec 460 Tracergas). Any leak detected must be repaired immediately. If needed, the unit can be stopped, depressurized and purged with nitrogen.

As a standard procedure, the leak test at this stage should be performed in the same manner as it was prior to Start-up. Particular attention must be given to the HPP, the hydrogen analysis section, and all lines and equipment with tags containing **63X** and **80X** numbers.

5.4.1.7 Safety Stops at 10%

During START mode when hydrogen is being produced at 10% of the nominal flowrate, the safety stops shall be tested. However, since all safety loops were already triggered/simulated during Commissioning phase (cf. ELO-CMM-BPH-PRD-00010), at this stage, the compliance of safety loops in START mode could be checked by triggering one of the emergencies stop buttons (ESD-00X). Check that all the effects represented in the Cause & Effect diagram are performed for the selected ESD (cf. Cause & Effect diagram-C63-PWI-002).

During commissioning and Start-up, the machine is subject to different tests, therefore the circuit breakers are in high demand. For this reason, the number of Safety stops limit that could be trigger within 24 hours is given by the number of cycles till 10% of the components fails (B10D). For these circuit breakers, it is $2x10^7$ cycles (ref. PLC-RSC- 24DC/21). Hence, to limit the wear of the circuit breakers during commissioning and start-up phase, it is recommended to trigger a maximum of 3 safety stops per day during the whole commissioning period (2 months). So, the number of cycles used will be restricted to 0.001% of the total.

5.4.1.8 Increasing current from 10% up to 100%

This section aims to increase slowly the hydrogen production from 10% of nominal capacity up to 100%. Since it is the first ramp up of the unit, the current will be increased by 10% manually. Set the flowrate as explained on Section 6.4.1.2.

Table 14. Hydrogen production stepwise increment

Percentage of nominal capacity	H2 flowrate setpoint [Nm3/h]
10%	50
20%	100
30%	150
40%	200
50%	250
60%	300
70%	350
80%	400
90%	450
100%	500

Once the hydrogen setpoint is changed, the current fed into the stacks start to increase. Follow the voltage ramp-up and take note of this transition duration. Wait until the flowrate of hydrogen produced is stable.

Let the system run at steady state (variations on the flowrate below 2% of the setpoint) at each setpoint for 15 minutes minimum and check for normal operation and the execution of regulating and functional sequences.

5.4.1.9 Setting production at 100%

Once reached the 500 Nm3/h, let the system run at steady state and check for hydrogen leaks as previously explained (see Section 5.4.1.6).

Check the compliance of the regulating sequences at 100% of capacity. Especially the Glycol loop flowrate, the direct balancing regulation and in general good overall control and absence of defaults. Use a copy of table in Appendix Section 7.2 to record these functions compliances.

5.4.1.10 HPP Start-Up

As presented in the Commissioning Manual (cf. C063-ELO-PRO-CO-0004), the HPP must be subject to a series of test before bringing process gas into the system. The activities described in this section must be carried out with hydrogen, since the HPP performance, and particularly the heaters, work differently with hydrogen compared to nitrogen or other inert gas.

Hence, after assuring a hydrogen production up to maximum capacity by the electrolyser (100% of nominal flowrate), the adjustment of the performance of the HPP can be carried out to test the compliance of the global process through the reading of the OIHA-800A/B/C and DPT-800A/B/C.

All instructions and information related to the installation and commissioning of the HPP are detailed in the document DEDR 500/36 Installation, Commissioning, Operation and Maintenance Manual. The activities are summarised and presented in tabular format, including the columns 'Completed by,' 'Witnessed by,' and 'Date,' to assist the staff in verifying compliance with each step during the procedure (Sections 7.3.1, 7.3.2, and 0).

The commissioning and performance procedure for the HPP that requires process gas, and is deployed into three main stages:

a. Start of the Deoxo-Dryer
b. Flow control positioner
c. Setup of pressurized condensation system

Once the performance of the HPP has been tested in all the flowrate range (10-100% of nominal), check the conformity of the hydrogen purity (through the reading of the OIHA-800A/B/C and DPT-800A/B/C). Both measures must be below **5 ppmv** (i.e. impurities 10 ppmv which corresponds to 0.001%vol).

At this point, when a hydrogen production at maximum capacity is stabilised, along with the HPP operation, the performance test of the whole unit can be carried out. Follow the respective procedure given in the document C063-ELO-PRO-CO-0006 and complete the control list given on the same document.

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5.4.1.11 Electrolyser Integrated Testing ONSHORE Notes and Remarks

5.4.1.12 *Testing of EMCS Operating modes ONSHORE*

Table 15. Test report for EMCS Operating modes Onshore activities

Step	Description	Result	Verified by	Date
Electrolyser operating modes to be controlled from PCS via ECMS. Gas Production set point of Electrolyser to be agreed prior to test based on current site conditions/limitations.				
1	Confirm on PCS that CCS operating mode is in "IDLE". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
2	On PCS, change CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package continues to produce H2 at specified set point.			
3	On PCS, change CCS operating mode to "IMPORT (MODE 1B)". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			
4	On PCS, change CCS operating mode to "HOT STANDBY". Confirm Electrolyser remains in STOP.			
5	On PCS, change CCS operating mode to "EXPORT". Confirm Electrolyser remains in STOP.			
6	On PCS, change CCS operating mode to "COLD STANDBY". Confirm Electrolyser remains in STOP.			

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Step	Description	Result	Verified by	Date
7	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm Electrolyser remains in STOP.			
8	On PCS, change CCS operating mode to "MAINTENANCE". Confirm Electrolyser can only be operated locally.			
9	On PCS, return CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
10	On PCS, return CCS operating mode to "COLD STANDBY". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			

Full details of the EMCS HMI control graphics can be found in Document Number: **123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)**

5.4.1.13 Electrolyser Integrated Testing ONSHORE - Certifying Authority Table of Attendances

Table 16. Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

5.4.1.14 *Electrolyser Integrated Testing ONSHORE - Final Signatures and Company Acceptance*

Table 17. Final Signatures and Company Acceptance

Name and Surname	Certifying Authority	Position	Signature

6 OTP AT SITE

6.1 Planning and Manpower

6.1.1 Offshore Site overview

It is expected that all pre-commissioning tests, systems energization and commissioning steps will have been successfully performed during the Onshore Phases.

Consequently, during the offshore SITE phase, the respective systems will be inspected prior to re-energization.

No additional test steps will be required on these items of equipment, correct operation and functioning will be verified.

6.1.2 Planned tasks with estimated manpower

Table 18. Estimated manpower OFFSHORE Worksite

Activity	Staff qualifications	Advised presence
Safety Stops at 10%	1 engineer and 1 automation engineer	
Increasing current by 10% up to 100%	1 automation engineer	
Production Settings at 100%	1 automation engineer	
HPP Start-Up	1 automation engineer	1 technician from Aquagas

6.1.3 Test duration estimate

Table 19. Estimated duration for Start-Up activities OFFSHORE Worksite

Document ID	Duration [h]
Safety Stops at 10%	8
Increasing current by 10% up to 100%	54
Production Settings at 100%	4
HPP Start-Up	48

If necessary, the estimated time can be extended to complete all required pre-commissioning and commissioning activities.

6.1.4 Vendor Assistance

- For offshore commissioning Elogen will provide onsite support.

6.1.5 Items Postponed to C&E OTP

- Not Applicable

6.1.6 HOLDS

- Not Applicable

6.2 OTP Test Requirements – Offshore SITE

6.2.1 Pre-Commissioning Achievement

- Not applicable

6.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the Electrolyser package installed on BLPH.

The successful commissioning result, achieved during the WORKSITE commissioning phase for the functionality and safeguard of the Electrolyser Package, will allow for a smoother commissioning phase of the offshore SITE.

- PHASE 4

Subsystems required RFC for OFFSHORE Commissioning of the Electrolyser Package

- 25-01 to 25-08: Hydrogen Storage Vessels & Header
- 43-00: Hydrogen Vent Header and Drum System
- 50-10: Water Desalination Package & Distribution
- 50-11: Non-Oxidant Biocide
- 55-00: Waste Water Disposal
- 55-01: Waste Water Brine Discharge System
- 63-00: Instrument Air Package (A-63000)
- 63-30: Instrument Air Distribution Network
- 64-00: Nitrogen Generator Package (U64000)
- 64-10: Nitrogen Distribution Network
- 70-00: F&G Control System
- 70-11: F&G Devices FZ-02 (Hydrogen Storage Area)
- 70-12: F&G Devices FZ-03 (Electrolyser Area)
- 79-00: Emergency Shutdown Systems (SIS)
- 79-12: Emergency Shutdown Systems (SIS) – Devices FZ-03 (Electrolyser Area)
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-00: 66 kV Subsea Cable

- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-20: Power Transformer 3.15 MVA
- 83-00 400V Switchboard SG200N1
- 83-20 Distribution board
- 87-00: EMCS
- 87-10: PCS
- 88-00: Earthing System

6.2.3 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches.
- ATEX Field telephone or Walkie-Talkie.
- Leak detector sprays.
- VARIOTEC°460 Tracer gas.
- Chronometer.
- Personal hydrogen detectors for each people on site, calibrated up to date.

All equipment used must have a serial number and a valid calibration certificate up to date (if applicable).

Table 20. Test equipment register OFFSHORE activities

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

6.2.4 Consumable List

- Not applicable

6.2.5 Commissioning Spare Parts

- See reference document ELO-CMM-BPH-PRD-00006 - BLPH Electrolyser Commissioning Start-Up (CSU) Execution Plan

6.2.6 Temporary Facilities

- Not applicable

6.3 OTP Description – SITE

The SITE test will consist of a repeat of the onshore integration testing with the BLPH now installed in situ to its permanent connections. In the following steps the functionality of the Electrolyser package shall be tested for operation in all BLPH operating modes.

6.3.1 OTP Test Preparation

Table 21. OTP requirements Offshore Worksite

Step	Description	Result	Verified by	Date
1	System Ready for Operation (RFO) Certificate is issued and approved.			
2	No blocking punch list items are outstanding against the system to be commissioned.			
3	System(s), (de)isolations as per LOTO procedure enclosed within commissioning Work Permits procedures prepared and approved			
4	Verify and confirm that all steps performed at WORKSITE of this procedure are completed without any pending issues that would prevent from proceeding with the offshore SITE PROCEDURE			
5	All personnel involved in the implementation of this procedure are familiar with this procedure as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			

Step	Description	Result	Verified by	Date
6	A final walkdown after hook-up of the system has been completed, any preservation items have been removed and to ensure that the system and the area are ready for energization.			
7	Check that areas are free for work and escape routes are clear of any obstructions.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9	Verify availability of test equipment and consumables as per chapters 6.2.4.			
10	All personnel have been duly notified during dedicated daily SIMOPS meetings that the system(s) is ready for operation.			

6.3.2 Electrical Preparation

Table 22. Electrical requirements OTP Offshore Worksite

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are completed.			

6.3.3 Mechanical Preparation

Table 23. Mechanical requirements OTP Offshore Worksite

Step	Description	Result	Verified by	Date
1	No blocking punch list items are outstanding against the system to be commissioned.			
2	Ensure all unnecessary isolations are removed.			

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3	Ensure downstream systems are ready to receive H2.			

6.3.4 Instrument Preparation

Table 24. Instrument requirements OTP Offshore Worksite

Step	Description	Result	Verified by	Date
6	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
7	Verify that all relevant associated systems / subsystems are ready.			
8	Check Inhibit and Override register has been prepared and validated.			
9	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			
10	Verify availability of test equipment as per Section 5.2.4.			

6.3.5 Piping Preparation

Not applicable

6.3.6 Additional Discipline Preparation

Not applicable.

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6.4 OTP Test Steps – Offshore PHASE 4

The previous chapters must be successfully performed prior to commissioning of the Electrolyser Package.

In the following steps the functionality of the Electrolyser package shall be tested for operation in all BLPH operating modes.

6.4.1.1 Electrolyser Integrated Testing OFFSHORE

This section outlines all the steps required to perform the Unit Start-Up. The Unit Start-Up Test Report Table in Section 7.1 provides the steps that must be followed sequentially. During the procedure, please complete the columns labelled 'Completed by,' 'Witnessed by,' and 'Date.

During the follow-up of the Start-Up Procedure, the current supplied to the electrolysis stacks is gradually increased from 10% to 100%, reaching the maximum hydrogen production capacity of 500 Nm^3/h. The successful execution of this procedure also depends on the correct application of the O&M vendors' package.

6.4.1.2 Setting the machine at START mode OFFSHORE

Follow the description given in Section 5.4.1.2.

6.4.1.3 Stack's Polarization

Follow the description given in Section 5.4.1.35.4.1.2.

6.4.1.4 Hydrogen Production

Follow the description given in Section 5.4.1.4.

6.4.1.5 Safety Stops at 10%

Follow the description given in Section 5.4.1.7.

6.4.1.6 Increasing current from 10% up to 100%

Follow the description given in Section 5.4.1.8.

6.4.1.7 Setting production at 100%

Follow the description given in Section 5.4.1.9.

6.4.1.8 Testing of EMCS Operating modes OFFSHORE

Table 25. Test report for EMCS Operating modes Offshore activities

Step	Description	Result	Verified by	Date
Electrolyser operating modes to be controlled from PCS via ECMS. Gas Production set point of Electrolyser to be agreed prior to test based on current site conditions/limitations.				
1	Confirm on PCS that CCS operating mode is in "IDLE". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
2	On PCS, change CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package continues to produce H2 at specified set point.			
3	On PCS, change CCS operating mode to "IMPORT (MODE 1B)". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			
4	On PCS, change CCS operating mode to "HOT STANDBY". Confirm Electrolyser remains in STOP.			
5	On PCS, change CCS operating mode to "EXPORT". Confirm Electrolyser remains in STOP.			
6	On PCS, change CCS operating mode to "COLD STANDBY". Confirm Electrolyser remains in STOP.			

Step	Description	Result	Verified by	Date
7	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm Electrolyser remains in STOP.			
8	On PCS, change CCS operating mode to "MAINTENANCE". Confirm Electrolyser can only be operated locally.			
9	On PCS, return CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
10	On PCS, return CCS operating mode to "COLD STANDBY". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			

Full details of the EMCS HMI control graphics can be found in Document Number: **123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)**

6.4.1.9 Electrolyser Integrated Testing OFFSHORE Notes and Remarks

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6.4.1.10 Electrolyser Integrated Testing OFFSHORE - Certifying Authority Table of Attendances

Table 26. Certifying Authority Table of Attendances Offshore

Name and Surname	Certifying Authority	Position	Signature

6.4.1.11 Electrolyser Integrated Testing OFFSHORE - Final Signatures and Company Acceptance

Table 27. Final Signatures and Company Acceptance Offshore

Name and Surname	Certifying Authority	Position	Signature

6.5 Post-test Conditions

After functional tests have been completed, system / sub-systems are left in healthy and safety condition and operational.

6.6 Reinstatement tasks

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- All inhibition done for the test shall be removed (as per Inhibit / Override List)
- All equipment/devices shall be returned in healthy functional conditions.

7 APPENDICES

7.1 Unit Start-up Test Report

Table 28. Test report Start-up of the Electrolyser

Step	Description	Completed by	Witnessed by	Date
01	Select the LOCAL Mode.	FMO NG		21/06/25
02	Log-in as "Expert" on the HMI.	FMO NG		21/06/25
03	Check that all alarms are acknowledged, and all areas are clear.	FMO NG		21/06/25
04	Check that Electrolyser is in STOP mode.	FMO NG		21/06/25
05	Set the Hydrogen production at 50 Nm^3/h. (10% of hydrogen production).	FMO NG		21/06/25
06	Press START and monitor the progression (Check that oxygen and hydrogen pumps CP-600A or B and CP-620A or B, and HVAC system are starting-up). 08:36	FMO NG		21/06/25
07	Check that 3 °C is reached in the HVAC Loop system.	FMO NG		21/06/25
08	Check that the stacks are polarized at 132.5 V.	FMO NG		21/06/25

Step	Description	Completed by	Witnessed by	Date
09	Check that the cold start-up is in good process (TT-600 < 50 °C). Separator tanks (ST-600 and ST-620) are being pressurized by the hydrogen produced. Warning: The voltage per stack must not exceed 222,6 V (890,4 V per rectifier).	FMO NG		21/06/25
10	Observe that hot start-up reached (TT-600> 50 °C). Ramp-up shifts to 20 A/s automatically.	FMO NG		21/06/25
11	Check that the Pressure in separator tanks is being regulated via PV-631 and MPV-611, until reaching the nominal pressure on both loops (11 barg at ST-600 and 31 barg ST-620). * ST-620 30bar At this point Hydrogen is routed to the HPP.	FMO NG		21/06/25
12	Check if the production is stabilized at 50 Nm3/h of hydrogen (monitor FT-630) and the unit is working at its nominal pressure (11 barg at ST-600 and 31 barg at ST-620).	FMO NG		21/06/25
13	Perform a Leak Check at 10% of nominal production.	FMO NG		21/06/25
14	Check that all sequences and regulating functions are working as expected at 10 % of nominal flowrate (see table in Section 7.2).	FMO NG		21/06/25

* 29,7 bar < PV-631 < 31,5 but MPV-630 at 30 bar

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Step	Description	Completed by	Witnessed by	Date
15	Proceed to the Safety Test at 10% of nominal production are compliant (One ESD trigger).	FMO NG		09/05/25
16	Do the ramp up manually and until 100% of Hydrogen production (cell voltage between the range and setting of current according to R-REC-001). 09:50	FMO NG		21/06/25
17	Check that Hydrogen production stabilized at 100% (500 Nm3/h)	FMO NG		21/06/25
18	Check that the sequences and controls are working as expected within the range of 10-100% of nominal flowrate.	FMO NG		21/06/25
19	Check that the HPP is working as expected with a hydrogen quality produced as expected. OIHA-800A/B/C < 5 ppmv and DPT-800A/B/C < 5 ppmv	FMO NG		21/06/25
21	Sequences and regulating functions are working as expected at 100 % of nominal flowrate (11.2 to be completed again for 100%).	FMO NG		21/06/25
22	Perform a Leak Check at 100% of nominal production.	FMO NG		21/06/25

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7.2 Test Report for Functional Test

Table 29. Test report Functional test for the Electrolyser

Function – Description. Tested at 10% or 100% of nominal flow	Completed by	Witnessed by	Date	Comment
S-A5-001 – STOP in progress (from START/STANDBY/IDLE states)	FMO NG		20/06/25	
S-F2-001 – START in progress (from STOP)	FMO NG		21/06/25	
R-DPC-001 – Delta Pressure H2/O2 control (START) *If ΔP[4] > 21 barg, then PV-631 OPEN. If ΔP < 21 barg, then PV-631 CLOSED.* *If ΔP < 5 barg, then PV-631 CLOSED, MPV-611=100% OPEN, VAR-600 = VAR600_LR*	FMO NG		21/06/25	ΔP ≥ 20bar PV631 OPEN ΔP < 20bar PV631 closed
R-LC-600 – ST-600 Water Level Control (Direct Injection) *If LT-600 < 38% & LT-300 > 20%[5], then LP-300 START. If LT-600 > 48%, then LP-300 STOP*	FMO NG		21/06/25	LP300 start if LT600 < 42% LP300 Stop if LT-600 > 47%
R-LC-610 – CS-610 water level control *If LSH-610 COVERED[6] & VAR-300 = 0%, then SV-600 OPEN. If LSL-610 UNCOVERED or VAR-300 > 0%, then SV-600 CLOSED*	FMO NG		21/06/25	
R-LC-620 – ST-620 Water Level Control (Direct balancing) *If PT-630 > 11 barg & LT-620 > 54%, then SV-640 OPEN.* *If LT-620 < 35% or PT-630 < 11 barg, then SV-640 CLOSED.*	FMO NG		21/06/25	SV-640 always open SV-641 open if PT 630 > 8bar PT 630 > 11 bar LT 620 > 52%
R-LC-630 – CS-630 water level control	FMO NG		21/06/25	

SV-641 closed if LT620 < 4

From 40% → 52% : 3min40 at 100% (500 Nm³/H

Function – Description. Tested at 10% or 100% of nominal flow	Completed by	Witnessed by	Date	Comment
If LSH-630 COVERED, then SV-620 OPEN. If LSL-630 UNCOVERED, then SV-620 CLOSED.	FMO NG		21/06/25	
R-LC-642 – DG-640 Hydrogen Purge If LSL-640 UNCOVERED & SV-640 CLOSED & LSH-640 UNCOVERED & PT-630 > 20 barg & → always open ΔP > 2 barg, then SV-642 OPEN. If LSH-640 COVERED, then SV-642 CLOSED.	FMO NG		21/06/25	SV-640 is forced as NO valve
R-LC-500 – Water Level Control of H2 vent condensates If LSH-500 COVERED, then PV-500 OPEN. If LSL-500 UNCOVERED, then PV-500 CLOSED.	FMO NG		21/06/25	
R-PC-610 – Pressure Control Oxygen Loop If PT-610 > 11,5 barg, then MPV-611 = 100 % OPEN. If PT-610 < 10,8 barg, then MPV- 611 = 0% (CLOSED).	FMO NG		21/06/25	MPV-611 Settings KP = 2 TI = 1 TD = 0
R-PC-630 – Pressure Control Hydrogen Loop If PT-630 > 31,5 barg, then PV-631 OPEN. If PT-630 < 29,7 barg, then PV-631 CLOSED.	FMO NG		21/06/25	MPV-630 Settings KP = 3 TI = 10 TD = 0
R-REC-001 – Rectifier setting current. This function can be validated by comparing the hydrogen setpoint entered by the user and the flowrate measured by the FT-630.	FMO NG		21/06/25	
R-TC-600 – O2 Water Temperature Control Loop	FMO NG		21/06/25	

Function – Description. Tested at 10% or 100% of nominal flow	Completed by	Witnessed by	Date	Comment
The M3WV-200 is commanded by a PID regulation, where the setpoint is TT-601 = 65 °C. Check that the TT-601 is stable and that the 3WV-200 opens to approach the setpoint.	FMO NG		21/06/25	PID setting KP = 6 TI = 84,5 TD = 0
S-PC-610 – O2 Depressurisation ΔP > 1 barg & ΔP < 21 barg & LT-600 < 50%, then MPV-611 = 100%. If PT-610 < 0,15 barg & PT-630 < 0,15 barg, then MPV-611 = 0%. If this sequence is still active after 20 minutes, MPV-611 = 0% and displayed "O2 depressurisation failed. Going to safety O2 depressurisation"	FMO NG		21/06/25	
S-PC-630 – H2 Depressurisation If PT-610 > 0,35 barg & ΔP < 21 barg & ΔP > 1 barg & LT-620 < 62%, the PV-631 OPEN. If ΔP < 1 barg, the PV-631 CLOSED. If LT-620 > 62%, then PV-631 CLOSED. If PT-630 < 0,15 barg, then PV-631 CLOSED.	FMO NG		21/06/25	
S-REC-001 – Stack polarization See Section 5.4.1.3	FMO NG		21/06/25	
S-REC-003 – Stop rectifier (decreasing current) This function can be validated by an observed decrease in the hydrogen flowrate (measured by the FT-630)	FMO NG		21/06/25	

7.3 HPP Start-Up Test Report

7.3.1 HPP commissioning performance adjustment and test - Start of Deoxo-Dryer

Table 30. Test report HPP Start-up- Start of Deoxo-Dryer

Step	Description	Completed by	Witnessed by	Date	Comment
01	Check inert gas is available and all connections have been checked against leakages.	FMO NG		06/06/25	
02	Check that instruments and electrical power are available.	FMO NG		06/06/25	
03	(If the DEDR has been opened against the atmosphere) Purge it with inert gas before feeding the hydrogen.	FMO NG		06/06/25	
04	Open cooling water to the coolers.	FMO NG		06/06/25	
05	Open the compressed hydrogen gas intake slowly. In case there is no valve to isolate the electrolyser and the HPP, once the previous steps completed, start the hydrogen production through the HMI at 10% of production (50 Nm3/h). And wait until the systems starts to be pressurised as described in previous sections.	FMO NG		06/06/25	
06	Check for leakages.	FMO NG		21/06/25	

7.3.2 HPP Commissioning performance adjustment and test - Flow controller positioner

Table 31. Test report HPP Start-up - Flow controller positioner

Step	Description	Completed by	Witnessed by	Date	Comment
01	Check that the PLC control have a linear output signal (0-100% = 4-20 mA)	FMO NG		06/06/25	
02	Check the positioner's output when no pilot pressure is supplied to the 64-V6. Positioner must indicate 100% open	FMO NG		06/06/25	
03	Test with pilot pressure: 4 mA: Positioner indicates 0% open. 8 mA: Positioner indicates ~10% open. 12 mA: Positioner indicates ~25% open 16 mA: Positioner indicates ~50% open. 20 mA: Positioner indicates ~75% open.	FMO NG		06/06/25	
04	Start the dryer in heating sequence at ~~100%~~ 10% of hydrogen ~~nominal~~ flow capacity.	FMO NG		21/06/25	Done at 10%
05	Check that positioner FC-64.1 indicates ~75% open.	FMO NG		06/06/25	
06	Adjust the by-pass needle valve 64-V14.1: count the turns from fully open to fully close and set it at 50% open.	FMO NG		06/06/25	
07	Partly close valve 64-V14 to about 50%.	FMO NG		06/06/25	

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Step	Description	Completed by	Witnessed by	Date	Comment
08	Wait 15 minutes and read the regeneration temperature (DR-TT-64-6 or DR-TT-64-8 depending on which tower is in regeneration sequence).	FMO NG		21/06/25	
09	If the temperature is below 155°C, partly close valve 64-V14 step by step until 155-160°C is reached. Wait 10-15 minutes between every step. You can also use by-pass needle valve 64-V14.1 for fine tuning,	FMO NG		21/06/25	
10	If the temperature is above 165°C, partly open valve 64-V14 step by step until 160-165°C is reached. Wait 10- 15 minutes between every adjustment. Use the by-pass needle valve 64-V14.1 for fine tuning. If 155-160°C cannot be reached, increase the heater set point by 25°C and restart from step 04.	FMO NG		21/06/25	
11	Check the heater ON vs OFF time. If the heater is ON between 75% and 95% of the heating time, proceed to the control of operation at 25-100% capacity If ON time > 95%, then partly close the valve 64-V14 until the heater ON time drops to 75-95% of the time. If ON time < 75%, then partly open the valve 64-V14 until the heater ON time increase up to 75-95% of the time. Use the by-pass needle valve (64-V1431) for fine tuning. (Wait 15 minutes between every adjustment)	FMO NG		21/06/25	

Step	Description	Completed by	Witnessed by	Date	Comment
12	Start the dryer in heating sequence at 75% of hydrogen nominal flow capacity (375 Nm^3/h). From the electrolyser's HMI, as indicated in Section 6.4.1.2.	FMD NG		21/06/25	
13	Check that positioner indicates ~50% open.	FMD NG		21/06/25	
14	Wait 15 minutes and read the regeneration temperature (TT-64.6 or TT-64.8 depending on which tower is in regeneration sequence). If TT-64.6 or TT-64.8 < 155 °C, then remove the cover of the positioner and slightly increase the span until reaching 155-160 °C. If TT-64.6 or TT-64.8 > 165 °C, then slightly decrease the span until reaching 160-165 °C. (Wait 15 minutes between every adjustment)	FMD NG		21/06/25	
15	Start the dryer in heating sequence at 25% of hydrogen nominal flow capacity (125 Nm3/h). From the electrolyser's HMI, as indicated in Section 6.4.1.2. Let it stabilize and run for 15 minutes.	FMD NG		21/06/25	
16	Ramp-up the hydrogen flow every 15 minutes by 25% (i.e. 25%, 50%, 75% and 100%).	FMD NG		21/06/25	
17	Check regeneration temperature (TT-64.6 or TT-64.8). It must be around 160 - 180 °C for the range of flowrates, if not, contact Aquagas for assistance.	FMD NG		21/06/25	

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7.3.3 HPP commissioning performance adjustment and test - Setup of condensation system

Table 32. Test report HPP Start-up - Setup of condensation system

Step	Description	Completed by	Witnessed by	Date	Comment
01	Start the dryer at 100% of hydrogen nominal flow capacity (500 Nm^3/h) and let the system to stabilise.	FMO NG		21/06/25	
02	If the Pbar factor is set too high. Reduce it by a factor of 0.1 (ex. If initially set at 15 barg, then reduce it at 13.5 barg). If the Pbar factor is set too low. Increase it by a factor of 0.1 (ex. If initially set at 15 barg, then increase it at 16.5 barg). For both cases, repeat with a smaller difference if needed.	FMO NG		21/06/25	
03	Check if there is remaining water to be drained, by activating the solenoid valve 64-V12 and check how much water is coming out.	FMO NG		21/06/25	

7.4 Vendor SAT Procedure

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7.5 Proverlis Summary System Reports

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7.6 Equipment Related Technical Queries

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7.7 As Built Documentation

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7.8 Management of Change - Summary Table of Tasks and Details of Affected Related Documentation

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C063-ELO-PRO-CO-0006

BLPH Electrolyzer Performance Test Procedure

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
02	*2nd Issue*	*27-FEB-2025*	*DPI*	*MSA*	*HRO*
01	1st Issue	16-JAN-2025	DPI	MSA	DWA

Subcontractor Document Number	
Client Document Number	

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Revision / Change Log

Rev.	Description
01	First issue
02	Second issue: Format updated. Sections 5 and 7 updated.

Reference documents

Doc Number	Rev.	Description
C63-PID-001	08	Electrolyzer Piping and Instrumentation Diagram
123A90-PML-COM-PRO-03007	01	BLPH Commissioning Strategy
123A90-PML-QHSE-PRO-00117	01	Punch List Management Procedure
123A90-PML-QHSE-PL-00001	01	Project HSE Management Plan
C063-ELO-PRO-CO-0001	01	BLPH Electrolyser Commissioning & Start-Up (CSU) Execution Plan
C063-ELO-PRO-CO-0002	01	BLPH Electrolyser CSU Method Statements
C063-ELO-PRO-CO-0003	01	BLPH Electrolyser Pre-Commissioning Manual
C063-ELO-PRO-CO-0004	01	BLPH Electrolyser Commissioning Manual
C063-ELO-PRO-CO-0005	01	BLPH Electrolyser Operational Test Procedure
C063-ELO-PRO-CO-0007	01	BLPH Electrolyser O&M Training
C063-ELO-LST-CO-0001	01	BLPH Electrolyser - General Item list

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1. Introduction

This document describes the philosophy, organization and milestones required for the Commissioning & Start-Up of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the coordinating on site of all the means and resources required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

1.1 Overview of Project Scope

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

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Figure 1. *HOLLANDSE KUST NOORD WIND PARK Location Map*



Figure 2. *Wind Park Details*

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

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1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

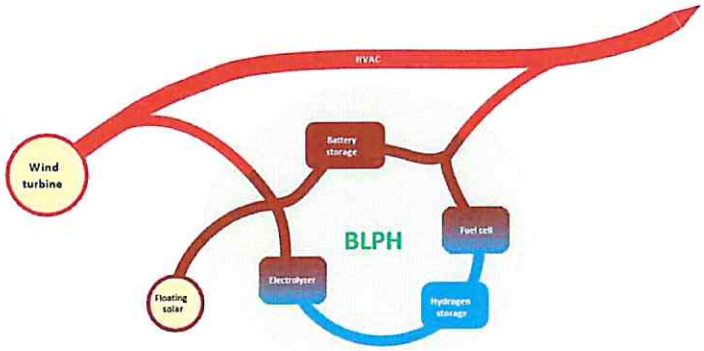


Figure 3. *BLPH Concept*

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2. Document Scope

In this document are described the activities developed to evaluate the performance of the electrolysis unit. This activities are carried out after achieving completion on the hydrogen production from 10% to 100% of nominal flowrate, which is from 50 Nm^3/h up to 500 Nm^3/h (cf. C063-ELO-PRO-CO-0005).

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In the section 7 are given the steps to conclude if the unit performs as expected and established by the contract. In addition to the operation description, are given the prerequisites, acceptance criteria, as well as the time required for each operation.

The performance of the electrolysis unit is evaluated towards the following parameters:

- Hydrogen production rate
- Hydrogen purity
- Efficiency at maximum capacity
- Hot start time
- Energy consumption in hot stand-by
- Cold start time
- Energy consumption in cold stand-by
- Ramp down time
- Ramp up time
- Fresh water consumption

3. Definitions

Table 1. Table of definitions

Term	Definition
COMPANY	means CROSSWIND C.V., owner & developer of the offshore WIND FARM Hollandse Kust Noord Wind Park Project.
ELOGEN	means ELOGEN as CONTRACTOR, the contracted party for engineering, and onshore commissioning of the Electrolyzer facilities associated with the PROJECT.
Pre-Commissioning	Pre-Commissioning relates to the preliminary Commissioning activities to test and check the individual basic functions of individual items within any given system and/or sub-system to confirm they perform as designed.
Commissioning	The phase of the project after Pre-Commissioning. Commissioning consists of a comprehensive series of dynamic and energized Checks and Tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project Documents, Specifications, Standards and Engineering Best Practices.
Equipment	An item that may be part of a System and be commissioned independently, however, it may or may not be operated independently.

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Term	Definition
Inspection Test Records (ITR)	A-ITR – used to record and verify construction scope associated with a tagged item (component). B-ITR – used to record and verify energization and function testing during pre-commissioning of a tagged item
Operations	Operations include all personnel directly involved with Production Operations and Maintenance of the facility.
Performance Test	The Performance Test takes place following the Commissioning and Site Acceptance Test. A performance test is executed if there is a specific requirement to test performance criteria of an individual piece of equipment, a system, or the plant.
Plant	Refers to the permanent facilities (Base Load Power Hub) being constructed or to be constructed at WORKSITE resulting from the WORK.
Project	Refers to the BASE LOAD POWER HUB project.
Pre-Start Up Audit (PSUA)	The PSUA is a precursor to the PSSR meeting. The intention is to audit the readiness of the facility to commence start up with the findings being used as part of the PSSR and shall be conducted 6 weeks prior to Start-up.
Pre-Start Up Safety Review (PSSR)	Pre-Start-up Safety review (PSSR) meeting is the final determination that all prerequisites have been met to permit the hydrogen production and shall be conducted 4 weeks prior the RFSU.
Procedure	A document that details the execution of an activity.
Punch List	Work not executed as per approved documents and/or not meeting quality, health, safety, environment, operability/maintainability requirement and/or Standard; and recorded as a list for rectification.
Ready For Start-up (RFSU)	RFSU applies to the whole or part of the Plant and its associated Facilities and Systems. RFSU signifies that the applicable scopes have been fully commissioned and are ready for safe hydrogen production. RFSU will be authorized with the signing of the RFSU certificate. The RFSU requires that the Pre-Start-Up Audit (PSUA) and the Pre-Start- Up Safety Review have been completed, and all related action/blocking issues have been resolved

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Term	Definition
SITE	Refers to the offshore location where the PLANT is to be installed and the vicinity thereof (offshore North Sea - Netherlands).
Start-up	The stage at which process fluid is introduced/created into the Plant. It is defined as operation of all the facilities under the project. It can only be performed once Commissioning of all associated utilities and auxiliaries and Pre-Commissioning activities of the Plant have been completed.
Start-up/Ramp-up	It is the initial start-up of processing equipment after first hydrogen, followed by a staged ramp up to full operating conditions. On completion of ramp-up, and after a period of steady state operations, the facility is ready to be performance tested.
System	A System is a major subdivision of a plant, being either process or utility, which performs an operational function of the plant. A System includes all the various equipment that allows it to operate. The division into functional Commissioning Systems corresponds to the prevailing fluids or services.
Sub-system	A Sub-system is a further subdivision of a System, which performs a partial operational function of the System, with little or no interference from the other Sub-systems. The Sub-system is the basic unit for Commissioning.
WORKSITE	means any construction location(s), where any major parts of the PLANT (such as templates, piles, nodes, jacket structure, modules, decks) shall be fabricated and assembled, excluding all other offices, premises and workshops of CONTRACTOR and SUBCONTRACTORS.
Shall	used to indicate requirements strictly to be followed to conform to the specification and accepted by all involved parties.
Should	used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
May	used to indicate a course of action permissible within the limits of the specification.
Can	used for statements of possibility and capability, whether material, physical or casual.

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4. Abbreviations

***Table 2.** Table of abbreviations*

Term	Definition
BLPH	Base Load Power Hub
BOP	Balance of plant
CSU	Commissioning & Start-Up
FT	Functional Transmitter
HMI	Human Machine Interface
HPP	Hydrogen Purification Unit[1]
QHSE	Quality, Health, Safety, & Environment
ITR	Inspection & Test Record
PID (P&ID)	Piping and Instrumentation Diagram
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PSUA	Pre-Start-Up Audit
PTW	Permit to Work
PV	Pneumatic Valve
RFC	Ready for Commissioning
RFO	Ready for Operation
RFSU	Ready For Start-Up

[1] It could also be referred as HPU (Hydrogen Purification Unit) in other documents

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Term	Definition
SLD	Single Line Diagram
UPS	Uninterruptible Power Supply

5. Requirements

Electrolyser's unit performance test activities can be performed when the Start-up report for the entirety of the electrolysis unit has been signed by all parties:

- All Punchlist that does not require the system to be reopened are cleared. OK
- All relevant documentation is available in the latest revision. OK
- The UPS is loaded at 100%. OK
- All Utilities are operational. OK
- The electrolyzer is stopped depressurized and cold (T < 40 °C). OK
- Electrolyzer Unit Start-Up & Ramp Up procedure has been completed and the corresponding ITRs have been completed and signed (cf. C063-ELO-PRO-0005). OK
- All systems are power-up and available to start automatically. OK
- Appropriate PPE must be always worn during loop testing. OK
- A permit to work has been delivered. OK
- In any case this procedure shall not conflict with, or supersede, the electrical lock-out procedure. Only electrical system leaders will be authorized to remove padlocks in electrical cabinets. OK
- Written authorization has been obtained to send hydrogen through the client's installation (**Figure 4** piping highlighted in turquoise, PV-633 open and PV-632 close). In the absence of such authorization, the hydrogen will be directed through the designated hydrogen vent (**Figure 4** piping highlighted in yellow, PV-633 close and PV-632 open). OK

18/06/2025
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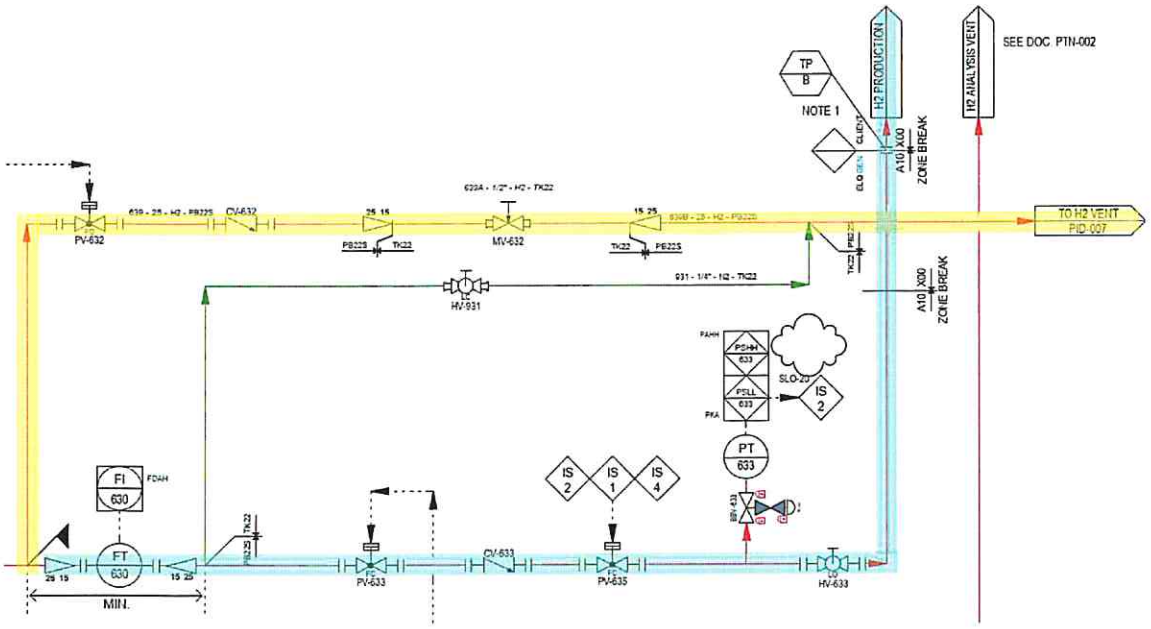


***Figure 4.** Hydrogen production routing*

5.1 Required Equipment

- Toolboxes (e.g. screwdrivers, wrenches, pliers, spanners). OK
- ATEX Field telephone or Walkie-Talkie. OK
- Portable Ultrasonic flow meter Endress+Hauser Prosonic Flow 93T (ref. 500075)[2]
- Chronometer. OK
- Personal hydrogen detectors for each people on site, calibrated up to date. OK

All equipment used must have a serial number and a valid calibration certificate up to date (if applicable).

Table 3. Test equipment register

[2] This reference is provided in case a flowmeter for the freshwater intake is not installed on site.

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TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2 Required Documents

- This procedure approved.
- A work permit has been issued and signed.
- Signed report test for the Start-up activities (cf. C063-ELO-PRO-CO-0005).

5.3 Required Manpower (Indicative)

For all the operations it is required the presence of a commissioning engineer and an automation engineer. The presence of the client is optional.

In case of any additional test, maintenance or trouble shooting for one or more components in the unit, it is recommended to count with a mechanical, electrical, piping and instrument technician, as well as the site supervisor.

6. Risk

6.1 Gas risk

The hydrogen produced in the electrolysis unit is an odorless, colorless and flammable gas, that can be released up to 500 Nm^3/h. The principal risks related to hydrogen are:

- Risk of inflammation or explosion. In the event of inflammation, hydrogen produces a flame invisible to the bare eye.
- Risk of anoxia due to the replacement of oxygen.

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The nitrogen used to purge the system during stop and start sequences is an odorless gas, naturally present in the air. The principal risk related to this gas is anoxia due to replacement of oxygen.

6.2 Fire risk

The fire risk is induced by the presence of hydrogen gas in the system, as well as by the presence of electrical equipment. All sources of ignition (electric sparks, hot surfaces, static electricity, mechanical hot spots...), and a presence of hydrogen leak, could lead to a fire risk.

⚠	The external fire case is not covered by the machine safety system and is under the responsibility of the operator.

6.3 Electrical and electrostatic risk

The system is composed of elements operating at voltage higher than the safety voltage (400 Vac for certain auxiliaries) and can therefore cause significant damage to people and property. The design and manufacture of the electrolysis unit is compliant with the CE Low Voltage Directive (2014/35/EU). There are three types of electrical risk:

- Residual polarisation voltage: after a machine's shutdown, and even after electrical lockout, the stacks keep a residual polarisation voltage that can last up to three days.
- Electrostatic: eliminated generally by periodically checking the grounding of the installation and the use of suitable PPE.
- Electrical: controlled by the compliance of the cabling of the installation and the good practice following the recommendations given by the procedures.

⚠	All elements in the system must be connected to a grounding surface connected to the ground terminal and checked at every intervention.

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6.4 Thermal risk

The thermal risk carried is related to burns on contact with hot surfaces. The process globally carries fluids reaching 165 °C[3], which can cause second degree burns. The electric heater presents in the containers (indicated as EH- on the P&ID) can reach even higher surface temperatures.

6.5 Pressure risk

The risk associated with pressure devices is due to the amount of energy released in the event of a device rupturing or bursting due to sudden release of fluid.

6.6 Risk of falling

Maintenance operations on the roof of the electrolyser must be carried out by personnel trained and authorised to work at height. Operators must be attached in such a way as to limit the risk of falling. Operations may be carried out from a platform if necessary.

⚠	Risk of injury. Respect safety measures for working at height when working on the roof of the electrolyser.

7. Operation description

The validation of the performance tests is concluded through the **Table 7** to **Table 16**, where each step is described in a row and the columns "Completed by", "Witnessed by" and "Date" are used to register the compliance of the activity. Take note of the results obtained, and if it is compliant according to the expected value.

If the test is interrupted by any factor (major or safety fault, or due to an external situation), the test is not longer valid, and it must be re-started.

Despite the independence of the tests, they can be carried out in an optimized circuit, to avoid waiting times and limit the stops of the electrolyser. In **Figure 5** is presented a recommended planning for the activities. The

[3] particularly on the HPP, the BOP reaches temperatures of 65 °C

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descriptions given in **Table 7** to Table 16 do not consider a continuity between the performance tests, so the operator can perform the test whenever is convenient according to situations presented on site.

The main views of the HMI used during this procedure are presented on **Figure 6**, **Figure 7** and **Figure 8**. The information displayed on the HMI that is referenced in the description of the activities (**Table 7** to **Table 16**) is identified by the numbers 1 to 11.

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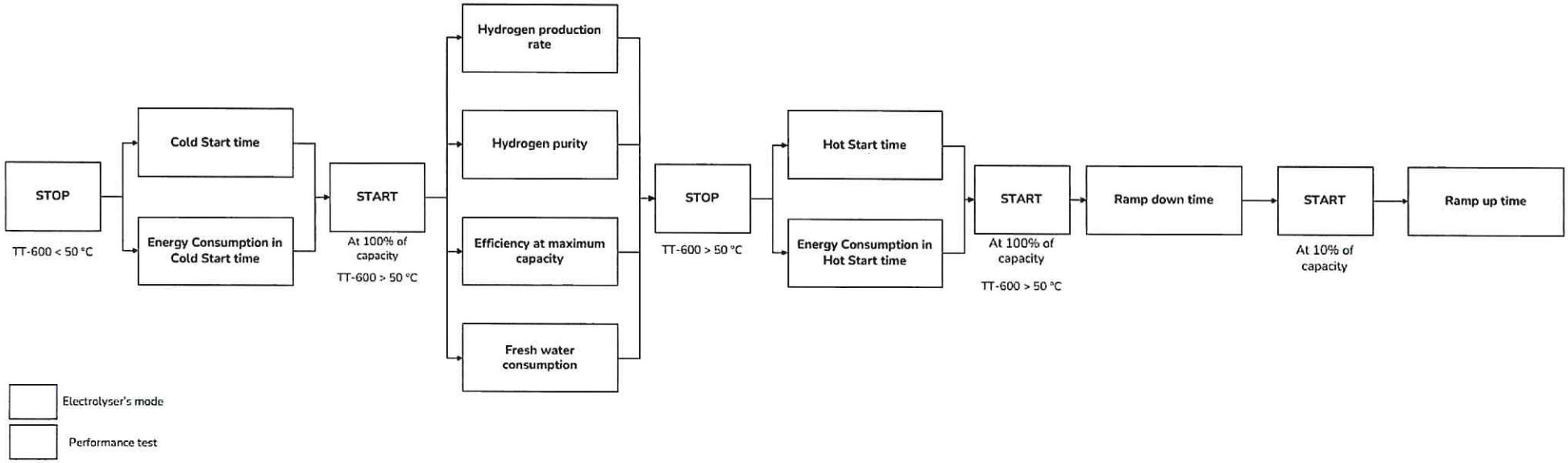


Figure 5. *Planning performance test*

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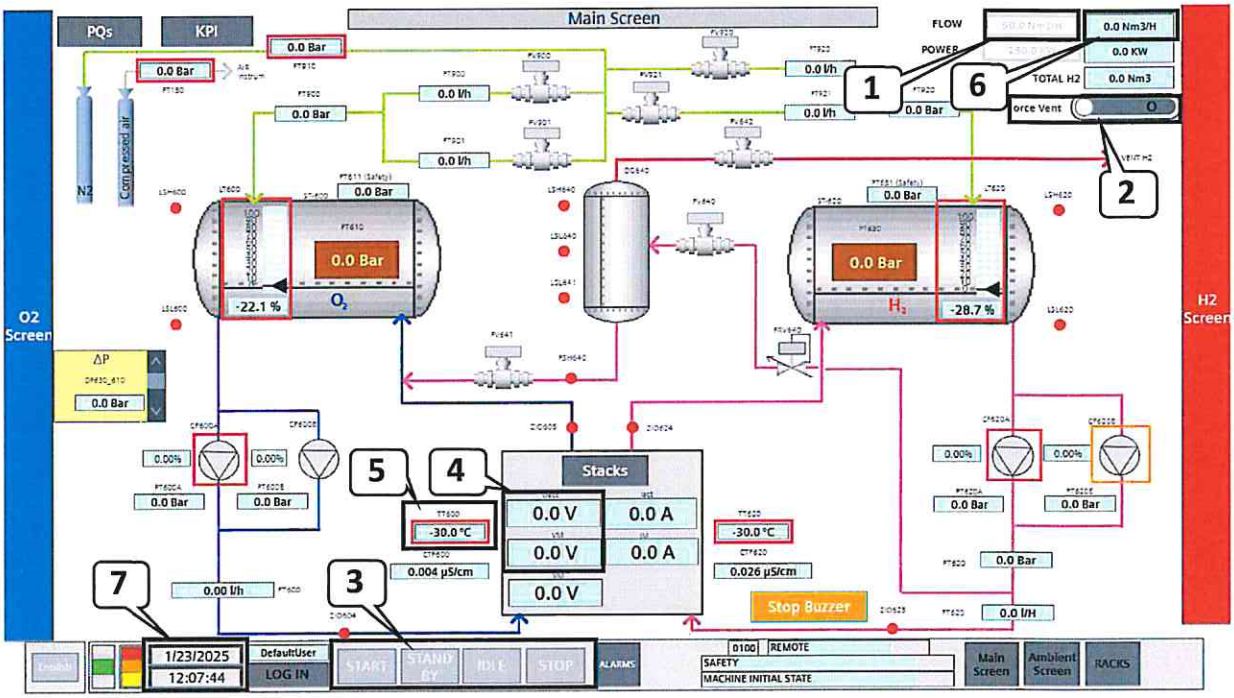


Figure 6. *Main process HMI view*

Table 4. *Reference points on Main process HMI view*

Reference point	Designation
1	Hydrogen flowrate setpoint selected by the user [Nm^3/h].
2	Force vent selector for H_2.
3	Electrolyser's mode panel. Buttons to change the mode of the electrolyser (START, STANDBY, IDLE, STOP).
4	Total voltage (both rectifiers). Value on top corresponds to the voltage measured by the rectifiers. Value on bottom, measured by the stacks.
5	Temperature at the inlet stream of the stacks.
6	Hydrogen production calculated by the PLC [Nm^3/h]
7	Date and hour display

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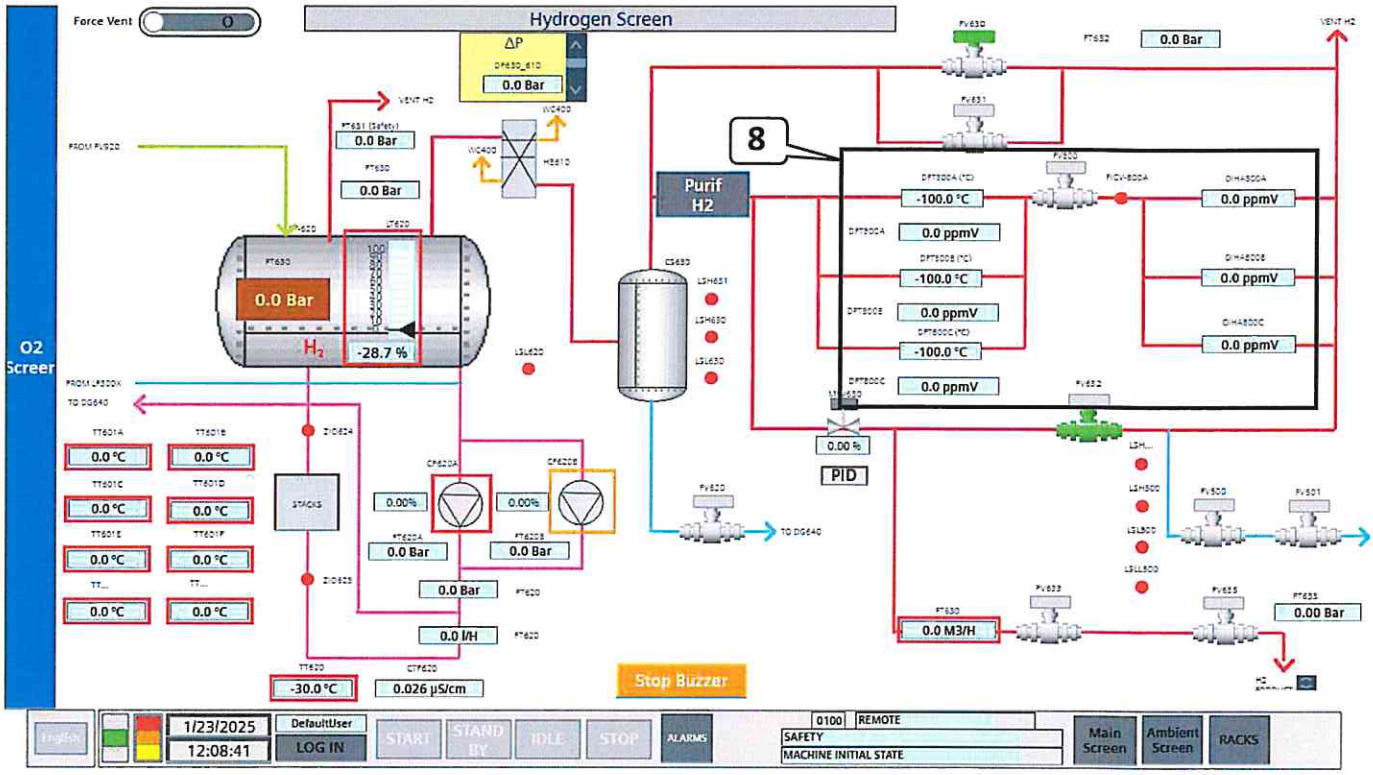


Figure 7. *H2 HMI view*

Table 5. *Reference points on H2 page HMI view*

Reference point	Designation
8	Display of measured oxygen and water content (OIHA-800A/B/C and DPT-800A/B/C).

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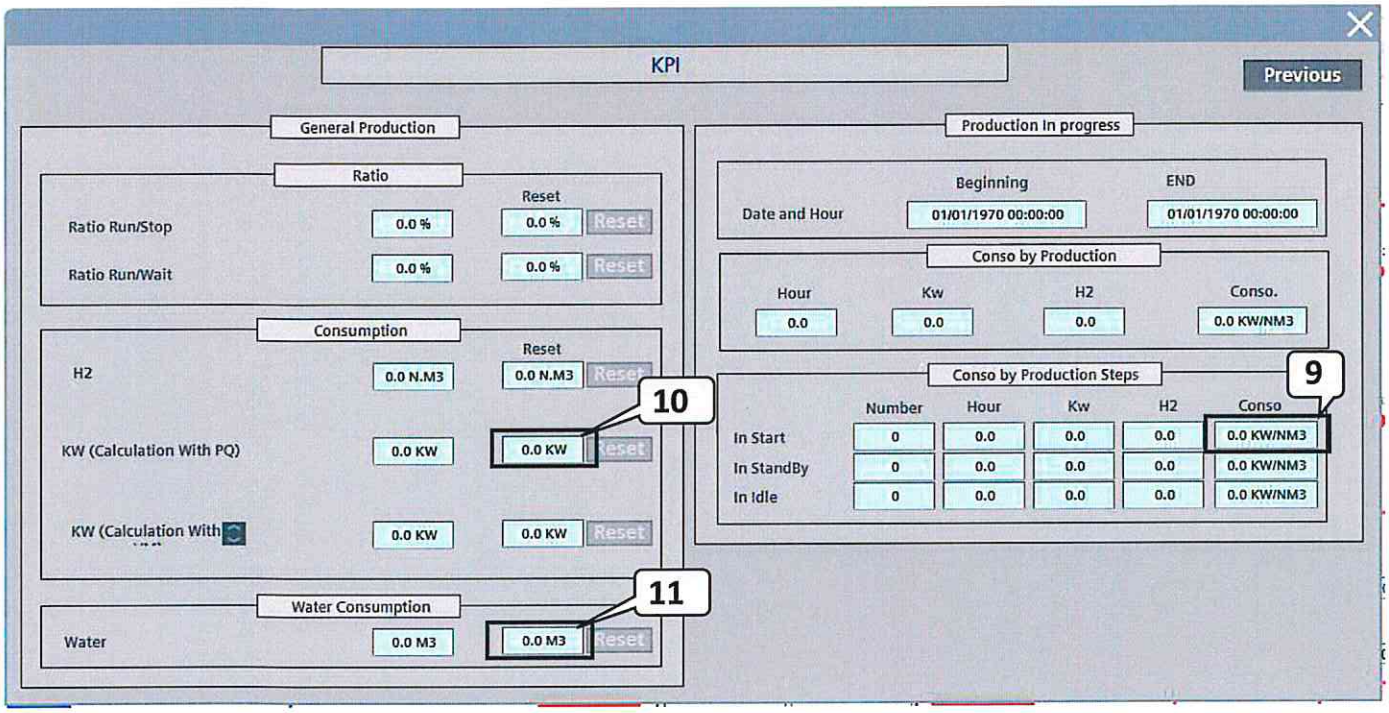


Figure 8. *KPI view on HMI*

Table 6. *Reference points on KPI HMI view*

Reference point	Designation
9	Electrolysis efficiency in start mode
10	Energy consumption by the electrolysis unit
11	Fresh water consumption

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7.1 Hydrogen production rate

***Table 7.** Hydrogen production rate*

Time required	Pre-requisites	Validation criteria
2 hours	Electrolyser initial state displayed on HMI: STOP	Hydrogen production rate at maximum capacity is 500 ± 1,25 Nm^3/h

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMO NG		18/06/25
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [4].	FMO NG		18/06/25
03	On the HMI, enter 10% of the maximum hydrogen flow rate in Nm^3/h (50 Nm^3/h). (Figure 6 point **1**).	FMO NG		18/06/25
04	(If applicable) On the hydrogen separator tank view of the HMI, select the button "Force Event" to force the hydrogen production to the vent. (Figure 6 point **2**).	FMO NG		18/06/25

[4] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
05	Press the "START" button on the HMI navigator. (Figure 6 point **3**).	FMO NG		18/06/25
06	Check that the stacks are being polarized at a ramp of 5 V per second up to a voltage equal to 1,25 x Number of Cells for each stack (1,25*106 V=**132.5 V**). The polarization phase ends once the rectifier voltage is higher than or equal to the polarisation point (i.e. **530 V** per rectifier and **1060 V** in total[5]). (Figure 6 point **4**). **Note:** in regard of the possible fluctuations of stacks voltage, it is considered that the polarization point is achieved once the voltage per stacks is above **119.25 V** (i.e. **477 V** per rectifier and **954 V** in total).	FMO NG		18/06/25
07	Let the electrolyser run at 10% of the maximum production setpoint to heat the water inlet to stacks up to 50°C (TT-600). This value measured can be read directly on the HMI. The operation should last about 30 minutes. (Figure 6 point **5**).	FMO NG		18/06/25
08	Once the temperature measured by the TT-600, reaches 50 °C, enter the maximum production setpoint on the HMI (500 Nm3/h). (Figure 6 point **1**).	FMO NG		18/06/25
09	The current passing through the stacks should start to ramp up. The production should reach the setpoint within 30 s to 5 min after setting the process at its maximum production (500 Nm^3/h).	FMO NG		18/06/25

[5] The systems is constituted by eight stacks of 106 cells each. The stacks are grouped by 4 and each group is supplied by one rectifier.

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Step	Description	Completed by	Witnessed by	Date
	Note: During the current ramp up phase, make sure that no cell in the stacks is subjected to a voltage higher than **2,1 V** (**890,4 V** per rectifier) by checking on the HMI (Figure 6 point **4**). The software will display an alarm and stop production if that is the case.	FMO NG		18/06/25
10	Monitor the hydrogen production flow rate on the HMI measure by the FT-630. Once it has reached its maximum value, let the system run for 30 minutes to reach stability. Throughout during this period, the hydrogen flow must be within the targeted value with a deviation of 0,25 %. (500 ± 1,25 Nm^3/h). (Figure 6 point **6**). 500.3 Nm^3/h	FMO NG		18/06/25
11	Record the hydrogen production flow rate measures during 1h for each second (sampling rate of 1 Hz).	FMO NG		18/06/25
12	Calculate the average value between the measures. The obtained value must be inside the range of uncertainty indicated (500 ± 1,25 Nm^3/h).	FMO NG		18/06/25

Result						
Hydrogen production rate at maximum capacity: 500.3 Nm^3/h	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

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7.2 Hydrogen purity

The hydrogen produced by the electrolysis process, after going through the separator and condensation vessels, is polluted by molecules of water and oxygen. The expected purity of 99,999% is reached while the hydrogen goes through the HPP. Hence, at client's stream (flowrate measured by the FT-630), the oxygen and water content are both limited to 5 ppmv. This section describes the method to validate the oxygen and water content in the hydrogen produced at maximum capacity (i.e. 500 Nm^3/h).

***Table 8.** Hydrogen purity*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	The electrolyser has run at its maximum capacity recently[6]. OK Electrolyser initial state displayed on HMI: STOP OK Temperature of the cold loop TT-60 between 3 and 5 °C. OK Temperature at the inlet of stacks TT-600 > 50 °C. OK	Dew point is lower than 5 ± 0,15 ppmv at atmospheric pressure. Oxygen content in the hydrogen is lower than 5 ± 0,1 ppmv.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.			18/06/25

[6] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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Step	Description	Completed by	Witnessed by	Date
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [7].			18/06/25
03	On the HMI, enter 100% of the maximum hydrogen flowrate in Nm^3/h (500 Nm^3/h). (Figure 6 point **1**).			18/06/25
04	Press the "START" button on the HMI navigator. (Figure 6 point **3**).			18/06/25
05	Verify that the hydrogen production flowrate is at a steady state, that is, the hydrogen production flow is according to the setpoint (500 Nm^3/h) for at least 30 minutes. (Figure 6 point **6**).			18/06/25
06	If the electrolyzer is operating at a steady state, go to the "H2 page" view on the HMI. Read the values of the DPT-800 and OIHA-800 (**Figure 7** point **8**).			18/06/25
07	For 1 hour, record the values sent by DPT-800 and OIHA-800 every second (sampling rate of 1 Hz).			18/06/25
08	Calculate the average value of the measurements of DPT-800A/B/C. The obtained value must be lower than 5 ± 0,15 ppmv.			18/06/25

[7] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
09	Calculate the average value of the measurements of OIHA-800 A/B/C. The obtained value must be lower than 5 ± 0,1 ppmv.	FMO NG		18/06/25

Result						
Hydrogen purity at maximum capacity: 1.68 (average DPT) water ppmv 0.03 (average OIHA) oxygen ppmv	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

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7.3 Efficiency at maximum capacity

The efficiency of the electrolysis unit is measured as the energy consumed per Nm^3/h of hydrogen produced. This value is directly calculated by the PLC and displayed on the HMI. This procedure described the steps to validate the performance of the electrolysis related to efficiency at its maximum capacity (i.e. 500 Nm^3/h).

Table 9. *Efficiency at maximum capacity*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	The electrolyser has run at its maximum capacity recently[8]. OK Electrolyser initial state displayed on HMI: STOP OK Temperature of the cold loop TT-60 between 3 and 5 °C. OK Temperature of stacks TT-600 > 50 °C. OK	The power consumed by the electrolyser divided by the produced hydrogen flow rate is lower than 5 ± 0,06 kWh/Nm^3H_2 at its maximum capacity at the beginning of life of the electrolyser.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMD NG		18/06/25

[8] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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Step	Description	Completed by	Witnessed by	Date
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [9].	FMO NG		18/06/25
03	On the HMI, enter 100% of the maximum hydrogen flow rate in Nm3/h (500 Nm^3/h). (Figure 6 point **1**).	FMO NG		18/06/25
04	Press the "START" button on the HMI navigator (Figure 6 point **3**).	FMO NG		18/06/25
05	Verify that the hydrogen production flow rate is at a steady state, that is, the hydrogen production flow is according to the setpoint (500 Nm^3/h) for at least 30 minutes (Figure 6 point **6**).	FMO NG		18/06/25
06	If the electrolyzer is operating at a steady state, go to the "KPI" view of the HMI. Read the values of the efficiency on the "Conso by production steps" "In start" field (Figure 8 point **9**).	FMO NG		18/06/25
07	For 1 hour, record the values of the efficiency every second (sampling rate of 1 Hz).	FMO NG		18/06/25
08	Calculate the average value of the reported values. The result must be lower than 5 ± 0,06 $kWh/Nm^3 H_2$.	FMO NG		18/06/25

Result						
Efficiency at maximum capacity 4,7 kWh/Nm^3H_2	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

[9] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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7.4 Hot start time

The term "Hot Start" stands for the process in which the electrolyzer goes from the "STANDBY" mode to the "START" mode[10]. In "STANDBY" mode the electrolyzer is pressurized (if it has been less than 1 hour that it was running in "START" mode), the oxygen and hydrogen loop pumps (CP-600A/B and CP-620A/B) are running and the stacks are polarized (i.e. 1,25 V per cell, 132.5 V per rectifier). Hence, in a "STANDBY" mode the unit is pre-started, which enables a faster initiation of hydrogen production. In this section, the steps are given to evaluate the duration of a Hot Start.

⚠	The pressurized "*Standby*" mode is limited to 1 hour to avoid an H_2/O_2 mixture.

Table 10. *Hot start time*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	The electrolyser has run at its maximum capacity recently[11]. OK Temperature of the cold loop TT-60 between 3 and 5 °C. OK Temperature of stacks TT-600 > 50 °C. OK	Hot start completed within 5 to 15 minutes.

[10] This time is noted in the contract as "Hot Stand-by to full production", indicating as initial state the pressurized STANDBY mode.

[11] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMO NG		18/06/25
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [12].	FMO NG		18/06/25
03	Set the electrolyzer in "START" mode at 100% of nominal flow (500 Nm^3/h). Let the electrolyzer run at a steady state for at least 15 minutes or until the temperature of the stacks reaches 65 °C (TT-600) (Figure 6 points **1** and **5**).	FMO NG		18/06/25
04	Press the "STANDBY" button to switch from the maximum hydrogen flow rate to "STANDBY" mode (in this state the machine is pressurized, and the stacks are polarized) (Figure 6 point **3**).	FMO NG		18/06/25
05	The voltage and current feeding the stacks will drop to the polarization point. Once the "Standby" state is reached (STANDBY button turns green in the HMI screen), let the system run on this state for at least 30 minutes. **During this 30 minutes in STANDBY mode, the Energy consumption in hot stand-by test can be carried out.**	FMO NG		18/06/25
06	Once the 30 minutes elapsed, enter the maximum hydrogen production setpoint on the HMI (500 Nm3/h).	FMO NG		18/06/25

[12] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
07	Press the START button and take note of the time displayed on the HMI (Figure 6 point **7**) (point A). **Time:** 19:12:00	FMO NG		18/06/25
08	The current passing through the stacks should start to ramp up as well as the hydrogen production flow rate (Figure 6 point **6**).	FMO NG		18/06/25
09	Monitor the produced hydrogen flow rate (FT-630). Once it has reached the maximum setpoint value (500 ± 1,25 Nm^3/h) take note of the time displayed on the HMI (Figure 6 point **7**) (point B). **Time:** 19:13:12	FMO NG		18/06/25
10	The electrolyzer shall remain in START mode for at least 15 minutes. During this time, the produced hydrogen flowrate must remain steady (500 Nm^3/h ±5%). The time interval between point A and point B determines the hot start time.	FMO NG		18/06/25
11	Verify the hot start was completed within 5 to 15 minutes.	FMO NG		18/06/25

Result						
Hot start time: 01 min 12 S	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

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7.5 Energy consumption in hot stand-by

The energy consumption is given by the Power Monitoring Device Control panel present on the unit (**Figure 9**). This value could also be read on the HMI "KPI" view "consommation" area (Figure 8).

This section describes the method to set the unit in Hot Standby (or pressurized STANDBY) and to establish the energy consumed during this state. In Hot Standby the unit is kept pressurized, the pumps (CP-600A/B and CP-620A/B) are running and the stacks are polarized. No hydrogen is being produced.

The aim is to evaluate the energy cost for letting the unit pre-started, as defined in the previous section.



Figure 9. *Reported energy consumption on the Power Monitoring Device onsite.*

⚠	The pressurized "*Standby*" mode is limited to 1 hour to avoid an H_2/O_2 mixture.

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***Table 11.** Energy consumption in hot stand-by*

Time required	Pre-requisites	Validation criteria
1 hour	The electrolyser has run at its maximum capacity recently[13]. OK Temperature of the cold loop TT-60 between 3 and 5 °C. OK Temperature of stacks TT-600 > 50 °C.Hot start time test in progress. OK	Energy consumption must be 90 ± 1 KWh.

Step	Description	Completed by	Witnessed by	Date
01	Once the "Standby" state is reached (STANDBY button turns green on the HMI screen), go to the "KPI" view "consommation" area, and read the values displayed for the energy consumption (Figure 8 point **10**). This value must correspond to the value displayed by the Power Monitoring Device Control panel (Figure 9). **Note:** Make sure that the initial value of energy consumed is set at zero, to take into consideration just the energy consumed during this test.	FMO NG		18/06/25
02	For 30 minutes, record the values of the total energy consumed every second (sampling rate of 1 Hz) (Figure 8 point **10**).	FMO NG		18/06/25
03	Calculate the average energy of the reported values. The result must be 90 ± 1 KWh.	FMO NG		18/06/25

Result						
Energy consumption in hot stand-by: 37,7 kWh	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

CP600 at 60% CP620 at 70%

[13] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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7.6 Cold start time

The term "Cold Start" stands for the process in which the electrolyzer goes from the "IDLE" mode to the "START" mode[14]. In "IDLE" mode the electrolyzer is depressurized, the oxygen and hydrogen loop pumps (CP-600A/B and CP-620A/B) are stopped and the stacks are polarized (i.e. 1,25 V per cell, 132.5 V per rectifier). Hence, in a "IDLE" mode the unit is pre-started, which enables a faster initiation of the hydrogen production, but in theory longer than the Hot start since the system is depressurized. In this section, the steps are given to evaluate the duration of a Cold Start.

Additionally, since the unit is not pressurized, the duration of this mode is not restricted to 1 hour, compared to the pressurized Standby.

***Table 12.** Cold start time*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	Performance test of Hydrogen completed. OK The temperature of the stacks TT-600 is below 50 °C[15]. OK 40°C Electrolyser initial state displayed on HMI: STOP OK	Cold start time below 30 minutes.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMO NG	JD	18/06/23

[14] This time is noted in the contract as "Cold Stand-by to full production" indicating as initial state the IDLE mode.

[15] The estimate duration of this transition consider that the temperature of oxygen and hydrogen loop are around 15 °C, and that the cold loop is at 10 °C initially.

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Step	Description	Completed by	Witnessed by	Date
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [16].	FMO NG		18/06/25
03	Press the "IDLE" button to switch from "Stop" to "Idle" mode (In this state, the system is depressurized, the stacks are polarized, and no hydrogen is produced) (**Figure 6** point 3). Check that the stacks are being polarized at a ramp of 5 V per second up to a voltage equal to 1,25 x Number of Cells for each stack (1,25*106 V=**132.5 V**). The polarization phase ends once the rectifier voltage is higher than or equal to the polarisation point (i.e. **530 V** per rectifier and **1060 V** in total[17]). (Figure 6 point **4**). **Note:** in regard of the possible fluctuations of stacks voltage, it is considered that the polarization point is achieved once the voltage per stacks is above **119.25 V** (i.e. **477 V** per rectifier and **954 V** in total).	FMO NG		18/06/25
04	The voltage and current sent to the stacks will be set at the polarization point. Once the "Idle" state is reached (button IDLE turns green in the HMI screen), let the system run on this state for at least 30 minutes. **During this 30 minutes in IDLE mode, theEnergy consumption in cold stand-by test can be carried out.**	FMO NG		18/06/25

[16] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

[17] The systems is constituted by eight stacks of 106 cells each. The stacks are grouped by 4 and each group is supplied by one rectifier.

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Step	Description	Completed by	Witnessed by	Date
05	Once the 30 minutes elapsed, enter the maximum hydrogen setpoint on the HMI (500 Nm^3/h).	FMO NG		18/06/25
07	Press the START button and take note of the time displayed on the HMI (**Figure 6** point **7**) (point A). **Time:** 15:33:00	FMO NG		18/06/25
08	The current passing through the stacks should start to ramp up and the hydrogen production flowrate should start to increase.	FMO NG		18/06/25
09	Monitor the produced hydrogen flowrate. Once it has reached its maximum capacity (500 Nm^3/h) take note of the time displayed on the HMI (**Figure 6** point **7**) (point B). **Time:** 15:34:13	FMO NG		18/06/25
10	The electrolyzer shall remain in operation for at least 15 minutes. During this time, the produced hydrogen flow rate must remain steady (500 Nm^3/h). The time interval between point A and point B determines the cold start time.	FMO NG		18/06/25
11	Verify the cold start takes less than 30 minutes.	FMO NG		18/06/25

Result						
Cold start time: 01 min 13 S	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

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7.7 Energy consumption in cold stand-by

The energy consumption is given by the Power Monitoring Device Control panel present on the unit (Figure 9). This value could also be read on the HMI "KPI" view "consommation" area (Figure 8). This section describes the method to set the unit in Cold Standby (also known as IDLE mode) and read the energy consumed during this. In IDLE mode the unit is depressurized, the pumps (CP-600A/B and CP-620A/B) are stopped and the stacks are polarized. No hydrogen is being produced.

The aim is to evaluate the energy cost of letting the unit polarized, as defined in the previous section.

Table 13. *Energy consumption in cold stand-by*

Time required	Pre-requisites	Validation criteria
1 hour	Performance test of Hydrogen completed. OK The temperature of the stacks TT-600 is below 50 °C[18]. OK Cold start time test in progress. OK	Energy consumption must be around 34 ± 1 kWh.

[18] The estimate duration of this transition consider that the temperature of oxygen and hydrogen loop is around 15 °C, and that the cold loop is at 10 °C initially.

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Step	Description	Completed by	Witnessed by	Date
01	Once the "Idle" state is reached (confirmed by the IDLE button turning into green on the HMI screen), go to the "KPI" view "consommation" area, and read the values displayed for the energy consumption (Figure 8 point **10**). This value must correspond to the value displayed by the Power Monitoring Device Control panel (Figure 9). The transition from the maximum hydrogen flow rate to "Idle" takes under 10 minutes. **Note:** Make sure that the initial value of energy consumed is set at zero, to take into consideration just the energy consumed during this test.	FMO NG		18/06/25
02	For 30 minutes, record the values of the total energy consumed every second (sampling rate of 1 Hz) (Figure 8 point **10**).	FMO NG		18/06/25
03	Calculate the average energy of the reported values. The result must be approximately 34 ± 1 KWh.	FMO NG		18/06/25

Result						
Energy consumption in cold stand-by: 33.2 kWh	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	18/06/25

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7.8 Ramp down time

The ramp down time is described as the duration of the transition from START mode at 100% of the nominal flow, to 10% of the nominal flow. In other terms, is the time that takes to decrease the current sent to the electrolysis stacks and consequently, the hydrogen produced by them. In this sections are given the steps to execute this transition and to evaluate its duration.

Table 14. *Ramp down time*

Time required	Pre-requisites	Validation criteria
1 hour	The electrolyser is initially running at its maximum capacity (500 ± 1,25 Nm^3/h)	Ramp down time below 30 seconds.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMO NG		18/06/25
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [19].	FMO NG		18/06/25

[19] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
03	Verify that the hydrogen production flow rate is at 500 ± 1,25 Nm^3/h for at least 30 minutes. Hydrogen production flow rate can be read directly on the HMI, in the "Hydrogen Process" view.	FMO NG		18/06/25
04	Once the 30 minutes elapsed, enter the minimal production setpoint on the HMI (10% of the maximum hydrogen flow rate, 50 Nm^3/h) and take note of the time displayed on the HMI (**Figure 6** point **7**) (point A). **Time:** 15:53:00	FMO NG		18/06/25
05	The current passing through the stacks should start to ramp down as well as the hydrogen production flow rate.	FMO NG		18/06/25
06	Monitor the flow of hydrogen produced. Once it has reached the minimal production (50 ± 0,12 Nm^3/h) take note of the time displayed on the HMI (**Figure 6** point **7**) (point B). **Time:** 15:54:04	FMO NG		18/06/25
07	The electrolyzer shall remain in operation for at least 15 minutes. During this time, the produced hydrogen flow rate must remain steady at a minimum setpoint (50 Nm^3/h). The time elapsed between point A and point B determines the ramp down duration.	FMO NG		18/06/25
08	Verify that the ramp down takes less than 30 seconds.	FMO NG		18/06/25

Result						
Ramp down time: 64 **seconds**	**Compliant (YES/NO)**	YES	**Completed by**	FMO NG	**Date**	18/06/25

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7.9 Ramp up time

The ramp up time is described as the duration of the transition from START mode at 10% of the nominal flow, to 100% of the nominal flow. In other terms, is the time that takes to increase the current sent to the electrolysis stacks and consequently, the hydrogen produced by them. In this sections are given the steps to execute this transition and to evaluate its duration.

***Table 15.** Ramp up time*

Time required	Pre-requisites	Validation criteria
1 hour	The electrolyser is initially running at its minimum capacity (50 ± 0,12 Nm^3/h). OK	Ramp up time below 30 seconds.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMO NG		20/06/25
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [20].	FMO NG		20/06/25
03	Verify that the hydrogen production flow rate is at 50 Nm^3/h for at least 30 minutes. Hydrogen production flow rate can be read directly on the HMI, in the "Hydrogen Process" view.	FMO NG		20/06/25

[20] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
04	Once the 30 minutes have elapsed, enter the maximum production setpoint on the HMI (100% of the maximum hydrogen flow rate, 500 ± 1,25 Nm^3/h) and take note of the time displayed on the HMI (**Figure 6** point **7**) (point A). **Time:** 14:46:00	FMO NG		20/06/25
05	The current passing through the stacks should start to ramp up as well as the hydrogen production flow.	FMO NG		20/06/25
06	Monitor the produced hydrogen flow rate. Once it has reached the maximum production (500 Nm^3/h) take note of the time displayed on the HMI (**Figure 6** point **7**) (point B). **Time:** 14:47:06	FMO NG		20/06/25
07	The electrolyzer shall remain in operation for at least 15 minutes. During this time, the produced hydrogen flow rate must remain steady at 500 Nm^3/h. The time elapsed between point A and point B determines the duration of ramp up.	FMO NG		20/06/25
08	Verify that the ramp up takes less than 30 seconds.	FMO NG		20/06/25

Result						
Ramp up time: 66 seconds	Compliant (YES/NO)	YES	Completed by	FMO NG	Date	20/06/25

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7.10Fresh water consumption

This section aims to describe the method to evaluate freshwater consumption (at WTP inlet) when the electrolysis unit is set at its maximum capacity (500 Nm^3/h).

***Table 16.** Fresh water consumption*

Time required	Pre-requisites	Validation criteria
2 hours	The electrolyser is initially running at its maximum capacity (500 ± 1,25 Nm^3/h). If there is no flowmeter installed at the upstream of the WTP, install a portable flowmeter (see Required Equipment) at the proximities of the CV-300 (cf. C63-PID-001).	Fresh water consumption at maximum hydrogen production is 930 ± 5 L/h

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.	FMO ~~NCA~~		20/06/25
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms[21].	FMO ~~NCA~~		20/06/25

[21] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
03	Verify that the hydrogen production is at steady state at 500 Nm^3/h for at least 30 minutes. Hydrogen production flowrate can be read directly on the HMI (**Figure 6** point **6**).	FMO ~~NG~~		20/06/25
04	If the electrolyzer is operating at a steady state as explained previously, read on the flowmeter installed onsite (**Figure 8** point **11**), or on the portative one, the freshwater consumed volume or the flowrate measured.	FMO ~~NG~~		20/06/25
05	For 1 hour, record the values of the flow (or the volume consumed) every second (sampling rate of 1 Hz), while the electrolyzer is in "Start" mode at its maximum capacity.	FMO ~~NG~~		20/06/25
06	Calculate the average of the reported values. The result must be around 930 ± 19 L/h. 14:51 15:57	FMO ~~NG~~		20/06/25

Result						
Freshwater consumption at 500 Nm^3/h H_2: 384 ~~seconds~~ L/h	Compliant (YES/NO)	YES	Completed by	FMO ~~NG~~	Date	20/06/25

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8. Conclusion

Table 17. *Performance test overall report*

Criterion	Expected value	Reported value	Performed by	Approved by	Comments
Hydrogen production rate	500 ± 1,25 Nm^3/h	500	FMO NG	CPA	
Hydrogen purity	H_2O 5 ± 0,15 ppmv O_2 5 ± 0,1 ppmv	DPT 1,68 ppmv OIHA 0,03 ppmv	FMO NG	LPA	
Efficiency at maximum capacity	< 5 ± 0,06 kWh/Nm^3H_2	4,7	FMO NG	LPA	
Hot start time	< 5 min - 15 min	1 min 12 S	FMO NG	LPA	
Energy consumption in hot stand-by	90 ± 1 KWh.	37,7 Kwh (30 minutes)	CP600 = 60% LPA CP620 = 70% FMO NG		
Cold start time	< 30 min	1 min 13 S	FMO NG	LPA	
Energy consumption in cold stand-by	34 ± 1 kWh	33,2 Kwh (30 minutes)	FMO NG	LPA	
Ramp-up time	< 30 s	66 S	FMO NG	LPA	
Ramp-down time	< 30 s	64 S	FMO NG	LPA	
Fresh water consumption	930 ± 5 L/h	384	FMO NG	LPA	

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CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

CONTROL SYSTEM TEST

LEGEND

D-OSD	OPTICAL SMOKE DETECTOR
X-OSD	OPTICAL SMOKE DETECTOR ATEX
D-MCP	MANUAL CALL POINT

C&E MATRIX

TYPE	DESCRIPTION
FAULT	if a MCP is in fault status, the SSI panel activate the fault output
	if 1 sensor is in fault status, the SSI panel activate the fault output
	if the SSI panel has an internal fault status (battery fault, card fault ecc..), the SSI panel activate the fault output
FIRE	if a MCP is pressed, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in alarm status, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in fault status, the SSI panel activate the fire alarm output
	if there is 1 sensor in alarm and 1 sensor in fault in the same zone, the SSI panel activate the fire alarm output

SD-00xA	SD-00xB	SD-00xC	OUT
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

TESTED 11.4.25
JOHN MACKILLOP

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C63-PWI-003

Alarm List

C63- CrossWind Project

REV.	STATUS	DESCRIPTION	DATE	BY	CHECK	APPR.
4	IFC	Issued For Construction	11/03/2025	JNG	DPI	BCA
3	Detailed Design	Issued For Construction	28/01/2025	DPI	BCA	IDI
2	Detailed Design	Issued For Construction	15/11/2024	JNG	HCH	BCA
1	Detailed Design	First issue	26/04/2024	JNG	HCH	BCA

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elogen	Electrolyzer Package					Document Code	C63-PWI-003
	Alarm List					Revision	04
Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
OIHA-800	AAH-800 (ISO22)	5	volppm	IP9	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800	5	TO PLC
OIHA-800	AAHH-800 (C63)	6	volppm	IP4	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-800	1200	TO PLC
REC-001	ACA-001 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001	-	COM
REC-002	ACA-002 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002	-	COM
LP-300A	ACA-300A (C63)	-	-	IP17A	LP-300A STARTING FAULT - LP-300A	1	TO PLC
LP-300B	ACA-300B (C63)	-	-	IP17B	LP-300B STARTING FAULT - LP-300B	1	TO PLC
CP-600A	ACA-600A (ISO22)	-	-	IP6A	STARTING MALFUNCTION CP-600A - ERR - CP-600A	60	TO PLC
CP-600B	ACA-600B (ISO22)	-	-	IP6B	STARTING MALFUNCTION CP-600B - ERR - CP-600B	60	TO PLC
CP-620A	ACA-620A (ISO22)	-	-	IP5A	STARTING MALFUNCTION CP-620A - ERR - CP-620A	60	TO PLC
CP-620B	ACA-620B (ISO22)	-	-	IP5B	STARTING MALFUNCTION CP-620B - ERR - CP-620B	60	TO PLC
PQ-001	AQA-016 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION PQ001 - ERR	1	TO PLC
PQ-002	AQA-017 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION PQ002 - ERR	1	TO PLC
DC-200	AQA-200 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-200	-	COM
DC-201	AQA-201 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-201	-	COM
WC-400	AQA-400 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-400	-	COM
WC-401	AQA-401 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-401	-	COM
RSP-001	AQA-1005	-	-	IP1	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER	0	COM
HVAC PACKAGE	AQA-1006	-	-	IP1	DEFAULT COMMUNICATION PLC Elogen / HVAC	0	COM
REC-001	AQA-001 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-001	-	COM
REC-002	AQA-002 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-002	-	COM

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
RIO_MAIN	AQA-005 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO MAIN - ERR	1	TO PLC
RIO1	AQA-006 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO 1 - ERR	1	TO PLC
RIO2	AQA-007 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO 2 - ERR	1	TO PLC
PN-001	AQA-008 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN001 - ERR	1	TO PLC
PN-002	AQA-009 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN002 - ERR	1	TO PLC
PN-003	AQA-010 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN003 - ERR	1	TO PLC
PN-004	AQA-011 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN004 - ERR	1	TO PLC
PN-005	AQA-012 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN005 - ERR	1	TO PLC
PN-006	AQA-013 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN006 - ERR	1	TO PLC
PN-007	AQA-014 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN007 - ERR	1	TO PLC
PN-008	AQA-015 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN008 - ERR	1	TO PLC
RIO_BURKERT	AQA-018 (C63)			IP1	LOSS OF COMMUNICATION RIO BURKERT - ERR	1	TO PLC
N/A	AQA-052	-	-	IP1	CUSTOMER/ELOGEN communication switch fault, in remote mode.	-	TO PLC
SSI-1000	AQA-1001 (ISO22)	-	-	IP1	FIRE CONTROL PANEL FAULT - ERR - SSI-1000	-	HARDWIRED
WTP-300	AQA-1003	-	-	IP1	COMMUNICATION FAULT PLC ELOGEN / WTP	0	COM
SSI-1000	AQA-1010 (ISO22)	-	-	IS4	FIRE AND GAS DETECTION - FIRE - SSI-1000	-	HARDWIRED
PLC	BZ-001 (ISO22)	-	-	IS1	PLC FAULT - ERR - PLC-001	0	HARDWIRED
HIOD-610	CAH-610 (C63)	25	% LFL	IP9	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3	1	TO PLC
AHD-1000	CAH-1000 (ISO22)	25	%LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000	1	TO PLC
AHD-1001	CAH-1001 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001	1	TO PLC
AHD-1002	CAH-1002 (C63)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002	1	TO PLC
AHD-1003	CAH-1003 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
AHD-1004	CAH-1004 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004	1	TO PLC
QIA-1B4	CAHH-300 (C63)	1	µS/cm	IP16	CONDUCTIVITY TOO HIGH UPSTREAM LP300 - HH	5	COM
HIOD-610	CAHH-610 (C63)	50	% LFL	IS1	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3	-	TO PLC
DPT-800	CAHH-800 (ISO22)	6	ppmv	IP1	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800	1200	TO PLC
AHD-1000	CAHH-1000 (C63)	50	%LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000	1	TO PLC
AHD-1001	CAHH-1001 (C63)	50	%LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001	1	TO PLC
AHD-1002	CAHH-1002 (C63)	50	% LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002	1	TO PLC
AHD-1003	CAHH-1003 (C63)	50	% LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003	1	TO PLC
AHD-1004	CAHH-1004 (C63)	50	% LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004	1	TO PLC
400VAC	EGA-002 (C63)	-	-	IS1	FAULT -PHASE MONITORING RELAY - 1U1	1	TO PLC
REC-001/002	EGA-003 (C63)	-	-	IS1	RECTIFIER 1 & 2 + ESD-008 TRIGGERED - 360KA1	1	TO PLC
EH-1001	EGA-1001 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1001	-	COM
EH-1002	EGA-1002 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1002	-	COM
EH-1003	EGA-1003 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1003	-	COM
EH-1004	EGA-1004 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1004	-	COM
EH-1006	EGA-1006 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1006	-	COM
EH-1007	EGA-1007 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1007	-	COM
EXT-001	EGA-1101 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001	-	TO PLC
EXT-002	EGA-1102 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002	-	TO PLC
EXT-003	EGA-1103 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003	-	TO PLC
EXT-004	EGA-1104 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004	-	TO PLC
EXT-005	EGA-1105 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005	-	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
EXT-006	EGA-1106 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006	-	TO PLC
EXT-007	EGA-1107 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007	-	TO PLC
EXT-008	EGA-1108 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008	-	TO PLC
PQ-001	EJAHH-001 (C63)	250	V	IP1	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001	0	TO PLC
PQ-002	EJAHH-002 (C63)	440	V	IP1	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002	0	TO PLC
PQ-003	EJAHH-003 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-003	0	TO PLC
PQ-004	EJAHH-004 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-004	0	TO PLC
REC-001/002	EJAHH-006 (C63)	-	-	IP1	RECTIFIER HIGH VOLTAGE MODULE - ERR - REC-001/002	1	TO PLC
PQ-001	EJALL-001 (C63)	209	V	IP9	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001	0	TO PLC
PQ-002	EJALL-002 (C63)	380	V	IP9	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002	0	TO PLC
PQ-003	EJALL-003 (C63)	342	V	IP9	VERY LOW RECTIFIER VOLTAGE - LL - PQ-003	0	TO PLC
PQ-004	EJALL-004 (C63)	342	V	IP9	VERY LOW RECTIFIER VOLTAGE - LL - PQ-004	0	TO PLC
FSH-640	FAHH-640(ISO22-E500)	1 (4,9)	- (m3/h)	IS3	BALANCING FLOW HIGH - FSH-640 - HH	15	TO PLC
FICV-800	FAHH-800 (C63)	1 - (3.9)	NL/min	IS9	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800	15	TO PLC
FT-600	FAL-600 (ISO22-500)	79,38	m3/h	IP9	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600	2	TO PLC
FT-620	FAL-620 (ISO22-500)	30,24	m3/h	IP9	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620	2	TO PLC
FT-900	FAL-900 (C63)	41,4	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-900	1	TO PLC
FT-901	FAL-901 (C63)	70,3	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-901	1	TO PLC
FT-920	FAL-920 (C63)	3,6	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-920	1	TO PLC
FT-921	FAL-921 (C63)	10,5	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-921	1	TO PLC
FT-600	FALL-600 (ISO22-500)	44,1	m3/h	IS1	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600	2	TO PLC
FICV-610	FALL-610 (ISO22)	0,7	- (NL/min)	IS1	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610	15	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
FICV-611	FALL-611 (ISO22)	7,7	- (NL/min)	IP9	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611	15	TO PLC
FT-620	FALL-620 (ISO22-500)	26,88	m3/h	IP1	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620	2	TO PLC
FICV-800	FALL-800 (C63)	1 - (2.1)	NL/min	IP1	VERY LOW H2 ANALYSIS FLOWRATE - LL - FICV-800	15	TO PLC
FT-630	FDAH-630 (ISO22)	5	%	IP9	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630	2	TO PLC
FC 64.1	FSA 64.1	No 4-20	mA	IP1	NO SIGNAL - ERR - FC 64.1	0	TO PLC
FC 64.1	FSA 64.1 LL	<5.16	mA	IP1	GAS INLET FLOW VERY LOW - LL - FC 64.1	0	TO PLC
MPV-611	GDA-611 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-611 - ERR - MPV-611	133	TO PLC
MPV-630	GDA-630 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-630 - ERR - MPV-630	133	TO PLC
ZIO-604	GGA-604 (C63)	1	-	IP1	HV-604 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-604	5	TO PLC
ZIO-605	GGA-605 (C63)	1	-	IP1	HV-605 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-605	5	TO PLC
ZIO-623	GGA-623 (C63)	1	-	IP1	HV-623 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-623	5	TO PLC
ZIO-624	GGA-624 (ISO22)	1	-	IS1	HV-624 VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-624	5	TO PLC
GS 64.1.1	GSA 64.1.1 HH	1	-	IP1	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1	5	TO PLC
GS 64.1.1	GSA 64.1.1 LL	0	-	IP1	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1	5	TO PLC
GS 64.1.2	GSA 64.1.2 HH	1	-	IP1	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2	5	TO PLC
GS 64.1.2	GSA 64.1.2 LL	0	-	IP1	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2	5	TO PLC
GS 64.1.3	GSA 64.1.3 HH	1	-	IP1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3	5	TO PLC
GS 64.1.3	GSA 64.1.3 LL	0	-	IP1	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3	5	TO PLC
GS 64.1.4	GSA 64.1.4 HH	1	-	IP1	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4	5	TO PLC
GS 64.1.4	GSA 64.1.4 LL	0	-	IP1	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4	5	TO PLC
GS 64.2	GSA 64.2 HH	1	-	IP1	VALVE 64-V5 NOT CLOSED - HH - GS 64.2	5	TO PLC
GS 64.2	GSA 64.2 LL	0	-	IP1	VALVE 64-V5 NOT OPEN - LL - GS 64.2	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
GS 64.3	GSA 64.3 HH	1	-	IP1	VALVE 64-V7 NOT CLOSED - HH - GS 64.3	5	TO PLC
GS 64.3	GSA 64.3 LL	0	-	IP1	VALVE 64-V7 NOT OPEN - LL - GS 64.3	5	TO PLC
GS 64.T2	GSA 64.T2 HH	1	-	IP1	VALVE 64-T2 NOT OPEN - HH - GS 64.T2	5	TO PLC
GS 64.T2	GSA 64.T2 LL	0	-	IP1	VALVE 64-T2 NOT CLOSED - LL - GS 64.T2	5	TO PLC
IM-001	IAHH-001 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-001	1	TO PLC
IM-002	IAHH-002 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-002	1	TO PLC
IM-001	IDAHH-001 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001	2	TO PLC
IM-002	IDAHH-002 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002	2	TO PLC
HVAC	JGA-010 (C63)	-	-	IP1	HVAC PANEL CIRCUIT BREAKER AUXILIARY CONTACT - 102QM1	1	TO PLC
WC-400	JGA-400 (C63)	-	-	IP9	BREAKER WC-400 - CHILLER 1 - 102QM5	1	TO PLC
WC-401	JGA-401 (C63)	-	-	IP9	BREAKER WC-401 - CHILLER 2 - 102QM7	1	TO PLC
POWER 400V	JGA-001 (ISO22)	-	-	IP1	LOSS OF 400 VAC POWER SUPPLY - ERR	0	TO PLC
REC-001/002	JGA-002 (C63)	-	-	IP1	OVERVOLTAGE - SURGE PROTECTION - RF8	1	TO PLC
UPS	JGA-003 (C63)	-	-	IP1	FAULT - UPS CIRCUIT BREAKER AUXILIARY CONTACT - QF5	1	TO PLC
AUX2	JGA-004 (C63)			IP1	BREAKER - AUXILIARY TYPE 2 - 120QM1	1	TO PLC
230_AUX	JGA-005 (C63)	-	-	IP1	FAULT - RECTIFIER 230Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF1	1	TO PLC
400Vac	JGA-006 (ISO22)	-	-	IS1	REC_MAIN_BREK_DEF	-	TO PLC
TSF-001	JGA-007 (C63)			IP1	TRANSFORMER GAS PRESSURE TEMPERATURE DETECTION FAULT	1	TO PLC
REC-001/002	JGA-008 (C63)	-	-	IP1	FAULT - HCU RECTIFIER 400Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF3	1	TO PLC
DEOXO	JGA-009 (C63)	-	-	IP1	FAULT - DEOXO CIRCUIT BREAKER AUXILIARY CONTACT - 101QF1	1	TO PLC
SOCKET	JGA-011 (C63)	-	-	IP9	BREAKER SOCKET - 124QFx	1	TO PLC
ALIM1_24	JGA-012 (C63)	-	-	IP9	BREAKER DC ALIM1 24VDC - 130QF1	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
ALIM2_24	JGA-013 (C63)	-	-	IP9	BREAKER DC ALIM2 24VDC - 130QF3	1	TO PLC
REC_UPS	JGA-014 (C63)	-	-	IP1	FAULT - RECTIFIER UPS POWER SUPPLY 1 CIRCUIT BREAKER AUXILIARY CONTACT - 130QF5	1	TO PLC
RIO1	JGA-015 (C63)	-	-	IP1	RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF1	-	TO PLC
RIO2	JGA-016 (C63)	-	-	IP1	RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF3	-	TO PLC
LP-300A	JGA-300A (C63)	-	-	IP17A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A	1	TO PLC
LP-300B	JGA-300B (C63)	-	-	IP17B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B	1	TO PLC
WTP-300	JGA-301 (C63)	-	-	IP20	WTP300 - ERR - WTP-300	1	TO PLC
WTP-300	JGA-302 (C63)	-	-	IP1	BREAKER WTP300 - 102QF3	1	TO PLC
HR-306	JGA-306 (C63)	-	-	IP9	FAULT - HEAT RIBBON 306 CIRCUIT BREAKER AUXILIARY CONTACT - 122QF7	1	TO PLC
HR-307	JGA-307 (C63)	-	-	IP9	FAULT - HEAT RIBBON 307 CIRCUIT BREAKER AUXILIARY CONTACT - 123QF1	1	TO PLC
HR-503	JGA-503 (C63)	-	-	IP9	FAULT - HEAT RIBBON 503 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-600A	JGA-600A (C63)	-	-	IP9	FAULT - HEAT RIBBON 600A CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
CP-600A	JGA-600A (ISO22)	-	-	IP6A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A	0	TO PLC
CP-600B	JGA-600B (ISO22)	-	-	IP6B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B	0	TO PLC
HR-606	JGA-606 (C63)	-	-	IP9	FAULT - HEAT RIBBON 606 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-607B	JGA-607B (C63)	-	-	IP9	FAULT - HEAT RIBBON 607B CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-620A	JGA-620A (C63)	-	-	IP9	FAULT - HEAT RIBBON 620A CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
CP-620A	JGA-620A (ISO22)	-	-	IP5A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A	0	TO PLC
CP-620B	JGA-620B (ISO22)	-	-	IP5B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B	0	TO PLC
HR-625	JGA-625 (C63)	-	-	IP9	FAULT - HEAT RIBBON 625 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-640	JGA-640 (C63)	-	-	IP9	FAULT - HEAT RIBBON 640 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
SSI-1000	JGA-1000 (C63)	-	-	IP1	SSI-1000 POWER FAILURE - 130QF7	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
EH-1001	JGA-1001 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001	0	COM
EH-1002	JGA-1002 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002	0	COM
EH-1003	JGA-1003 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003	0	COM
EH-1004	JGA-1004 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004	0	COM
EH-1006	JGA-1006 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006	0	COM
EH-1007	JGA-1007 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007	0	COM
EXT 001/002/003/004	JGA-1121	-	-	IP9	MALFUNCTION MAIN CIRCUIT BREAKER FOR 4 FANS STACK - ERR - BREAKER STACK 001/002/003/004	0	TO PLC
EXT 005/ 006/ 007/ 008	JGA-1122	-	-	IP9	MALFUNCTION COMMON CIRCUIT BREAKER OF 4 FANS STACKS - ERR - BREAKER STACK 005/ 006/ 007/ 008	0	TO PLC
K01	KSA K01 HH	1	-	IP1	Dryer heater HE 64.1, K01 Not deactivated	5	TO PLC
K01	KSA K01 LL	0	-	IP1	Dryer heater HE 64.1, contactor K01 Not activated	5	TO PLC
K02	KSA K02 HH	1	-	IP1	Dryer heater HE 64.1, K02 Not deactivated	5	TO PLC
K02	KSA K02 LL	0	-	IP1	Dryer heater HE 64.1, K02 Not activated	5	TO PLC
K03	KSA K03 HH	1	-	IP1	Deoxo Trace heater HE 61.1, K03 Not deactivated	5	TO PLC
K03	KSA K03 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03	5	TO PLC
K04	KSA K04 HH	1	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04	5	TO PLC
K04	KSA K04 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04	5	TO PLC
LT-600	LAH-600 (C63)	50	%	IP9	HIGH LEVEL ST-600 - H - LT-600	2	TO PLC
LSH-610	LAH-610 (ISO22)	1	-	IP9	HIGH LEVEL CS-610 - H - LSH-610	60	TO PLC
LT-620	LAH-620 (C63)	62	%	IP9	HIGH LEVEL ST-620 - H - LT-620	2	TO PLC
LSH-630	LAH-630 (C63)	1	-	IP1	HIGH LEVEL CS-630 - HH - LSH-630	1080	TO PLC
WLD-001	LAHH-001 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-001	60	TO PLC
WLD-002	LAHH-002 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-002	60	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
WLD-003	LAHH-003 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-003	60	TO PLC
WLD-004	LAHH-004 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-004	60	TO PLC
WLD-005	LAHH-005 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-005	60	TO PLC
WLD-006	LAHH-006 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-006	60	TO PLC
LT-600	LAHH-600 (C63)	52	%	IP1	VERY HIGH LEVEL ST-600 - HH - LT-600	2	TO PLC
LT-620	LAHH-620 (C63)	71	%	IP1	VERY HIGH LEVEL ST-620 - HH - LT-620	2	TO PLC
LSH-631	LAHH-631 (ISO22)	1	-	IS1	VERY HIGH LEVEL CS-630 - HH - LSH-631	60	TO PLC
LSH-640	LAHH-640 (ISO22)	1	-	IP9	HIGH LEVEL DG-640 - HH - LSH-640	60	TO PLC
LT-600	LAL-600 (C63)	32	%	IP9	LOW LEVEL ST-600 - LT-600 - L	2	TO PLC
LSL-610	LAL-610 (ISO22)	1	-	IP9	LOW LEVEL CS-610 - L - LSL-610	60	TO PLC
LT-620	LAL-620 (C63)	31	%	IP9	LOW LEVEL ST-620 - L - LT-620	2	TO PLC
LSL-630	LAL-630 (ISO22)	1	-	IP9	LOW LEVEL CS-630 - L - LSL-630	60	TO PLC
LISA-1B1	LALL-301 (C63)	20	%	IP16	VERY LOW LEVEL WTP-300 - LL - LT-300	2	TO PLC
LT-600	LALL-600 (C63)	26	%	IP2	VERY LOW LEVEL ST-600 - LL - LT-600	2	TO PLC
LSL-611	LALL-611 (ISO22)	1	-	IS13	VERY LOW LEVEL CS-610 - LL - LSL-611	60	TO PLC
LT-620	LALL-620 (C63)	27	%	IP3	VERY LOW LEVEL ST-620 - LL - LT-620	2	TO PLC
LSH-600	LASHH-600 (ISO22)	1	-	IS12	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600	5	TO PLC
LSHH-500	LASHH-500 (C63)	1	-	IP1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500	5	TO PLC
LSL-600	LASLL-600 (C63)	1		IS6	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600	5	TO PLC
LSL-620	LASLL-620 (C63)	1	-	IS5	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620	5	TO PLC
LSLL-500	LASLL-500 (C63)	1	-	IS14	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT -LSLL-500	1	TO PLC
LSL-641	LALL-641 (ISO22)	1	-	IS3	VERY LOW LEVEL DG-640 (SIS) - LL - LSL-641	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
AUC-001	OAR-001 (C63)	-	-	IS1	CUSTOMER EMERGENCY STOP - AUC-001 - SIS XS-001	-	HARDWIRED
DS-001	OAS-001 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-001	5	TO PLC
DS-002	OAS-002 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-002	5	TO PLC
DS-003	OAS-003 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-003	5	TO PLC
DS-004	OAS-004 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-004	5	TO PLC
DS-005	OAS-005 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-005	5	TO PLC
DS-006	OAS-006 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-006	5	TO PLC
DS-007	OAS-007 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-007	5	TO PLC
DS-008	OAS-008 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-008	5	TO PLC
DS-009	OAS-009 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-009	5	TO PLC
DS-010	OAS-010 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-0010	5	TO PLC
DS-011	OAS-011 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-011	5	TO PLC
DS-012	OAS-012 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-012	5	TO PLC
ESD-001	OAZ-001 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-001	-	HARDWIRED
ESD-002	OAZ-002 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-002	-	HARDWIRED
ESD-003	OAZ-003 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-003	-	HARDWIRED
ESD-004	OAZ-004 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-004	-	HARDWIRED
ESD-005	OAZ-005 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-005	-	HARDWIRED
ESD-006	OAZ-006 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-006	-	HARDWIRED
ESD-007	OAZ-007 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-007	-	HARDWIRED
PLC	ODA-001 (C63)	-	-	IP9	DIVERGENCE REMOTE / LOCAL	1	TO PLC
PT-64.1	PA 64.1 L	15	barg	IP9	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1	15	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PT-150	PAH-150 (ISO22)	8,5	barg	IP9	HIGH INSTRUMENT AIR PRESSURE - H - PT-150	1	TO PLC
PT-300	PAH-300 (ISO22)	14	barg	IP9	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300	1	TO PLC
PT-600	PAH-600 (ISO22)	15	barg	IP9	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600	2	TO PLC
PT-610	PAH-610 (ISO22)	11,8	barg	IP9	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- H - PT-610	1	TO PLC
PT-612	PAH-612 (ISO22)	0,5	barg	IP9	HIGH OXYGEN VENT PRESSURE - H - PT-612	2	TO PLC
PT-620	PAH-620 (ISO22)	37	barg	IP9	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620	2	TO PLC
PT-630	PAH-630 (ISO22)	33	barg	IP9	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630	1	TO PLC
PT-910	PAH-910 (ISO22)	8,5	barg	IP9	HIGH NITROGEN PRESSURE - H - PT-910	1	TO PLC
PT-105	PAHH-05 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-05	1	COM
PT-12	PAHH-12 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-12	1	COM
PT-15	PAHH-15 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-15	1	COM
PT-22	PAHH-22 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 2 - HH - PT-22	1	COM
PT-105	PAHH-105 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 1 - HH - PT-105	1	COM
PT-112	PAHH-112 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 1 - HH - PT-112	1	COM
PT-115	PAHH-115 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 2 - HH - PT-115	1	COM
PT-122	PAHH-122 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 2 - HH - PT-122	1	COM
PT-150	PAHH-150 (ISO22)	9	barg	IP1	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150	10	TO PLC
PT-300	PAHH-300 (C63)	16	barg	IP16	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300	1	TO PLC
PT-600A	PAHH-600A (C63)	16	barg	IS15	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A	1	TO PLC
PT-600B	PAHH-600B (C63)	16	barg	IS16	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B	1	TO PLC
PT-610	PAHH-610 (ISO22)	12	barg	IP1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610	1	TO PLC
PT-611	PAHH-611 (ISO22)	12,5	barg	IS1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS)- HH - PT-611	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PT-620A	PAHH-620A (C63)	38	barg	IS17	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A	1	TO PLC
PT-620B	PAHH-620B (C63)	38	barg	IS18	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B	1	TO PLC
PT-630	PAHH-630 (ISO22)	33,5	barg	IP1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630	1	TO PLC
PT-631	PAHH-631 (ISO22)	34	barg	IS1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631	1	TO PLC
PT-632	PAHH-632 (C63)	3,6	barg	IP9	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632	1	TO PLC
PT-633	PAHH-633 (C63)	33	barg	IP4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633	1	TO PLC
PT-900	PAHH-900 (ISO22)	9	barg	IP1	LEAK ON OXYGEN INERTING LINE - HH - PT-900	1	TO PLC
PT-910	PAHH-910 (ISO22)	9	barg	IP1	VERY HIGH NITROGEN PRESSURE - HH - PT-910	10	TO PLC
PT-920	PAHH-920 (ISO22)	9	barg	IP1	LEAK ON HYDROGEN INERTING LINE - HH - PT-920	10	TO PLC
PT-150	PAL-150 (ISO22)	6	barg	IP9	LOW INSTRUMENT AIR PRESSURE - L - PT-150	10	TO PLC
PT-300	PAL-300 (C63)	10,8	barg	IP9	LP300 PUMP PRESSURE LOSS - L - PT300	10	TO PLC
PT-600	PAL-600 (C63)	2,79	barg	IP9	CP-600 PUMP PRESSURE LOSS - L - PT600	10	TO PLC
PT-620	PAL-620 (C63)	3,11	barg	IP9	CP-620 PRESSURE LOSS - L - PT-620	10	TO PLC
PT-910	PAL-910 (ISO22)	6	barg	IP9	LOW NITROGEN PRESSURE - L - PT-910	10	TO PLC
PT-150	PALL-150 (ISO22)	5,5	barg	IP1	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150	10	TO PLC
PT-300	PALL-300 (C63)	9,6	barg	IP17A/B	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300	10	TO PLC
PT-600	PALL-600 (C63)	2,48	barg	IP6A/B	CP-600 CHANGEOVER UNFORESEEN - LL - PT-600	60	TO PLC
PT-611	PALL-611 (ISO22)	0	barg	IS10	LOW PRESSURE ON ANODIC SIDE - LL - PT-611	1	TO PLC
PT-620	PALL-620 (C63)	2,76	barg	IP5A/B	CP-620 CHANGEOVER UNFORESEEN - LL - PT-620	60	TO PLC
PT-631	PALL-631 (ISO22)	0	barg	IS11	LOW PRESSURE ON CATHODIC SIDE - LL - PT-631	1	TO PLC
PT-910	PALL-910 (ISO22)	5,5	barg	IP1	VERY LOW NITROGEN PRESSURE - LL - PT910	10	TO PLC
PT-1001	PALL-1001 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT-1001	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PT-1002	PALL-1002 (C63)	10	Pa	IP1	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002	1	TO PLC
PT-1003	PALL-1003 (C63)	10	Pa	IP1	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003	1	TO PLC
PT-1004	PALL-1004 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004	1	TO PLC
PT-1005	PALL-1005 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005	1	TO PLC
PT-1006	PALL-1006 (C63)	10	Pa	IP1	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006	1	TO PLC
DPY-001 = PT630 - PT610	PDAH-001 (ISO22)	21,5	barg	IP9	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610	15	TO PLC
PT-610	PDAH-610 (ISO22)	1200	s	IP9	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610	0	TO PLC
PT-630	PDAH-630 (ISO22)	1200	s	IP9	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630	0	TO PLC
DPY-001 = PT630 - PT610	PDAHH-001 (ISO22)	22	barg	IP1	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610	15	TO PLC
DPY-002 = PT631 - PT611	PDAHH-002 (ISO22)	23	barg	IS1	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611	15	TO PLC
DPY-001 = PT630 - PT610	PDAL-001 (ISO22)	-0,1	barg	IP9	REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC
DPY-001 = PT630 - PT610	PDALL-001 (ISO22)	-0,5	barg	IP1	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC
DPY-002 = PT631 - PT611	PDALL-002 (ISO22)	-1	barg	IS1	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611	15	TO PLC
PT-633	PKA-633 (C63)	-7	barg/s	IS2	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633	0	TO PLC
PT-64.1	PSA 64.1	No 4-20	mA	IP1	PT 64.1 NO SIGNAL - ERR - PT 64.1	0	TO PLC
PT-64.1	PSA 64.1 HH	-	barg	IP1	CONDENSATE PRESSURE VERY HIGH - HH - PT 64.1	0	TO PLC
PT 64.1	PSA 64.1 LL	14.9	barg	IP1	CONDENSATE, PRESSURE VERY HIGH - LL - PT-64-1	15	TO PLC
PS-001	PSA-001 (C63)	-	-	IP1	RECTIFIER COOLING NETWORK PRESSURE SWITCH - PS001	1	TO PLC
PT-611	PZAH-611 (C63)	12.3	barg	IS19	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS) OPENING PV-610 - H - PT-611	1	TO PLC
PT-631	PZAH-631 (C63)	33.8	barg	IS20	HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS) OPENING PV-630 - H - PT-631	1	TO PLC
VAR-300A	SCA-300A (C63)	-	-	IP17A	ERROR VSD LP-300A - ERR - VAR-300A	1	TO PLC
VAR-300B	SCA-300B (C63)	-	-	IP17B	ERROR VSD LP-300B - ERR - VAR-300B	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
VAR-600A	SCA-600A	-	-	IP6A	ERROR VSD CP-600A - ERR - VAR-600A	1	TO PLC
VAR-600B	SCA-600B	-	-	IP6B	ERROR VSD CP-600B - ERR - VAR-600B	1	TO PLC
VAR-620A	SCA-620A	-	-	IP5A	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC
VAR-620B	SCA-620B	-	-	IP5B	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC
TT 60.1	TA 60.1 H	>200	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1	0	TO PLC
TT 60.1	TA 60.1 L	<50	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1	3600	TO PLC
TT 60.2	TA 60.2 H	>220	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2	0	TO PLC
TT 60.2	TA 60.2 L	<70	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2	3600	TO PLC
TT 61.1	TA 61.1 H	>200	°C	IP9	DEOXO TOWER 61, GAS UTLET TEMPERATURE HIGH - H - TT 61.1	0	TO PLC
TT 64.5	TA 64.5 H	>40	°C	IP9	DRYER TOWER 64A, COOLING FLOW LOW - H - TT 64.5	0	TO PLC
TT 64.5	TA 64.5 H A	>45	°C	IP9	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5	0	TO PLC
TT 64.5	TA 64.5 H R	>120	°C	IP9	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5	0	TO PLC
TT 64.5	TA 64.5 L	<100	°C	IP9	DRYER TOWER 64A, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.5	0	TO PLC
TT 64.6	TA 64.6 H A	>45	°C	IP9	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6	0	TO PLC
TT 64.6	TA 64.6 H R	>200	°C	IP9	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6	0	TO PLC
TT-64.6	TA 64.6 L	<150	°C	IP9	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6	0	TO PLC
TT-64.7	TA 64.7 H	>40	°C	IP9	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7	0	TO PLC
TT 64.7	TA 64.7 H A	>45	°C	IP9	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7	0	TO PLC
TT 64.7	TA 64.7 H R	>120	°C	IP9	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7	0	TO PLC
TT-64.7	TA 64.7 L	<100	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7	0	TO PLC
TT 64.8	TA 64.8 H A	>45	°C	IP9	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8	0	TO PLC
TT 64.8	TA 64.8 H R	>200	°C	IP9	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8	0	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT-64.8	TA 64.8 L	<150	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-600	TAHH-600 (ISO22)	80	°C	IP1	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-620	TAHH-620 (ISO22)	80	°C	IP1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620	0	TO PLC
TT-1001	TAHH-1001 (C63)	30	°C	IP11	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001	5	TO PLC
TT-1002	TAHH-1002 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002	5	TO PLC
TT-1003	TAHH-1003 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT-1004	TAHH-1004 (C63)	35	°C	IP11	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004	5	TO PLC
TT-1005	TAHH-1005 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005	5	TO PLC
TT-1006	TAHH-1006 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006	5	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-600	TALL-600 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-600	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-620	TALL-620 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-620	0	TO PLC
TT-HY-1001	TALL-1001 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT-HY-1002	TALL-1002 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002	5	TO PLC
TT-HY-1003	TALL-1003 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003	5	TO PLC
TT-1004	TALL-1004 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW ELECTRICAL ROOM -LL - TT-1004	5	TO PLC
TT-HY-1005	TALL-1005 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005	5	TO PLC
TT-HY-1006	TALL-1006 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006	5	TO PLC
TDI-600	TDAH-600 (ISO22)	10	°C	IP9	ANODE DT HIGH - H - TDY-600	0	TO PLC
TDI-600	TDAHH-600 (ISO22)	12	°C	IP1	ANODE DT VERY HIGH - HH - TDY-600	0	TO PLC
TDI-600	TDAL-600 (ISO22)	-1	°C	IP9	ANODE DT LOW - L - TDY-600	0	TO PLC
TDI-600	TDALL-600 (ISO22)	-2	°C	IP1	ANODE DT VERY LOW - LL - TDY-600	0	TO PLC
TT 60.1	TSA 60.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.1	0	TO PLC
TT 60.1	TSA 60.1 HH	>250	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1	0	TO PLC
TT 60.1	TSA 60.1 LL	<40	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1	3600	TO PLC
TT 60.2	TSA 60.2	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.2	0	TO PLC
TT 60.2	TSA 60.2 HH	>250	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2	0	TO PLC
TT 60.2	TSA 60.2 LL	<50	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2	3600	TO PLC
TT 61.1	TSA 61.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 61.1	0	TO PLC
TT 61.1	TSA 61.1 HH	>250	°C	IP1	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1	0	TO PLC
TS 64.2	TSA 64.2 HH	>400	°C	IP1	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2	0	TO PLC
TS 64.3	TSA 64.3 HH	>200	°C	IP1	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3	0	TO PLC
TS 64.4	TSA 64.4 HH	>60	°C	IP1	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4	0	TO PLC
TT 64.5	TSA 64.5	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.5	0	TO PLC
TT 64.5	TSA 64.5 HH A	>50	°C	IP1	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT 64.5	TSA 64.5 HH R	>150	°C	IP1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC
TT 64.6	TSA 64.6	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.6	0	TO PLC
TT 64.6	TSA 64.6 HH A	>50	°C	IP1	DRYER TOWER 64A, TOP ADS. TEMPERATURE VERY HIGH -HH - 64.6	0	TO PLC
TT-64.6	TSA 64.6 HH C	>40	°C	IP1	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6	0	TO PLC
TT 64.6	TSA 64.6 HH R	>250	°C	IP1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6	0	TO PLC
TT 64.7	TSA 64.7	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.7	0	TO PLC
TT 64.7	TSA 64.7 HH A	>50	°C	IP1	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC
TT 64.7	TSA 64.7 HH R	>150	°C	IP1	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC
TT 64.8	TSA 64.8	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.8	0	TO PLC
TT 64.8	TSA 64.8 HH A	>50	°C	IP1	DRYER TOWER 64B, TOP ADS. TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC
TT-64.8	TSA 64.8 HH C	>40	°C	IP1	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8	0	TO PLC
TT 64.8	TSA 64.8 HH R	>250	°C	IP1	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC
TT-621A	TSAHH-621A (ISO22)	80	°C	IP5A	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A	0	TO PLC
TT-621B	TSAHH-621B (ISO22)	80	°C	IP5B	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B	0	TO PLC
PCA-001	VAH-001 (ISO22)	2.2	V/cell	IP9	STACK-001 VERY HIGH CELL VOLTAGE - H - PCA-001	1	TO PLC
PCA-002	VAH-002 (ISO22)	2.2	V/cell	IP9	STACK-002 VERY HIGH CELL VOLTAGE - H - PCA-002	1	TO PLC
PCA-003	VAH-003 (ISO22)	2.2	V/cell	IP9	STACK-003 VERY HIGH CELL VOLTAGE - H - PCA-003	1	TO PLC
PCA-004	VAH-004 (ISO22)	2.2	V/cell	IP9	STACK-004 VERY HIGH CELL VOLTAGE - H - PCA-004	1	TO PLC
PCA-005	VAH-005 (ISO22)	2.2	V/cell	IP9	STACK-005 VERY HIGH CELL VOLTAGE - H - PCA-005	1	TO PLC
PCA-006	VAH-006 (ISO22)	2.2	V/cell	IP9	STACK-006 VERY HIGH CELL VOLTAGE - H - PCA-006	1	TO PLC
PCA-007	VAH-007 (ISO22)	2.2	V/cell	IP9	STACK-007 VERY HIGH CELL VOLTAGE - H - PCA-007	1	TO PLC
PCA-008	VAH-008 (ISO22)	2.2	V/cell	IP9	STACK-008 VERY HIGH CELL VOLTAGE - H - PCA-008	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
REC-001	VAH-101 (C63)	975	V	IP9	REC-001 HIGH VOLTAGE - H - VM-101	1	COM
REC-002	VAH-102 (C63)	975	V	IP9	REC-002 HIGH VOLTAGE - H - VM-102	1	COM
PCA-001	VAHH-001 (ISO22)	2.3	V/cell	IP1	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001	1	TO PLC
PCA-002	VAHH-002 (ISO22)	2.3	V/cell	IP1	STACK-002 VERY HIGH CELL VOLTAGE - HH - PCA-002	1	TO PLC
PCA-003	VAHH-003 (ISO22)	2.3	V/cell	IP1	STACK-003 VERY HIGH CELL VOLTAGE - HH - PCA-003	1	TO PLC
PCA-004	VAHH-004 (ISO22)	2.3	V/cell	IP1	STACK-004 VERY HIGH CELL VOLTAGE - HH - PCA-004	1	TO PLC
PCA-005	VAHH-005 (ISO22)	2.3	V/cell	IP1	STACK-005 VERY HIGH CELL VOLTAGE - HH - PCA-005	1	TO PLC
PCA-006	VAHH-006 (ISO22)	2.3	V/cell	IP1	STACK-006 VERY HIGH CELL VOLTAGE - HH - PCA-006	1	TO PLC
PCA-007	VAHH-007 (ISO22)	2.3	V/cell	IP1	STACK-007 VERY HIGH CELL VOLTAGE - HH - PCA-007	1	TO PLC
PCA-008	VAHH-008 (ISO22)	2.3	V/cell	IP1	STACK-008 VERY HIGH CELL VOLTAGE - HH - PCA-008	1	TO PLC
REC-001	VAHH-101 (C63)	1023	V	IP1	REC-001 VERY HIGH VOLTAGE - HH - VM-101	1	COM
REC-002	VAHH-102 (C63)	1023	V	IP1	REC-002 VERY HIGH VOLTAGE - HH - VM-102	1	COM
PCA-001	VAL-001 (ISO22)	1.55	V/cell	IP9	STACK-001 LOW CELL VOLTAGE - L - PCA-001	1	TO PLC
PCA-002	VAL-002 (ISO22)	1.55	V/cell	IP9	STACK-002 LOW CELL VOLTAGE - L - PCA-002	1	TO PLC
PCA-003	VAL-003 (ISO22)	1.55	V/cell	IP9	STACK-003 LOW CELL VOLTAGE - L - PCA-003	1	TO PLC
PCA-004	VAL-004 (ISO22)	1.55	V/cell	IP9	STACK-004 LOW CELL VOLTAGE - L - PCA-004	1	TO PLC
PCA-005	VAL-005 (ISO22)	1.55	V/cell	IP9	STACK-005 LOW CELL VOLTAGE - L - PCA-005	1	TO PLC
PCA-006	VAL-006 (ISO22)	1.55	V/cell	IP9	STACK-006 LOW CELL VOLTAGE - L - PCA-006	1	TO PLC
PCA-007	VAL-007 (ISO22)	1.55	V/cell	IP9	STACK-007 LOW CELL VOLTAGE - L - PCA-007	1	TO PLC
PCA-008	VAL-008 (ISO22)	1.55	V/cell	IP9	STACK-008 LOW CELL VOLTAGE - L - PCA-008	1	TO PLC
PCA-001	VALL-001 (ISO22)	1.5	V/cell	IP1	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001	1	TO PLC
PCA-002	VALL-002 (ISO22)	1.5	V/cell	IP1	STACK-002 VERY LOW CELL VOLTAGE - LL - PCA-002	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PCA-003	VALL-003 (ISO22)	1.5	V/cell	IP1	STACK-003 VERY LOW CELL VOLTAGE - LL - PCA-003	1	TO PLC
PCA-004	VALL-004 (ISO22)	1.5	V/cell	IP1	STACK-004 VERY LOW CELL VOLTAGE - LL - PCA-004	1	TO PLC
PCA-005	VALL-005 (ISO22)	1.5	V/cell	IP1	STACK-005 VERY LOW CELL VOLTAGE - LL - PCA-005	1	TO PLC
PCA-006	VALL-006 (ISO22)	1.5	V/cell	IP1	STACK-006 VERY LOW CELL VOLTAGE - LL - PCA-006	1	TO PLC
PCA-007	VALL-007 (ISO22)	1.5	V/cell	IP1	STACK-007 VERY LOW CELL VOLTAGE - LL - PCA-007	1	TO PLC
PCA-008	VALL-008 (ISO22)	1.5	V/cell	IP1	STACK-008 VERY LOW CELL VOLTAGE - LL - PCA-008	1	TO PLC
PCA-001	VCA-001 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-001 - PCA-001	1	TO PLC
PCA-002	VCA-002 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-002 - PCA-002	1	TO PLC
PCA-003	VCA-003 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-003 - PCA-003	1	TO PLC
PCA-004	VCA-004 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-004 - PCA-004	1	TO PLC
PCA-005	VCA-005 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-005 - PCA-005	1	TO PLC
PCA-006	VCA-006 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-006 - PCA-006	1	TO PLC
PCA-007	VCA-007 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-007 - PCA-007	1	TO PLC
PCA-008	VCA-008 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-008 - PCA-008	1	TO PLC
PCA-001	VKA-001 (ISO22)	10	%	IP1	STACK-001 VOLTAGE DROP - PCA-001 - DROP	0	TO PLC
PCA-002	VKA-002 (ISO22)	10	%	IP1	STACK-002 VOLTAGE DROP - PCA-002 - DROP	0	TO PLC
PCA-003	VKA-003 (ISO22)	10	%	IP1	STACK-003 VOLTAGE DROP - PCA-003 - DROP	0	TO PLC
PCA-004	VKA-004 (ISO22)	10	%	IP1	STACK-004 VOLTAGE DROP - PCA-004 - DROP	0	TO PLC
PCA-005	VKA-005 (ISO22)	10	%	IP1	STACK-005 VOLTAGE DROP - PCA-005 - DROP	0	TO PLC
PCA-006	VKA-006 (ISO22)	10	%	IP1	STACK-006 VOLTAGE DROP - PCA-006 - DROP	0	TO PLC
PCA-007	VKA-007 (ISO22)	10	%	IP1	STACK-007 VOLTAGE DROP - PCA-007 - DROP	0	TO PLC
PCA-008	VKA-008 (ISO22)	10	%	IP1	STACK-008 VOLTAGE DROP - PCA-008 - DROP	0	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
REC-001/002	VPA-001 (ISO22)	600	s	IP9	POLARIZATION TIME TOO LONG	-	TO PLC
VM-001	VQAHH-001 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-001 AND VM-001 - HH	5	TO PLC
VM-002	VQAHH-002 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-002 AND VM-002 - HH	5	TO PLC
VM-003	VQAHH-003 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-003 AND VM-003 - HH	5	TO PLC
VM-004	VQAHH-004 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-004 AND VM-004 - HH	5	TO PLC
VM-005	VQAHH-005 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-005 ET VM-005 - HH	5	TO PLC
VM-006	VQAHH-006 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-006 ET VM-006 - HH	5	TO PLC
VM-007	VQAHH-007 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-007 ET VM-007 - HH	5	TO PLC
VM-008	VQAHH-008 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-008 ET VM-008 - HH	5	TO PLC
CT-600	YAH-600 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT600 - H	5	TO PLC
CT-620	YAH-620 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT620 - H	5	TO PLC
CT-600	YAHH-600 (ISO22)	1	µS/cm	IP1	VERY HIGH CONDUCTIVITY CT600 - HH	5	TO PLC
CT-620	YAHH-620 (ISO22)	1	µS/cm	IP1	VERY HIGH CONDUCTIVITY CT620 - HH	5	TO PLC
CT-600	YALL-600 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT600	5	TO PLC
CT-620	YALL-620 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT620	5	TO PLC

Legend:

	Update compare to rev03

elogen

Electrolyser Package
CAUSE AND EFFECT MATRIX
C&S CrossWind Project

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CAUSE & EFFECT DIAGRAM

MARK UP BCA - 14/04/2025

CAUSES

Effect reference		EFFECTS
INTERLOCK PROCESS	DESCRIPTION	
IP1	Major Fault	DISPLAY alarm
IP2	LALL-600 - Low Level in ST-600	STOP AND SET (Hydrolyser Unit) (Hydrolyser)
IP3	LALL-620 - Low Level in ST-620	DEENERGISE
IP4	Hydrogen Purity not reached or Hydrogen pressure too high	Air solenoid valves Back to rest position
IP5A	Problem on CP-620A requiring start of the CP-620B pump	CLOSE Control valves MPV-611 (FC)
IP5B	Problem on CP-620B requiring start of the CP-620A pump	CLOSE Control valves MPV-630 (FC)
IP6A	Problem on CP-600A requiring start of the CP-600B pump	CLOSE PV-631 (FC)
IP6B	Problem on CP-600B requiring start of the CP-600A pump	CLOSE H2 purification unit pneumatic valves
IP7	Problem on LP 300A/B requiring instant stop of the running pump	CLOSE M3WV-200 (FC)
IP8	Low Temperature in anodic/cathodic water loop and Ambient	CLOSE PV-633 (FC) - CUSTOMER LINE ISOLATED
IP9	Process value out of regular operating value	CLOSE PV-640 (FC)
IP10	*Not Used*	CLOSE PV-642 (FC)
IP11	High Ambient temperature - Loss of AHU	START INTERMITTENTLY (SU2: 1000 / 1001 / 1002 / 1003
IP12	*Not Used*	LIGHT ON CONSTANT VE-002 / 006 / 010 (Orange)
IP13	Hydrogen Ambient Detection High	LIGHT ON FLASHING VE-001 / 005 / 009 (Rouge)
IP17B	Problem on LP 300B requiring start of the LP 300A	STOP IMMEDIATELY CP-200
IP15	*Not Used*	STOP AT THE END OF STOP SEQUENCE CP-200
IP16	Problem on pure water feed to anodic loop	STOP IMMEDIATELY BY SETTING VAR600A/B to 0% (STO) THE RUNNING CP-600 (A or B following status)
IP17A	Problem on LP 300A requiring start of the LP 300B	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR600A/B TO 0% THE RUNNING CP-600 (A or B following status)
IP20	LOSS OF HALF OF THERMAL POWER (THS-400 or THS-200)	STOP IMMEDIATELY BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)
		STOP AT THE END OF STOP SEQUENCE BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)
		STOP AT THE END OF STOP SEQUENCE DC-200 - All motors
		STOP IMMEDIATELY H2 purification unit deoxo dryers heating
		STOP IMMEDIATELY BY SETTING VAR300A/B TO 0% THE RUNNING LP-300 (A or B following status)
		STOP IMMEDIATELY WC-400 (CP-400)
		STOP AT THE END OF STOP SEQUENCE WC-400 (CP-400)
		STOP IMMEDIATELY WC-401 (CP-401)
		STOP AT THE END OF STOP SEQUENCE WC-401 (CP-401)
		OPEN MPV-611 (FC) till depressurisation and/or inerting of ST-600 completed. OPEN PV-610 if MPV-611 is failing
		OPEN PV-631 (FC) till depressurisation and/or inerting of ST-620 completed. OPEN PV-630 if PV-631 is failing.
		OPEN PV-901 (FC) till PT-610 reach 0.5 barg
		OPEN PV-901 (FC) till inerting of ST-600 completed
		OPEN PV-921 (FC) till inerting of ST-620 completed
		OPEN PV-921 (FC) till PT-610 reach 0.6 barg
		OPEN IMMEDIATELY PV-631 (FC)
		OPEN IMMEDIATELY PV-630 (FC) till pressure < PT-630 HH
		FORCE STANDBY PRESSURISED TT-1003-1 TAH-1003 or TT-1004-1 TAH-1004 or TT-1005-1 TAH-1005 or TT-1006-1 TAH-1006
		FORCE STANDBY PRESSURISED After 1100s
		SWITCH LP-300 - From A to B or B to A
		SWITCH CP-600 - From A to B or B to A
		SWITCH CP-620 - From A to B or B to A
		GO TO STANDBY PRESSURISED
		REDUCE ELECTROLYSER SETPOINT AT 50%
		Rectifier current is set instantly to 0A (no ramp down)

Notes:

Modification V5 Rev06 are in yellow

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DAVE MUSGROVE 17/04/2025
LUC PAOLETTI 17/04/2025

elogen

Electrolyzer Package

CAUSE AND EFFECT MATRIX

C63- CrossWind Project

Document Code	C63-PWI-002
Revision	Rev.006
Page Number	05 of 05

CAUSE & EFFECT DIAGRAM

CAUSES		EFFECTS	DISPLAY alarm	ENABLE ESD signal (ASE-001 : Process) to customer SCADA	ENABLE ESD signal (ASE-002: Fire issue) to customer SCADA	ENABLE ESD signal (ASE-003:Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger MN Breaker (Main Supply)	STOP AND SET Rectifiers (all) (Uset=0V)	ACTIVATE Safety E.Board ~~Green~~ 360KA1 MN Inter DC (ESD Rectifiers), MN Rectifier Breaker	START CONTINOUSLY (NOT IN SIS) BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT (NOT IN SIS) VE-001 / 005 / 009 / 013 ~~Orange~~ Red	STOP IMMEDIATELY CP-600A/B BY SETTING VAR-600A/B TO 0%	STOP IMMEDIATELY CP-620A/B BY SETTING VAR-620A/B TO 0%	STOP IMMEDIATELY LP-300A/B BY SETTING VAR-300A/B TO 0%	OPEN PV-610 (FO) till depressurisation and/or inerting of ST-600 completed.	OPEN PV-630 (FO) till depressurisation and/or inerting of ST-620 completed. OPEN PV-631 if PV-630 is failing.	OPEN PV-900 (FO) after inerting of ST-600 completed	OPEN PV-920 (FO) after inerting of ST-620 completed	CLOSE AND LOCK PV-641 (FC)	CLOSE PV-635 (FC)	CLOSE AND LOCK PV-601 (FC)	OPEN IMMEDIATELY PV-610 (FO) till pressure < PT-611_H-0,2	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-631_H-0,2	CLOSE PV-800	OPEN PV-900 (FO) till PT611 > 0.5 barg	OPEN PV-920 (FO) till PT-631 > 0.5 barg	CLOSE PV-501 (FC)	STOP IMMEDIATELY CP-600A BY SETTING VAR-600A TO 0%	STOP IMMEDIATELY CP-600B BY SETTING VAR-600B TO 0%	STOP IMMEDIATELY CP-620A BY SETTING VAR-620A TO 0%	STOP IMMEDIATELY CP-620B BY SETTING VAR-620B TO 0%	TRIGGER IS1
Effect reference																																	
INTERLOCK SAFETY	*DESCRIPTION*																																
IS1	ESD Electrolyser following Process issue SAFETY STOP		X	X			X	X	X	X	X				X	X	X	X		X													
IS2	Isolation from customer H2 line		X																	X													
IS3	Isolation balancing line (640)		X																X														
IS4	ESD Electrolyser following Fire issue		X		X		X	X	X	X	X				X	X	X	X		X													
IS5	Very Low water level in ST-620		X					X					X																				X 360KA1
IS6	Very Low water level in ST-600		X					X				X																					X 360KA1
IS7	ESD Electrolyser following Gas issue		X			X	X	X	X	X	X				X	X	X	X		X													
IS8	*Not Used*																																
IS9	Very High Flowrate on H2 Analysis Line		X																							X							
IS10	Very Low Pressure on anodic side		X																								X						
IS11	Very Low Pressure on cathodic side		X																									X					
IS12	Very High Level ST-600		X											X																			
IS13	Very Low Level CS-610		X																														
IS14	Very Low Level in H2 Vent		X																										X				
IS15	Blocked discharge CP600A		X																											X			
IS16	Blocked discharge CP600B		X																												X		
IS17	Blocked discharge CP620A		X																													X	
IS18	Blocked discharge CP620B		X																														X
IS19	MPV-611 fault - High Oxygen Pressure		X																														
IS20	PV-631 fault - High Hydrogen Pressure		X																										X				

Notes:

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IS15 & IS16 TO FOR RANGE 16 BAR

DAVE MUSGROVE 17/04/2025

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elogen	Electrolyzer Package						Document Code	
	Smoke Detector Zone List						Revision	Rev.0
	C63- CrossWind Project						Page Number	4 of 4
NAME	CARD	RACK	POS	CHANNEL	TYPE	LEVEL	ZONE	LOGIC
SD-001A_SMOKE DET.	F7009	1	1	1	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001B_SMOKE DET.	F7009	1	1	2	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001C_SMOKE DET.	F7009	1	1	3	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-002A_SMOKE DET.	F7009	1	1	4	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002B_SMOKE DET.	F7009	1	1	5	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002C_SMOKE DET.	F7009	1	1	6	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-003A_SMOKE DET.	F7009	1	1	7	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003B_SMOKE DET.	F7009	1	1	8	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003C_SMOKE DET.	F7009	1	1	9	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-004A_SMOKE DET.	F7009	1	1	10	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004B_SMOKE DET.	F7009	1	1	11	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004C_SMOKE DET.	F7009	1	1	12	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-005A_SMOKE DET.	F7009	1	1	13	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005B_SMOKE DET.	F7009	1	1	14	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005C_SMOKE DET.	F7009	1	1	15	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-006A_SMOKE DET.	F7009	1	1	16	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006B_SMOKE DET.	F7009	1	1	17	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006C_SMOKE DET.	F7009	1	1	18	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-007A_SMOKE DET.	F7009	1	1	19	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007B_SMOKE DET.	F7009	1	1	20	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007C_SMOKE DET.	F7009	1	1	21	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-008A_SMOKE DET.	F7009	1	1	22	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008B_SMOKE DET.	F7009	1	1	23	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008C_SMOKE DET.	F7009	1	1	24	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
FB-001_FIRE BUTT.	F7009	1	1	25	D-MCP	00	8 - 20-UCP-001	1 = ALARM
FB-002_FIRE BUTT.	F7009	1	1	26	D-MCP	00	9 - LEVEL 00	1 = ALARM
FB-003_FIRE BUTT.	F7009	1	1	27	D-MCP	01	10 - LEVEL 01	1 = ALARM
FB-004_FIRE BUTT.	F7009	1	1	28	D-MCP	01	10 - LEVEL 01	1 = ALARM

TESTED 11.04.25
JOHN MACKILLOP
E. [illegible]

Section 6 PIPING AND VESSEL PREPARATION

Section 6.1 Final Mechanical / Vessel Inspection Checks Index

5.0 ITRs P&M
GALT

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS	
Leak Test Pack	#01
Tested System	ANODE WATER LOOP
Test Pressure (Barg)	2.0
Test Fluid	NITROGEN

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
ST-25 PRESSURE GAUGE (4bar)	4068 17052	02 AUG 2025

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
	28 FEB 2025	11:45	2.3	10.0
END	Date	Time	Pressure (Barg)	Temperature (°C)
	28 FEB 2025	13:45	2.3	10.0

RESULT			
Test Duration		Delta P (Bar)	
Snoop Detection without Bubbles	~~YES~~ / NO / NA		
Gas Detection Without Leaks	YES / NO / ~~NA~~		
Result	~~OK~~ / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

FORES ENGINEERING FORLI' - ITALY

	FORES	ELOGEN	CROSSWIND
NAME	MATTEO ZANELLATO		
DATE	28 FEB 2025		
SIGNATURE	FORES ENGINEERING FORLI' - ITALY		

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS	
Leak Test Pack	#02
Tested System	CATHODE WATER LOOP / H2 PRODUCTION
Test Pressure (Barg)	2.0
Test Fluid	NITROGEN

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
ST-25 PRESSURE GAUGE (4 barg)	1106817052	02 AUG 2025

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
	01 MAR 2025	14:55	2.0	9.0
END	Date	Time	Pressure (Barg)	Temperature (°C)
	01 MAR 2025	15:55	2.0	9.0

RESULT			
Test Duration	2 h	Delta P (Bar)	0.0
Snoop Detection without Bubbles	~~YES~~ / NO / NA		
Gas Detection Without Leaks	YES / NO / ~~NA~~		
Result	~~OK~~ / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	LUCA MARCI		
DATE	01 MAR 2025		
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS	
Leak Test Pack	LT03
Tested System	All in LT03
Test Pressure (Barg)	2
Test Fluid	N2

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Manometer.	1108 81 70 52 - (ST-25)	02/08/2025.

TEST				
	Date	Time	Pressure (Barg)	Temperature (°C)
BEGINNING	21/02/25	19H07	2	6
	Date	Time	Pressure (Barg)	Temperature (°C)
END	21/02/25	20H22	2	6

RESULT			
Test Duration	1H05	Delta P (Bar)	0
Snoop Detection without Bubbles	YES / NO / NA		
Gas Detection Without Leaks	YES / NO / NA		
Result	OK / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	S. OSTI	MLF	
DATE	21/02/2025	21/02/25.	
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS	
Leak Test Pack	LT03
Tested System	All in LT03
Test Pressure (Barg)	2
Test Fluid	N2

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Manometer.	1108 81 70 52 - (ST-25)	02/08/2025.

TEST				
	Date	Time	Pressure (Barg)	Temperature (°C)
BEGINNING	21/02/25	19H07	2	6
	Date	Time	Pressure (Barg)	Temperature (°C)
END	21/02/25	20H22	2	6

RESULT			
Test Duration	1H05	Delta P (Bar)	0
Snoop Detection without Bubbles	YES / NO / NA		
Gas Detection Without Leaks	YES / NO / NA		
Result	OK / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	S. OSTI	MLF	
DATE	21/02/2025	21/02/25.	
SIGNATURE			

Oggi
14:44

LIVE



17:14

5G 66

Oggi
16:48

LIVE



elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS	
Leak Test Pack	HVAC Glycoled water loop Leak Test Packs 1
Tested System	BLPH 61-06
Test Pressure (Barg)	2,4
Test Fluid	

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
	05/03/25	14:48	2.4	14
END	Date	Time	Pressure (Barg)	Temperature (°C)
	05/03/25	16:48	2,4	14

RESULT			
Test Duration	2h	Delta P (Bar)	0
Snoop Detection without Bubbles	YES / NO / NA		
Gas Detection Without Leaks	YES / NO / ~~NA~~		
Result	OK / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	Osli Stelou	PAOLETTI Luc	
DATE	05/03/25	05/03/25	
SIGNATURE			



Manometer - 1106817052 (ST-25) - 15/02/25 - 15:45



Manometer - 1106817052 (ST-25) - 15/02/25 - 17:04

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS

Leak Test Pack	HVAC Glycoled water Loop leak Test Pack 2
Tested System	HVAC Loop 200
Test Pressure (Barg)	2
Test Fluid	Dry Air

EQUIPEMENT USED

Test Equipment Used	Serial Number	Calibration Expiry Date
Manometer	1106 81 7052 (ST-C5)	02/08/25

TEST

	Date	Time	Pressure (Barg)	Temperature (°C)
BEGINNING	15/02	15h45	2,05	7
END	15/02	17h10	2,05	7

RESULT

Test Duration	1h 25	Delta P (Bar)	0
Snoop Detection without Bubbles	(YES) / NO / NA		
Gas Detection Without Leaks	YES / NO / (NA)		
Result	(OK) / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	MANUEL SCHIAVONI	MOUFOUMA FRAY	E. MACKUP
DATE	15/02/25	15/02/2025	15.02.25
SIGNATURE			

Test Inspection certificate / Abnahmeprüfzeugnis **EN 10204 – 3.1**

for setting and testing of safety valves acc. to / über die Einstellung und Prüfung von Sicherheitsventilen gemäß/
AD2000-A2; DIN EN ISO 4126-1

Material documentation / Werkstoffdokumentation

HEROSE

Customer Auftraggeber	Elogen 27-29 Avenue Carnot F-91300 MASSY	**Order-No.** Bestell-Nr.	BC0008742	**Item.-No.** Pos.-Nr.	**Date** Datum 03.09.2024
Customer Ref.-No Kunden-Ref.-Nr.		**HEROSE-Ref-No.** HEROSE-Kom-Nr.	1000775674	**Item.-No.** Pos.-Nr. 10	**HEROSE Prod-No.** HEROSE-Prod-Nr. SVKO2295473

Test Object Prüfgegenstand	Safety Valve, type tested for air and similar gases Normal-Sicherheitsventil bauteilgeprüft für Luft und ähnliche Gase	**Custom. Mat.-No.** Kunden Mat.-Nr.	SOU-1305	**Tolerance**	+-3% of set pressure or +-0,1 bar whichever is greater
		Part-No. Artikel-Nr.	06C02.A002.000011	**Serial-No.** Serien-Nr.	according to appendix gemäß Anhang
Set Pressure Einstelldruck	10,00 bar 145 PSI	**Flow area A0 [mm²]** Strömungsquerschnitt A0 [mm²]	50,3	**Flow diameter d0 [mm]** Strömungsdurchmesser d0 [mm]	8
Quantity Stückzahl	1				
Coefficient of discharge Ausflussziffer	α_w / K_{dr} 0,70	**Nominal Size** Nennweite	**Inlet** / Eintritt	male thread BSPP 1/4"	
			Outlet / Austritt		
		Nominal Pressure Nenndruck	**Inlet** / Eintritt	PN63	
Capacity / Leistung	291Nm³/h (AD 2000)		**Outlet** / Austritt		
Lift Hub	2,3 mm	**Temperature range** Termperaturbereich	-20 °C till/bis +160 °C	**Function** Funktion	AD 2000 **Full lift** / Vollhub (5%) **Standard lift** / Normalhub (10%) X

Approval / Zulassung EC-Type Examination / EG-Baumusterprüfung

Ventilnorm / valve standard EN ISO4126-1:2016

Approval No. / Zulassg. Nr. 0045/202/1201/Z/00517/23/D/001(02)

Approval / Zulassung TÜV-Verband

Standard / Standard BP SIVE 0100-RL

Approval No. / Bauteilkennzeichen 20-1090

Notified Body benannte Stelle TÜV NORD

Identification-No. Identifikations-Nr. 0045

Category IV acc. PED 2014/68/EU **Modul** B + D
Kategorie IV nach DGRL 2014/68/EU

Customer Auftraggeber	Elogen 27-29 Avenue Carnot F-91300 MASSY	**Order-No.** Bestell-Nr.	BC0008742	**Item.-No.** Pos-Nr.	**Date** Datum 03.09.2024
Customer Ref.-No Kunden-Ref.-Nr.		**HEROSE-Ref-No.** HEROSE-Kom-Nr.	1000775674	**Item.-No.** Pos.-Nr. 10	**HEROSE Prod-No.** HEROSE-Prod-Nr. SVKO2295473

The testing was done with X **Luft** / Air **at ambient temperature**
Die Einstellung erfolgte mit **Water** / Wasser bei Umgebungstemperatur

Testing of Valve / Prüfung der Armatur

Description / Beschreibung	**Remark** / Bemerkung		
Shell strength test with water 1,5 x PN Festigkeit des drucktrag. Gehäuses mit Wasser 1,5 x PN	Test acc. to / gemäß EN ISO 4126-1 Kap. 6.3 + 6.4		X
Seat tightness test Sitzdichtheit von Armaturen	Test acc. to / gemäß EN ISO 4126-1 Kap. 6.6	**Seat tightness similar to API 527** Sitzdichtheit in Anlehnung an API 527	X
Operability Funktionsfähigkeit	Test acc. to / gemäß EN ISO 4126-1 Kap. 6.5		X
cleaned for oxygen service gereinigt für den Betrieb mit Sauerstoff	In acc. / entsprechend ISO 23208 - O2		

Results of the inspection / Ergebnis der Prüfungen:
The inspections marked with x were carried out on each valve. No faults were observed.
Die mit x gekennzeichneten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt.

seal marked with
Plombe gekennzeichnet mit 

body marked with
Gehäuse gekennzeichnet mit

country of origin / Ursprungsland **Germany** / Deutschland

Bad Oldesloe, 26.09.2024

Authorized inspection representative/ Abnahmebeauftragter

Customer Auftraggeber	Elogen 27-29 Avenue Carnot F-91300 MASSY	**Order-No.** Bestell-Nr.	BC0008742	**Item.-No.** Pos-Nr.	**Date** Datum 03.09.2024
Customer Ref.-No Kunden-Ref.-Nr.		**HEROSE-Ref-No.** HEROSE-Kom-Nr.	1000775674	**Item.-No.** Pos.-Nr. 10	**HEROSE Prod-No.** HEROSE-Prod-Nr. SVKO2295473

Materials / Materialien

Batches used / verwendete Chargen

Serial-No. Serien-Nr.	**TAG-No. 1** TAG-Nr. 1	**TAG-No. 2** TAG-Nr. 2	**TAG-No. 3** TAG-Nr. 3	**TAG-No. 4** TAG-Nr. 4	**Name** Benennung	**Material** Werkstoff	**Batch-No.** Charge
4601569	PSV-150				body / Gehäuse	1.4404	AW24043

Enclosure / Anlagen

Abnahmeprüfzeugnis / Test Inspection certificate
über die Einstellung und Prüfung von Sicherheitsventilen gemäß /
for setting and testing of safety valves acc. to
AD2000-A2; DIN EN ISO 4126-1
Werkstoffdokumentation / Material documentation

EN 10204 – 3.1

gemäß / EN 10204 – 3.1
acc. to

Auftraggeber Elogen / 27-29 Avenue Carnot / F-91300 Massy
Customer

Zertifikats-Nr. 225
Certificate No.

Bestell-Nr. BC0006330
Order-No.
Customer Order no.

Datum 04.12.23
Date

HEROSE-Kom-Nr. 1000760244
HEROSE-Ref-No.

Pos. 50
Item

Art-Nr. Part. No.	**Menge** Quantity	**TÜV-Verband-Bauteilprüf-Nr.** TÜV-Verband-Type-test approval No.	**K_{dr} / α_w Ausflussziffer** Coefficient of discharge				**DGRL 2014/68/EU** PED 2014/68/EU
			D/G S/G	Dämpfe / Gase Steam / Gase	**F L**	Flüssigkeiten Liquids	
06810.1022.000000M	1	23-1130	0,50		0,50		CE 0045

Ansprechdruck Set pressure **p_a [bar g]**	**PN**	**DN**		**d_o [mm]**	**A_o [mm²]**	**Tag No.:**
		Eintritt Inlet	**Austritt** Outlet	Strömungs-durchmesser Flow diameter	Strömungs-querschnitt Flow area	
13,0	180	G 1/2 male	G 1/2 female	10,0	78,5	-

Serial Nr. /Valve No.: 4363991
Customer Material No. SOU-2405

Leistung / Capacity 413 **Nm³/h**
7561 **kg/h**

Gehäuse Body	1.4408	**Chargen-No.** Batch-No.	TDPH450	**von** from	Tengda
Sitzeinsatz Seat	1.4571	**Chargen-No.** Batch-No.	9523	**von** from	Damstahl

Prüfung der Armatur / Testing of Valve**:**

Beschreibung / Description	**Bemerkung /** Remark
Festigkeit des Gehäuses mit Wasser 1,5 x PN Body strength test with water 1,5 x PN	**Test P10 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.3 + 6.4**
Funktionsfähigkeit Functional test	**Test F20 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.5**
Dichtheitstest des Abschlusses Seat tightness	**Test gemäß** / acc. to **EN ISO 4126-1 Kap. 6.6, API 527, Herose QMVA10-006**
Gereinigt für den Betrieb mit Sauerstoff cleaned for oxygen service	**entspr**. / in acc. **ISO 23208 -** O2

Die Einstellung erfolgte mit: The setting was done with:	☒ **Luft** Air	☐ **Wasser** Water	☐ **Dampf** Steam	
	Umgebungstemperatur [°C] Ambient temperature		Temp.[°C]	

☒ **Plombe gekennzeichnet mit** seal marked with	**Gehäuse gekennzeichnet mit** body marked with

Ergebnis der Prüfungen / Results of the inspections

Die oben genannten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt.
The above mentioned tests were carried out on each valve. No faults were observed.

Anlagen / Enclosures: 2

Bad Oldesloe, 07.02.2024

Abnahmebeauftragter/
Authorized inspection representative

HEROSE GMBH
ARMATUREN UND METALLE
Elly-Heuss-Knapp-Str.12
D-23843 Bad Oldesloe
Tel. (+49) 4531/509-0
Fax (+49) 4531/509-120

Abnahmeprüfzeugnis / Test Inspection certificate
über die Einstellung und Prüfung von Sicherheitsventilen gemäß /
for setting and testing of safety valves acc. to
AD2000-A2; DIN EN ISO 4126-1
Werkstoffdokumentation / Material documentation

EN 10204 – 3.1

gemäß / EN 10204 – 3.1
acc. to

Auftraggeber Elogen / 27-29 Avenue Carnot / F-91300 Massy
Customer

Zertifikats-Nr. 837
Certificate No.

Bestell-Nr. BC0007674
Order-No.
Customer Order-No.

Datum 29.04.24
Date

HEROSE-Kom-Nr. 1000768121
HEROSE-Ref-No.

Pos. 10
Item

Art-Nr. Part. No.	**Menge** Quantity	**TÜV-Verband Bauteilprüf-Nr.** TÜV-Verband Type-test approval No.	**K_{dr} / α_w Ausflussziffer** Coefficient of discharge				**DGRL 2014/68/EU** PED 2014/68/EU
			D/G **S/G** Dämpfe / Gase Steam / Gase		**F** **L** Flüssigkeiten Liquids		
06810.0622.000000M	1	23-1130	0,52		0,42		CE 0045

Ansprechdruck Set pressure **p_a [bar g]**	**PN**	**DN**		**d_o [mm]**	**A_o [mm²]**	**Tag No.:**
		Eintritt Inlet G 1/2 male	**Austritt** Outlet G 1/2 female	Strömungs-durchmesser Flow diameter	Strömungs-querschnitt Flow area	
36,0	400			6,0	28,0	-

Serial Nr. /Valve No.: 4484758
Customer Material No. -

Leistung / Capacity 418 **Nm³/h** 3805 **kg/h**

Gehäuse Body	1.4408	**Chargen-No.** Batch-No.	TDPM401	**von** from	Tengda
Sitzeinsatz Seat	1.4571	**Chargen-No.** Batch-No.	9699	**von** from	Damstahl

Prüfung der Armatur / Testing of Valve**:**

Beschreibung / Description	**Bemerkung /** Remark
Festigkeit des Gehäuses mit Wasser 1,5 x PN Body strength test with water 1,5 x PN	**Test P10 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.3 + 6.4**
Funktionsfähigkeit Functional test	**Test F20 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.5**
Dichtheitstest des Abschlusses Seat tightness	**Test gemäß** / acc. to **EN ISO 4126-1 Kap. 6.6,** **In Anlehnung an/** similar to **API 527, Herose QMVA10-006**
Gereinigt für den Betrieb mit Sauerstoff cleaned for oxygen service	**entspr**. / in acc. **ISO 23208 -** O2

Die Einstellung erfolgte mit: The setting was done with:	☒ **Luft** Air ☐ **Wasser** Water **Umgebungstemperatur** [°C] Ambient temperature	☐ **Dampf** Steam Temp.[°C]	
☒ **Plombe gekennzeichnet mit** seal marked with		**Gehäuse gekennzeichnet mit** body marked with	

Ergebnis der Prüfungen / Results of the inspections

Die oben genannten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt.
The above mentioned tests were carried out on each valve. No faults were observed.

Anlagen / Enclosures: 2

Bad Oldesloe, 10.06.2024

Abnahmebeauftragter/
Authorized inspection representative

HEROSE GMBH Elly-Heuss-Knapp-Str.12 Tel. (+49) 4531/509-0
ARMATUREN UND METALLE D-23843 Bad Oldesloe Fax (+49) 4531/509-120

Quanzhou Tengda Fine Casting Co., Ltd.

Address:29 Luojiang Road ,Luojiang District, Quanzhou, Fujian,China
TEL: +86 595 22653165 FAX: +86 595 22653480

Abnahmeprüfzeugnis (EN10204-3.2)
Inspection Certificate (EN10204-3.2)
检验证明（EN10204-3.2）

Certificate No.: 01 202 CHN/Q-02 0009

Zertifiziert nach Druckgeräte-Richtlinie 2014/68/EU,Anhang 1, Abschnitt 4.3, AD2000-W0 durch TÜV Rheinland Service GmbH (Benannte Stelle Kenn-Nr. 0035)	Certified in accordance to Pressure Equipment Directive 2014/68/EU Annex 1, Paragraph 4.3, AD2000-W0 by TÜV Rheinland Service GmbH （Notified Body Code No. 0035）	德国莱茵公司根据压力容器 2014/68/EU，附录 1 第 4.3 章的要求进行论证（Notified Body Code No. 0035）

014XM-09

Prüf-Nr. / Certificate No / 证明号**:2024003-014**	Besteller / Customer / 客户: HEROSE GMBH
Prüfgegenstand / Article / 品名:	Gussteil / Casting / 铸件
Prüfgrundlage / Testbasis / 生产技术规范**:**	AD2000-Merkblatt W5, W10, A4 (Herose material specification ES-Guss 1.4408/CF8M
Werkstoff / Material / 材质: 1.4408/CF8M	Entsprechend / according to / 生产依据: DIN EN 10213 /ASTM-SA351, CF8M
Erschmelzungsart / Melting process / 冶炼方法**:**	Electric furnace melting/电炉冶炼
Wärmebehandlung / Heat treatment / 热处理:	1050℃ / 2h, AT QW / Lösungsgeglüht und in Wasser abgeschreckt 1050℃ / 2h, AT QW / Solution annealing and quenched by water 1050℃ / 2 小时 / 固溶
Nennweite/Nominal Size/公称尺寸:	Nenndruck / Nominal Pressure / 标称压力**: see table below**
Herstellerzeichen / Mark of Manufacture / 厂家标志:	TD

Umfang der Lieferung / Content of delivery / 运输内容

Art.-Nr. Item No. 零件号	Stückzahl Quantity 数量	Gewicht Weight 重量	Gegenstand / Article/品名	DN	PN	Schmelze Nr. Heat No. 炉次	Probe-Nr. Specimen No. 试样号
55051.0095.0787	26					TDPM401	G-15-230926
55051.0095.0787	24					TDPH449	J-11-230828

Ergebnis	Die gestellten Anforderung sind laut Anlage 1 erfüllt.
Result	The requirements are fulfilled, as listed in Annex 1.
结果	满足附录 1 中所列的要求。

Anlage 1 / Annex 1 / 附录 1: Ergebnis der Prüfungen / Test Results / 测试结果

M) Chemische Analyse / chemical analysis / 化学分析

Schmelze Nr. Heat No. / 炉次	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	/
DIN EN 10213 / ASTM-SA351	≤0.07	≤1.5	≤1.5	≤0.040	≤0.030	18.0-20.0	2.00-2.50	9.0-12.0	/

TDPM401	0.052	0.697	1.081	0.0340	0.0032	18.66	2.208	9.76	/
TDPH449	0.067	0.726	1.263	0.0320	0.0036	18.51	2.187	9.56	/

N) Mechanische Prüfungen / Mechanical test / 机械性能试验

Casting No. 铸造炉号	Test temp 试温℃ RT				Test temp 试温℃ RT
	stress 试验应力 Rp0.2% N/mm²	stress 试验应力 Rp1.0% N/mm²	Tensile Strength 抗拉强度 Rm N/mm²	Elongation 延伸率 A_b %	Energy of impact of ISO V-specimen ISO V 形试样的冲击能量
DIN EN 10213 / ASTM-SA351	≥205	/	485-640	≥30	≥70
G-15-230926	227		528	41	175
J-11-230828	223		524	38	172

O) Maßliche Prüfung und ZfP (acc. AD2000-W5) / Dimensional check and NDT (acc. AD2000-W5) / 尺寸检验和无损检验 (acc. AD2000-W5)

Prüfung / testing / 检验	Details / details /详内容	Ergebnis / result / 结果
Besichtigung, Maßprüfung /Visual inspection & dimensional check 肉眼检 A 验&尺寸检验		OK
The Surface Quality 表面质量检验标准	ANSI / MSS SP-55-2011	OK
Oberflächenrißprüfung, / Surface crack inspection 表面裂纹检验	Waived by customer agreement 经客户同意，放弃	N/A
Prüfung auf Beständigkeit gegen l.K. Intergranular corrosion testing(ASTM A 262-91) 晶间腐蚀试验(ASTM A 262-91)	Waived by customer agreement 经客户同意，放弃	N/A
Röntgenprüfung / X-ray inspection / X 射线检验	Waived by customer agreement 经客户同意，放弃	N/A

泉州腾达精铸有限公司 质检专用章

D) Bemerkungen/Remarks/备注:

Lieferzustand / Delivery condition / 出货状态:	gebeizt / pickled / 钝化

Ort / Place / 场地 Datum / Date / 日期:2024.03.20 ***014XM-010***

Fujian Quanzhou Tengda Fine Casting Co., Ltd

Fremdprüfer / Third Party Inspector / 第三方检验员：

Unterschrift und Stempel des Werksachverständigen / Signature and Stamp of Work inspector / 检验员盖章：

HEROSE-Chargen-Nr. 9699 E. Braun

Damstahl® stainless steel solutions

Umstempelbescheinigung / Re-stamping Certificate

Bescheinigungs-Nr. / Certificate No.:	DErecrt-0098751-2024	Datum / Date:	19 Feb 2024
Kunde (gemäß Kundenstamm) / Customer (Acc. customer base):		Herose GmbH	
Ihre Bestellung /Your Order:		4500157387	
Ihre Sachnummer / Your part number:			
Unser Auftrag /Our Order:		SO07217919	

Material / Product	Werkstoff / Quality	Abmessung / Dimension	Chargen-Nr. / Heat No.
Profile bar	EN 1.4571	32	92122128
Zeugnis- / Certificate ID	**Anzahl x Länge / Quantity x Length**	**Gewicht (kg) / Weight (kg)**	**Kunden- / Customer-Code**
1161875	24,00 x 1000	170	

Ausgewiesen durch: Abnahmeprüfzeugnis nach DIN EN 10204 / 3.1 in der gültigen Fassung.
Declared by: certificate acc. DIN EN 10204 / 3.1 in the valid version.

Mit der Prüfung und Umstempelung beauftragt / Resposible for checking and re-stamping:

DS- 18 - niko

(Säger: interne Nr. / Sawyer internal No.)

Das Umstempeln erfolgt mit Zustimmung der TÜV-Rheinland Industrie Service GmbH
- Zertifikat-Nr.: 01 202 811/U-09 0005
Re-stamping is made with all required authorisations from TÜV-Rheinland Industrie Service GmbH
- Certificate-No.: 01 202 811/U-09 0005

Die Umstempelbescheinigung wurde maschinell erstellt und ist ohne Unterschift gültig.
This re-stamping certificate has been produced electronically and is valid without signature.

Mit freundlichen Grüßen / Best regards
Damstahl GmbH

HEROSE- Chargen-Nr. 9699 E. Braun

Damstahl® stainless steel solutions

Umstempelbescheinigung / Re-stamping Certificate

Bescheinigungs-Nr. / Certificate No.:	DErecrt-0098801-2024	Datum / Date:	19 Feb 2024
Kunde (gemäß Kundenstamm) / Customer (Acc. customer base):		Herose GmbH	
Ihre Bestellung /Your Order:		4500157387	
Ihre Sachnummer / Your part number:			
Unser Auftrag /Our Order:		SO07217919	

Material / Product	Werkstoff / Quality	Abmessung / Dimension	Chargen-Nr. / Heat No.
Profile bar	EN 1.4571	32	92122128
Zeugnis- / Certificate ID	**Anzahl x Länge / Quantity x Length**	**Gewicht (kg) / Weight (kg)**	**Kunden- / Customer-Code**
1161875	18,00 x 1000	128	

Ausgewiesen durch: Abnahmeprüfzeugnis nach DIN EN 10204 / 3.1 in der gültigen Fassung.
Declared by: certificate acc. DIN EN 10204 / 3.1 in the valid version.

Mit der Prüfung und Umstempelung beauftragt / Resposible for checking and re-stamping:

DS- 16 - osc

(Säger: interne Nr. / Sawyer internal No.)

Das Umstempeln erfolgt mit Zustimmung der TÜV-Rheinland Industrie Service GmbH
- Zertifikat-Nr.: 01 202 811/U-09 0005
Re-stamping is made with all required authorisations from TÜV-Rheinland Industrie Service GmbH
- Certificate-No.: 01 202 811/U-09 0005

Die Umstempelbescheinigung wurde maschinell erstellt und ist ohne Unterschift gültig.
This re-stamping certificate has been produced electronically and is valid without signature.

Mit freundlichen Grüßen / Best regards
Damstahl GmbH

BÖLLINGHAUS STEEL

Böllinghaus Steel Lda.
Trav. da Indústria 6 | 2430-668 Vieira de Leiria
ISO 9001:2015 | EN 9100:2018
CERT No. 01 100 030458 | 01 117 1800364

Abnahmeprüfzeugnis/Mill Test Certificate/Certificado de Qualidade
EN 10204:2004 / 3.1

Cert.No.:1161875.1

Unsere innere Verweisung /Our Int. Ref. / Ref. int.
5600066664 / 000030

Datum / Date / Data
31.08.2023

Kunde / Customer / Cliente
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

HEROSE-Chargen-Nr. 9699

Produktgruppe / Product Group / Grupo Produto
AISI 316Ti CD HEX 32 MM
1.4571 / X 6 CrNiMoTi 17-12-2

Bestell Nr./Order Nr./Enc.Nr.:DEPPO-00014708-1

Gewicht/ Weight/ Peso
561 KG

Bunde/Bundles/Atados
1

Endgültiger Kunde/Final Customer/Cliente Final
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Beschreibung / Description / Descrição
Stainless steel cold drawn hexagon bars 30653

Bestell Nr./Order Nr./Enc.Nr.:
DEPPO-00014708-1.04

Normen / Standards / Normas
1.4571 | TYPE 316Ti/UNS S31635 | DIN EN 10088-3:2014 (Condition 2H) | DIN EN 10272:2016-10 | PED 2014/68/EU AD 2000 Merkblatt W0/W2/W10:2020-01 | ASTM A276/A276M-17 | ASTM A479/A479M-23A | ASME SA-276 2021 ASME SA-479/SA-479M 2021 | NACE MR0103/ISO 17945:2015 | NACE MR0175/ISO 15156:2015 | DIN EN 10278:1999 - h11 DIN EN ISO 6506-1:2015 | ISO 6892-1:2019 | ISO 148-1:2016 | ISO 3651-2:1998 Method A+T1 - Conform

Chemische analyse in % / Chemical composition in % / Análise química em %

C	0,010	**Si**	0,590	**Mn**	1,820	**P**	0,027	**S**	0,0200	**Cr**	16,680
Ni	10,500	**Mo**	2,000	**Co**	0,140	**Cu**	0,240		0,000	**N**	0,0200
Ti	0,1800	**Nb**	0,004								

Schmelzen Nr./Cast nr./Fusão nr.	92122128
Erschmelzungsart/Melting/Processo de Fundição	EAF+VOD
Wärmebehandlung/Heat treatment/Tratamento térmico	Solution annealed 1050°C (1922°F)
Visuelle Kontrolle/Visual Inspection/Inspeção Visual	OK
Mak. Untersuchung/Macrographic Test/T.Macr.	OK
Proben Nr./Test no./Amostra nr.:	5182163.01 3109599.01 #1
Härte/Hardness/Dureza [HB]	226
Kerbschlagarbeit/Impact Test/Resiliência Charpy-V [J]	152
Streckgrenze/Yield point/Tensão limite Rp 0,2 % [MPa]	462
Dehngrenze/1% point/Limite de extensão Rp 1,0% [MPa]	521
Zugfestigkeit/Tensile strength/Tensão de rotura Rm [MPa]	632
Dehnung/Elongation/Alongamento A5 [%]	42,2
Dehnung/Elongation/Alongamento 4D [%]	45,3
Einschnürung/Reduction of area/Coef. Estrição Z [%]	69,0
Korngrösse/Grain size/Tamanho de grão	9

Country of origin: Portugal
Antimixing checked.
Material is free of mercury and radiation contamination.
No weld repair done.
We confirm that this material meets this specification according the mentioned standards.
Certified acc. PED 2014/68/EU and AD 2000 W0
Notified Body 0035 - TUV Rheinland Industrie Service Gmbh 01 202 926/Q-02 0040
Certified acc. EN764-5, Article 4.2, PERS2016. SI 2016 No.1105
Notified Body 2571 - TUV Rheinland UK, Ltd 2571 - 641/Q-22 0040

CE 0035 14 Certificate N.:0035-CPR-A196
UKCA 2571 23 Certificate N.: 2571-CPR-A196
EN 10088-5:2009
Stainless steel hot rolled and cold drawn bars for building constructions or civil engineering

Abnahmebeauftragter
Authorized Inspection Representative
Rep. Inspeção Autorizado

Nuno Silva (BS-NS)

Abnahmeprüfzeugnis / Test Inspection certificate

über die Einstellung und Prüfung von Sicherheitsventilen gemäß /
for setting and testing of safety valves acc. to
AD2000-A2; DIN EN ISO 4126-1

Werkstoffdokumentation / Material documentation

EN 10204 – 3.1

HEROSE

gemäß / **EN 10204 – 3.1**
acc. to

Auftraggeber Elogen / 27-29 Avenue Carnot / F-91300 Massy
Customer

Zertifikats-Nr. 213
Certificate No.

Bestell-Nr. BC0006330
Order-No.

Datum 04.12.23
Date

HEROSE-Kom-Nr. 1000760244
HEROSE-Ref-No.

Pos. 40
Item

Customer Order no.

Art-Nr. Part. No.	**Menge** Quantity	**TÜV-Verband Bauteilprüf-Nr.** TÜV-Verband Type-test approval No.	**K_{dr} / α_w Ausflusszifer** Coefficient of discharge				**DGRL 2014/68/EU** PED 2014/68/EU
			D/G **S/G**	Dämpfe / Gase Steam / Gase	**F** **L**	Flüssigkeiten Liquids	
06810.0622.000000M	1	23-1130	0,52		0,42		CE 0045

Ansprechdruck Set pressure **p_a [bar g]**	**PN**	**DN**		**d_o [mm]**	**A_o [mm²]**	**Tag No.:**
		Eintritt Inlet	**Austritt** Outlet	Strömungs-durchmesser Flow diameter	Strömungs-querschnitt Flow area	
36,0	400	G 1/2 male	G 1/2 female	6,0	28,0	-

Serial Nr. /Valve No.: 4363989
Customer material no. SOU-2303

Leistung / Capacity 418 **Nm³/h**
3805 **kg/h**

Gehäuse Body	1.4408	**Chargen-No.** Batch-No.	TDPH450	**von** from	Tengda
Sitzeinsatz Seat	1.4571	**Chargen-No.** Batch-No.	9523	**von** from	Damstahl

Prüfung der Armatur / Testing of Valve**:**

Beschreibung / Description	**Bemerkung /** Remark
Festigkeit des Gehäuses mit Wasser 1,5 x PN Body strength test with water 1,5 x PN	**Test P10 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.3 + 6.4**
Funktionsfähigkeit Functional test	**Test F20 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.5**
Dichtheitstest des Abschlusses Seat tightness	**Test gemäß** / acc. to **EN ISO 4126-1 Kap. 6.6, API 527, Herose QMVA10-006**
Gereinigt für den Betrieb mit Sauerstoff cleaned for oxygen service	**entspr**. / in acc. **ISO 23208 -** O2

Die Einstellung erfolgte mit: The setting was done with:	☒ **Luft** Air ☐ **Wasser** Water **Umgebungstemperatur** [°C] Ambient temperature	☐ **Dampf** Steam Temp.[°C]	
☒ **Plombe gekennzeichnet mit** seal marked with		**Gehäuse gekennzeichnet mit** body marked with	

Ergebnis der Prüfungen / Results of the inspections

Die oben genannten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt.
The above mentioned tests were carried out on each valve. No faults were observed.

Anlagen / Enclosures: 2

Bad Oldesloe, 06.02.2024

Abnahmebeauftragter/
Authorized inspection representative

HEROSE GMBH Elly-Heuss-Knapp-Str.12 Tel. (+49) 4531/509-0
ARMATUREN UND METALLE D-23843 Bad Oldesloe Fax (+49) 4531/509-120

Quanzhou Tengda Fine Casting Co., Ltd.

Address:29 Luojiang Road ,Luojiang District, Quanzhou, Fujian,China
TEL: +86 595 22653165 FAX: +86 595 22653480

Abnahmeprüfzeugnis (EN10204-3.2)
Inspection Certificate (EN10204-3.2)
检验证明（EN10204-3.2）

Certificate No.: 01 202 CHN/Q-02 0009

Zertifiziert nach Druckgeräte-Richtlinie 2014/68/EU,Anhang 1, Abschnitt 4.3, AD2000-W0 durch TÜV Rheinland Service GmbH (Benannte Stelle Kenn-Nr. 0035)	Certified in accordance to Pressure Equipment Directive 2014/68/EU Annex 1, Paragraph 4.3, AD2000-W0 by TÜV Rheinland Service GmbH （Notified Body Code No. 0035）	德国莱茵公司根据压力容器 2014/68/EU，附录 1 第 4.3 章的要求进行论证（Notified Body Code No. 0035）

059XM-025

Prüf-Nr. / Certificate No / 证明号:**2023009-059**	Besteller / Customer / 客户: HEROSE GMBH
Prüfgegenstand / Article / 品名:	Gussteil / Casting / 铸件
Prüfgrundlage / Testbasis / 生产技术规范**:**	AD2000-Merkblatt W5, W10, A4 (Herose material specification ES-Guss 1.4408/CF8M
Werkstoff / Material / 材质: 1.4408/CF8M	Entsprechend / according to / 生产依据: DIN EN 10213 /ASTM-SA351, CF8M
Erschmelzungsart / Melting process / 冶炼方法**:**	Electric furnace melting/电炉冶炼
Wärmebehandlung / Heat treatment / 热处理:	1050℃ / 2h, AT QW / Lösungsgeglüht und in Wasser abgeschreckt 1050℃ / 2h, AT QW / Solution annealing and quenched by water 1050℃ / 2 小时 / 固溶
Nennweite/Nominal Size/公称尺寸:	Nenndruck / Nominal Pressure / 标称压力**: see table below**
Herstellerzeichen / Mark of Manufacture / 厂家标志:	TD

Umfang der Lieferung / Content of delivery / 运输内容

Art.-Nr. Item No. 零件号	Stückzahl Quantity 数量	Gewicht Weight 重量	Gegenstand / Article/品名	DN	PN	Schmelze Nr. Heat No. 炉次	Probe-Nr. Specimen No. 试样号
55177.0100.1787	72					TDPD450	J-13-230828
55177.0100.1787	3					TDNM450	G-02-220829
56050.0110.0787	5					TDJD049	F-05-180417
56051.0096.0787	60					TDPH450	J-12-230828
55051.0095.0787	50					TDPH449	J-11-230828

Ergebnis	Die gestellten Anforderung sind laut Anlage 1 erfüllt.
Result	The requirements are fulfilled, as listed in Annex 1.
结果	满足附录 1 中所列的要求。

Anlage 1 / Annex 1 / 附录 1: Ergebnis der Prüfungen / Test Results / 测试结果

KK) Chemische Analyse / chemical analysis / 化学分析

Schmelze Nr. Heat No. / 炉次	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	/
DIN EN 10213 / ASTM-SA351	≤0.07	≤1.5	≤1.5	≤0.040	≤0.030	18.0-20.0	2.00-2.50	9.0-12.0	/

TDPD450	0.069	0.772	1.234	0.0290	0.0026	18.41	2.087	9.53	/
TDNM450	0.066	0.767	1.343	0.0250	0.0028	18.18	2.232	9.62	/
TDJD049	0.056	0.718	1.188	0.0380	0.0051	18.39	2.380	9.20	/
TDPH450	0.067	0.741	1.323	0.0310	0.0037	18.38	2.130	9.70	/
TDPH449	0.067	0.726	1.263	0.0320	0.0036	18.51	2.187	9.56	/

LL)Mechanische Prüfungen / Mechanical test / 机械性能试验

Casting No. 铸造炉号	Test temp 试温℃ RT				Test temp 试温℃ RT
	stress 试验应力 Rp0.2% N/mm^2	stress 试验应力 Rp1.0% N/mm^2	Tensile Strength 抗拉强度 Rm N/mm^2	Elongation 延伸率 A_b %	Energy of impact of ISO V-specimen ISO V 形试样的冲击能量
DIN EN 10213 / ASTM-SA351	≥205	/	485-640	≥30	≥70
J-13-230828	224		525	39	174
G-02-220829	228		529	40	176
F-05-180417	215		517	37	167
J-12-230828	226		528	40	175
J-11-230828	223		524	38	172

MM) Maßliche Prüfung und ZfP (acc. AD2000-W5) / Dimensional check and NDT (acc. AD2000-W5) / 尺寸检验和无损检验 (acc. AD2000-W5)

Prüfung / testing / 检验	Details / details /详内容	Ergebnis / result / 结果
Besichtigung, Maßprüfung /Visual inspection & dimensional check 肉眼检 A 验&尺寸检验		OK
The Surface Quality 表面质量检验标准	ANSI / MSS SP-55-2011	OK
Oberflächenrißprüfung, / Surface crack inspection 表面裂纹检验	Waived by customer agreement 经客户同意，放弃	N/A
Prüfung auf Beständigkeit gegen l.K. Intergranular corrosion testing(ASTM A 262-91) 晶间腐蚀试验(ASTM A 262-91)	Waived by customer agreement 经客户同意，放弃	N/A
Röntgenprüfung / X-ray inspection / X 射线检验	Waived by customer agreement 经客户同意，放弃	N/A

D) Bemerkungen/Remarks/备注:

Lieferzustand / Delivery condition / 出货状态:	gebeizt / pickled / 钝化

Ort / Place / 场地 Datum / Date / 日期:2023.09.25 ***059XM-026***

Fujian Quanzhou Tengda Fine Casting Co., Ltd

Fremdprüfer / Third Party Inspector / 第三方检验员：

Unterschrift und Stempel des Werksachverständigen / Signature and Stamp of Work inspector / 检验员盖章：

HEROSE- Chargen-Nr. 9523 E. Braun

Damstahl® stainless steel solutions

Umstempelbescheinigung / Re-stamping Certificate

Bescheinigungs-Nr. / Certificate No.:	DErecrt-0082554-2023	Datum / Date:	17 Aug 2023
Kunde (gemäß Kundenstamm) / Customer (Acc. customer base):		Herose GmbH	
Ihre Bestellung /Your Order:		4500154235	
Ihre Sachnummer / Your part number:			
Unser Auftrag /Our Order:		SO07181816	

Material / Product	Werkstoff / Quality	Abmessung / Dimension	Chargen-Nr. / Heat No.
Profile bar	EN 1.4571	32	67227029
Zeugnis- / Certificate ID	**Anzahl x Länge / Quantity x Length**	**Gewicht (kg) / Weight (kg)**	**Kunden- / Customer-Code**
1153534.1	12,00 x 1000	87	

Ausgewiesen durch: Abnahmeprüfzeugnis nach DIN EN 10204 / 3.1 in der gültigen Fassung.
Declared by: certificate acc. DIN EN 10204 / 3.1 in the valid version.

Mit der Prüfung und Umstempelung beauftragt / Resposible for checking and re-stamping:

DS- 5 - aay

(Säger: interne Nr. / Sawyer internal No.)

Das Umstempeln erfolgt mit Zustimmung der TÜV-Rheinland Industrie Service GmbH
- Zertifikat-Nr.: 01 202 811/U-09 0005
Re-stamping is made with all required authorisations from TÜV-Rheinland Industrie Service GmbH
- Certificate-No.: 01 202 811/U-09 0005

Die Umstempelbescheinigung wurde maschinell erstellt und ist ohne Unterschift gültig.
This re-stamping certificate has been produced electronically and is valid without signature.

Mit freundlichen Grüßen / Best regards
Damstahl GmbH

HEROSE-Chargen-Nr. 9523 E. Braun

Damstahl® stainless steel solutions

Umstempelbescheinigung / Re-stamping Certificate

Bescheinigungs-Nr. / Certificate No.:	DErecrt-0082710-2023	Datum / Date:	17 Aug 2023
Kunde (gemäß Kundenstamm) / Customer (Acc. customer base):		Herose GmbH	
Ihre Bestellung /Your Order:		4500154235	
Ihre Sachnummer / Your part number:			
Unser Auftrag /Our Order:		SO07181816	

Material / Product	Werkstoff / Quality	Abmessung / Dimension	Chargen-Nr. / Heat No.
Profile bar	EN 1.4571	32	67227029
Zeugnis- / Certificate ID	**Anzahl x Länge / Quantity x Length**	**Gewicht (kg) / Weight (kg)**	**Kunden- / Customer-Code**
1153534.1	30,00 x 1000	214	

Ausgewiesen durch: Abnahmeprüfzeugnis nach DIN EN 10204 / 3.1 in der gültigen Fassung.
Declared by: certificate acc. DIN EN 10204 / 3.1 in the valid version.

Mit der Prüfung und Umstempelung beauftragt / Resposible for checking and re-stamping:

DS- 4 - pl

(Säger: interne Nr. / Sawyer internal No.)

Das Umstempeln erfolgt mit Zustimmung der TÜV-Rheinland Industrie Service GmbH
- Zertifikat-Nr.: 01 202 811/U-09 0005
Re-stamping is made with all required authorisations from TÜV-Rheinland Industrie Service GmbH
- Certificate-No.: 01 202 811/U-09 0005

Die Umstempelbescheinigung wurde maschinell erstellt und ist ohne Unterschift gültig.
This re-stamping certificate has been produced electronically and is valid without signature.

Mit freundlichen Grüßen / Best regards
Damstahl GmbH

BÖLLINGHAUS® STEEL

Böllinghaus Steel Lda.
Trav. da Indústria 6 | 2430-668 Vieira de Leiria
ISO 9001:2015 | EN 9100:2018
CERT No. 01 100 030458 | 01 117 1800364

Abnahmeprüfzeugnis/Mill Test Certificate/Certificado de Qualidade
EN 10204:2004 / 3.1

Cert.No.: 1153534.1

Unsere innere Verweisung /Our Int. Ref. / Ref. int.
5600065887 / 000010

Datum / Date / Data
27.04.2023

Kunde / Customer / Cliente
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

HEROSE-Chargen-Nr. 9523 E. Braun

Produktgruppe / Product Group / Grupo Produto
AISI 316Ti CD HEX 32 MM
1.4571 / X 6 CrNiMoTi 17-12-2

Gewicht/ Weight/ Peso
518 KG

Bunde/Bundles/Atados
1

Bestell Nr./Order Nr./Enc.Nr.: DEPPO-00014708-1

Endgültiger Kunde/Final Customer/Cliente Final
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Beschreibung / Description / Descrição
Stainless steel cold drawn hexagon bars

Bestell Nr./Order Nr./Enc.Nr.:
DEPPO-00014708-1.03

Normen / Standards / Normas
1.4571 | TYPE 316Ti/UNS S31635 | DIN EN 10088-3:2014 (Condition 2H) | DIN EN 10272:2016-10 | PED 2014/68/EU AD 2000 Merkblatt W0/W2/W10:2020-01 | ASTM A276/A276M-17 | ASTM A479/A479M-21 | ASME SA-276 2021 ASME SA-479/SA-479M 2021 | NACE MR0103/ISO 17945:2015 | NACE MR0175/ISO 15156:2015 | DIN EN 10278:1999 - h11 DIN EN ISO 6506-1:2015 | ISO 6892-1:2019 | ISO 148-1:2016 | ISO 3651-2:1998 Method A+T1 - Conform

Chemische analyse in % / Chemical composition in % / Análise química em %

C	**Si**	**Mn**	**P**	**S**	**Cr**	**Ni**	**Mo**	**Cu**	**N**	**Ti**
0,013	0,658	1,541	0,025	0,0201	16,683	11,042	2,038	0,256	0,0120	0,1270

Schmelzen Nr./Cast nr./Fusão nr.	67227029
Erschmelzungsart/Melting/Processo de Fundição	EAF+AOD+CC
Wärmebehandlung/Heat treatment/Tratamento térmico	Solution annealed 1050°C (1922°F)
Visuelle Kontrolle/Visual Inspection/Inspeção Visual	OK
Mak. Untersuchung/Macrographic Test/T.Macr.	OK
Proben Nr./Test no./Amostra nr.:	5181627.01 3109032.01 #1
Härte/Hardness/Dureza [HB]	207
Kerbschlagarbeit/Impact Test/Resiliência Charpy-V [J]	216
Streckgrenze/Yield point/Tensão limite Rp 0,2 % [MPa]	408
Dehngrenze/1% point/Limite de extensão Rp 1,0% [MPa]	438
Zugfestigkeit/Tensile strength/Tensão de rotura Rm [MPa]	609
Dehnung/Elongation/Alongamento A5 [%]	45,2
Dehnung/Elongation/Alongamento 4D [%]	48,4
Einschnürung/Reduction of area/Coef. Estrição Z [%]	75,8
Korngrösse/Grain size/Tamanho de grão	9

Country of origin: Portugal
Antimixing checked.
Material is free of mercury and radiation contamination.
No weld repair done.
We confirm that this material meets this specification according the mentioned standards.

Certified acc. PED 2014/68/EU and AD 2000 W0
Notified Body 0035 - TUV Rheinland Industrie Service Gmbh
01 202 926/Q-02 0040

CE
NB 0035
14
Certificate N.: 0035-CPR-A196
EN 10088-5:2009
Stainless steel hot rolled and cold drawn bars
for building constructions or civil engineering

Abnahmebeauftragter
Authorized Inspection Representative
Rep. Inspeção Autorizado

305

Nuno Silva (BS-NS)

Abnahmeprüfzeugnis / Test Inspection certificate

EN 10204 – 3.1

über die Einstellung und Prüfung von Sicherheitsventilen gemäß /
for setting and testing of safety valves acc. to
AD2000-A2; DIN EN ISO 4126-1

gemäß / EN 10204 – 3.1
acc. to

Werkstoffdokumentation / Material documentation

Auftraggeber Elogen / 27-29 Avenue Carnot / F-91300 Massy
Customer

Zertifikats-Nr. 1205
Certificate No.

Bestell-Nr. BC0008198
Order-No.

Datum 24.06.24
Date

HEROSE-Kom-Nr. 1000771536
HEROSE-Ref-No.

Pos. 10
Item

Customer Order No.

Art-Nr. Part. No.	**Menge** Quantity	**TÜV-Verband - Bauteilprüf-Nr.** */ TÜV-Verband-Component test no.*	**K_{dr} / α_w Ausflussziffer** Coefficient of discharge				**DGRL 2014/68/EU** PED 2014/68/EU
			D/G S/G	Dämpfe / Gase Steam / Gase	**F L**	Flüssigkeiten Liquids	
06850.1024.000002F	1	23-1130	0,84		0,61		CE 0045

Ansprechdruck Set pressure **p_a [bar g]**	**PN**	**DN**		**d_o [mm]**	**A_o [mm²]**	**Tag-No.:**
		Eintritt Inlet	**Austritt** Outlet	Strömungs-durchmesser Flow diameter	Strömungs-querschnitt Flow area	
36,0	250	G 1/ 2 male	G 1 female	10,0	78,5	-

Serial Nr. / Valve No.: 4548055
Customer Material No.: SOU-2455

Leistung / Capacity: 1877 **[Nm³/h]** / 15350 **[kg/h]**

Gehäuse Body	1.4408	**Chargen-No.** Batch-No.	TDPL450	**von** from	Tengda
Sitzeinsatz Seat	1.4571	**Chargen-No.** Batch-No.	9708	**von** from	Damstahl

Prüfung der Armatur / Testing of Valve**:**

Beschreibung / Description	**Bemerkung /** Remark
Festigkeit des Gehäuses mit Wasser 1,5 x PN Body strength test with water 1,5 x PN	**Test P10 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.3 + 6.4**
Funktionsfähigkeit Functional test	**Test F20 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.5**
Dichtheitstest des Abschlusses Seat tightness	**Test gemäß** / acc. to **EN ISO 4126-1 Kap. 6.6,** **In Anlehnung an/** similar to **API 527, Herose QMVA10-006**
Gereinigt für den Betrieb mit Sauerstoff cleaned for oxygen service	**entspr**. / in acc. **ISO 23208 -** O2

Die Einstellung erfolgte mit: The setting was done with:	☒ **Luft** Air ☐ **Wasser** Water	☐ **Dampf** Steam	
	Umgebungstemperatur [°C] Ambient temperature	Temp.[°C]	

☒ **Plombe gekennzeichnet mit** seal marked with	**Gehäuse gekennzeichnet mit** body marked with

Ergebnis der Prüfungen / Results of the inspections

Die oben genannten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt.
The above mentioned tests were carried out on each valve. No faults were observed.

Anlagen / Enclosures: 2

Bad Oldesloe, 06.08.2024

Abnahmebeauftragter /
Authorized inspection representative

HEROSE GMBH
ARMATUREN UND METALLE
Elly-Heuss-Knapp-Str.12
D-23843 Bad Oldesloe
Tel. (+49) 4531/509-0
Fax (+49) 4531/509-120

Abnahmeprüfzeugnis / Test Inspection certificate
über die Einstellung und Prüfung von Sicherheitsventilen gemäß /
for setting and testing of safety valves acc. to
AD2000-A2; DIN EN ISO 4126-1
Werkstoffdokumentation / Material documentation

EN 10204 – 3.1

gemäß / EN 10204 – 3.1
acc. to

Auftraggeber Elogen / 27-29 Avenue Carnot / F-91300 Massy
Customer

Zertifikats-Nr. 891
Certificate No.

Bestell-Nr. BC0006330
Order-No.

Datum 04.12.23
Date

HEROSE-Kom-Nr. 1000760244
HEROSE-Ref-No.

Pos. 20
Item

Customer Order No.

Art-Nr. Part. No.	**Menge** Quantity	**TÜV-Verband-Bauteilprüf-Nr.** TÜV-Verband-Type-test approval No.	**K_{dr} / α_w Ausflussziffer** Coefficient of discharge				**DGRL 2014/68/EU** PED 2014/68/EU
			D/G S/G	Dämpfe / Gase Steam / Gase	**F L**	Flüssigkeiten Liquids	
06850.1846.000000M	1	23-1130	0,76		0,50		CE 0045

Ansprechdruck Set pressure **p_a [bar g]**	**PN**	**DN**		**d_o [mm]**	**A_o [mm²]**	**Tag No.**
		Eintritt Inlet	**Austritt** Outlet	Strömungs-durchmesser Flow diameter	Strömungs-querschnitt Flow area	
10,0	160	G1 male	G11/2 female	18,0	254	-

Serial Nr. /Valve No.: 4342903
Customer Material No.: SOU-1304

Leistung / Capacity 1597 **[Nm³/h]** 21485 **[kg/h]**

Gehäuse Body	1.4408	**Chargen-No.** Batch-No.	TDJD049	**von** from	Tengda
Sitzeinsatz Seat	1.4571	**Chargen-No.** Batch-No.	9436	**von** from	Damstahl

Prüfung der Armatur / Testing of Valve**:**

Beschreibung / Description	**Bemerkung /** Remark
Festigkeit des Gehäuses mit Wasser 1,5 x PN Body strength test with water 1,5 x PN	**Test P10 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.3 + 6.4**
Funktionsfähigkeit Functional test	**Test F20 gemäß** / acc. to **EN ISO 4126-1 Kap. 6.5**
Dichtheitstest des Abschlusses Seat tightness	**Test gemäß** / acc. to **EN ISO 4126-1 Kap. 6.6,** **In Anlehnung an/** similar to **API 527, Herose QMVA10-006**
Gereinigt für den Betrieb mit Sauerstoff cleaned for oxygen service	**entspr**. / in acc. **ISO 23208 -** O2

Die Einstellung erfolgte mit: The setting was done with:	☒ **Luft** Air ☐ **Wasser** Water **Umgebungstemperatur** [°C] Ambient temperature	☐ **Dampf** Steam Temp.[°C]	
☒ **Plombe gekennzeichnet mit** seal marked with		**Gehäuse gekennzeichnet mit** body marked with	

Ergebnis der Prüfungen / Results of the inspections

Die oben genannten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt.
The above mentioned tests were carried out on each valve. No faults were observed.

Anlagen / Enclosures: 2

Bad Oldesloe, 20.06.2024

Abnahmebeauftragter/
Authorized inspection representative

HEROSE GMBH Elly-Heuss-Knapp-Str.12 Tel. (+49) 4531/509-0
ARMATUREN UND METALLE D-23843 Bad Oldesloe Fax (+49) 4531/509-120

Quanzhou Tengda Fine Casting Co., Ltd.

Address:29 Luojiang Road ,Luojiang District, Quanzhou, Fujian,China
TEL: +86 595 22653165 FAX: +86 595 22653480

Abnahmeprüfzeugnis (EN10204-3.2)
Inspection Certificate (EN10204-3.2)
检验证明（EN10204-3.2）

Certificate No.: 01 202 CHN/Q-02 0009

Zertifiziert nach Druckgeräte-Richtlinie 2014/68/EU,Anhang 1, Abschnitt 4.3 durch TÜV Anlagetechnik GmbH (Benannte Stelle Kenn-Nr. 0035)	Certified in accordance to Pressure Equipment Directive 2014/68/EU Annex 1, Paragraph 4.3 by TÜV Anlagetechnik GmbH （Notified Body Code No. 0035）	德国莱茵公司根据压力容器 2014/68/EU，附录 1 第 4.3 章的要求进行论证 （Notified Body Code No. 0035）

084XM-015

Prüf-Nr. / Certificate No / 证明号**: 201809-084**	Besteller / Customer / 客户: HEROSE GMBH
Prüfgegenstand / Article / 品名:	Gussteil / Casting / 铸件
Prüfgrundlage / Testbasis / 生产技术规范**:**	AD2000-Merkblatt **W5** QMAA06-001-002 Rev.7
Werkstoff / Material / 材质: 1.4408/CF8M	Entsprechend / according to / 生产依据: DIN EN 10213 /ASTM-SA351
Erschmelzungsart / Melting process / 冶炼方法**:**	Electric furnace melting/电炉冶炼
Wärmebehandlung / Heat treatment / 热处理:	1050℃ / 2h, AT QW / Lösungsgeglüht und in Wasser abgeschreckt 1050℃ / 2h, AT QW / Solution annealing and quenched by water 1050℃ / 2 小时 / 固溶
Nennweite/Nominal Size/公称尺寸:	Nenndruck / Nominal Pressure / 标称压力**:**
Herstellerzeichen / Mark of Manufacture / 厂家标志:	TD

Umfang der Lieferung / Content of delivery / 运输内容

Art.-Nr. Item No. 零件号	Stückzahl Quantity 数量	Gewicht Weight 重量	Gegenstand / Article/品名	DN	PN	Schmelze Nr. Heat No. 炉次	Probe-Nr. Specimen No. 试样号
55051 0130 0787	5					TDDH206C	DH20-6-C
55051 0130 0787	2					TDDI178D	DI17-8-D
55051 0130 0787	18					TDDH1211E	DH12-11-E
55300 0065 0787	700					TDJF042	C-04-180627
55051 0131 0787	50					TDJF026	D-04-180615
56050 0110 0787	10					TDJD049	F-05-180417

Ergebnis	Die gestellten Anforderung sind laut Anlage 1 erfüllt.
Result	The requirements are fulfilled, as listed in Annex 1.
结果	满足附录 1 中所列的要求。

Anlage 1 / Annex 1 / 附录 1: Ergebnis der Prüfungen / Test Results / 测试结果

V) Chemische Analyse / chemical analysis / 化学分析

Schmelze Nr. Heat No. / 炉次	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	/
DIN EN 10213 / ASTM-SA351	≤0.07	≤1.5	≤1.5	≤0.040	≤0.030	18.0-20.0	2.00-2.50	9.0-12.0	/
TDDH206C	0.029	0.58	1.02	0.0376	0.0012	18.65	2.21	9.65	/
TDDI178D	0.069	0.76	0.95	0.031	0.0012	18.29	2.22	9.46	/
TDDH1211E	0.033	0.58	0.98	0.0296	0.0012	18.28	2.10	9.83	/
TDJF042	0.067	0.695	1.236	0.0323	0.0077	18.40	2.44	9.37	/
TDJF026	0.045	0.735	1.237	0.0380	0.0077	18.33	2.34	9.39	/
TDJD049	0.056	0.718	1.188	0.0380	0.0051	18.39	2.38	9.20	/

W) Mechanische Prüfungen / Mechanical test / 机械性能试验

Probe Nr. Specimen No. 试样号	Prüftemperatur Test temp 试温 [℃]	Rp0.2% Proof stress 试验应力 [N/mm²]	Rp1.0% Proof stress 试验应力 [N/mm²]	Zugfestigkeit Rm Tensile Strength 抗拉强度 [N/mm²]	Bruchdehnung Elongation 延伸率 A_b %	Härte Hardnes 硬度 HB	Kerbschlagarbeit der ISO V-Probe Energy of impact of ISO V-specimen ISO V 形试样的冲击能量 Joule 焦耳
DIN EN 10213 / ASTM-SA351	RT	≥205		485-640	≥30	/	≥60
DH20-6-C	RT	213		514	37	/	164
DI17-8-D	RT	207		518	38	/	166
DH12-11-E	RT	216		514	39	/	168
C-04-180627	RT	220		522	40	/	170
D-04-180615	RT	218		519	39	/	169
F-05-180417	RT	215		517	37	/	167

X) Maßliche Prüfung und ZfP / Dimensional check and NDT / 尺寸检验和无损检验

Prüfung / testing / 检验	Details / details /详内容	Ergebnis / result / 结果
Besichtigung, Maßprüfung /Visual inspection & dimensional check 肉眼检 A 验&尺寸检验		OK
The Surface Quality 表面质量检验标准	ANSI / MSS SP-55-2011	OK
Oberflächenrißprüfung, / Surface crack inspection 表面裂纹检验	Waived by customer agreement 经客户同意，放弃	N/A
Prüfung auf Beständigkeit gegen l.K. Intergranular corrosion testing(ASTM A 262-91) 晶间腐蚀试验(ASTM A 262-91)	Waived by customer agreement 经客户同意，放弃	N/A
Röntgenprüfung / X-ray inspection / X 射线检验	Waived by customer agreement 经客户同意，放弃	N/A

D) Bemerkungen/Remarks/备注:

Lieferzustand / Delivery condition / 出货状态:	gebeizt / pickled / 钝化

Ort / Place / 场地 Datum / Date / 日期:2018.09.04 ***084XM-016***

Fujian Quanzhou Tengda Fine Casting Co., Ltd

Unterschrift und Stempel des Werksachverständigen / Signature and Stamp of Work inspector / 检验员盖章:

Fremdprüfer / Third Party Inspector / 第三方检验员:

HEROSE-Chargen-Nr. 9436 E. Braun

Damstahl®
stainless steel solutions

Umstempelbescheinigung / Re-stamping Certificate

Bescheinigungs-Nr. / Certificate No.:	DErecrt-0073510-2023	Datum / Date:	15 Mai 2023
Kunde (gemäß Kundenstamm) / Customer (Acc. customer base):		Herose GmbH	
Ihre Bestellung /Your Order:		4500152236	
Ihre Sachnummer / Your part number:			
Unser Auftrag /Our Order:		SO07156685	

Material / Product	Werkstoff / Quality	Abmessung / Dimension	Chargen-Nr. / Heat No.
Profile bar	EN 1.4571	41	92120556
Zeugnis- / Certificate ID	**Anzahl x Länge / Quantity x Length**	**Gewicht (kg) / Weight (kg)**	**Kunden- / Customer-Code**
1150486.1	30,00 x 1000	350	

Ausgewiesen durch: Abnahmeprüfzeugnis nach DIN EN 10204 / 3.1 in der gültigen Fassung.
Declared by: certificate acc. DIN EN 10204 / 3.1 in the valid version.

Mit der Prüfung und Umstempelung beauftragt / Resposible for checking and re-stamping:

DS- 16 - osc

(Säger: interne Nr. / Sawyer internal No.)

Das Umstempeln erfolgt mit Zustimmung der TÜV-Rheinland Industrie Service GmbH
- Zertifikat-Nr.: 01 202 811/U-09 0005
Re-stamping is made with all required authorisations from TÜV-Rheinland Industrie Service GmbH
- Certificate-No.: 01 202 811/U-09 0005

Die Umstempelbescheinigung wurde maschinell erstellt und ist ohne Unterschift gültig.
This re-stamping certificate has been produced electronically and is valid without signature.

Mit freundlichen Grüßen / Best regards
Damstahl GmbH

Böllinghaus Steel Lda.
Trav. da Indústria 6 | 2430-668 Vieira de Leiria
ISO 9001:2015 | EN 9100:2018
CERT No. 01 100 030458 | 01 117 1800364

Abnahmeprüfzeugnis/Mill Test Certificate/Certificado de Qualidade
EN 10204:2004 / 3.1

Cert.No.:1150486.1

Unsere innere Verweisung /Our Int. Ref. / Ref. int.
5600065385 / 000090

Datum / Date / Data
23.03.2023

Kunde / Customer / Cliente
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Produktgruppe / Product Group / Grupo Produto
AISI 316Ti CD HEX 41 MM
1.4571 / X 6 CrNiMoTi 17-12-2

Bestell Nr./Order Nr./Enc.Nr.:DEPPO-00012619-1

Gewicht/ Weight/ Peso
2.385 KG

Bunde/Bundles/Atados
5

Endgültiger Kunde/Final Customer/Cliente Final
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

HEROSE-Chargen-Nr. 9436 E. Braun

Bestell Nr./Order Nr./Enc.Nr.:
DEPPO-00012619-1.24

Beschreibung / Description / Descrição

Stainless steel cold drawn hexagon bars

Normen / Standards / Normas

1.4571 | TYPE 316Ti/UNS S31635 | DIN EN 10088-3:2014 (Condition 2H) | DIN EN 10272:2016-10 | PED 2014/68/EU AD 2000 Merkblatt W0/W2/W10:2020-01 | ASTM A276/A276M-17 | ASTM A479/A479M-21 | ASME SA-276 2021 ASME SA-479/SA-479M 2021 | NACE MR0103/ISO 17945:2015 | NACE MR0175/ISO 15156:2015 | DIN EN 10278:1999 - h11 DIN EN ISO 6506-1:2015 | ISO 6892-1:2019 | ISO 148-1:2016 | ISO 3651-2:1998 Method A+T1 - Conform

Chemische analyse in % / Chemical composition in % / Análise química em %

C	0,012	**Si**	0,550	**Mn**	1,840	**P**	0,027	**S**	0,0230	**Cr**	16,670
Ni	10,500	**Mo**	2,020	**Co**	0,110	**Cu**	0,270				
N	0,0165	**Ti**	0,1800	**Nb**	0,006						

Schmelzen Nr./Cast nr./Fusão nr.	92120556
Erschmelzungsart/Melting/Processo de Fundição	EAF+VOD
Wärmebehandlung/Heat treatment/Tratamento térmico	Solution annealed 1050°C (1922°F)
Visuelle Kontrolle/Visual Inspection/Inspeção Visual	OK
Mak. Untersuchung/Macrographic Test/T.Macr.	OK
Proben Nr./Test no./Amostra nr.:	5180817.01 3107673.01 #1
Härte/Hardness/Dureza [HB]	226
Kerbschlagarbeit/Impact Test/Resiliência Charpy-V [J]	137
Streckgrenze/Yield point/Tensão limite Rp 0,2 % [MPa]	452
Dehngrenze/1% point/Limite de extensão Rp 1,0% [MPa]	529
Zugfestigkeit/Tensile strength/Tensão de rotura Rm [MPa]	636
Dehnung/Elongation/Alongamento A5 [%]	43,7
Dehnung/Elongation/Alongamento 4D [%]	47,0
Einschnürung/Reduction of area/Coef. Estrição Z [%]	73,9
Korngrösse/Grain size/Tamanho de grão	9

Country of origin: Portugal
Antimixing checked.
Material is free of mercury and radiation contamination.
No weld repair done.
We confirm that this material meets this specification according the mentioned standards.

Certified acc. PED 2014/68/EU and AD 2000 W0
Notified Body 0035 - TUV Rheinland Industrie Service Gmbh
01 202 926/Q-02 0040

CE
NB 0035
14
Certificate N.: 0035-CPR-A196
EN 10088-5:2009
Stainless steel hot rolled and cold drawn bars
for building constructions or civil engineering

Abnahmebeauftragter
Authorized Inspection Representative
Rep. Inspeção Autorizado

305

Nuno Silva (BS-NS)

elogen	COMMISSIONING C63-ELO-REP-CO-0102 - FLUSHING	CROSSWIND

TEST CONDITIONS	
Procedure Reference	C063-ELO-PRO-CO-0004 - BLPH Electrolyser Commissioning Manual
System Flushing	Loop 600 (0,1)
Reference Sampling Point	HV - 602 D
Online Conductivity Meter Tag	CITP - 600
Water from WTP conductivity value (µS.cm-1)	0,1

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Portable Conductivity Meter	0,8-170004101	06/2027
O2 Meter	NA	NA

FLUSHING OPERATION				
	Date	Time	Conductivity (µS.cm-1)	Temperature (°C)
Beginning	18/03/25	10:00	13.29	20°
End	02/04/25	17:00	0,206	19,7
After 12h	08/04/25	07:45	0,206	17,7
After Resin Filling	09/04/25	08:00	0,041	20,7
After Stacks Installation	14/04/25	23:00	0,041	18,4

RESULT		
Pure Water Flushing		
Conductivity	σ < 0.1 µS.cm-1 on all sampling points	(OK) / NOK
Nitrogen Purging		
Inerting	O2 Content < 3 % on all sampling points	OK / NOK

NOTES

Resin Filling : 08/04
Stack connection : 14/04

	~~FORES~~ ELOGEN	ELOGEN	CROSSWIND
NAME	Montoya	Falcetti Luc	Martin Tafelli
DATE	15/04	15/04	15/04
SIGNATURE			

elogen	COMMISSIONING C63-ELO-REP-CO-0102 - FLUSHING	CROSSWIND

TEST CONDITIONS	
Procedure Reference	C063-ELO-PRO-CO-0004 - BLPH Electrolyser Commissioning Manual
System Flushing	Loop 620 (H_2)
Reference Sampling Point	HV - 623D
Online Conductivity Meter Tag	C/TP - 620
Water from WTP conductivity value (µS.cm-1)	0,1

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Portable Conductivity Meter	0,817 000 4 101	06/2025
O2 Meter	NA	NA

FLUSHING OPERATION				
	Date	Time	Conductivity (µS.cm-1)	Temperature (°C)
Beginning	13/03	9:00	9	15°
End	07/04	15:00	0,145	20°
After 12h	08/04	07:45	0,163	15,8
After Resin Filling	09/04	08:00	0,046	20,4
After Stacks Installation	14/04	23:00	0,045	18,6

RESULT		
Pure Water Flushing		
Conductivity	σ < 0.1 µS.cm-1 on all sampling points	(OK) / NOK
Nitrogen Purging		
Inerting	O2 Content < 3 % on all sampling points	OK / NOK

NOTES

Resin Filling : 08/04
Stack insertion : 14/04

	~~EORES~~ ELOGEN	ELOGEN	CROSSWIND
NAME	MOUFOUMA	PAOLETTI Luc	MARINTAICA
DATE	15/04	15/04	15/04
SIGNATURE			

elogen	COMMISSIONING C63-ELO-REP-CO-0102 - FLUSHING	CROSSWIND

TEST CONDITIONS	
Procedure Reference	C063-ELO-PRO-CO-0004 - BLPH Electrolyser Commissioning Manual
System Flushing	Line 640
Reference Sampling Point	HV-640 D
Online Conductivity Meter Tag	
Water from WTP conductivity value (µS.cm-1)	0,06

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Portable Conductivity Meter	0,817 0004 101	06/2025
O2 Meter		

FLUSHING OPERATION				
	Date	Time	Conductivity (µS.cm-1)	Temperature (°C)
Beginning	05/04	08:00	2,2	21,3
End	07/04	15:00	0,22	20,6
After 12h	08/04	09:00	0,3	18,5
After Resin Filling	09/04	08:00	0,043	22,2
After Stacks Installation	14/04	23:00	0,051	18,9

RESULT		
Pure Water Flushing		
Conductivity	σ < 0.1 µS.cm-1 on all sampling points	(OK) / NOK
Nitrogen Purging		
Inerting	O2 Content < 3 % on all sampling points	OK / NOK N/A

NOTES

Resin Filling : 08/04
Stack Insertion: 14/04

	~~FORES~~ elogen	ELOGEN	CROSSWIND
NAME	MOUFOUMAA	PAOLETTI Luc	MARTIN TAYLOR
DATE	15/04	~~15/04~~ 15/04	15/04/25
SIGNATURE			

elogen	PRECOMMISSIONING C63-ELO-REP-CO-0101 - LEAK TEST	CROSSWIND

TEST CONDITIONS	
Leak Test Pack	PACK 02
Tested System	Cathode water H_2 loop 620
Test Pressure (Barg)	32,4
Test Fluid	Hydrogen - Nitrogen (H_2/N_2)

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
PT-630	W707DE1198	

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
	11/04/25	16:45	32,32	29°C
END	Date	Time	Pressure (Barg)	Temperature (°C)
	11/04/25	17:45	32,02	32°C

RESULT			
Test Duration	1 hour	Delta P (Bar)	0,3
Snoop Detection without Bubbles	(YES) / NO / NA		
Gas Detection Without Leaks	(YES) / NO / NA		
Result	(OK) / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	~~FORES~~ ELOGEN	ELOGEN	CROSSWIND
NAME	MONFOUMA FRAY	PAOLOTTI Luc	MARTIN TATAY
DATE	11/04/25	11/04/25	11/04/25
SIGNATURE			

Test Report

Endress+Hauser
People for Process Automation

Final Inspection Report

Order information

Customer name	ELOGEN
Customer purchase order	BC0007140
Sales order number / Item	3011154568/0020
Internal order number / Item	3021332622000040

Device information

Description	Cerabar PMP71B
TAG	CPT-1107
Serial number	W707DE01198
Order code	PMP71B-2MFR0/0
Extended order code	PMP71B-BFBADBF6AA3SBI1WBJA1+CCNNZ1

Additional information

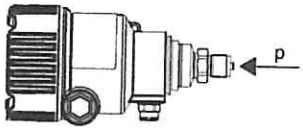
Output type	4-20 mA HART
Software version	01.00.06
Sensor range	-1...40 bar rel
Adjusted measuring range	0...40 bar rel
Maximum permissible error	± 0.05 % of span
Output mode	Linear

Procedure

Test specification	160000559 / 160000554, Comparison of unit under test (UUT) with standard
Test rig	15105 / 15106

Measuring condition

Ambient temperature	25.8 °C ±1 °C
Ambient pressure	980.0 mbar ±0.2 mbar
Ambient humidity	48.5 % rel. ±10 % rel.
UUT orientation	



Execution

Maulburg, 2024-07-30, 110714

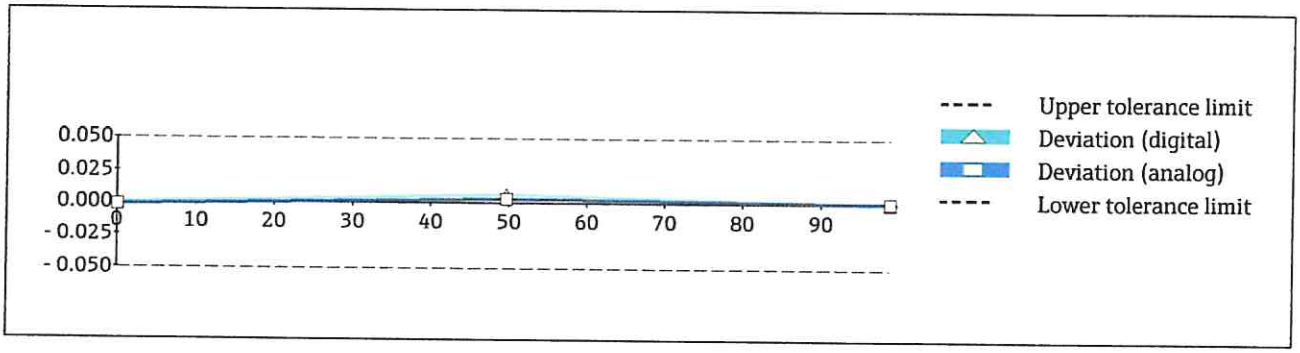
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Endress+Hauser SE+Co. KG
Postfach/P.O. Box 1261
D-79690 Maulburg
Germany
www.endress.com

Final Inspection Report

Test result

Deviation
% of span

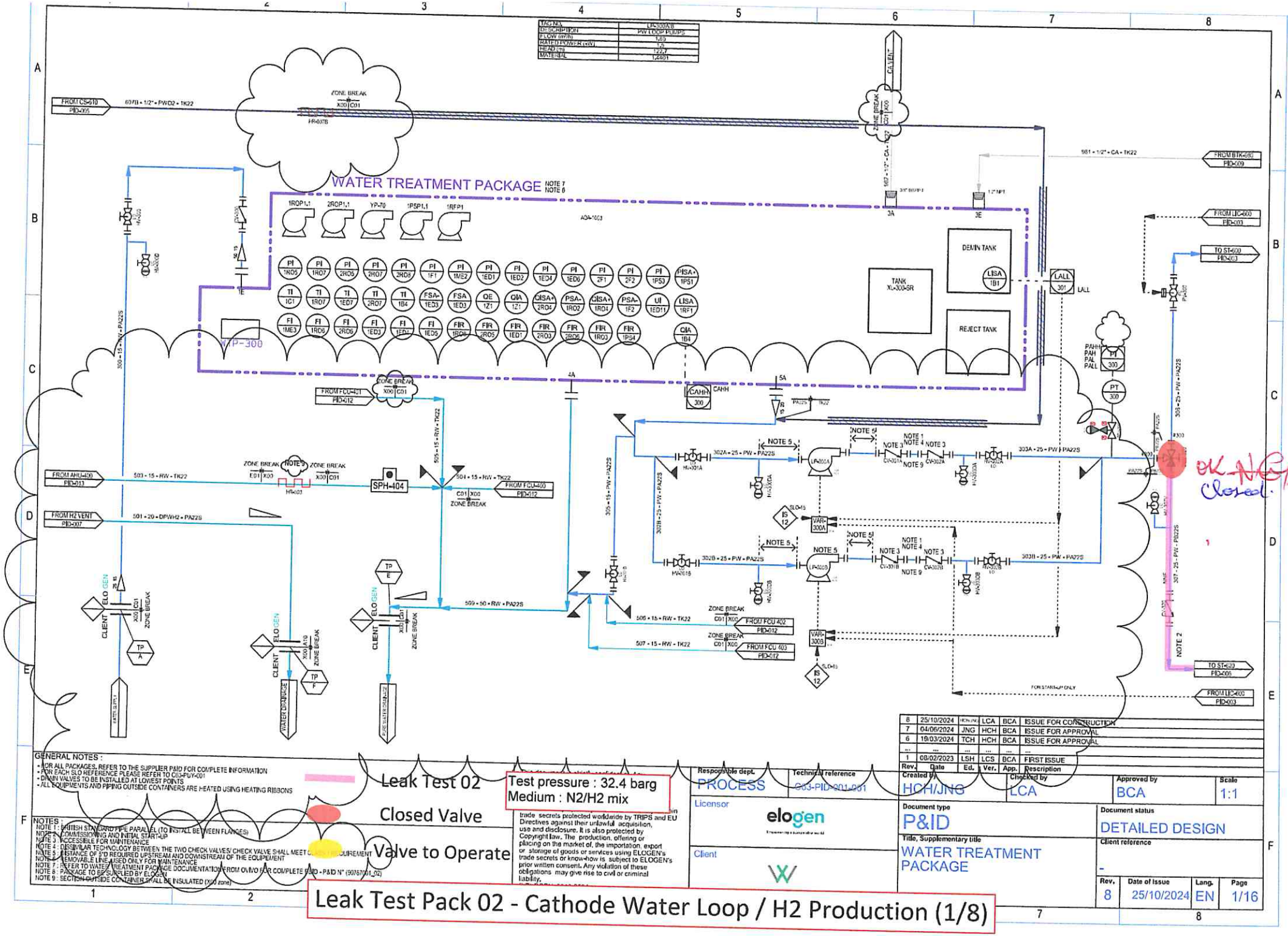


Test point	Reference pressure	UUT output (digital)	Measure-ment error (digital)	Measure-ment error (digital)	Reference pressure (Iout calc.)	UUT output (analog)	Measure-ment error (analog)
[%]	[bar]	[bar]	[% of span]	[bar]	[mA]	[mA]	[% of span]
-0	-0.00027	-0.00027	-0.00000	0.00000	3.99989	3.99959	-0.00189
50	19.8478	19.8504	0.00640	0.00260	11.9391	11.9396	0.00311
99	39.5137	39.5137	0.00000	0.00000	19.8055	19.8055	0.00012

Hereby we confirm that all applicable tests according to the Quality plan (IP00008P) have been performed successfully.

Test	Procedure number	Test description
Contract review	TS00001F	As required in ISO 9001
Incoming goods inspection	TS00003F	Verification of conformance to the specified requirements
Printed circuit boards test	TS00009F	In-circuit test and functional test
High voltage test	TS00002F	The voltage used is chosen depending on operating voltage, terminals and approvals in accordance to the valid national / international standards
Welding inspection	TS00010F	Quality and tightness of the welding seams
Functional test of sensor	TS00022P	Check the sensor function
Calibration of instrument	TS00023P	Measurement, adjustment and verification of lower range value, upper range value and output signal
Final check of instrument	TS00024P	Verification of general functionality and customer specific settings
Outgoing visual check	TS00006F	Visual inspection of completeness and correctness of the instrument and the markings
Logistical verification	TS00005F	Automatic verification in the delivery phase via barcode that the instrument correspond to the order
Pressure test	TS00007F	Test the mechanical stability of the pressure bearing parts

Hereby we confirm that all measuring equipment used to assure the quality of the products has been calibrated and is traceable to national or international standards.



GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C03-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS TIGHTNESS REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OWNER FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (XX0 zone)

Leak Test 02
Closed Valve
Valve to Operate

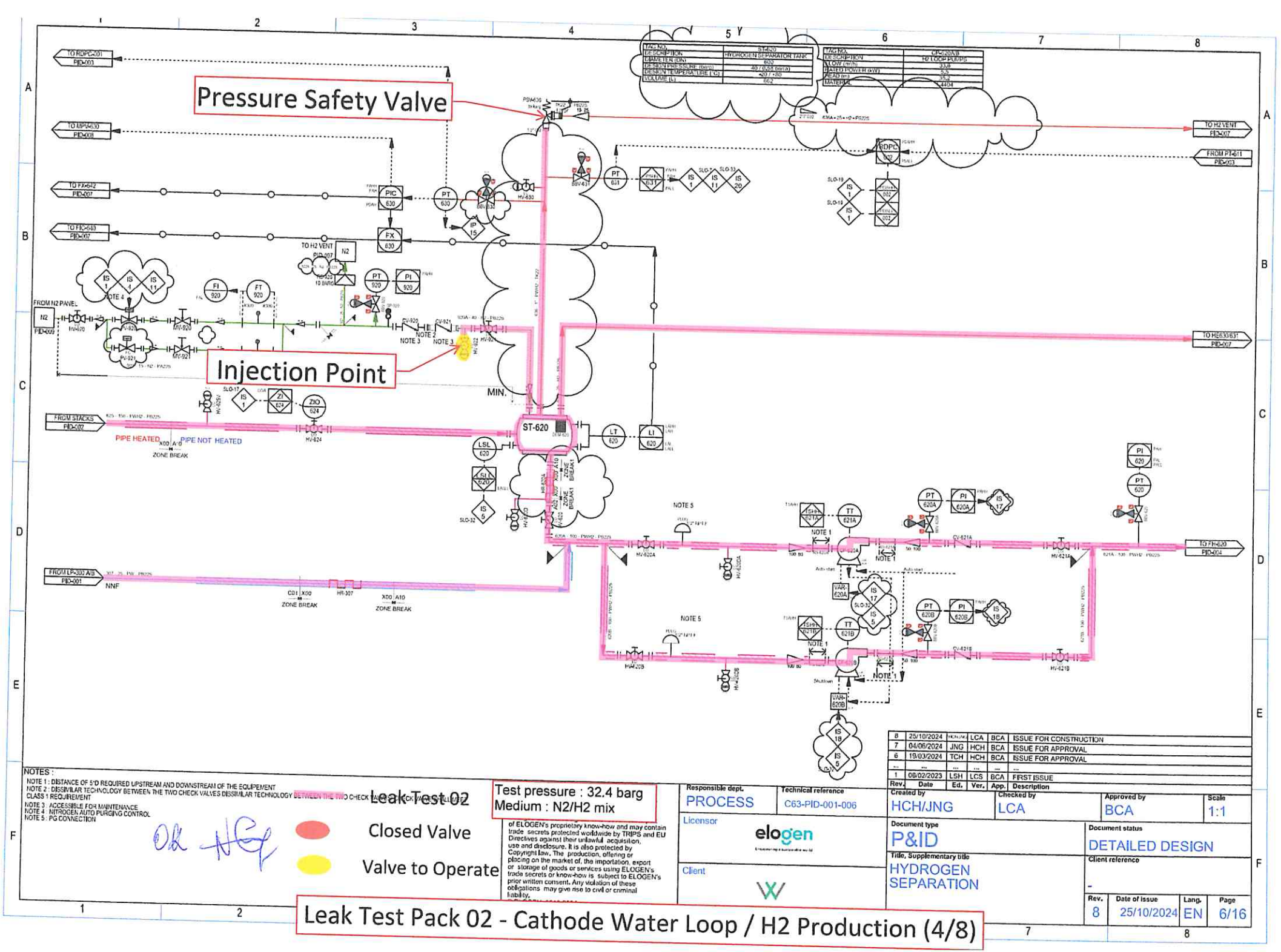
Test pressure : 32.4 barg
Medium : N2/H2 mix

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

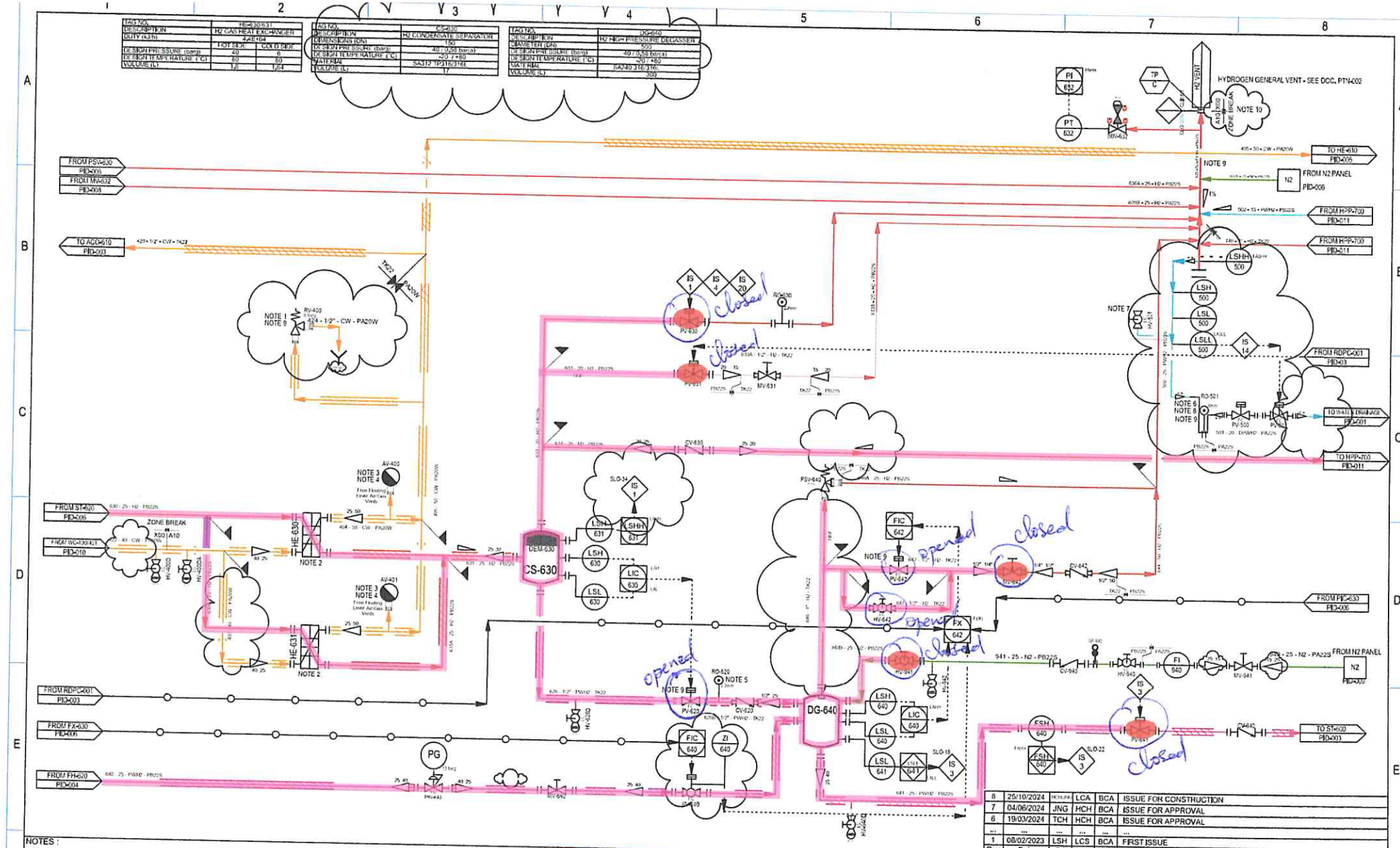
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Responsible dept. PROCESS
Technical reference C03-PID-001-001
Created by HCH/JNG
Checked by LCA
Approved by BCA
Scale 1:1
Licensor elogen
Client
Document type P&ID
Document status DETAILED DESIGN
Title, Supplementary title WATER TREATMENT PACKAGE
Client reference -
Rev. 8
Date of Issue 25/10/2024
Lang. EN
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Leak Test Pack 02 - Cathode Water Loop / H2 Production (1/8)



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TAG NO.	HE-630/631
DESCRIPTION	H2 GAS HEAT EXCHANGER
DUTY (kJ/h)	2,4E+04
	HOT SIDE / COLD SIDE
DESIGN PRESSURE (barg)	40 / 6
DESIGN TEMPERATURE (°C)	80 / 80
VOLUME (L)	1,0 / 1,04

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 barg
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	350
DESIGN PRESSURE (barg)	40 / 0,58 barg
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	309

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHO
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILING DURING STARTUP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM, LELL AND LSL DISTANCE = 200MM, LEL AND LSH DISTANCE = 100MM
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 02

Closed Valve

Test pressure : 32,4 barg
Medium : N2/H2 mix

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

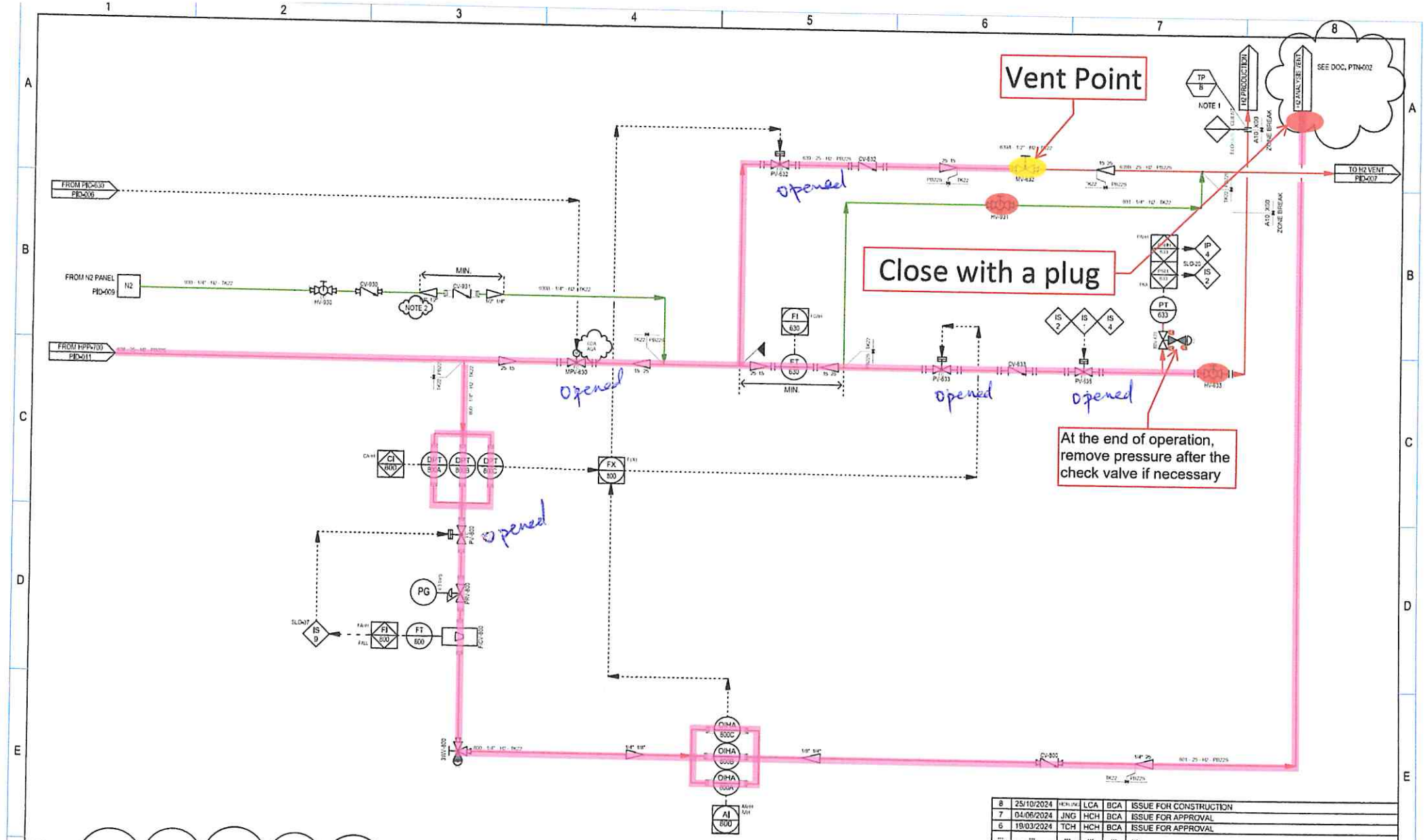
Responsible dept. PROCESS
Technical reference C63-PID-001-007
Licensor elogen
Client

Created by HCH/JNG
Checked by LCA
Approved by BCA
Scale 1:1

Document type P&ID
Document status DETAILED DESIGN
Title, Supplementary title H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP
Client reference -

Rev. 8
Date of Issue 25/10/2024
Lang. EN
Page 7/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (5/8)



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

Leak Test 02
Closed Valve
Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

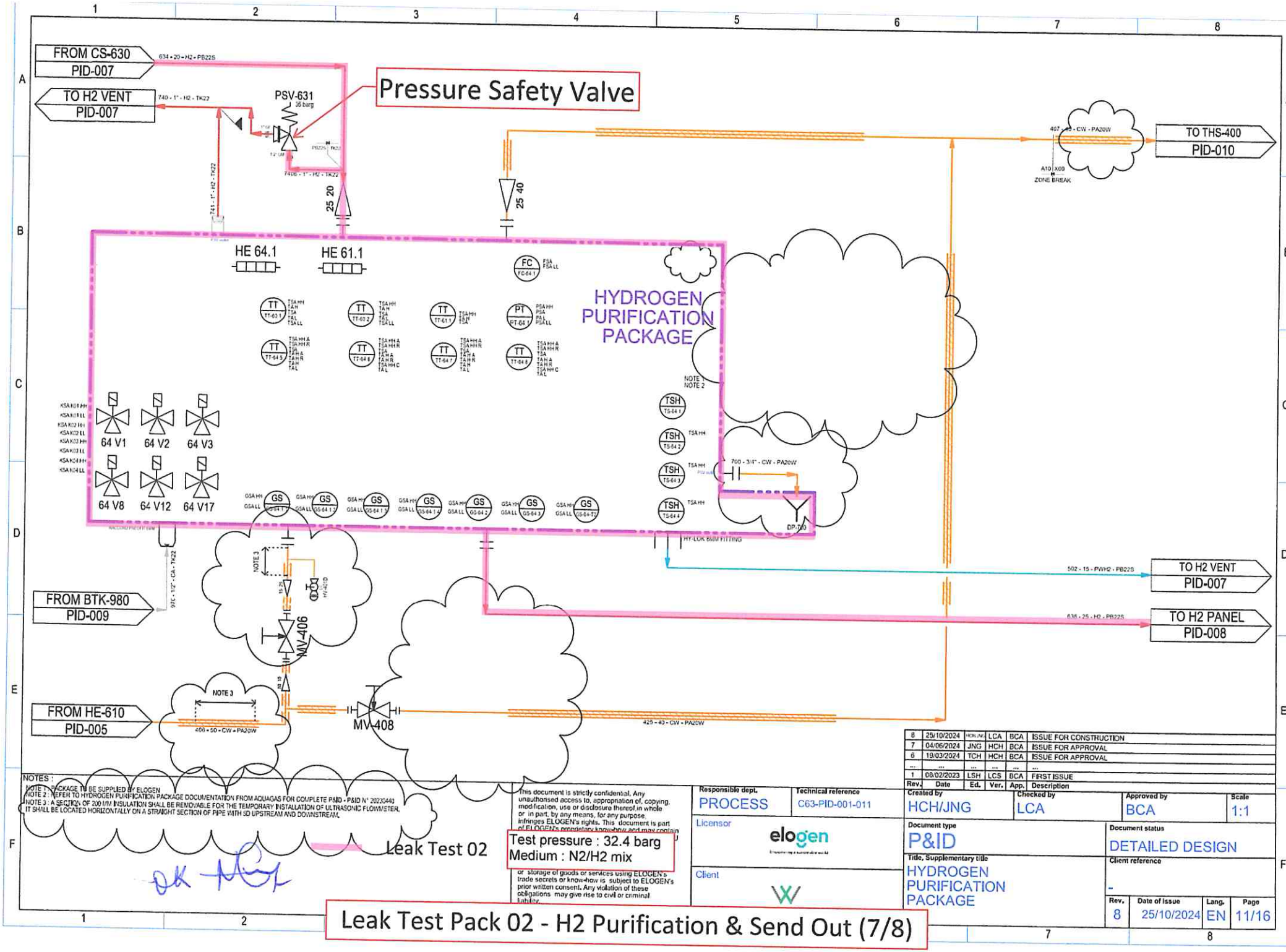
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	06/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.: PROCESS
Technical reference: C63-PID-001-008
Licensor: elogen
Client:
Created by: HCH/JNG
Checked by: LCA
Approved by: BCA
Scale: 1:1
Document type: P&ID
Document status: DETAILED DESIGN
Title, Supplementary title: H2 PANEL
Client reference: -
Rev.: 8
Date of issue: 25/10/2024
Lang.: EN
Page: 8/16

Leak Test Pack 02 - H2 Purification & Send Out (6/8)



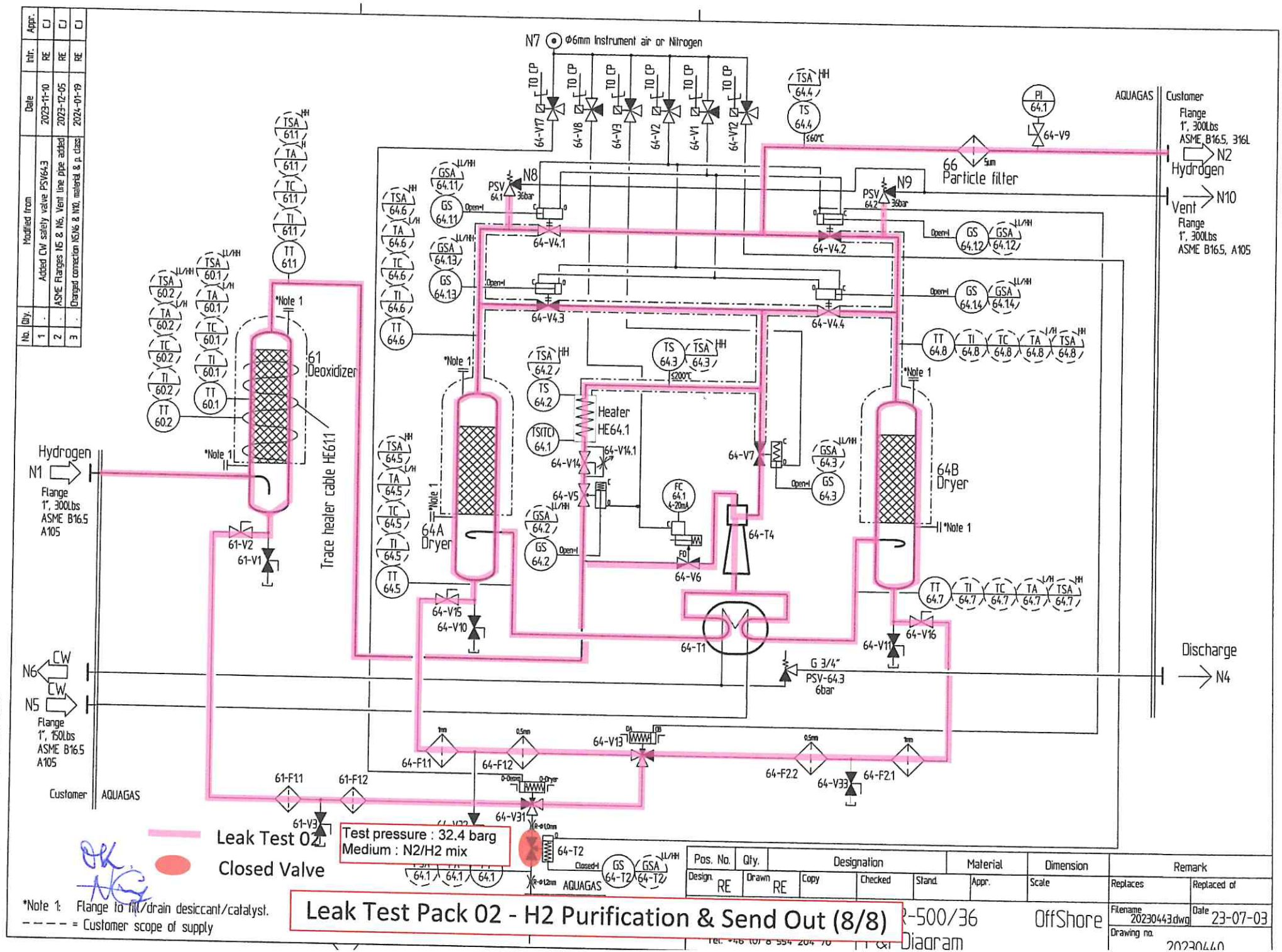
NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN.
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 M/M INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

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...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

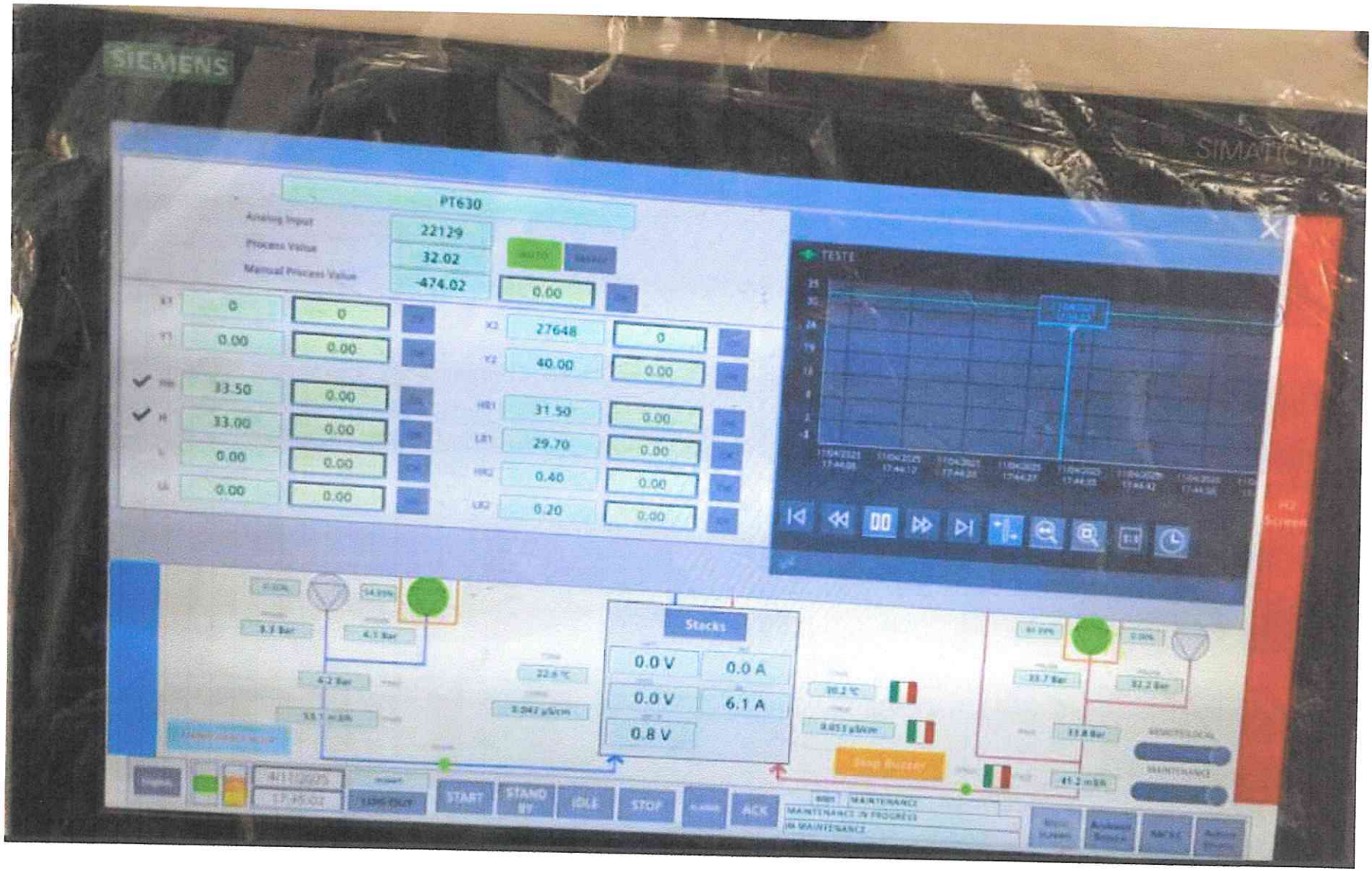
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Responsible dept.	Technical reference	Created by	Checked by / Approved by / Scale
PROCESS	C63-PID-001-011	HCH/JNG	LCA / BCA / 1:1
Licensor: elogen		Document type: P&ID	Document status: DETAILED DESIGN
Client		Title, Supplementary title: HYDROGEN PURIFICATION PACKAGE	Client reference: -

Rev.	Date of Issue	Lang.	Page
8	25/10/2024	EN	11/16


N7 Ø6mm Instrument air or Nitrogen
64-V17
64-V8
64-V3
64-V2
64-V1
64-V12
TSA 64.4
TS 64.4 ≤60°C
PI 64.1
64-V9
AQUAGAS
Customer
Flange 1", 300Lbs ASME B16.5, 316L
N2 Hydrogen
N10 Vent
Flange 1", 300Lbs ASME B16.5, A105
66 Particle filter 5µm
N8
PSV 64.1 36bar
N9
PSV 64.2 36bar
64-V4.1
64-V4.2
64-V4.3
64-V4.4
GSA 64.11
GS 64.11
GSA 64.12
GS 64.12
GSA 64.13
GS 64.13
GSA 64.14
GS 64.14
TT 64.8
TI 64.8
TC 64.8
TA 64.8
TSA 64.8
TSA 64.6
TA 64.6
TC 64.6
TI 64.6
TT 64.6
TSA 61.1
TA 61.1
TC 61.1
TI 61.1
TT 61.1
61 Deoxidizer
TSA 60.1
TA 60.1
TC 60.1
TI 60.1
TT 60.1
TSA 60.2
TA 60.2
TC 60.2
TI 60.2
TT 60.2
*Note 1
Trace heater cable HE611
Hydrogen N1
Flange 1", 300Lbs ASME B16.5 A105
61-V2
61-V1
64A Dryer
TSA 64.5
TA 64.5
TC 64.5
TI 64.5
TT 64.5
TSA 64.2
TS 64.2
TSITCI 64.1
Heater HE64.1
64-V14.1
64-V14
64-V5
GSA 64.2
GS 64.2
TS 64.3
TSA 64.3 ≤200°C
FC 64.1 4-20mA
64-V7
GSA 64.3
GS 64.3
64B Dryer
64-T4
64-V6
64-T1
TT 64.7
TI 64.7
TC 64.7
TA 64.7
TSA 64.7
64-V15
64-V10
64-V11
64-V16
G 3/4" PSV-64.3 6bar
Discharge
N4
N6 CW
N5 CW
Flange 1", 150Lbs ASME B16.5 A105
Customer
AQUAGAS
64-F1.1
64-F1.2
64-V13
64-F2.2
64-V33
64-F2.1
61-F1.1
61-F1.2
61-V3
64-V31
64-T2
GS 64-T2
GSA 64-T2
Leak Test 02
Closed Valve
Test pressure : 32.4 barg
Medium : N2/H2 mix
*Note 1: Flange to fill/drain desiccant/catalyst.
= Customer scope of supply
Leak Test Pack 02 - H2 Purification & Send Out (8/8)
OffShore
P&I Diagram
Filename 20230443.dwg
Date 23-07-03
Drawing no. 20230440
Modified from
No. Qty. Modified from Date Intr. Appr.
1 . Added CW safety valve PSV64.3 2023-11-10 RE CJ
2 . ASME Flanges N5 & N6, Vent line pipe added 2023-12-05 RE CJ
3 . Changed connection N5/N6 & N10, material & p. class 2024-01-19 RE CJ
Pos. No. Qty. Designation Material Dimension Remark
Design. RE Drawn RE Copy Checked Stand. Appr. Scale Replaces Replaced of
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PT630
22339
32.32
474.02
START
STAND BY
STOP
0.0 V
0.0 A
0.0 V
6.6 A
0.8 V


SIEMENS
PT630
Analog Input
22129
Process Value
32.02
Manual Process Value
-474.02
0.00
0
0.00
33.50
33.00
0.00
27648
40.00
31.50
29.70
0.40
0.20
TESTE
Stacks
0.0 V
0.0 A
0.0 V
6.1 A
0.8 V
START
STAND BY
IDLE
STOP
ACK
MAINTENANCE
MAINTENANCE IN PROGRESS

elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0101 - LEAK TEST	

TEST CONDITIONS	
Leak Test Pack	Pack 01
Tested System	Anode water O2 LOOP 600
Test Pressure (Barg)	11,7
Test Fluid	Nitrogen (N2)

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
PT-610	W707570119 8	

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
	10/04/25	13:50	11,89	17,4
END	Date	Time	Pressure (Barg)	Temperature (°C)
	10/04/25	14:50	11,89	17,7

RESULT			
Test Duration	1 hour	Delta P (Bar)	0
Snoop Detection without Bubbles	(YES) / NO / NA		
Gas Detection Without Leaks	(YES) / NO / NA		
Result	(OK) / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	~~FORES~~ ELOGEN	ELOGEN	CROSSWIND
NAME	PAOLETTI Luc	MOUFOUMA FRAY	J. Mackillop
DATE	10/04/25	10/04/25	10.4.25
SIGNATURE			

Test Report

Endress+Hauser
People for Process Automation

Final Inspection Report

Order information

Customer name	ELOGEN
Customer purchase order	BC0007140
Sales order number / Item	3011154568/0010
Internal order number / Item	3021332622000030

Device information

Description	Cerabar PMP71B
TAG	CPT-1106
Serial number	W7075701198
Order code	PMP71B-4EFQ0/101
Extended order code	PMP71B-BFBADBF6AA3SJI1WBJA1+HANNZ1

Additional information

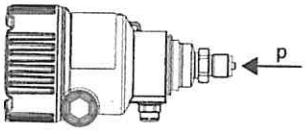
Output type	4-20 mA HART
Software version	01.00.06
Sensor range	-1...40 bar rel
Adjusted measuring range	0...16 bar rel
Maximum permissible error	± 0.05 % of span
Output mode	Linear

Procedure

Test specification	160000559 / 160000554, Comparison of unit under test (UUT) with standard
Test rig	15105 / 15106

Measuring condition

Ambient temperature	25.7 °C ±1 °C
Ambient pressure	979.5 mbar ±0.2 mbar
Ambient humidity	51.0 % rel. ±10 % rel.
UUT orientation	



Execution

Maulburg, 2024-07-29, 413570

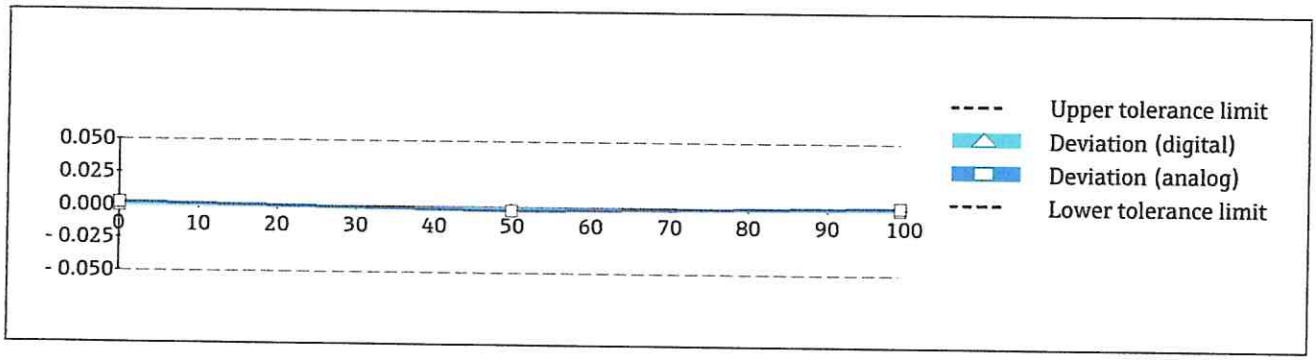
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Endress+Hauser SE+Co. KG
Postfach/P.O. Box 1261
D-79690 Maulburg
Germany
www.endress.com

Final Inspection Report

Test result

Deviation
% of span

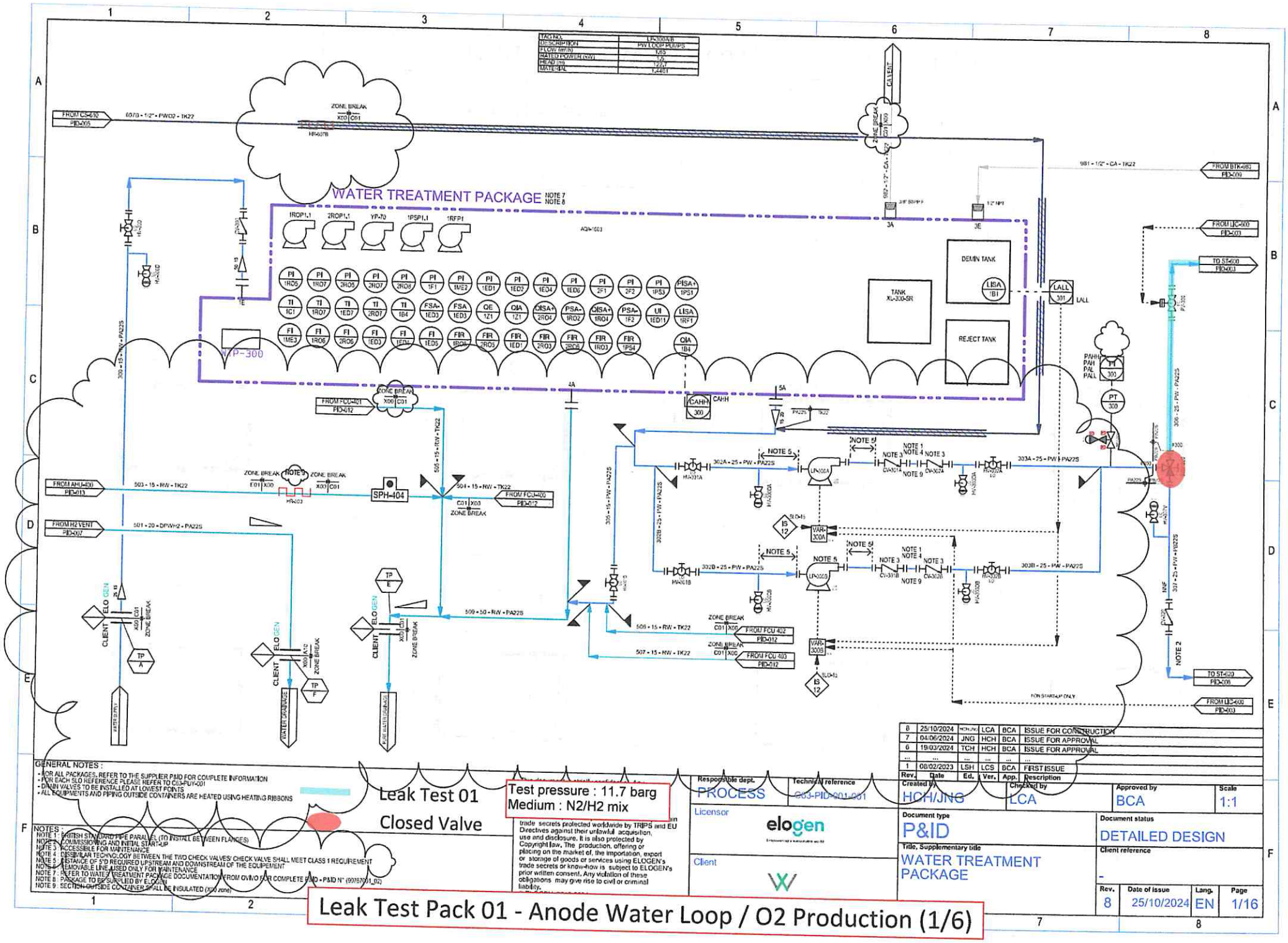


Test point	Reference pressure	UUT output (digital)	Measure-ment error (digital)	Measure-ment error (digital)	Reference pressure (Iout calc.)	UUT output (analog)	Measure-ment error (analog)
[%]	[bar]	[bar]	[% of span]	[bar]	[mA]	[mA]	[% of span]
0	0.00000	0.00000	-0.00000	0.00000	4.00000	4.00031	0.00190
50	7.97078	7.97054	-0.00149	-0.00024	11.9708	11.9704	-0.00249
99	15.8915	15.8915	0.00000	0.00000	19.8915	19.8917	0.00125

Hereby we confirm that all applicable tests according to the Quality plan (IP00008P) have been performed successfully.

Test	Procedure number	Test description
Contract review	TS00001F	As required in ISO 9001
Incoming goods inspection	TS00003F	Verification of conformance to the specified requirements
Printed circuit boards test	TS00009F	In-circuit test and functional test
High voltage test	TS00002F	The voltage used is chosen depending on operating voltage, terminals and approvals in accordance to the valid national / international standards
Welding inspection	TS00010F	Quality and tightness of the welding seams
Functional test of sensor	TS00022P	Check the sensor function
Calibration of instrument	TS00023P	Measurement, adjustment and verification of lower range value, upper range value and output signal
Final check of instrument	TS00024P	Verification of general functionality and customer specific settings
Outgoing visual check	TS00006F	Visual inspection of completeness and correctness of the instrument and the markings
Logistical verification	TS00005F	Automatic verification in the delivery phase via barcode that the instrument correspond to the order
Pressure test	TS00007F	Test the mechanical stability of the pressure bearing parts

Hereby we confirm that all measuring equipment used to assure the quality of the products has been calibrated and is traceable to national or international standards.



GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

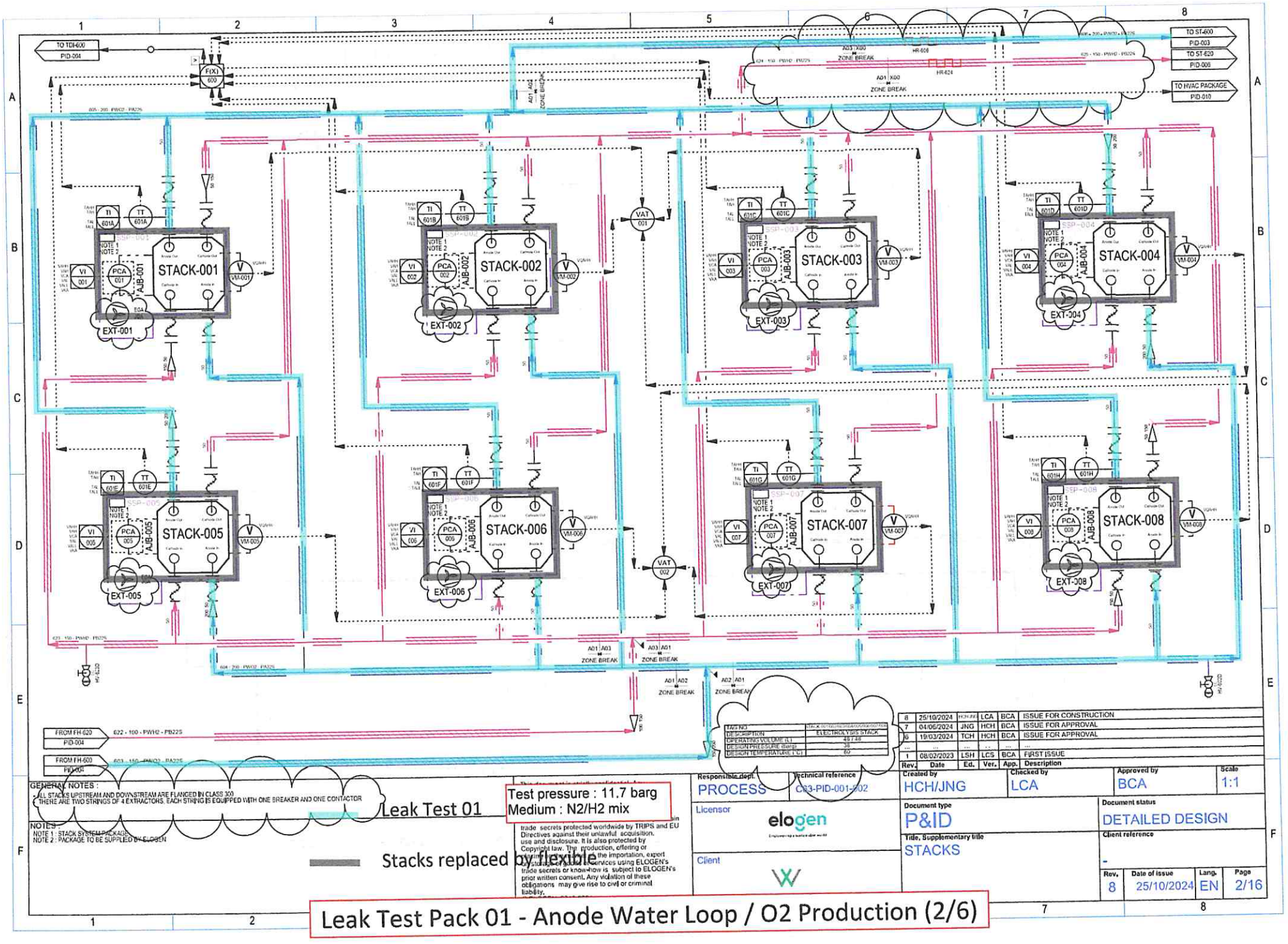
NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (99787001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (Y00 zone)

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JN	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

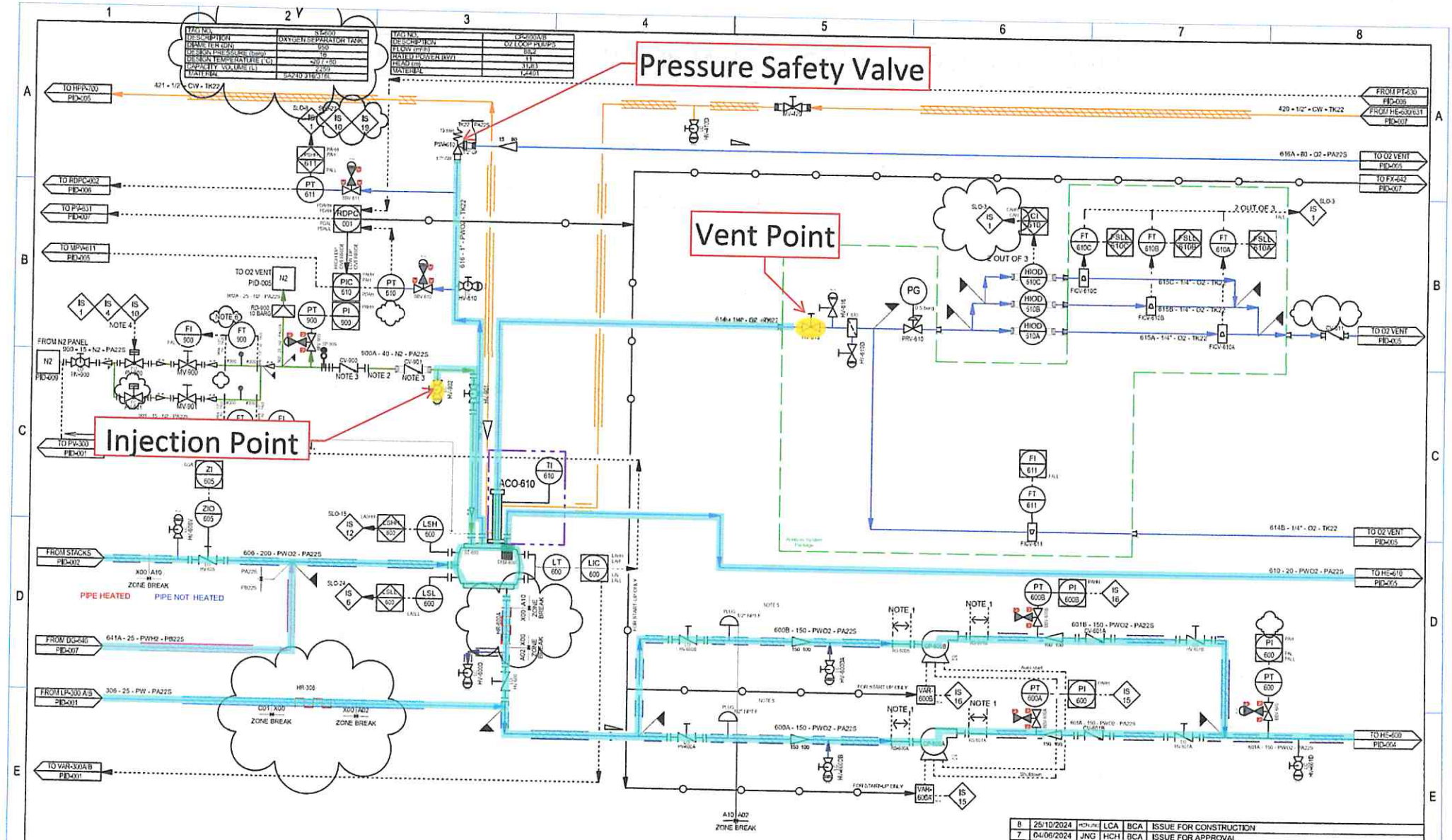
Responsible dept. PROCESS
Technical reference C63-PID-001-001
Created by HCH/JNG
Checked by LCA
Approved by BCA
Scale 1:1
Licensor elogen
Client
Document type P&ID
Document status DETAILED DESIGN
Title, Supplementary title WATER TREATMENT PACKAGE
Client reference -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	1/16



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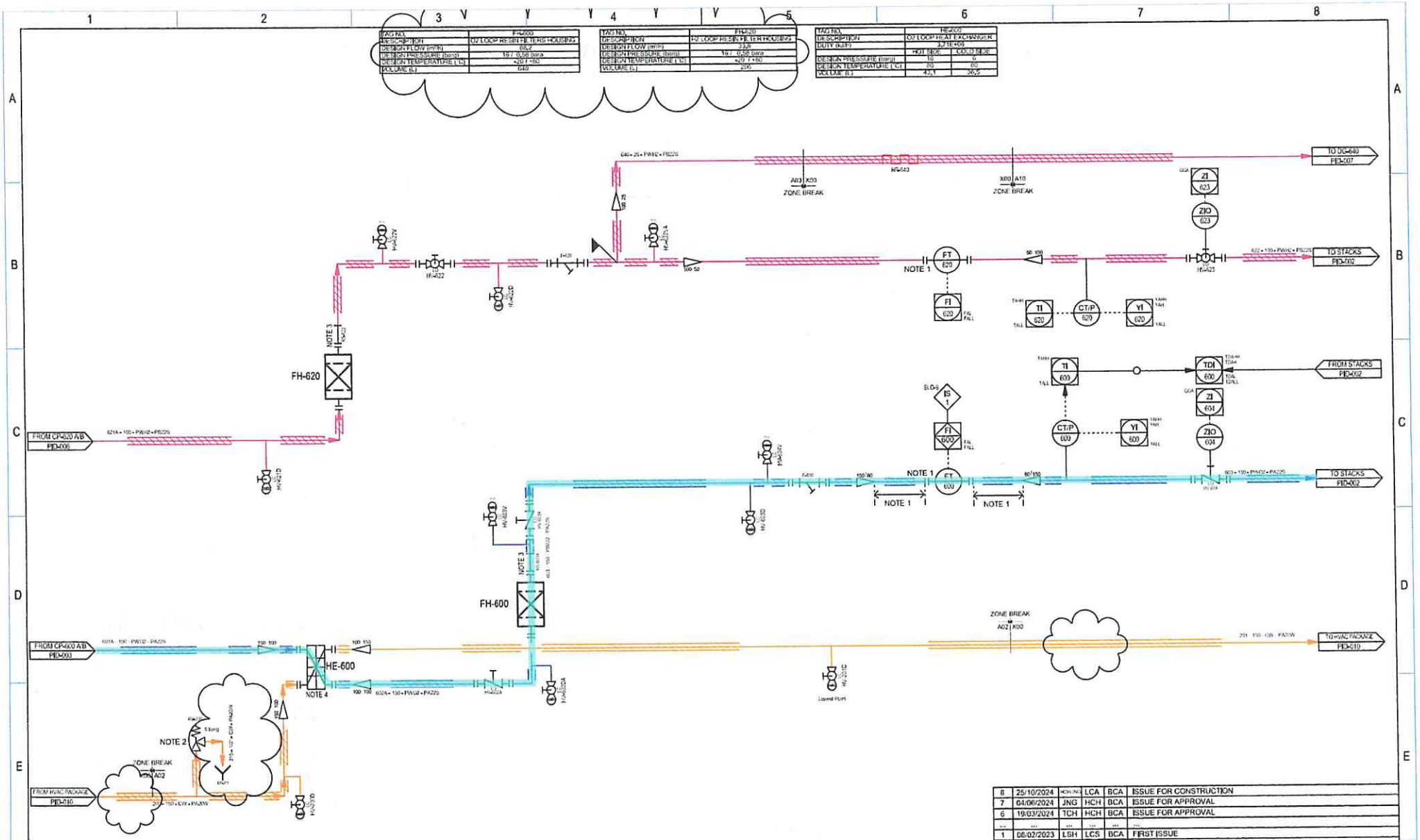
Leak Test Pack 01 - Anode Water Loop / O2 Production (2/6)



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/09/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept. PROCESS	Technical reference C63-PID-001-003	Created by HCH/JNG	Checked by LCA
Approved by BCA	Scale 1:1	Licensor elogen	Client
Document type P&ID	Document status DETAILED DESIGN	Title, Supplementary title OXYGEN SEPARATION	Client reference -
Rev. 8	Date of issue 25/10/2024	Lang. EN	Page 3/16

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TAG NO.	FH-620
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	66,2
DESIGN PRESSURE (barg)	16 / -0,58 bara
DESIGN TEMPERATURE (°C)	+20 / +60
VOLUME (L)	640

TAG NO.	FH-600
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33,0
DESIGN PRESSURE (barg)	16 / -0,58 bara
DESIGN TEMPERATURE (°C)	+20 / +60
VOLUME (L)	250

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3,71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	60	60
VOLUME (L)	42,1	36,5

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 01

Test pressure : 11.7 barg
Medium : N2/H2 mix

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	06/02/2023	LSH	LCS	BCA	FIRST ISSUE

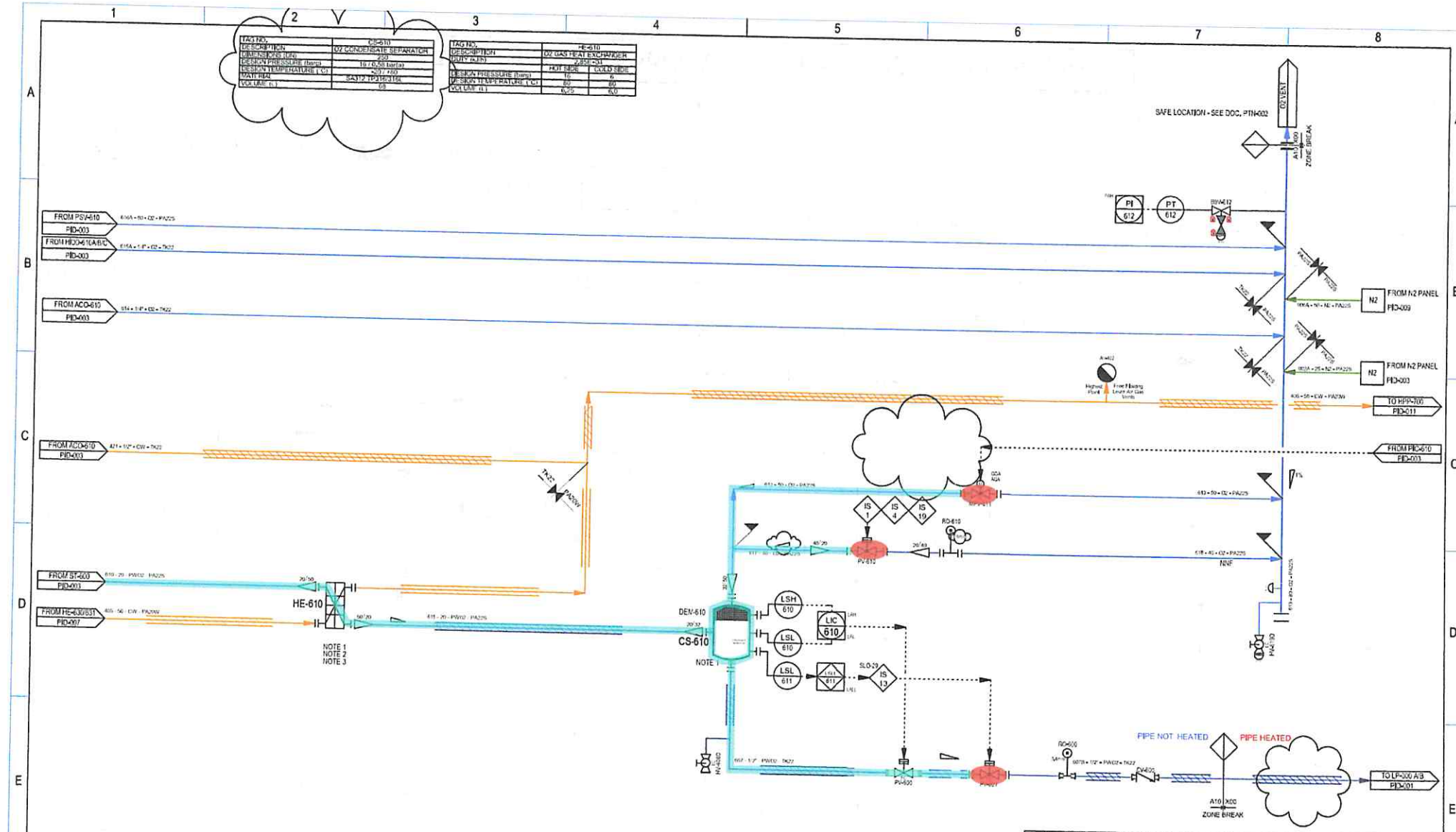
Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Client:

Document type: P&ID
Document status: DETAILED DESIGN
Title, Supplementary title: PURE WATER RESIN FILTERING
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (4/6)



TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATION
QUANTITY (UNIT)	1
DESIGN PRESSURE (barg)	19 (-0.5/ bar(a)
DESIGN TEMPERATURE (°C)	-20 / +60
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,855,701	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	19	6
DESIGN TEMPERATURE (°C)	60	60
VOLUME (L)	6,25	15,0

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

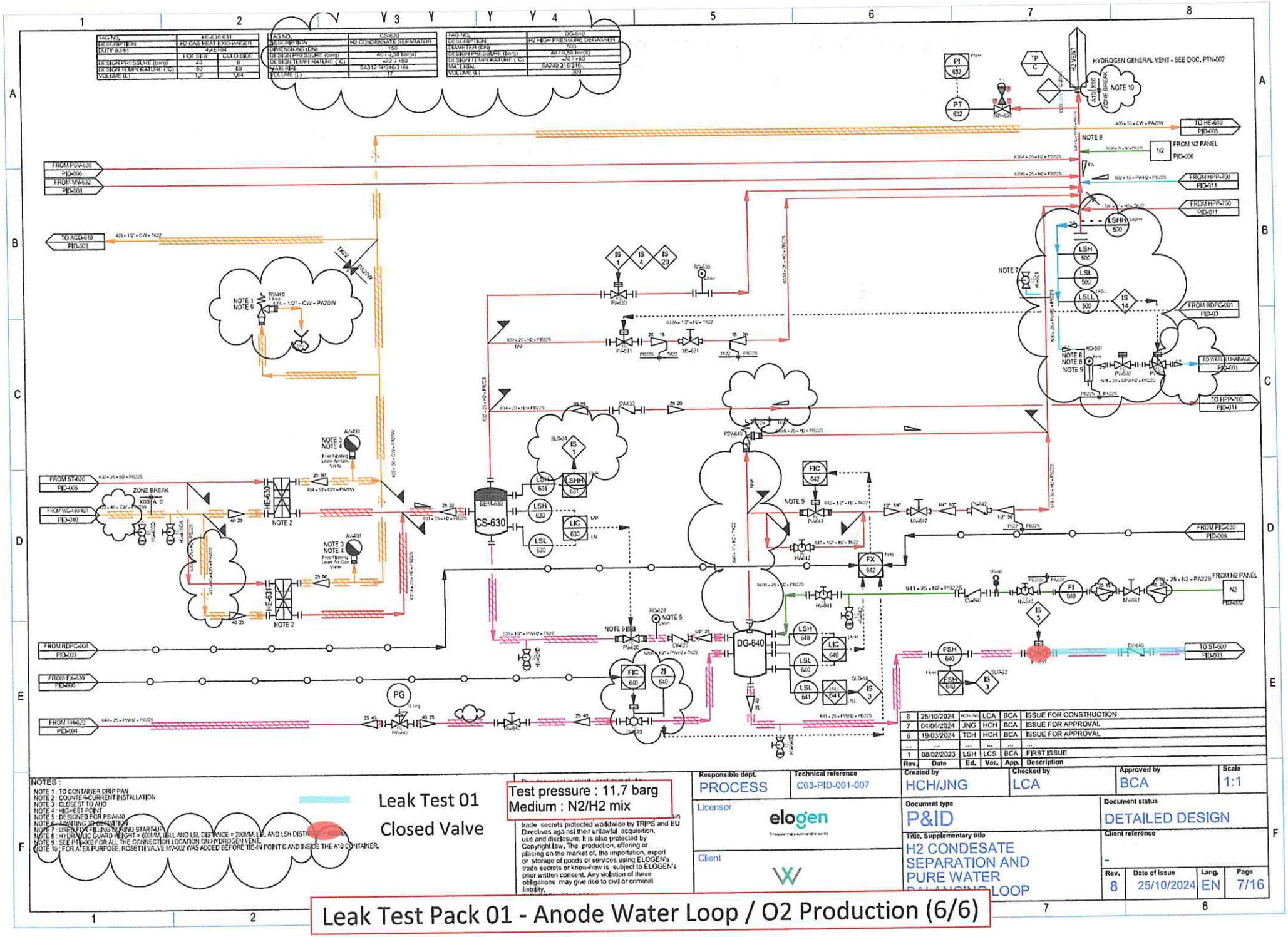
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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	[illegible]	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.: PROCESS
Technical reference: C63-PID-001-005
Licensor: elogen
Client:
Created by: HCH/JNG
Checked by: LCA
Approved by: BCA
Scale: 1:1
Document type: P&ID
Document status: DETAILED DESIGN
Title, Supplementary title: OXYGEN CONDENSATE SEPARATION
Client reference: -

Rev.	Date of Issue	Lang.	Page
8	25/10/2024	EN	5/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (5/6)



TAG NO.	HE-630/631
DESCRIPTION	H2 GAS HEAT EXCHANGER
DUTY (kJ/h)	4,2E+04
	HOT SIDE / COLD SIDE
DESIGN PRESSURE (barg)	40 / 6
DESIGN TEMPERATURE (°C)	60 / 60
VOLUME (L)	1,0 / 1,64

TAG NO.	DS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 barg
DESIGN TEMPERATURE (°C)	+5/ + 60
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 barg
DESIGN TEMPERATURE (°C)	+5/ +60
MATERIAL	SA240 316/316L
VOLUME (L)	300

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSW-640
NOTE 6 : AWAITING 3D PRESENTATION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM, LSLL AND LSL DISTANCE = 200MM, LSH AND LSH DISTANCE = 100MM
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-602 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 01
Closed Valve

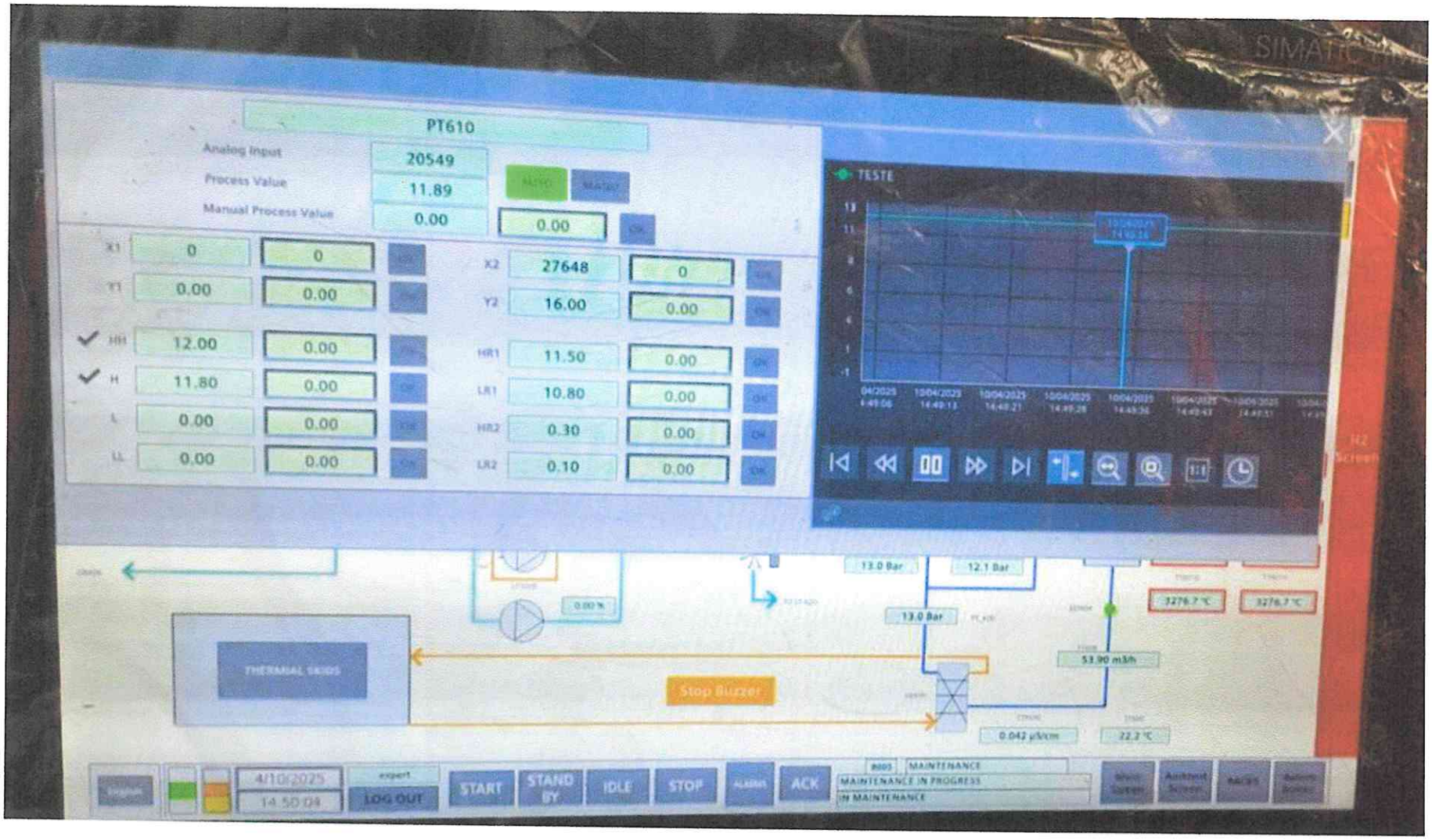
Test pressure : 11.7 barg
Medium : N2/H2 mix

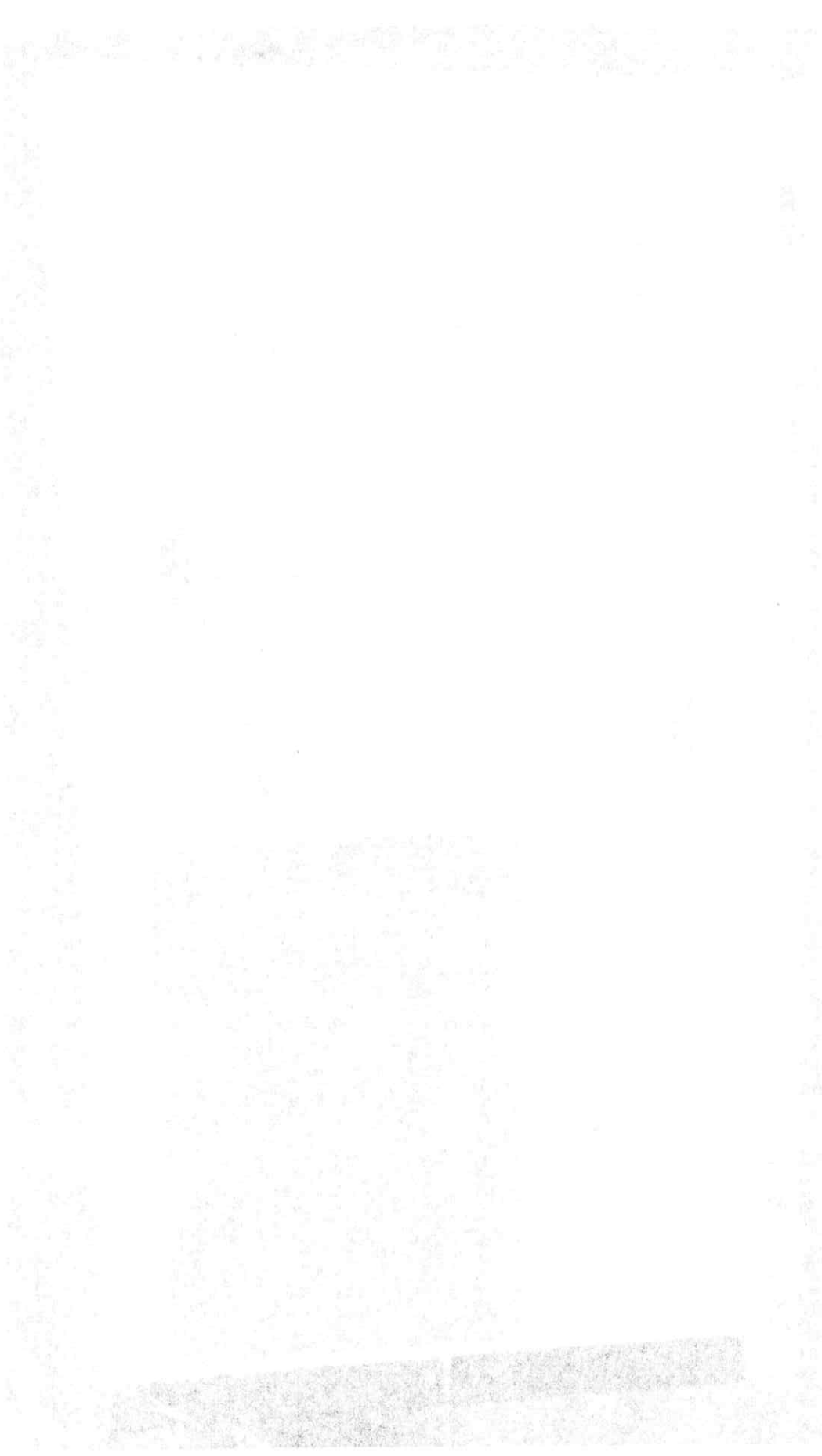
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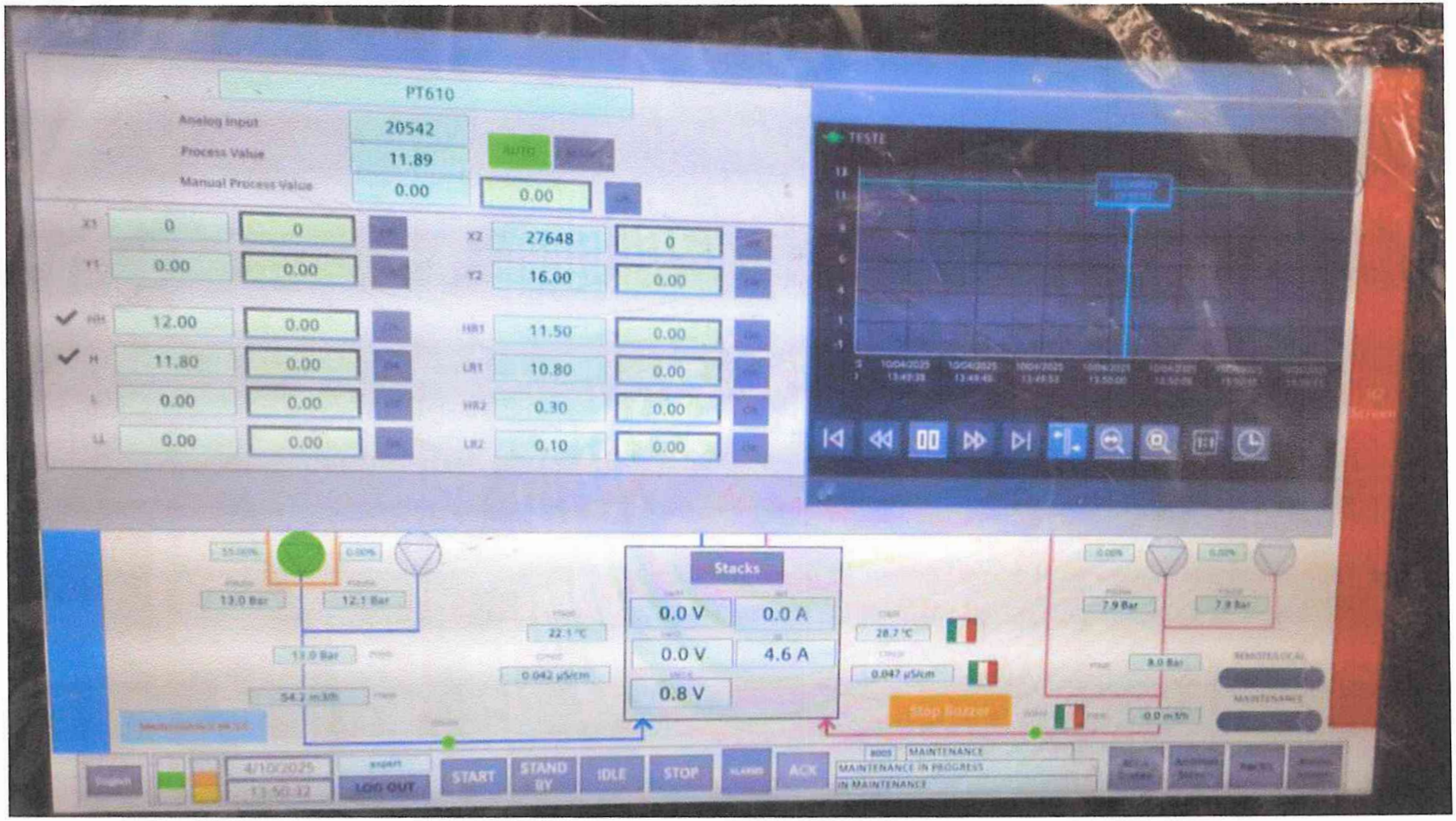
Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

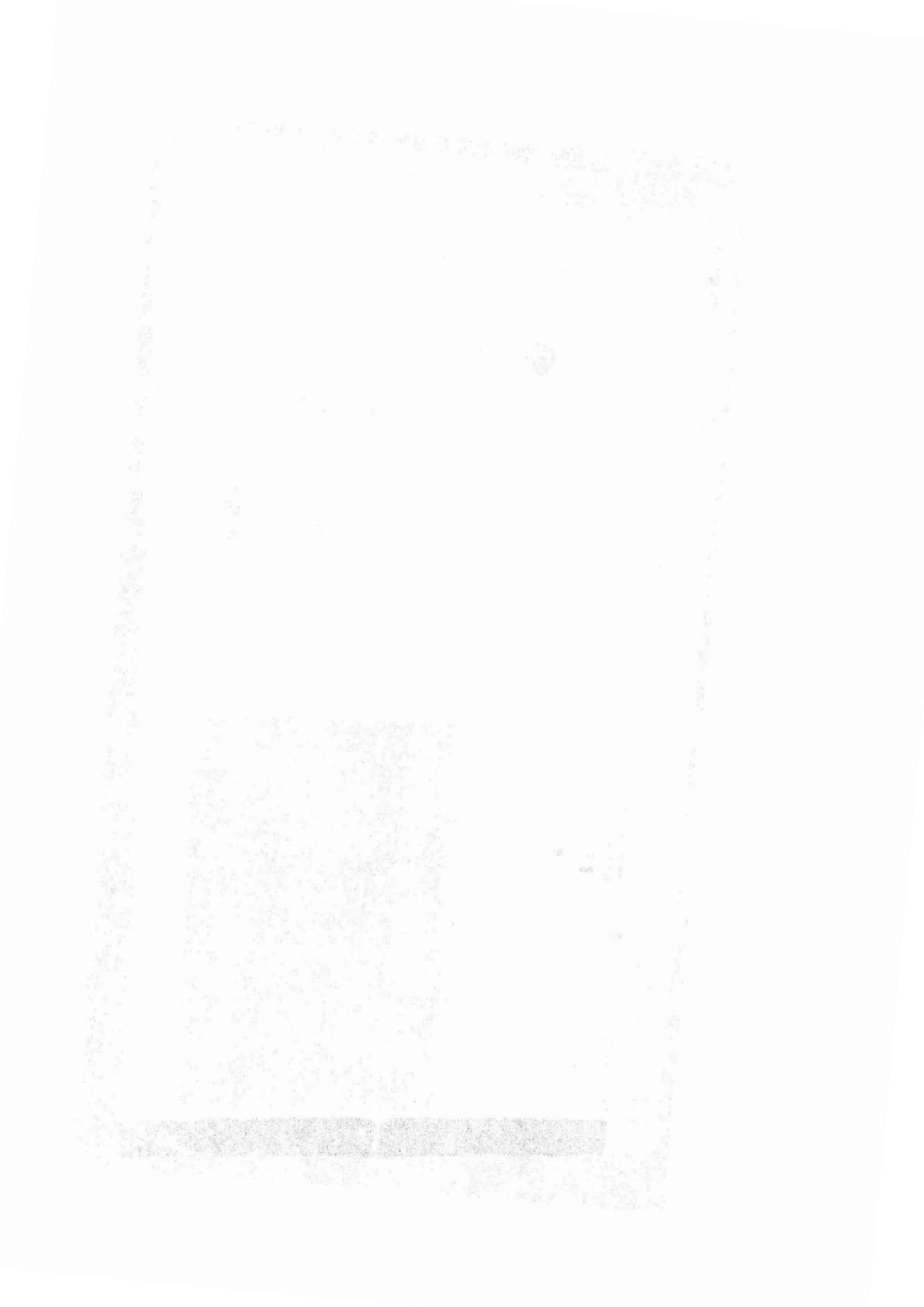
Responsible dept.	PROCESS
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Licensor	elogen
Client	
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Checked by	LCA
Approved by	BCA
Scale	1:1
Document type	P&ID
Document status	DETAILED DESIGN
Title, Supplementary title	H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP
Client reference	-
Rev.	8
Date of issue	25/10/2024
Lang.	EN
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Leak Test Pack 01 - Anode Water Loop / O2 Production (6/6)


PT610
Analog Input
20549
Process Value
11.89
Manual Process Value
0.00
0.00
X1
0
0
X2
27648
0
Y1
0.00
0.00
Y2
16.00
0.00
HH
12.00
0.00
HR1
11.50
0.00
H
11.80
0.00
LR1
10.80
0.00
L
0.00
0.00
HR2
0.30
0.00
LL
0.00
0.00
LR2
0.10
0.00
TESTE
THERMAL SKIDS
Stop Buzzer
13.0 Bar
12.1 Bar
13.0 Bar
53.90 m3/h
0.042 µS/cm
22.2 °C
3276.7 °C
3276.7 °C
4/10/2025
14:50:04
LOG OUT
START
STAND BY
IDLE
STOP
ACK
MAINTENANCE
MAINTENANCE IN PROGRESS
IN MAINTENANCE




PT610
Analog Input
20542
Process Value
11.89
Manual Process Value
0.00
0.00
AUTO
X1
0
0
X2
27648
0
Y1
0.00
0.00
Y2
16.00
0.00
HH
12.00
0.00
HR1
11.50
0.00
H
11.80
0.00
LR1
10.80
0.00
L
0.00
0.00
HR2
0.30
0.00
LL
0.00
0.00
LR2
0.10
0.00
TESTE
Stacks
0.0 V
0.0 A
0.0 V
4.6 A
0.8 V
13.0 Bar
12.1 Bar
13.0 Bar
54.2 m3/h
22.1 °C
0.042 µS/cm
28.7 °C
0.047 µS/cm
7.9 Bar
7.9 Bar
8.0 Bar
0.0 m3/h
Stop Buzzer
4/10/2025
13:50:32
expert
LOG OUT
START
STAND BY
IDLE
STOP
ACK
MAINTENANCE
MAINTENANCE IN PROGRESS
IN MAINTENANCE



			Electrolyzer Package FLANGE MANAGEMENT REGISTER CBS- Crossfilled Project					Document Code Revision Page Number	- Rev. 00 1/XXX																			
ZONE	AREA	Line iso Nr.	Line Nr.	Short Line Nr.	Piping Class	Joint Tag Nr.	Joint Type (Normal Flanged or Wafer)	Flange Dia	Flange Raiting	Flange Facing	Nut Material	Bolt Dia	Bolts Nr.	Torque 30% [Nm]	Torque 60% [Nm]	Final Torque [Nm]	Note	Assembled	Date	Tightened	Date	Tested Pass / Fail	Dis - Assembled	Date	Assembled	Date	Tightened	Date
WP1	A02/D01	224J10-DDL-PP-DI-00001_01	200-150-CW-PA20W_A02/D01	200-150-CW	PA20W	WP1_01-J01	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP1	A02/D01	224J10-DDL-PP-DI-00001_01	200-150-CW-PA20W_A02/D01	200-150-CW	PA20W	WP1_01-J02	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP1	A02/D01	224J10-DDL-PP-DI-00001_02	201-150-CW-PA20W_A02/D01	201-150-CW	PA20W	WP1_02-J01	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP1	A02/D01	224J10-DDL-PP-DI-00001_02	201-150-CW-PA20W_A02/D01	201-150-CW	PA20W	WP1_02-J02	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_03	307-25-PW-PB22S_A03	307-25-PW	PB22S	WP1_03-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	18/02/2025	YES	18/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_03	307-25-PW-PB22S_A03	307-25-PW	PB22S	WP1_03-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A02/A10	224J10-DDL-PP-DI-00001_04	600A-150-PWO2-PA22S_A02/A10	600A-150-PWO2	PA22S	WP1_04-J01	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02/A10	224J10-DDL-PP-DI-00001_04	600A-150-PWO2-PA22S_A02/A10	600A-150-PWO2	PA22S	WP1_04-J02	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02/A10	224J10-DDL-PP-DI-00001_04	600A-150-PWO2-PA22S_A02/A10	600A-150-PWO2	PA22S	WP1_04-J03	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02/A10	224J10-DDL-PP-DI-00001_04	600A-150-PWO2-PA22S_A02/A10	600A-150-PWO2	PA22S	WP1_04-J04	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02/A10	224J10-DDL-PP-DI-00001_04	600A-150-PWO2-PA22S_A02/A10	600A-150-PWO2	PA22S	WP1_04-J05	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_05	600B-150-PWO2-PA22S_A02	600B-150-PWO2	PA22S	WP1_05-J01	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_05	600B-150-PWO2-PA22S_A02	600B-150-PWO2	PA22S	WP1_05-J02	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	18/02/2025	YES	18/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_05	600B-150-PWO2-PA22S_A02	600B-150-PWO2	PA22S	WP1_05-J03	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	18/02/2025	YES	18/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_06	601A-150-PWO2-PA22S_A02	601A-150-PWO2	PA22S	WP1_06-J01	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_06	601A-150-PWO2-PA22S_A02	601A-150-PWO2	PA22S	WP1_06-J02	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_06	601A-150-PWO2-PA22S_A02	601A-150-PWO2	PA22S	WP1_06-J03	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_06	601A-150-PWO2-PA22S_A02	601A-150-PWO2	PA22S	WP1_06-J04	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_06	601A-150-PWO2-PA22S_A02	601A-150-PWO2	PA22S	WP1_06-J05	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	12/02/2025	YES	12/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_07	601B-150-PWO2-PA22S_A02	601B-150-PWO2	PA22S	WP1_07-J01	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_07	601B-150-PWO2-PA22S_A02	601B-150-PWO2	PA22S	WP1_07-J02	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_07	601B-150-PWO2-PA22S_A02	601B-150-PWO2	PA22S	WP1_07-J03	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_07	601B-150-PWO2-PA22S_A02	601B-150-PWO2	PA22S	WP1_07-J04	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_08	602A-150-PWO2-PA22S_A02	602A-150-PWO2	PA22S	WP1_08-J01	NORMAL	4"	CL150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70		YES	12/02/2025	YES	12/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_08	602A-150-PWO2-PA22S_A02	602A-150-PWO2	PA22S	WP1_08-J02	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_08	602A-150-PWO2-PA22S_A02	602A-150-PWO2	PA22S	WP1_08-J03	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J01	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass	yes	08/04/2025	yes	08/04/2025	yes	08/04/2025
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J02	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass	yes	08/04/2025	yes	08/04/2025	yes	08/04/2025
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J03	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J04	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J05	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J06	WAFER	3"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65		YES	14/02/2025	YES	14/02/2025	Pass						
WP1	A02	224J10-DDL-PP-DI-00001_09	603-150-PWO2-PA22S_A02	603-150-PWO2	PA22S	WP1_09-J07	WAFER	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120		YES	26/02/2025	YES	26/02/2025	Pass						
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J01	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J03	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J04	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J05	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J06	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J07	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J08	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80						Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J09	NORMAL	6"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120						Pass						
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J10	NORMAL	8"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	66	110		YES	14/02/2025	YES	14/02/2025	Pass	YES	24/02/2025	YES	24/02/2025	YES	24/02/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J11	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J12	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J13	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J14	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J15	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J16	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J17	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J18	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80						Pass	YES	14/04/2025	YES	14/04/2025	YES	14/04/2025
WP1	A01/A02	224J10-DDL-PP-DI-00001_10	604-200-PWO2-PA22S_A01/A02	604-200-PWO2	FLEX-HOSE	WP1_10-J19	NORMAL	8"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	33	66	110		YES	26/02/2025	YES	26/02/2025	Pass	YES	24/02/2025	YES	24/02/2025	YES	24/02/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J01	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J03	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J04	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J05	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J06	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J07	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J08	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J09	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J10	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J11	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J12	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J13	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J14	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J15	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J16	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J17	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J18	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J19	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J20	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J21	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J22	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J23	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J24	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J25	NORMAL	8"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	33	66	110		YES	26/02/2025	YES	26/02/2025	Pass	YES	24/02/2025	YES	24/02/2025	YES	24/02/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_11	605-200-PWO2-PA22S_A03/A01	605-200-PWO2	PA22S	WP1_11-J26	NORMAL	8"	CL150	RF	ASTM A194 Gr.8M	3/4"	8	33	66	110		YES	18/02/2025	YES	18/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J01	NORMAL	4"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J02	NORMAL	4"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J03	NORMAL	4"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J04	NORMAL	4"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J05	NORMAL	4"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J06	NORMAL	3"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	19,5	39	65		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	A03	224J10-DDL-PP-DI-00001_13	620A-100-PWH2-PB22S_A03	620A-100-PWH2	PB22S	WP1_13-J07	NORMAL	3"	CL300	RF	ASTM A194 Gr.8M	3/4"	8	19,5	39	65		YES	17/02/2025	YES	17/02/2025	Pass						
WP1

Electrolyser Package
FLANGE MANAGEMENT REGISTER
CBI- Crosswind Project

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Page Number: XXXX

ZONE	AREA	Line Iso Nr.	Line Nr.	Short Line Nr.	Piping Class	Joint Tag Nr.	Joint Type (Normal Flanged or Wafer)	Flange Dia	Flange Rating	Flange Facing	Nut Material	Bolt Dia	Bolts Nr.	Torque 30% [Nm]	Torque 60% [Nm]	Final Torque [Nm]	Note	Assembled	Date	Tightened	Date	Tested Pass / Fail	Dis - Assembled	Date	Assembled	Date	Tightened	Date
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	623-150-PWH2	FLEX-HOSE	WP1_18-J12	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	623-150-PWH2	FLEX-HOSE	WP1_18-J13	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	623-150-PWH2	FLEX-HOSE	WP1_18-J14	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	623-150-PWH2	FLEX-HOSE	WP1_18-J15	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	623-150-PWH2	FLEX-HOSE	WP1_18-J16	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	623-150-PWH2	FLEX-HOSE	WP1_18-J17	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_18	623-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J01	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J02	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J03	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J04	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J05	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J06	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J07	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J08	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J09	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J10	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J11	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J12	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J13	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J14	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J15	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A01	224J10-DDL-PP-DI-00001_19	624-150-PWH2-PB22S_A03/A01	624-150-PWH2	FLEX-HOSE	WP1_19-J16	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		yes	20/02/2025	yes	20/02/2025	Pass	yes	14/04/2025	yes	14/04/2025	yes	14/04/2025
WP1	A03/A10	224J10-DDL-PP-DI-00001_20	640-25-PWH2-PB22S_A03/A10	640-25-PWH2	PB22S	WP1_20-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	17/02/2025	YES	17/02/2025	Pass						
WP1	FH-600	224J10-DDL-VS-DD-00001	NA	NA	NA	WP1_21-J01	NORMAL	AS PER DWG	AS PER DWG	AS PER DWG	AS PER DWG	AS PER DWG	AS PER DWG	400	600	1000		YES	20/02/2025	YES	20/02/2025	Pass	yes	08/04/2025	yes	08/04/2025	yes	08/04/2025
WP1	FH-620	224J10-DDL-VS-DD-00001	NA	NA	NA	WP1_22-J01	NORMAL	AS PER DWG	AS PER DWG	AS PER DWG	AS PER DWG	AS PER DWG	AS PER DWG	400	600	1000		YES	20/02/2025	YES	20/02/2025	Pass	yes	08/04/2025	yes	08/04/2025	yes	08/04/2025
WP2	CD1	224J10-DDL-PP-DI-00002_01	300-15-RW-PA22S_C01	300-15-RW	PA22S	WP2_01-J01	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_01	300-15-RW-PA22S_C01	300-15-RW	PA22S	WP2_01-J02	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_01	300-15-RW-PA22S_C01	300-15-RW	PA22S	WP2_01-J03	WAFER	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_01	300-15-RW-PA22S_C01	300-15-RW	PA22S	WP2_01-J04	NORMAL	3/4"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_02	302A-25-PW-PA22S_C01	302A-25-PW	PA22S	WP2_02-J01	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_02	302A-25-PW-PA22S_C01	302A-25-PW	PA22S	WP2_02-J02	NORMAL	3/4"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_02	302A-25-PW-PA22S_C01	302A-25-PW	PA22S	WP2_02-J03	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_02	302A-25-PW-PA22S_C01	302A-25-PW	PA22S	WP2_02-J04	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_03	302B-25-PW-PA22S_C01	302B-25-PW	PA22S	WP2_03-J01	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_03	302B-25-PW-PA22S_C01	302B-25-PW	PA22S	WP2_03-J02	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_03	302B-25-PW-PA22S_C01	302B-25-PW	PA22S	WP2_03-J03	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_04	303A-25-PW-PA22S_C01	303A-25-PW	PA22S	WP2_04-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_04	303A-25-PW-PA22S_C01	303A-25-PW	PA22S	WP2_04-J02	WAFER	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_04	303A-25-PW-PA22S_C01	303A-25-PW	PA22S	WP2_04-J03	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_04	303A-25-PW-PA22S_C01	303A-25-PW	PA22S	WP2_04-J04	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_04	303A-25-PW-PA22S_C01	303A-25-PW	PA22S	WP2_04-J05	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_05	303B-25-PW-PA22S_C01	303B-25-PW	PA22S	WP2_05-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_05	303B-25-PW-PA22S_C01	303B-25-PW	PA22S	WP2_05-J02	WAFER	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_05	303B-25-PW-PA22S_C01	303B-25-PW	PA22S	WP2_05-J03	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_05	303B-25-PW-PA22S_C01	303B-25-PW	PA22S	WP2_05-J04	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_05	303B-25-PW-PA22S_C01	303B-25-PW	PA22S	WP2_05-J05	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_05	303B-25-PW-PA22S_C01	303B-25-PW	PA22S	WP2_05-J06	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_06	305-15-PW-PA22S_C01	305-15-PW	PA22S	WP2_06-J01	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_06	305-15-PW-PA22S_C01	305-15-PW	PA22S	WP2_06-J02	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_06	305-15-PW-PA22S_C01	305-15-PW	PA22S	WP2_06-J03	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_06	305-15-PW-PA22S_C01	305-15-PW	PA22S	WP2_06-J04	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_07	306-25-PW-PA22S_C01	306-25-PW	PA22S	WP2_07-J01	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_07	306-25-PW-PA22S_C01	306-25-PW	PA22S	WP2_07-J02	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_07	306-25-PW-PA22S_C01	306-25-PW	PA22S	WP2_07-J03	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_07	306-25-PW-PA22S_C01	306-25-PW	PA22S	WP2_07-J04	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_07	306-25-PW-PA22S_C01	306-25-PW	PA22S	WP2_07-J05	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_08	307-25-PW-PB22S_C01	307-25-PW	PB22S	WP2_08-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_08	307-25-PW-PB22S_C01	307-25-PW	PB22S	WP2_08-J02	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_08	307-25-PW-PB22S_C01	307-25-PW	PB22S	WP2_08-J03	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_08	307-25-PW-PB22S_C01	307-25-PW	PB22S	WP2_08-J04	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_09	503-15-RW-PA22S_C01	503-15-RW	PA22S	WP2_09-J01	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_09	503-15-RW-PA22S_C01	503-15-RW	PA22S	WP2_09-J02	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_10	509-50-RW-PA22S_C01	509-50-RW	PA22S	WP2_10-J01	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	CD1	224J10-DDL-PP-DI-00002_10	509-50-RW-PA22S_C01	509-50-RW	PA22S	WP2_10-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		YES	12/02/2025	YES	12/02/2025	Pass						
WP2	B01	224J10-DDL-PP-DI-00002_11	413-50-CW-PA20W_B01	413-50-CW	PA20W	WP2_11-J01	NORMAL	1.1/4"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	15	30	50	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP2	B01	224J10-DDL-PP-DI-00002_11	413-50-CW-PA20W_B01	413-50-CW	PA20W	WP2_11-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP2	B01	224J10-DDL-PP-DI-00002_12	430-50-CW-PA20W_B01	430-50-CW	PA20W	WP2_12-J01	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP2	B01	224J10-DDL-PP-DI-00002_12	430-50-CW-PA20W_B01	430-50-CW	PA20W	WP2_12-J02	NORMAL	1.1/4"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	15	30	50	Paumier	YES	12/02/2025	YES	12/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_01	403-40-CW-PA20W_A10	403-40-CW	PA20W	WP3_01-J01	NORMAL	1.1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_01	403-40-CW-PA20W_A10	403-40-CW	PA20W	WP3_01-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30	Paumier	Yes	30/01/2025	Yes	30/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_02	404-50-CW-PA20W_A10	404-50-CW	PA20W	WP3_02-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30	Paumier	Yes	30/01/2025	Yes	30/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_02	404-50-CW-PA20W_A10	404-50-CW	PA20W	WP3_02-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_03	405-50-CW-PA20W_A10	405-50-CW	PA20W	WP3_03-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_03	405-50-CW-PA20W_A10	405-50-CW	PA20W	WP3_03-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_03	405-50-CW-PA20W_A10	405-50-CW	PA20W	WP3_03-J03	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J01	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J02	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J03	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J04	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J05	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J06	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_04	406-50-CW-PA20W_A10	406-50-CW	PA20W	WP3_04-J07	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_05	407-40-CW-PA20W_A10	407-40-CW	PA20W	WP3_05-J01	NORMAL	1.1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_05	407-40-CW-PA20W_A10	407-40-CW	PA20W	WP3_05-J02	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_05	407-40-CW-PA20W_A10	407-40-CW	PA20W	WP3_05-J03	NORMAL	1.1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_05	407-40-CW-PA20W_A10	407-40-CW	PA20W	WP3_05-J04	NORMAL	1.1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_05	407-40-CW-PA20W_A10	407-40-CW	PA20W	WP3_05-J05	NORMAL	1.1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_06	422-40-CW-PA20W_A10	422-40-CW	PA20W	WP3_06-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30	Paumier	Yes	30/01/2025	Yes	30/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_07	425-40-CW-PA20W_A10	425-40-CW	PA20W	WP3_07-J01	NORMAL	1.1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	31/01/2025	YES	31/01/2025	Pass	

Electrolyser Package
FLANGE MANAGEMENT REGISTER
CIEI- Cross/Wind Project

Document Code -
Revision Rev. 00
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ZONE	AREA	Line Iso Nr.	Line Nr.	Short Line Nr.	Piping Class	Joint Tag Nr.	Joint Type (Normal Flanged or Wafer)	Flange Dia	Flange Rating	Flange Facing	Nut Material	Bolt Dia	Bolts Nr.	Torque 30% [Nm]	Torque 60% [Nm]	Final Torque [Nm]	Note	Assembled	Date	Tightened	Date	Tested Pass / Fail	Dis - Assembled	Date	Assembled	Date	Tightened	Date
WP3	A10	224J10-DDL-PP-DI-00003_22	625-150-PWH2-PB22S_A10	625-150-PWH2	PB22S	WP3_22-J01	NORMAL	6"	CL300	RF	ASTM A194 Gr.8M	3/4"	12	52,5	105	175		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_22	625-150-PWH2-PB22S_A10	625-150-PWH2	PB22S	WP3_22-J02	NORMAL	6"	CL300	RF	ASTM A194 Gr.8M	3/4"	12	52,5	105	175		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_22	625-150-PWH2-PB22S_A10	625-150-PWH2	PB22S	WP3_22-J03	NORMAL	6"	CL300	RF	ASTM A194 Gr.8M	3/4"	12	52,5	105	175		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_23	630-25-H2-PB22S_A10	630-25-H2	PB22S	WP3_23-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		Yes	30/01/2025	Yes	30/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_23	630-25-H2-PB22S_A10	630-25-H2	PB22S	WP3_23-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		Yes	30/01/2025	Yes	30/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_24	630A-25-H2-PB22S_A10	630A-25-H2	PB22S	WP3_24-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_24	630A-25-H2-PB22S_A10	630A-25-H2	PB22S	WP3_24-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_25	631-25-H2-PB22S_A10	631-25-H2	PB22S	WP3_25-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_25	631-25-H2-PB22S_A10	631-25-H2	PB22S	WP3_25-J02	NORMAL	1 1/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	15	30	50		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_26	631A-25-H2-PB22S_A10	631A-25-H2	PB22S	WP3_26-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_27	632-20-H2-PB22S_A10	632-20-H2	PB22S	WP3_27-J01	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_27	632-20-H2-PB22S_A10	632-20-H2	PB22S	WP3_27-J02	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_27	632-20-H2-PB22S_A10	632-20-H2	PB22S	WP3_27-J03	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	22/02/2025	YES	22/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_27	632-20-H2-PB22S_A10	632-20-H2	PB22S	WP3_27-J04	WAFER	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	22/02/2025	YES	22/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_28	633-20-H2-PB22S_A10_A10	633-20-H2	PB22S	WP3_28-J01	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_28	633-20-H2-PB22S_A10_A10	633-20-H2	PB22S	WP3_28-J02	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	22/02/2025	YES	22/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_29	633B-20-H2-PB22S_A10	633B-20-H2	PB22S	WP3_29-J01	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	22/02/2025	YES	22/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_30	634-20-H2-PB22S_A10	634-20-H2	PB22S	WP3_30-J01	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_30	634-20-H2-PB22S_A10	634-20-H2	PB22S	WP3_30-J02	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_30	634-20-H2-PB22S_A10	634-20-H2	PB22S	WP3_30-J03	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_30	634-20-H2-PB22S_A10	634-20-H2	PB22S	WP3_30-J04	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_31	635-50-PWH2-PB22S_A10	635-50-PWH2	PB22S	WP3_31-J01	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		YES	22/02/2025	YES	22/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_31	635-50-PWH2-PB22S_A10	635-50-PWH2	PB22S	WP3_31-J02	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_31	635-50-PWH2-PB22S_A10	635-50-PWH2	PB22S	WP3_31-J03	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_31	635-50-PWH2-PB22S_A10	635-50-PWH2	PB22S	WP3_31-J04	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		YES	28/01/2025	YES	28/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_32	636A-25-H2-PB22S_A10	636A-25-H2	PB22S	WP3_32-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		Yes	30/01/2025	Yes	30/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J02	NORMAL	1/2"	CL300	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J03	NORMAL	1/2"	CL300	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J04	NORMAL	1/2"	CL300	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J05	NORMAL	1/2"	CL300	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J06	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J07	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J08	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J09	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J10	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J11	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J12	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	29/01/2025	YES	29/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_33	638-25-H2-PB22S_A10	638-25-H2	PB22S	WP3_33-J13	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_34	639-25-H2-PB22S_A10	639-25-H2	PB22S	WP3_34-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_34	639-25-H2-PB22S_A10	639-25-H2	PB22S	WP3_34-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_34	639-25-H2-PB22S_A10	639-25-H2	PB22S	WP3_34-J03	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_34	639-25-H2-PB22S_A10	639-25-H2	PB22S	WP3_34-J04	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	31/01/2025	YES	31/01/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_36	640-25-PWH2-PB22S_A10	640-25-PWH2	PB22S	WP3_36-J01	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_37	640B-25-PWH2-PB22S_A10	640B-25-PWH2	PB22S	WP3_37-J01	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_37	640B-25-PWH2-PB22S_A10	640B-25-PWH2	PB22S	WP3_37-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_37	640B-25-PWH2-PB22S_A10	640B-25-PWH2	PB22S	WP3_37-J03	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_37	640B-25-PWH2-PB22S_A10	640B-25-PWH2	PB22S	WP3_37-J04	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_37	640B-25-PWH2-PB22S_A10	640B-25-PWH2	PB22S	WP3_37-J05	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_37	640B-25-PWH2-PB22S_A10	640B-25-PWH2	PB22S	WP3_37-J06	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_38	641-25-PWH2-PB22S_A10	641-25-PWH2	PB22S	WP3_38-J01	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_38	641-25-PWH2-PB22S_A10	641-25-PWH2	PB22S	WP3_38-J02	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_38	641-25-PWH2-PB22S_A10	641-25-PWH2	PB22S	WP3_38-J03	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_38	641-25-PWH2-PB22S_A10	641-25-PWH2	PB22S	WP3_38-J04	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_39	641A-25-PWH2-PB22S_A10	641A-25-PWH2	PB22S	WP3_39-J01	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_39	641A-25-PWH2-PB22S_A10	641A-25-PWH2	PB22S	WP3_39-J02	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_39	641A-25-PWH2-PB22S_A10	641A-25-PWH2	PB22S	WP3_39-J03	NORMAL	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_40	644-50-H2-PB22S_A10	644-50-H2	PB22S	WP3_40-J01	NORMAL	2"	CL300	RF	ASTM A194 Gr.8M	5/8"	8	24	48	80		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_42	900-15-N2-PA22S_A10	900-15-N2	PA22S	WP3_42-J01	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_42	900-15-N2-PA22S_A10	900-15-N2	PA22S	WP3_42-J02	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_42	900-15-N2-PA22S_A10	900-15-N2	PA22S	WP3_42-J03	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_42	900-15-N2-PA22S_A10	900-15-N2	PA22S	WP3_42-J04	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_42	900-15-N2-PA22S_A10	900-15-N2	PA22S	WP3_42-J05	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_42	900-15-N2-PA22S_A10	900-15-N2	PA22S	WP3_42-J06	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_43	900A-40-N2-PA22S_A10	900A-40-N2	PA22S	WP3_43-J01	NORMAL	1 1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_43	900A-40-N2-PA22S_A10	900A-40-N2	PA22S	WP3_43-J02	WAFER	1 1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_43	900A-40-N2-PA22S_A10	900A-40-N2	PA22S	WP3_43-J03	WAFER	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_43	900A-40-N2-PA22S_A10	900A-40-N2	PA22S	WP3_43-J04	NORMAL	1 1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_43	900A-40-N2-PA22S_A10	900A-40-N2	PA22S	WP3_43-J05	NORMAL	1 1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_43	900A-40-N2-PA22S_A10	900A-40-N2	PA22S	WP3_43-J06	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_44	901-15-N2-PA22S_A10	901-15-N2	PA22S	WP3_44-J01	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_44	901-15-N2-PA22S_A10	901-15-N2	PA22S	WP3_44-J02	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_44	901-15-N2-PA22S_A10	901-15-N2	PA22S	WP3_44-J03	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_44	901-15-N2-PA22S_A10	901-15-N2	PA22S	WP3_44-J04	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_44	901-15-N2-PA22S_A10	901-15-N2	PA22S	WP3_44-J05	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_45	902-25-N2-PA22S_A10	902-25-N2	PA22S	WP3_45-J01	WAFER	1"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_45	902-25-N2-PA22S_A10	902-25-N2	PA22S	WP3_45-J02	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_46	902A-25-N2-PA22S_A10	902A-25-N2	PA22S	WP3_46-J01	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_48	906A-50-N2-PA22S_A10	906A-50-N2	PA22S	WP3_48-J01	NORMAL	2"	CL150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J01	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J02	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J03	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J04	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J05	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J06	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J07	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_49	910-25-N2-PA22S_A10	910-25-N2	PA22S	WP3_49-J08	NORMAL	1"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J01	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J02	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J03	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J04	NORMAL	3/4"	CL300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J05	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J06	NORMAL	1/2"	CL150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	17/02/2025	YES	17/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_50	920-15-N2-PA22S_A10	920-15-N2	PA22S	WP3_50-J07	NORMAL	1 1/2"	CL300	RF	ASTM A194 Gr.8M	3/4"	4	18	36	60		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_51	920A-40-N2-PB22S_A10	920A-40-N2	PB22S	WP3_51-J01	WAFER	1 1/2"	CL300	RF	ASTM A194 Gr

Electrolyser Package
FLANGE MANAGEMENT REGISTER
CID: CrossWind Project

Document Code: -
Revision: Rev. 00
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ZONE	AREA	Line Iso Nr.	Line Nr.	Short Line Nr.	Piping Class	Joint Tag Nr.	Joint Type (Normal Flanged or Wafer)	Flange Dia	Flange Rating	Flange Facing	Nut Material	Bolt Dia	Bolts Nr.	Torque 30% [Nm]	Torque 00% [Nm]	Final Torque [Nm]	Note	Assembled	Date	Tightened	Date	Tested Pass / Fail	Dis - Assembled	Date	Assembled	Date	Tightened	Date
WP3	A10	224J10-DDL-PP-DI-00003_63	TRIM-LINE_ST-600_LSL-600	ST-600_LSL-600	PA22S	WP3_63-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_64	TRIM-LINE_DG-640_LSL-641	DG-640_LSL-641	PB22S	WP3_64-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_65	TRIM-LINE_DG-640_LSL-640	DG-640_LSL-641	PB22S	WP3_65-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_66	TRIM-LINE_DG-640_LSH-631	DG-640_LSH-631	PB22S	WP3_66-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	14/02/2025	YES	14/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_67	TRIM-LINE_CS-610_LSH-610	CS-610_LSH-610	PA22S	WP3_67-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_68	TRIM-LINE_CS-610_LSH-611	CS-610_LSH-611	PA22S	WP3_68-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_69	TRIM-LINE_ST-620_DRAIN	ST-620_DRAIN	PA22S	WP3_69-J01	NORMAL	3/4"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	7,5	15	25		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_70	TRIM-LINE_ST-600_DRAIN	ST-600_DRAIN	PA22S	WP3_70-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_71	TRIM-LINE_ST-600_LT-600	ST-600_LT-600	PA22S	WP3_71-J01	NORMAL	1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_71	TRIM-LINE_ST-600_LT-600	ST-600_LT-600	PA22S	WP3_71-J02	NORMAL	1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_72	TRIM-LINE_CS-610_LSL-610	CS-610_LSL-610	PA22S	WP3_72-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00003_73	TRIM-LINE_ST-600_LSH-600	ST-600_LSH-600	PA22S	WP3_73-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30		YES	15/02/2025	YES	15/02/2025	Pass						
WP3	ST-620	224J10-DDL-VS-DD-00001	MANHOLE + BLIND	NA	NA	WP3_74_J01	KEMPCHEN - RUBBER-STEEL GASKET	6"	Cl.300	RF		3/4"	12	75	175	249		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	ST-620	224J10-DDL-VS-DD-00001	MANHOLE + BLIND	NA	NA	WP3_74_J02	KEMPCHEN - RUBBER-STEEL GASKET	6"	Cl.300	RF		3/4"	12	75	175	249		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	DG-640	224J10-DDL-VS-DD-00001	MANHOLE + BLIND	NA	NA	WP3_75_J01	KEMPCHEN - RUBBER-STEEL GASKET	6"	Cl.300	RF		3/4"	12	75	175	249		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	DG-640	224J10-DDL-VS-DD-00001	MANHOLE + BLIND	NA	NA	WP3_75_J02	KEMPCHEN - RUBBER-STEEL GASKET	6"	Cl.300	RF		3/4"	12	75	175	249		YES	19/02/2025	YES	19/02/2025	Pass						
WP3	ST-600	224J10-DDL-VS-DD-00001	MANHOLE + BLIND	NA	NA	WP3_76_J01	KEMPCHEN - RUBBER-STEEL GASKET	6"	Cl.150	RF		1"	16	145	338	483		YES	19/02/2025	YES	19/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_01	209-150-CW-PA20W_E01	209-150-CW	PA20W	WP4_01-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_02	210-150-CW-PA20W_E01	210-150-CW	PA20W	WP4_02-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_03	408-80-CW-PA20W_E01	408-80-CW	PA20W	WP4_03-J01	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_03	408-80-CW-PA20W_E01	408-80-CW	PA20W	WP4_03-J02	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_04	410-25-CW-PA20W_E01	410-25-CW	PA20W	WP4_04-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass	YES	05/03/2025	YES	05/03/2025	YES	05/03/2025
WP4	E01	224J10-DDL-PP-DI-00004_04	410-25-CW-PA20W_E01	410-25-CW	PA20W	WP4_04-J02	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_04	410-25-CW-PA20W_E01	410-25-CW	PA20W	WP4_04-J03	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_04	410-25-CW-PA20W_E01	410-25-CW	PA20W	WP4_04-J04	NORMAL	1.1/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	15	30	50	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_05	411-25-CW-PA20W_E01	411-25-CW	PA20W	WP4_05-J01	NORMAL	1.1/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	15	30	50	Paumier	YES	11/02/2025	YES	11/02/2025	Pass	YES	05/03/2025	YES	05/03/2025	YES	05/03/2025
WP4	E01	224J10-DDL-PP-DI-00004_05	411-25-CW-PA20W_E01	411-25-CW	PA20W	WP4_05-J02	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass	YES	05/03/2025	YES	05/03/2025	YES	05/03/2025
WP4	E01	224J10-DDL-PP-DI-00004_05	411-25-CW-PA20W_E01	411-25-CW	PA20W	WP4_05-J03	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass	YES	05/03/2025	YES	05/03/2025	YES	05/03/2025
WP4	E01	224J10-DDL-PP-DI-00004_05	411-25-CW-PA20W_E01	411-25-CW	PA20W	WP4_05-J04	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_06	426-80-CW-PA20W_E01	426-80-CW	PA20W	WP4_06-J01	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
WP4	E01	224J10-DDL-PP-DI-00004_06	426-80-CW-PA20W_E01	426-80-CW	PA20W	WP4_06-J02	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J02	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	08/02/2025	YES	08/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J03	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J04	WAFER	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	08/02/2025	YES	08/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J05	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	08/02/2025	YES	08/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J06	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	08/02/2025	YES	08/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_01	200-150-CW-PA20W_X00	200-150-CW	PA20W	X00_01-J07	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	08/02/2025	YES	08/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J02	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	08/02/2025	YES	08/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J03	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J04	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J05	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J06	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_02	201-150-CW-PA20W_X00	201-150-CW	PA20W	X00_02-J07	WAFER	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_03	202-80-CW-PA20W_X00	202-80-CW	PA20W	X00_03-J01	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_03	202-80-CW-PA20W_X00	202-80-CW	PA20W	X00_03-J02	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_03	202-80-CW-PA20W_X00	202-80-CW	PA20W	X00_03-J03	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_03	202-80-CW-PA20W_X00	202-80-CW	PA20W	X00_03-J04	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_03	202-80-CW-PA20W_X00	202-80-CW	PA20W	X00_03-J05	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_04	203-50-CW-PA20W_X00	203-50-CW	PA20W	X00_04-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_04	203-50-CW-PA20W_X00	203-50-CW	PA20W	X00_04-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_04	203-50-CW-PA20W_X00	203-50-CW	PA20W	X00_04-J03	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_06	205-100-CW-PA20W_X00	205-100-CW	PA20W	X00_06-J01	WAFER	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_06	205-100-CW-PA20W_X00	205-100-CW	PA20W	X00_06-J02	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_06	205-100-CW-PA20W_X00	205-100-CW	PA20W	X00_06-J03	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_06	205-100-CW-PA20W_X00	205-100-CW	PA20W	X00_06-J04	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_06	205-100-CW-PA20W_X00	205-100-CW	PA20W	X00_06-J05	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_07	206-100-CW-PA20W_X00	206-100-CW	PA20W	X00_07-J01	WAFER	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_07	206-100-CW-PA20W_X00	206-100-CW	PA20W	X00_07-J02	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_07	206-100-CW-PA20W_X00	206-100-CW	PA20W	X00_07-J03	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_07	206-100-CW-PA20W_X00	206-100-CW	PA20W	X00_07-J04	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_07	206-100-CW-PA20W_X00	206-100-CW	PA20W	X00_07-J05	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_08	207-100-CW-PA20W_X00	207-100-CW	PA20W	X00_08-J01	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_08	207-100-CW-PA20W_X00	207-100-CW	PA20W	X00_08-J02	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_08	207-100-CW-PA20W_X00	207-100-CW	PA20W	X00_08-J03	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_08	207-100-CW-PA20W_X00	207-100-CW	PA20W	X00_08-J04	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_08	207-100-CW-PA20W_X00	207-100-CW	PA20W	X00_08-J05	WAFER	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_09	208-100-CW-PA20W_X00	208-100-CW	PA20W	X00_09-J01	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_09	208-100-CW-PA20W_X00	208-100-CW	PA20W	X00_09-J02	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_09	208-100-CW-PA20W_X00	208-100-CW	PA20W	X00_09-J03	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_09	208-100-CW-PA20W_X00	208-100-CW	PA20W	X00_09-J04	NORMAL	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_09	208-100-CW-PA20W_X00	208-100-CW	PA20W	X00_09-J05	WAFER	4"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	8	21	42	70	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_10	209-150-CW-PA20W_X00	209-150-CW	PA20W	X00_10-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_10	209-150-CW-PA20W_X00	209-150-CW	PA20W	X00_10-J02	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_11	210-150-CW-PA20W_X00	210-150-CW	PA20W	X00_11-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_11	210-150-CW-PA20W_X00	210-150-CW	PA20W	X00_11-J02	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_12	211-80-CW-PA20W_X00	211-80-CW	PA20W	X00_12-J01	NORMAL	6"	Cl.150	RF	ASTM A194 Gr.8M	3/4"	8	36	72	120	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_12	211-80-CW-PA20W_X00	211-80-CW	PA20W	X00_12-J02	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_12	211-80-CW-PA20W_X00	211-80-CW	PA20W	X00_12-J03	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_12	211-80-CW-PA20W_X00	211-80-CW	PA20W	X00_12-J04	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_12	211-80-CW-PA20W_X00	211-80-CW	PA20W	X00_12-J05	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_13	409-80-CW-PA20W_X00	409-80-CW	PA20W	X00_13-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_13	409-80-CW-PA20W_X00	409-80-CW	PA20W	X00_13-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_13	409-80-CW-PA20W_X00	409-80-CW	PA20W	X00_13-J03	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_14	231-50-CW-PA20W_X00	231-50-CW	PA20W	X00_14-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_14	231-50-CW-PA20W_X00	231-50-CW	PA20W	X00_14-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_15	232-50-CW-PA20W_X00	232-50-CW	PA20W	X00_15-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_15	232-50-CW-PA20W_X00	232-50-CW	PA20W	X00_15-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_16	235-50-CW-PA20W_X00	235-50-CW	PA20W	X00_16-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_16	235-50-CW-PA20W_X00	235-50-CW	PA20W	X00_16-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_16	235-50-CW-PA20W_X00	235-50-CW	PA20W	X00_16-J03	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	10/02/2025	YES	10/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_17	429-50-CW-PA20W_X00	429-50-CW	PA20W	X00_17-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_17	429-50-CW-PA20W_X00	429-50-CW	PA20W	X00_17-J02	NORMAL	2"	Cl.150	RF	ASTM A194

Electrolyser Package
FLANGE MANAGEMENT REGISTER
CID: CrossWind Project

Document Code: -
Revision: Rev. 00
Pipe Number: 3XXX

ZONE	AREA	Line Iso Nr.	Line Nr.	Short Line Nr.	Piping Class	Joint Tag Nr.	Joint Type (Normal Flanged or Wafer)	Flange Dia	Flange Rating	Flange Facing	Nut Material	Bolt Dia	Bolts Nr.	Torque 30% [Nm]	Torque 00% [Nm]	Final Torque [Nm]	Note	Assembled	Date	Tightened	Date	Tested Pass / Fail	Dis - Assembled	Date	Assembled	Date	Tightened	Date
X00	X00	224J10-DDL-PP-DI-00005_28	411-25-CW-PA20W_X00	411-25-CW	PA20W	X00_28-J02	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_29	412-25-CW-PA20W_X00	412-25-CW	PA20W	X00_29-J02	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_29	412-25-CW-PA20W_X00	412-25-CW	PA20W	X00_29-J02	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_29	412-25-CW-PA20W_X00	412-25-CW	PA20W	X00_29-J03	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_30	413-50-CW-PA20W_X00	413-50-CW	PA20W	X00_30-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_30	413-50-CW-PA20W_X00	413-50-CW	PA20W	X00_30-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_30	413-50-CW-PA20W_X00	413-50-CW	PA20W	X00_30-J03	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_30	413-50-CW-PA20W_X00	413-50-CW	PA20W	X00_30-J04	WAFER	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_30	413-50-CW-PA20W_X00	413-50-CW	PA20W	X00_30-J05	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_31	414-20-CW-PA20W_X00	414-20-CW	PA20W	X00_31-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_31	414-20-CW-PA20W_X00	414-20-CW	PA20W	X00_31-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_31	414-20-CW-PA20W_X00	414-20-CW	PA20W	X00_31-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_31	414-20-CW-PA20W_X00	414-20-CW	PA20W	X00_31-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_31	414-20-CW-PA20W_X00	414-20-CW	PA20W	X00_31-J05	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_32	415-20-CW-PA20W_X00	415-20-CW	PA20W	X00_32-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_32	415-20-CW-PA20W_X00	415-20-CW	PA20W	X00_32-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_32	415-20-CW-PA20W_X00	415-20-CW	PA20W	X00_32-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_32	415-20-CW-PA20W_X00	415-20-CW	PA20W	X00_32-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_32	415-20-CW-PA20W_X00	415-20-CW	PA20W	X00_32-J05	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_33	416-20-CW-PA20W_X00	416-20-CW	PA20W	X00_33-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_33	416-20-CW-PA20W_X00	416-20-CW	PA20W	X00_33-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_33	416-20-CW-PA20W_X00	416-20-CW	PA20W	X00_33-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_33	416-20-CW-PA20W_X00	416-20-CW	PA20W	X00_33-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_34	417-20-CW-PA20W_X00	417-20-CW	PA20W	X00_34-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_34	417-20-CW-PA20W_X00	417-20-CW	PA20W	X00_34-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_34	417-20-CW-PA20W_X00	417-20-CW	PA20W	X00_34-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_34	417-20-CW-PA20W_X00	417-20-CW	PA20W	X00_34-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_34	417-20-CW-PA20W_X00	417-20-CW	PA20W	X00_34-J05	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_35	418-20-CW-PA20W_X00	418-20-CW	PA20W	X00_35-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_35	418-20-CW-PA20W_X00	418-20-CW	PA20W	X00_35-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_35	418-20-CW-PA20W_X00	418-20-CW	PA20W	X00_35-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_35	418-20-CW-PA20W_X00	418-20-CW	PA20W	X00_35-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_36	419-20-CW-PA20W_X00	419-20-CW	PA20W	X00_36-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_36	419-20-CW-PA20W_X00	419-20-CW	PA20W	X00_36-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_36	419-20-CW-PA20W_X00	419-20-CW	PA20W	X00_36-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_36	419-20-CW-PA20W_X00	419-20-CW	PA20W	X00_36-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_36	419-20-CW-PA20W_X00	419-20-CW	PA20W	X00_36-J05	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_37	433-20-CW-PA20W_X00	433-20-CW	PA20W	X00_37-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_37	433-20-CW-PA20W_X00	433-20-CW	PA20W	X00_37-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_37	433-20-CW-PA20W_X00	433-20-CW	PA20W	X00_37-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_37	433-20-CW-PA20W_X00	433-20-CW	PA20W	X00_37-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_38	434-20-CW-PA20W_X00	434-20-CW	PA20W	X00_38-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_38	434-20-CW-PA20W_X00	434-20-CW	PA20W	X00_38-J02	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_38	434-20-CW-PA20W_X00	434-20-CW	PA20W	X00_38-J03	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_38	434-20-CW-PA20W_X00	434-20-CW	PA20W	X00_38-J04	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_38	434-20-CW-PA20W_X00	434-20-CW	PA20W	X00_38-J05	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	7,5	15	25	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_39	422-40-CW-PA20W_X00	422-40-CW	PA20W	X00_39-J01	NORMAL	1.1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_39	422-40-CW-PA20W_X00	422-40-CW	PA20W	X00_39-J02	NORMAL	1.1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_39	422-40-CW-PA20W_X00	422-40-CW	PA20W	X00_39-J03	NORMAL	1.1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_40	426-80-CW-PA20W_X00	426-80-CW	PA20W	X00_40-J01	NORMAL	1.1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	18	36	60	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_40	426-80-CW-PA20W_X00	426-80-CW	PA20W	X00_40-J02	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_40	426-80-CW-PA20W_X00	426-80-CW	PA20W	X00_40-J03	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_40	426-80-CW-PA20W_X00	426-80-CW	PA20W	X00_40-J04	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_41	427-50-CW-PA20W_X00	427-50-CW	PA20W	X00_41-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_41	427-50-CW-PA20W_X00	427-50-CW	PA20W	X00_41-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_42	428-50-CW-PA20W_X00	428-50-CW	PA20W	X00_42-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_42	428-50-CW-PA20W_X00	428-50-CW	PA20W	X00_42-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_43	236-50-CW-PA20W_X00	236-50-CW	PA20W	X00_43-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_43	236-50-CW-PA20W_X00	236-50-CW	PA20W	X00_43-J02	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_43	236-50-CW-PA20W_X00	236-50-CW	PA20W	X00_43-J03	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_44	430-50-CW-PA20W_X00	430-50-CW	PA20W	X00_44-J01	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_44	430-50-CW-PA20W_X00	430-50-CW	PA20W	X00_44-J02	WAFER	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_44	430-50-CW-PA20W_X00	430-50-CW	PA20W	X00_44-J03	NORMAL	2"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	24	48	80	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_45	431-25-CW-PA20W_X00	431-25-CW	PA20W	X00_45-J01	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_45	431-25-CW-PA20W_X00	431-25-CW	PA20W	X00_45-J02	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_45	431-25-CW-PA20W_X00	431-25-CW	PA20W	X00_45-J03	NORMAL	1"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	9	18	30	Paumier	YES	11/02/2025	YES	11/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_47	619-80-O2-PA22S_X00	619-80-O2	PA22S	X00_47-J01	NORMAL	3"	Cl.150	RF	ASTM A194 Gr.8M	5/8"	4	19,5	39	65		YES	19/02/2025	YES	19/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_48	620A-100-PWH2-PB22S_X00	620A-100-PWH2	PB22S	X00_48-J01	NORMAL	4"	Cl.300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	19/02/2025	YES	19/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_48	620A-100-PWH2-PB22S_X00	620A-100-PWH2	PB22S	X00_48-J02	NORMAL	4"	Cl.300	RF	ASTM A194 Gr.8M	3/4"	8	30	60	100		YES	18/02/2025	YES	18/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_49	625-150-PWH2-PB22S_X00	625-150-PWH2	PB22S	X00_49-J01	NORMAL	6"	Cl.300	RF	ASTM A194 Gr.8M	3/4"	12	52,5	105	175		YES	18/02/2025	YES	18/02/2025	Pass	YES	24/02/2025	YES	24/02/2025	YES	24/02/2025
X00	X00	224J10-DDL-PP-DI-00005_49	625-150-PWH2-PB22S_X00	625-150-PWH2	PB22S	X00_49-J02	NORMAL	6"	Cl.300	RF	ASTM A194 Gr.8M	3/4"	12	52,5	105	175		YES	18/02/2025	YES	18/02/2025	Pass	YES	24/02/2025	YES	24/02/2025	YES	24/02/2025
X00	X00	224J10-DDL-PP-DI-00005_51	640-25-PWH2-PB22S_X00	640-25-PWH2	PB22S	X00_51-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	18/02/2025	YES	18/02/2025	Pass						
X00	X00	224J10-DDL-PP-DI-00005_51	640-25-PWH2-PB22S_X00	640-25-PWH2	PB22S	X00_51-J02	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	18/02/2025	YES	18/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_15_T	607-1/2"-PWO2-TK22_A10	607-1/2"-PWO2	TK22	WP3_15_T-J01	NORMAL	1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	8	15	25		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_15_T	607-1/2"-PWO2-TK22_A10	607-1/2"-PWO2	TK22	WP3_15_T-J02	NORMAL	1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	8	15	25		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_16_T	607B-1/2"-PWO2-TK22_A10	607B-1/2"-PWO2	TK22	WP3_16_T-J01	NORMAL	1/2"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	8	15	25		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_22_T	616-1"-PWO2-TK22_A10	616-1"-PWO2	TK22	WP3_22_T-J01	NORMAL	3/4"	Cl.150	RF	ASTM A194 Gr.8M	1/2"	4	8	15	25		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_23_T	626-1/2"-PWH2-TK22_A10	626-1/2"-PWH2	TK22	WP3_23_T-J01	NORMAL	1/2"	Cl.300	RF	ASTM A194 Gr.8M	1/2"	4	8	15	25		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_24_T	626B-1/2"-PWH2-TK22_A10	626B-1/2"-PWH2	TK22	WP3_24_T-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_26_T	636-1"-PWH2-TK22_A10	636-1"-PWH2	TK22	WP3_26_T-J01	NORMAL	3/4"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	8	15	25		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_28_T	642-1"-H2-TK22_A10	642-1"-H2	TK22	WP3_28_T-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	27/02/2025	YES	27/02/2025	Pass						
WP3	A10	224J10-DDL-PP-DI-00006_33_T	741-1"-H2-TK22_A10	741-1"-H2	TK22	WP3_33_T-J01	NORMAL	1"	Cl.300	RF	ASTM A194 Gr.8M	5/8"	4	9	18	30		YES	27/02/2025	YES	27/02/2025	Pass						

ID Fores	Strument	Application Range	Calibration Date	Expire Date	Calibration Period	Status	Serial Number	Brand	Model
ST-04	CHIAVE DINAMOMETRIA	60-300 Nm	23/10/2024	18/10/2026	24	Valid	sn:2005/903366	DINA BETA	666N/30
ST-23	CHIAVE DINAMOMETRICA	60-300 Nm	06/04/2024	06/04/2025	12	Valid	sn:118751912241828055	WURTH	Art. 0714 720 300
ST-28	CHIAVE DINAMOMETRICA	20-100 Nm	27/09/2024	27/09/2025	12	Valid	sn:118751936242441921	WURTH	Art. 0714 720 101
ST-44	CHIAVE DINAMOMETRICA	00 - 1000 Nı	01/10/2024	01/10/2025	12	Valid	sn:118751938242476538	WURTH	Art. 71471 25

CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

CH7 AS-BUILT P&M

MANAGEMENT OF CHANGE

Paumier					**DATE 09/04/25**
WRITTEN BY:	**Baptiste CHIROIS**	**CHECKED BY:**	**XXX**	**APPROVED BY:**	**XXX**

SUPPORT DOCUMENTATION :

- **LIST HERE EVERY DOCUMENTS MENTIONNED OR ANNEXED (reference, name & revision)**
- **P.0608871.L.02.104 Ind.H Hydraulic diagram**
- **XXXX**
- **XXXX**

Appropriate frame

1. BACKGROUND ☐

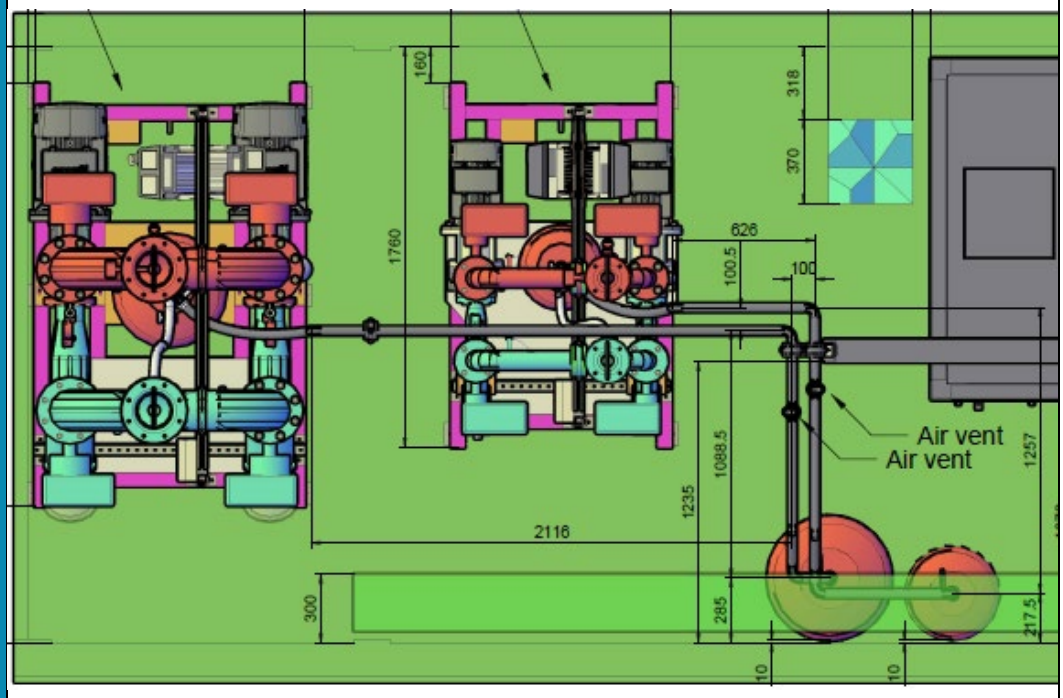
1.1. Describe the context in which the change proposal is put forward:

- *Why is this change proposed?*
- *What is the change (detailed description)?*

The answer may be based on supporting documentation, drawings, or photos.

The reason for our proposal is that the expansion tank volumes are too small compared to the glycol volumes in the installation. When we performed our calculations, we estimated the pipe lengths because the model was not finalized. In our calculations we omitted to consider the volume of chilled water in the process We had taken some margin in our calculations, but unfortunately not enough.

Below the implantation proposal sent by Paumier :



	1.2. What is the foreseen benefit? What risks are we creating if we don't implement this change? What risks do we create if we implement this change?	
	The consequence is that existing vessels are not able to absorb the large variations in temperature and pressure of the network. The risk is that the valve spits out glycol when the temperature and pressure rise.	
	1.3. What analysis has been done on the matter? Who has been consulted? i.e. Process engineering, safety engineering	
	An entire analysis has been done with Elogen Team, based on the existing installation and the site constraints	
	1.4. Boundaries (Givens vs assumptions and issues) understood.	
	The expansion vase are primordial to absorb temperature and pressure variations in the glycol water network.	
Creative doable alternatives	**2. ALTERNATIVES**	☐
	2.1. Describe one or more alternatives to the proposed change	
	We considered several possibilities. • Change the fluid with a lower glycol concentration, but it will decrease the freezing point temperature. • Replace the 3-bar safety valve with a 5-bar safety valve, but this would involve repeating pressure tests. • Install additional expansion tanks to accommodate temperature and pressure variations in the HVAC room. This is the solution we recommend.	
Useful information & ranges	**3. IDENTIFIED RISKS:**	☐
	3.1. Please indicate if the approval of this change creates a new risk	
	No risk, Paumier will provide the material in advance. The pipes will be prefabricated upstream with the aim of only doing flange-to-flange assembly on site and no welding.	
	3.2. Risks and uncertainties understood, and mitigations agreed	
	One identified risk is the tight schedule for sending equipment in Italia.	
Clear value measures & trade-offs	**4. IMPACT ANALYSIS**	☐
	4.1. Cost & Schedule - Describe potential cost and/or schedule impact	
	Paumier takes care of the cost of the equipment and piping. The task will be completed in W17 in parallel of the endurance tests.	
	4.2. HSSE Impact, impact on interfaces (Engineering-Construction-Commissioning-O&M)	
	No HSE impact	

Sound reasoning	**5. <u>RECOMMENDATION</u>**	☐
	5.1. RECOMENDATION 1: Change the fluid with a lower glycol concentration, but it will decrease the freezing point temperature 5.2. RECOMMENDATION 2: Replace the 3-bar safety valve with a 5-bar safety valve, but this would involve repeating pressure tests 5.3. RECOMMENDATION 3: Install additional expansion tanks to accommodate temperature and pressure variations in the HVAC room. This is the solution recommended by PAUMIER.	
Commitment to action	**6. <u>ACTIONS REQUIRED TO IMPLEMENT CHANGE</u>**	☐
	6.1. Please describe the actions required to implement the change: • What, Who and by when. • Any documents/deliverables to be updated?	
	We book Nicolas Bourgeois and Esteban Daoudal to make the changes on site. We will update the P.0608871.L.02.104 Ind.H Hydraulic diagram. Paumier sent the 3D drawing of the installation on site.	

C63-MLO-001

Line List

(Phase 2)

C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
007	7TH ISSUANCE (Ph2)	10/02/2025	JNG	DPI	BCA
006	6TH ISSUANCE (Ph2)	18/10/2023	ALE	HCH	MIT
005	5TH ISSUANCE (Ph2)	20-AUG-2024	ALE	HCH	MIT
004	4TH ISSUANCE (Ph2)	12-APR-2024	BCA	HCH	NZE
003	3RD ISSUANCE (Ph2)	05-APR-2024	BCA	HCH	NZE
002	2ND ISSUANCE (PH2)	08-MAR-2024	TCH	BCA	NZE
001	1ST ISSUANCE (Ph1)	18-AUG-2023	DSH	DAR	EGR

Elogen Project Document Number	C63-MLO-001
Elogen Project Document Name	LINE LIST
Elogen Document File Name	C63-MLO-001_007

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REVISION LIST

REV.	DESCRIPTION
001	*1st Issuance (Ph1)*
002	*2nd Issuance*
003	*3rd Issuance*
004	*4th Issuance*
005	5th Issuance
006	6th Issuance
007	7th Issuance

HOLD RECORD

REV. ITEM	REV. DESCRIPTION
001	*Issue for review*
002	*Linelist before HAZOP Action*
003	*Integration of FORES comments and HAZOP actions*
004	*Integration of FORES comments and change from welded to seamless*
005	*Integration of FORES comments and change of Paumier lines*
006	*Integration of FORES comments and change of Paumier lines*
007	*Integration of FORES comments*

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C63-LINE LIST

REVISION	LINE ID	PROJET	LINE NUMBER	DN (mm)	FLUID CODE	PMC	TRACING	TRACING AREA	INSULATION	PAINTING	FROM	TO	PID	Operating Temperature (°C)	Design Temperature (°C)	Operating Pressure (barg)	Design Pressure (barg)	Test Pressure (barg)	Density (kg/m3)	Fluid	FLUID PHASE	PED FLUID CATEGORY	Critical line (yes / no)	Stress Calculation Note
5	200-150-CW-PA20W	C63	200	150	CW	PA20W	-	-	th = 25 mm	-	C63-210	HE-600	10/16	35	70	2.6	6	8.58	1016	CW	Liquide	2	YES	YES
5	201-150-CW-PA20W	C63	201	150	CW	PA20W	-	-	th = 25mm	-	HE-600	C63-204	4 -10/16	45	70	1.9	6	8.58	1016	CW	Liquide	2	YES	YES
5	202-80-CW-PA20W	C63	202	80	CW	PA20W	-	-	th=25mm	-	TIE-IN POINT (Q/J)	C63-204	10/16	45	70	1.9	6	8.58	1016	CW	Liquide	2	-	-
3	204-150-CW-PA20W	C63	204	150	CW	PA20W	-	-	th=25mm	-	C63-202	C63-205 C63-206	10/16	45	70	1.9	6	8.58	1016		Liquide	2	YES	YES
5	205-100-CW-PA20W	C63	205	100	CW	PA20W	-	-	th=25mm	-	C63-204	DC-200	10/16	45	70	1.9	6	8.58	1016	CW	Liquide	2	YES	YES
3	206-100-CW-PA20W	C63	206	100	CW	PA20W	-	-	th=25mm	-	C63-204	DC-201	10/16	45	70	1.9	6	8.58	1016	CW	Liquide	2	YES	YES
3	207-100-CW-PA20W	C63	207	100	CW	PA20W	-	-	th=25mm	-	DC-200	C63-209	10/16	35	70	1.4	6	8.58	1016	CW	Liquide	2	YES	YES
3	208-100-CW-PA20W	C63	208	100	CW	PA20W	-	-	th=25mm	-	DC-201	C63-209	10/16	35	70	1.4	6	8.58	1016	CW	Liquide	2	YES	YES
3	209-150-CW-PA20W	C63	209	150	CW	PA20W	-	-	th=25mm	-	C63-207 C63-208	TIE-IN POINT (Y)	10/16	35	70	1.4	6	8.58	1016	CW	Liquide	2	YES	YES
3	210-150-CW-PA20W	C63	210	150	CW	PA20W	-	-	th=25mm	-	THS-200	C63-211	10/16	35	70	3	6	8.58	1016	CW	Liquide	2	YES	YES
3	211-80-CW-PA20W	C63	211	80	CW	PA20W	-	-	th=25mm	-	C63-210	TIE-IN POINT (S/M)	10/16	35	70	3	6	8.58	1016		Liquide	2	-	-
5	215-1/2''-CW-PA20W	C63	215	1/2''	CW	PA20W	-	-	th = 25mm	-	RV-200	DP-201	4/14	35	75	0.5	6	8.58	1013	CW	Liquid	2	-	-
5	231-50-CW-PA20W	C63	231	50	CW	PA20W	-	-	th=25mm	-	TIE-IN POINT (L)	TIE-IN POINT (K)	10/16	45	70	1.9	6	8.58	1016	CW	Liquide	2	-	-
5	232-50-CW-PA20W	C63	232	50	CW	PA20W	-	-	th=25mm	-	TIE-IN POINT (R)	TIE-IN POINT (AB)	10/16	45	70	1.9	6	8.58	1016	CW	Liquide	2	-	-
2	300-15-RW-PA22S	C63	300	15	RW	PA22S	-	-	-	-	TIE-IN CLIENT A	WTP-300	1/16	15	50	4	6	8.58	997	RW	Liquide	2	-	-
2	302A-25-PW-PA22S	C63	302A	25	PW	PA22S	-	-	-	-	WTP-300	LP-300A	1/16	25	80	0.2	16	22.88	997	PW	Liquide	2	-	-
2	302B-25-PW-PA22S	C63	302B	25	PW	PA22S	-	-	-	-	C63-302A	LP-303B	1/16	25	80	0.2	16	22.88	997	PW	Liquide	2	-	-
2	303A-25-PW-PA22S	C63	303A	25	PW	PA22S	-	-	-	-	LP-300A	C63-307	1/16	25	80	12	16	22.88	997	PW	Liquide	2	-	-
2	303B-25-PW-PA22S	C63	303B	25	PW	PA22S	-	-	-	-	LP-300B	3MV-320	1/16	25	80	12	16	22.88	997	PW	Liquide	2	-	-
3	305-15-PW-PA22S	C63	305	15	PW	PA22S	-	-	-	-	302A	509	1/16	25	45	0.2	16	22.88	997	PW	Liquide	2	-	-
6	306-25-PW-PA22S	C63	306	25	PW	PA22S	HR-306	X00	th = 25mm (zone X00)	-	303A	600A	1-3/16	25	80	12	16	22.88	997	PW	Liquide	2	-	-
6	307-25-PW-PB22S	C63	307	25	PW	PB22S	HR-307	X00	th = 25mm (zone X00)	-	303A	620A	1-6/16	25	80	12	40	57.2	997	PW	Liquide	2	-	-
5	402-80-CW-PA20W	C63	402	80	CW	PA20W	-	-	th =40mm	-	Tie-in Point (V)/(P)	C63-430	10/16	5	40	2.5	6	8.58	1039	CW	Liquide	2	-	-
3	403-40-CW-PA20W	C63	403	40	CW	PA20W	-	-	th = 25mm	-	C63-422	HE-631	07/16	5	40	2.5	6	8.58	1039	CW	Liquide	2	-	-
3	404-50-CW-PA20W	C63	404	50	CW	PA20W	-	-	th = 25mm	-	HE-630	C63-405	7/16	6	40	2	6	8.58	1039	CW	Liquide	2	-	-
3	405-50-CW-PA20W	C63	405	50	CW	PA20W	-	-	th = 25mm	-	HE-631	HE610	7/16	6	40	2.5	6	8.58	1039	CW	Liquide	2	-	-
3	406-50-CW-PA20W	C63	406	50	CW	PA20W	-	-	th = 25mm	-	HE-610	HPP-700	7-11/16	6.6	40	2	6	8.58	1039	CW	Liquide	2	-	-
3	407-40-CW-PA20W	C63	407	40	CW	PA20W	-	-	th = 25mm	-	HPP-700	C63-426	10-11/16	11	40	1.9	6	8.58	1039	CW	Liquide	2	-	-
5	408-80-CW-PA20W	C63	408	80	CW	PA20W	-	-	th=40mm	-	THS-400	C63-429	10/16	11	40	3	6	8.58	1039	CW	Liquide	2	-	-
3	409-50-CW-PA20W	C63	409	50	CW	PA20W	-	-	th=40mm	-	C63-408	Tie-in Point (T)	10/16	11	40	3	6	8.58	1039	CW	Liquide	2	-	-
3	410-25-CW-PA20W	C63	410	25	CW	PA20W	-	-	th=40mm	-	C63-402	AHU-400	10-13/16	5	40	2.5	6	8.58	1039	CW	Liquide	2	-	-
3	411-25-CW-PA20W	C63	411	25	CW	PA20W	-	-	th=40mm	-	AHU-400	C63-426	10-13/16	11	40	1.5	6	8.58	1039	CW	Liquide	2	-	-
3	412-25-CW-PA20W	C63	412	25	CW	PA20W	-	-	th=40mm	-	C63-402	C63-433	10-13/16	5	40	3	6	8.58	1039	CW	Liquide	2	-	-
3	413-50-CW-PA20W	C63	413	50	CW	PA20W	-	-	th=40mm	-	HCU-400	C63-426	10-12/16	11	40	2	6	8.58	1039	CW	Liquide	2	-	-
3	414-20-CW-PA20W	C63	414	20	CW	PA20W	-	-	th=40 mm	-	C63-412	FCU-400	10-12/16	5	40	3	6	8.58	1039	CW	Liquide	2	-	-
3	415-20-CW-PA20W	C63	415	20	CW	PA20W	-	-	th=40 mm	-	FCU-400	C63-431	10-12/16	11	40	2	6	8.58	1039	CW	Liquide	2	-	-
3	416-20-CW-PA20W	C63	416	20	CW	PA20W	-	-	th=40 mm	-	C63-412	FCU-401	10-12/16	5	40	3	6	8.58	1039	CW	Liquide	2	-	-
3	417-20-CW-PA20W	C63	417	20	CW	PA20W	-	-	th=40mm	-	FCU-401	C63-431	10-12/16	11	40	2	6	8.58	1039	CW	Liquide	2	-	-
6	418-20-CW-PA20W	C63	418	20	CW	PA20W	-	-	th=40mm	-	C63-412	FCU-402	10-12/16	5	40	2	6	8.58	1039	CW	Liquide	2	-	-
3	419-20-CW-PA20W	C63	419	20	CW	PA20W	-	-	th=40mm	-	FCU-402	C63-431	10-12/16	11	40	2	6	8.58	1039	CW	Liquide	2	-	-
5	420-1/2''-CW- TK22	C63	420	1/2''	CW	TK22	-	-	th=40mm	-	C63-405	AC0-610	3-7/16	6	40	2	6	8.58	1039	CW	Liquide	2	-	-
5	421-1/2''-CW--TK22	C63	421	1/2''	CW	TK22	-	-	th = 25mm	-	ACO-610	C63-406	5-7/16	6.6	40	2.5	6	8.58	1039	CW	Liquide	2	-	-
3	422-40-CW-PA20W	C63	422	40	CW	PA20W	-	-	th=40mm	-	C63-402	HE-630	11/16	5	40	2?5	6	8.58	1039	CW	Liquide	2	-	-
5	424-1/2''-CW-PA20W	C63	424	1/2''	CW	PA20W	-	-	th = 25mm	-	RV-400	DP-401	7/14	6.6	40	0.5	6	8.58	1013	CW	Liquid	2	-	-
5	425-40-CW-PA20W	C63	425	40	CW	PA20W	-	-	th = 25mm	-	C63-406	C63-407	12/16	6.6	40	2	6	8.58	1013	CW	Liquid	2	-	-
5	426-80-CW-PA20W	C63	426	80	CW	PA20W	-	-	th = 40mm	-	C63-413	TIE-IN (AA)	10/16	11	40	1.5	6	8.58	1013	CW	Liquid	2	-	-
5	427-50-CW-PA20W	C63	427	50	CW	PA20W	-	-	th=40mm	-	Tie-in Point (AC)	Tie-in Point (0)	10/16	5	40	3	6	8.58	1039	CW	Liquide	2	-	-
5	428-50-CW-PA20W	C63	428	50	CW	PA20W	-	-	th=40mm	-	Tie-in Point (AD)	Tie-in Point (U)	10/16	5	40	3	6	8.58	1039	CW	Liquide	2	-	-
5	429-50-CW-PA20W	C63	408	50	CW	PA20W	-	-	th=40mm	-	C63-408	Tie-in Point (N)	10/16	11	40	3	6	8.58	1039	CW	Liquide	2	-	-
5	430-50-CW-PA20W	C63	430	50	CW	PA20W	-	-	Th=40mm	-	C63-402	HCU-400	10/16	5	40	2.5	6	8.58	1039	CW	Liquide	2	-	-
5	431-25-CW-PA20W	C63	431	25	CW	PA20W	-	-	th=40mm	-	C63-434	C63-426	10/16	11	40	1.5	6	8.58	1039	CW	Liquide	2	-	-
7	433-20-CW-PA20W	C63	433	20	CW	PA20W	-	-	th=40mm	-	C63-412	FCU-403	10-12/16	5	40	2	6	8.58	1039	CW	Liquide	2	-	-
5	434-20-CW-PA20W	C63	434	20	CW	PA20W	-	-	Th=40mm	-	FCU-403	C63-431	10-12/16	11	40	2	6	8.58	1039	CW	Liquide	2	-	-
5	500-25-PWH2-PB22S	C63	500	25	PWH2	PB22S	-	-	-	-	C63-635	C63-501	7/16	25	40	0	40	57.2	997	CW	Liquid + Gas (consider gas)	1	-	-
6	501-20-PWH2-PA22S	C63	501	20	PWH2	PA22S	-	-	-	-	RO-501	TIE-IN CLIENT F	1-7/16	25	40	0	6	8.58	981	PWH2	Liquid + Gas (consider gas)	1	-	-
3	502-15-PWH2-PB22S	C63	502	15	PWH2	PB22S	-	-	-	-	HPP-700	H2 Vent	7-11/16	25	40	0	40	57.2	981	PWH2	Liquid + Gas (consider gas)	1	-	-
6	503-15-RW-TK22	C63	503	15	RW	TK22	HR-503	X00	th=25mm (X00)	-	HVAC PACKAGE	509	1-13/16	25	40	0	6	8.58	981	RW	Liquide	2	-	-
6	504-15-RW-TK22	C63	504	15	RW	TK22	-	-	-	-	FCU-400	C63-503	1-12/16	25	40	0	6	8.58	981	RW	Liquide	2	-	-
6	505-15-RW-TK22	C63	505	15	RW	TK22	-	-	-	-	FCU-401	C63-503	1-12/16	25	40	0	6	8.58	981	RW	Liquide	2	-	-
6	506-15-RW-TK22	C63	506	15	RW	TK22	-	-	-	-	FCU-402	C63-305	1-12/16	25	40	0	6	8.58	981	RW	Liquide	2	-	-
6	507-15-RW-TK22	C63	507	15	RW	TK22	-	-	-	-	FCU-403	C63-305	1-12/16	25	40	0	6	8.58	981	RW	Liquide	2	-	-
6	509-50-RW-PA22S	C63	509	50	RW	PA22S	-	-	-	-	WTP-300	TIE-IN CLIENT E	1/16	25	40	0	6	8.58	981	RW	Liquide	2	-	-
6	600A-150-PWO2-PA22S	C63	600A	150	PWO2	PA22S	HR-600A	X00	th = 40mm	-	ST-600	CP-600A	3/16	65	80	11	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	600B-150-PWO2-PA22S	C63	600B	150	PWO2	PA22S	-	-	th = 40mm	-	C63-600A	CP-620B	3/16	65	80	11	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	YES	YES
3	601A-150-PWO2-PA22S	C63	601A	150	PWO2	PA22S	-	-	th = 40mm	-	CP-600A	HE-600	3-4/16	65	80	14.4	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	601B-150-PWO2-PA22S	C63	601B	150	PWO2	PA22S	-	-	th = 40mm	-	CP-620B	C6-601A	3/16	65	80	14.4	16	22.88	98.45	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	602A-150-PWO2-PA22S	C63	602A	150	PWO2	PA22S	-	-	th = 40mm	-	HE-600	FH-600	4/16	55	80	13.63	16	22.88	985.7	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	603-150-PWO2-PA22S	C63	603	150	PWO2	PA22S	-	-	th = 40mm	-	FH-600	C63-604	2-4/16	55	80	12.1	16	22.88	985.7	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	604-200-PWO2-PA22S	C63	604	200	PWO2	PA22S	-	-	th = 40mm	-	C63-603	SST-001 to 008	2/16	55	80	11.9	16	22.88	985.7	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	605-200-PWO2-PA22S	C63	605	200	PWO2	PA22S	-	-	th = 40mm	-	SST-001 to 008	C63-606	2/16	65	80	11.3	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	YES	YES
6	606-200-PWO2-PA22S	C63	606	200	PWO2	PA22S	~~HR-602~~ HR-606	X00	th = 40mm	-	C63-605	ST-600	2-3/16	65	80	11.3	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	YES	YES
2	607-1/2"-PWO2-TK22	C63	607	1/2"	PWO2	TK22	-	-	th = 25mm	-	CS-610	RO-600	5/16	8.3	80	11	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	-	-
3	607B-1/2"-PWO2-TK22	C63	607B	1/2"	PWO2	TK22	HR-607B	X00	th = 25mm	-	RO-600	C63-302A	1-5/16	8.3	80	0.5	16	22.88	980.45	PWO2	Liquid + Gas (consider gas)	1	-	-
6	610-20-PWO2-PA22S	C63	610	20	PWO2	PA22S	-	-	-	-	ST-600	HE-610	3-5/16	65	80	11	16	22.88	13.65	O2	Gas	1	-	-
5	611-20-PWO2-PA22S	C63	611	20	PWO2	PA22S	-	-	th = 25mm	-	HE-610	CS-610	5/16	8.5	80	11	16	22.88	16.37	O2	Gas	1	-	-
2	612-50-O2-PA22S	C63	612	50	O2	PA22S	-	-	-	-	CS-610	C63-613	5/16	8.5	80	10.8	16	22.88	16.37	O2	Gas	1	-	-
2	613-50-O2-PA22S	C63	613	50	O2	PA22S	-	-	-	-	C63-612	C63-619	5/16	8.5	80	0.5	16	22.88	2.05	O2	Gas	1	-	-
3	614-1/4"-O2-TK22	C63	614	1/4"	O2	TK22	-	-	-	-	ACO-610	ANALYSE SYSTEM PACKAGE	3-5/16	8.5	80	11	16	22.88	16.37	O2	Gas	1	-	-
5	614B-1/4"-O2-TK22	C63	614B	1/4	O2	TK22	-	-	-	-	C63-614	C63-619	3/16	8.5	80	0.5	16	22.88	16.37	O2	Gas	1	-	-
2	615A-1/4"-O2-TK22	C63	615A	1/4"	O2	TK22	-	-	-	-	C63-614	C63-619	3-5/16	8.5	80	0.5	16	22.88	2.05	O2	Gas	1	-	-
2	615B-1/4"-O2-TK22	C63	615B	1/4"	O2	TK22	-	-	-	-	C63-615A	C63-615A	3/16	8.5	80	0.5	16	22.88	2.05	O2	Gas	1	-	-
2	615C-1/4"-O2-TK22	C63	615C	1/4"	O2	TK22	-	-	-	-	C63-615B	C63-615B	3/16	8.5	80	0.5	16	22.88	2.05	O2	Gas	1	-	-
3	616-1"-PWO2-TK22	C63	616	1"	PWO2	TK22	-	-	-	-	ST-600	PSV-610	3/16	65	80	11	16	22.88	1000	PWO2	Liquid + Gas (consider gas)	1	-	-
3	616A-80-PWO2-PA22S	C63	616A	80	PWO2	PA22S	-	-	-	-	PSV-610	O2 VENT	3-5/16	65	80	0.5	16	22.88	1000	PWO2	Liquid + Gas (consider gas)	1	-	-
5	617-40-O2-PA22S	C63	617	40	O2	PA22S	-	-	-	-	C63-612	RO-610	5/16	8.5	80	10.8	16	22.88	16.37	O2	Gas	1		

C63-LINE LIST

REVISION	LINE ID	PROJET	LINE NUMBER	DN (mm)	FLUID CODE	PMC	TRACING	TRACING AREA	INSULATION	PAINTING	FROM	TO	PID	Operating Temperature (°C)	Design Temperature (°C)	Operating Pressure (barg)	Design Pressure (barg)	Test Pressure (barg)	Density (kg/m3)	Fluid	FLUID PHASE	PED FLUID CATEGORY	Critical line (yes / no)	Stress Calculation Note
5	618-40-02-PA22S	C63	618	40	O2	PA22S	-	-	-	-	RO-610	C63-619	5/16	8.5	80	0.5	16	22.88	16.37	O2	Gas	1	-	-
2	619-80-O2-PA22S	C63	619	80	O2	PA22S	-	-	-	-	-	O2 VENT	5/16	Amb	80	0.5	16	22.88	1000	PWO2	Liquid + Gas (consider gas)	1	-	-
6	620A-100-PWH2-PB22S	C63	620A	100	PWH2	PB22S	HR-620A	X00	th = 40mm	-	ST-620	CP-620A	6/16	65	80	30.9	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
2	620B-100-PWH2-PB22S	C63	620B	100	PWH2	PB22S	-	-	th = 40mm	-	C63-620A	CP-620B	6/16	65	80	30.9	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
2	621A-100-PWH2-PB22S	C63	621A	100	PWH2	PB22S	-	-	th = 40mm	-	CP-620A	FH-620	4-6/16	65	80	34	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
2	621B-100-PWH2-PB22S	C63	621B	100	PWH2	PB22S	-	-	th = 40mm	-	CP-620B	C63-621A	6/16	65	80	34	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
2	622-100-PWH2-PB22S	C63	622	100	PWH2	PB22S	-	-	th = 40mm	-	FH-620	C63-623	2-4/16	65	80	31.9	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
2	623-150-PWH2-PB22S	C63	623	150	PWH2	PB22S	-	-	th = 40mm	-	C63-622	SST-001 to 008	2/16	65	80	31.3	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
6	625-150-PWH2-PB22S	C63	625	150	PWH2	PB22S	HR-625	X00	th = 40mm	-	C63-624	ST-620	2-6/16	65	80	31.1	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	YES	YES
3	626-1/2"-PWH2-TK22	C63	626	1/2"	PWH2	TK22	-	-	th = 25mm	-	CS-630	RO-620	7/16	7	80	30.9	40	57.2	980.5	PWH2	C	1	-	-
5	626B-1/2"-PWH2-TK22	C63	626	1/2"	PWH2	TK22	-	-	th = 25mm	-	RO-620	DG-640	7/16	7	80	13	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
2	630-25-H2-PB22S	C63	630	25	H2	PB22S	-	-	-	-	ST-620	HE-630	6/16	65	80	30.9	40	57.2	2.3	H2	Gas	1	-	-
2	630A-25-H2-PB22S	C63	630A	25	H2	PB22S	-	-	-	-	C63-630	HE-631	7/16	65	80	30.9	40	57.2	2.3	H2	Gas	1	-	-
2	631-25-H2-PB22S	C63	631	25	H2	PB22S	-	-	th = 25mm	-	HE-630	CS-630	7/16	7	80	30.9	40	57.2	2.7	H2	Gas	1	-	-
2	631A-25-H2-PB22S	C63	631A	25	H2	PB22S	-	-	th = 25mm	-	HE-631	C63-631	7/16	7	80	30.9	40	57.2	2.7	H2	Gas	1	-	-
2	632-20-H2-PB22S	C63	632	20	H2	PB22S	-	-	-	-	CS-630	C63-635	7/16	7	80	30.9	40	57.2	2.7	H2	Gas	1	-	-
3	633-20-H2-PB22S	C63	633	20	H2	PB22S	-	-	-	-	632	633A	7/16	7	80	30.9	40	57.2	2.7	H2	Gas	1	-	-
5	633A-1/2"-H2-TK22	C63	633A	1/2''	H2	TK22	-	-	-	-	633	633B	7/16	7	80	0.5	40	57.2	1.42	H2	Gas	1	-	-
5	633B-20-H2-PB22S	C63	633B	20	H2	PB22S	-	-	-	-	633A	635	7/16	7	80	0.5	40	57.2	1.42	H2	Gas	1	-	-
2	634-20-H2-PB22S	C63	634	20	H2	PB22S	-	-	-	-	C63-632	HPP-700	7/16	7	80	30.9	40	57.2	2.7	H2	Gas	1	-	-
5	635-50-PWH2-PB22S	C63	635	50	PWH2	PB22S	-	-	-	-	-	VENT H2	7/16	65	80	0.5	40	57.2	0.13	PWH2	Liquid + Gas (consider gas)	1	-	-
6	636-1"-PWH2-TK22	C63	636	1"	PWH2	TK22	-	-	-	-	ST-620	PSV630	6/16	65	80	30	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
6	636A-25-H2-PB22S	C63	636A	25	PWH2	PB22S	-	-	-	-	PSV630	C63-635	6-7/16	65	80	0.5	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
2	638-25-H2-PB22S	C63	638	25	H2	PB22S	-	-	-	-	HPP-700	TIE-IN CLIENT B	8-11/16	AMB	80	30	40	57.2	2.7	H2	Gas	1	-	-
2	639-25-H2-PB22S	C63	639	25	H2	PB22S	-	-	-	-	C63-638	C63-639A	8/16	25	80	30	40	57.2	2.7	H2	Gas	1	-	-
5	639A-1/2"-H2--TK22	C63	639A	1/2"	H2	TK22	-	-	-	-	C63-639	C63-639B	8/16	25	80	30	40	57.2	2.7	H2	Gas	1	-	-
3	639B-25-H2-PB22S	C63	639B	25	H2	PB22S	-	-	-	-	C63-639A	C63-635	8/16	25	80	0.5	40	57.2	2.7	H2	Gas	1	-	-
6	640-25-PWH2-PB22S	C63	640	25	PWH2	PB22S	HR-640	X00	th = 25mm	-	C63-622	PRV-640	4-7/16	65	80	31.9	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
~~5~~	~~640B-25-PWH2-PB22S~~	~~C63~~	~~640B~~	~~25~~	~~PWH2~~	~~PB22S~~	~~-~~		~~th = 25mm~~	~~-~~	~~PRV-640~~	~~DG-640~~	~~7/16~~	~~65~~	~~80~~	~~13~~	~~40~~	~~57.2~~	~~980.5~~	~~PWH2~~	~~Liquid + Gas (consider gas)~~	~~1~~	~~-~~	~~-~~
3	641-25-PWH2-PB22S	C63	641	25	PWH2	PB22S	-	-	th = 25mm	-	DG-640	C63-641A	7/16	65	80	11.3	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
3	641A-25-PWH2-PB22S	C63	641A	25	PWH2	PB22S	-	-	th = 25mm	-	C63-640	C63-606	3-7/16	65	80	11.3	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
5	642-1/2"-H2-TK22	C63	642	1/2"	H2	TK22	-	-	-	-	C63-646	C63-644	7/16	65	80	11.3	40	57.2	2.7	H2	Gas	1	-	-
2	644-50-H2-PB22S	C63	644	50	H2	PB22S	-	-	-	-	C63-642	C63-635	7/16	65	80	0.5	40	57.2	0.13	H2	Gas	1	-	-
2	646-1"-H2-TK22	C63	646	1"	H2	TK22	-	-	-	-	DG-640	PSV-640	7/14	65	80	13	40	57.2	980.5	H2	Gas	1	-	-
3	646A-25-H2-PB22S	C63	646A	25	PWH2	PB22S	-	-	-	-	PSV640	644	7/16	65	80	0.5	40	57.2	980.5	PWH2	Liquid + Gas (consider gas)	1	-	-
2	647-1/2"-H2-TK22	C63	647	1/2"	H2	TK22	-	-	-	-	C63-642	C63-642	7/16	65	80	11.3	40	57.2	2.7	H2	Gas	1	-	-
5	700-3/4''-CW-PA20W	C63	700	3/4''	CW	PA20W	-	-	th = 25mm	-	PSV64.1 (HPP)	DP-700	11/16	11	40	0.5	6	8.58	1013	CW	Liquid	2	-	-
2	740-1"-H2-TK22	C63	740	1"	H2	TK22	-	-	-	-	PSV-631	C63-635	7-11/14	AMB	80	0.5	40	57.2	2.7	H2	Gas	1	-	-
5	740B-1"-H2-TK22	C63	740B	1"	H2	TK22	-	-	-	-	HPP-700	PSV-631	11/16	AMB	80	32	40	57.2	2.7	H2	Gas	1	-	-
2	741-1"-H2-TK22	C63	741	1"	H2	TK22	-	-	-	-	HPP-700	C63-740	11/14	AMB	80	0.5	40	57.2	2.7	H2	Gas	1	-	-
2	800-1/4"-H2-TK22	C63	800	1/4"	H2	TK22	-	-	-	-	C63-638	C63-801	8/16	25	80	0.5	40	57.2	2.7	H2	Gas	1	-	-
5	801-25-H2-PB22S	C63	801	25	H2	PB22S	-	-	-	-	C63-800	H2 Analysis vent	8/14	25	80	0.5	40	57.2	0.0899	H2	Gas	1	-	-
3	900-15-N2-PA22S	C63	900	15	N2	PA22S	-	-	-	-	C63-910	C63-900A	9/14	25	45	7	10	14.3	10.96	N2	Gas	2	-	-
3	900A-40-N2-PA22S	C63	900A	40	N2	PA22S	-	-	-	-	C63-900	ST600	3-9/14	65	80	7	16	22.88	10.96	N2	Gas	2	-	-
3	901-15-N2-PA22S	C63	901	15	N2	PA22S	-	-	-	-	C63-900	C63-900	3/14	25	45	7	10	14.3	10.96	N2	Gas	2	-	-
3	902-25-N2-PA22S	C63	902	25	N2	PA22S	-	-	-	-	C63-900	C63-902A	3/14	25	45	10	16	22.88	10.96	N2	Gas	2	-	-
3	902A-25-N2-PA22S	C63	902A	25	N2	PA22S	-	-	-	-	RD900	C63-619	3-5 6/14	25	45	0.5	16	22.88	10.96	N2	Gas	2	-	-
2	906-25-N2-PA22S	C63	906	25	N2	PA22S	-	-	-	-	C63-910	PSV-900	9/16	25	45	9	10	14.3	10.96	N2	Gas	2	-	-
2	906A-50-N2-PA22S	C63	906A	50	N2	PA22S	-	-	-	-	PSV-900	C63-619	9 - 5/16	25	45	0.5	10	14.3	1.25	N2	Gas	2	-	-
2	910-25-N2-PA22S	C63	910	25	N2	PA22S	-	-	-	-	TIE-IN CLIENT D	-	9/14	25	45	9	10	14.3	10.96	N2	Gas	2	-	-
3	920-15-N2-PA22S	C63	920	15	N2	PA22S	-	-	-	-	C63-910	C63-920A	9/14	25	80	9	10	14.3	10.96	N2	Gas	2	-	-
3	920A-40-N2-PB22S	C63	920A	40	N2	PB22S	-	-	-	-	C63-920	ST620	6/14	25	80	7	40	57.2	10.96	N2	Gas	2	-	-
2	921-15-N2-PA22S	C63	921	15	N2	PA22S	-	-	-	-	C63-920	C63-920	6/14	25	45	7	10	14.3	10.96	N2	Gas	2	-	-
3	922-25-N2-PB22S	C63	922	25	N2	PB22S	-	-	-	-	C63-920	RD-920	6/14	25	80	7	40	57.2	10.96	N2	Gas	2	-	-
5	922A-25-N2-PB22S	C63	922A	25	N2	PB22S	-	-	-	-	RD920	H2 Vent	6-7/14	65	80	0.5	40	57.2	0.0899	N2	Gas	2	-	-
3	930-1/4"-N2-TK22	C63	930	1/4"	N2	TK22	-	-	-	-	C63-910	HV-930B	8-9/14	25	45	9	10	14.3	10.96	N2	Gas	2	-	-
3	930B-1/4"-N2-TK22	C63	930B	1/4"	N2	TK22	-	-	-	-	HV-930	C63-638	8/16	25	45	30	40	57.2	10.96	N2	Gas	2	-	-
2	931-1/4"-N2-TK22	C63	931	1/4"	N2	TK22	-	-	-	-	C58-638	C63-639B	8/14	25	45	9	40	57.2	10.96	N2	Gas	2	-	-
3	940-25-N2-PA22S	C63	940	25	N2	PA22S	-	-	-	-	C63-910	HV-940	7-9/14	25	45	7	10	14.3	10.96	N2	Gas	2	-	-
5	940B-25-N2-PB22S	C63	940B	25	N2	PB22S	-	-	-	-	HV-941	DG-640	7/16	65	80	13	40	57.2	1.1687	H2	Gas	1	-	-
3	941-25-N2-PB22S	C63	941	25	N2	PB22S	-	-	-	-	HV940	HV941	7/14	65	80	7	40	57.2	1.1687		Gas	2	-	-
3	970-1/2''-CA-TK22	C63	970	1/2''	CA	TK22	-	-	-	-	980B	HPP-700	9-11/14	25	45	7	10	14.3	8.75	N2	Gas	2	-	-
3	980-1/2''-CA-TK22	C63	980	1/2''	CA	TK22	-	-	-	-	TIE-IN CLIENT D	BTK-980	9/14	25	45	7	10	14.3	8.75	N2	Gas	2	-	-
3	980B-1/2''-CA-TK22	C63	980B	1/2''	CA	TK22	-	-	-	-	BTK-980	PVI-980	9/14	25	45	7	10	14.3	8.75	CA	Gas	2	-	-
3	980C-1/2''-CA-TK22	C63	980C	1/2''	CA	TK22	-	-	-	-	C63-980B	PVI-900	9/14	25	45	7	10	14.3	8.75	CA	Gas	2	-	-
5	980D-1/2''-CA-TK22	C63	980D	1/2''	CA	TK22	-	-	-	-	C63-980B	PVI-901	9/14	25	45	7	10	14.3	8.75	CA	Gas	2	-	-
3	981-1/2''-CA-TK22	C63	981	1/2''	CA	TK22	-	-	-	-	C63-980B	WTP-300	1-9/16	25	45	7	10	14.3	8.75	CA	Gas	2	-	-
3	982-1/2''-CA-TK22	C63	982	1/2"	CA	TK22	-	-	-	-	WTP-300	CA Vent	1/16	25	45	7	10	14.3	8.75	Air	Gas	2	-	-

P.0608871.L.02.019
Hydraulic line list

Hydraulic line list

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Checked by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	13/02/2025	Document creation	1

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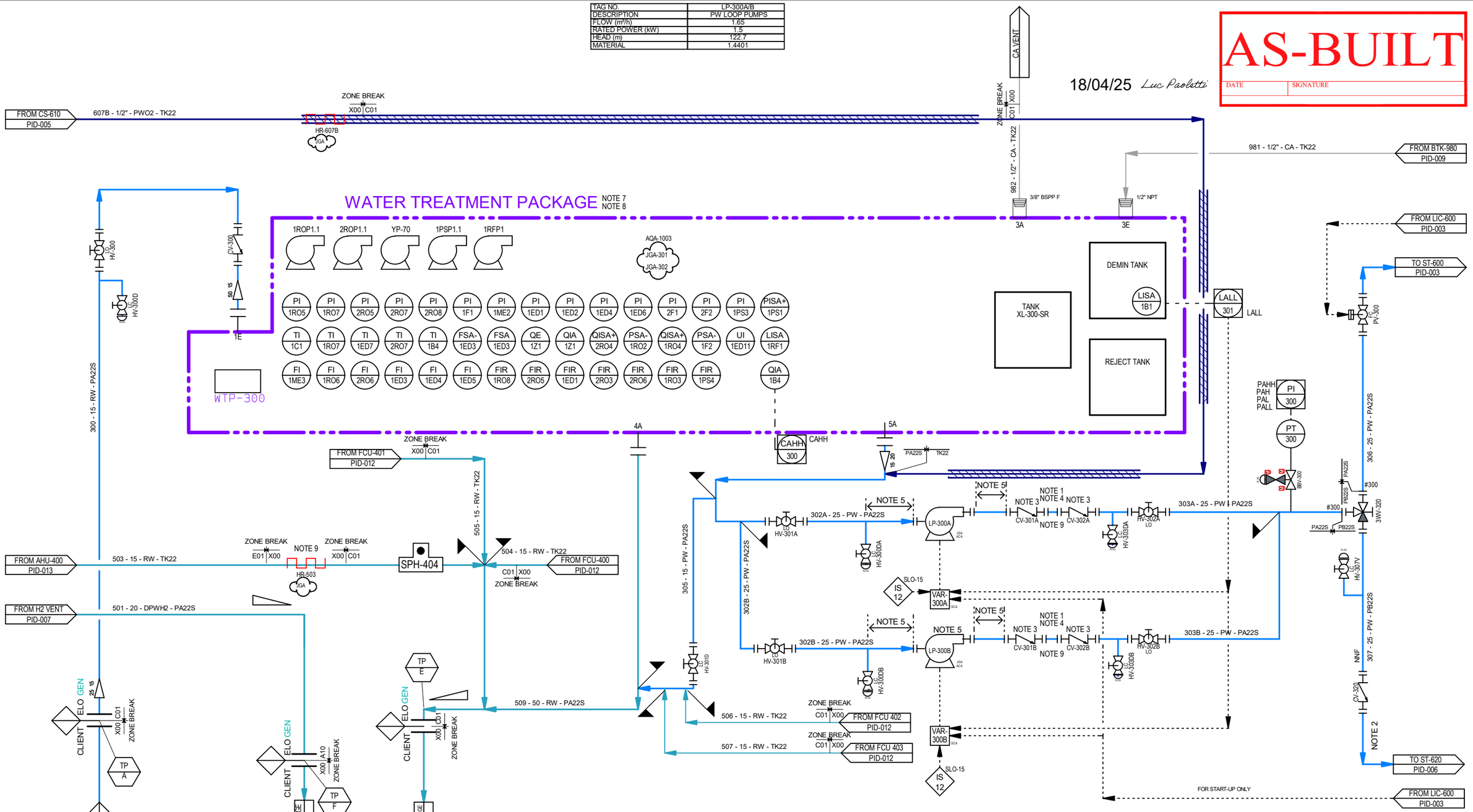
Line number	DN	Fluid	PS (bar)	TS (°C)	Insulation
Chilled water circuit					
400-50-CW-PA20W	50	MPG 40%	3 bar	-20 °C / 60°C	40 mm
401-50-CW-PA20W	50	MPG 40%	3 bar	-20 °C / 60°C	40 mm
402-80-CW-PA20W	80	MPG 40%	3 bar	-20 °C / 60°C	40 mm for outdoor and for 25 mm for indoor
407-80-CW-PA20W	80	MPG 40%	3 bar	-20 °C / 60°C	40 mm
408-80-CW-PA20W	80	MPG 40%	3 bar	-20 °C / 60°C	40 mm for outdoor and for 25 mm for indoor
409-50-CW-PA20W	50	MPG 40%	3 bar	-20 °C / 60°C	40 mm
410-25-CW-PA20W	25	MPG 40%	3 bar	-20 °C / 60°C	40 mm
411-25-CW-PA20W	25	MPG 40%	3 bar	-20 °C / 60°C	40 mm
412-25-CW-PA20W	25	MPG 40%	3 bar	-20 °C / 60°C	40 mm
413-25-CW-PA20W	25	MPG 40%	3 bar	-20 °C / 60°C	40 mm
414-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
415-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
416-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
417-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
418-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
419-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
420-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
421-20-CW-PA20W	20	MPG 40%	3 bar	-20 °C / 60°C	40 mm
422-40-CW-PA20W	40	MPG 40%	3 bar	-20 °C / 60°C	40 mm
423-40-CW-PA20W	40	MPG 40%	3 bar	-20 °C / 60°C	40 mm
Condensation circuit					
200-150-CW-PA20W	150	MPG 40%	3 bar	-20 °C / 60°C	25 mm
201-150-CW-PA20W	150	MPG 40%	3 bar	-20 °C / 60°C	25 mm
202-50-CW-PA20W	50	MPG 40%	3 bar	-20 °C / 60°C	25 mm
204-150-CW-PA20W	150	MPG 40%	3 bar	-20 °C / 60°C	25 mm for outdoor and for 0 mm for indoor
205-100-CW-PA20W	100	MPG 40%	3 bar	-20 °C / 60°C	25 mm
206-100-CW-PA20W	100	MPG 40%	3 bar	-20 °C / 60°C	25 mm
208-100-CW-PA20W	100	MPG 40%	3 bar	-20 °C / 60°C	25 mm
209-150-CW-PA20W	150	MPG 40%	3 bar	-20 °C / 60°C	25 mm
210-150-CW-PA20W	150	MPG 40%	3 bar	-20 °C / 60°C	25 mm for outdoor and for 0 mm for indoor
211-80-CW-PA20W	80	MPG 40%	3 bar	-20 °C / 60°C	25 mm
212-80-CW-PA20W	80	MPG 40%	3 bar	-20 °C / 60°C	25 mm
213-150-CW-PA20W	150	MPG 40%	3 bar	-20 °C / 60°C	25 mm

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1.5
HEAD (m)	122.7
MATERIAL	1.4401

AS-BUILT

DATE | SIGNATURE

18/04/25 Luc Paoletti



Rev.	Date	Ed.	Ver.	App.	Description
9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES. REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE. USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

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PROCESS	C63-PID-001-001	DPI	JNG	BCA	1:1

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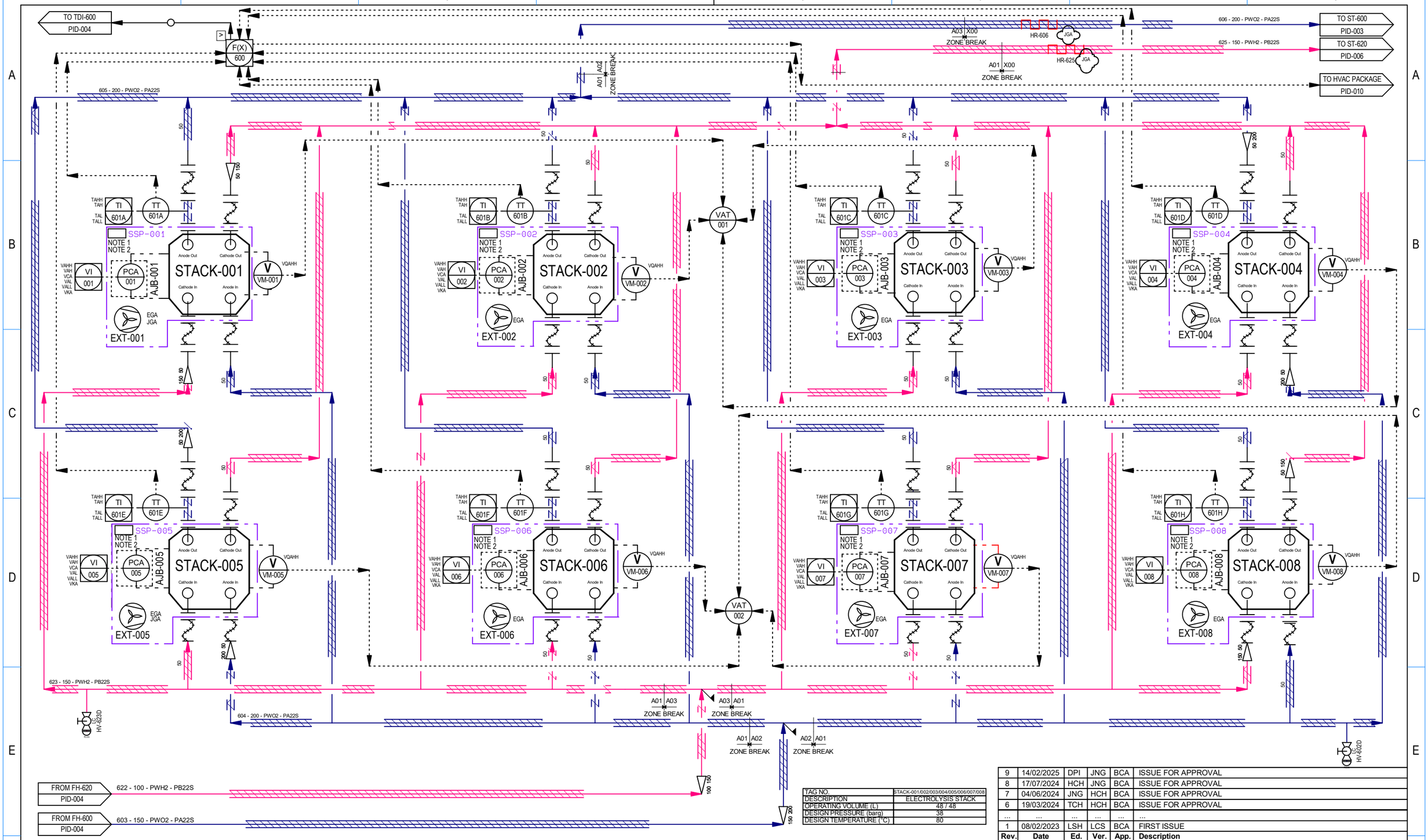
Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	1/16



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

Rev.	Date	Ed.	Ver.	App.	Description
9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

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PROCESS	C63-PID-001-002	DPI	JNG	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	2/16

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005
421 - 1/2" - CW - TK22
FROM PT-630 PID-006
FROM HE-630/631 PID-007
420 - 1/2" - CW - TK22
TO RDPC-002 PID-006
TO PV-631 PID-007
TO MPV-611 PID-005
TO O2 VENT PID-005
TO FX-642 PID-007
616A - 80 - O2 - PA22S
TO O2 VENT PID-005
SLO-8 IS 1
SLO-23 IS 10
IS 19
PSHH 611
PAHH PAH PALL
PT 611
BBV-611
TK22 PA22S
13 barg
PSV-610
1/2" GF
1/2" GM
HV-410D
MV-420
616 - 1" - PWO2 - TK22
RDPC 001
PDAHH PDAH PDAL PDALL
HIGH DP OVERRIDE
LOW DP OVERRIDE
PIC 610
PI 900
PT 610
BBV-610
LC HV-610
TO O2 VENT PID-005
N2
902A - 25 - N2 - PA22S
RD-900 10 BARG
PT 900
RV-900
SP-900
IS 1
IS 4
IS 10
NOTE 4
NOTE 6
FI 900
FAL
FT 900
FROM N2 PANEL
900 - 15 - N2 - PA22S
N2 PID-009
LO HV-900
FO PV-900
MV-900
902 - 25 - N2 - PA22S
CV-900
NOTE 3
NOTE 2
900A - 40 - N2 - PA22S
CV-901
NOTE 3
LO HV-902
LO HV-901
614 - 1/4" - O2 - TK22
HV-615
HV-616
HV-F-610
HV-610D
PG 0.5 barg
PRV-610
SLO-3 IS 1
CAHH CAH
CI 610
2 OUT OF 3
FALL
HIOD 610C
HIOD 610B
HIOD 610A
FS 610C
FSLL 610C
FS 610B
FSLL 610B
FS 610A
FSLL 610A
FICV-610C
615C - 1/4" - O2 - TK22
FICV-610B
615B - 1/4" - O2 - TK22
615A - 1/4" - O2 - TK22
FICV-610A
CV-611
TO O2 VENT PID-005
FROM PT-300 PID-001
MIN.
GGA ZI 605
ZIO 605
HV-606V
FROM STACKS PID-002
606 - 200 - PWO2 - PA22S
LO HV-605
X00 A10 ZONE BREAK
PA22S
PB22S
PIPE HEATED
PIPE NOT HEATED
ACO-610
TI 610
SLO-15 IS 12
LASHH LASHH 600
LSH 600
ST-600
DEM-600
LT 600
LIC 600
LAHH LAH LAL LALL
SLO-24 IS 6
LSLL 600
LSL 600
LASLL
FOR START-UP ONLY
FI 611
FALL
FT 611
FICV-611
Analysis System Package
614B - 1/4" - O2 - TK22
TO O2 VENT PID-005
610 - 20 - PWO2 - PA22S
TO HE-610 PID-005
FROM DG-640 PID-007
641A - 25 - PWH2 - PB22S
HR-600A
HR-600B
X00 A10 ZONE BREAK
X00 A02 ZONE BREAK
HR-306
FROM LP-300 A/B PID-001
306 - 25 - PW - PA22S
C01 X00 ZONE BREAK
X00 A02 ZONE BREAK
TO VAR-300A/B PID-001
A10 A02 ZONE BREAK
NOTE 5
PLUG 1/2" NPT F
600B - 150 - PWO2 - PA22S
LO HV-600B
RS-600B
CP-600B
NOTE 1
PT 600B
PI 600B
PAHH
IS 16
BBV-600B
601B - 150 - PWO2 - PA22S
CV-601A
LO HV-601B
PI 600
PAH PAL PALL
PT 600
BBV-600
TO HE-600 PID-004
600A - 150 - PWO2 - PA22S
LO HV-600A
RS-600A
CP-600A
PT 600A
PI 600A
BBV-600A
601A - 150 - PWO2 - PA22S
CV-601B
LO HV-601A
LO HV-601D
VAR-600B
VAR-600A
IS 15
Auto-start
Shutdown
LO HV-600C
LO HV-600D

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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5"D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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PROCESS	C63-PID-001-003	DPI	JNG	BCA	1:1

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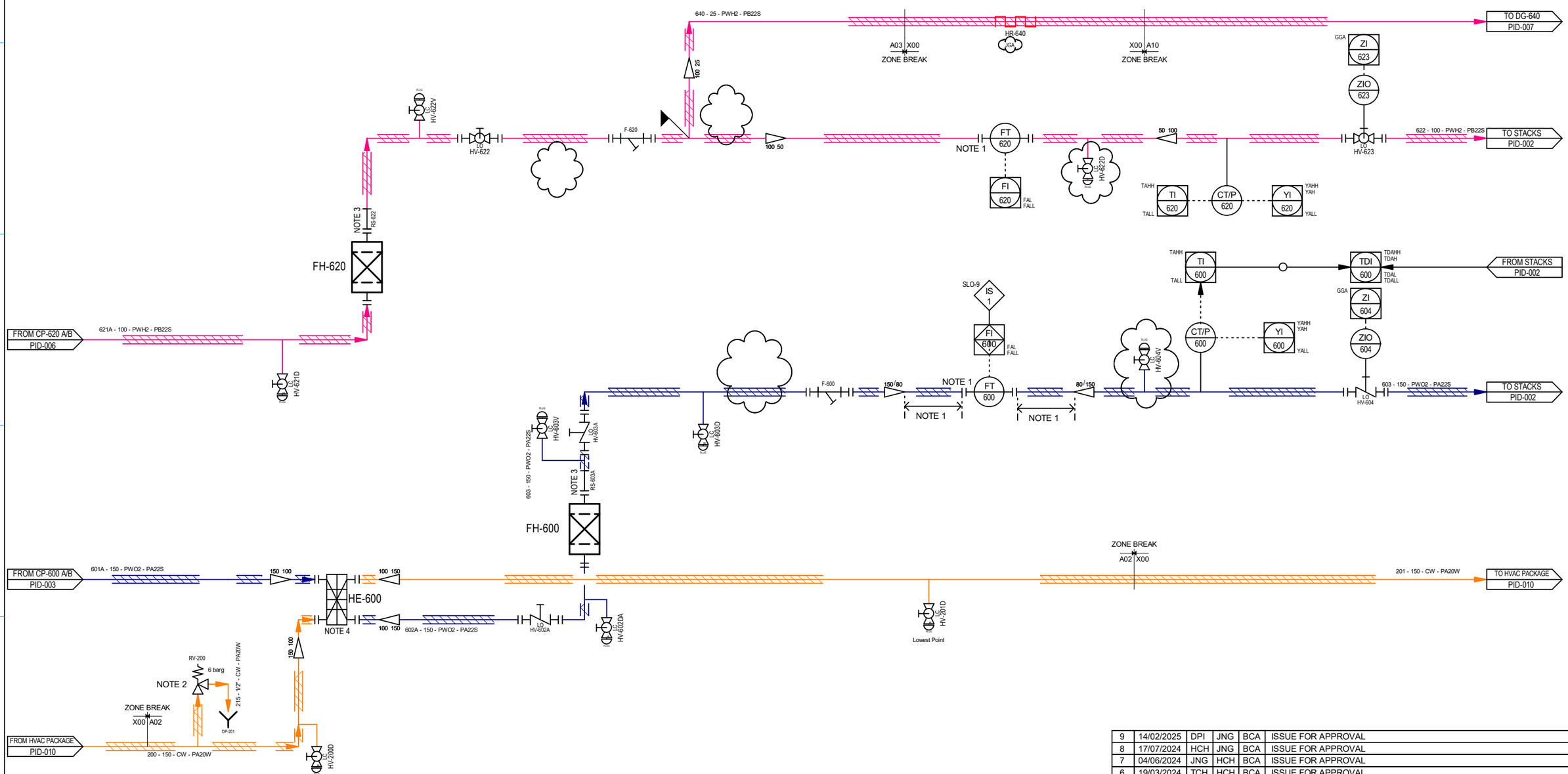
Title, Supplementary title: OXYGEN SEPARATION
Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	3/16

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

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PROCESS	C63-PID-001-004	DPI	JNG	BCA	1:1

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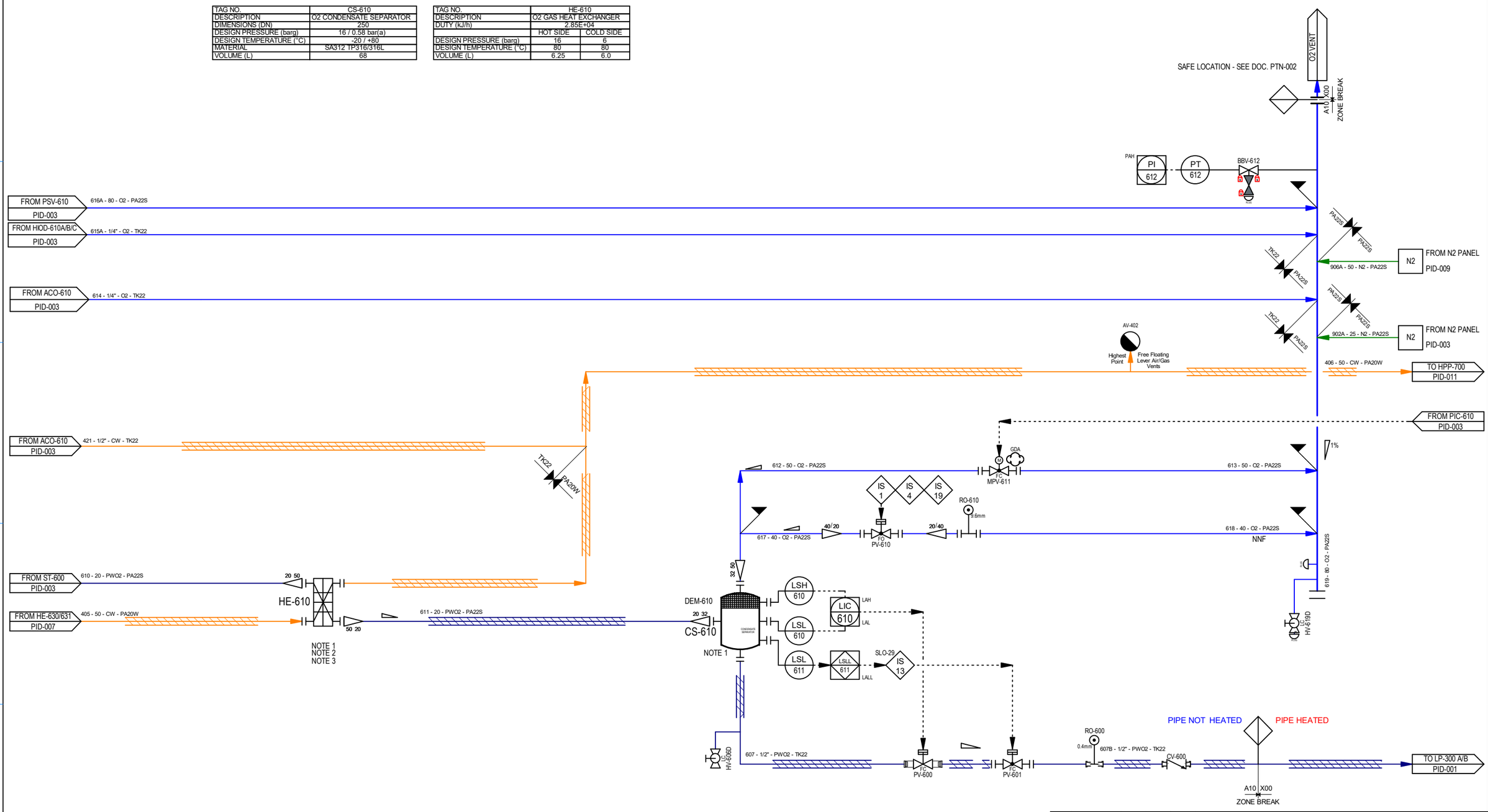
Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	4/16

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2.85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

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PROCESS	C63-PID-001-005	DPI	JNG	BCA	1:1

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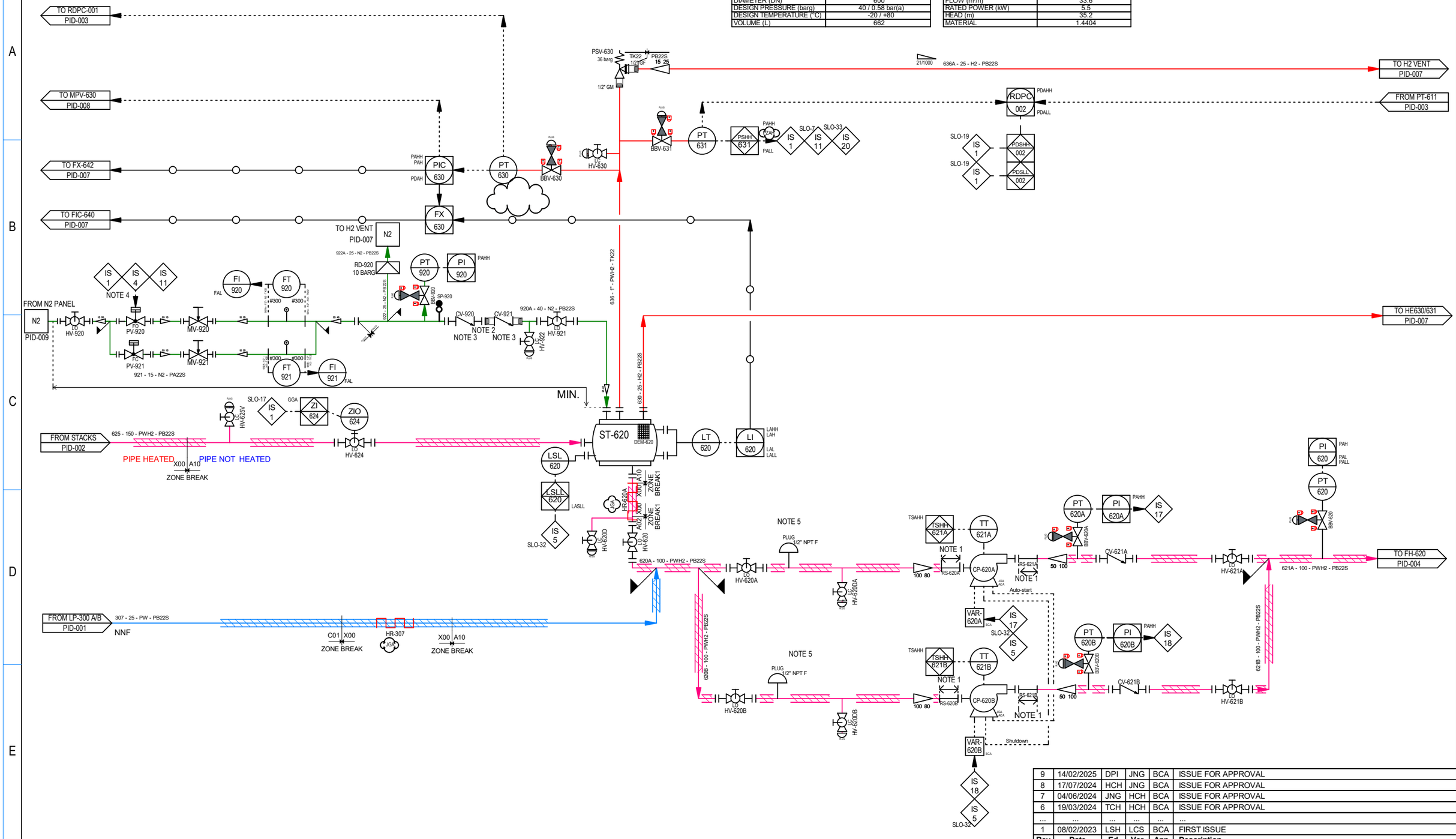
Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	5/16

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33.6
RATED POWER (kW)	5.5
HEAD (m)	35.2
MATERIAL	1.4404



NOTES :

NOTE 1 : DISTANCE OF 5"D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

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8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	DPI	JNG	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN SEPARATION

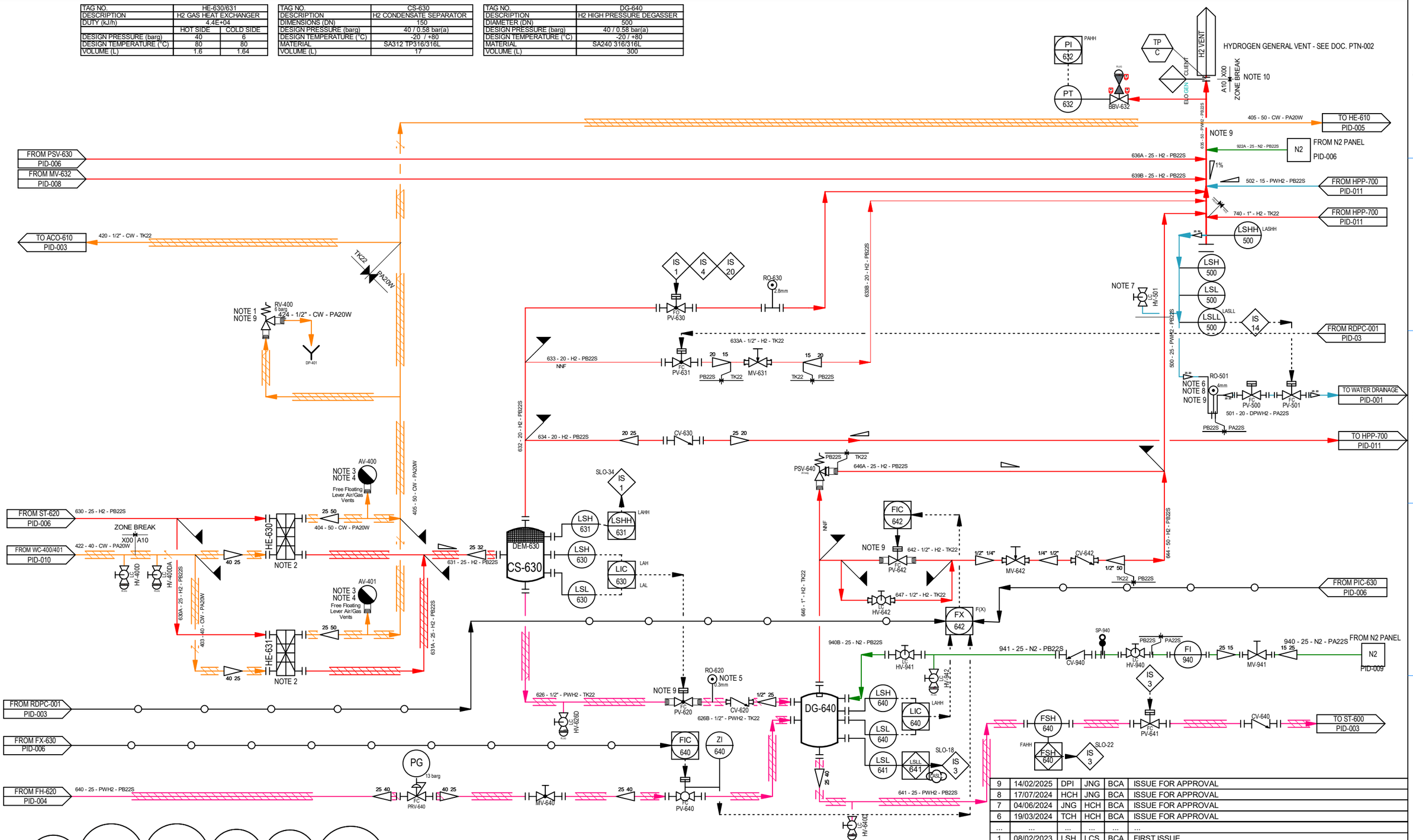
Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	6/16

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4.4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PV-642 & MV-642 SETTING
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

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PROCESS	C63-PID-001-007	DPI	JNG	BCA	1:1

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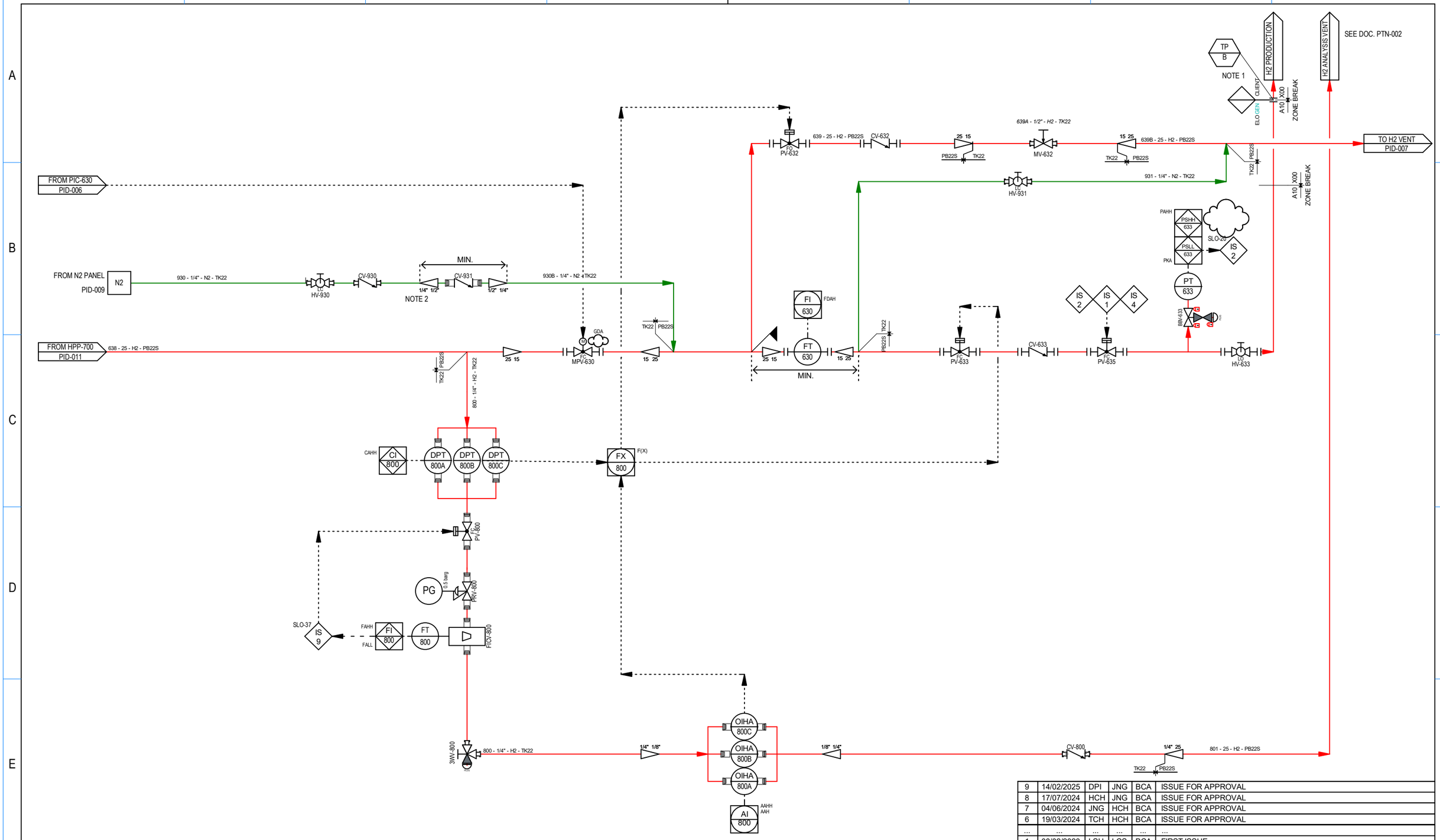
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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDENSATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	7/16



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

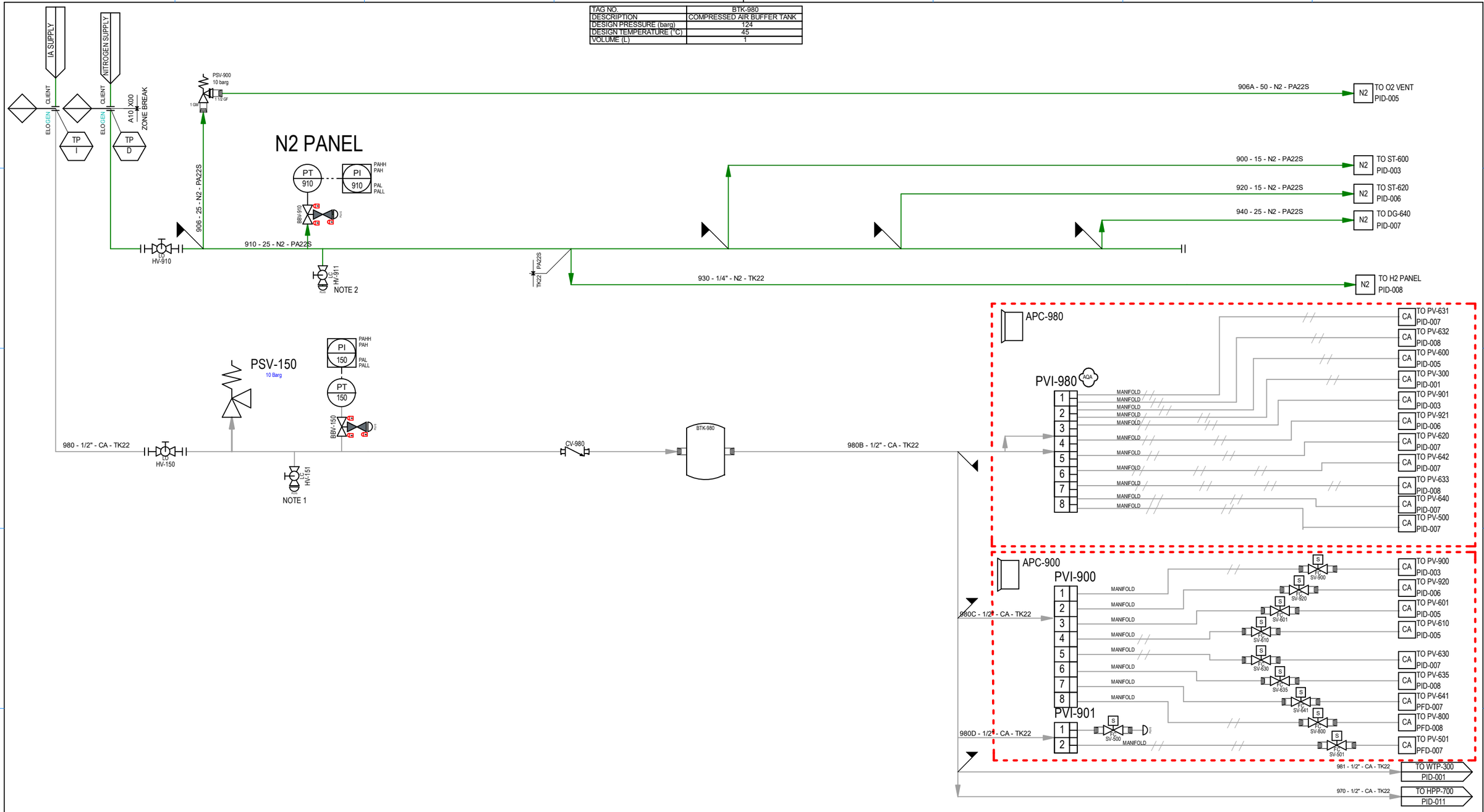
Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-008	DPI	JNG	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN
Title, Supplementary title	**Client reference**
H2 PANEL	-

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	8/16

TAG NO.	BTK-980
DESCRIPTION	COMPRESSED AIR BUFFER TANK
DESIGN PRESSURE (barg)	124
DESIGN TEMPERATURE (°C)	45
VOLUME (L)	1



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : IA CONNECTION FOR MAINTENANCE PURPOSE IN CASE OF NEED OF COMPRESSED AIR IN A SPECIFIC POINT ON ELECTROLYSER
NOTE 2 : NITROGEN CONNECTION FOR MAINTENANCE/COMISSIONING PURPOSE IN CASE OF NEED OF NITROGEN IN A SPECIFIC POINT ON THE ELECTROLYSER

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PROCESS	C63-PID-001-009	DPI	JNG	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: NITROGEN & INSTRUMENT AIR PANEL

Client reference: -

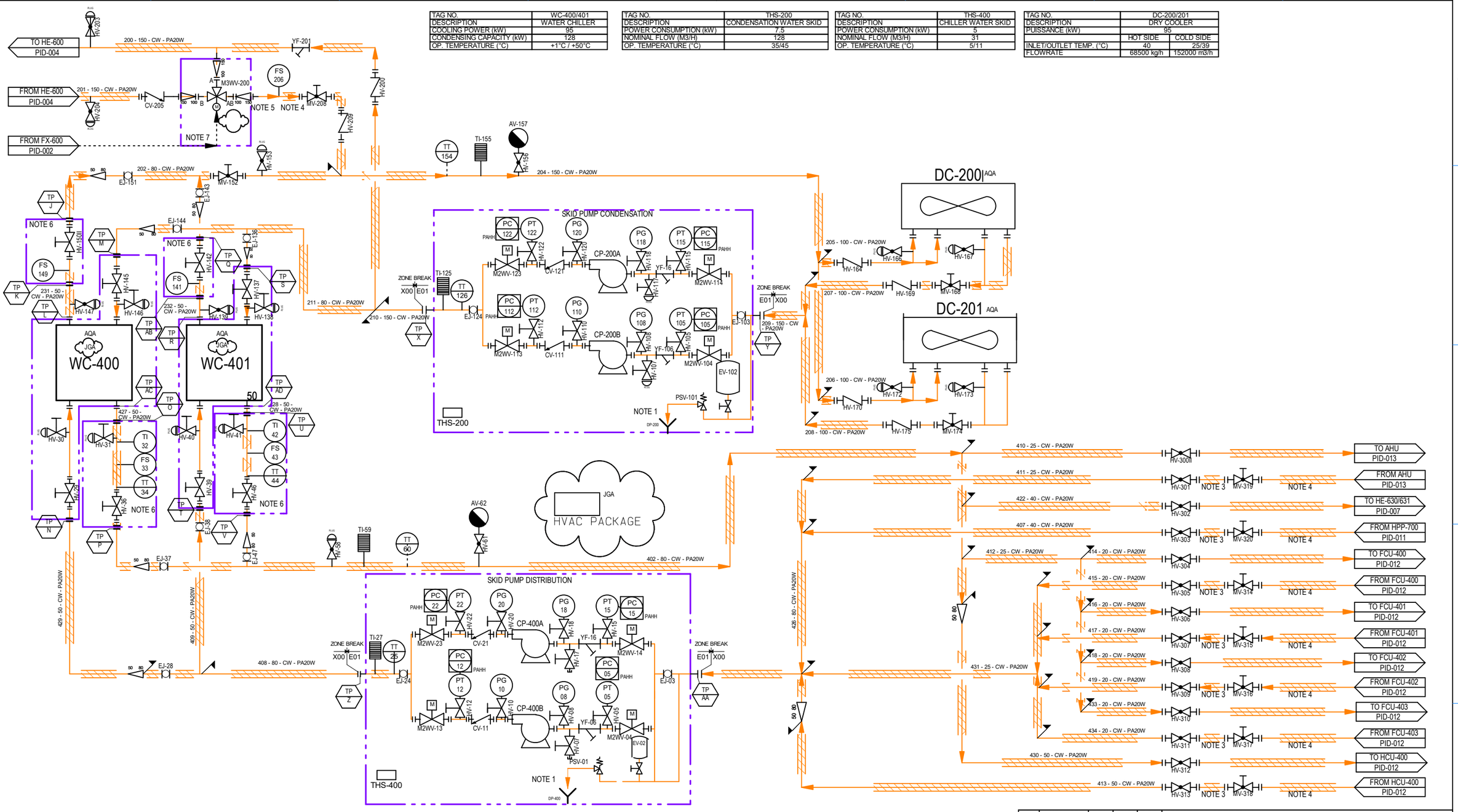
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TAG NO.	WC-400/401
DESCRIPTION	WATER CHILLER
COOLING POWER (kW)	95
CONDENSING CAPACITY (kW)	128
OP. TEMPERATURE (°C)	+1°C / +50°C

TAG NO.	THS-200
DESCRIPTION	CONDENSATION WATER SKID
POWER CONSUMPTION (kW)	7.5
NOMINAL FLOW (M3/H)	128
OP. TEMPERATURE (°C)	35/45

TAG NO.	THS-400
DESCRIPTION	CHILLER WATER SKID
POWER CONSUMPTION (kW)	5
NOMINAL FLOW (M3/H)	31
OP. TEMPERATURE (°C)	5/11

TAG NO.	DC-200/201	
DESCRIPTION	DRY COOLER	
PUISSANCE (kW)	95	
	HOT SIDE	COLD SIDE
INLET/OUTLET TEMP. (°C)	40	25/39
FLOWRATE	68500 kg/h	152000 m3/h



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GENERAL NOTES :
- REFER TO HVAC PACKAGE DOCUMENTATION FROM PAUMIER FOR COMPLETE P&ID - P&ID N° (HOLD)
-IS ON THE THERMAL SKID WILL BE ADDED FOR THE NEXT REVISION

NOTES :
NOTE 1: Drip pan will be provided by Paumier and installed on skid pump

NOTE 3 : 2xD MINIMUM DISTANCE
NOTE 4 : 5xD MINIMUM DISTANCE
NOTE 5 : 10xD MINIMUM DISTANCE
NOTE 6 : THESE EQUIPMENTS WILL BE SUPPLIED ASSEMBLED.
NOTE 7 : FROM B TO AB: PROCESS LINE 100% OPEN. FROM A TO AB: BYPASS LINE 100% OPEN.

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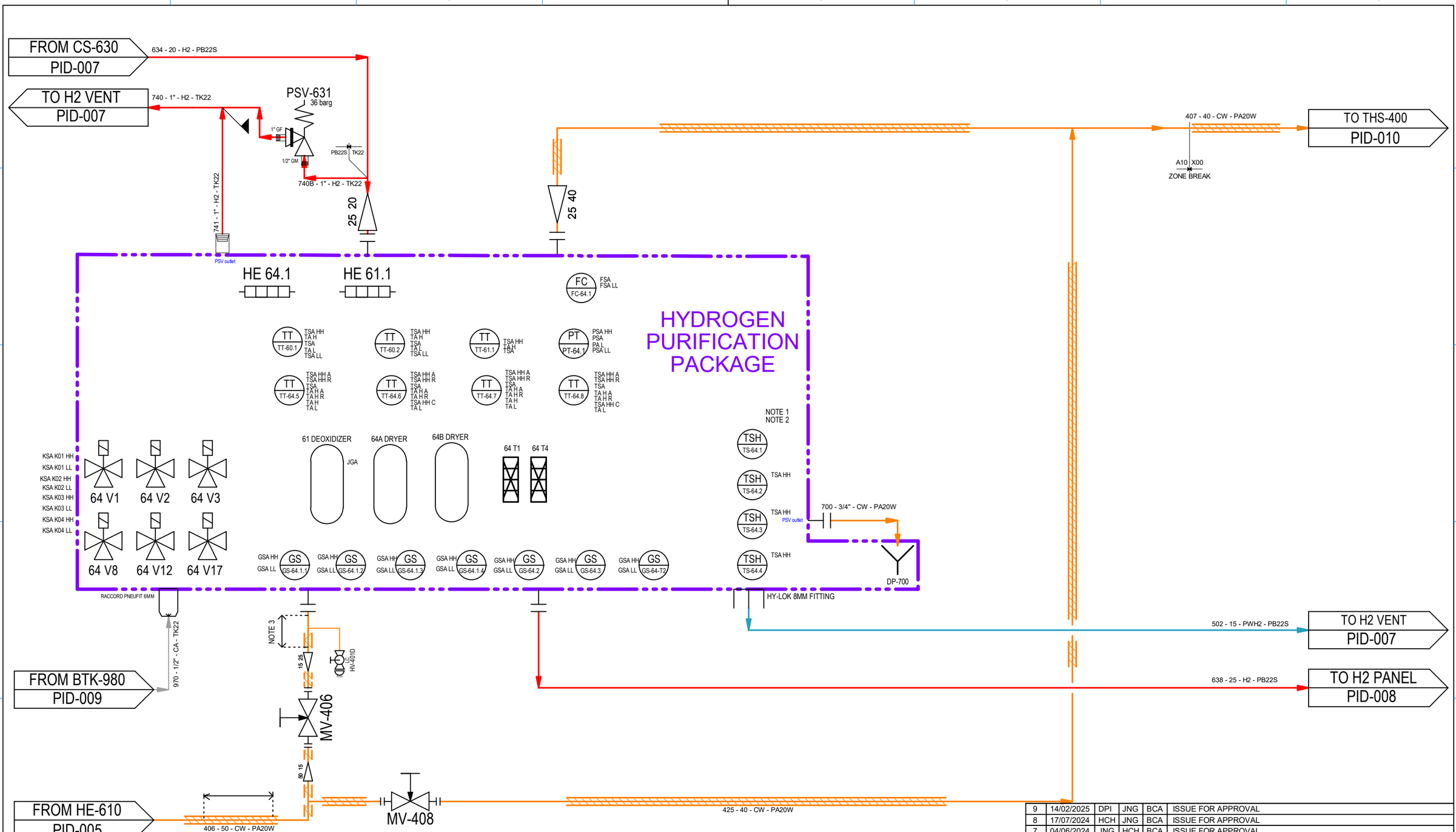
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PROCESS	C63-PID-001-010	DPI	JNG	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN
Title, Supplementary title	**Client reference**
HVAC UNIT	-

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
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NOTES :

NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

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PROCESS	C63-PID-001-011	DPI	JNG	BCA	1:1

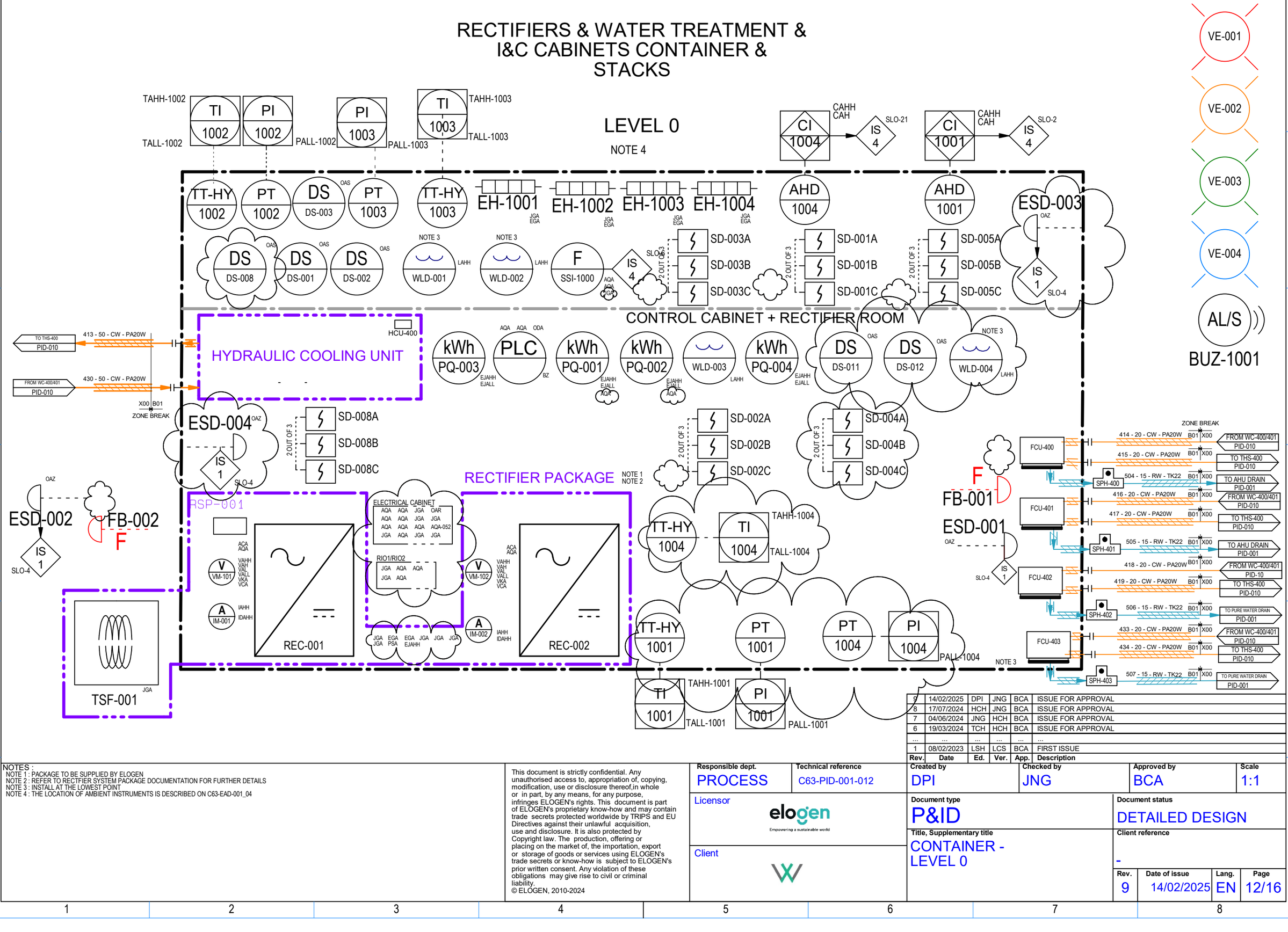
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Client:

Document type	Document status
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Title, Supplementary title	Client reference
HYDROGEN PURIFICATION PACKAGE	-

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RECTIFIERS & WATER TREATMENT & I&C CABINETS CONTAINER & STACKS



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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
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NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO RECTFIER SYSTEM PACKAGE DOCUMENTATION FOR FURTHER DETAILS
NOTE 3 : INSTALL AT THE LOWEST POINT
NOTE 4 : THE LOCATION OF AMBIENT INSTRUMENTS IS DESCRIBED ON C63-EAD-001_04

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PROCESS	C63-PID-001-012	DPI	JNG	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

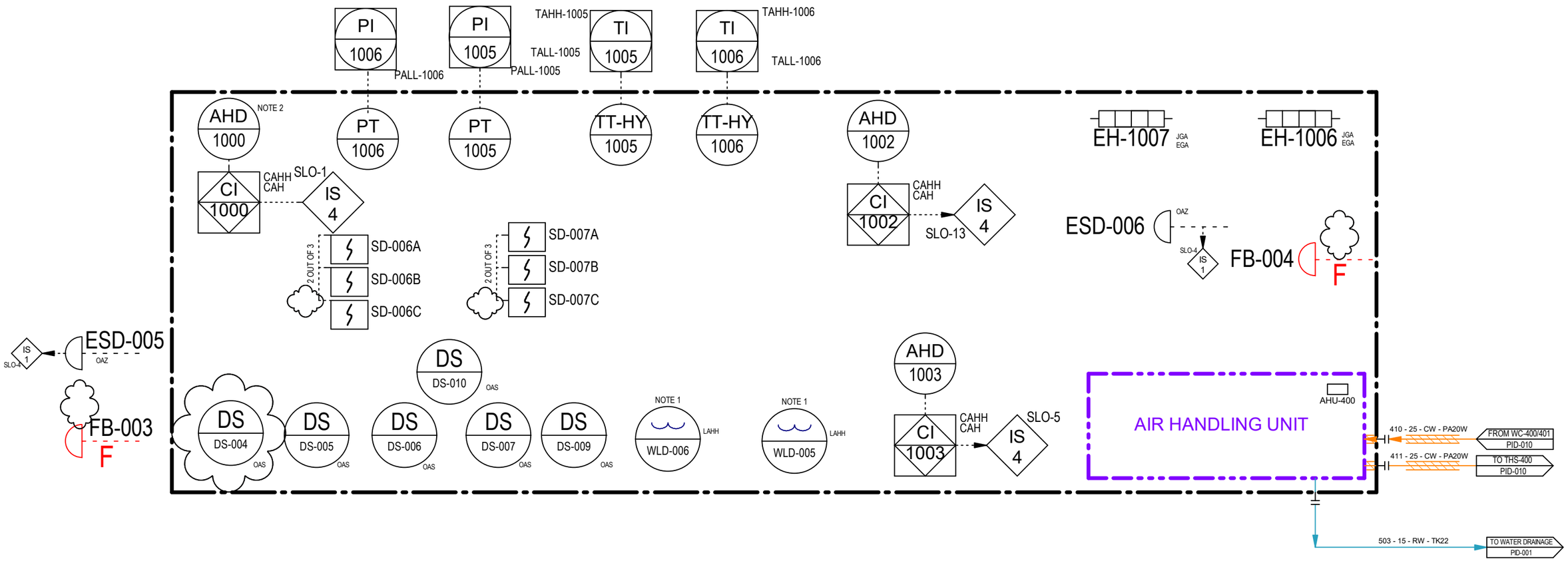
Title, Supplementary title: CONTAINER - LEVEL 0

Client reference: -

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AHU-400
AIR HANDLING UNIT

LEVEL 1



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
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NOTES :
NOTE 1 : INSTALL AT THE LOWEST POINT
NOTE 2 : CLOSE TO HPP-700
NOTE 3 : The location of ambient instruments is described on C63-EAD-001_04

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: CONTAINER - LEVEL 1

Client reference: -

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VE-005

VE-006

VE-007

VE-008

AL/S

BUZ-1002

LEVEL 2

VE-009

VE-010

VE-011

VE-012

AL/S

BUZ-1003

IS 1

SLO-4

ESD-007

OAZ

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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Title, Supplementary title

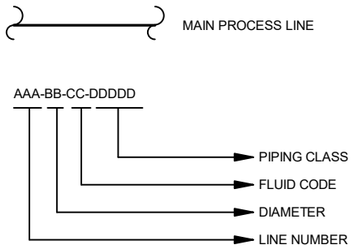
PROCESS CONTAINER LEVEL 2

Client reference

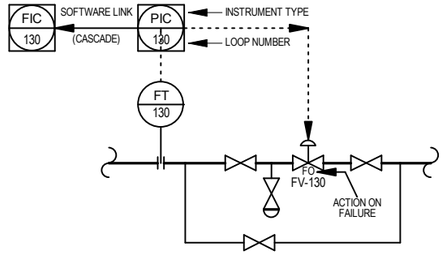
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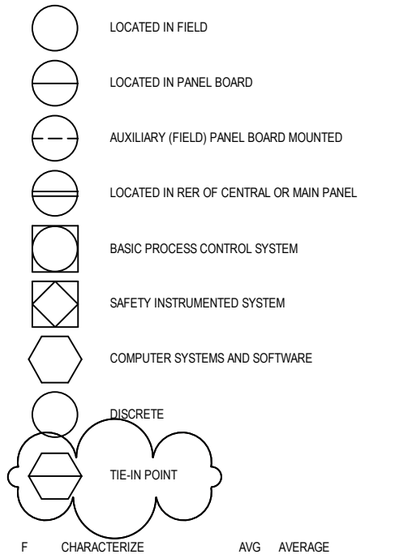
LINE IDENTIFICATION



INSTRUMENT IDENTIFICATION



INSTRUMENT SYMBOLS



F	CHARACTERIZE	AVG	AVERAGE
REV	REVERSE	%	GAIN OR ATTENUATE
X	MULTIPLICATION	x^n	EXPONENTIAL
÷	DIVISION	∫	INTEGRATE
√	ROOT EXTRACTION	>	HIGH SIGNAL SELECT
+	POSITIVE BIAS	<	LOW SIGNAL SELECT
±	BIAS	△	DIFFERENCE
∑	SUMMATION		

FO	FAIL TO OPEN POSITION
FC	FAIL TO CLOSED POSITION
FL	FAIL LOCK AT LAST POSITION



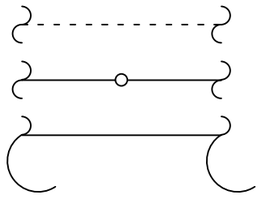
SPRING-DIAPHRAGM ACTUATOR

LINEAR PISTON OR SINGLE/DOUBLE ACTING ACTUATOR

SOLENOID ACTUATOR FOR PROCESS ON-OFF VALVE

ROTARY MOTOR OPERATED ACTUATOR

MANUAL ACTUATOR



ELECTRICAL LEAD

PNEUMATIC LEAD

SOFTWARE LINK

INSTRUMENT TYPES

AE	ANALYZER ELEMENT
AI	ANALYZER INDICATOR
AIC	ANALYZER INDICATING CONTROLLER
AT	ANALYZER TRANSMITTER
CI	CONDUCTIVITY INDICATOR
CIT	CONDUCTIVITY INDICATING TRANSMITTER
CT	CONDUCTIVITY TRANSMITTER
CV	CONTROL VALVE
EI	VOLTAGE INDICATOR (VOLTMETER)
EIS	VOLTAGE INDICATOR SWITCH
ES	VOLTAGE SWITCH
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIC	FLOW INDICATING CONTROLLER
FIT	FLOW INDICATING TRANSMITTER
FT	FLOW TRANSMITTER
FV	FLOW CONTROL VALVE
HS	HAND SWITCH
HV	HAND OPERATED CONTROL VALVE
II	CURRENT INDICATOR
LC	LEVEL CONTROLLER
LI	LEVEL INDICATOR
LIC	LEVEL INDICATING CONTROLLER
LIT	LEVEL INDICATING TRANSMITTER
LS	LEVEL SWITCH
LT	LEVEL TRASNMITTER
LV	LEVEL CONTROL VALVE
PRV	PRESSURE REGULATED VALVE (INTERNAL SELF CONTROLLED)
PDI	DIFFERENTIAL PRESSURE INDICATOR
PDIT	DIFFERENTIAL PRESSURE INDICATING TRANSMITTER
PDT	DIFFERENTIAL PRESSURE TRANSMITTER
PI	PRESSURE INDICATOR
PIC	PRESSURE INDICATING CONTROLLER
PIT	PRESSURE INDICATING TRANSMITTER
PSV	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
PV	PRESSURE CONTROL VALVE
PVRV	PRESSURE VACUUM RELIEF VALVE
RO	RESTRICTION ORIFICE
SCR	SILICON CONTROLLER RECTIFIER
SI	SPEED INDICATOR
SIC	SPEED INDICATING CONTROLLER
SS	SPEED SWITCH
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATING CONTROLLER
TIT	TEMPERATURE INDICATING TRANSMITTER
TT	TEMPERATURE TRANSMITTER
TV	TEMPERATURE CONTROL VALVE
TY	TEMPERATURE RELAY
VM	VIBRATION MONITOR
ZI	POSITION INDICATOR
ZS	POSITION SWITCH
ZSC	POSITION SWITCH CLOSED
ZSO	POSITION SWITCH OPEN
ZT	POSITION TRANSMITTER
TT-HY	TEMPERATURE & HUMIDITY TRANSMITTER

FLUID CODE

O2	OXYGEN
H2	HYDROGEN
PWH2	PURE WATER + DISSOLVED HYDROGEN
OWH2	PURE WATER + DISSOLVED OXYGEN
DPWH2	DRAIN PURE WATER + DISSOLVED HYDROGEN
PW	PURE WATER
RW	RAW WATER
N2	NITROGEN
CA	COMPRESSED AIR
AA	AMBIENT AIR
CW	COOLING WATER

ZONE DEFINITION

STACK ROOM	A01
PROCESS ROOM O2	A02
PROCESS ROOM H2	A03
WATER TREATMENT PACKAGE ROOM	C01
RECTIFIER + CONTROL CABINET ROOM	B01
HYDROGEN PROCESS CONTAINER	A10
HVAC ROOM	E01
INTERCONNECTION AREA	X00

PIPING CLASS

A B CC D
(1) (2) (3) (4)

(1) TYPE

P : PIPING (MM)
T : TUBING (INCH)
X : PFA

(2) PRESSURE RATING

A : CLASS 150
B : CLASS 300
D : CLASS 600
K : 3000 PSIG
R : MANUFACTURE'S STANDARD

(3) MAIN MATERIAL

10 : CARBON STEEL 0.0MM CORROSION ALLOWANCE
11 : CARBON STEEL 1.5MM CORROSION ALLOWANCE
13 : CARBON STEEL 3.0MM CORROSION ALLOWANCE
20 : STAINLESS STEEL 304
21 : STAINLESS STEEL 304L
22 : STAINLESS STEEL 316
23 : STAINLESS STEEL 316L
30 : CPVC SCH40
31 : CPVC SCH80
40 : PFA

(4) SPECIAL REQUIREMENT

S : SEAMLESS PIPING COMPONENTS
W : WELDED PIPING COMPONENTS

NOTES :

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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Title, Supplementary title: LEGEND SHEET 1

Client reference: -

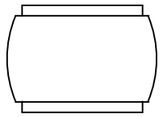
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PIPING SYMBOLS

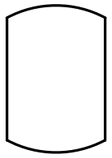
- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- NEEDLE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- HAND-OPERATED GLOBE VALVE
- THREE WAY VALVE
- PRESSURE SAFETY VALVE
- PRESSURE REGULATOR VALVE
- BLOCK AND BLEED VALVE
- MOTORIZED TWO WAY VALVE
- ECCENTRIC REDUCER
- CONCENTRIC REDUCER
- REMOVABLE SPOOL
- EXPANSION JOINT
- Y FILTER
- CLASS BREAK
- SPEC BREAK
- BATTERY LIMIT
- LINE BREAK
- COMPRESSION FITTING
- FLANGED CONNECTION
- THREADED CONNECTION
- PLUG
- SLOPE
- STEAM TRAP
- FLEXIBLE HOSE

- INTEGRAL VALVE ROTAMETER
- RUPTURE DISC
- SPECTACLE BLIND
- HEAT RIBBON
- INSULATION
- ORIFICE PLATE
- DRIP PAN
- THERMOMETER
- EXPANSION JOINT

EQUIPMENT SYMBOLS



HORIZONTAL SEPARATOR



CONDENSATE SEPARATOR

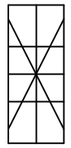
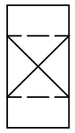
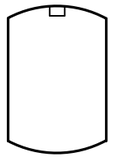


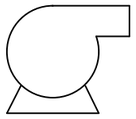
PLATE HEAT EXCHANGER



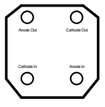
FIXED BED FILTER



HIGH PRESSURE DEGASSER



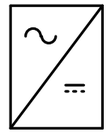
PUMP



STACK



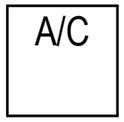
METALLIC MESH



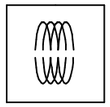
RECTIFIER



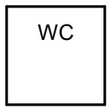
AIR EXTRACTOR



AIR CONDITIONER



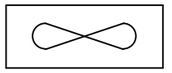
TRANSFORMER



WATER CHILLER



SMOKE DETECTOR



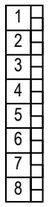
DRY COOLER



VISUAL ELEMENT



BUZZER



PNEUMATIC VALVE ISLAND



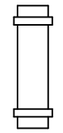
SPEED VARIATOR



ELECTRICAL HEATER



GAZ CYLINDER



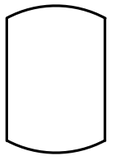
DUCTED PIPE



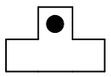
HAND SWITCH



FLOATING - HEAD TUBE -
BUNDLE HEAT EXCHANGER



BUFFER TANK



BALL SIPHON

Rev.	Date	Ed.	Ver.	App.	Description
9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-016	DPI	JNG	BCA	1:1

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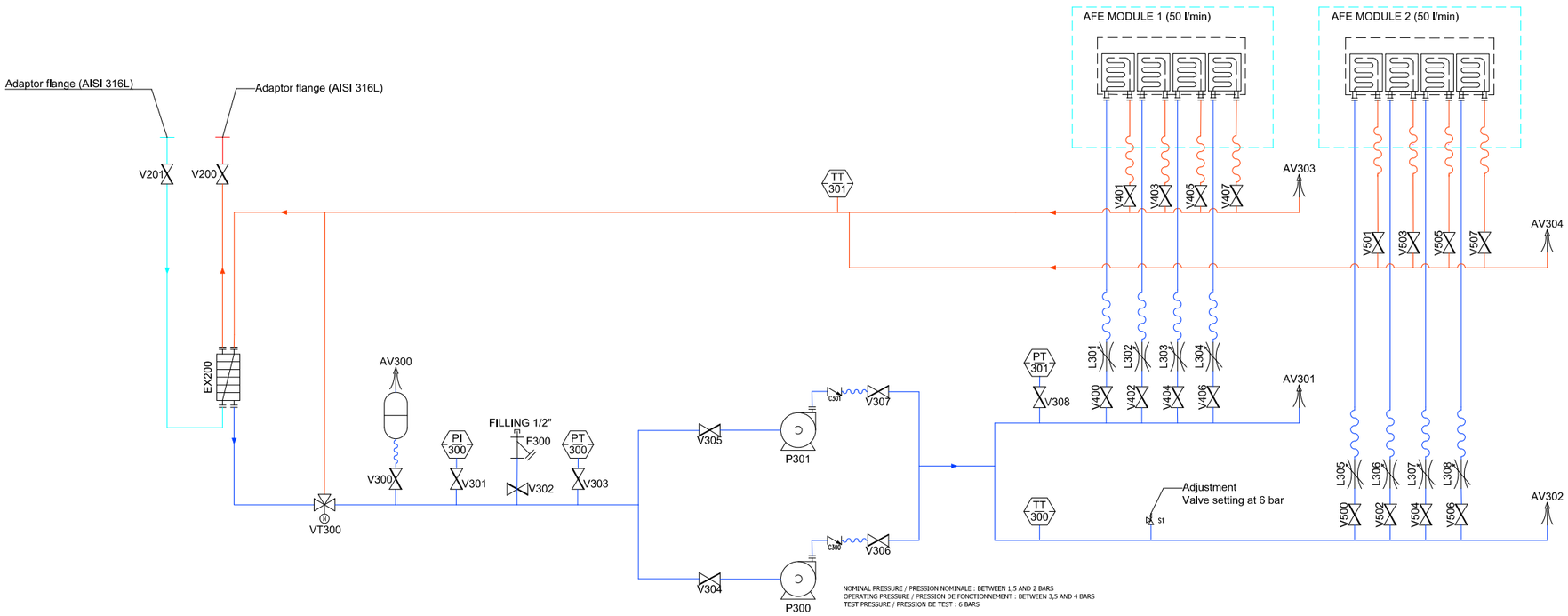
Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: LEGEND SHEET 2

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	16/16



LEGEND / LEGENDE

- VXXX — VALVE / VANNE
- CXXX — CHECK VALVE / CLAPET ANTI-RETOUR
- BX S1 — OVERFLOW VALVE / SOUPAPE DE DECHARGE
- AIR DRAINER / PURGEUR D'AIR
- FXXX — FILTER / FILTRE
- WXXX — MOTORISED THREE WAY VALVE / VANNE TROIS VOIES MOTORISEE
- EXXXX — EXCHANGER / ECHANGEUR
- PXXX — PUMP / POMPE
- FLOW LIMITER / LIMITEUR DE DEBIT
- XXX — PRESSURE TRANSMITTER / TRANSMETTEUR DE PRESSION
- XXX — PRESSURE INDICATOR / INDICATEUR DE PRESSION
- XXX — TEMPERATURE TRANSMITTER / TRANSMETTEUR DE TEMPÉRATURE
- TXXX — EXPANSION TANK / VASE D' EXPANSION

ELECTRICAL REFERENCE

P300	080M1
P301	080M2
PT300	085B3
PT301	085B4
TT300	085B2
TT301	085B1
VT300	081YV1

PRIMARY CIRCUIT

EAU CHAUDE DEMINERALISEE GLYCOLEE 40%
DEMINERALISED HOT WATER 40% GLYCOL
EAU FROIDE DEMINERALISEE GLYCOLEE 40%
DEMINERALISED COLD WATER 40% GLYCOL

SECONDARY CIRCUIT

EAU CHAUDE DEMINERALISEE
DEMINERALISED HOT WATER
EAU FROIDE DEMINERALISEE
DEMINERALISED COLD WATER

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VENDOR DOCUMENT REVIEW

Reviewed by	Position
Hichem CHETTAOUI	Process Engineer

Accepted/Reviewed without Comments. No further revision. Work may proceed.	**CODE 1**	☑
Accepted/Reviewed with Comments. Revise and resubmit. Work may proceed.	**CODE 2**	☐
Rejected. Revise and resubmit. Work may not proceed.	**CODE 3**	☐
Received but not reviewed.	**CODE 4**	☐

ELOGEN acceptance in no way relieves the duty of the supplier to meet the Purchase Order requirements.

	PT300	PT301	TT300	TT301
ALARM MIN	0,8 bars	2,8 bars	+ 19°C	NA
ALARM MAX	1,8 bars	4,2 bars	+ 42°C	+ 50°C
FAILURE MIN	0,5 bars	2 bars	+ 15°C	NA
FAILURE MAX	2,6 bars	5 bars	+ 45°C	+ 55°C

WATER VOLUME / VOLUME D'EAU : 50 LITRES APPROX
MATIERE TUYAUTERIE / PIPING MATERIAL : AISI 316L (DN32)

MAX PRIMARY INLET TEMPERATURE / TEMPERATURE MAX D'ENTREE PRIMAIRE : + 25°C
MAX PRIMARY OUTLET TEMPERATURE / TEMPERATURE MAX DE SORTIE PRIMAIRE : + 32°C
PRIMARY FLOW / DEBIT PRIMAIRE : 125 l/min

MAX SECONDARY INLET TEMPERATURE / TEMPERATURE MAX D'ENTREE SECONDAIRE : + 48°C
MAX SECONDARY OUTLET TEMPERATURE / TEMPERATURE MAX DE SORTIE SECONDAIRE : + 40°C
SECONDARY FLOW / DEBIT SECONDAIRE : 100 l/min

Rev.	Modification	Date	Drawn by	Date	Approved by
04					
03	TEMPERATURE MODIFICATION	03/07/2024	C. VEROT	03/07/2024	JP. CHOVET
02	AS BUILT	20/06/2024	C. VEROT	20/06/2024	JP. CHOVET
01	UPDATE	29/04/2024	C. VEROT	29/04/2024	JP. CHOVET
00	FIRST ISSUE	11/04/2024	C. VEROT	11/04/2024	JP. CHOVET

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Nidec — All for dreams

Project: ELOGEN 2.5MW H2 ELECTROLYSER

Document Title: HYDRAULIC SYNOPTIC — Format: A3

Projet N°: 8934 — Doc N°: 8934HYS01 — Date: 11/04/2024 — Index: 00

ISOMETRICS BOOKLET WP1
(incl. heat tracing)

NOTES:

- MANUFACTURER WILL BE RESPONSIBLE OF ANY ADJUSTMENT NECESSARY TO FIT THESE PIPES ON SKID;
- MANUFACTURER SHALL CONSIDER IN THE SCOPE 5% OF VARIANCE TO CHANGE REQUEST DURING DETAILED ENGINEERING PHASE;
- BEFORE PREFABRICATING THE DIMENSIONS MUST BE CHECKED IN SHOP

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

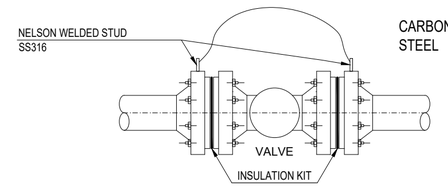
TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	A	- / -	C.B.

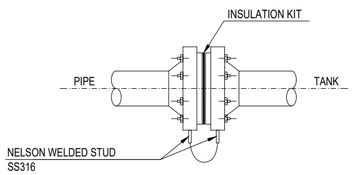
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SHEET	REVISIONS						DESCRIPTION
	00	01	02	03	04	05	
A	25.09.24						COVER SHEET
B	25.09.24						INDEX & REVISIONS
1	25.09.24						200-150-CW-PA20W_A02
2	25.09.24						201-150-CW-PA20W_A02
3	25.09.24						307-25-PW-PB22S_A03
4	25.09.24						600A-150-PWO2-PA22S_A02
5	25.09.24						600B-150-PWO2-PA22S_A02
6	25.09.24						601A-150-PWO2-PA22S_A02
7	25.09.24						601B-150-PWO2-PA22S_A02
8	25.09.24						602A-150-PWO2-PA22S_A02
9	25.09.24						603-150-PWO2-PA22S_A02
10	25.09.24						604-200-PWO2-PA22S_A01
11	25.09.24						605-200-PWO2-PA22S_A03
12	25.09.24						606-200-PWO2-PA22S_A03
13	25.09.24						620A-100-PWH2-PB22S_A03
14	25.09.24						620B-100-PWH2-PB22S_A03
15	25.09.24						621A-100-PWH2-PB22S_A03
16	25.09.24						621B-100-PWH2-PB22S_A03
17	25.09.24						622-100-PWH2-PB22S_A03
18	25.09.24						623-150-PWH2-PB22S_A03
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20	25.09.24						640-25-PWH2-PB22S_A03

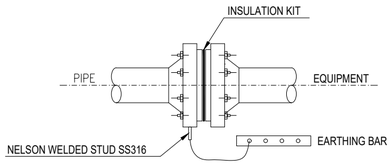
TYPICAL EARTHING DETAILS



CARBON STEEL / STAINLESS STEEL



CARBON STEEL / STAINLESS STEEL
TANK



CARBON STEEL / STAINLESS STEEL
GENERAL EQUIPMENT

FLANGED JOINTS IN METALLIC PIPELINES THAT HAVE NEITHER INSULATION KIT NOR PTFE GASKET ARE CONSIDERED INHERENTLY CONTINUOUS.

NOTES:

- ALL DIMENSIONS MUST BE VERIFIED DURING CONSTRUCTION;
- ALL VALVE DIMENSIONS MUST BE CHECKED ON SITE BEFORE ASSEMBLY;
- ALL THE WELDED COMPONENTS WILL BE CHECKED ON SITE BEFORE THE ASSEMBLY;
- VALVE HANDWHEEL ORIENTATION TO BE CHECKED AND DEFINED DURING ERECTION PHASE BY CONSTRUCTION COMPANY.

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

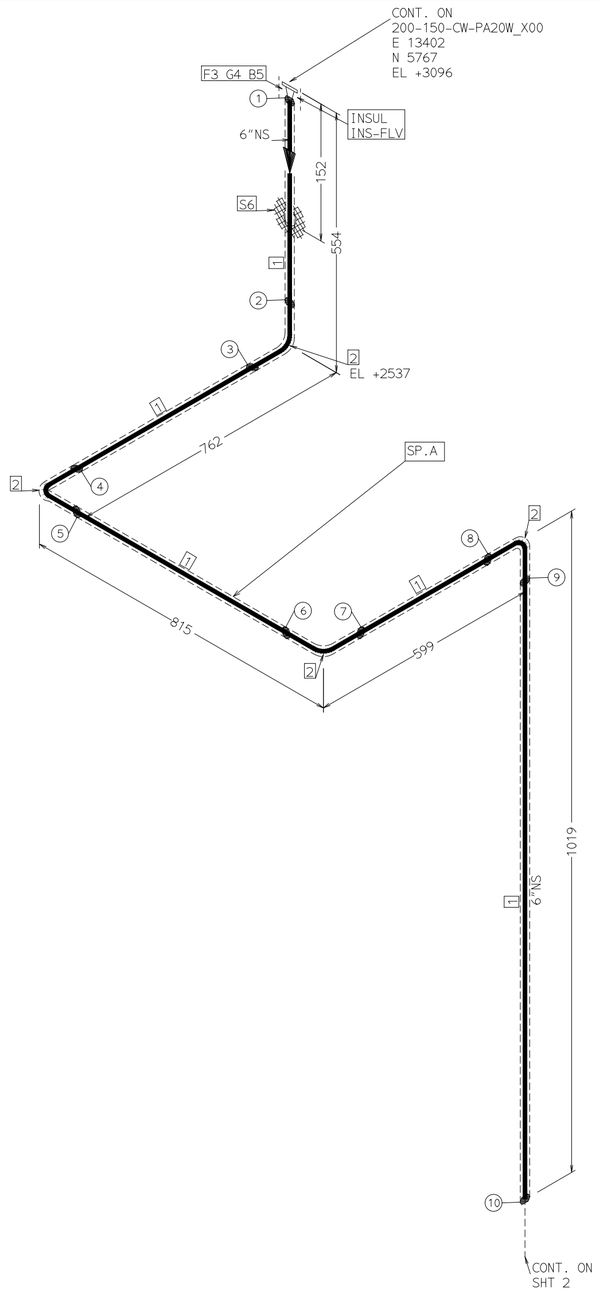
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	B	- / -	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	1.9M	51.15
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	4	40.80
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	1	10.80
			TOTAL FABRICATION WEIGHT		102.75

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
	BOLTS				
5	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
	SUPPORTS				
6	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-300/168/60/F3, AS PER DRAWING S1606157	6	2MCTZFR-6a	1	7.30
			TOTAL ERECTION WEIGHT		11.21
			TOTAL WEIGHT		113.96

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

200-150-CW-PA20W_A02/D01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):		TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	HR-201	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	2,6					VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

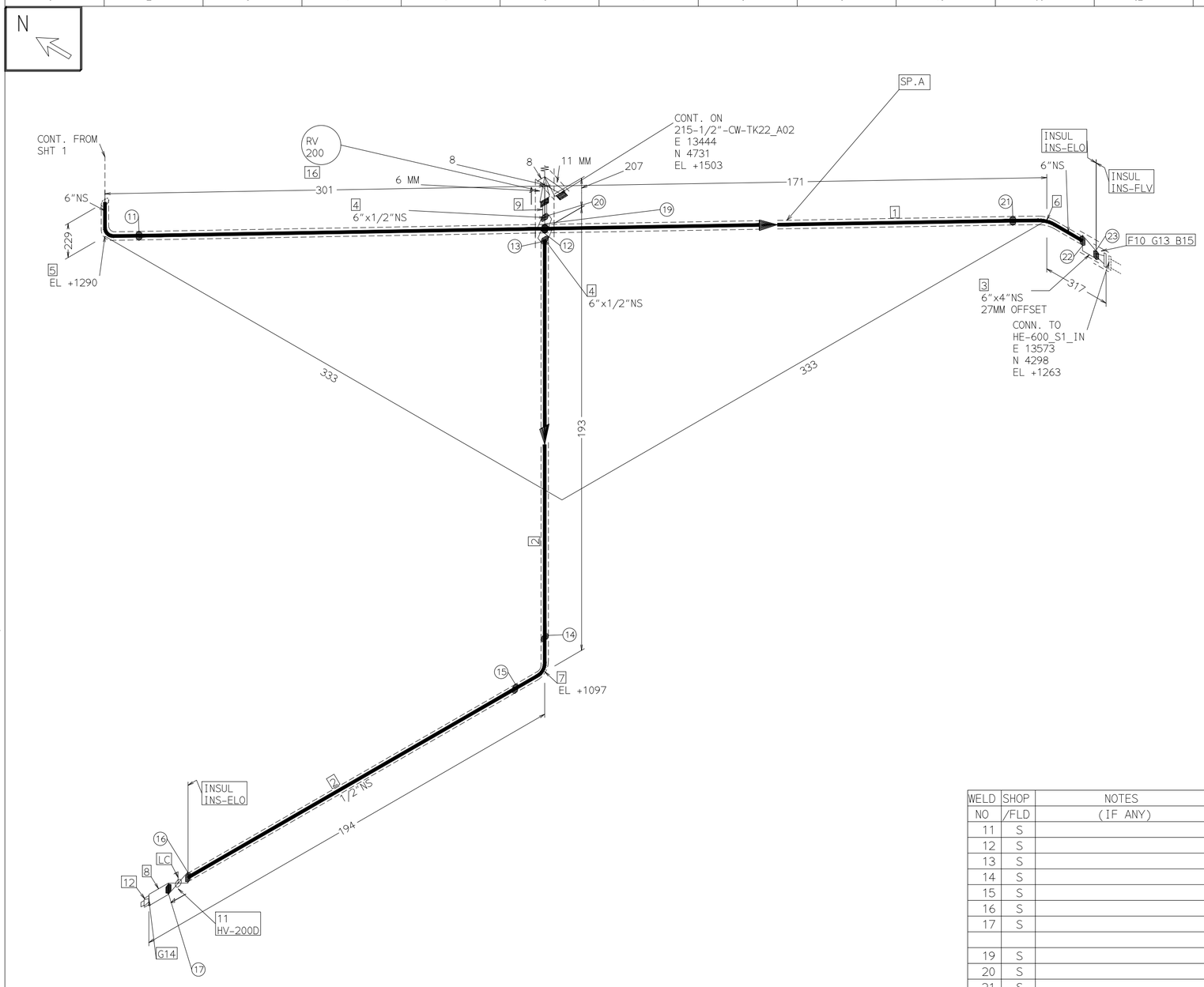
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 01

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.2M	4.15
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.2M	0.17
	FITTINGS				
3	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 4	REE0SS10050604	1	3.90
4	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	2	0.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	1	10.20
6	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
8	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
9	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
10	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00
	VALVES / IN-LINE ITEMS				
11	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F304/304L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 32.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
12	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	1	0.23
14	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
15	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	INSTRUMENTS				
16	PSV HEROSE TYPE 06370, BSPP-FxBSPP-F BRONZE RV 200	1/2	BY CLIENT	1	0.24

TOTAL ERECTION WEIGHT 2.57

TOTAL WEIGHT 34.61

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
19	S	
20	S	
21	S	
22	S	
23	S	

200-150-CW-PA20W_A02/D01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING : HR-201	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	2,6				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

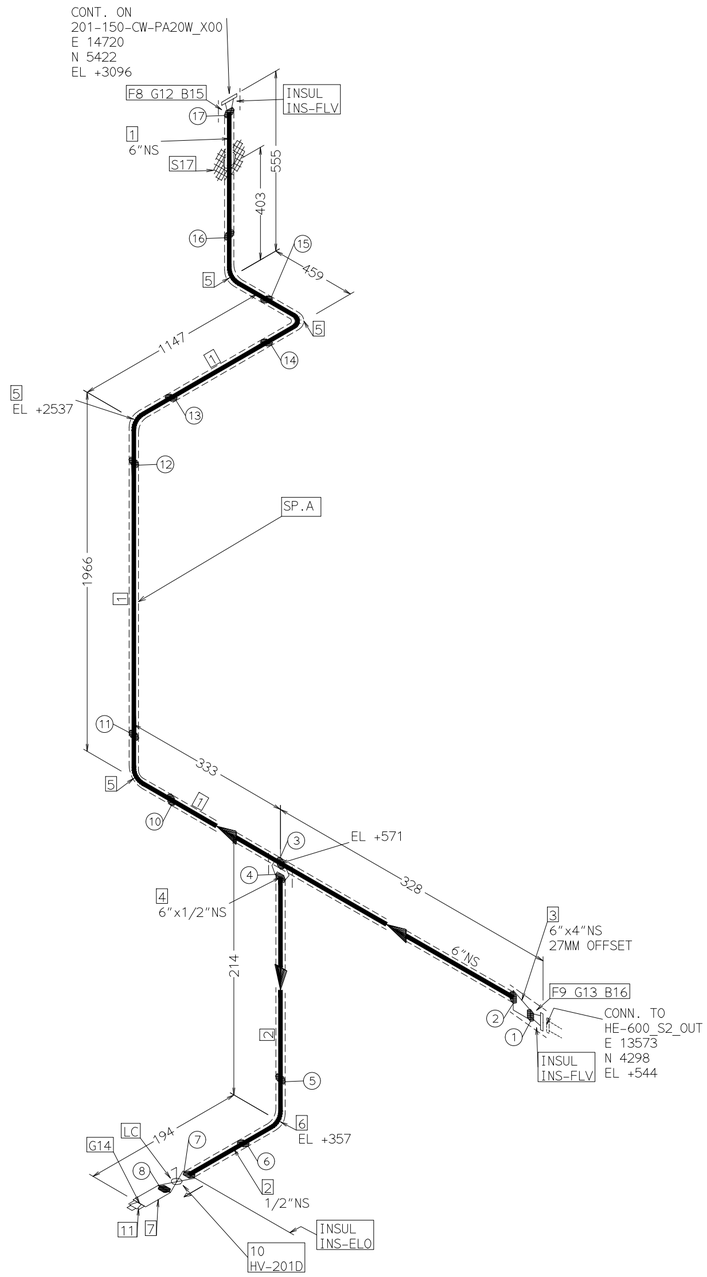
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 01

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	2.7M	74.41
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.2M	0.19
	FITTINGS				
3	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 4	REE0SS10050604	1	3.90
4	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	4	40.80
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
7	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	1	10.80
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00
	VALVES / IN-LINE ITEMS				
10	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F304/304L	1/2	BY CLIENT	1	0.88
				TOTAL FABRICATION WEIGHT	138.36

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
11	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	1	0.23
14	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
15	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
16	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
17	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-300/168/60/F3, AS PER DRAWING S1606157	6	2MCTZFR-6a	1	7.30
				TOTAL ERECTION WEIGHT	13.54
				TOTAL WEIGHT	151.90

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	

201-150-CW-PA20W_A02/D01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-004/010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD; FIELD WELD; SOCKET WELD; SCREWED JOINT; COMPR.N JOINT; SITE CONNECTION; PIPE SUPPORT / ATTACHMENT; PIPE INSULATION; PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
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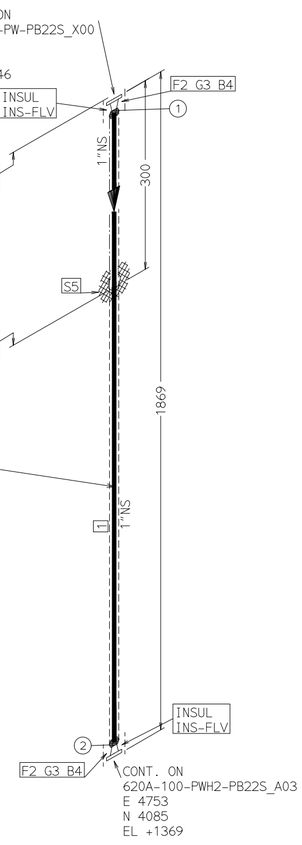
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-003	224J10-DDL-PP-DI-00001		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	02	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.8M	4.35
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		8.35

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
4	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		5.38
			TOTAL WEIGHT		13.73

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

307-25-PW-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid	thk =25		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-307	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

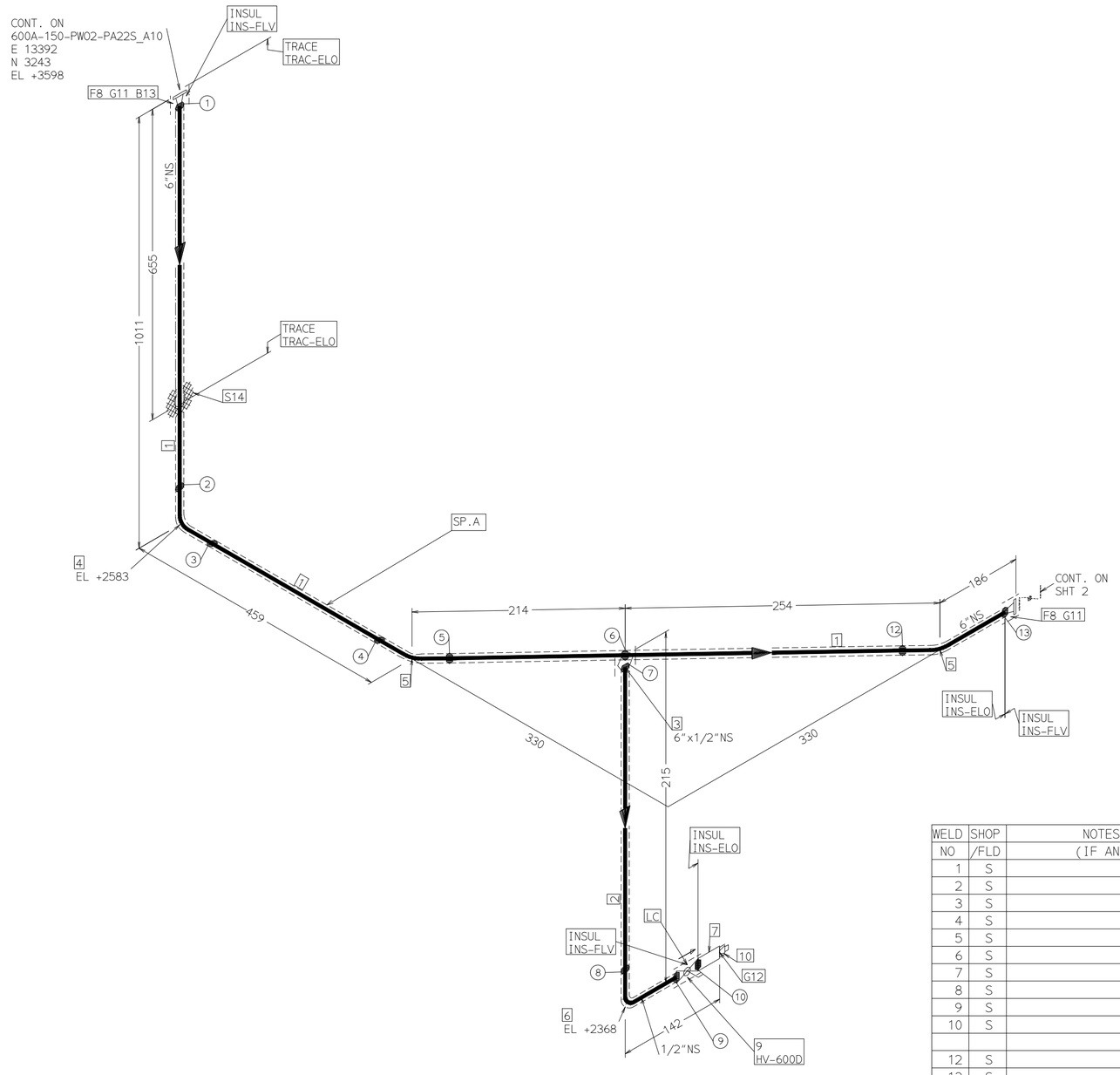
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 03

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.1M	30.89
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.11
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
5	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E45RSS00880600	2	10.20
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
7	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	2	21.60
	VALVES / IN-LINE ITEMS				
9	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 74.26

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	2	0.40
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
13	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	3.71
	SUPPORTS				
14	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-300/168/60/F3, AS PER DRAWING S1606157	6	2MCTZFR-6a	1	7.30

TOTAL ERECTION WEIGHT 11.49

TOTAL WEIGHT 85.75

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
12	S	
13	S	

600A-150-PW02-PA22S_A02/A10

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-600A	NDT : 100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

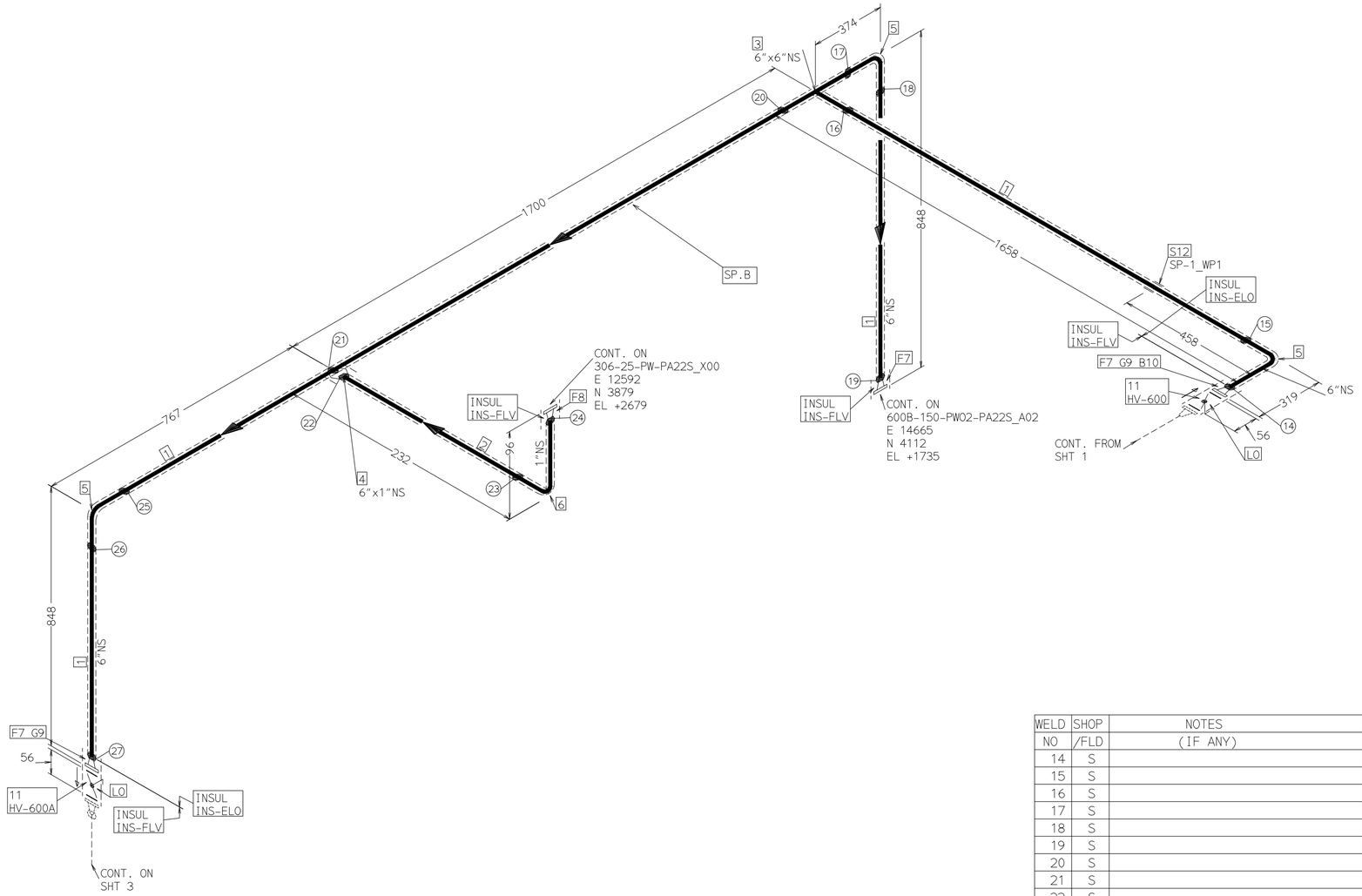
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 04

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	4.5M	125.59
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.1M	0.20
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 6	TEE0SS00910600	1	16.50
4	WELDOLET MSS SP-97, Sch.40S ASTM A182 Gr.F316/316L	6 x 1	OWELSS01850601	1	0.23
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	3	30.60
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	3	32.40
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10

TOTAL FABRICATION WEIGHT 206.77

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	2	0.40
	BOLTS				
10	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
	VALVES / IN-LINE ITEMS				
11	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	2	40.00
	SUPPORTS				
12	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50

TOTAL ERECTION WEIGHT 59.93

TOTAL WEIGHT 266.70

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	

600A-150-PW02-PA22S_A02/A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-600A	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

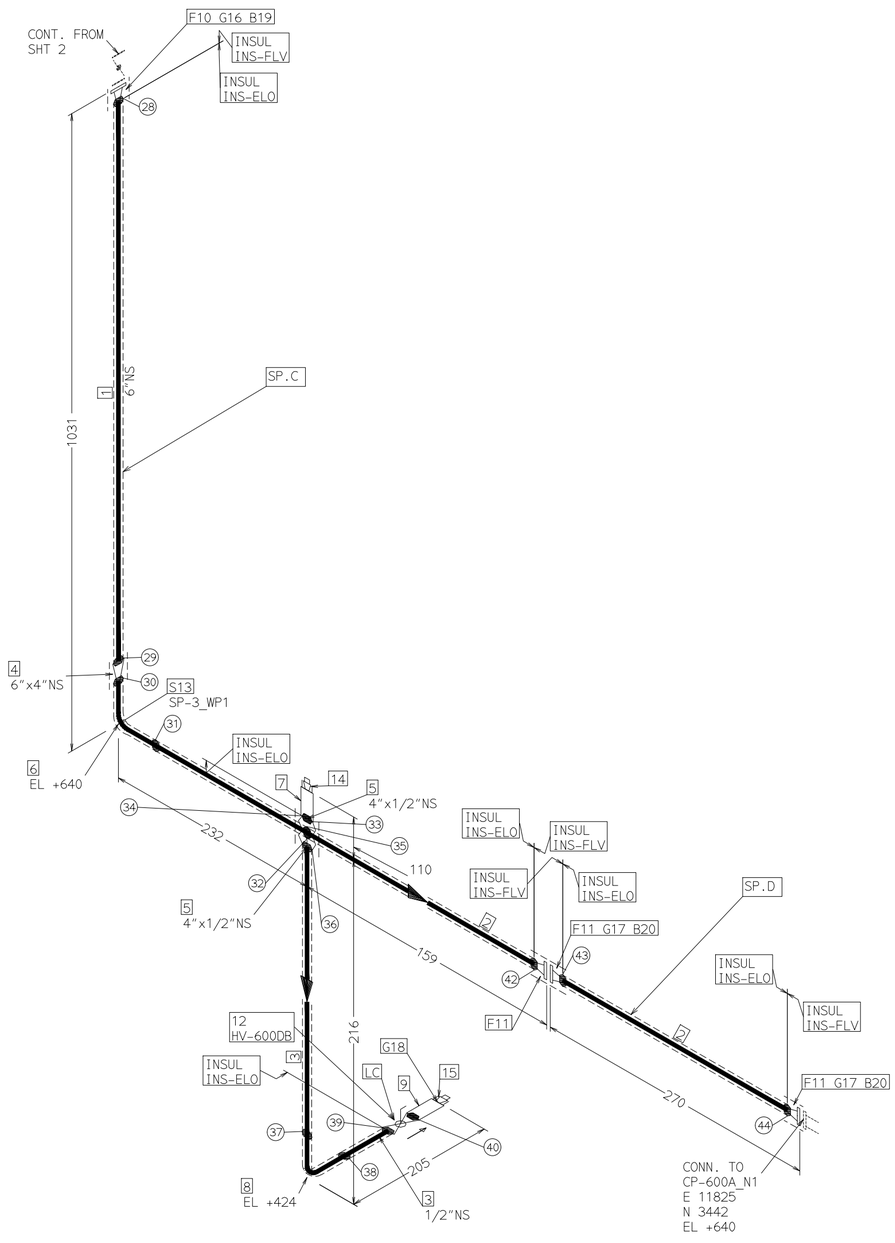
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 04

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.7M	18.31
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.3M	4.21
3	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.27
	FITTINGS				
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	REC0SS04040604	1	3.90
5	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	2	0.20
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
7	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x NPTF, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00120H0H	1	0.10
8	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
9	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
10	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	1	10.80
11	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS03380400	3	21.00
	VALVES / IN-LINE ITEMS				
12	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
13	TRUNNION, S-221-D-88.9-5.49-344.5-400.5-150-150-10 , PIPE ASTM A312 Gr.TP 316/316L, PLATE SS316	4	SUPPORT	1	6.29
			TOTAL FABRICATION WEIGHT		70.14

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
14	HEXAGONAL HEAD PLUG NPT, ASME B16.11 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
15	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
16	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
17	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00430400	2	0.46
18	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
19	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
20	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	16	4.05
			TOTAL ERECTION WEIGHT		9.89
			TOTAL WEIGHT		80.03

SPOOL NUMBERS:

SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
28	S	
29	S	
30	S	
31	S	
32	S	
33	S	
34	S	
35	S	
36	S	
37	S	
38	S	
39	S	
40	S	
42	S	
43	S	
44	S	

600A-150-PW02-PA22S_A02/A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):		TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-600A	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11						VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

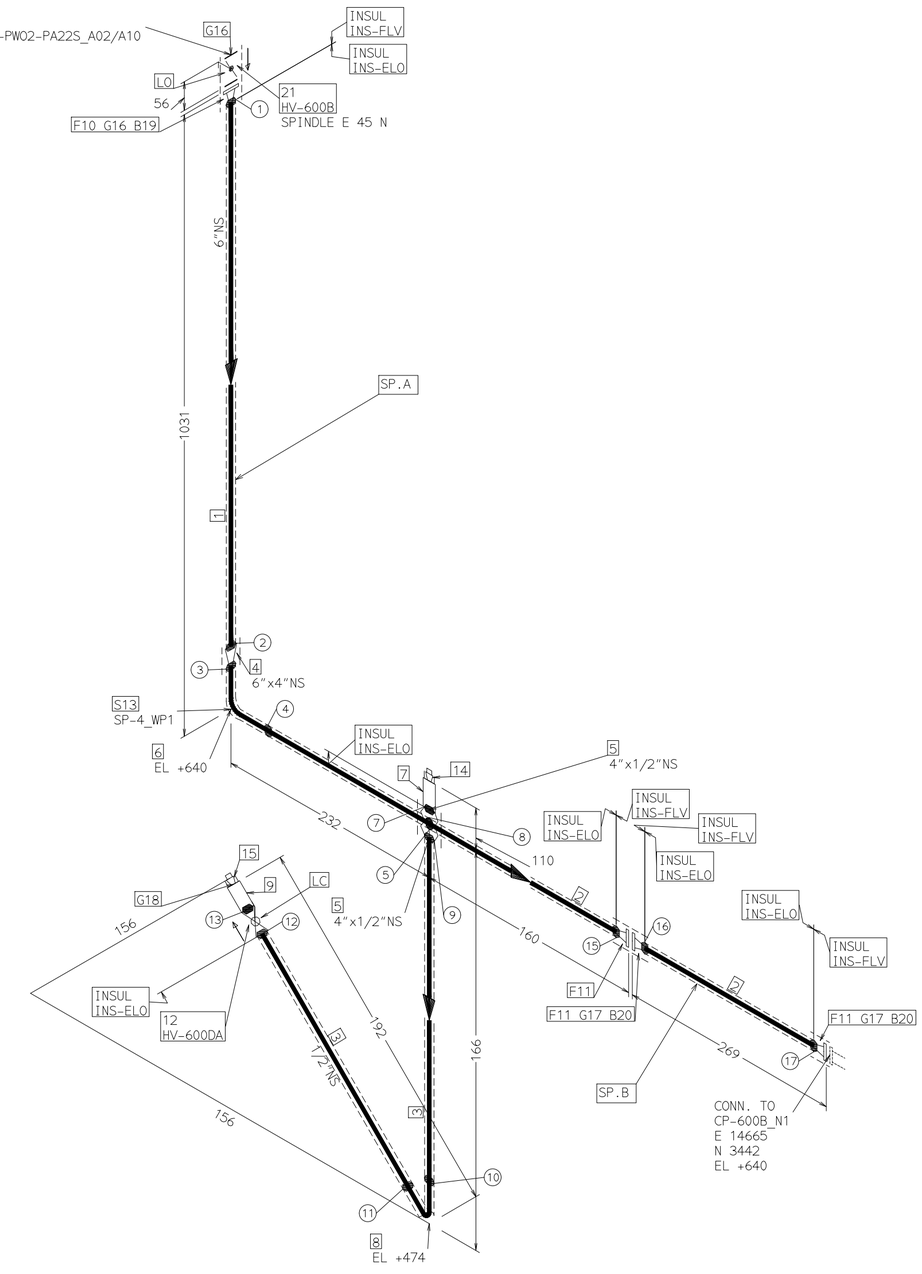
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 04

SHEET - OF: 3 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.7M	18.20
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.3M	4.11
3	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.15
	FITTINGS				
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	RECOSS04040604	1	3.90
5	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	2	0.20
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
7	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x NPTF, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00120H0H	1	0.10
8	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
9	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
10	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLWOSS04200600	1	10.80
11	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLWOSS03380400	3	21.00
	VALVES / IN-LINE ITEMS				
12	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
13	TRUNNION, S-221-D-88.9-5.49-344.5-400.5-150-150-10 , PIPE ASTM A312 Gr.TP 316/316L, PLATE SS316	4	SUPPORT	1	6.29
			TOTAL FABRICATION WEIGHT		69.81

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
14	HEXAGONAL HEAD PLUG NPT, ASME B16.11 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
15	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
16	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	2	0.40
17	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00430400	2	0.46
18	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
19	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
20	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	16	4.05
	VALVES / IN-LINE ITEMS				
21	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	20.00
	SPOOL NUMBERS:		TOTAL ERECTION WEIGHT		30.09
	SP.A SP.B		TOTAL WEIGHT		99.90

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
15	S	
16	S	
17	S	

600B-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11					VISUAL 100% ALL WELDS

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

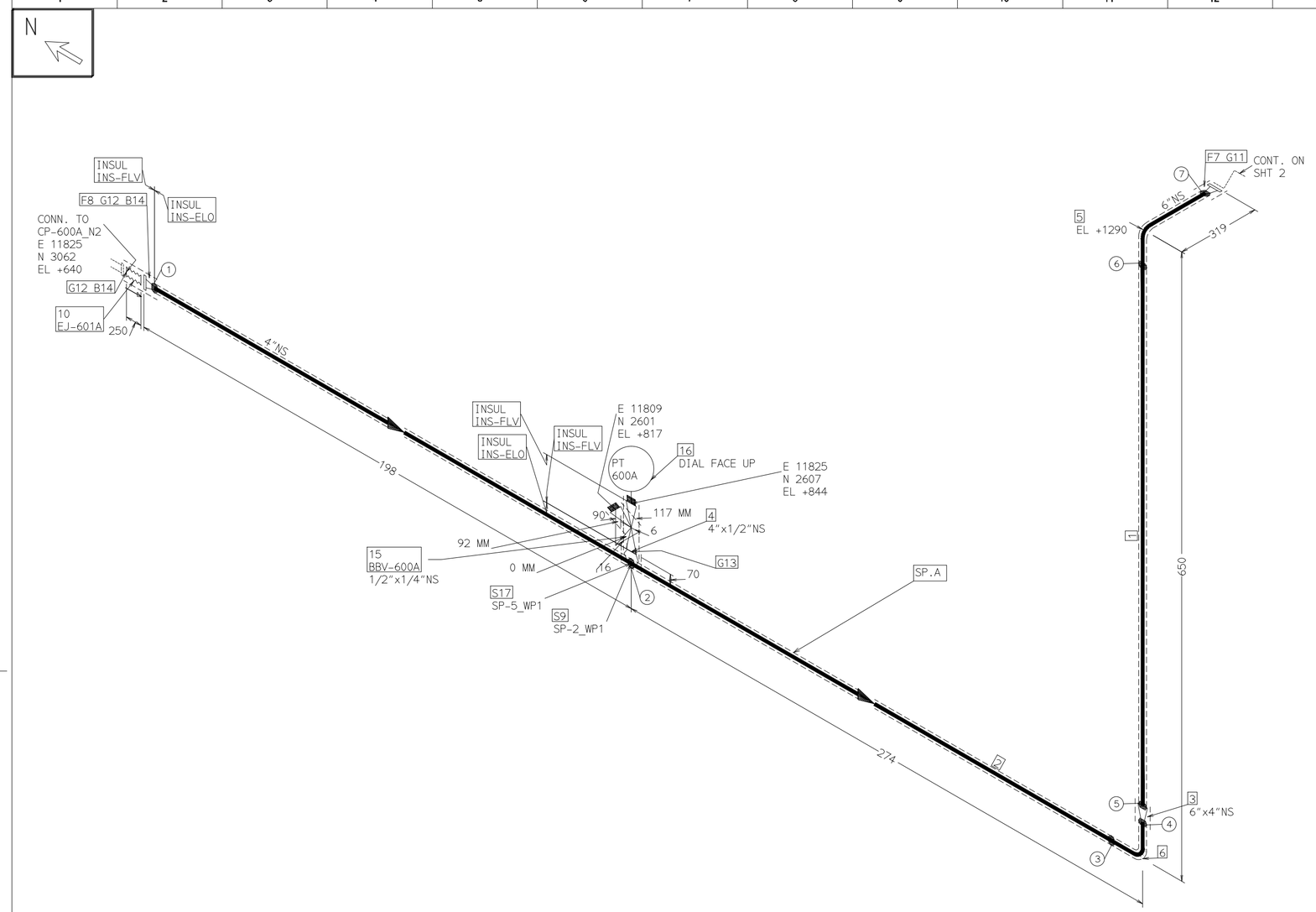
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 05
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.2M	3.48
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.3M	3.63
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	RECOSS04040604	1	3.90
4	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	4 x 1/2	OTHESS0332040H	1	0.13
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	1	10.80
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS03380400	1	7.00
	SUPPORTS				
9	BOLTED GUIDE WITH HOLD DOWN FOR SHOE, C-33-2-E-2mm, Carbon Steel	4	SUPPORT	1	1.90
			TOTAL FABRICATION WEIGHT		44.94

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	LATERAL EXPANSION JOINT DOUBLE BELLOWED ASME B36.10/B36.19, CL150 RF SS 316	4	1MECH014-100-316	1	10.00
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00430400	2	0.46
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
14	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	16	4.05
	VALVES / IN-LINE ITEMS				
15	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
16	PRESSURE TRANSMITTER, CERABAR PMP71B PT 600A	1/2	BY CLIENT	1	1.73
	SUPPORTS				
17	PIPE SHOE, S-64-DN100-110-200, Carbon Steel	4	SUPPORT	1	7.80
			TOTAL ERECTION WEIGHT		25.25
			TOTAL WEIGHT		70.19

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

SPOOL NUMBERS:

SP.A

601A-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	14,4					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

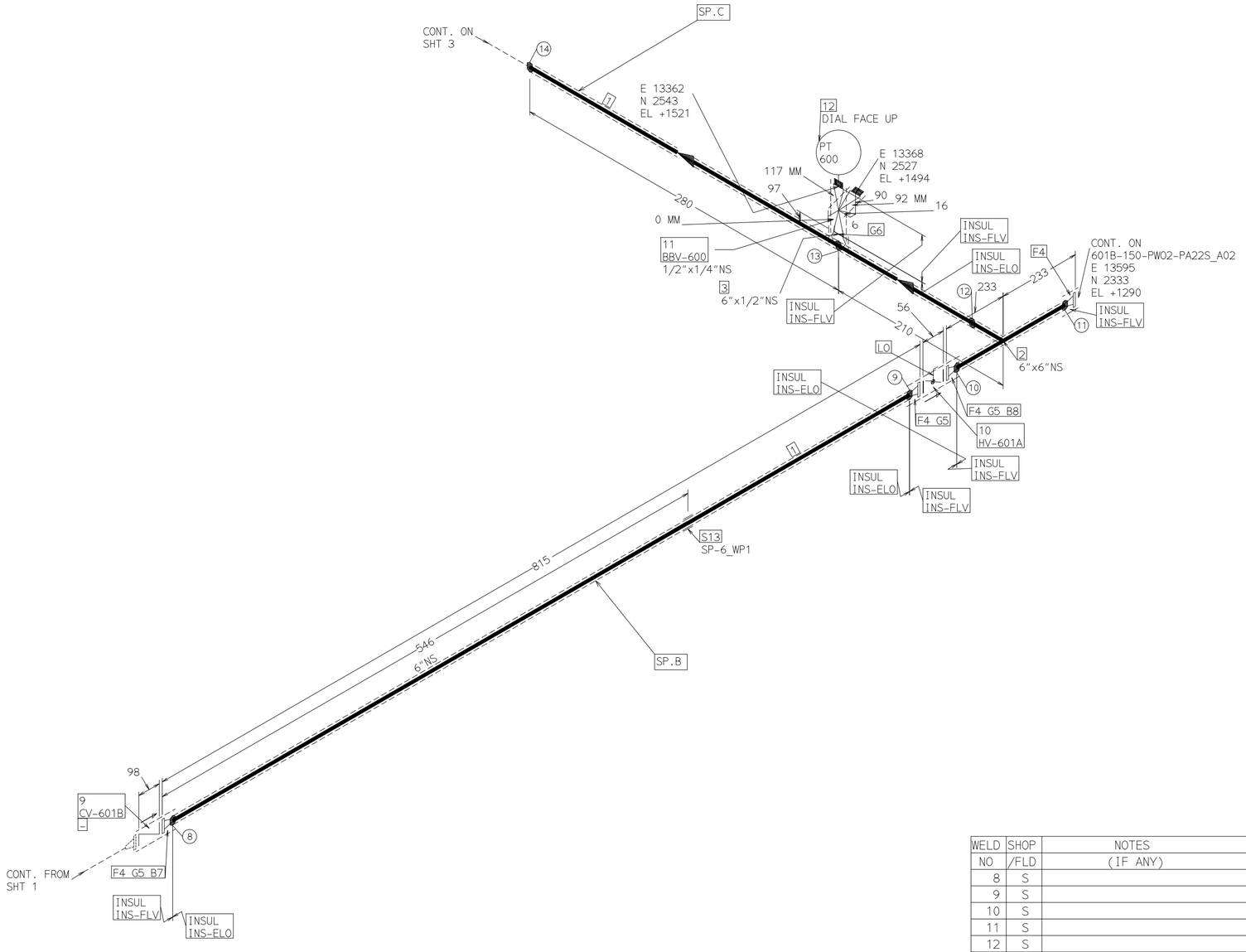
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr:	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	06	1 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.0M	27.81
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 6	TEE0SS00910600	1	16.50
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	6 x 1/2	OTHESS0337060H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	4	43.20
			TOTAL FABRICATION WEIGHT		87.64

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	3	0.60
6	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
7	210 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	6.03
8	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
	VALVES / IN-LINE ITEMS				
9	CHECK VALVE ASME B16.10, WAFER TYPE, CL150 RF ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	15.00
10	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	20.00
11	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
12	PRESSURE TRANSMITTER, CERABAR PMP71B PT 600	1/2	BY CLIENT	1	1.73
	SUPPORTS				
13	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		63.90
			TOTAL WEIGHT		151.54

SPOOL NUMBERS:
SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

601A-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	14,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

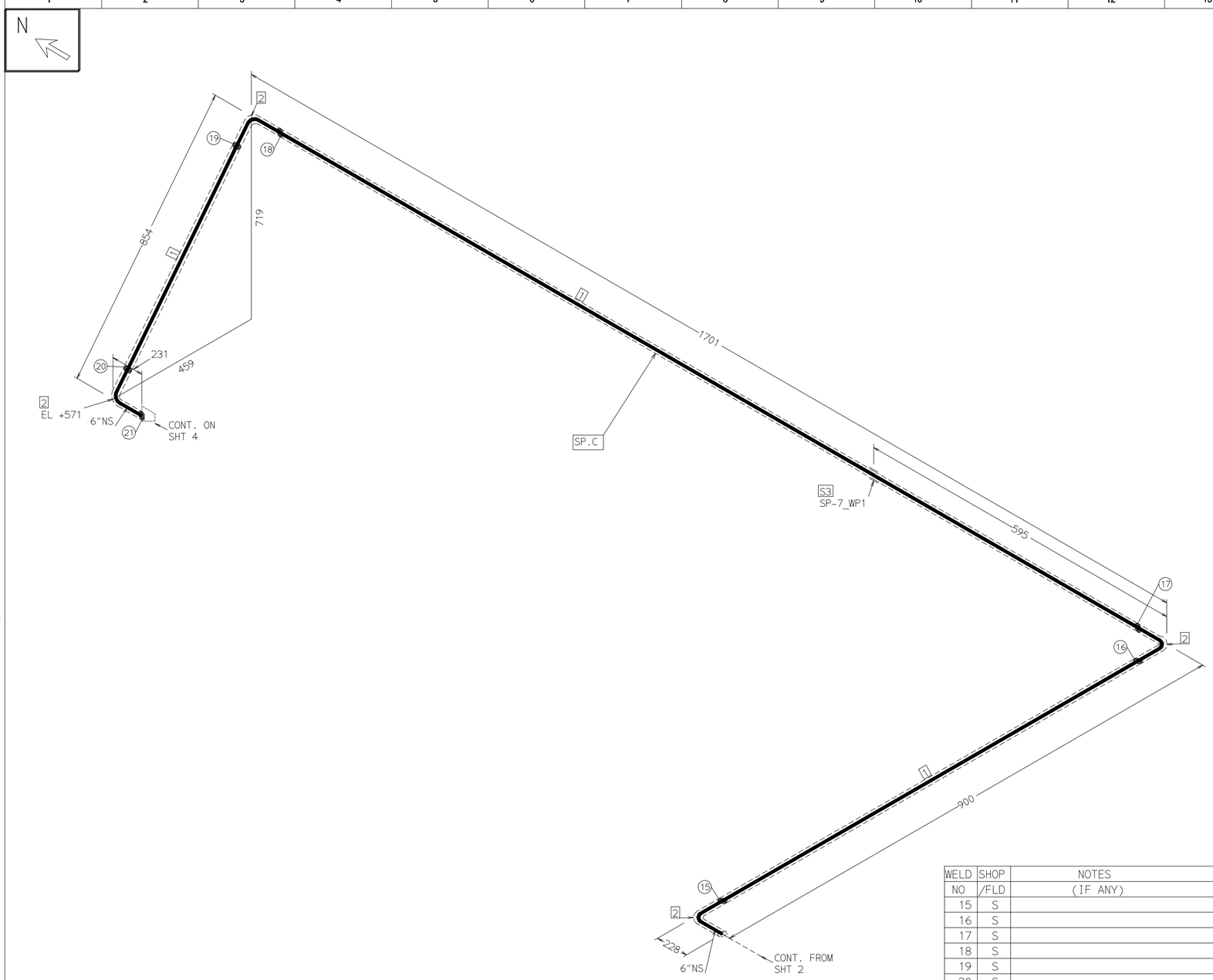
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 06
SHEET - OF: 2 / 4
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	2.1M	58.87
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	4	40.80
			TOTAL FABRICATION WEIGHT		99.67

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	SUPPORTS				
3	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		14.50
			TOTAL WEIGHT		114.17

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	

601A-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	14,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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elogen

PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

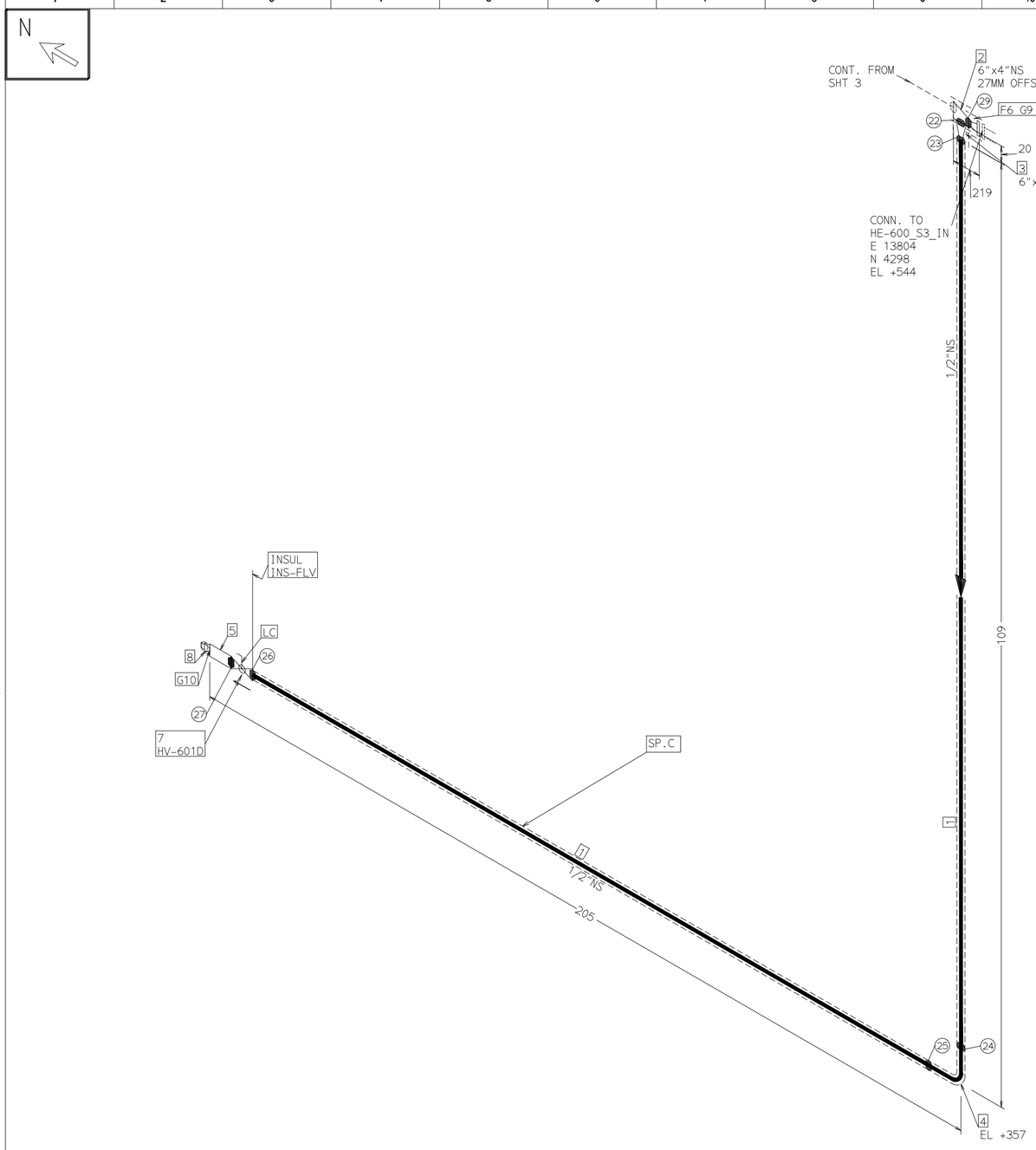
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 06

SHEET - OF: 3 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.22
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	REE0SS02400604	1	3.90
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS03380400	1	7.00
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		12.38

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00430400	1	0.23
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
11	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	8	2.02
			TOTAL ERECTION WEIGHT		2.33
			TOTAL WEIGHT		14.71

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	
29	S	

601A-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	14,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

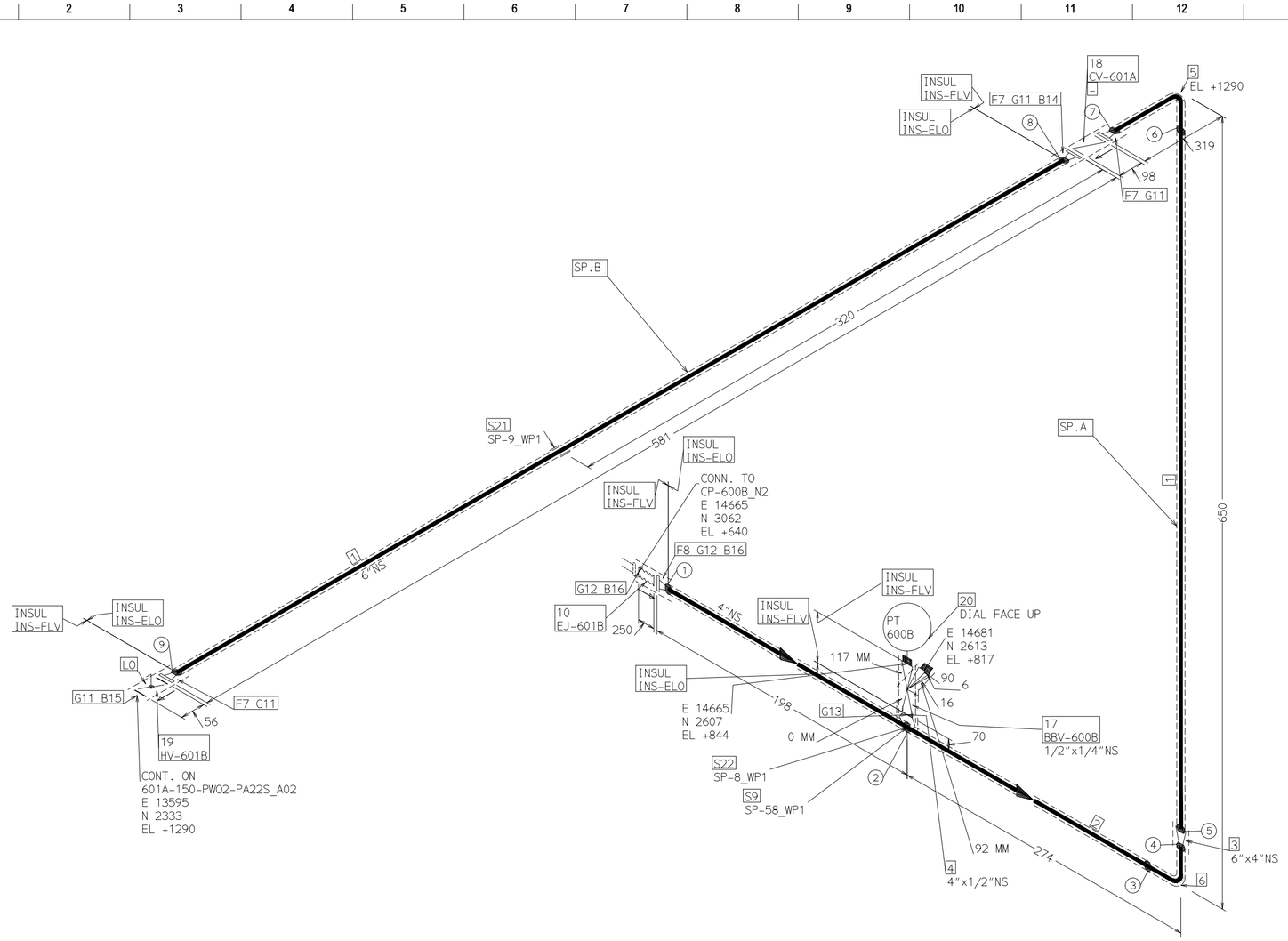
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	06	4 / 4	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

601B-150-PW02-PA22S_A02

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.6M	14.75
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.3M	3.63
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	REC0SS04040604	1	3.90
4	THREDOLET MSS SP-97, CL.3000, BSPP ASTM A182 Gr.F316/316L	4 x 1/2	OTHESS0332040H	1	0.13
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	3	32.40
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS03380400	1	7.00
	SUPPORTS				
9	BOLTED GUIDE WITH HOLD DOWN FOR SHOE, C-33-2-E-2mm, Carbon Steel	4	SUPPORT	1	1.90
			TOTAL FABRICATION WEIGHT		77.81

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	LATERAL EXPANSION JOINT DOUBLE BELLOWED ASME B36.10/B36.19, CL150 RF SS 316	4	1MECH014-100-316	1	10.00
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	4	0.80
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00430400	2	0.46
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
14	210 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	6.03
15	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
16	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	16	4.05
	VALVES / IN-LINE ITEMS				
17	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
18	CHECK VALVE ASME B16.10, WAFER TYPE, CL150 RF ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	15.00
19	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	20.00
	INSTRUMENTS				
20	PRESSURE TRANSMITTER, CERABAR PMP71B PT 600B	1/2	BY CLIENT	1	1.73
	SUPPORTS				
21	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
22	PIPE SHOE, S-64-DN100-110-200, Carbon Steel	4	SUPPORT	1	7.80
			TOTAL ERECTION WEIGHT		86.41
			TOTAL WEIGHT		164.22

SPOOL NUMBERS:
SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	98.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	14,4					VISUAL 100% ALL WELDS

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

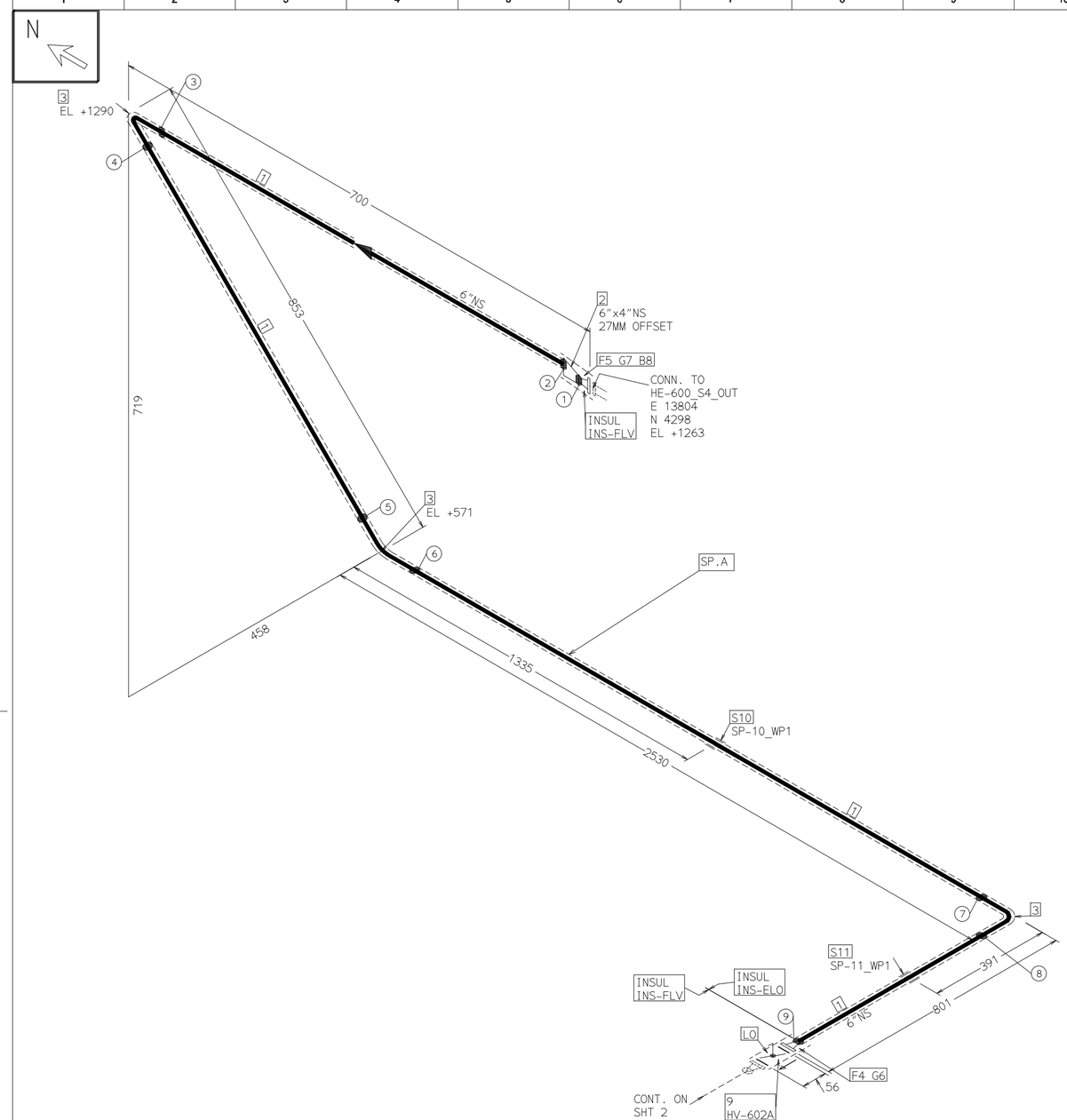
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 07
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	3.2M	90.12
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	REE0SS02400604	1	3.90
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	3	30.60
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	1	10.80
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS03380400	1	7.00

TOTAL FABRICATION WEIGHT 142.42

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00430400	1	0.23
	BOLTS				
8	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	8	2.02
	VALVES / IN-LINE ITEMS				
9	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	20.00
	SUPPORTS				
10	PIPE SHOE, S-64-DN150-90-200, Carbon Steel	6	SUPPORT	1	14.50
11	PIPE SHOE, S-64-DN150-90-200, Carbon Steel	6	SUPPORT	1	14.50

TOTAL ERECTION WEIGHT 51.45

TOTAL WEIGHT 193.87

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

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REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	13,63					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

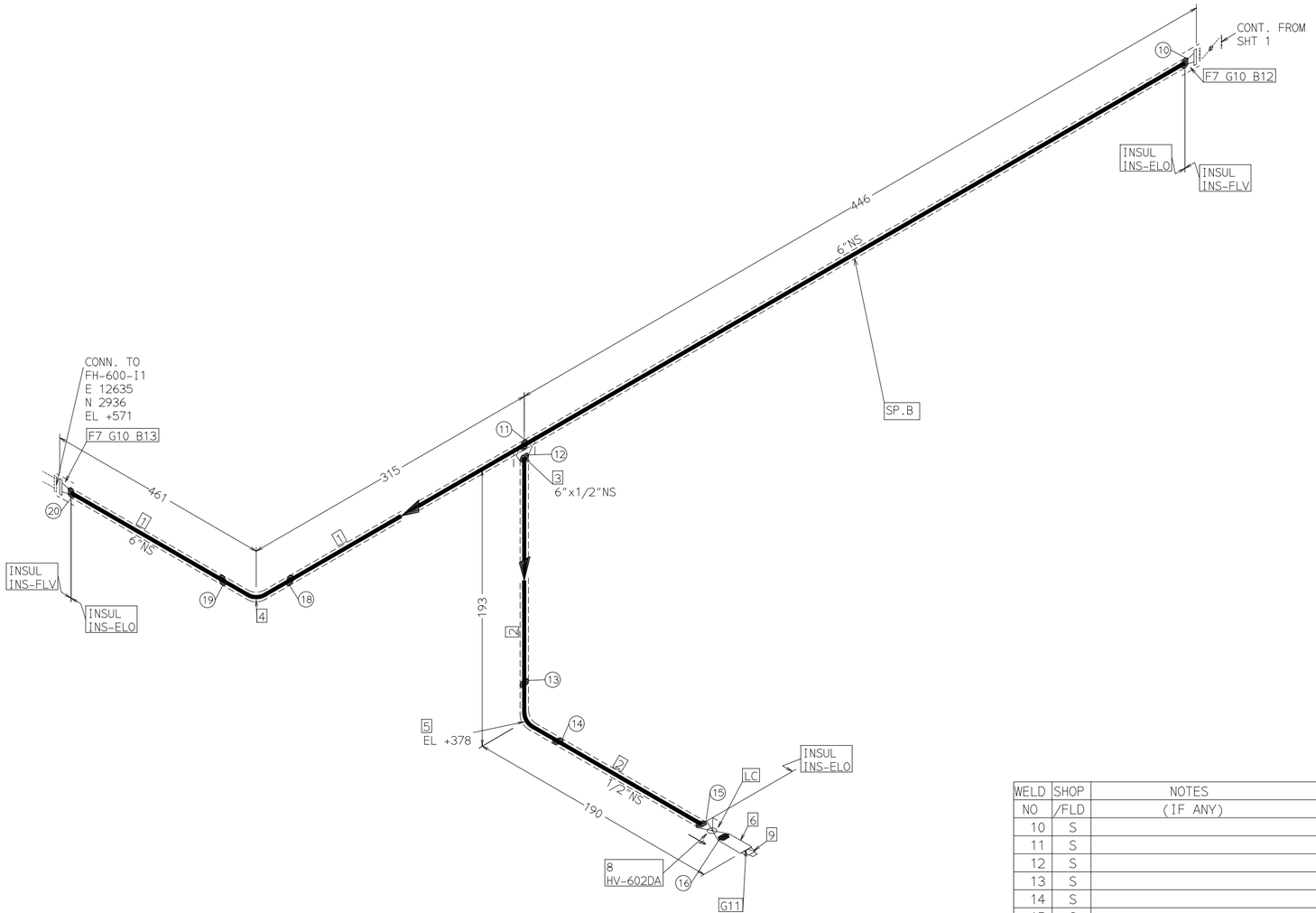
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	08	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.6M	16.53
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.16
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	2	21.60
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 49.75

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	2	0.40
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
12	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
13	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	3.71

TOTAL ERECTION WEIGHT 9.22

TOTAL WEIGHT 58.97

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
18	S	
19	S	
20	S	

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REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	13,63					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

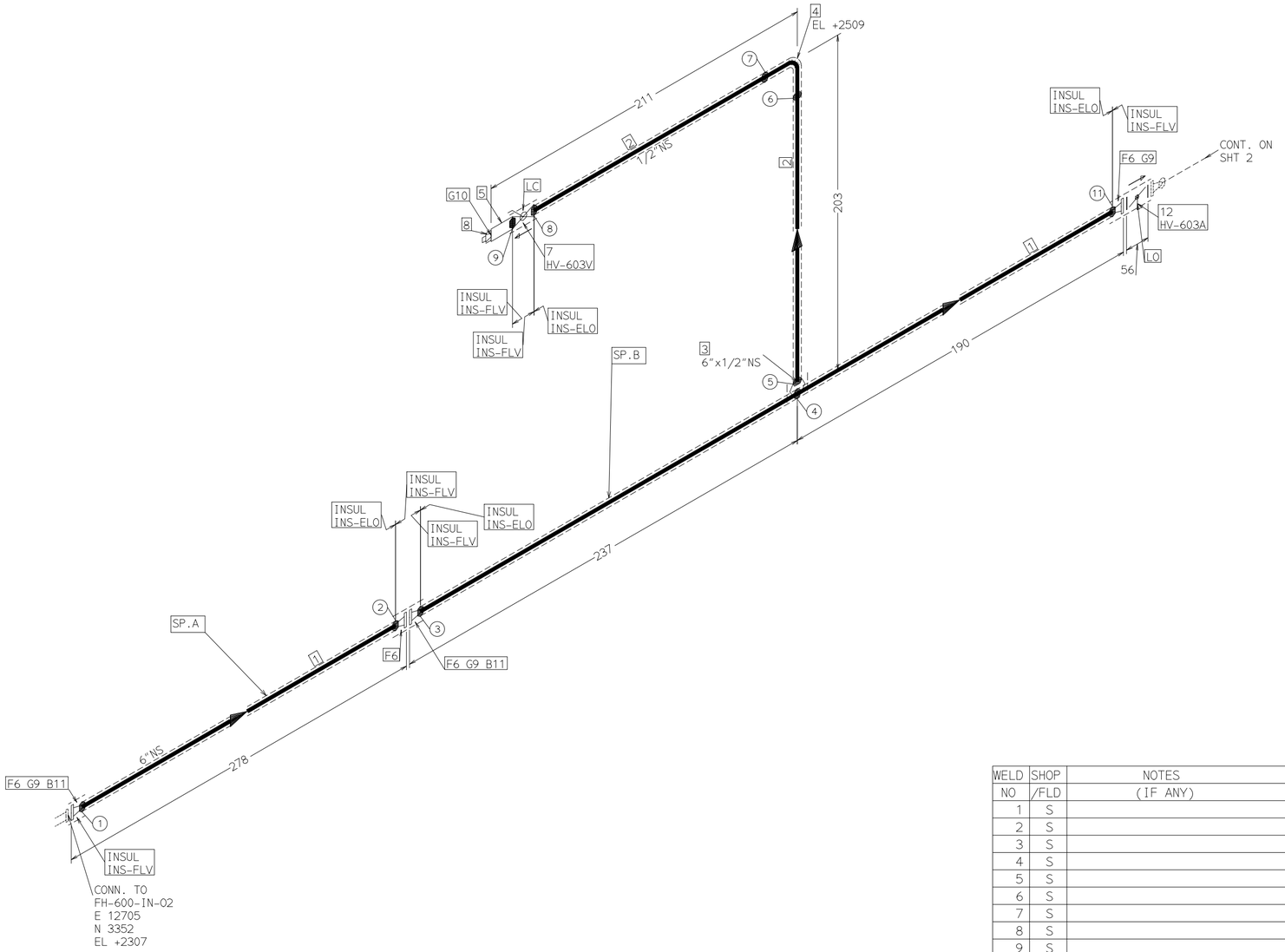
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 08

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.4M	9.69
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.20
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	4	43.20
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 54.35

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	3	0.60
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
11	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	16	7.42
	VALVES / IN-LINE ITEMS				
12	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	20.00

TOTAL ERECTION WEIGHT 28.10

TOTAL WEIGHT 82.45

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
11	S	

603-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	12,1					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

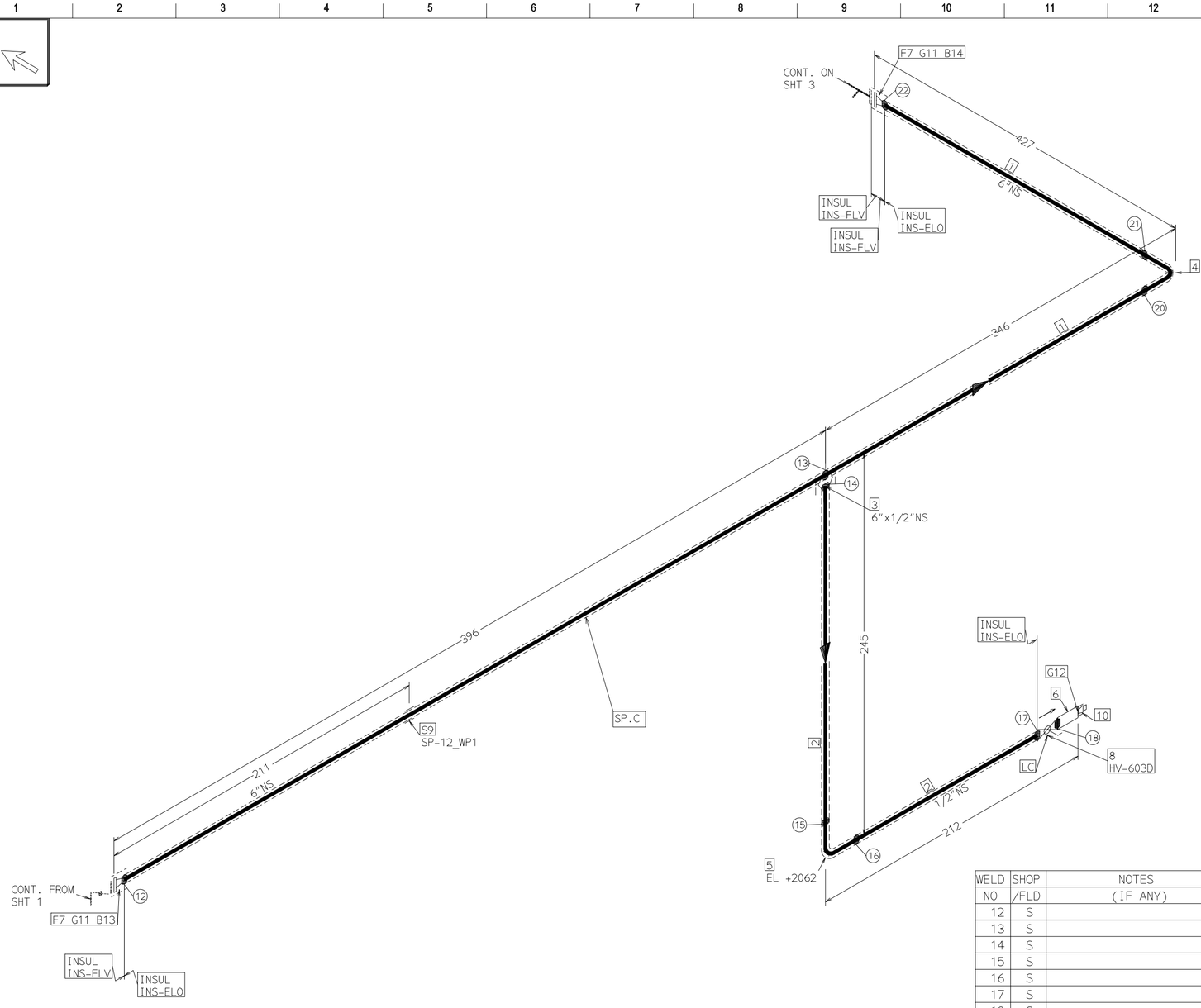
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 09

SHEET - OF: 1 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.6M	15.09
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.28
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	2	21.60
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
9	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50

TOTAL FABRICATION WEIGHT 62.93

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	2	0.40
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
13	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03
14	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	3.71

TOTAL ERECTION WEIGHT 9.22

TOTAL WEIGHT 72.15

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
20	S	
21	S	
22	S	

603-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	12,1					VISUAL 100% ALL WELDS

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

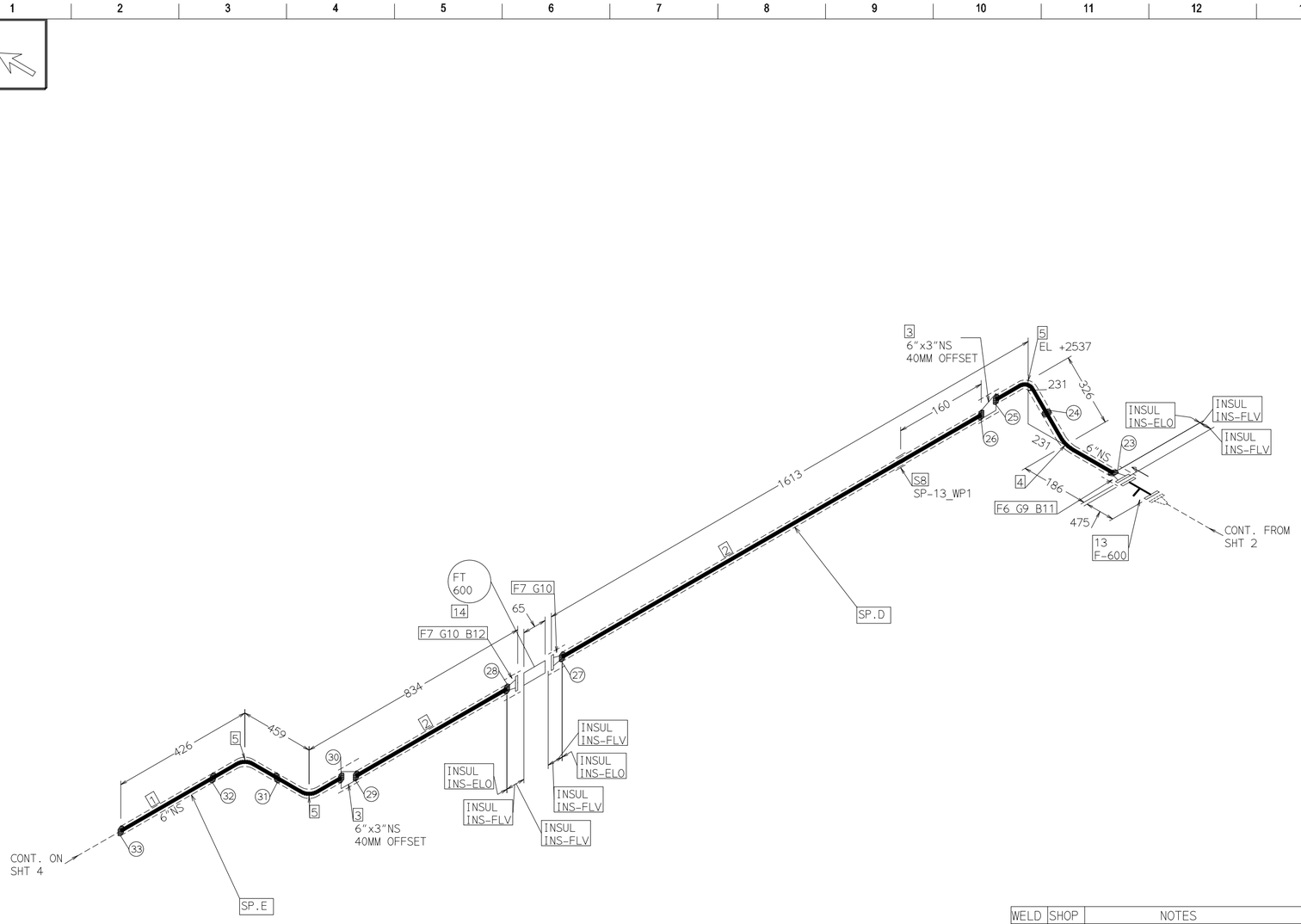
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 09

SHEET - OF: 2 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.2M	5.60
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	1.6M	17.65
	FITTINGS				
3	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 3	REE0SS02390603	2	7.80
4	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E45RSS00880600	1	5.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	3	30.60
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	1	10.80
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS03190300	2	9.00
	SUPPORTS				
8	PIPE SHOE, S-64-DN80-100-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL FABRICATION WEIGHT		91.85

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00420300	2	0.26
	BOLTS				
11	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	3.71
12	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	4	1.44
	VALVES / IN-LINE ITEMS				
13	Y-STRAINER, SPIRAX SARCO, CL.150 RF ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	109.00
	INSTRUMENTS				
14	FLOW INDICATOR, ENDRESS HAUSER, COMPACT TYPE D200, CL.150 RF FT 600	3	BY CLIENT	1	5.60
			TOTAL ERECTION WEIGHT		120.21
			TOTAL WEIGHT		212.06

WELD NO	SHOP /FLD	NOTES (IF ANY)
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	
29	S	
30	S	
31	S	
32	S	
33	S	

603-150-PW02-PA22S_A02

SPOOL NUMBERS:

SP.D SP.E

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	12,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

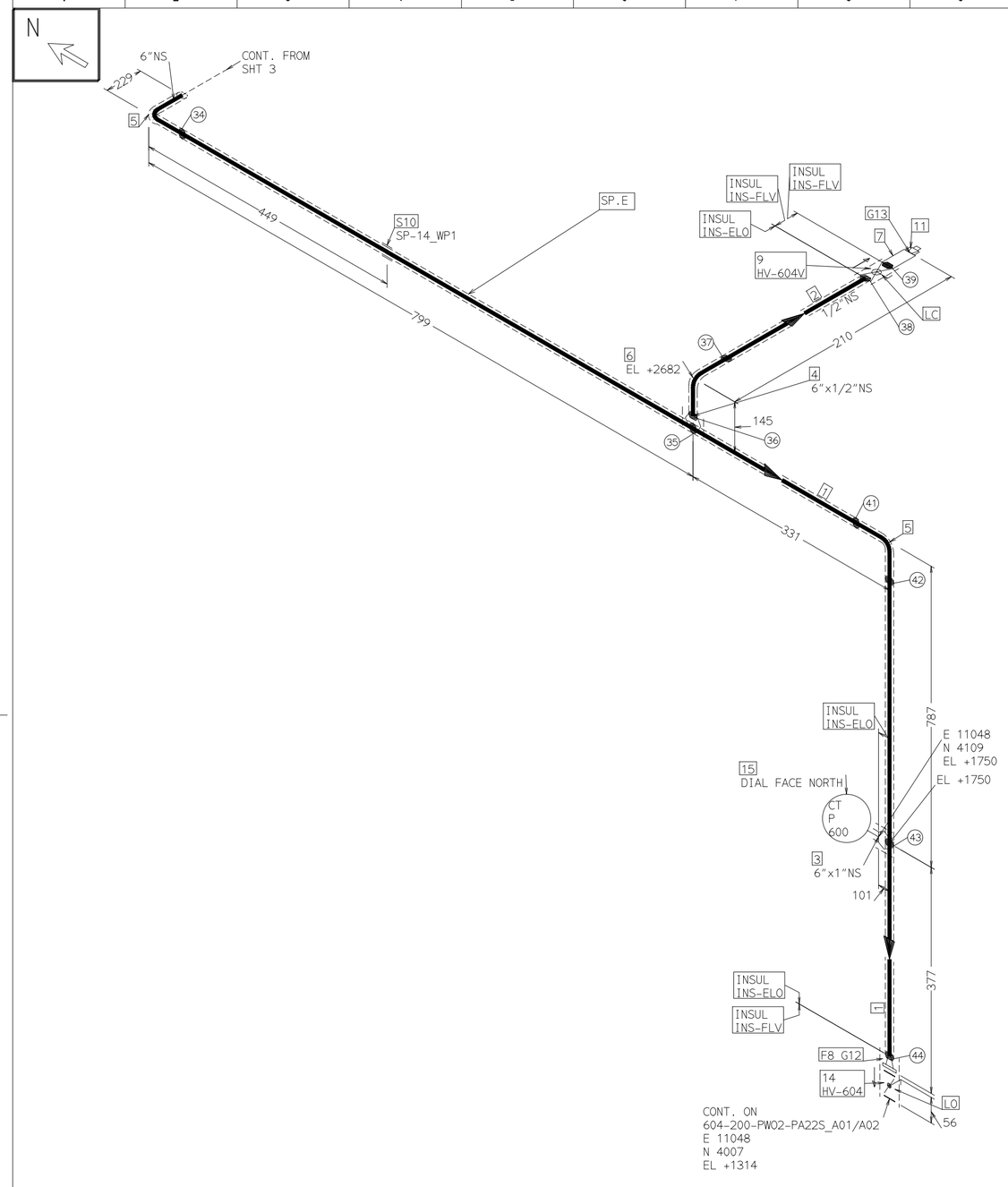
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	09	3 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.6M	42.90
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.11
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	6 x 1	OTHESS03390601	1	0.38
4	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	2	20.40
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
7	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	1	10.80
	VALVES / IN-LINE ITEMS				
9	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
10	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL FABRICATION WEIGHT		90.35

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
11	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	VALVES / IN-LINE ITEMS				
14	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM, WITH LIMIT SWITCH ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	21.00
	INSTRUMENTS				
15	CONDUCTIVITY AND TEMPERATURE TRANSMITTER, CONDUMAX W CLS 12 SS 316 CT P 600	1	BY CLIENT	1	1.40
			TOTAL ERECTION WEIGHT		22.68
			TOTAL WEIGHT		113.03

SPOOL NUMBERS:

SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
34	S	
35	S	
36	S	
37	S	
38	S	
39	S	
41	S	
42	S	
43	S	
44	S	

603-150-PW02-PA22S_A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	12,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

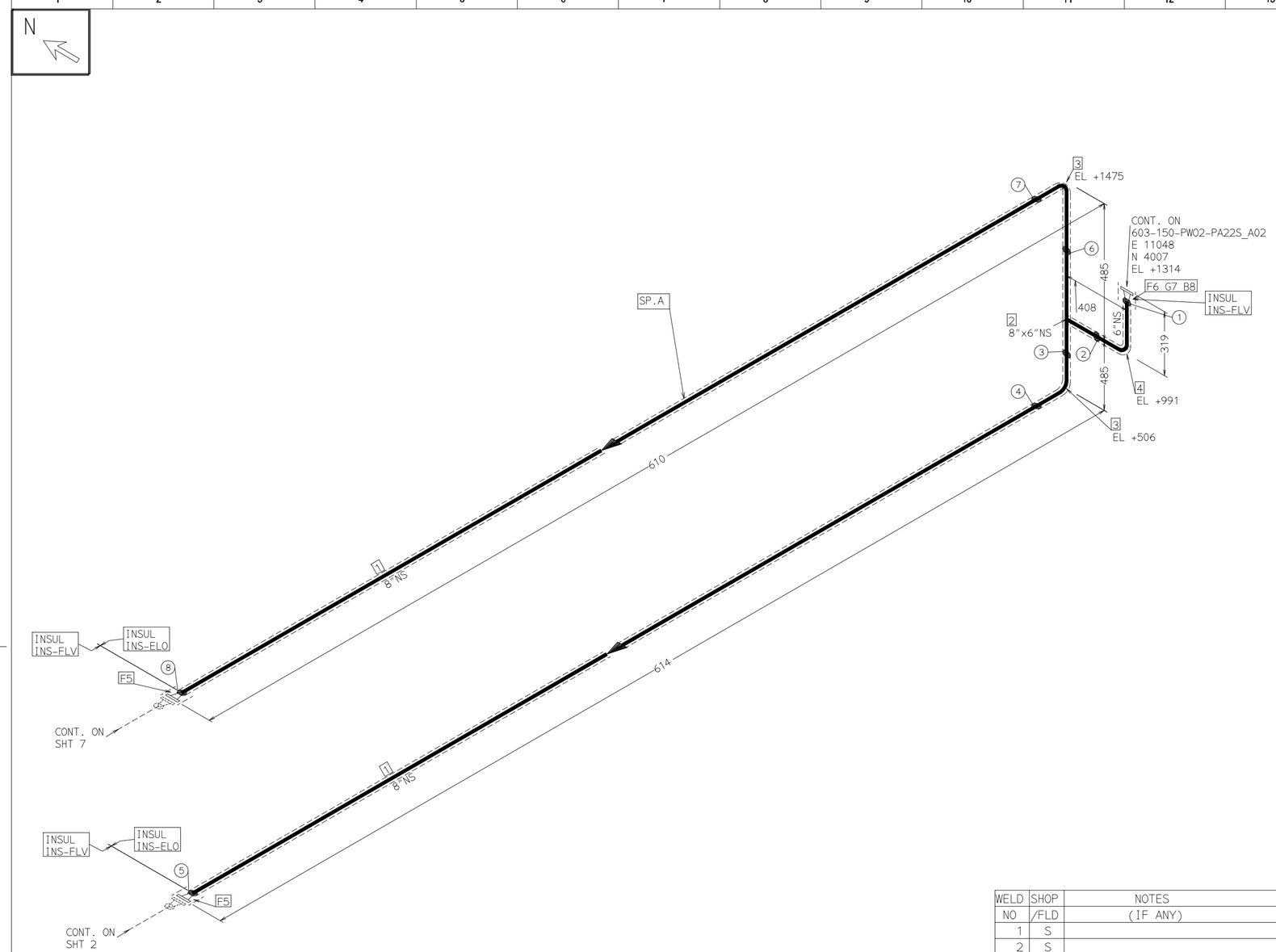
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 09

SHEET - OF: 4 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	0.4M	6.70
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	8 x 6	TER0SS03840806	1	28.00
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	E90RSS00690800	2	21.20
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.10S ASTM A182 Gr.F316/316L	8	FLW0SS00070800	2	36.00
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS04200600	1	10.80

TOTAL FABRICATION WEIGHT 112.90

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
	BOLTS				
8	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	5.03

TOTAL ERECTION WEIGHT 5.23

TOTAL WEIGHT 118.13

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

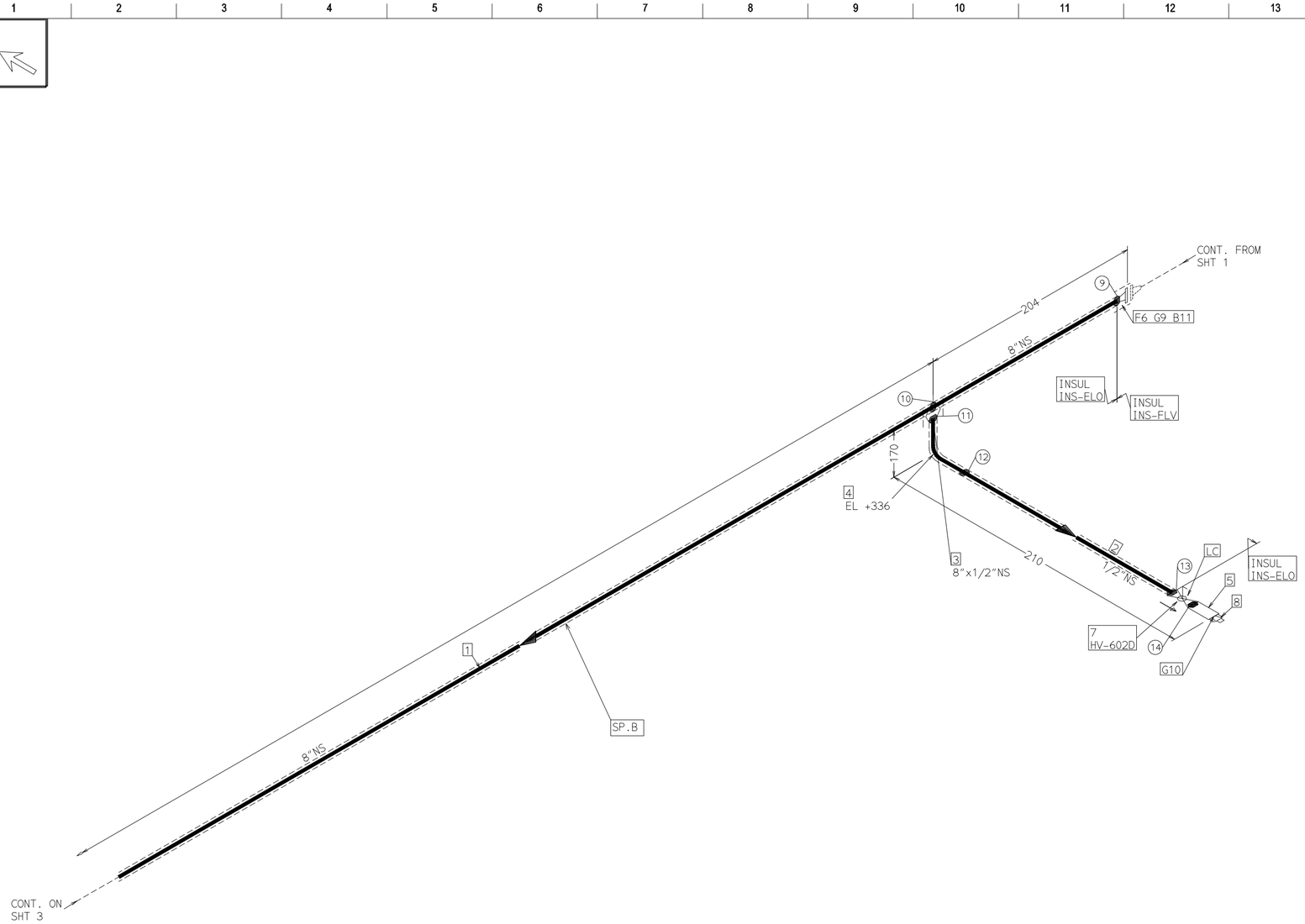
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 10

SHEET - OF: 1 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	0.6M	9.75
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.11
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.10S x 80S ASTM A182 Gr.F316/316L	8 x 1/2	OWELSS0948080H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.10S ASTM A182 Gr.F316/316L	8	FLW0SS00070800	1	18.00
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		29.12

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	8	GENEGK00450800	1	0.31
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
11	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	8	3.82
			TOTAL ERECTION WEIGHT		4.21
			TOTAL WEIGHT		33.33

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

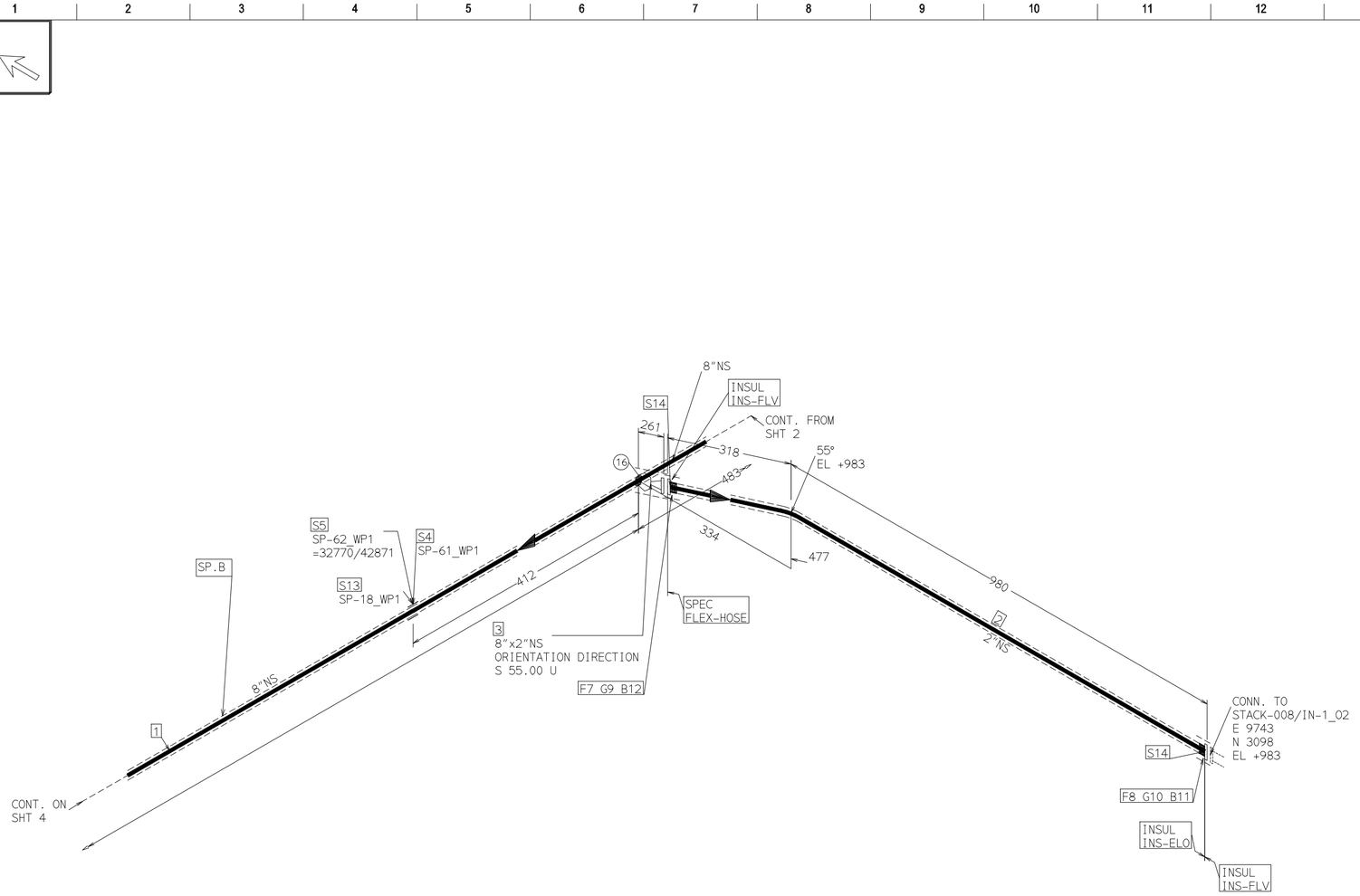
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 10

SHEET - OF: 2 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.2M	19.27
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-029	2	FLEX-HOSE	1.1M	2.29
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
	SUPPORTS				
4	BOLTED GUIDE FOR SHOE, C-34-4-L-2mm, Carbon Steel	8	SUPPORT	1	3.50
5	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-0mm, Carbon Steel	8	SUPPORT	1	1.10
			TOTAL FABRICATION WEIGHT		32.56

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
8	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
11	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
13	PIPE SHOE, S-64-DN200-100-400, Carbon Steel	8	SUPPORT	1	16.50
14	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		26.34
			TOTAL WEIGHT		58.90

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
16	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND: SHOP WELD; FIELD WELD; SOCKET WELD; SCREWED JOINT; COMPR.N JOINT; SITE CONNECTION; PIPE SUPPORT / ATTACHMENT; PIPE INSULATION; PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

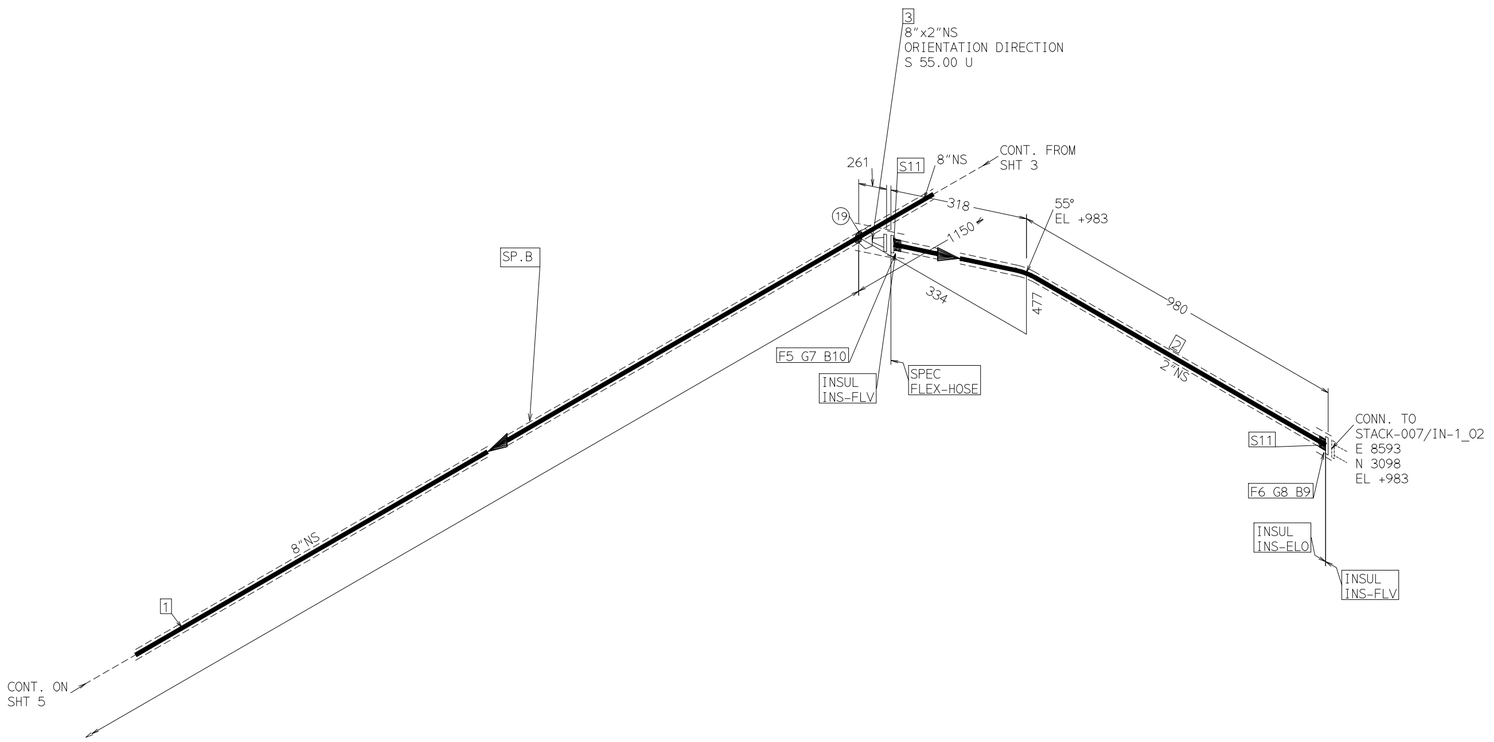
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-003	224J10-DDL-PP-DI-00001		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	10	3 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.9M	31.17
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-025	2	FLEX-HOSE	1.1M	2.29
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
				TOTAL FABRICATION WEIGHT	39.86

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
4	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
5	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
11	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	9.84
				TOTAL WEIGHT	49.70

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
19	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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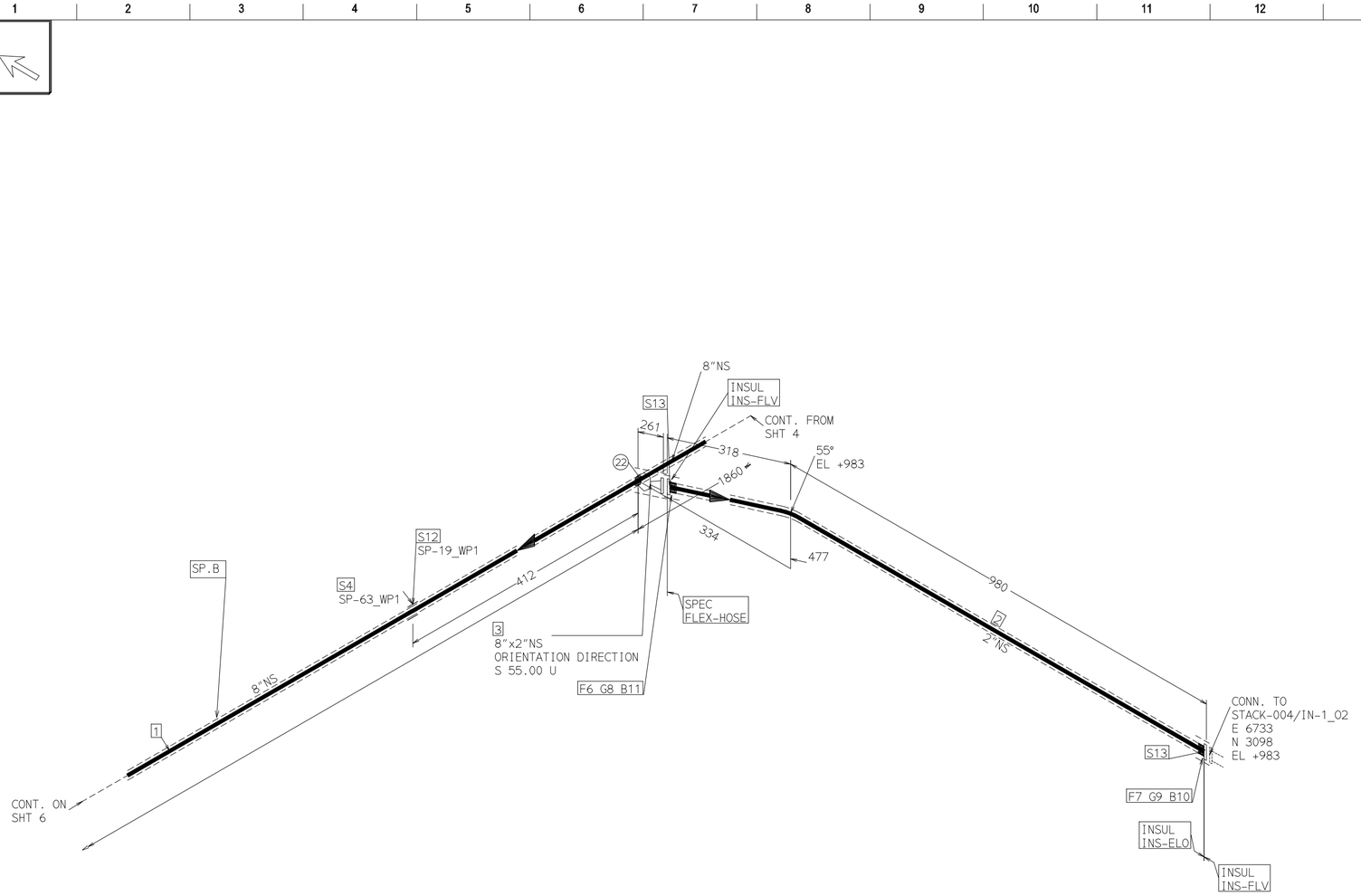
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	10	4 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.2M	19.27
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-013	2	FLEX-HOSE	1.1M	2.29
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
	SUPPORTS				
4	BOLTED GUIDE FOR SHOE, C-34-4-L-2mm, Carbon Steel	8	SUPPORT	1	3.50
			TOTAL FABRICATION WEIGHT		31.46

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
12	PIPE SHOE, S-64-DN200-100-250, Carbon Steel	8	SUPPORT	1	16.50
13	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		26.34
			TOTAL WEIGHT		57.80

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
22	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

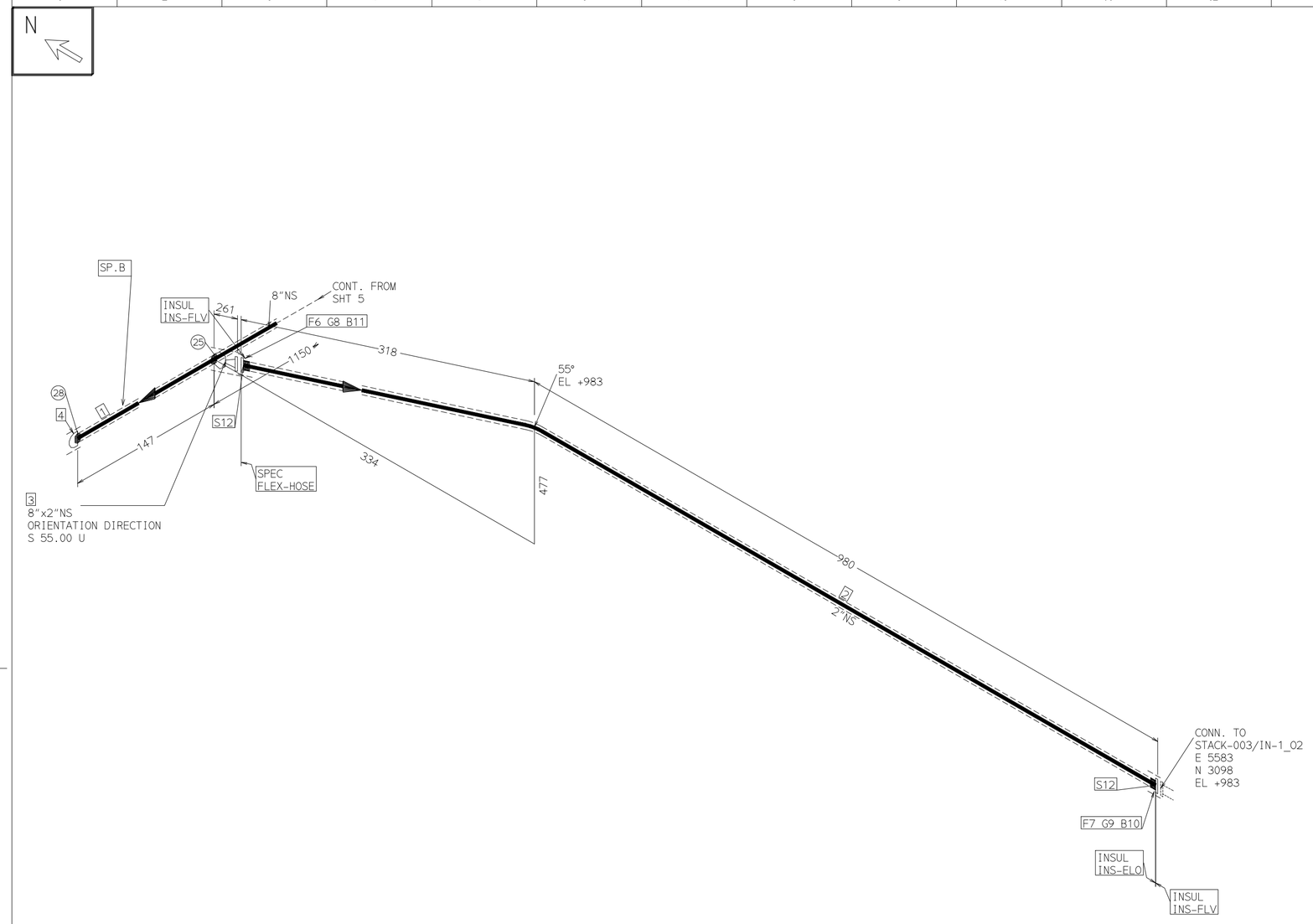
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-003	224J10-DDL-PP-DI-00001		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	10	5 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	0.2M	2.48
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-009	2	FLEX-HOSE	1.1M	2.29
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
4	CAP ASME B16.9, BE, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	CAP0SS00950800	1	4.50
			TOTAL FABRICATION WEIGHT		15.67

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
12	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		9.84
			TOTAL WEIGHT		25.51

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
25	S	
28	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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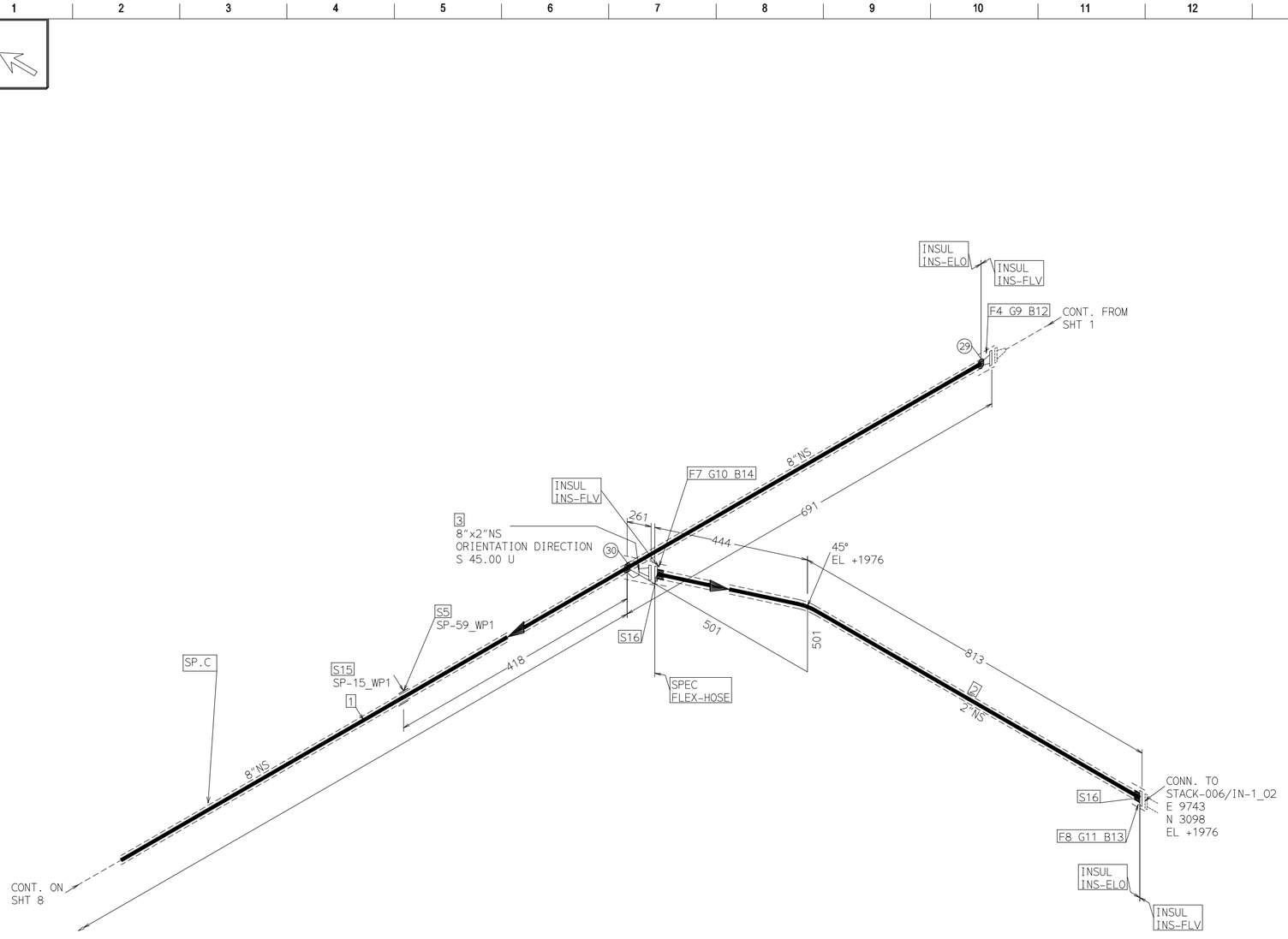
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	10	6 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.8M	29.10
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-021	2	FLEX-HOSE	1.1M	2.28
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.10S ASTM A182 Gr.F316/316L	8	FLW0SS00070800	1	18.00
	SUPPORTS				
5	BOLTED GUIDE FOR SHOE, C-34-4-K-2mm, Carbon Steel	8	SUPPORT	1	4.10
				TOTAL FABRICATION WEIGHT	59.88

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
8	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	8	GENEGK00450800	1	0.31
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
12	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	8	3.82
13	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
14	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
15	PIPE SHOE, S-64-DN200-100-250, Carbon Steel	8	SUPPORT	1	16.50
16	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	30.47
				TOTAL WEIGHT	90.35

WELD NO	SHOP /FLD	NOTES (IF ANY)
29	S	
30	S	

SPOOL NUMBERS:

SP.C

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

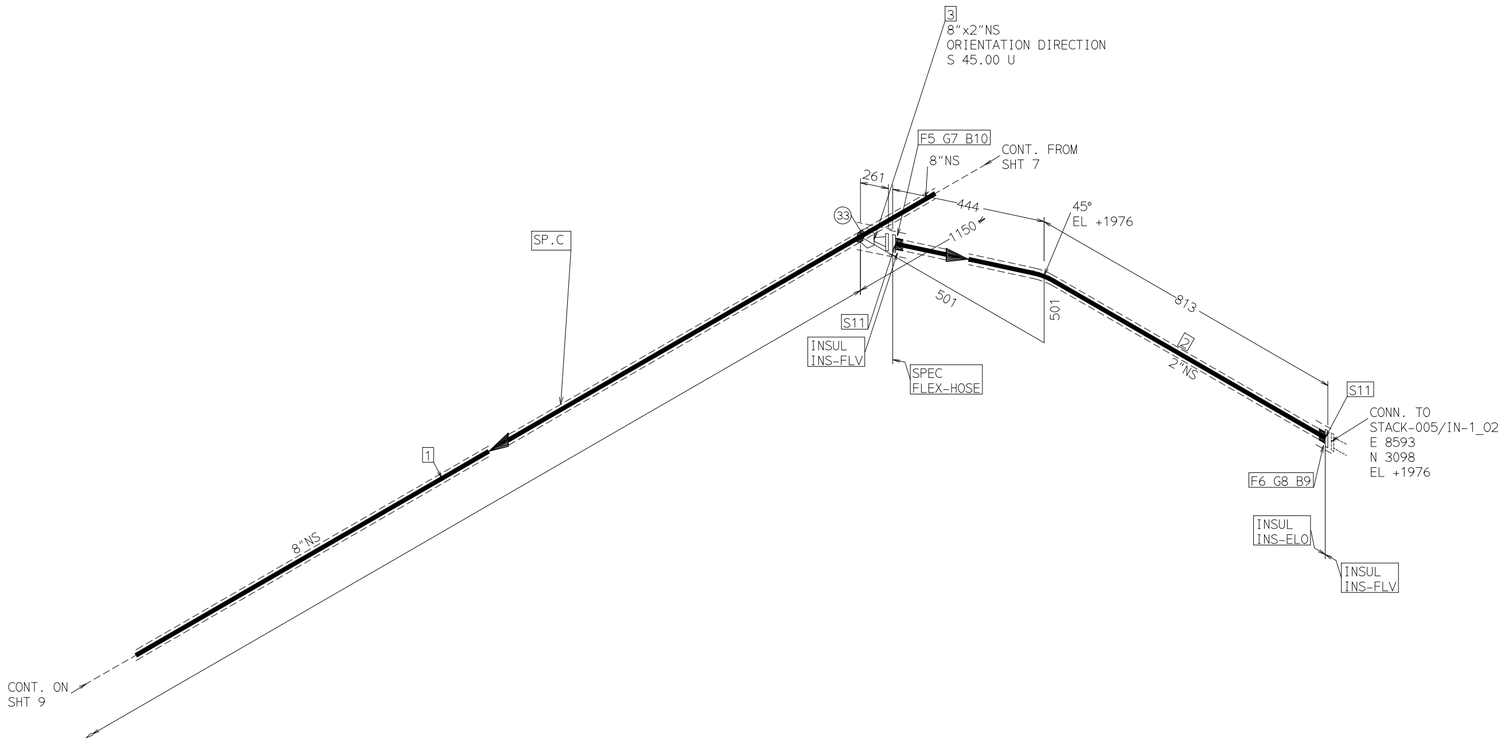
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	10	7 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.9M	31.17
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-017	2	FLEX-HOSE	1.1M	2.28
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
				TOTAL FABRICATION WEIGHT	39.85

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
4	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
5	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
11	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	9.84
				TOTAL WEIGHT	49.69

SPOOL NUMBERS:
SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
33	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

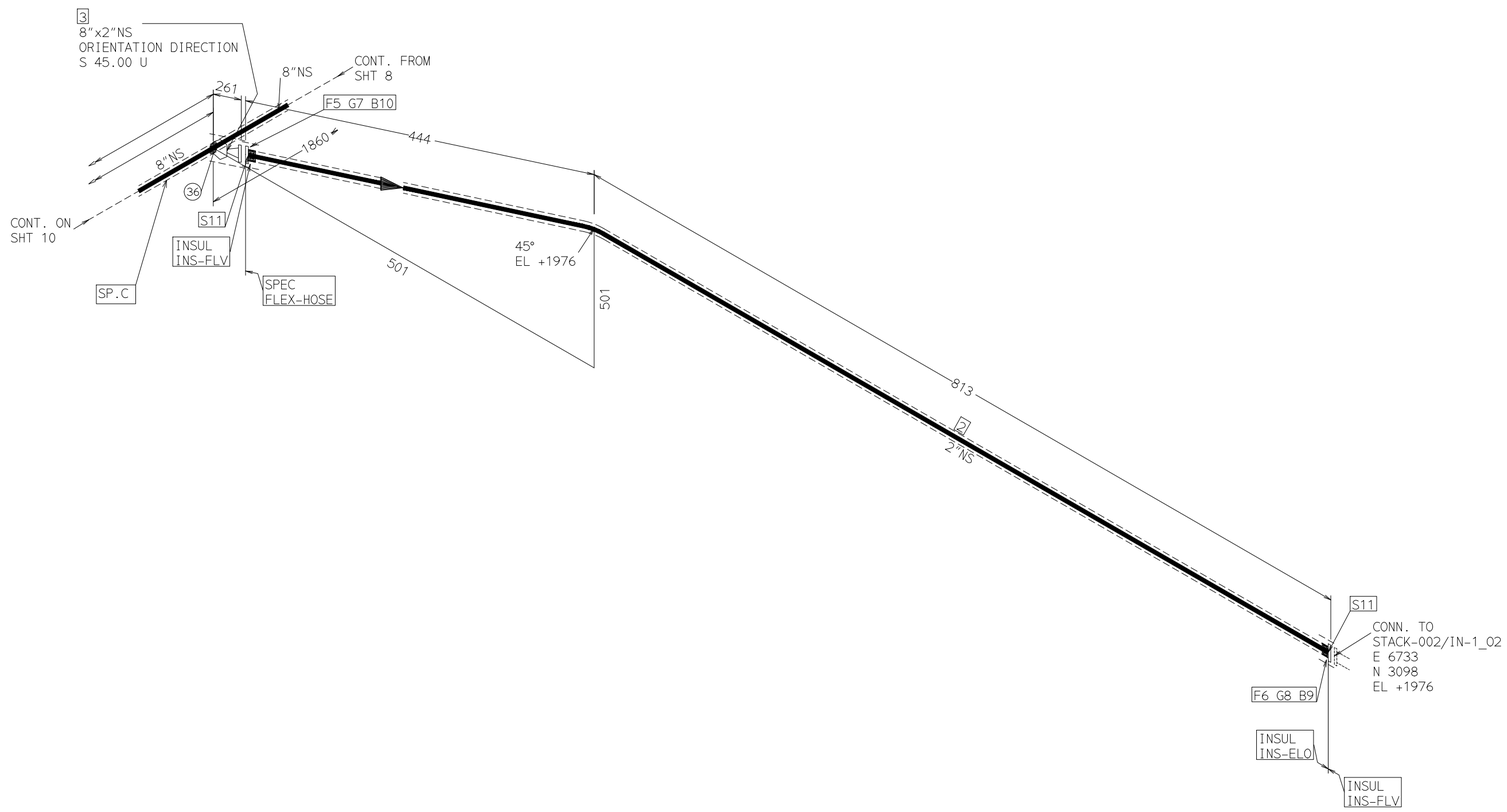
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 10

SHEET - OF: 8 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8		0.1M	---
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-005	2	FLEX-HOSE	1.1M	2.28
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
				TOTAL FABRICATION WEIGHT	8.68

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
4	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
5	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
11	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	9.84
				TOTAL WEIGHT	18.52

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
36	S	

604-200-PW02-PA22S_A01/A02

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

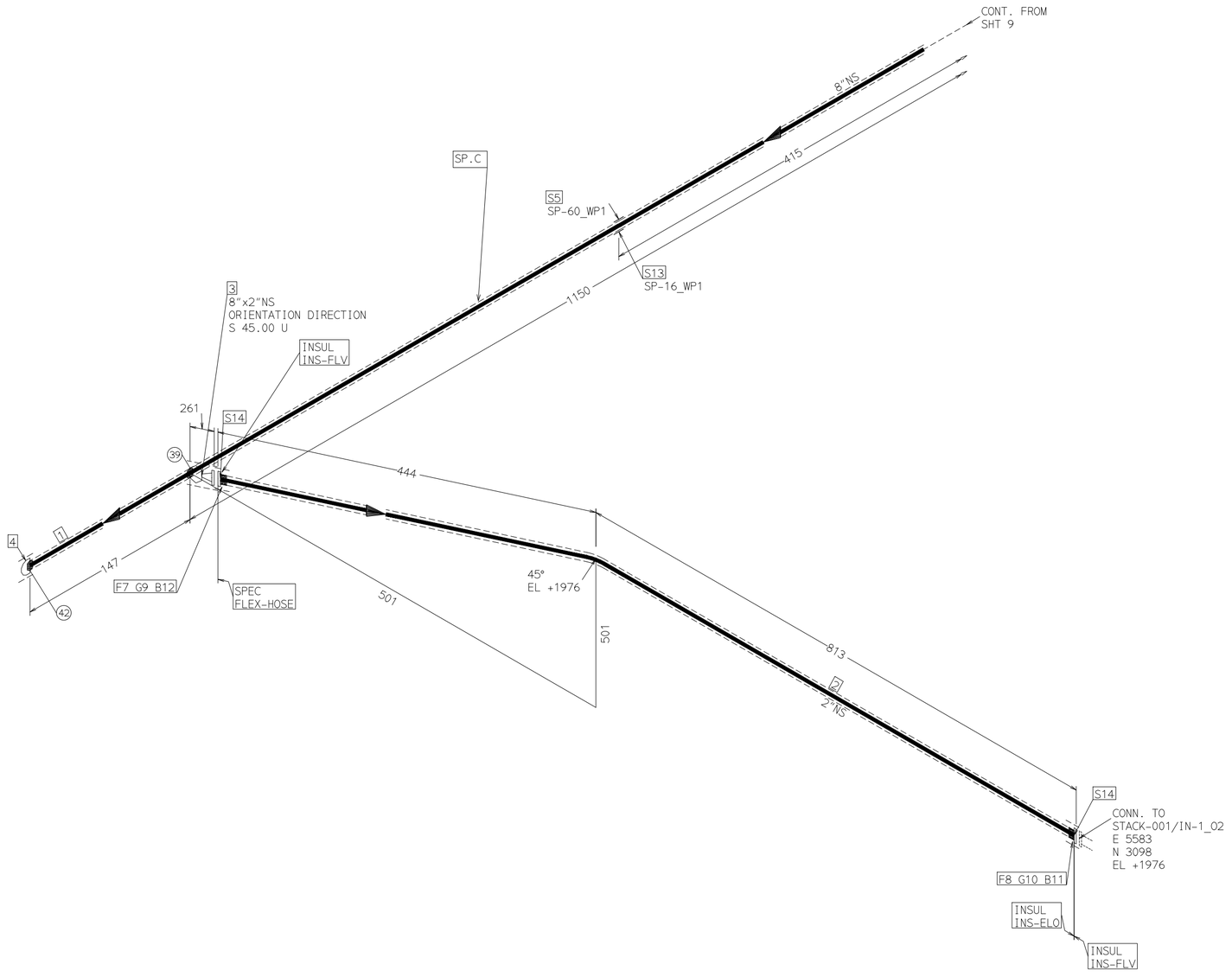
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 10

SHEET - OF: 9 / 10

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
39	S	
42	S	

604-200-PW02-PA22S_A01/A02

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.3M	21.72
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-001	2	FLEX-HOSE	1.1M	2.28
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
4	CAP ASME B16.9, BE, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	CAP0SS00950800	1	4.50
	SUPPORTS				
5	BOLTED GUIDE FOR SHOE, C-34-4-K-5mm, Carbon Steel	8	SUPPORT	1	4.10

TOTAL FABRICATION WEIGHT 39.00

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	2.70
8	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
11	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
13	PIPE SHOE, S-64-DN200-100-250, Carbon Steel	8	SUPPORT	1	16.50
14	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 26.34

TOTAL WEIGHT 65.34

SPOOL NUMBERS:

SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	985.7	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	55	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

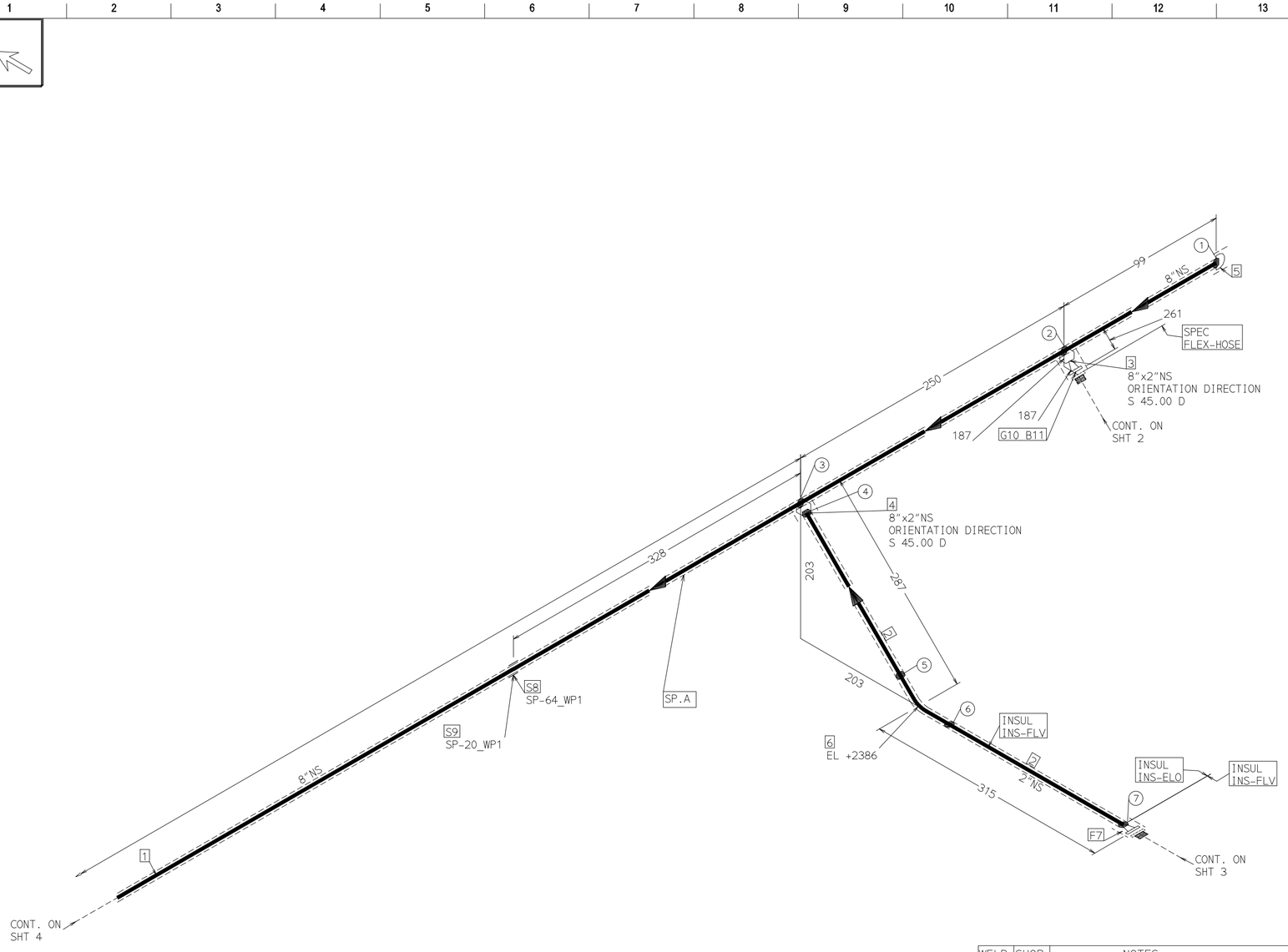
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 10

SHEET - OF: 10 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.3M	20.88
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.4M	1.69
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
4	WELDOLET MSS SP-97, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	OWELSS03560802	1	0.60
5	CAP ASME B16.9, BE, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	CAP0SS00950800	1	4.50
6	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E45RSS00020200	1	0.32
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
	SUPPORTS				
8	BOLTED GUIDE FOR SHOE, C-34-4-I-2mm, Carbon Steel	8	SUPPORT	1	3.30
9	PIPE SHOE, S-64-DN200-100-250, Carbon Steel	8	SUPPORT	1	16.50

TOTAL FABRICATION WEIGHT 56.89

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
	BOLTS				
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95

TOTAL ERECTION WEIGHT 1.05

TOTAL WEIGHT 57.94

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

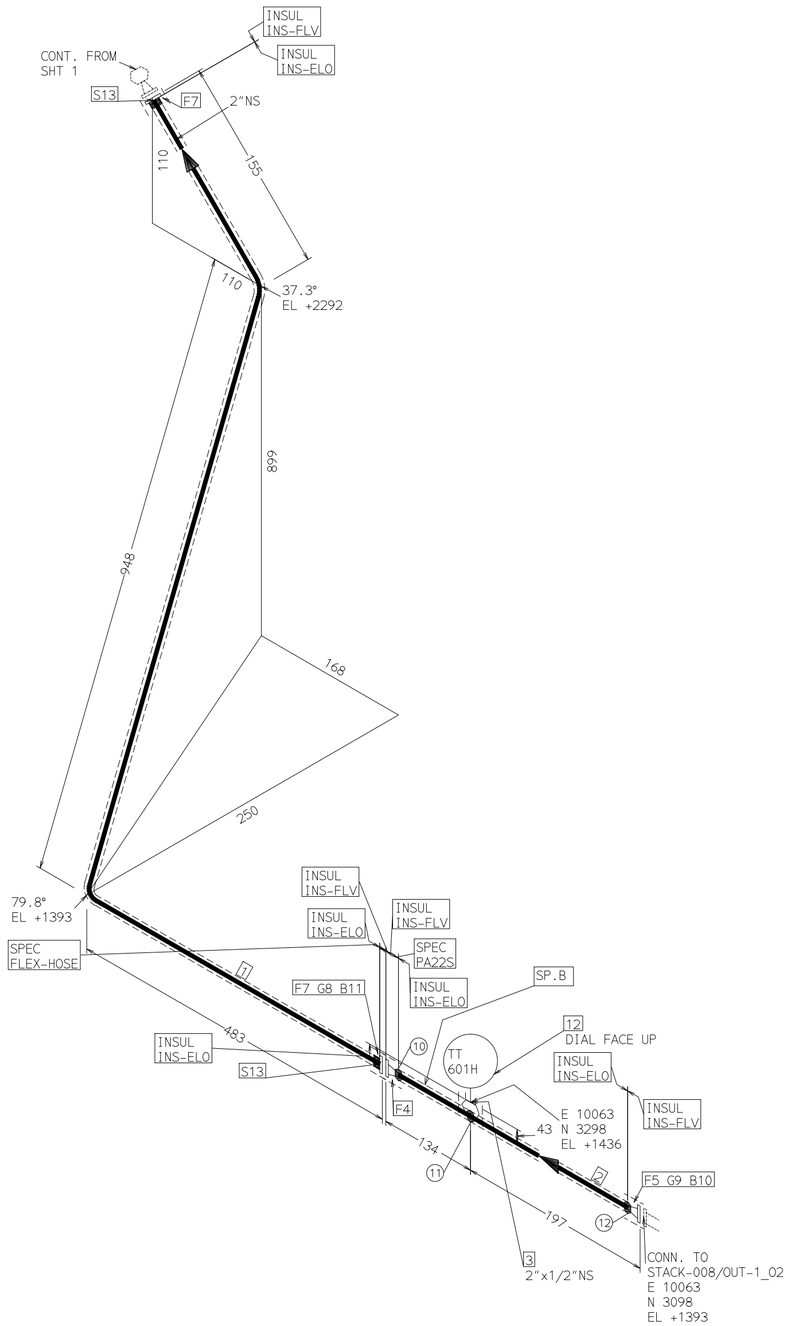
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	11	1 / 12	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L	2	FLEX-HOSE	1.1M	2.24
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L Tag: FP-030	2	PIPESS00500200	0.2M	1.07
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00

TOTAL FABRICATION WEIGHT 10.14

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.3M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
12	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601H	1/2	BY CLIENT	1	2.00
	SUPPORTS				
13	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 10.54

TOTAL WEIGHT 20.68

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
10	S	
11	S	
12	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS			

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

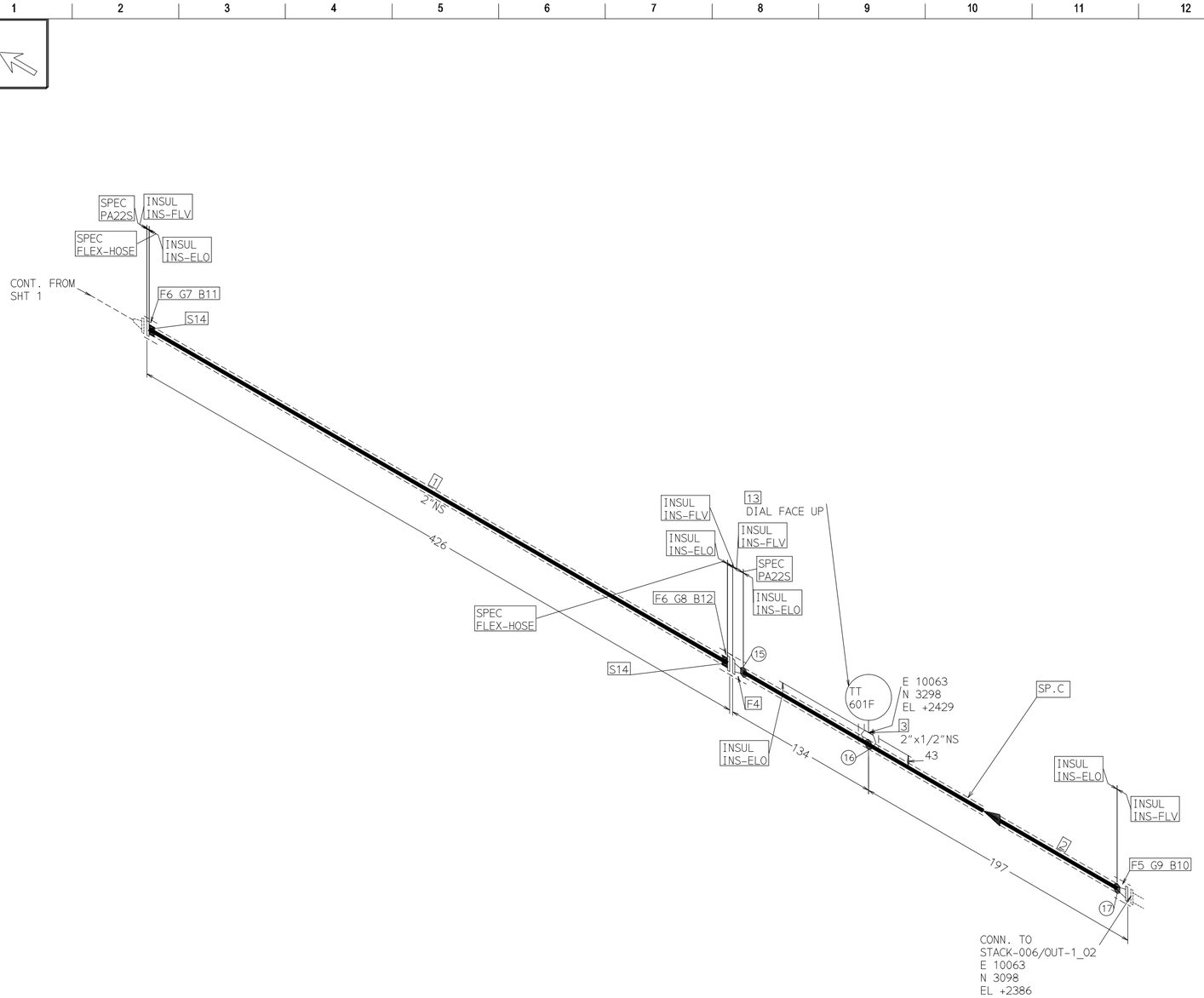
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 11

SHEET - OF: 2 / 12

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
15	S	
16	S	
17	S	

605-200-PW02-PA22S_A03/A01

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-022	2	FLEX-HOSE	0.5M	0.86
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	1.07
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
			TOTAL FABRICATION WEIGHT		8.76

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
13	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601F	1/2	BY CLIENT	1	2.00
	SUPPORTS				
14	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		11.59
			TOTAL WEIGHT		20.35

SPOOL NUMBERS:
SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND: SHOP WELD; FIELD WELD; SOCKET WELD; SCREWED JOINT; COMPR.N JOINT; SITE CONNECTION; PIPE SUPPORT / ATTACHMENT; PIPE INSULATION; PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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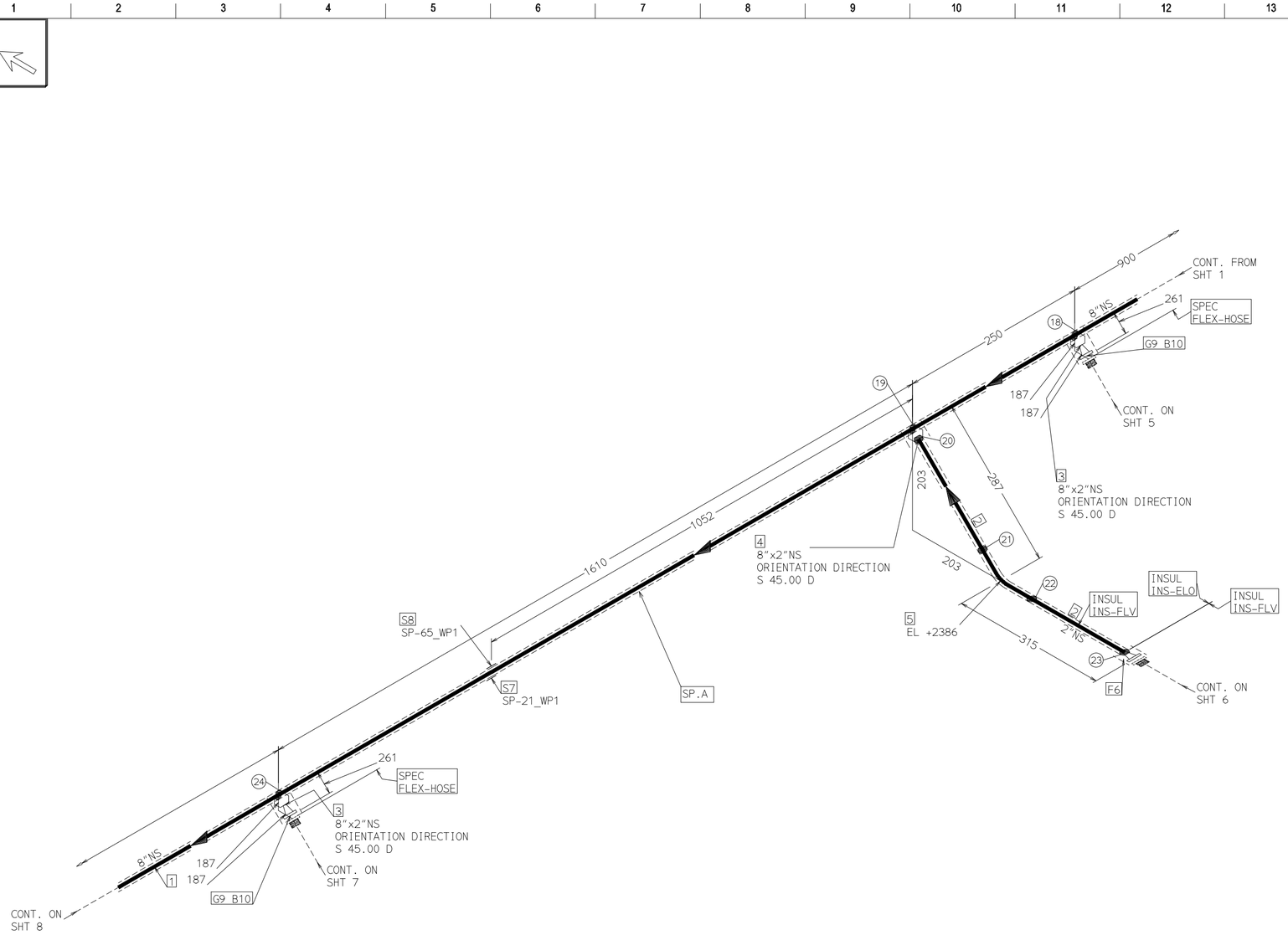
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 11
SHEET - OF: 3 / 12
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	2.2M	35.36
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.4M	1.73
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	2	12.80
4	WELDOLET MSS SP-97, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	OWELSS03560802	1	0.60
5	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E45RSS00020200	1	0.32
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
	SUPPORTS				
7	PIPE SHOE, S-64-DN200-100-400, Carbon Steel	8	SUPPORT	1	16.50
8	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-0mm, Carbon Steel	8	SUPPORT	1	1.10
			TOTAL FABRICATION WEIGHT		71.11

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	2	0.20
	BOLTS				
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	8	1.90
			TOTAL ERECTION WEIGHT		2.10
			TOTAL WEIGHT		73.21

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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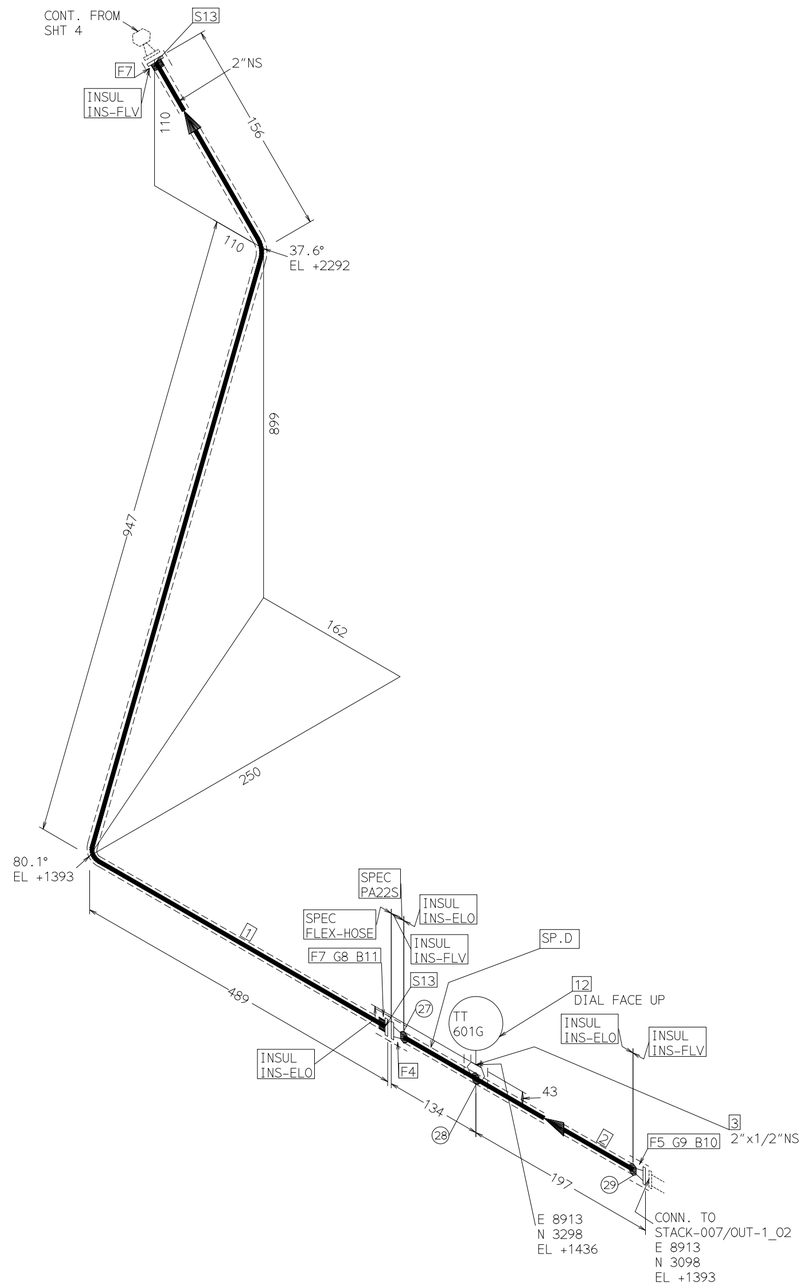
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	11	4 / 12	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-026	2	FLEX-HOSE	1.1M	2.25
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	1.07
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00

TOTAL FABRICATION WEIGHT 10.15

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.3M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
12	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601G	1/2	BY CLIENT	1	2.00
	SUPPORTS				
13	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 10.54

TOTAL WEIGHT 20.69

SPOOL NUMBERS:

SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
27	S	
28	S	
29	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

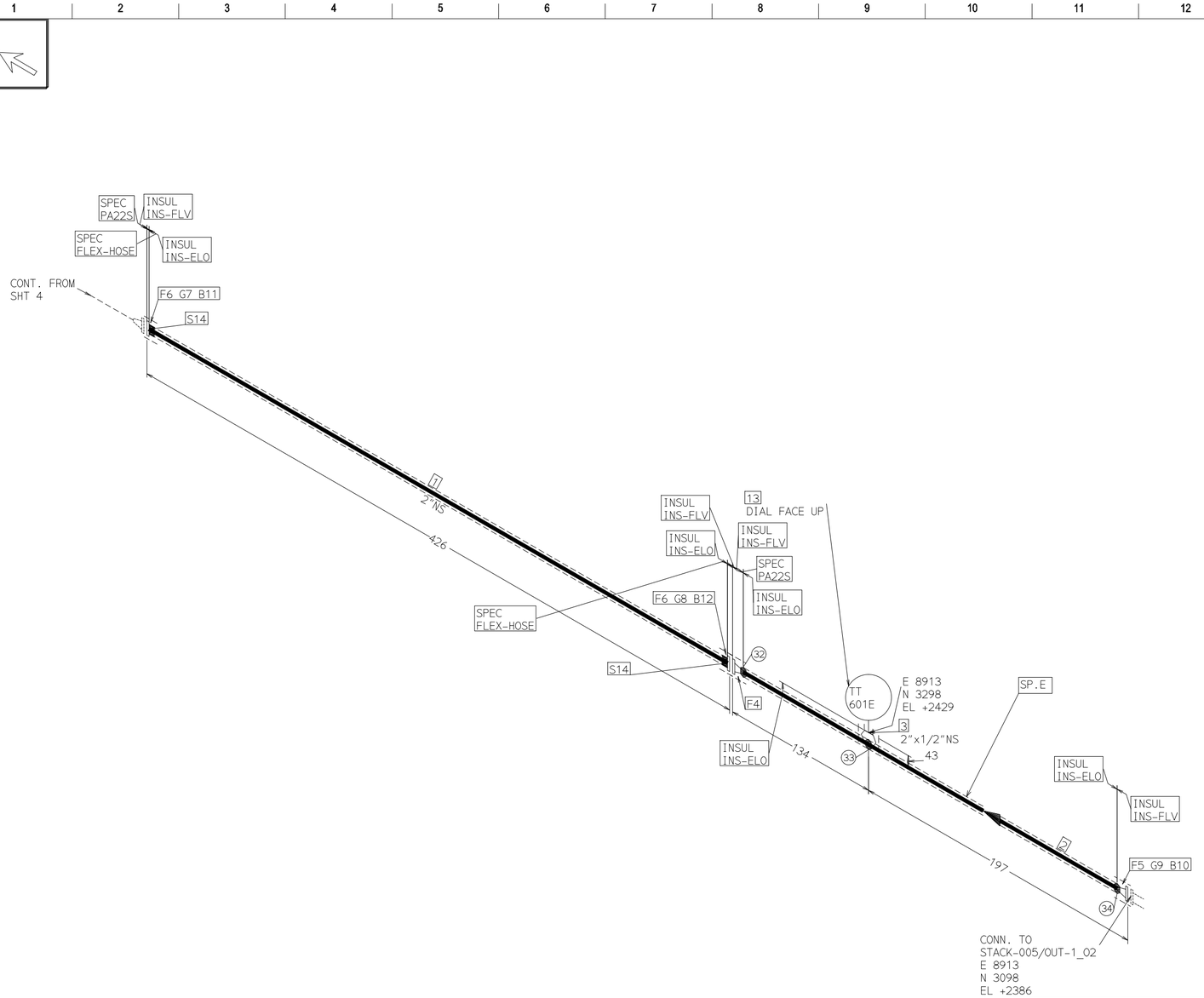
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 11

SHEET - OF: 5 / 12

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
32	S	
33	S	
34	S	

605-200-PW02-PA22S_A03/A01

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: SP-018	2	FLEX-HOSE	0.5M	0.86
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	1.07
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
			TOTAL FABRICATION WEIGHT		8.76

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
13	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601E	1/2	BY CLIENT	1	2.00
	SUPPORTS				
14	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		11.59
			TOTAL WEIGHT		20.35

SPOOL NUMBERS:
SP.E

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND: SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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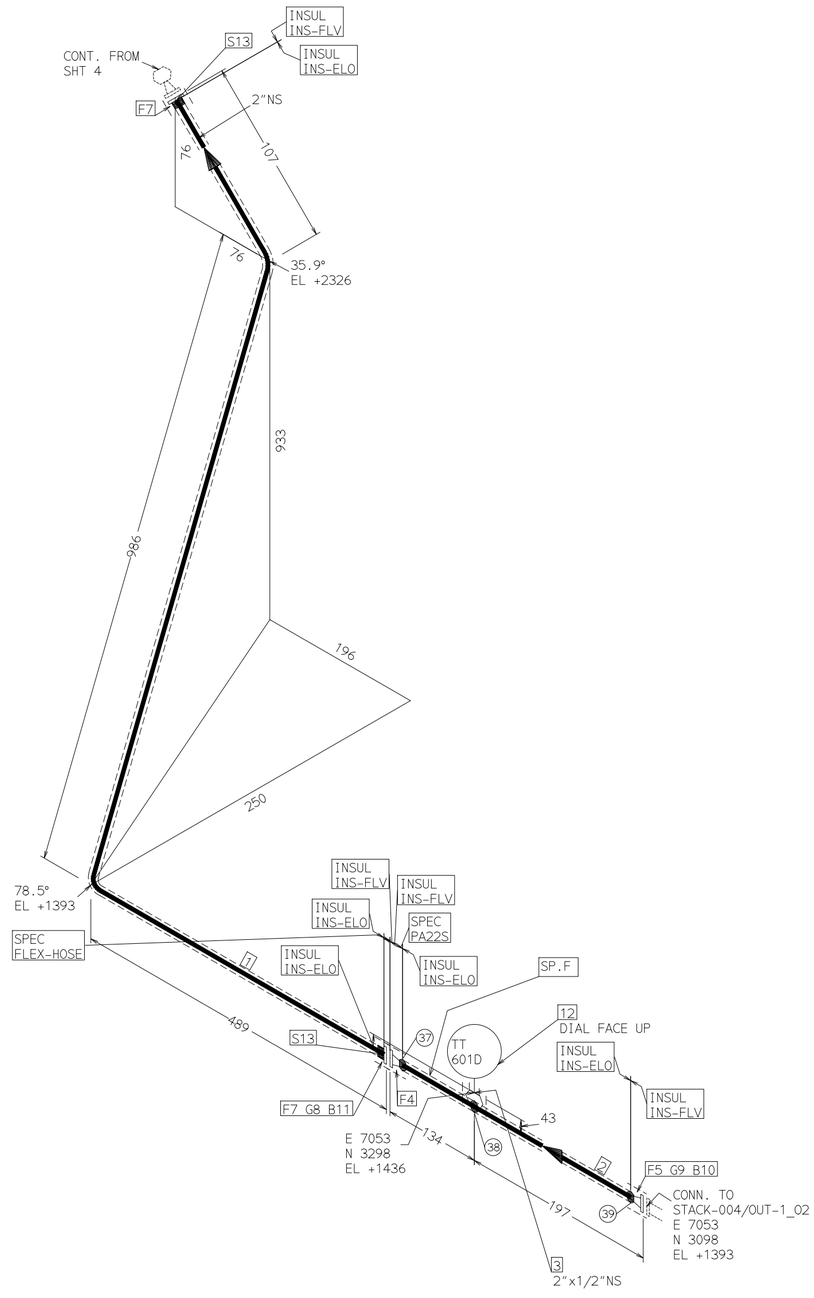
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 11
SHEET - OF: 6 / 12
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-014	2	FLEX-HOSE	1.2M	2.43
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	1.07
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
			TOTAL FABRICATION WEIGHT		10.33

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.2M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
12	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601D	1/2	BY CLIENT	1	2.00
	SUPPORTS				
13	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		10.54
			TOTAL WEIGHT		20.87

SPOOL NUMBERS:

SP.F

WELD NO	SHOP /FLD	NOTES (IF ANY)
37	S	
38	S	
39	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

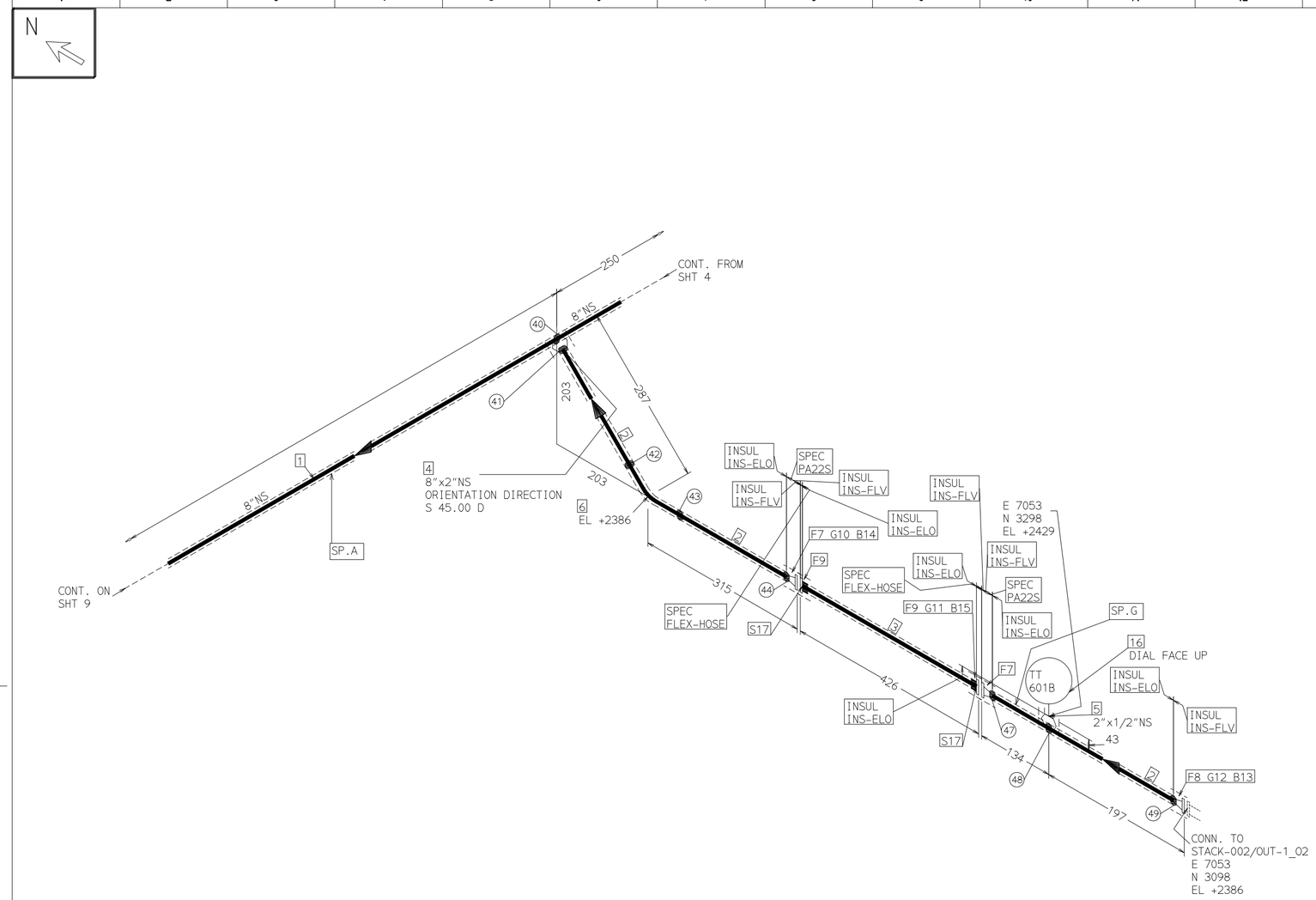
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	11	7 / 12	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
40	S	
41	S	
42	S	
43	S	
44	S	
47	S	
48	S	
49	S	

605-200-PW02-PA22S_A03/A01

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	0.9M	15.08
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.6M	2.80
3	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-006	2	FLEX-HOSE	0.5M	0.86
	FITTINGS				
4	WELDOLET MSS SP-97, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	OWELSS03560802	1	0.60
5	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
6	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E45RSS00020200	1	0.32
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWOSS02950200	2	5.40
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWOSS00500200	1	4.00
			TOTAL FABRICATION WEIGHT		29.19

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
9	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
13	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
14	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
15	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
16	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601B	1/2	BY CLIENT	1	2.00
	SUPPORTS				
17	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		11.59
			TOTAL WEIGHT		40.78

SPOOL NUMBERS:
SP.A SP.G

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

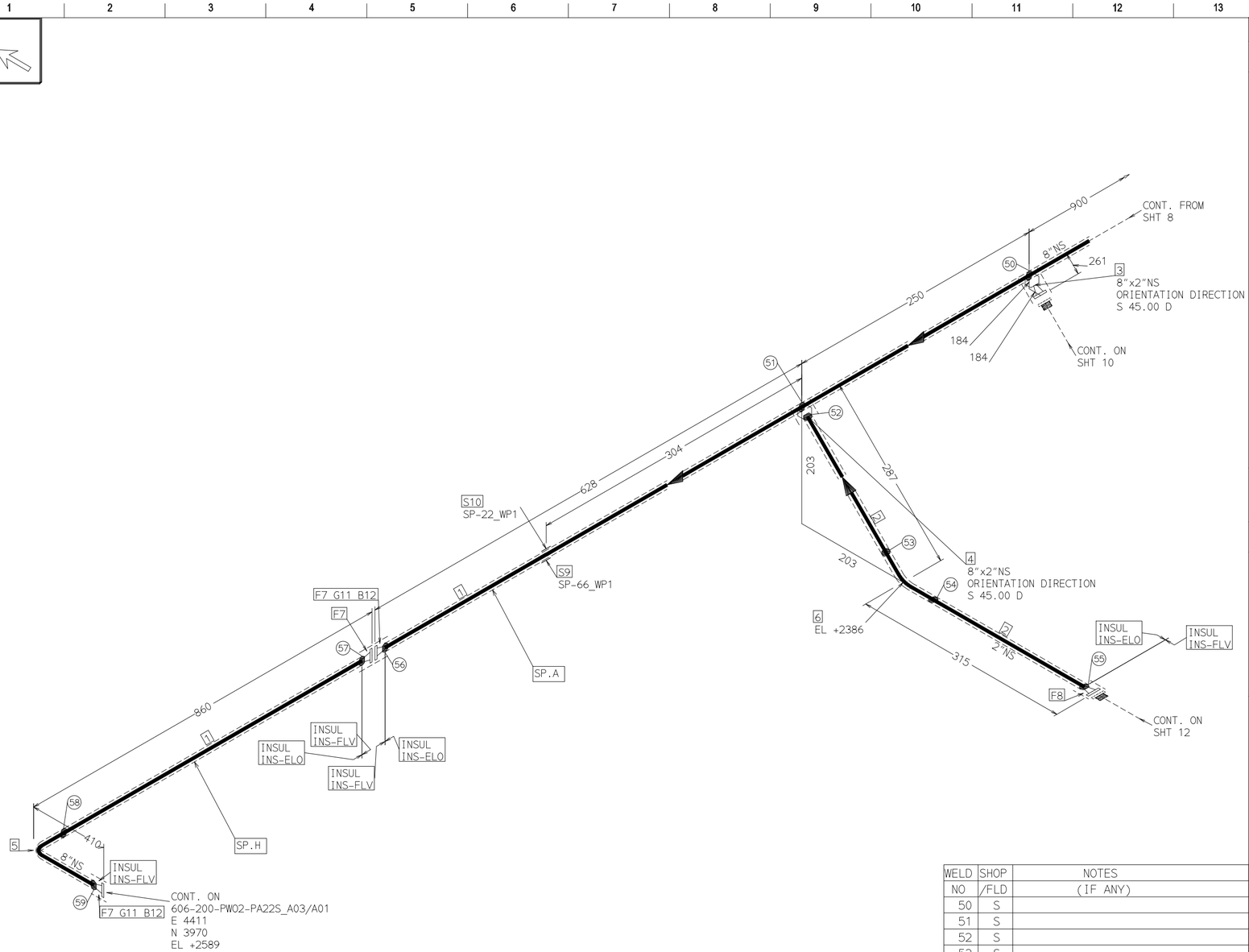
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 11
SHEET - OF: 8 / 12
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.3M	20.58
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.4M	1.73
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL150 RF, LENGTH 150mm, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	ONFLSS02290802	1	6.40
4	WELDOLET MSS SP-97, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 2	OWELSS03560802	1	0.60
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	E90RSS00690800	1	10.60
6	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E45RSS00020200	1	0.32
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.10S ASTM A182 Gr.F316/316L	8	FLW0SS00070800	3	54.00
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
	SUPPORTS				
9	BOLTED GUIDE FOR SHOE, C-34-4-I-2mm, Carbon Steel	8	SUPPORT	1	3.30
10	PIPE SHOE, S-64-DN200-100-250, Carbon Steel	8	SUPPORT	1	16.50

TOTAL FABRICATION WEIGHT 116.73

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	8	GENEGK00450800	2	0.62
	BOLTS				
12	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	16	7.65

TOTAL ERECTION WEIGHT 8.27

TOTAL WEIGHT 125.00

SPOOL NUMBERS:
SP.A SP.H

WELD NO	SHOP /FLD	NOTES (IF ANY)
50	S	
51	S	
52	S	
53	S	
54	S	
55	S	
56	S	
57	S	
58	S	
59	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

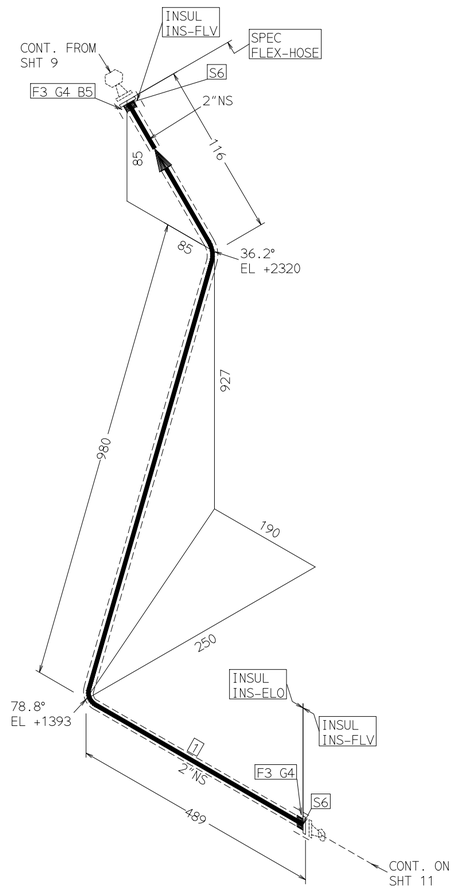
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 11

SHEET - OF: 9 / 12

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-010	2	FLEX-HOSE	1.2M	2.43
				TOTAL FABRICATION WEIGHT	2.43

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.2M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	2	0.20
	BOLTS				
5	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	SUPPORTS				
6	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	6.55
				TOTAL WEIGHT	8.98

WELD NO	SHOP /FLD	NOTES (IF ANY)

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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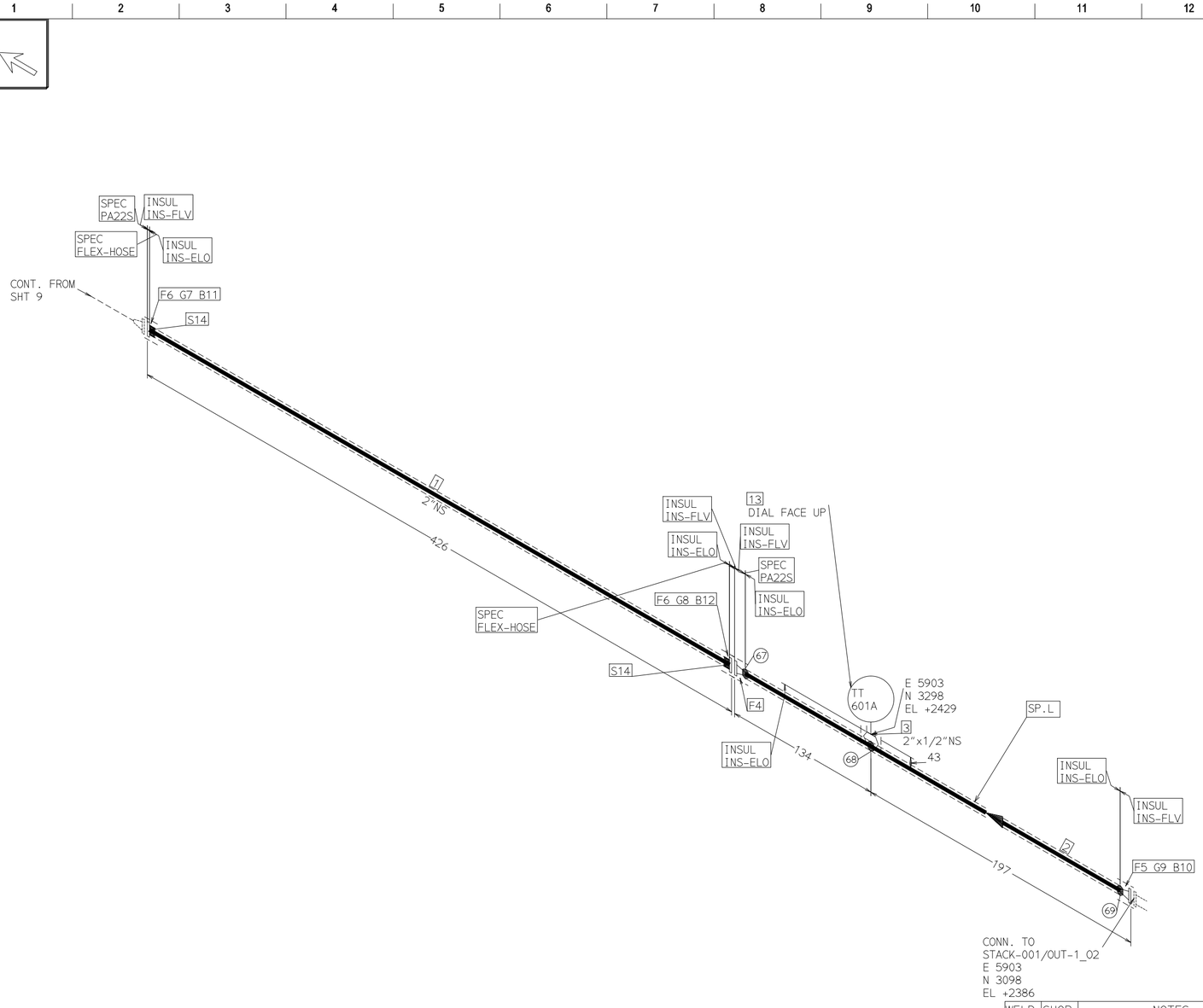
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	11	10 / 12	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-002	2	FLEX-HOSE	0.5M	0.86
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	1.07
	FITTINGS				
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
			TOTAL FABRICATION WEIGHT		8.76

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.150 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	5.40
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
13	TEMPERATURE TRANSMITTER, H+E TM131, 1/2" NPT-M ASTM A182 Gr.F316/316L TT 601A	1/2	BY CLIENT	1	2.00
	SUPPORTS				
14	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		11.59
			TOTAL WEIGHT		20.35

SPOOL NUMBERS:

SP.L

WELD NO	SHOP /FLD	NOTES (IF ANY)
67	S	
68	S	
69	S	

605-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

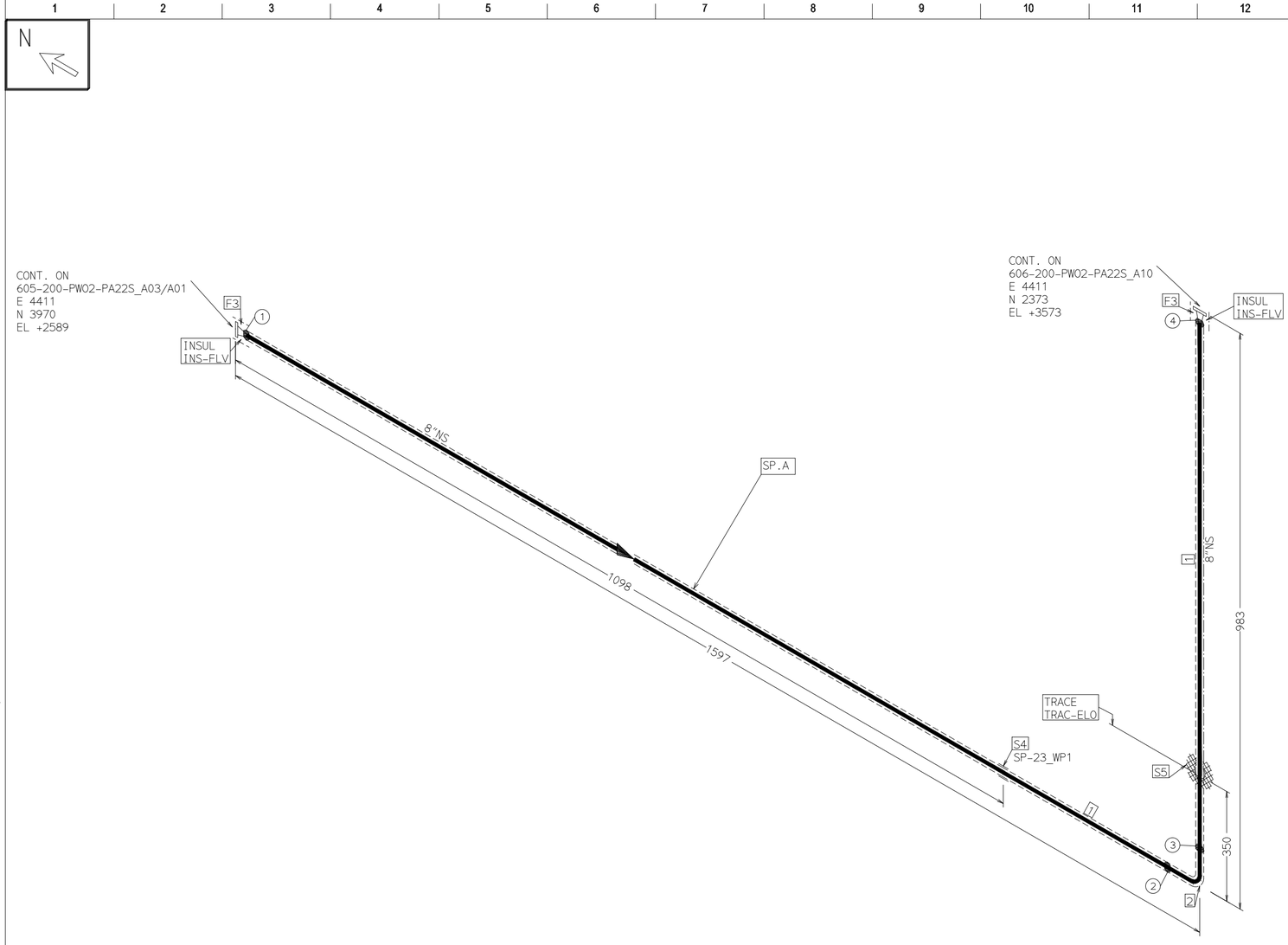
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 11

SHEET - OF: 12 / 12

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	1.8M	29.41
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	E90RSS00690800	1	10.60
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.10S ASTM A182 Gr.F316/316L	8	FLW0SS00070800	2	36.00
	SUPPORTS				
4	PIPE SHOE, S-64-DN200-100-250, Carbon Steel	8	SUPPORT	1	16.50

TOTAL FABRICATION WEIGHT 92.51

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-350/219/60/F3, AS PER DRAWING S1041059	8	2MCTZFR-8	1	8.60

TOTAL ERECTION WEIGHT 8.60

TOTAL WEIGHT 101.11

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

606-200-PW02-PA22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	thk =40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-606	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

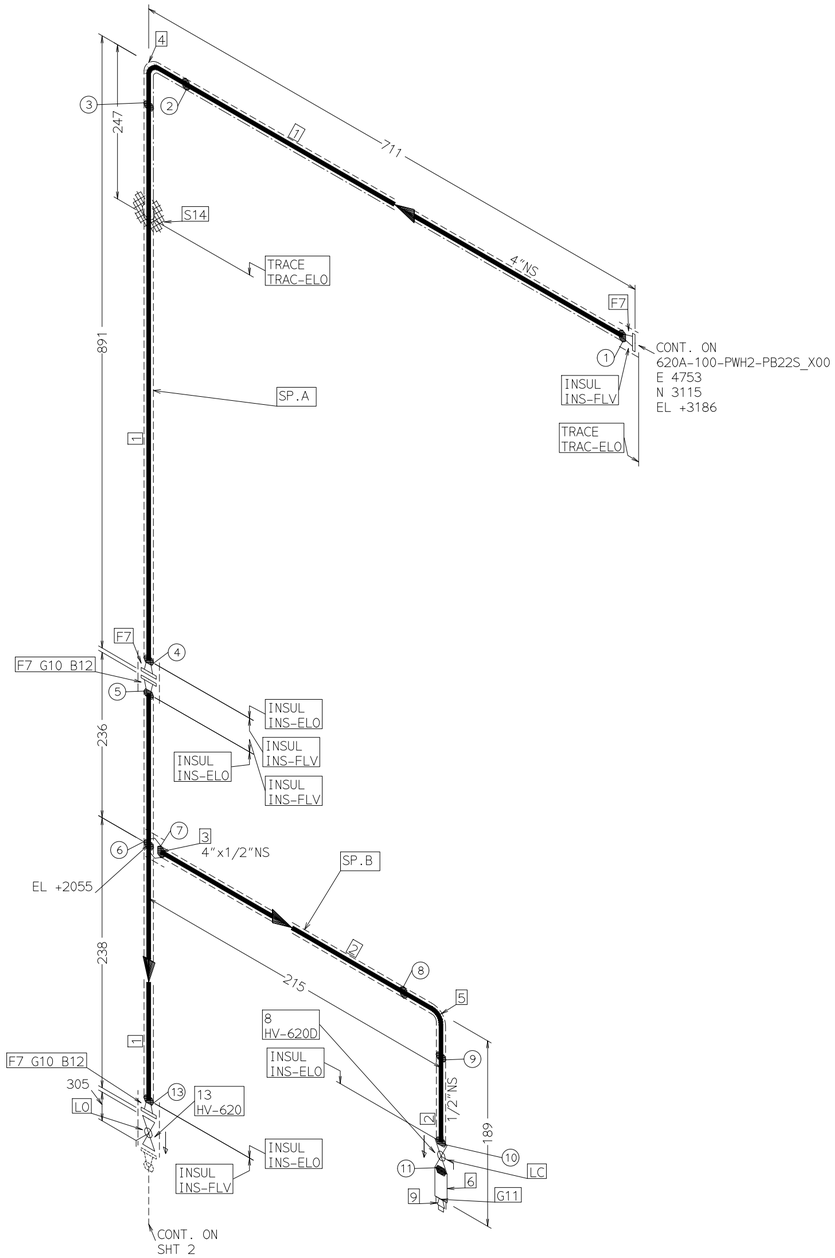
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 12

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	1.5M	21.61
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.23
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	4	44.00
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		71.00

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	2	0.58
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
12	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	16	7.86
	VALVES / IN-LINE ITEMS				
13	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50
	SUPPORTS				
14	MCT FLANGED FOR PIPING, ROXTEC, SEAL RS-300/114/60, AS PER DRAWING S1022388	4	2MCTZFR-4	1	7.30
			TOTAL ERECTION WEIGHT		60.32
			TOTAL WEIGHT		131.32

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
13	S	

620A-100-PWH2-PB22S_A03

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-620A	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	30,9					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

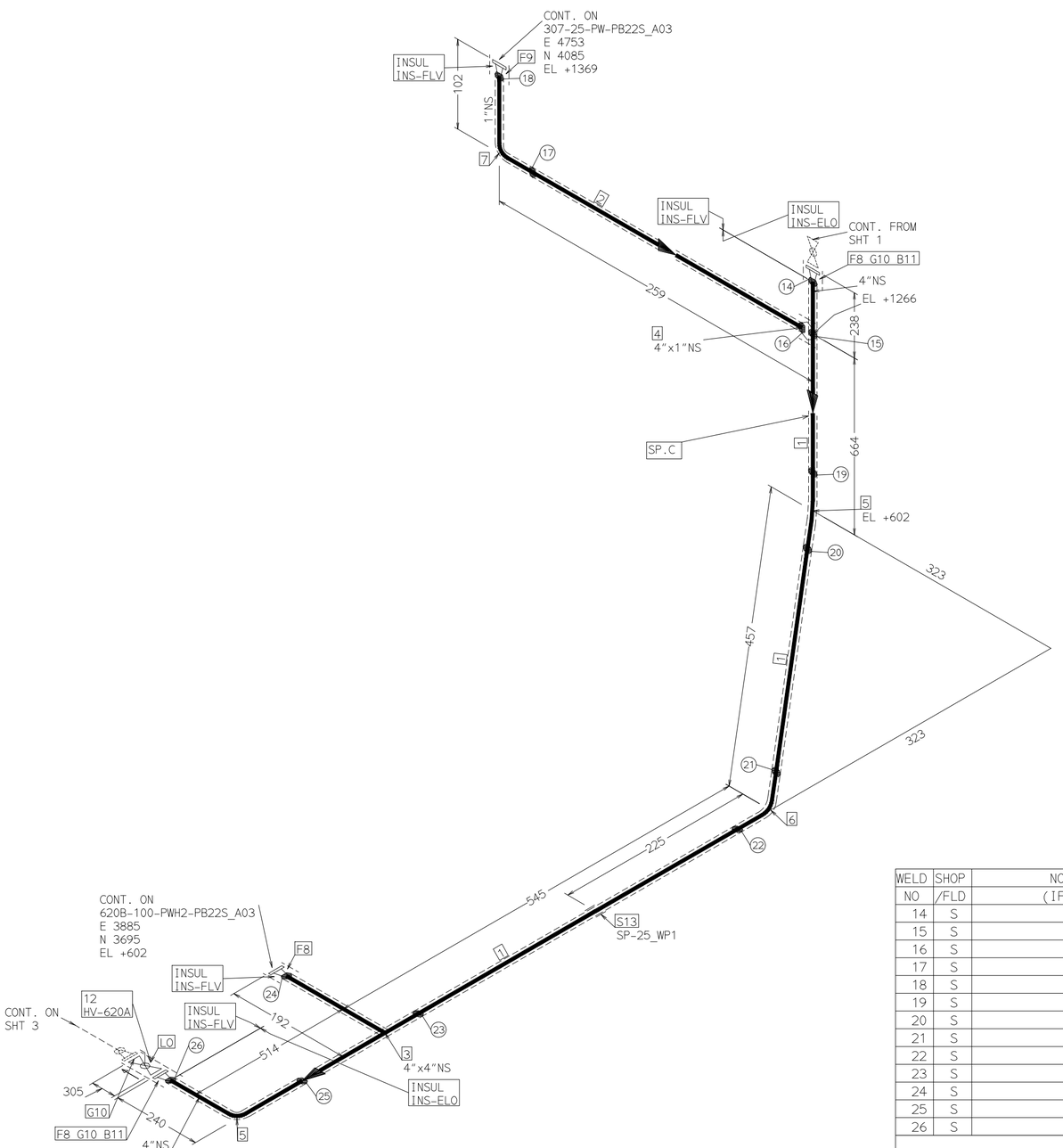
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	13	1 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	1.6M	23.55
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.2M	0.34
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 4	TEE0SS01160400	1	5.30
4	WELDOLET MSS SP-97, Sch.40S ASTM A182 Gr.F316/316L	4 x 1	OWELSS05270401	1	0.23
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	2	7.80
6	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E45RSS00870400	1	2.10
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	3	33.00
9	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00

TOTAL FABRICATION WEIGHT 74.47

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	3	0.87
	BOLTS				
11	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	16	7.86
	VALVES / IN-LINE ITEMS				
12	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50
	SUPPORTS				
13	PIPE SHOE, S-64-DN100-100-200, Carbon Steel	4	SUPPORT	1	7.80

TOTAL ERECTION WEIGHT 61.03

TOTAL WEIGHT 135.50

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	

620A-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-620A	NDT : 100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

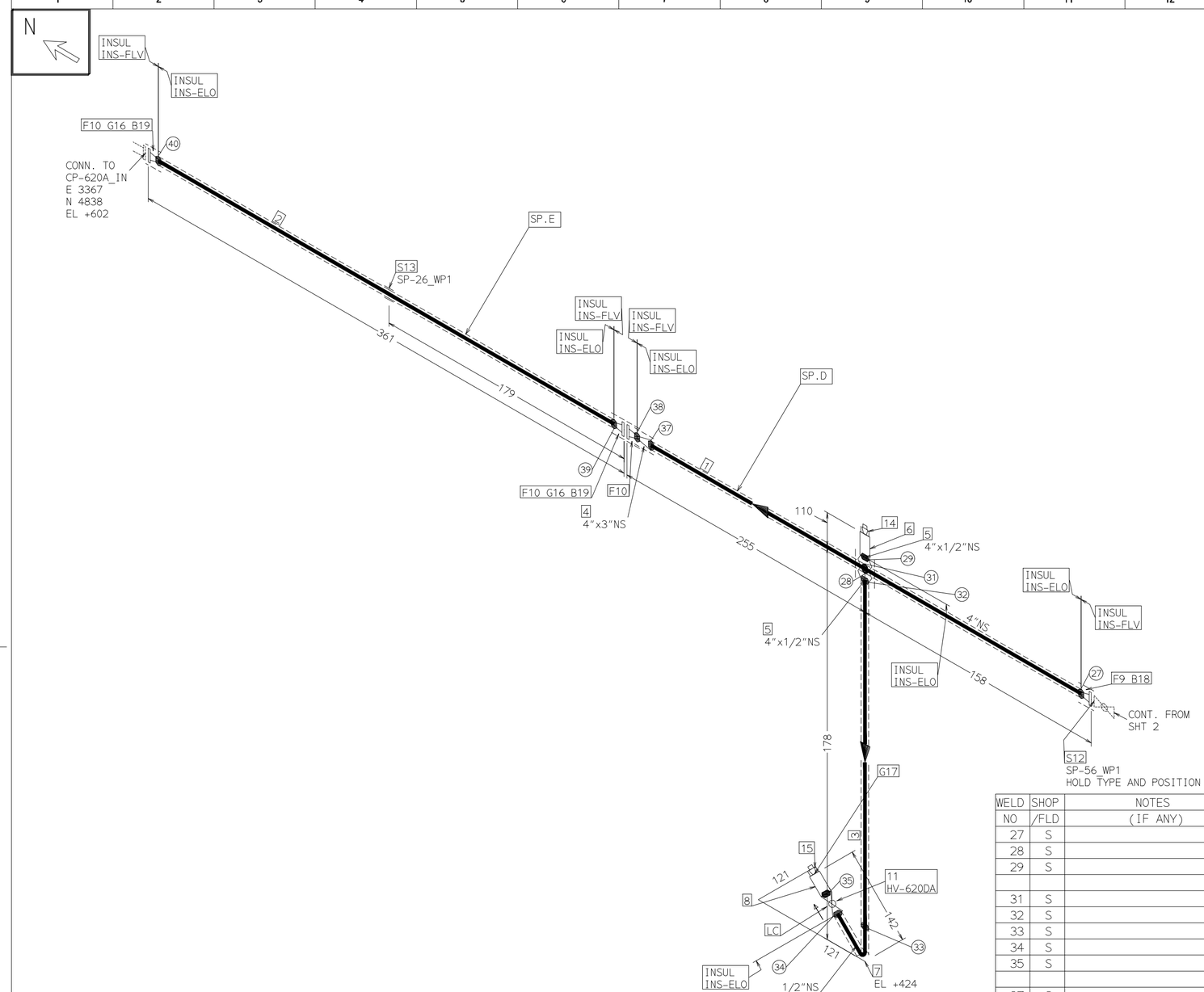
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 13

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.2M	2.18
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	0.3M	2.27
3	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.10
	FITTINGS				
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 3	REC0SS03990403	1	1.40
5	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	2	0.20
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x NPTF, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00120H0H	1	0.10
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
8	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
9	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	1	11.00
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS04330300	3	21.00
	VALVES / IN-LINE ITEMS				
11	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
12	General purpose ATTA SS 316	4	-	1	0.00
13	PIPE SHOE, S-64-DN80-100-200, Carbon Steel	3	SUPPORT	1	5.30

TOTAL FABRICATION WEIGHT 44.71

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
14	HEXAGONAL HEAD PLUG NPT, ASME B16.11 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
15	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
16	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00600300	2	0.42
17	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
18	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	8	3.93
19	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	16	7.65

TOTAL ERECTION WEIGHT 12.15

TOTAL WEIGHT 56.86

SPOOL NUMBERS:

SP.D SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
27	S	
28	S	
29	S	
31	S	
32	S	
33	S	
34	S	
35	S	
37	S	
38	S	
39	S	
40	S	

620A-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-620A	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	30,9					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

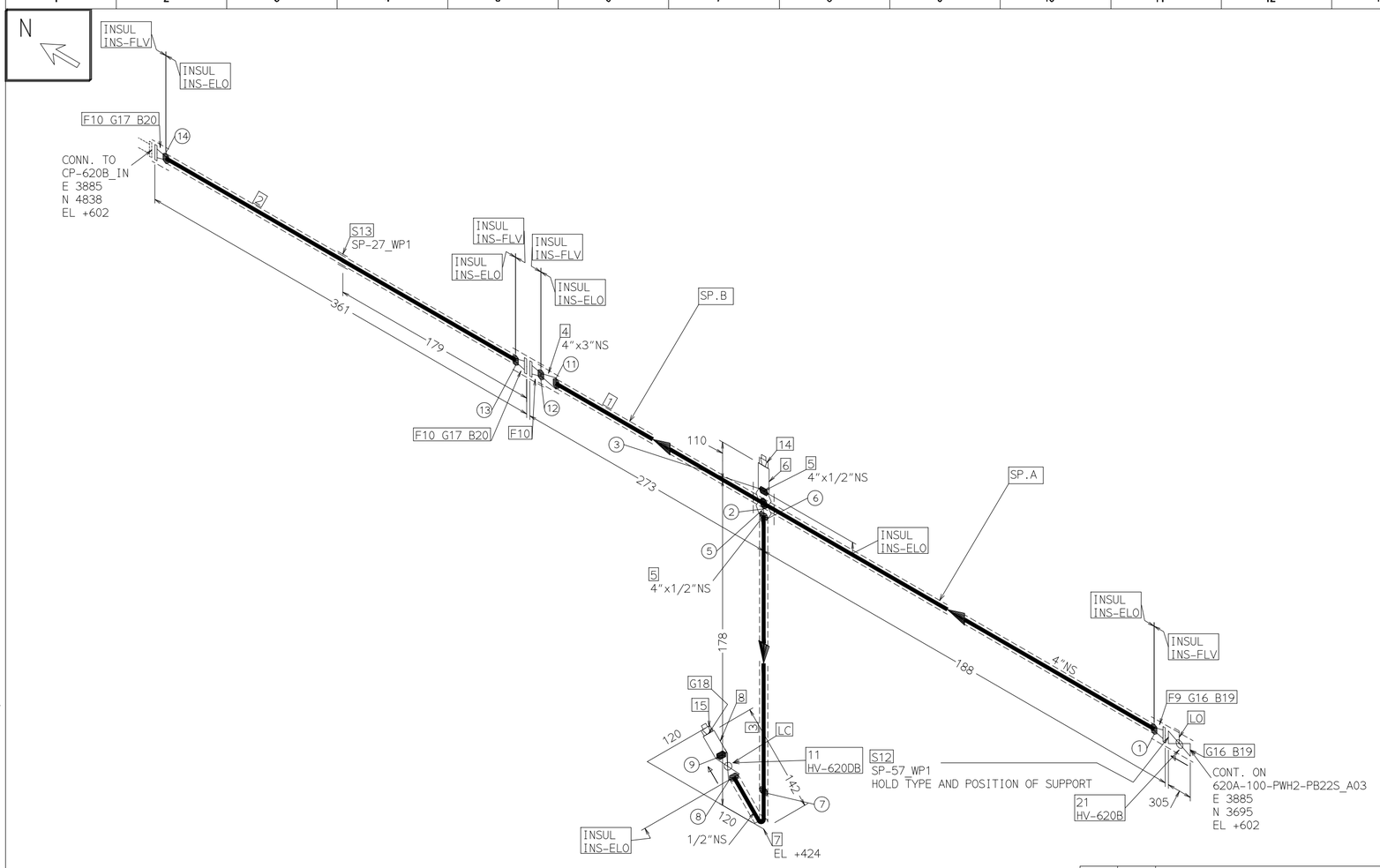
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 13

SHEET - OF: 3 / 3

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
5	S	
6	S	
7	S	
8	S	
9	S	
11	S	
12	S	
13	S	
14	S	

620B-100-PWH2-PB22S_A03

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.2M	2.86
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	0.2M	2.22
3	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.09
	FITTINGS				
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 3	REC0SS03990403	1	1.40
5	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	2	0.20
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x NPTF, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00120H0H	1	0.10
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
8	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
9	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	1	11.00
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS04330300	3	21.00
	VALVES / IN-LINE ITEMS				
11	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
12	General purpose ATTA SS 316	4	-	1	0.00
13	PIPE SHOE, S-64-DN80-100-200, Carbon Steel	3	SUPPORT	1	5.30

TOTAL FABRICATION WEIGHT 45.33

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
14	HEXAGONAL HEAD PLUG NPT, ASME B16.11 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
15	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
16	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	2	0.58
17	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00600300	2	0.42
18	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
19	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	16	7.86
20	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	16	7.65
	VALVES / IN-LINE ITEMS				
21	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50

SPOOL NUMBERS:
SP.A SP.B

TOTAL ERECTION WEIGHT 61.16
TOTAL WEIGHT 106.49

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT : 100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS	

NOTE
THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND
SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING
INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

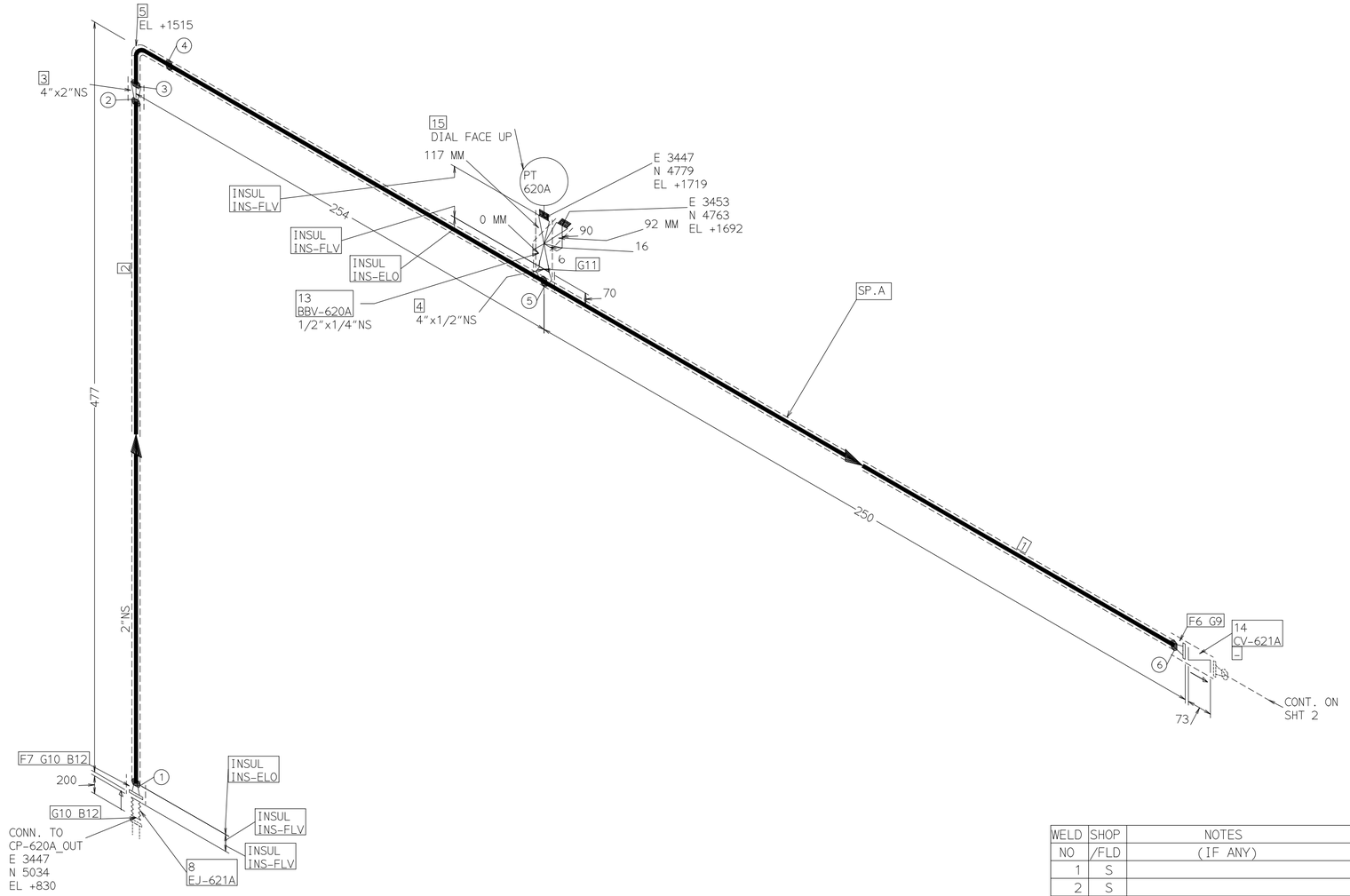
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 14
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.3M	4.00
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	0.80
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 2	RECOSS01130402	1	1.40
4	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	4 x 1/2	OTHESS0332040H	1	0.13
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	1	11.00
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00

TOTAL FABRICATION WEIGHT 25.23

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	LATERAL EXPANSION JOINT DOUBLE BELLOWED ASME B36.10/B36.19, CL300 RF SS 316	2	1MECH014-50	1	5.00
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	1	0.29
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
12	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	16	3.92
	VALVES / IN-LINE ITEMS				
13	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
14	CHECK VALVE ASME B16.10, WAFER TYPE, CL300 RF ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	7.50
	INSTRUMENTS				
15	PRESSURE TRANSMITTER, CERABAR PMP71B PT 620A	1/2	BY CLIENT	1	1.73

TOTAL ERECTION WEIGHT 19.71

TOTAL WEIGHT 44.94

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	

621A-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	34				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

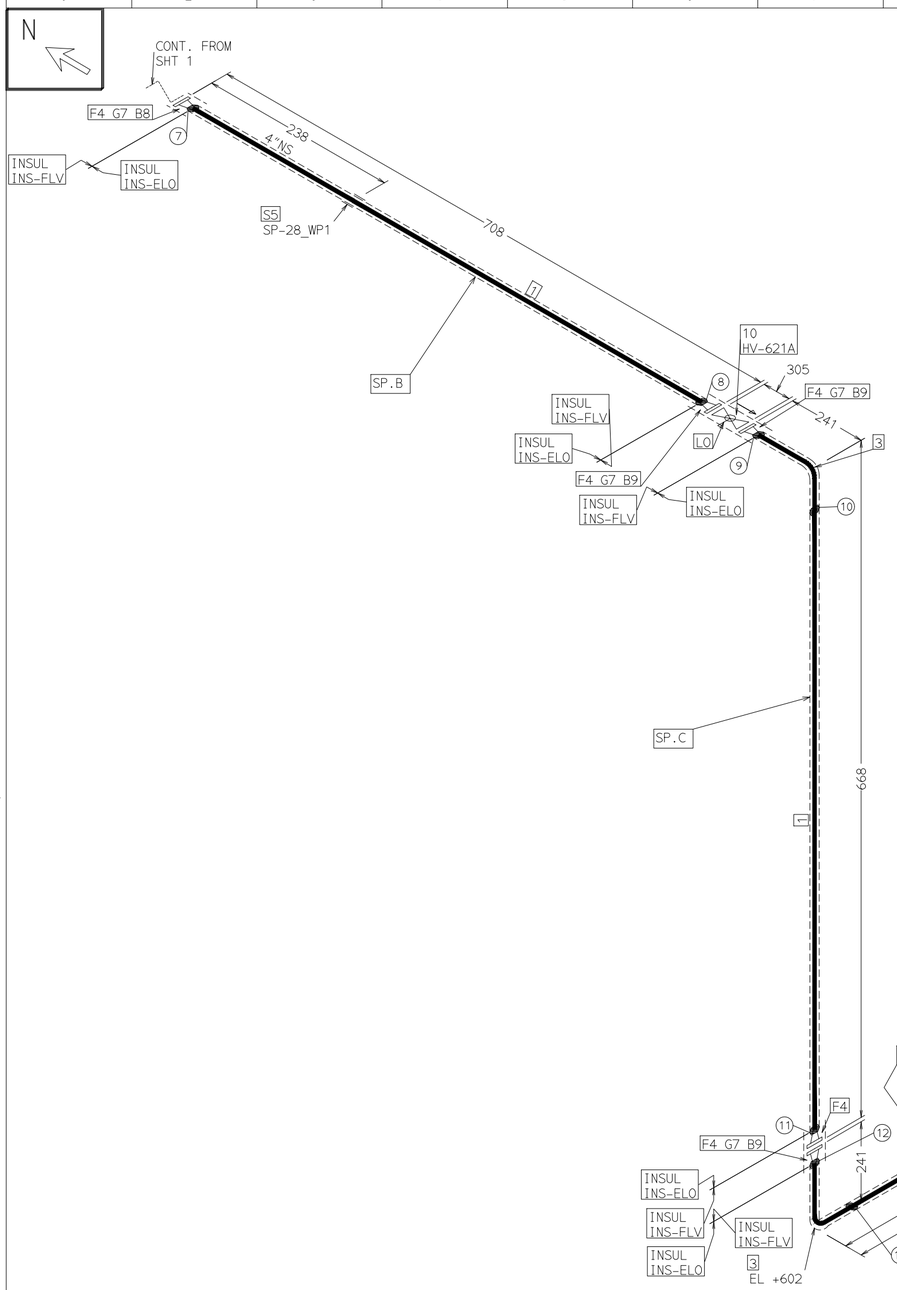
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 15

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	1.1M	16.38
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 4	TEE0SS01160400	1	5.30
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	3	11.70
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	6	66.00
	SUPPORTS				
5	PIPE SHOE, S-64-DN100-100-200, Carbon Steel	4	SUPPORT	1	7.80
6	PIPE SHOE, S-64-DN100-100-250, Carbon Steel	4	SUPPORT	1	7.80
			TOTAL FABRICATION WEIGHT		114.98

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	5	1.45
	BOLTS				
8	195 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	8	5.70
9	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	32	15.71
	VALVES / IN-LINE ITEMS				
10	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50
			TOTAL ERECTION WEIGHT		67.36
			TOTAL WEIGHT		182.34

SPOOL NUMBERS:

SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

621A-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-004/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	34					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

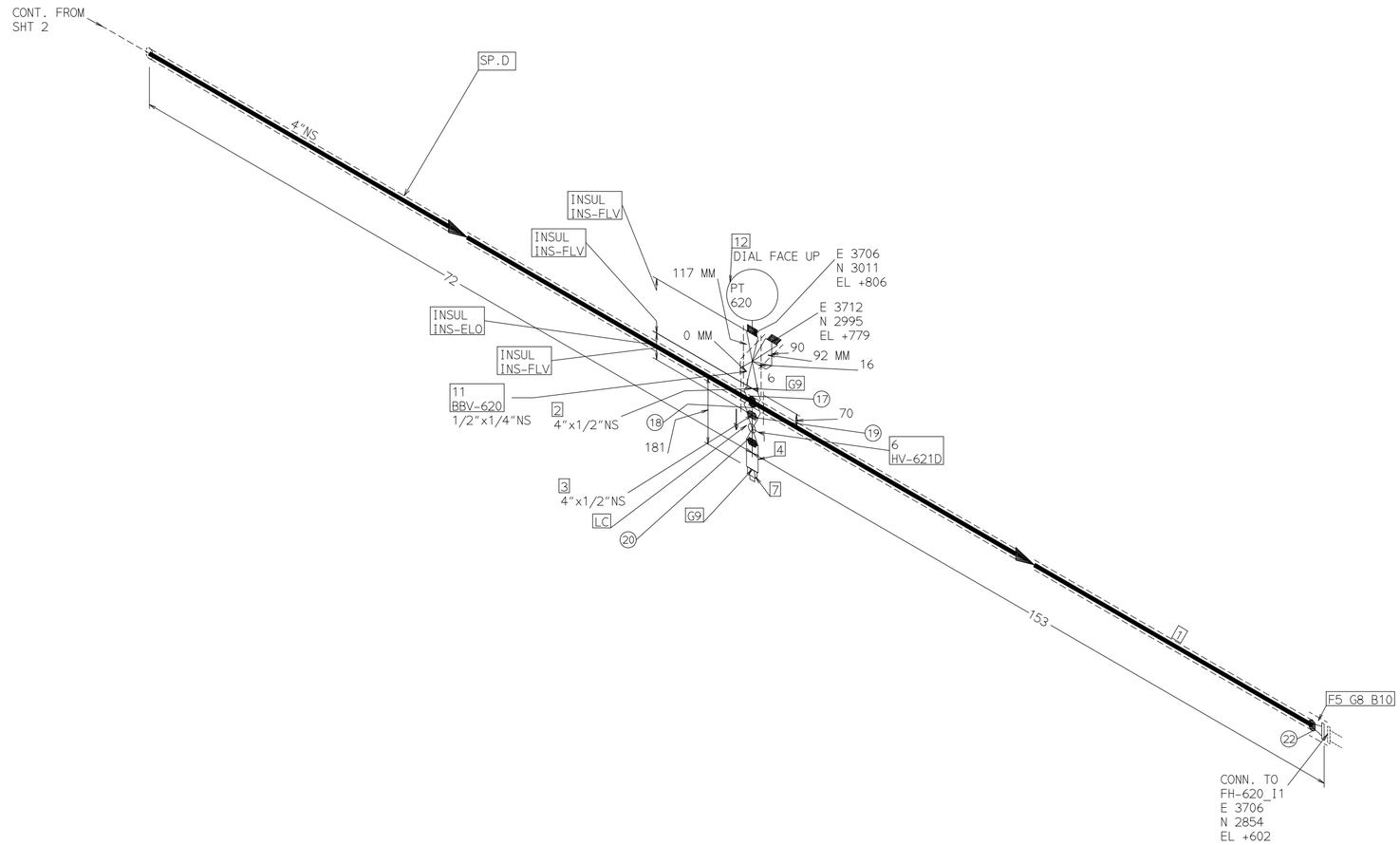
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 15
SHEET - OF: 2 / 3
COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
17	S	
18	S	
19	S	
20	S	
22	S	

621A-100-PWH2-PB22S_A03

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.2M	2.12
	FITTINGS				
2	THREDOLET MSS SP-97, CL.3000, BSPP ASTM A182 Gr.F316/316L	4 x 1/2	OTHESS0332040H	1	0.13
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	1	0.10
4	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	1	11.00
	VALVES / IN-LINE ITEMS				
6	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		14.33

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	1	0.29
9	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	2	0.02
	BOLTS				
10	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	8	3.93
	VALVES / IN-LINE ITEMS				
11	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
12	PRESSURE TRANSMITTER, CERABAR PMP71B PT 620	1/2	BY CLIENT	1	1.73
			TOTAL ERECTION WEIGHT		7.04
			TOTAL WEIGHT		21.37

SPOOL NUMBERS:

SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	34					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

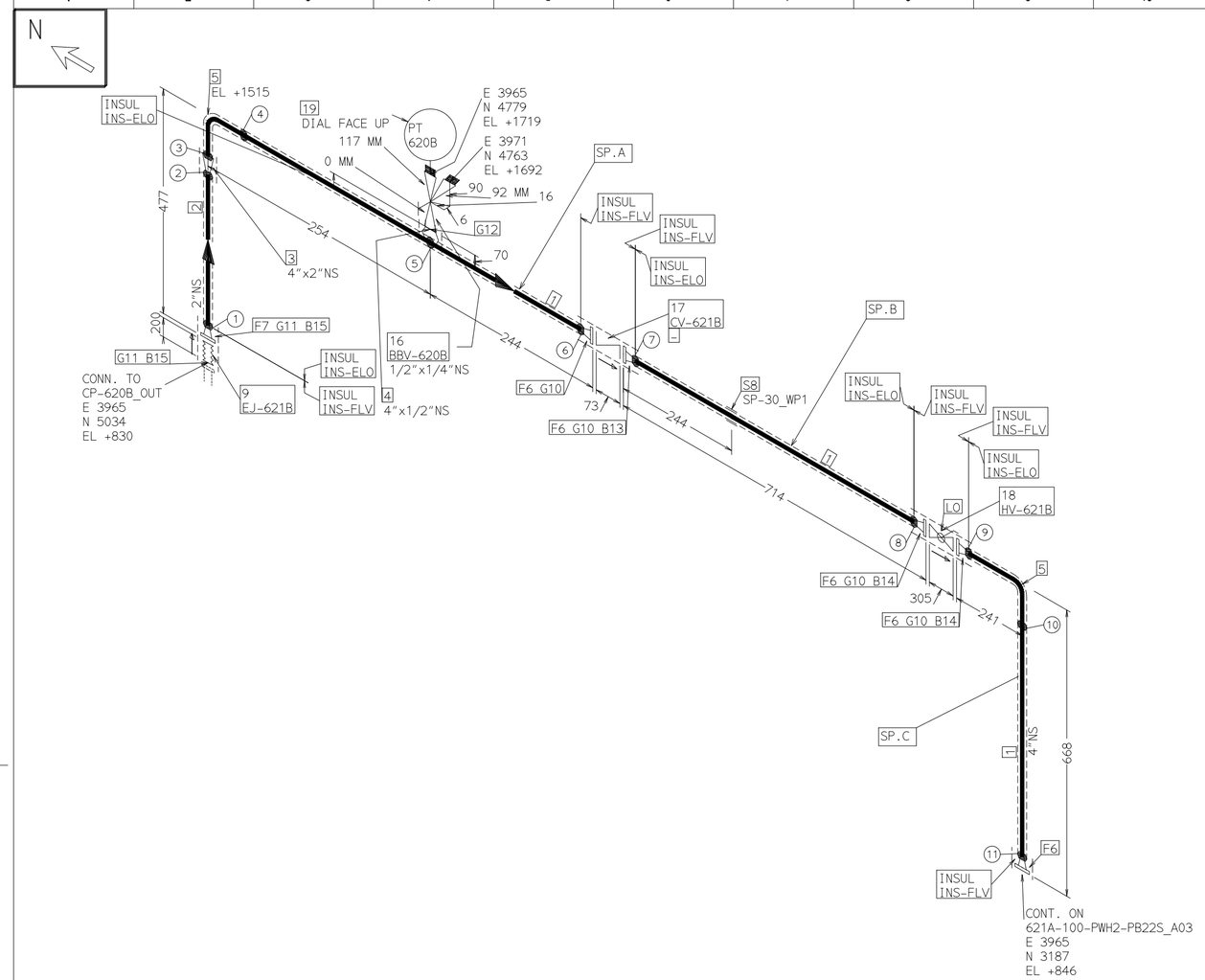
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 15

SHEET - OF: 3 / 3

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

621B-100-PWH2-PB22S_A03

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	1.3M	18.63
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	0.80
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 2	REC0SS01130402	1	1.40
4	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	4 x 1/2	OTHESS0332040H	1	0.13
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	2	7.80
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	5	55.00
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
	SUPPORTS				
8	PIPE SHOE, S-64-DN100-100-200, Carbon Steel	4	SUPPORT	1	7.80
			TOTAL FABRICATION WEIGHT		95.56

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	LATERAL EXPANSION JOINT DOUBLE BELLOWED ASME B36.10/B36.19, CL300 RF SS 316	2	1MECH014-50	1	5.00
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	4	1.16
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
13	195 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	8	5.70
14	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	16	7.86
15	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	16	3.92
	VALVES / IN-LINE ITEMS				
16	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
17	CHECK VALVE ASME B16.10, WAFER TYPE, CL300 RF ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	7.50
18	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50
	INSTRUMENTS				
19	PRESSURE TRANSMITTER, CERABAR PMP71B PT 620B	1/2	BY CLIENT	1	1.73
			TOTAL ERECTION WEIGHT		78.64
			TOTAL WEIGHT		174.20

SPOOL NUMBERS:
SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	34				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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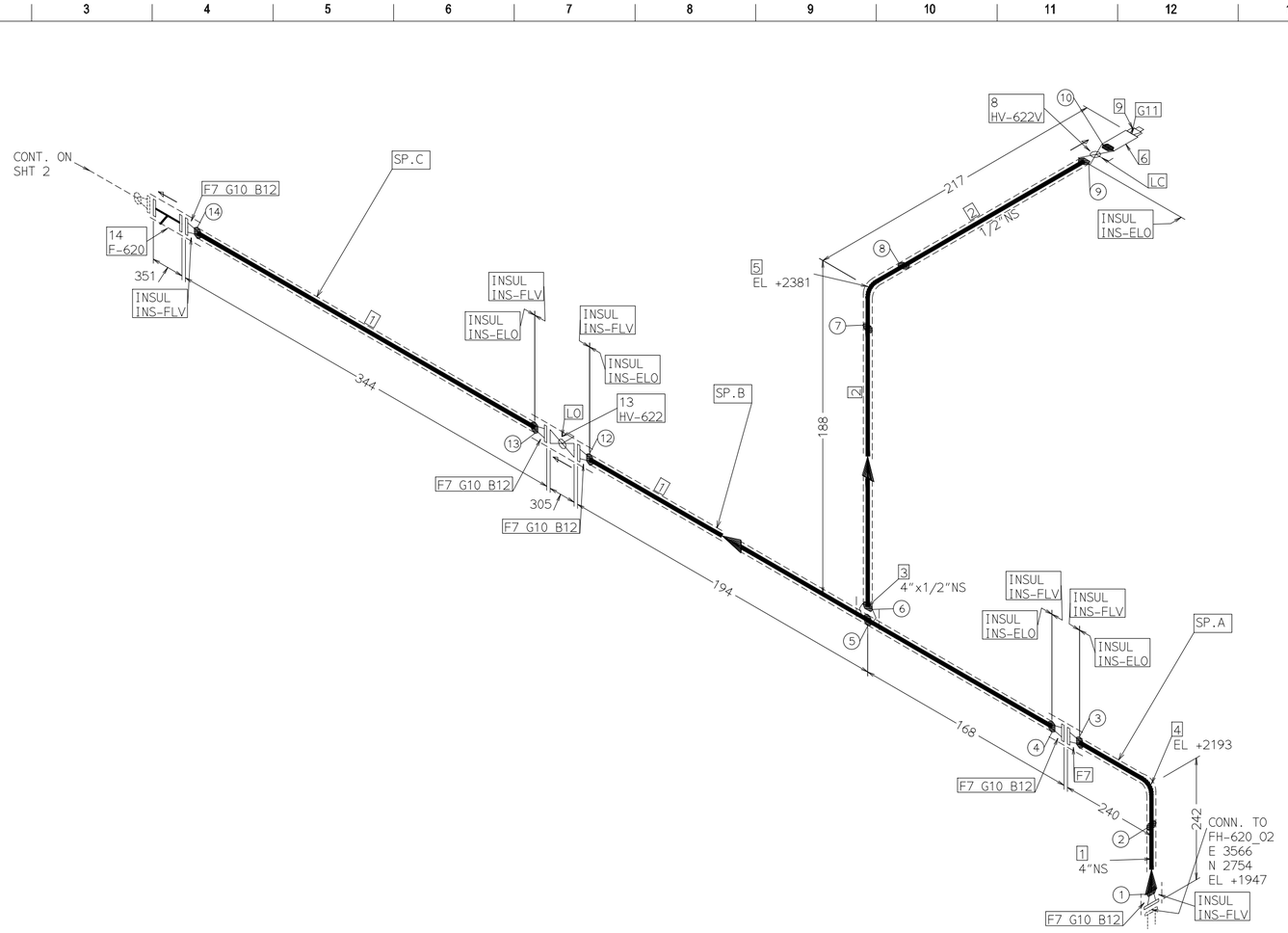
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr: 16
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.4M	5.42
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.23
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	4 x 1/2	OWELSS0836040H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	6	66.00
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 76.81

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	5	1.45
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
12	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	40	19.64
	VALVES / IN-LINE ITEMS				
13	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50
14	Y-STRAINER, SPIRAX SARCO, CL.300 RF ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	38.50

TOTAL ERECTION WEIGHT 104.17

TOTAL WEIGHT 180.98

SPOOL NUMBERS:

SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
12	S	
13	S	
14	S	

622-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:

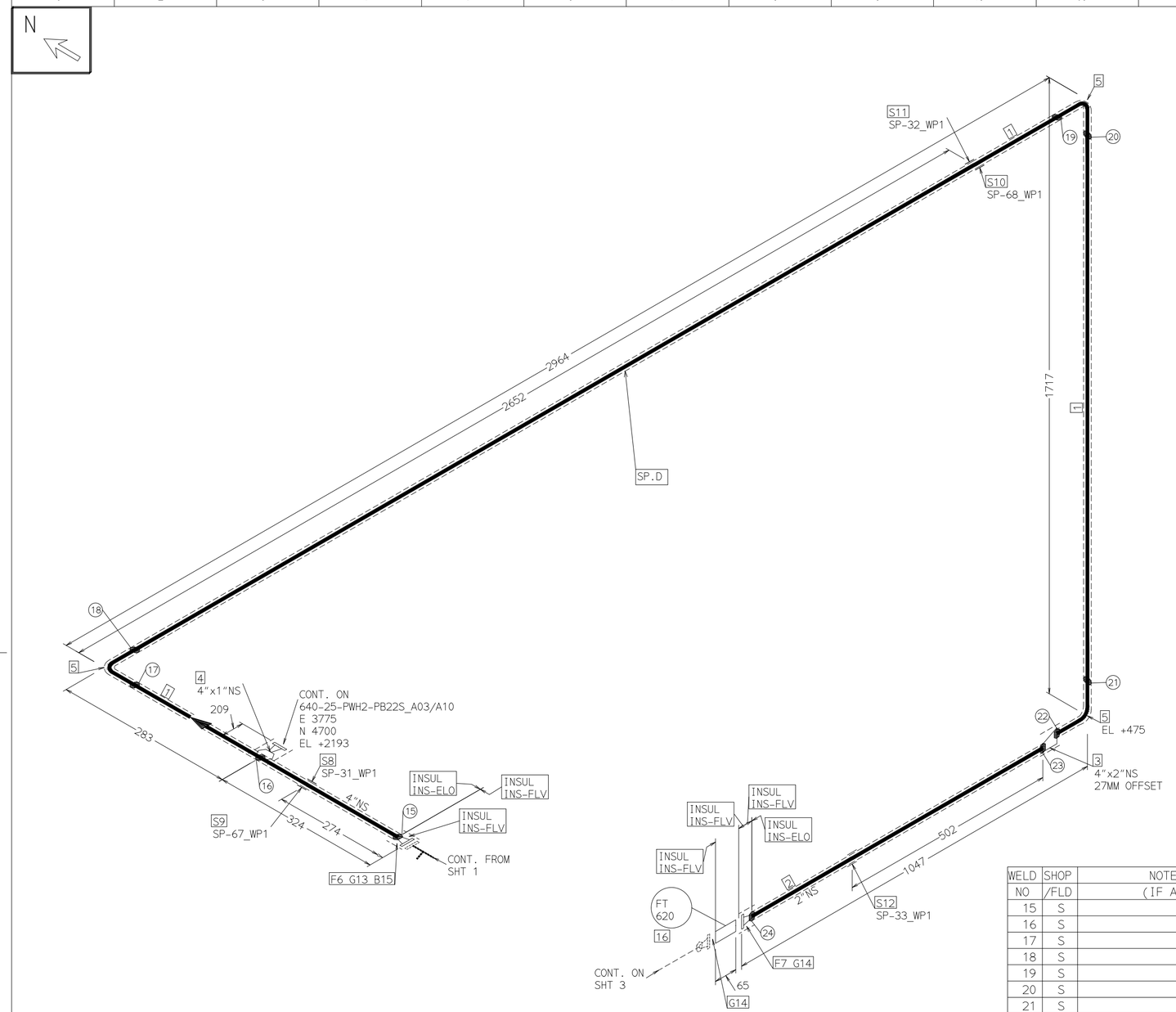
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	17	1 / 4	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	

622-100-PWH2-PB22S_A03

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	4.5M	67.83
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.8M	3.92
	FITTINGS				
3	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 2	REE0SS02450402	1	1.40
4	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	4 x 1	ONFLSS02540401	1	3.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	3	11.70
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	1	11.00
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
	SUPPORTS				
8	PIPE SHOE, S-64-DN100-100-300, Carbon Steel	4	SUPPORT	1	7.80
9	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	4	SUPPORT	1	3.40
10	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	4	SUPPORT	1	3.40
11	PIPE SHOE, S-64-DN100-100-200, Carbon Steel	4	SUPPORT	1	7.80
12	PIPE SHOE, S-64-DN50-125-200, Carbon Steel	2	SUPPORT	1	4.80

TOTAL FABRICATION WEIGHT 130.25

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	1	0.29
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
15	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	8	3.93
	INSTRUMENTS				
16	FLOW INDICATOR, ENDRESS HAUSER, COMPACT TYPE D200, Cl.300 RF FT 620	2	BY CLIENT	1	4.20

TOTAL ERECTION WEIGHT 8.68

TOTAL WEIGHT 138.93

SPOOL NUMBERS:

SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,9				VISUAL 100% ALL WELDS	

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

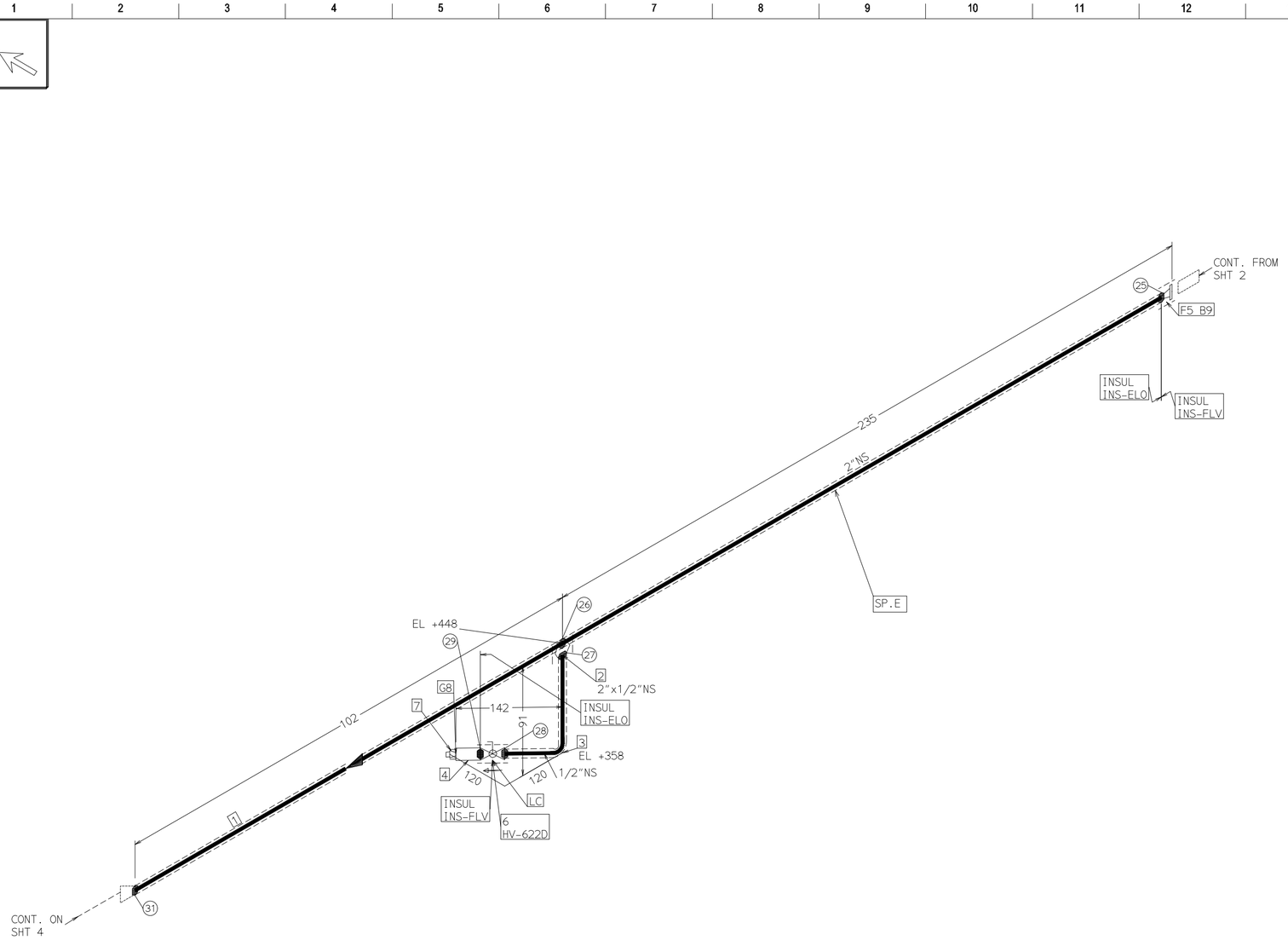
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	17	2 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.3M	1.45
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	2 x 1/2	OWELSS0944020H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
4	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
	VALVES / IN-LINE ITEMS				
6	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		6.71

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
8	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
9	160 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	2.82
			TOTAL ERECTION WEIGHT		2.90
			TOTAL WEIGHT		9.61

SPOOL NUMBERS:
SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
25	S	
26	S	
27	S	
28	S	
29	S	
31	S	

622-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

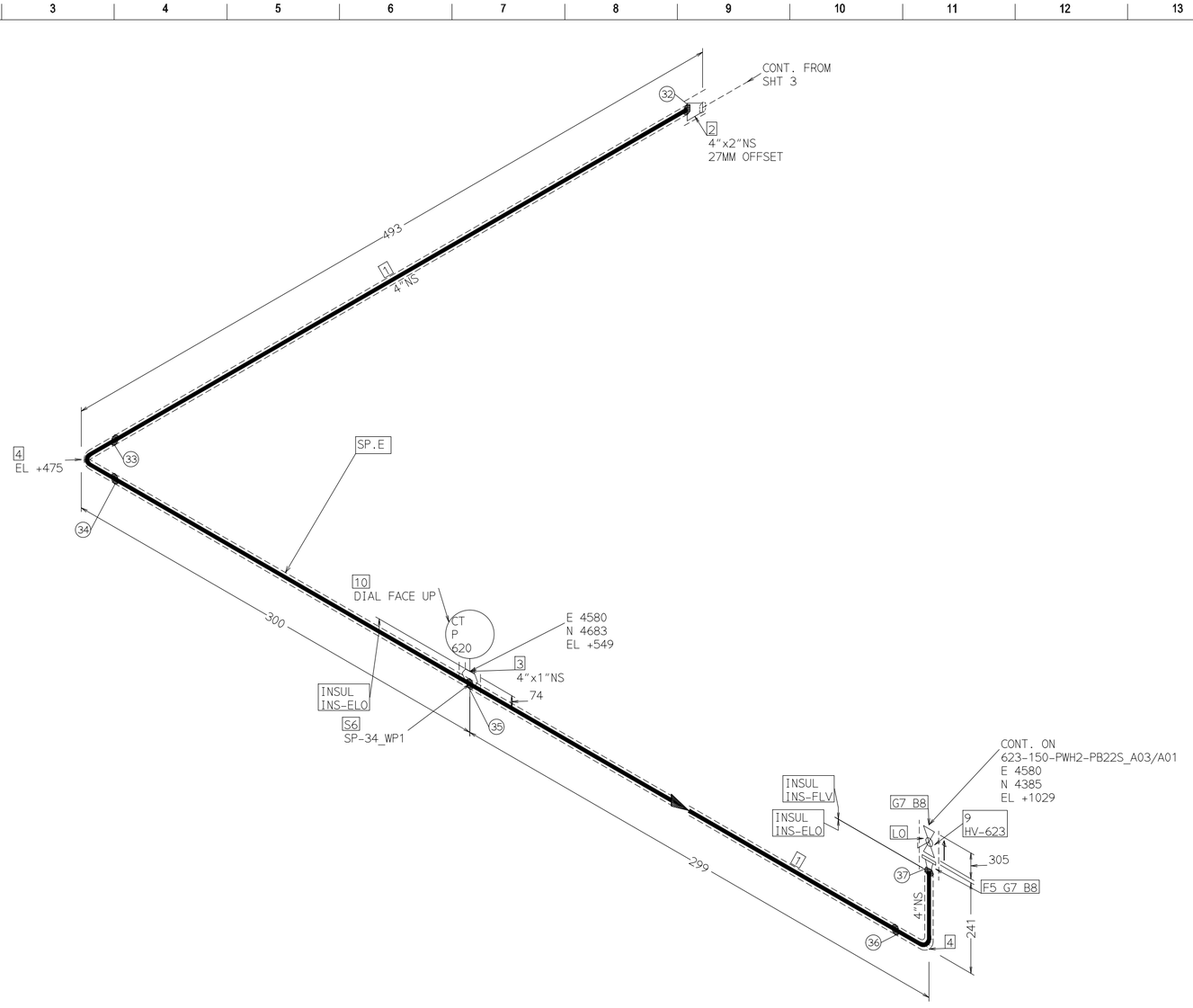
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 17

SHEET - OF: 3 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.6M	8.15
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	4 x 2	REE0SS02450402	1	1.40
3	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F316/316L	4 x 1	OTHESS03340401	1	0.38
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	2	7.80
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	1	11.00
	SUPPORTS				
6	PIPE SHOE, S-64-DN100-125-200, Carbon Steel	4	SUPPORT	1	7.80
			TOTAL FABRICATION WEIGHT		36.53

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	2	0.58
	BOLTS				
8	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	16	7.86
	VALVES / IN-LINE ITEMS				
9	BALL VALVE SFERACO 530 IIT, CL300 RF, FULL BORE, L.O., WITH LIMIT SWITCH ASTM A351 Gr.CF3M/CF8M	4	BY CLIENT	1	44.50
	INSTRUMENTS				
10	CONDUCTIVITY AND TEMPERATURE TRANSMITTER, CONDUMAX W CLS 12 SS 316 CT P 620	1	BY CLIENT	1	1.40
			TOTAL ERECTION WEIGHT		54.34
			TOTAL WEIGHT		90.87

SPOOL NUMBERS:

SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
32	S	
33	S	
34	S	
35	S	
36	S	
37	S	

622-100-PWH2-PB22S_A03

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/004	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

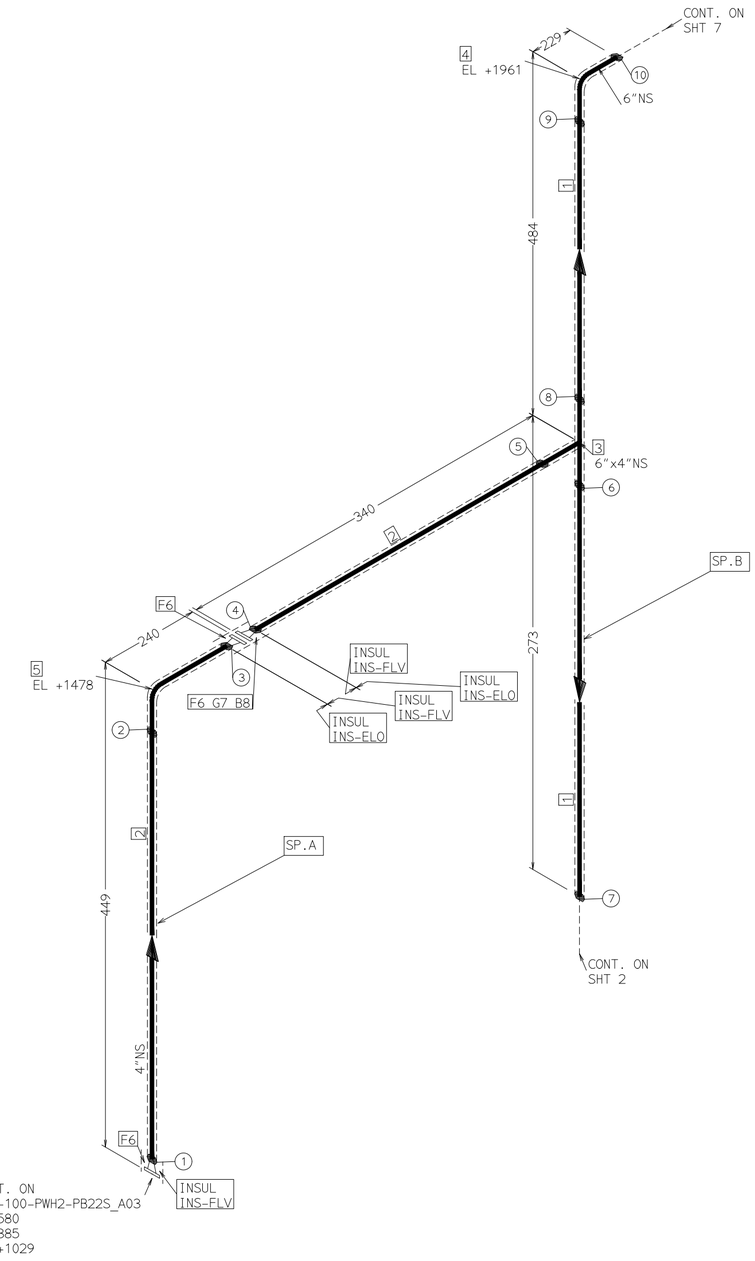
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	17	4 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.3M	6.61
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.4M	4.99
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6 x 4	TER0SS04700604	1	16.00
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	1	3.90
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLW0SS00520400	3	33.00

TOTAL FABRICATION WEIGHT 74.70

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	1	0.29
	BOLTS				
8	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B0029280400	8	3.93

TOTAL ERECTION WEIGHT 4.22

TOTAL WEIGHT 78.92

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

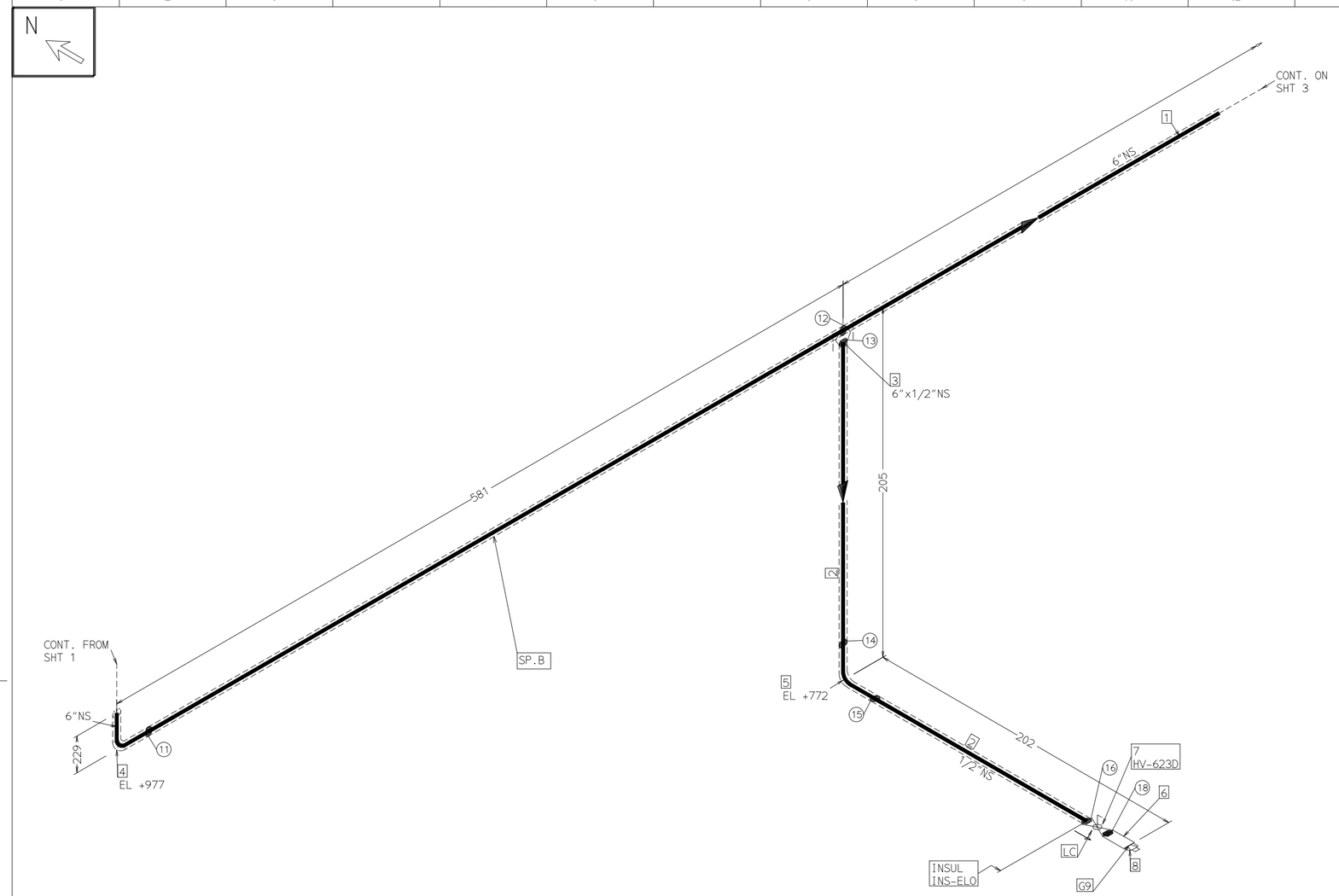
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	18	1 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.6M	14.38
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.20
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		26.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
9	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
			TOTAL ERECTION WEIGHT		0.08
			TOTAL WEIGHT		26.12

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
18	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLY = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

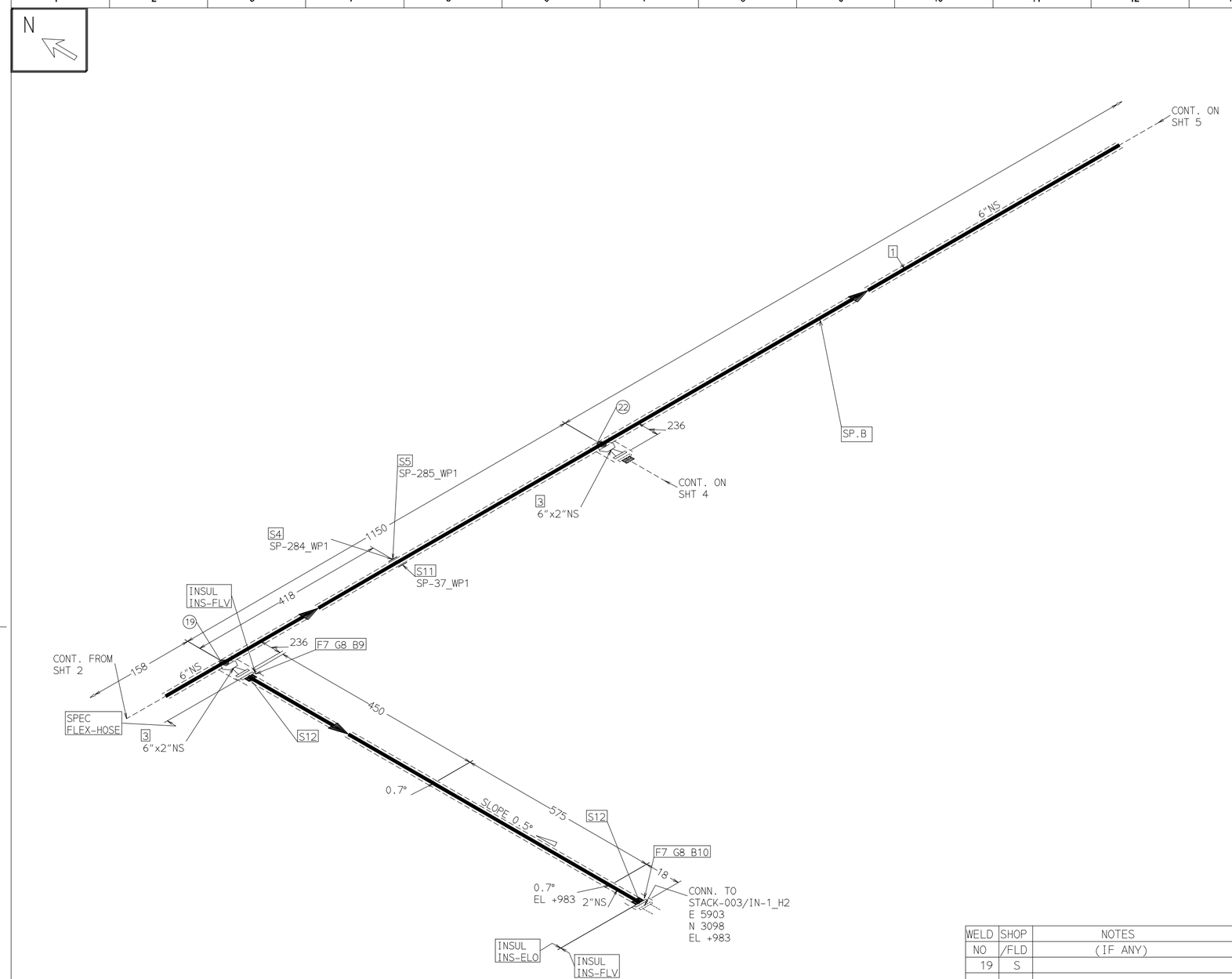
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 18
SHEET - OF: 2 / 10
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	3.1M	85.06
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-011	2	FLEX-HOSE	1.1M	2.12
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	2	14.80
	SUPPORTS				
4	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-2mm, Carbon Steel	6	SUPPORT	1	1.10
5	BOLTED GUIDE FOR SHOE, C-34-4-K-2mm, Carbon Steel	6	SUPPORT	1	4.10

TOTAL FABRICATION WEIGHT 107.18

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
7	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
11	PIPE SHOE, S-64-DN150-100-500, Carbon Steel	6	SUPPORT	1	14.50
12	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 26.68

TOTAL WEIGHT 133.86

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
19	S	
22	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

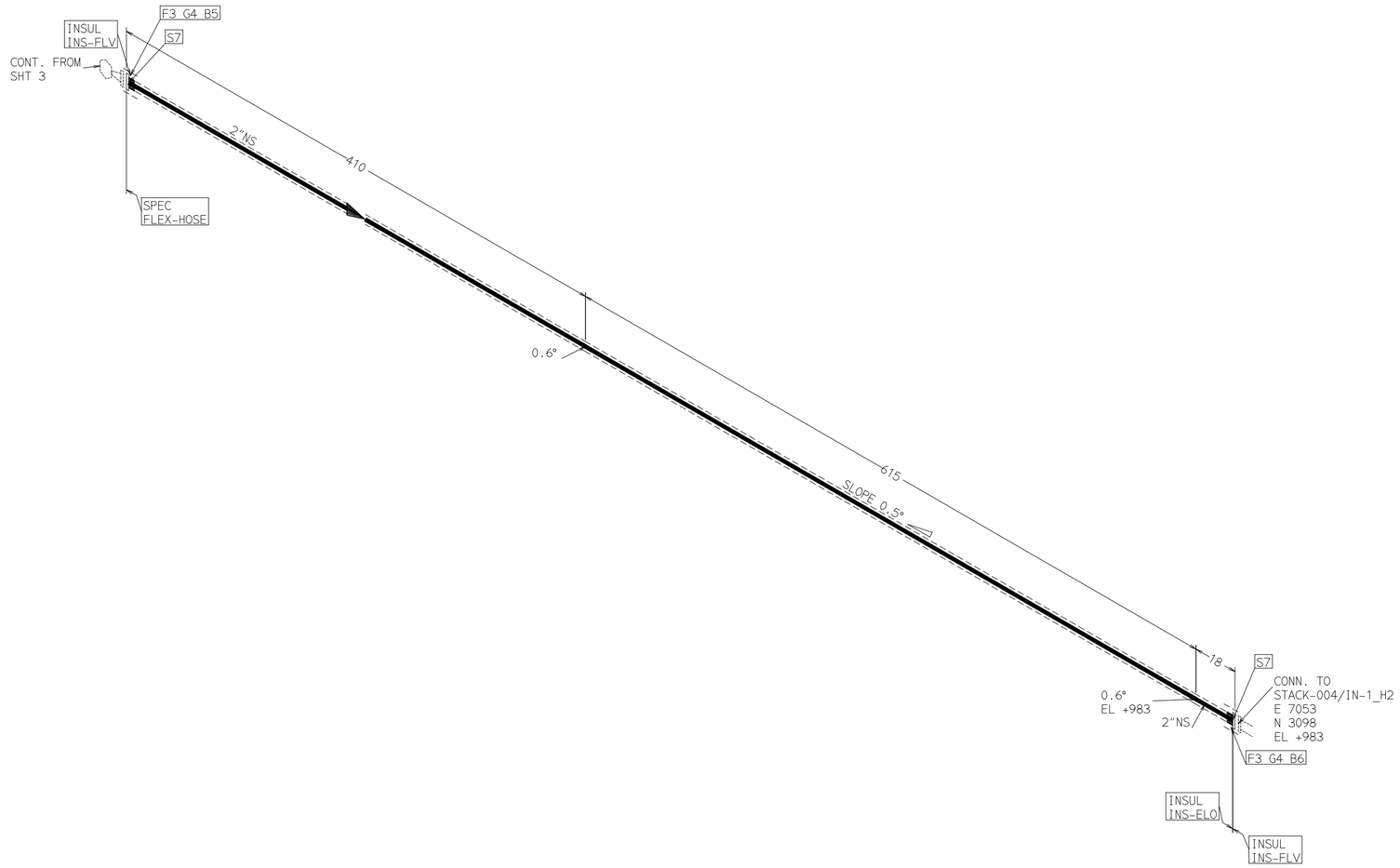
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 18

SHEET - OF: 3 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-015	2	FLEX-HOSE	1.1M	2.12

TOTAL FABRICATION WEIGHT 2.12

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 12.18

TOTAL WEIGHT 14.30

WELD NO	SHOP /FLD	NOTES (IF ANY)

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

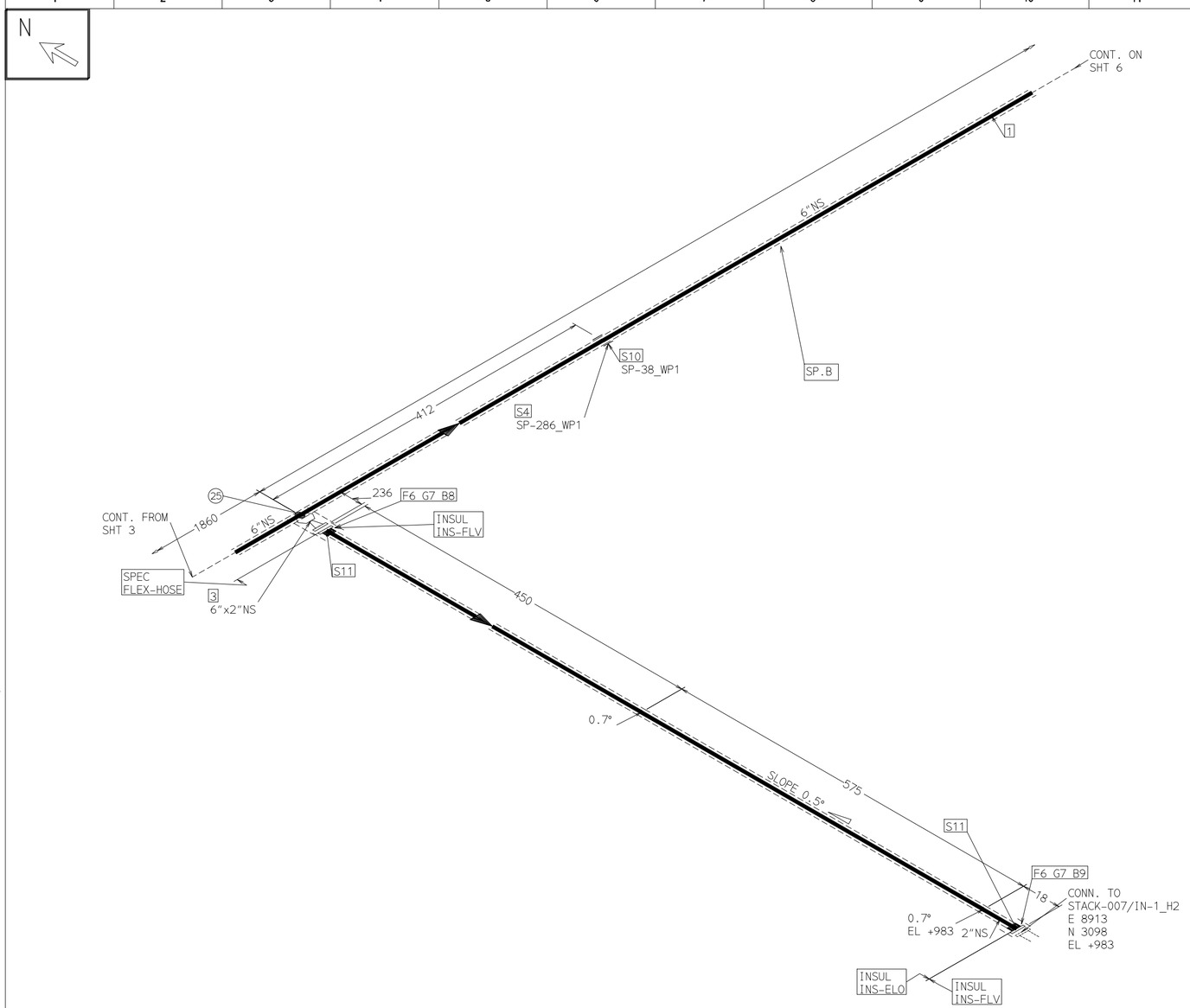
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 18

SHEET - OF: 4 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.2M	32.50
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-027	2	FLEX-HOSE	1.1M	2.12
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
	SUPPORTS				
4	BOLTED GUIDE FOR SHOE, C-34-3-K-2mm, Carbon Steel	6	SUPPORT	1	2.20
				TOTAL FABRICATION WEIGHT	44.22

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
10	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50
11	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	26.68
				TOTAL WEIGHT	70.90

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
25	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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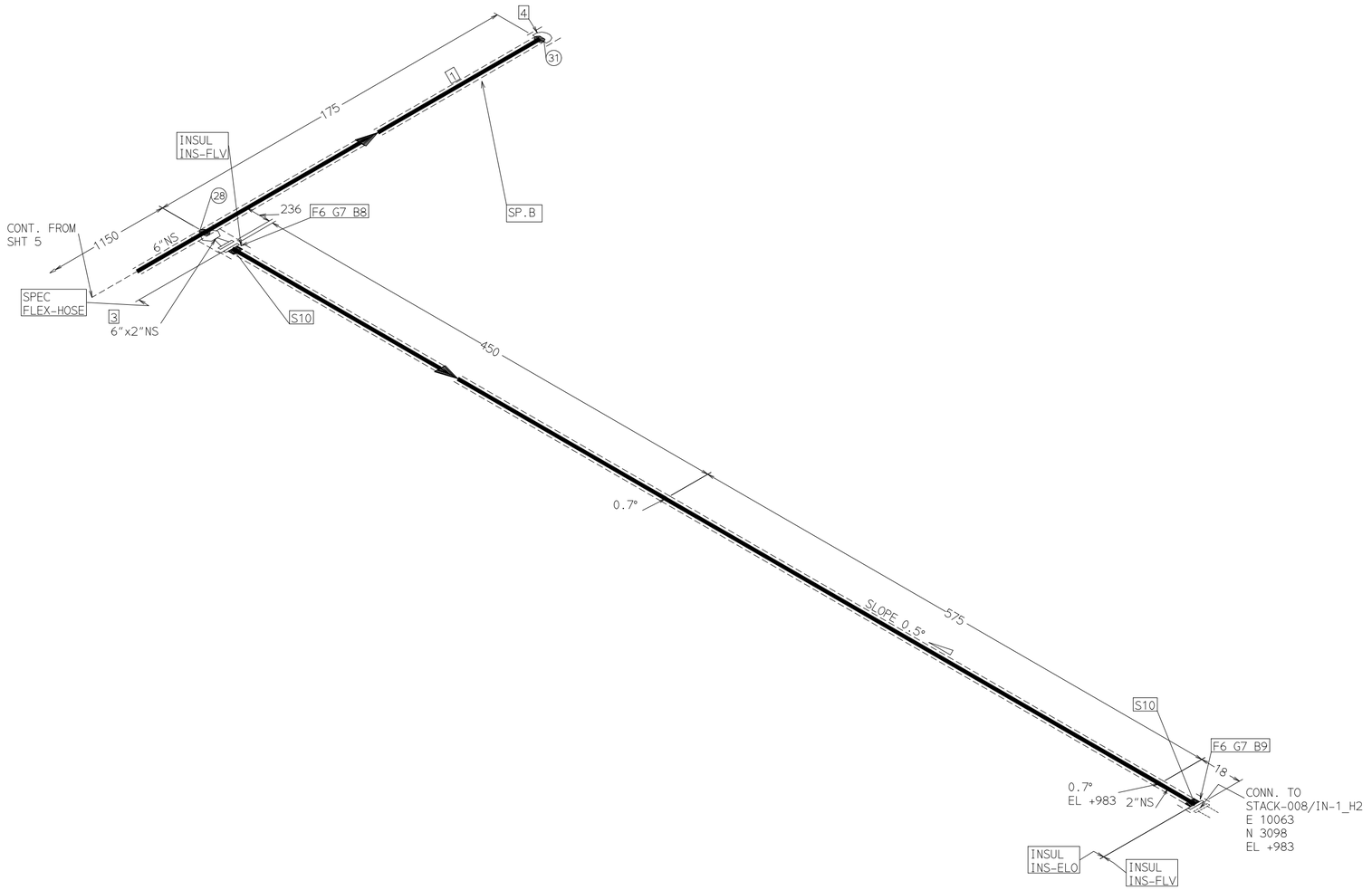
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	18	5 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.2M	4.97
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-031	2	FLEX-HOSE	1.1M	2.12
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
4	CAP ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	CAP0SS01060600	1	3.60
			TOTAL FABRICATION WEIGHT		18.09

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
10	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		12.18
			TOTAL WEIGHT		30.27

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
28	S	
31	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

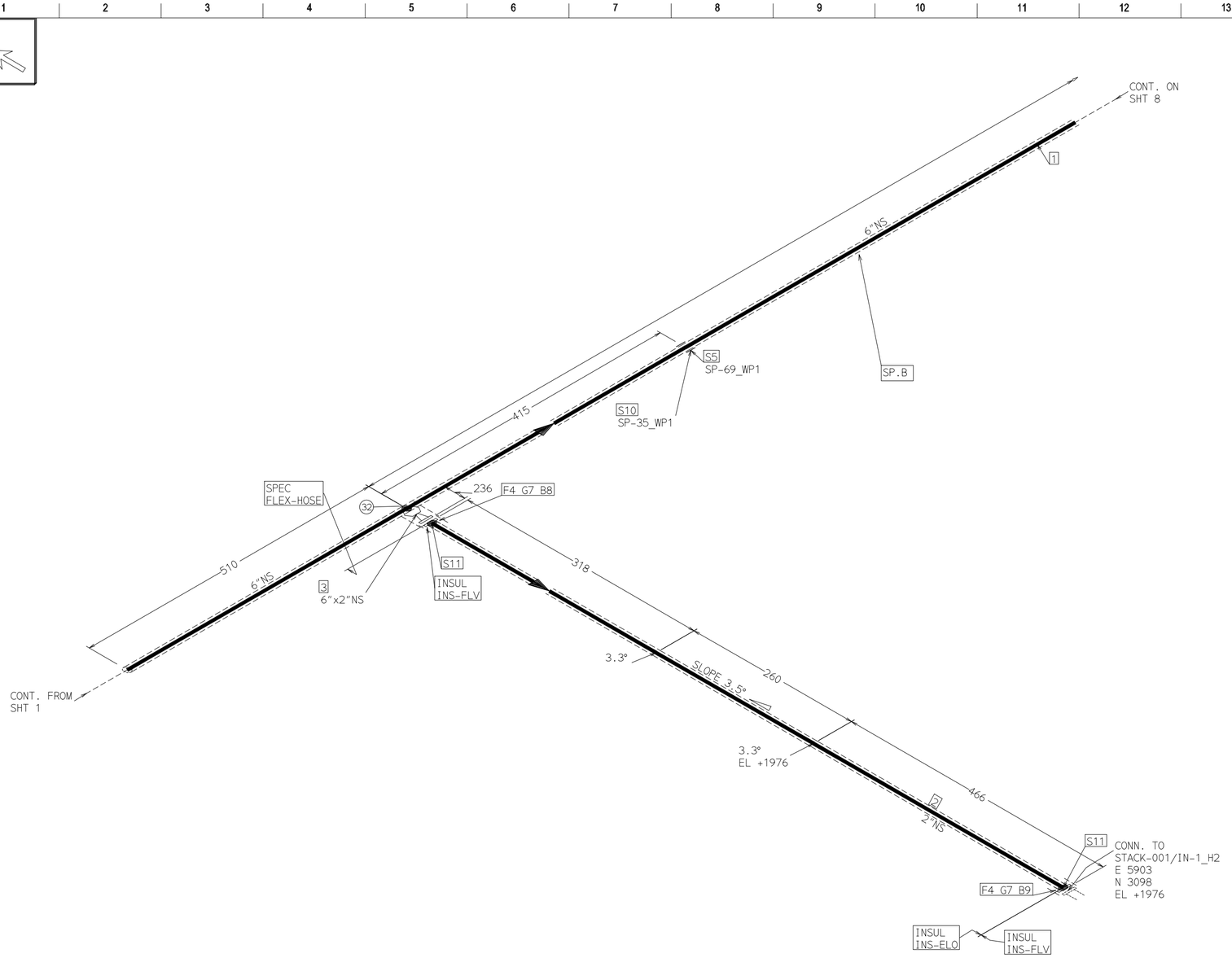
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 18

SHEET - OF: 6 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.7M	46.88
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-003	2	FLEX-HOSE	1.0M	2.06
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
	FLANGES				
4	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	SUPPORTS				
5	BOLTED GUIDE FOR SHOE, C-34-4-K-2mm, Carbon Steel	6	SUPPORT	1	4.10
			TOTAL FABRICATION WEIGHT		68.44

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
6	FLEX HOSE	2	1MECH052	0.1M	0.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
10	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50
11	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		18.68
			TOTAL WEIGHT		87.12

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
32	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

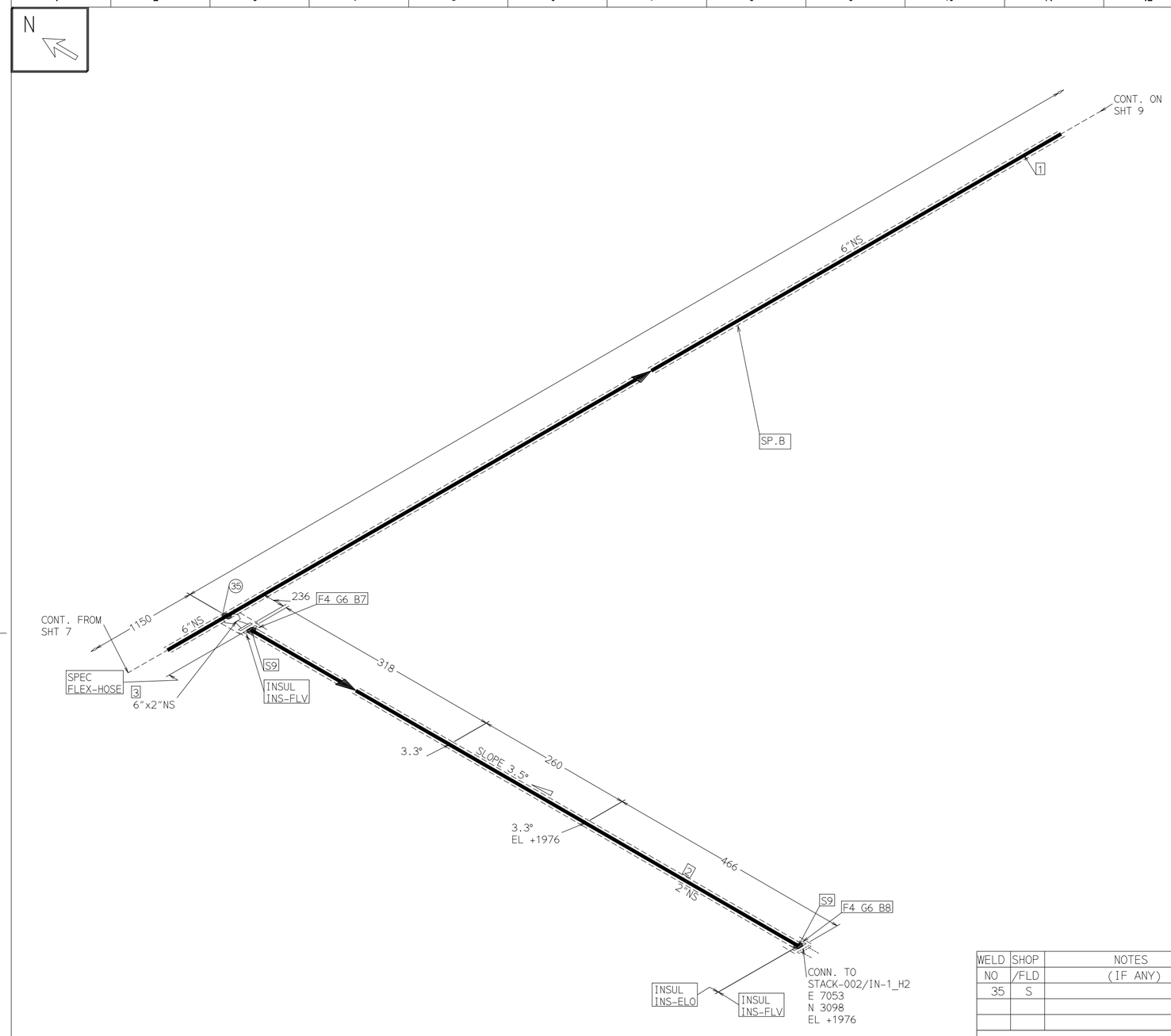
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 18

SHEET - OF: 7 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.9M	52.56
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-007	2	FLEX-HOSE	1.0M	2.06
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
	FLANGES				
4	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
				TOTAL FABRICATION WEIGHT	70.02

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.1M	0.00
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
7	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
9	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	4.18
				TOTAL WEIGHT	74.20

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
35	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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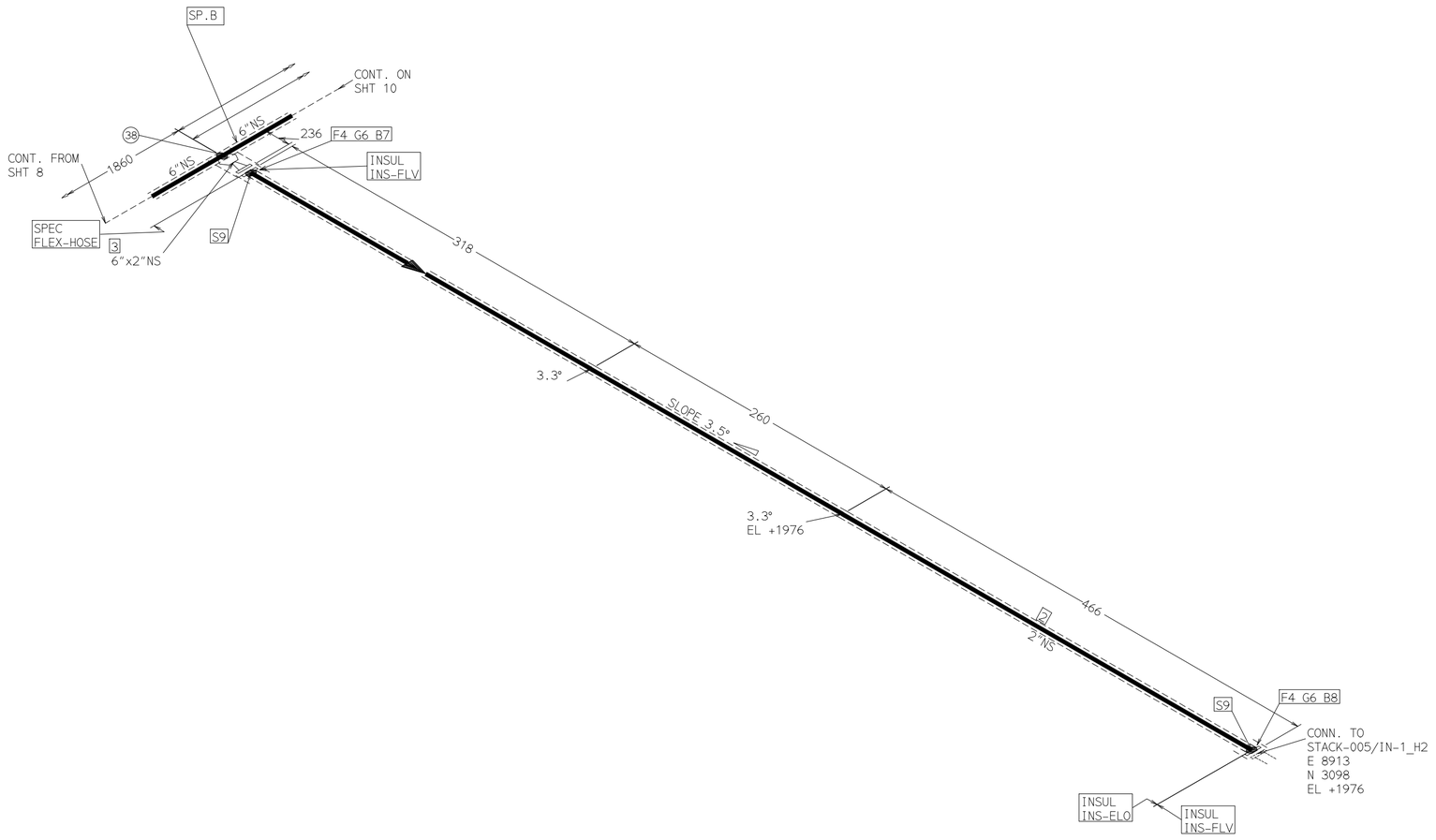
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	18	8 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6		0.1M	---
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-023	2	FLEX-HOSE	1.0M	2.06
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
	FLANGES				
4	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
			TOTAL FABRICATION WEIGHT		17.46

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.1M	0.00
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
7	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
9	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		4.18
			TOTAL WEIGHT		21.64

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
38	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

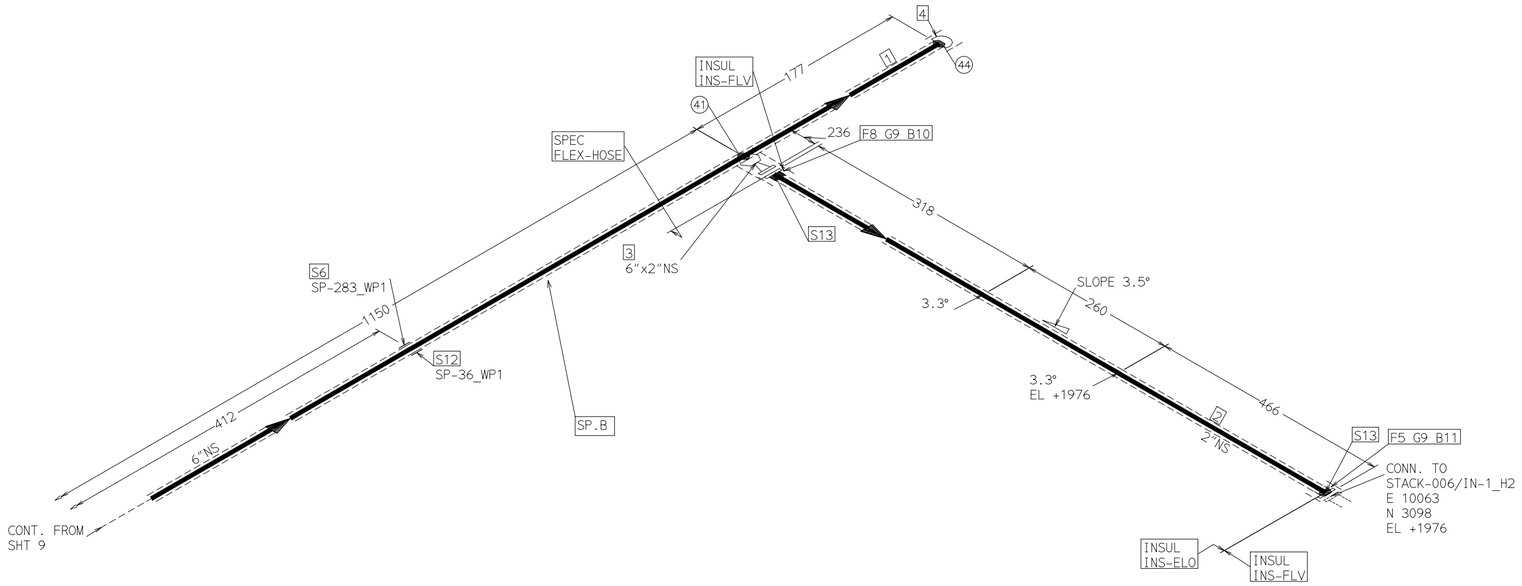
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 18

SHEET - OF: 9 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.4M	37.47
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-019	2	FLEX-HOSE	1.0M	2.06
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
4	CAP ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	CAP0SS01060600	1	3.60
	FLANGES				
5	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	SUPPORTS				
6	BOLTED GUIDE FOR SHOE, C-34-4-K-2mm, Carbon Steel	6	SUPPORT	1	4.10
			TOTAL FABRICATION WEIGHT		58.63

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
7	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
8	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	1	4.00
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
12	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50
13	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		22.68
			TOTAL WEIGHT		81.31

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
41	S	
44	S	

623-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

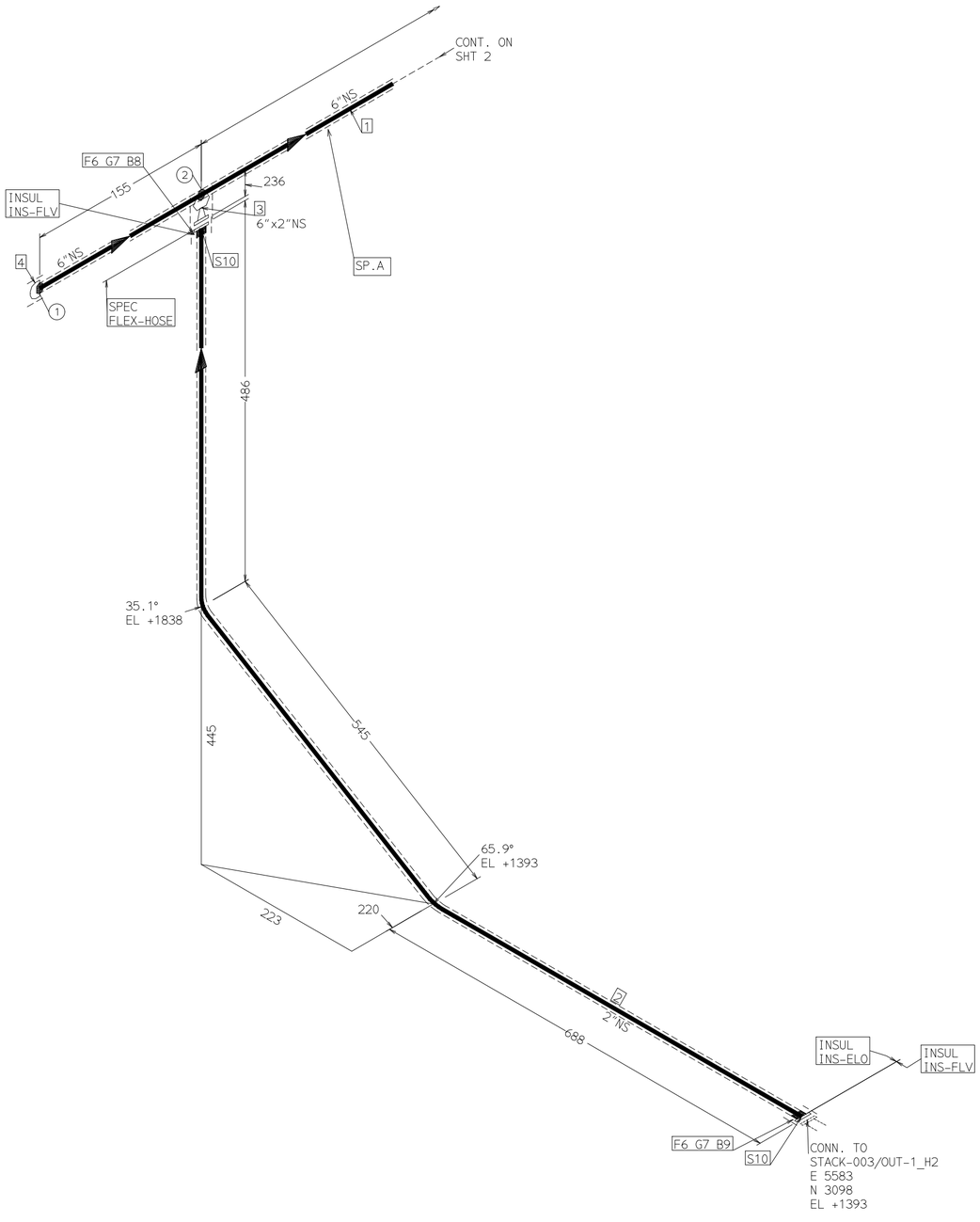
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 18

SHEET - OF: 10 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.4M	10.51
2	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-012	2	FLEX-HOSE	1.1M	2.30
	FITTINGS				
3	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	1	7.40
4	CAP ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	CAP0SS01060600	1	3.60
			TOTAL FABRICATION WEIGHT		23.81

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
5	FLEX HOSE	2	1MECH052	0.3M	0.00
	FLANGES				
6	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
10	General purpose ATTA SS 316	2	-	2	0.00
			TOTAL ERECTION WEIGHT		12.18
			TOTAL WEIGHT		35.99

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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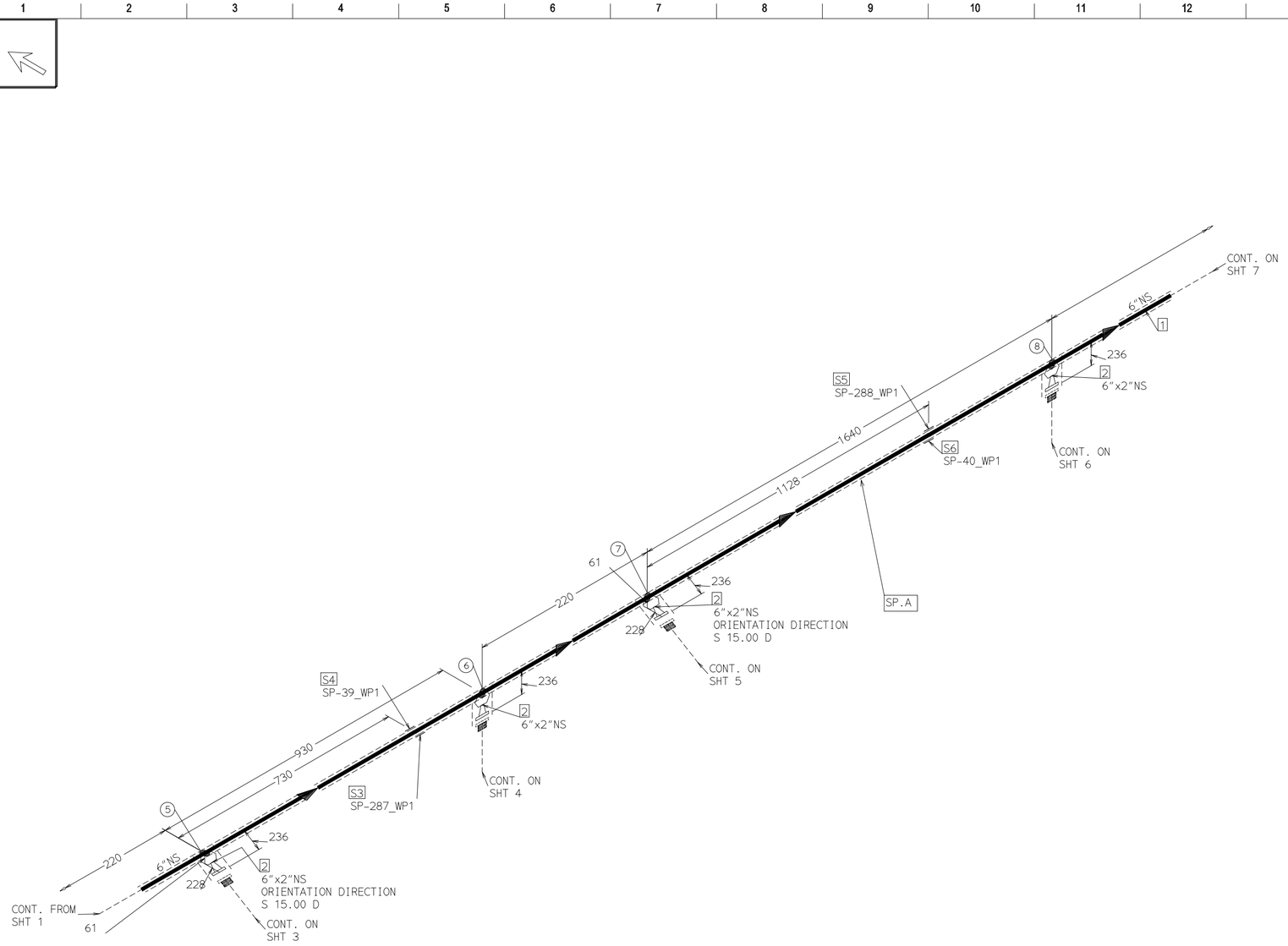
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr: 19
SHEET - OF: 1 / 10
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	3.1M	85.06
	FITTINGS				
2	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	4	29.60
	SUPPORTS				
3	BOLTED GUIDE FOR SHOE, C-34-4-I-2mm, Carbon Steel	6	SUPPORT	1	3.30
4	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50
5	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-0mm, Carbon Steel	6	SUPPORT	1	1.10
6	PIPE SHOE, S-64-DN150-100-400, Carbon Steel	6	SUPPORT	1	14.50

TOTAL FABRICATION WEIGHT 148.06

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
5	S	
6	S	
7	S	
8	S	

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

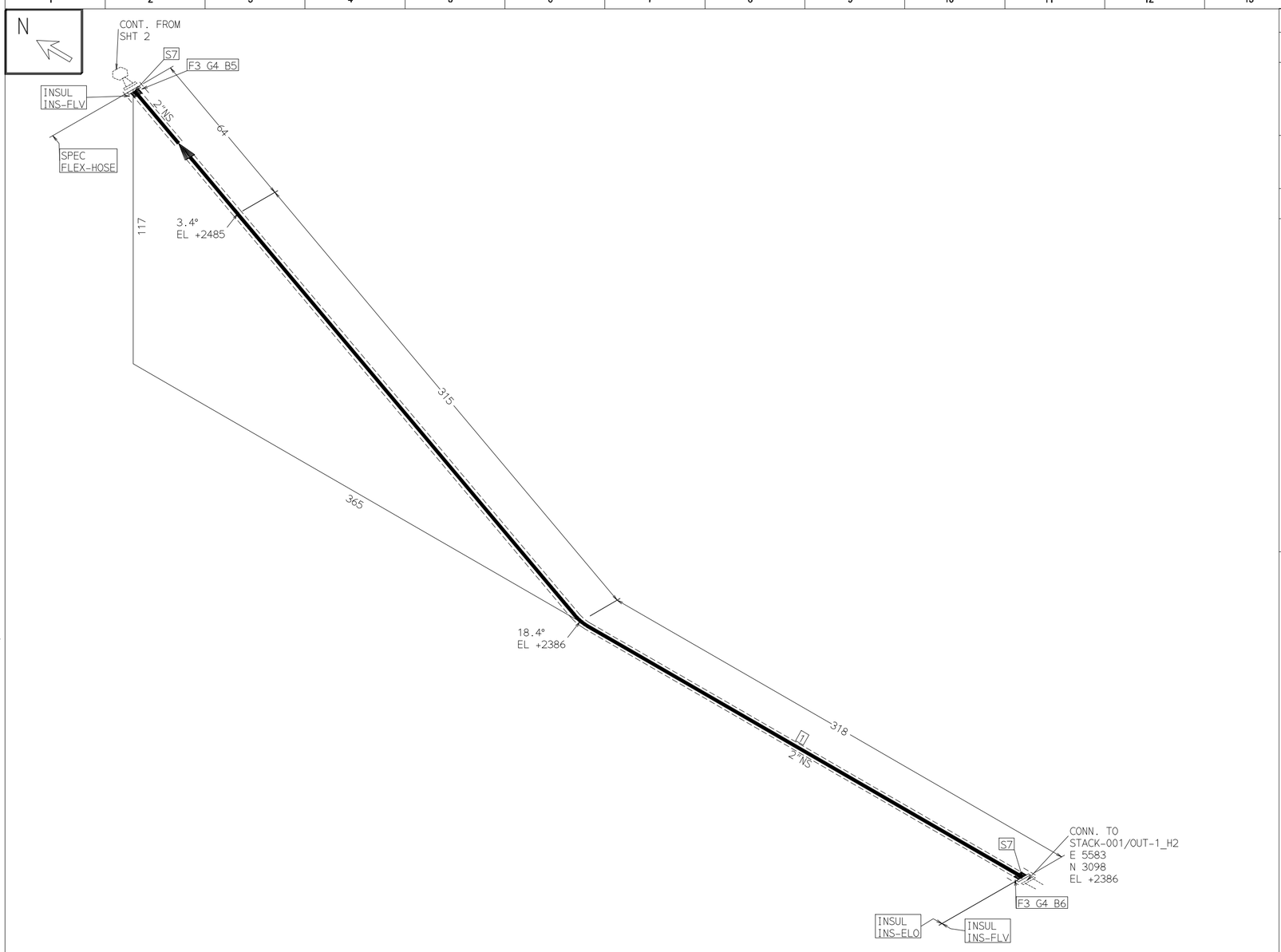
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00001	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00021	19	2 / 10	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-004	2	FLEX-HOSE	0.6M	1.18

TOTAL FABRICATION WEIGHT 1.18

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 12.18

TOTAL WEIGHT 13.36

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

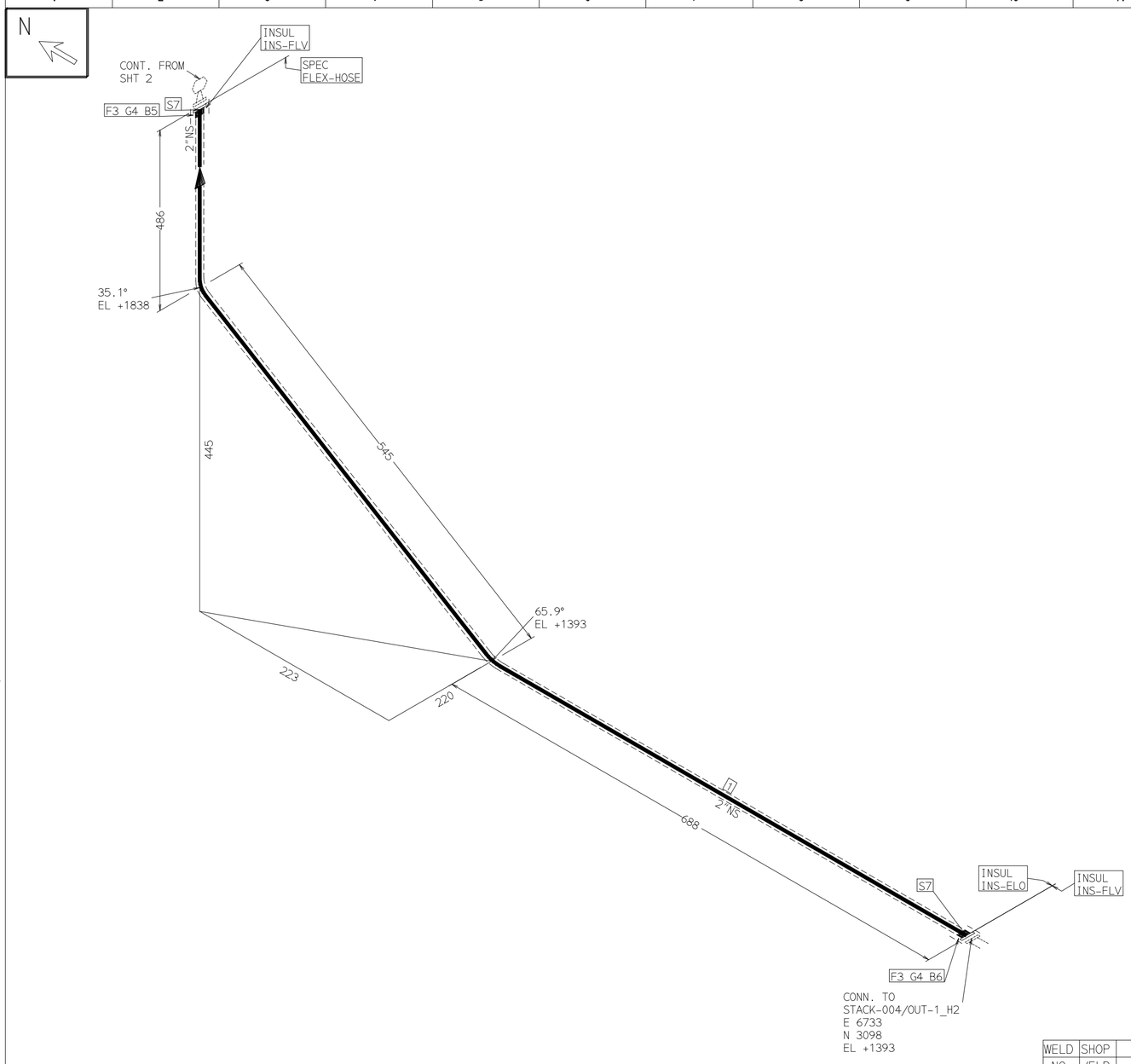
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 19

SHEET - OF: 3 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-016	2	FLEX-HOSE	1.1M	2.30
				TOTAL FABRICATION WEIGHT	2.30

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.3M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	12.18
				TOTAL WEIGHT	14.48

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) : 57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID : WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT : 100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

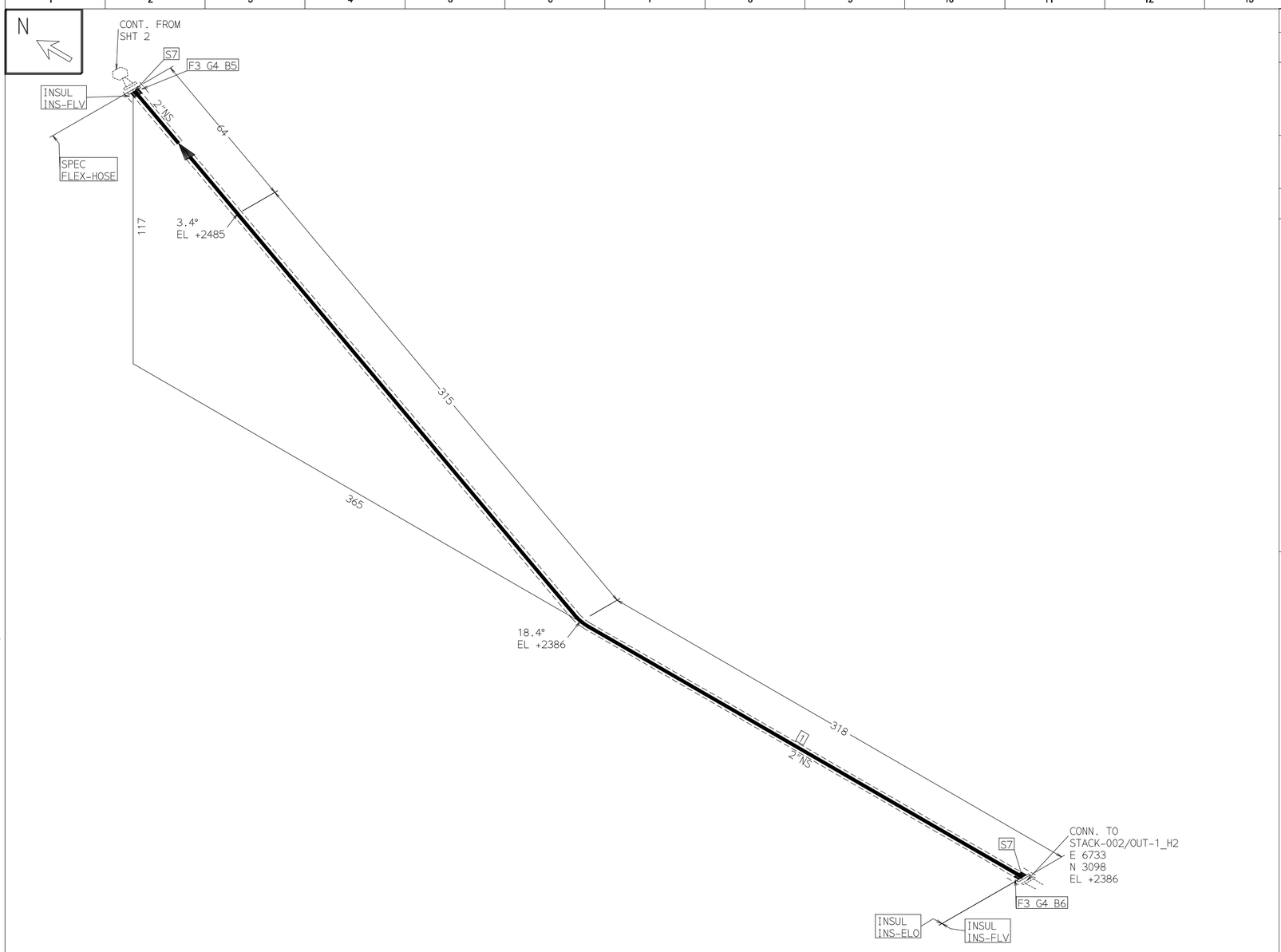
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 19

SHEET - OF: 4 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-008	2	FLEX-HOSE	0.6M	1.18

TOTAL FABRICATION WEIGHT 1.18

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 12.18

TOTAL WEIGHT 13.36

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS	
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	57,2
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40		FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-624	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1						VISUAL 100% ALL WELDS

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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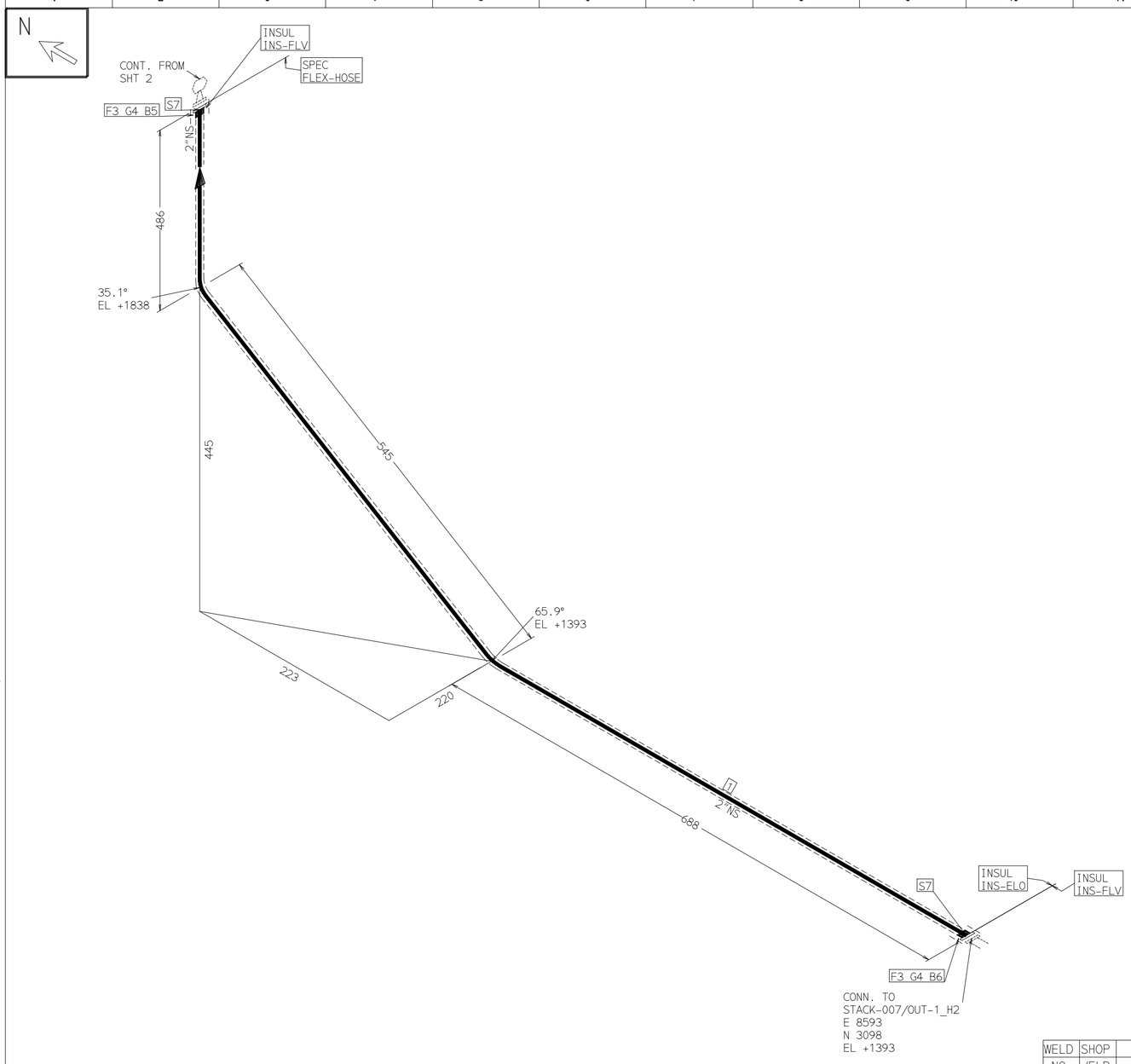
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
FORES DOC. Nr.: 224J10-DDL-PP-DI-00001
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 19
SHEET - OF: 5 / 10
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-028	2	FLEX-HOSE	1.1M	2.30
				TOTAL FABRICATION WEIGHT	2.30

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.3M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	12.18
				TOTAL WEIGHT	14.48

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

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PIPE INSULATION + TRACING

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

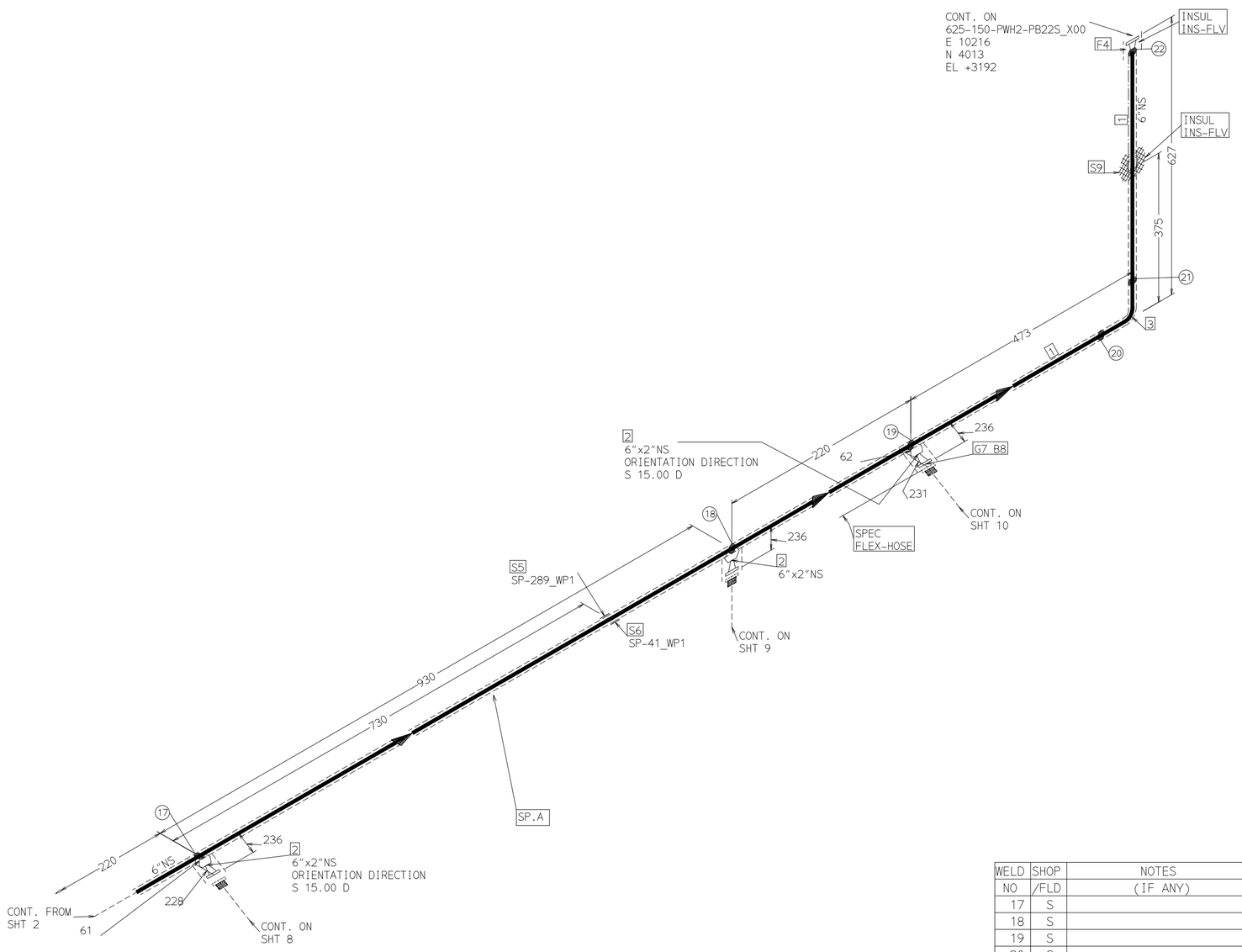
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 19

SHEET - OF: 6 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	1.7M	47.90
	FITTINGS				
2	NIPOFLANGE ASME B16.5, CL300 RF, LENGTH 150mm, Sch.40S ASTM A182 Gr.F316/316L	6 x 2	ONFLSS02580602	3	22.20
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	1	10.20
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS03290600	1	19.00
	SUPPORTS				
5	BOLTED GUIDE FOR SHOE, C-34-4-I-2mm, Carbon Steel	6	SUPPORT	1	3.30
6	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50

TOTAL FABRICATION WEIGHT 117.10

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
9	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-350/168/60/F3, AS PER DRAWING S1606153	6	2MCTZFR-6b	1	7.30

TOTAL ERECTION WEIGHT 9.39

TOTAL WEIGHT 126.49

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT : 100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS	

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
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OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

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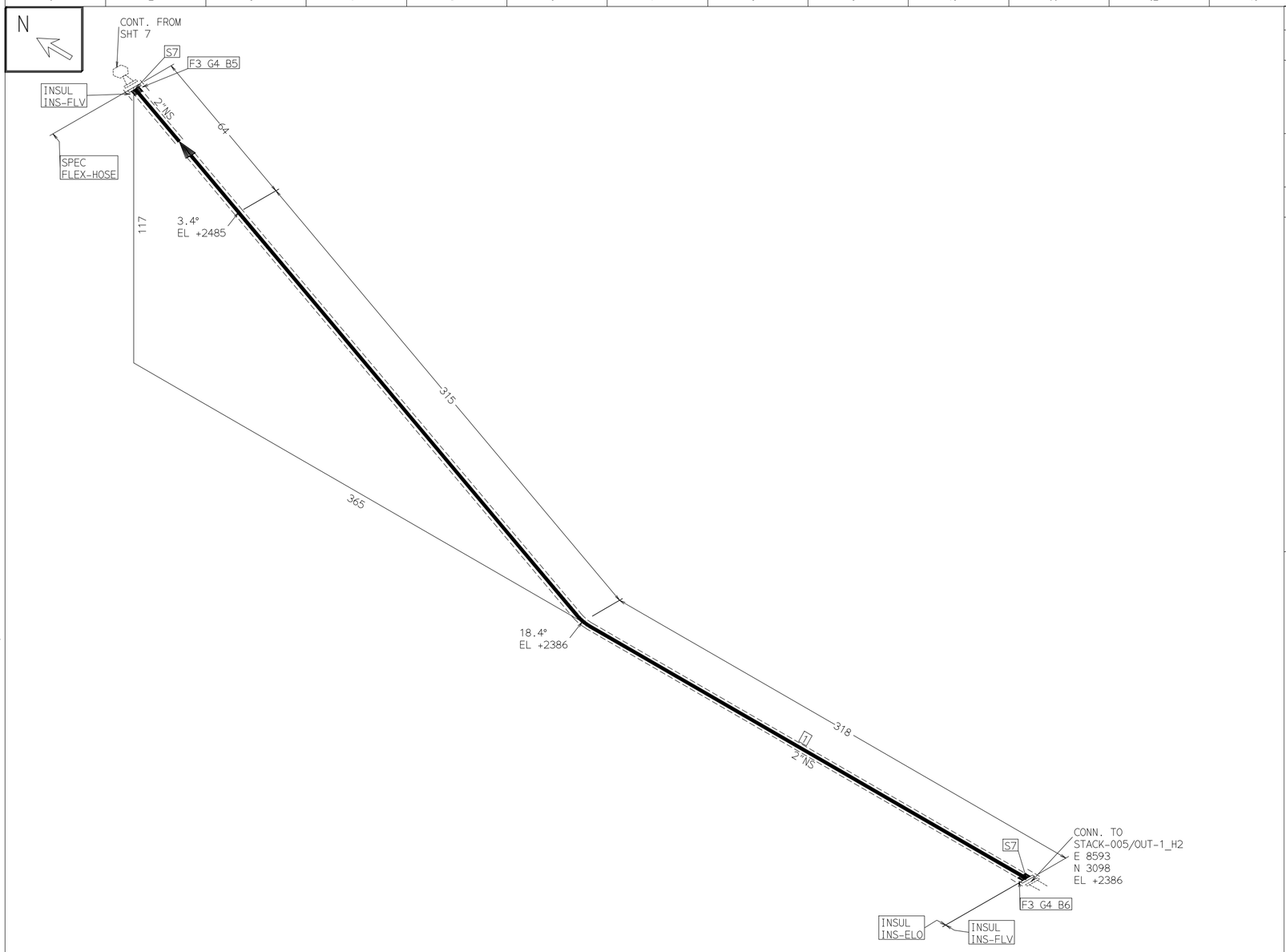
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003
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CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021
ISO Nr.: 19
SHEET - OF: 7 / 10
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-020	2	FLEX-HOSE	0.6M	1.18
				TOTAL FABRICATION WEIGHT	1.18

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00
				TOTAL ERECTION WEIGHT	12.18
				TOTAL WEIGHT	13.36

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
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TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

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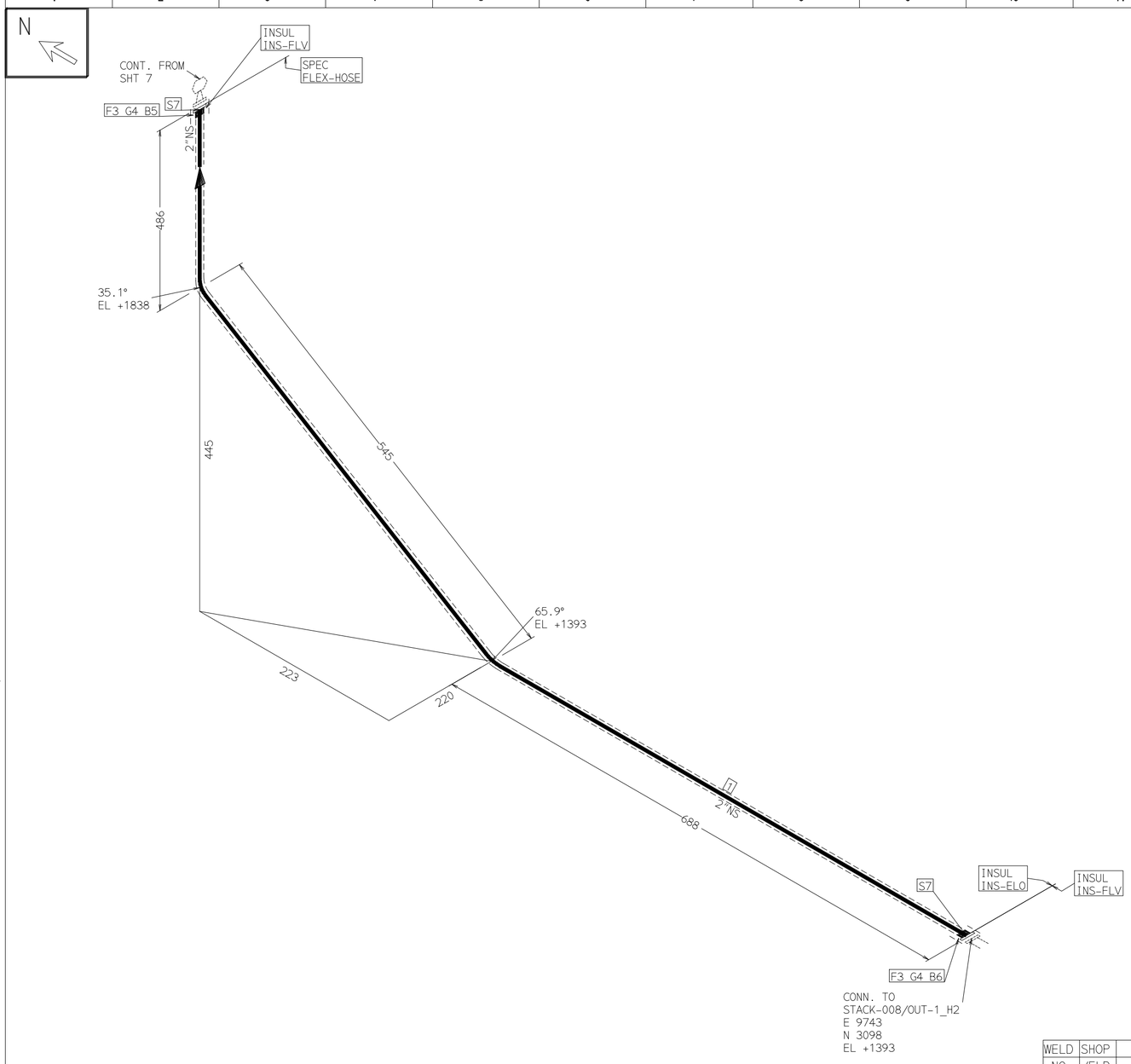
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 19

SHEET - OF: 8 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-032	2	FLEX-HOSE	1.1M	2.30

TOTAL FABRICATION WEIGHT 2.30

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.3M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	2	0.26
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
6	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
7	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 12.18

TOTAL WEIGHT 14.48

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

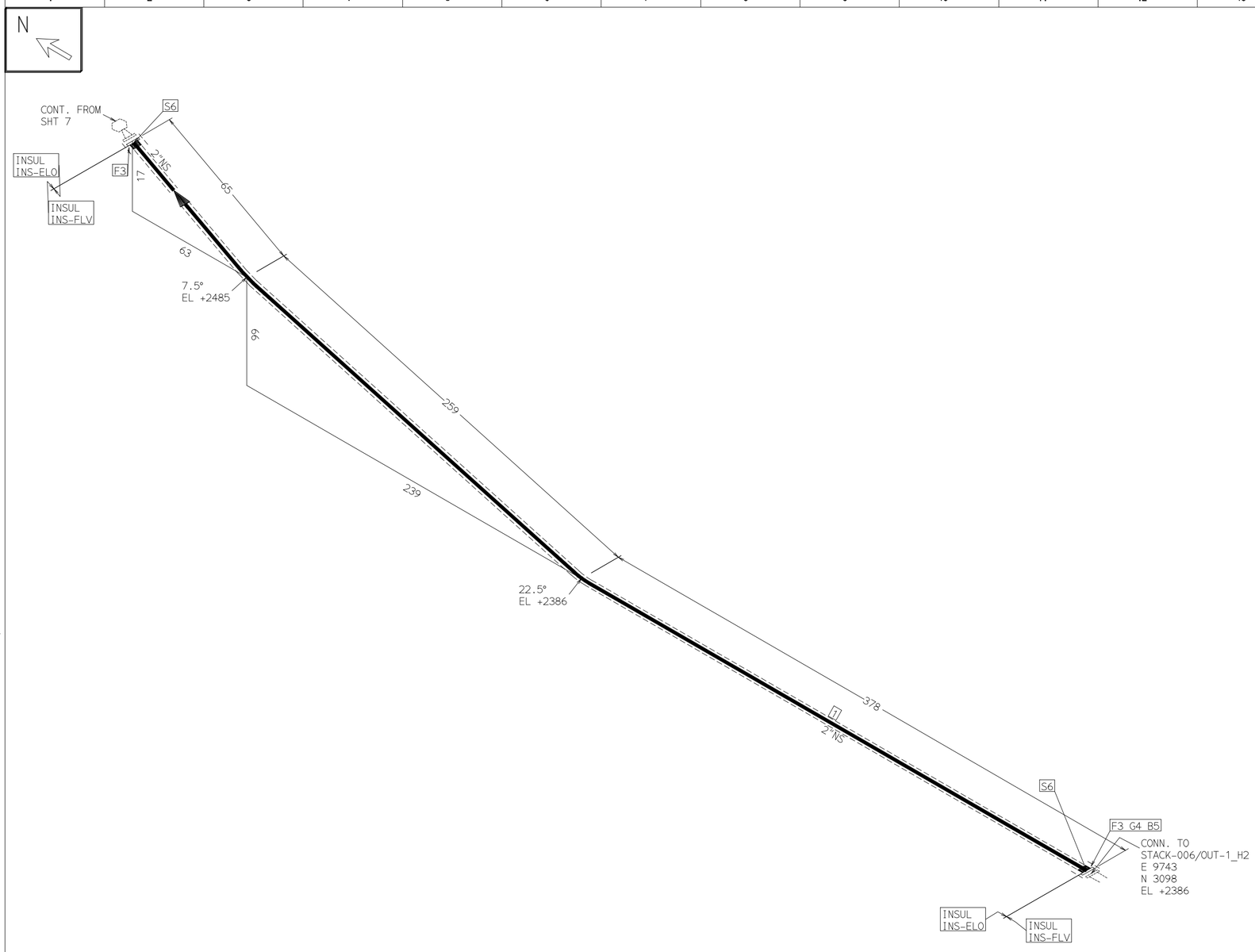
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 19

SHEET - OF: 9 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	FLEX HOSE ASTM A312 Gr.TP 316/316L Tag: FP-024	2	FLEX-HOSE	0.6M	1.11

TOTAL FABRICATION WEIGHT 1.11

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
2	FLEX HOSE	2	1MECH052	0.1M	0.00
	FLANGES				
3	FLANGED FLEXIBLE HOSE, ASME B16.5, CL.300 RF ASTM A182 Gr.F316/316L	2	1MECH052	2	8.00
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
5	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
	SUPPORTS				
6	General purpose ATTA SS 316	2	-	2	0.00

TOTAL ERECTION WEIGHT 10.09

TOTAL WEIGHT 11.20

WELD NO	SHOP /FLD	NOTES (IF ANY)

624-150-PWH2-PB22S_A03/A01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-624	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

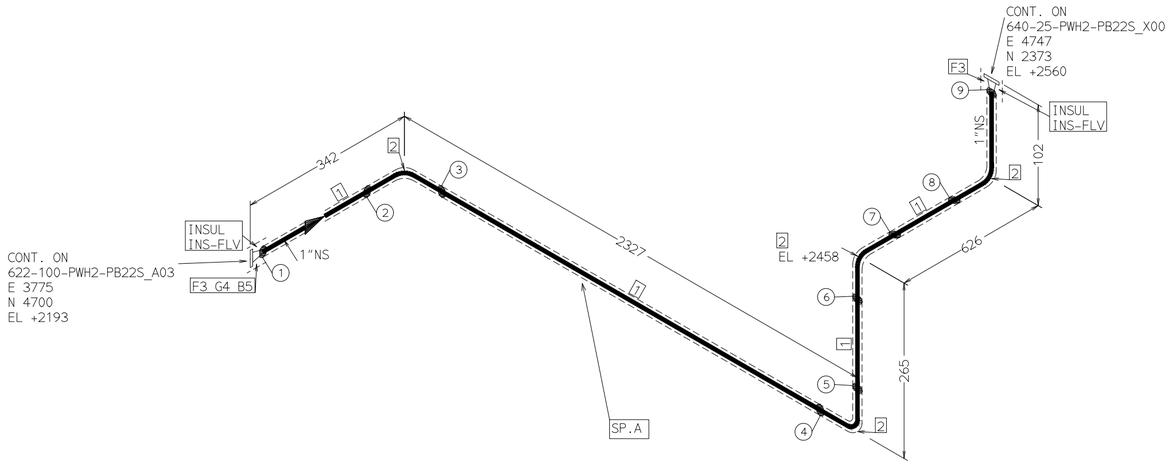
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 19

SHEET - OF: 10 / 10

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	3.3M	8.04
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	4	0.60
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		12.64

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
5	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
			TOTAL ERECTION WEIGHT		0.99
			TOTAL WEIGHT		13.63

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

640-25-PWH2-PB22S_A03/A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-004/007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	31,9					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-003

FORES DOC. Nr.: 224J10-DDL-PP-DI-00001

CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00021

ISO Nr.: 20

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:

ISOMETRICS BOOKLET WP2
(incl. heat tracing)

NOTES:

- MANUFACTURER WILL BE RESPONSIBLE OF ANY ADJUSTMENT NECESSARY TO FIT THESE PIPES ON SKID;
- MANUFACTURER SHALL CONSIDER IN THE SCOPE 5% OF VARIANCE TO CHANGE REQUEST DURING DETAILED ENGINEERING PHASE;
- BEFORE PREFABRICATING THE DIMENSIONS MUST BE CHECKED IN SHOP

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

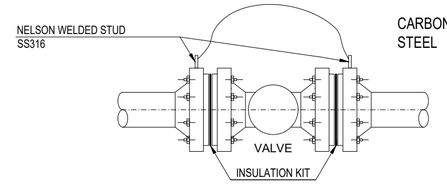
TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-004		224J10-DDL-PP-DI-00002	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	A	- / -	C.B.

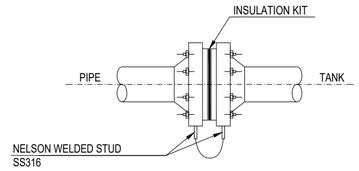
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SHEET	REVISIONS						DESCRIPTION
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A	25.09.24						COVER SHEET
B	25.09.24						INDEX & REVISIONS
1	25.09.24						300-15-RW-PA22S_C01
2	25.09.24						302A-25-PW-PA22S_C01
3	25.09.24						302B-25-PW-PA22S_C01
4	25.09.24						303A-25-PW-PA22S_C01
5	25.09.24						303B-25-PW-PA22S_C01
6	25.09.24						305-15-PW-PA22S_C01
7	25.09.24						306-25-PW-PA22S_C01
8	25.09.24						307-25-PW-PB22S_C01
9	25.09.24						503-15-RW-PA22S_C01
10	25.09.24						509-50-RW-PA22S_C01
11	25.09.24						413-50-CW-PA20W_B01
12	25.09.24						430-50-CW-PA20W_B01

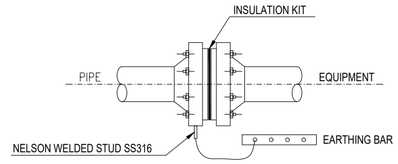
TYPICAL EARTHING DETAILS



CARBON STEEL / STAINLESS STEEL



CARBON STEEL / STAINLESS STEEL
TANK



CARBON STEEL / STAINLESS STEEL
GENERAL EQUIPMENT

FLANGED JOINTS IN METALLIC PIPELINES THAT HAVE NEITHER INSULATION KIT NOR PTFE GASKET ARE CONSIDERED INHERENTLY CONTINUOUS.

NOTES:

- ALL DIMENSIONS MUST BE VERIFIED DURING CONSTRUCTION;
- ALL VALVE DIMENSIONS MUST BE CHECKED ON SITE BEFORE ASSEMBLY;
- ALL THE WELDED COMPONENTS WILL BE CHECKED ON SITE BEFORE THE ASSEMBLY;
- VALVE HANDWHEEL ORIENTATION TO BE CHECKED AND DEFINED DURING ERECTION PHASE BY CONSTRUCTION COMPANY.

REV.	DATE	DESCRIPTION
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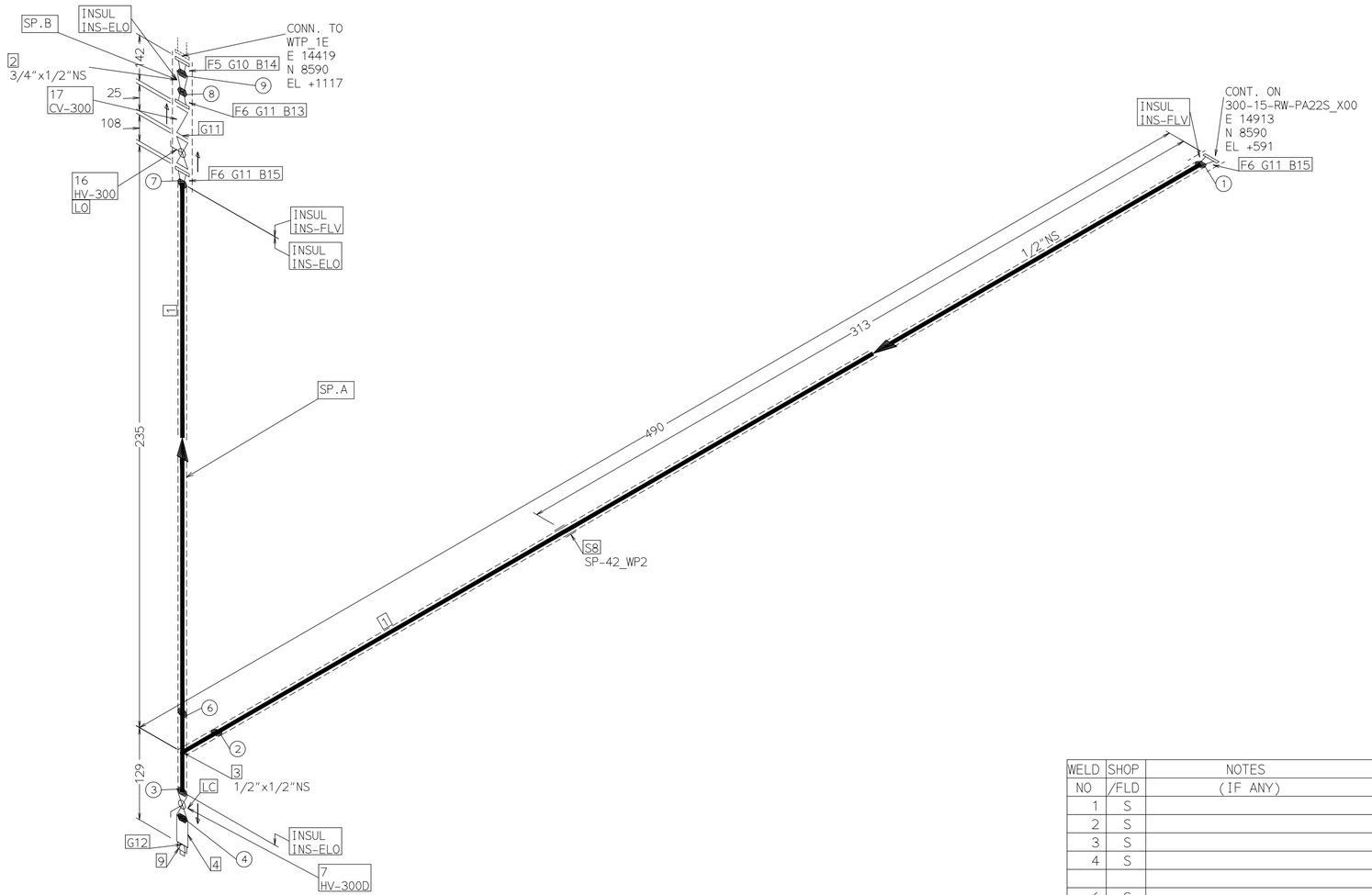
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-003		224J10-DDL-PP-DI-00002	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	B	- / -	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
6	S	
7	S	
8	S	
9	S	

300-15-RW-PA22S_C01

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.6M	0.93
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	RECOSS05113Q0H	1	0.10
3	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2 x 1/2	TEE0SS01490H00	1	0.25
4	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS03973Q00	1	0.80
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	3	1.80
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
8	PIPE SHOE, S-64-DN15-50-200, Carbon Steel	1/2	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		9.26

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00383Q00	1	0.05
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	4	0.12
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
13	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	4	0.73
14	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.59
15	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
16	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	1.80
17	CHECK VALVE ASME B16.10, WAFER TYPE, CL150 RF ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.24
			TOTAL ERECTION WEIGHT		4.74
			TOTAL WEIGHT		14.00

SPOOL NUMBERS:
SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	50	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	15	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

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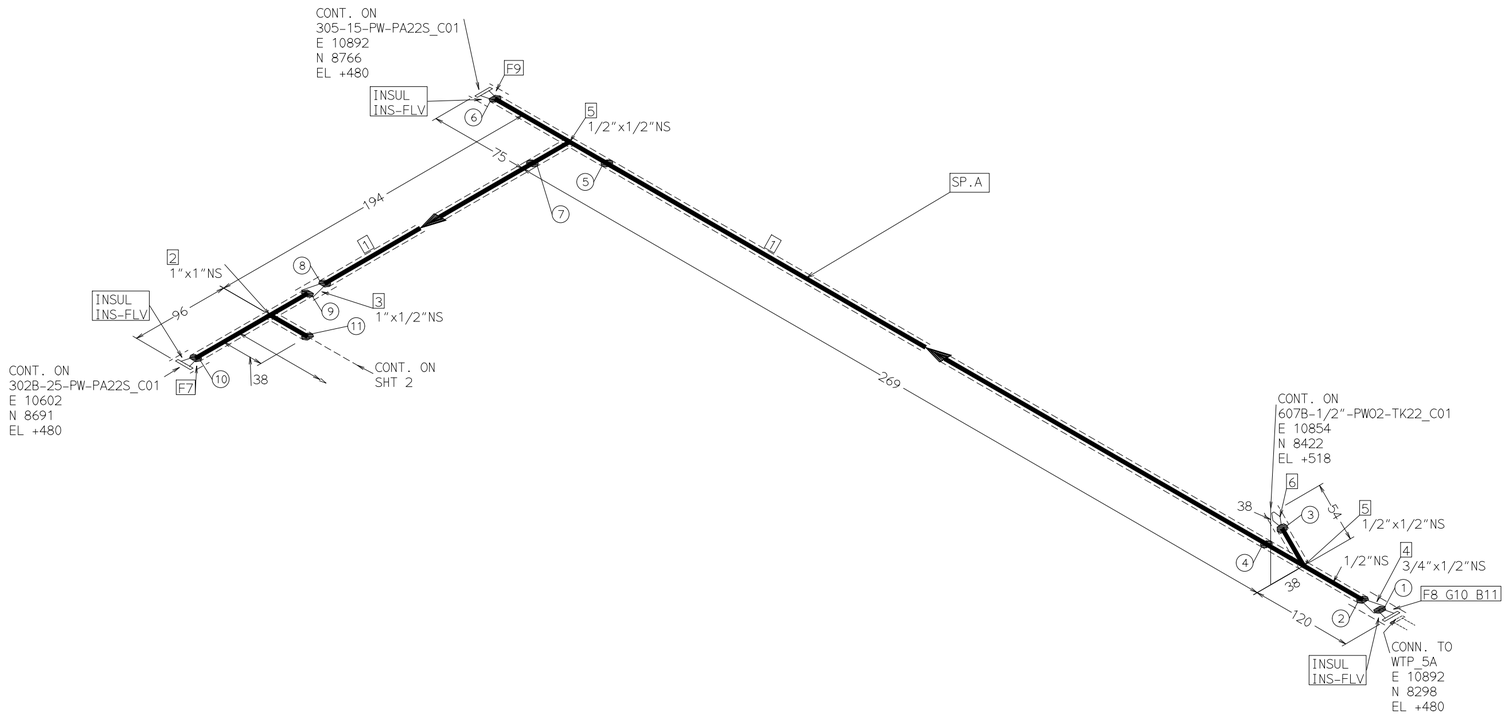
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-004		224J10-DDL-PP-DI-00002	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	01	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.3M	0.47
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
5	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2 x 1/2	TEE0SS01490H00	2	0.50
6	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS03973Q00	1	0.80
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	1	0.60
			TOTAL FABRICATION WEIGHT		4.12

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00383Q00	1	0.05
	BOLTS				
11	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.59
			TOTAL ERECTION WEIGHT		0.64
			TOTAL WEIGHT		4.76

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

302A-25-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

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PROJECT:
C63 - CROSSWIND PROJECT
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TITLE
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ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

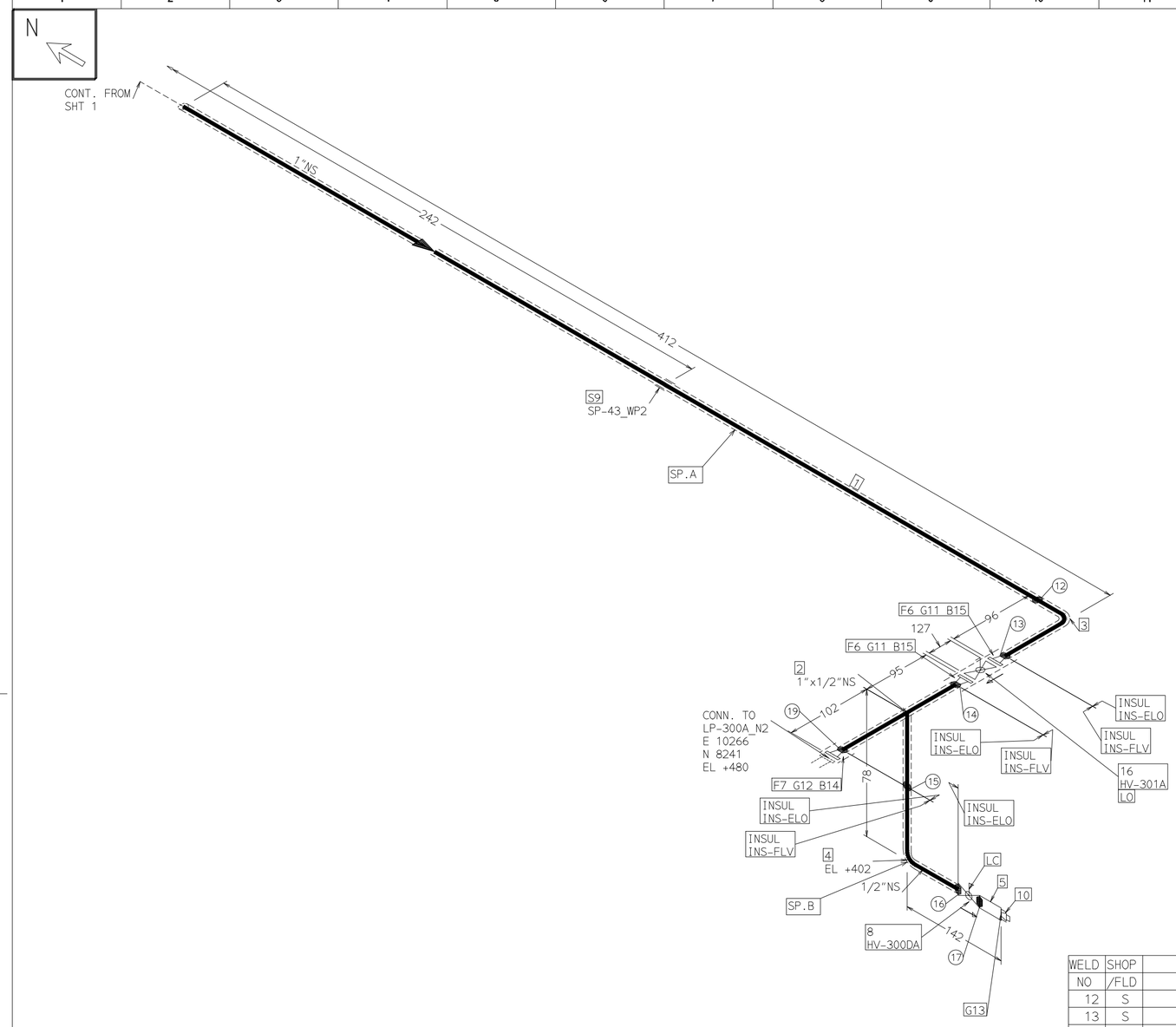
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 02

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.4M	0.93
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	2	2.20
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
9	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40

TOTAL FABRICATION WEIGHT 11.24

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	2	0.12
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
14	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
15	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	VALVES / IN-LINE ITEMS				
16	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	1	3.20

TOTAL ERECTION WEIGHT 5.63

TOTAL WEIGHT 16.87

WELD NO	SHOP /FLD	NOTES (IF ANY)
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
19	S	

302A-25-PW-PA22S_C01

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

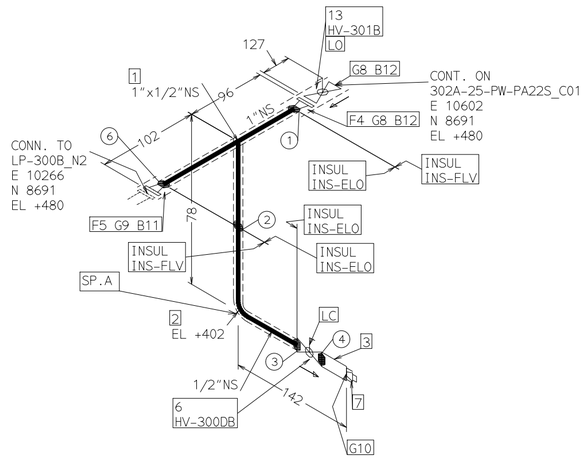
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 02

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
1	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
3	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	VALVES / IN-LINE ITEMS				
6	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 4.66

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	2	0.12
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
11	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
12	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	VALVES / IN-LINE ITEMS				
13	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	1	3.20

TOTAL ERECTION WEIGHT 5.63

TOTAL WEIGHT 10.29

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
6	S	

302B-25-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

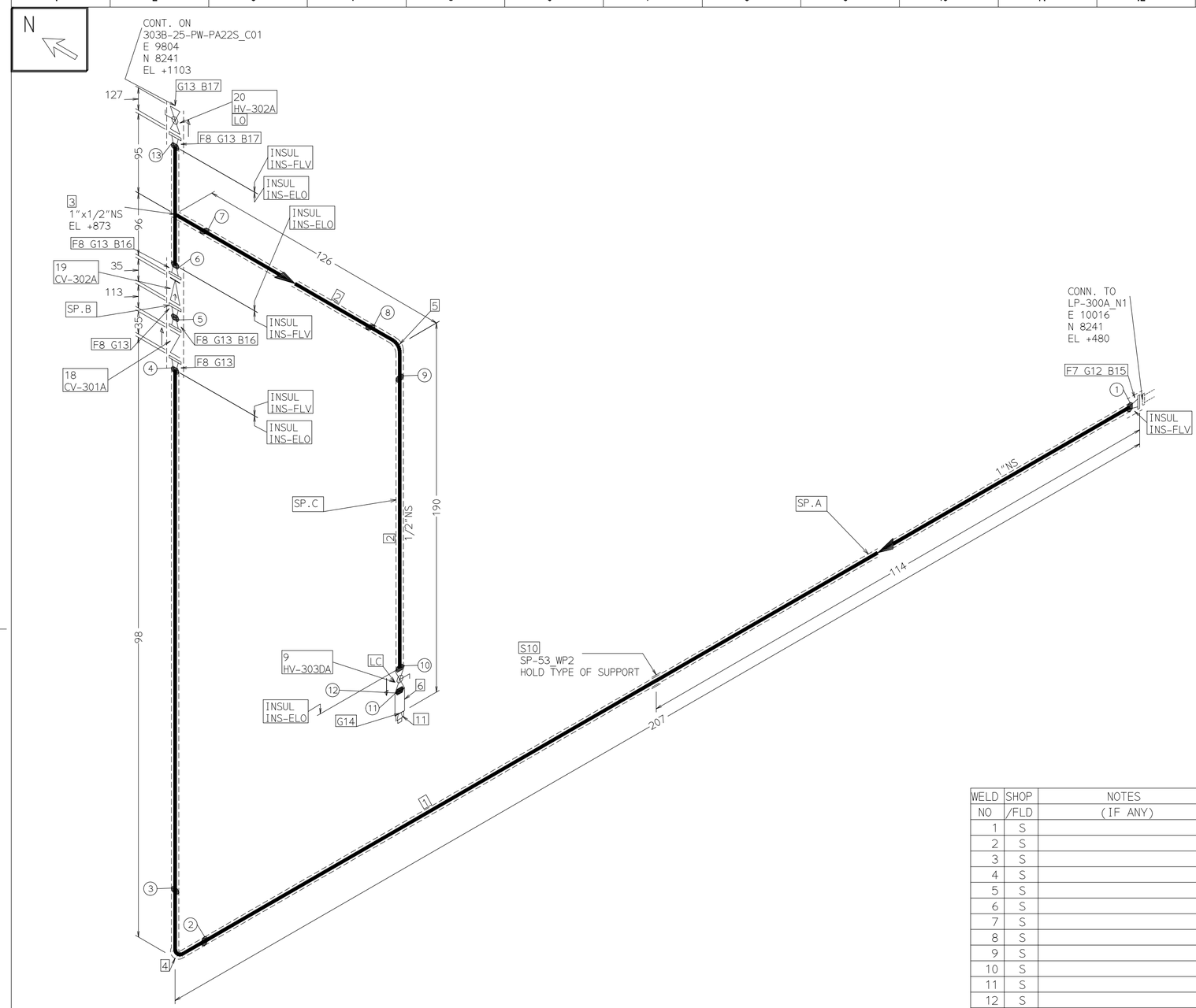
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 03

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.2M	0.26
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.15
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	5	5.50
	VALVES / IN-LINE ITEMS				
9	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
10	General purpose ATTA SS 316	1	-	1	0.00
			TOTAL FABRICATION WEIGHT		9.62

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
11	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	6	0.36
14	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
15	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
16	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.63
17	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	VALVES / IN-LINE ITEMS				
18	CHECK VALVE ASME B16.10, WAFER TYPE, CL150 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.54
19	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL150 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
20	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	1	3.20
			TOTAL ERECTION WEIGHT		8.71
			TOTAL WEIGHT		18.33

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

303A-25-PW-PA22S_C01

SPOOL NUMBERS:
SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

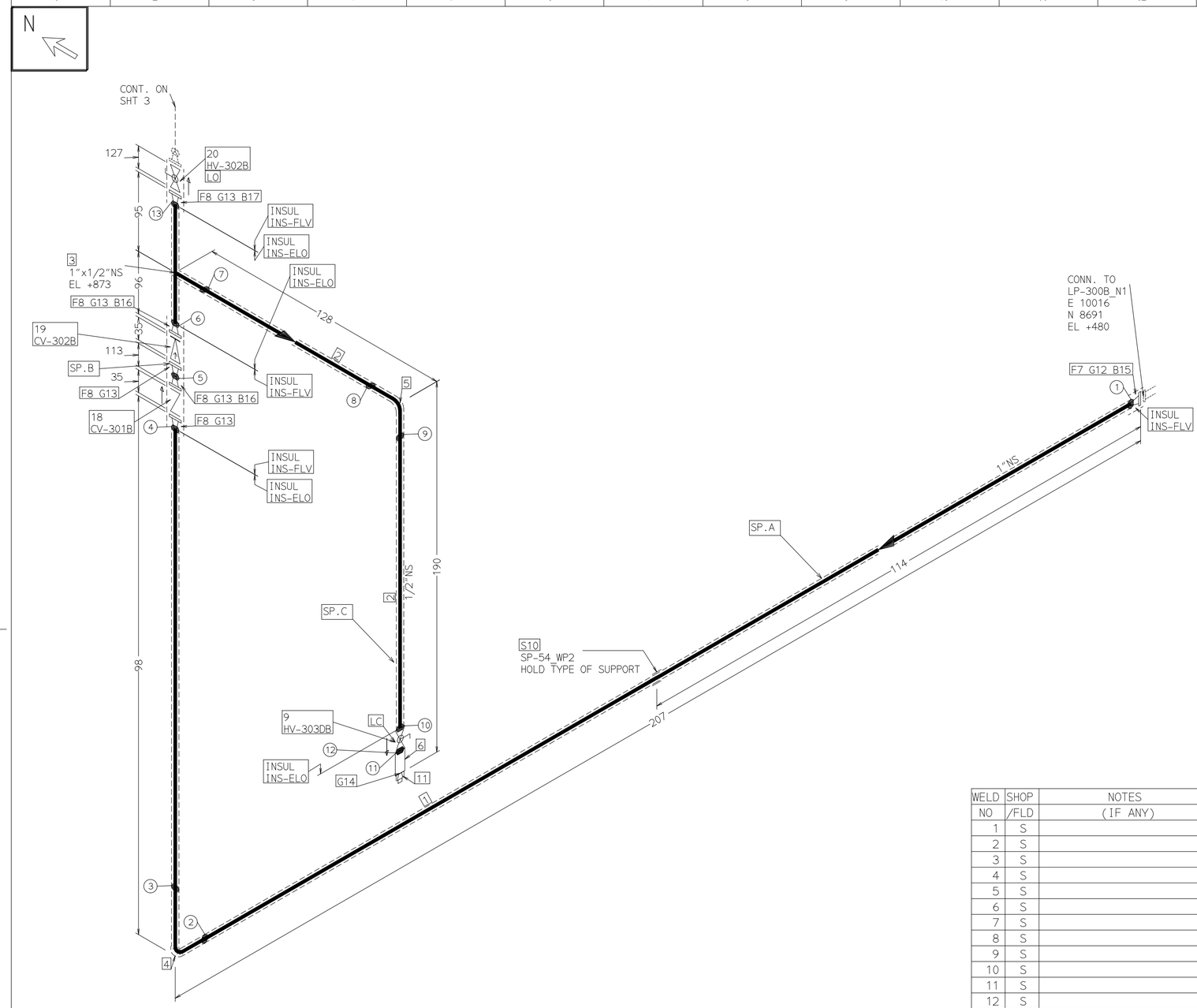
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004
FORES DOC. Nr.: 224J10-DDL-PP-DI-00002
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022
ISO Nr.: 04
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.2M	0.26
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.15
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	5	5.50
	VALVES / IN-LINE ITEMS				
9	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
10	General purpose ATTA SS 316	1	-	1	0.00
				TOTAL FABRICATION WEIGHT	9.62

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
11	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	5	0.30
14	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
15	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
16	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.63
17	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	VALVES / IN-LINE ITEMS				
18	CHECK VALVE ASME B16.10, WAFER TYPE, CL150 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.54
19	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL150 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
20	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	1	3.20
				TOTAL ERECTION WEIGHT	8.03
				TOTAL WEIGHT	17.65

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

SPOOL NUMBERS:
SP.A SP.B SP.C

303B-25-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

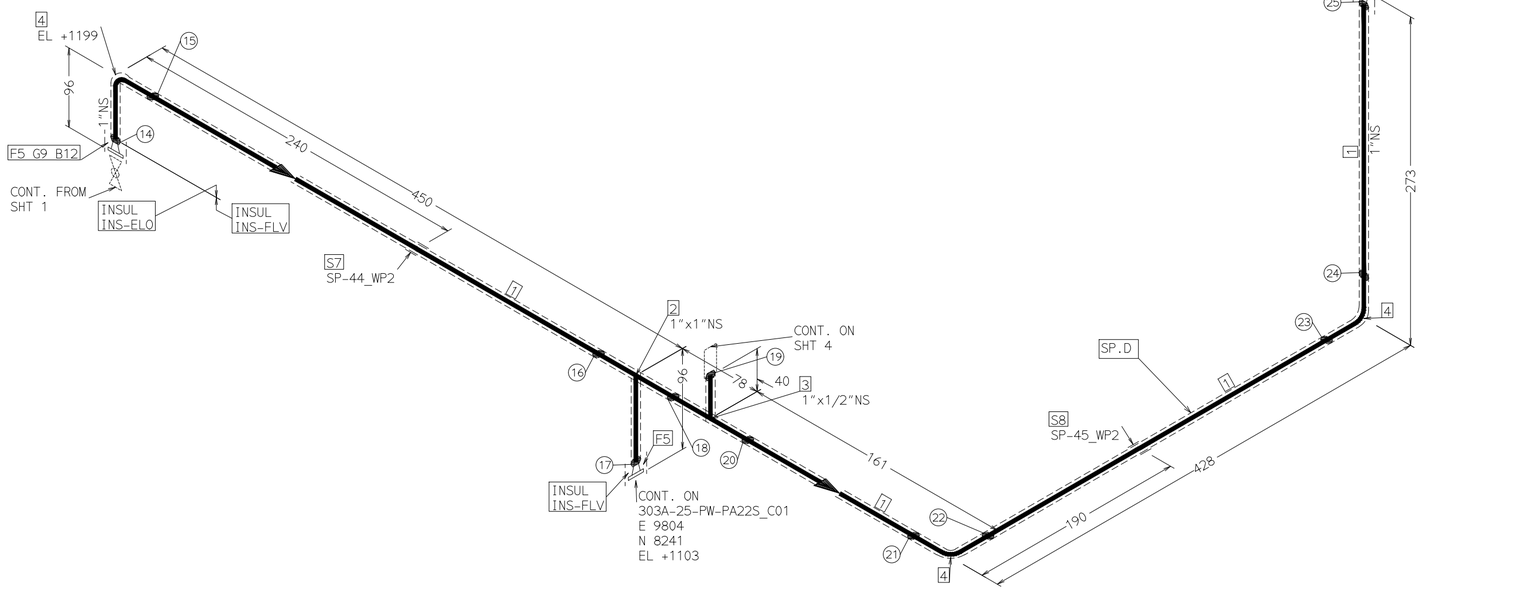
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004
FORES DOC. Nr.: 224J10-DDL-PP-DI-00002
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022
ISO Nr.: 05
SHEET - OF: 1 / 3
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.0M	2.46
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	2	2.20
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	SUPPORTS				
7	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
8	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40

TOTAL FABRICATION WEIGHT 16.60

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
11	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
12	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62

TOTAL ERECTION WEIGHT 1.67

TOTAL WEIGHT 18.27

SPOOL NUMBERS:

SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	

303B-25-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

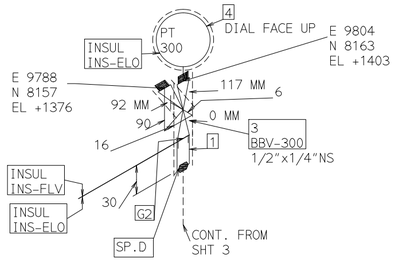
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 05

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
1	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
			TOTAL FABRICATION WEIGHT		0.10

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
2	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	VALVES / IN-LINE ITEMS				
3	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
4	PRESSURE TRANSMITTER, CERABAR PMP71B PT 300	1/2	BY CLIENT	1	1.73
			TOTAL ERECTION WEIGHT		2.74
			TOTAL WEIGHT		2.84

SPOOL NUMBERS:

SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)

303B-25-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

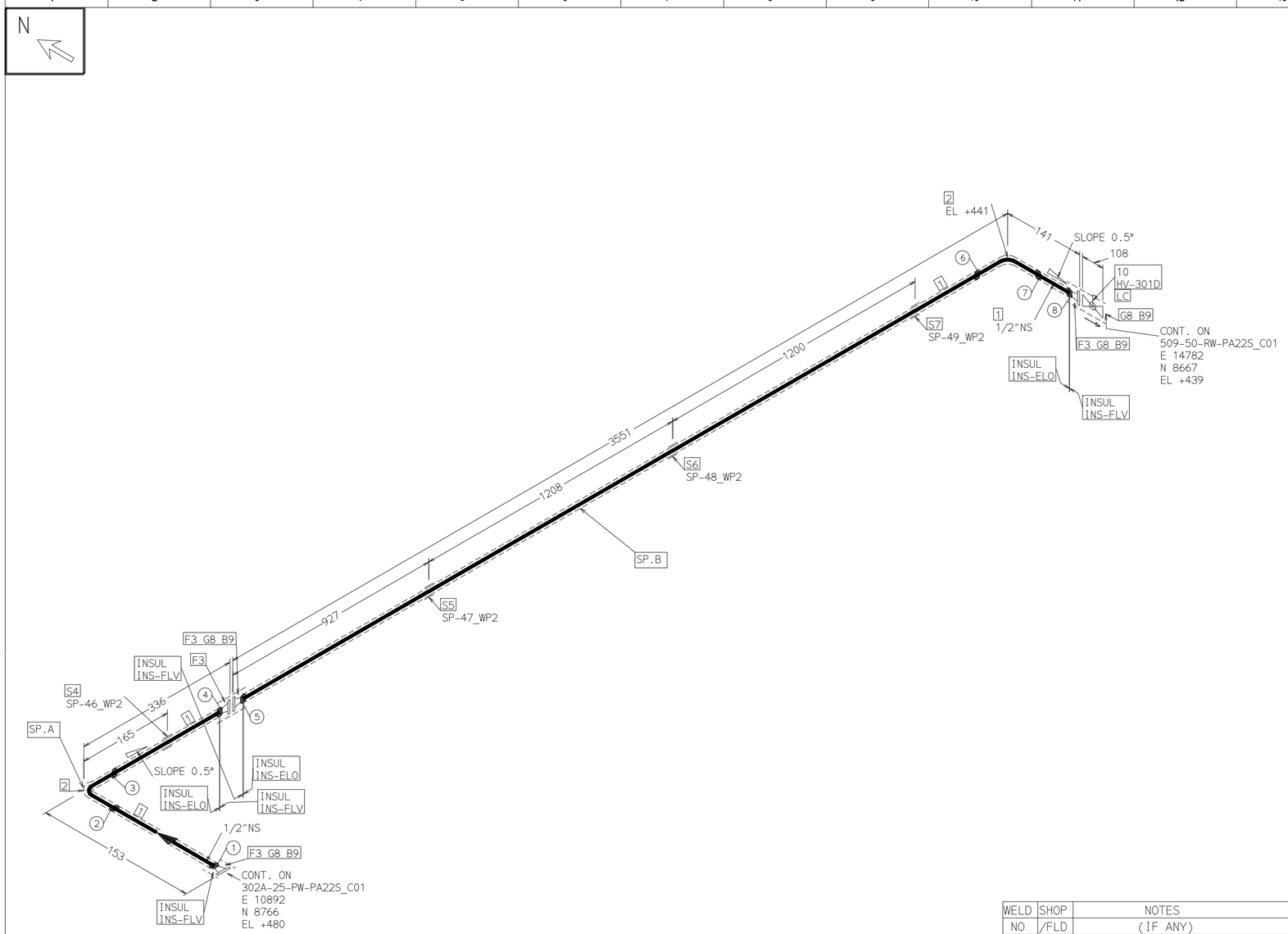
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-004		224J10-DDL-PP-DI-00002	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	05	3 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	3.9M	6.19
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	2	0.36
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	4	2.40
	SUPPORTS				
4	PIPE SHOE, S-64-DN15-70-200, Carbon Steel	1/2	SUPPORT	1	4.40
5	PIPE SHOE, S-64-DN15-70-200, Carbon Steel	1/2	SUPPORT	1	4.40
6	PIPE SHOE, S-64-DN15-70-200, Carbon Steel	1/2	SUPPORT	1	4.40
7	PIPE SHOE, S-64-DN15-70-200, Carbon Steel	1/2	SUPPORT	1	4.40

TOTAL FABRICATION WEIGHT 26.55

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	4	0.12
	BOLTS				
9	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	16	2.26
	VALVES / IN-LINE ITEMS				
10	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	1.80

TOTAL ERECTION WEIGHT 4.18

TOTAL WEIGHT 30.73

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

305-15-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

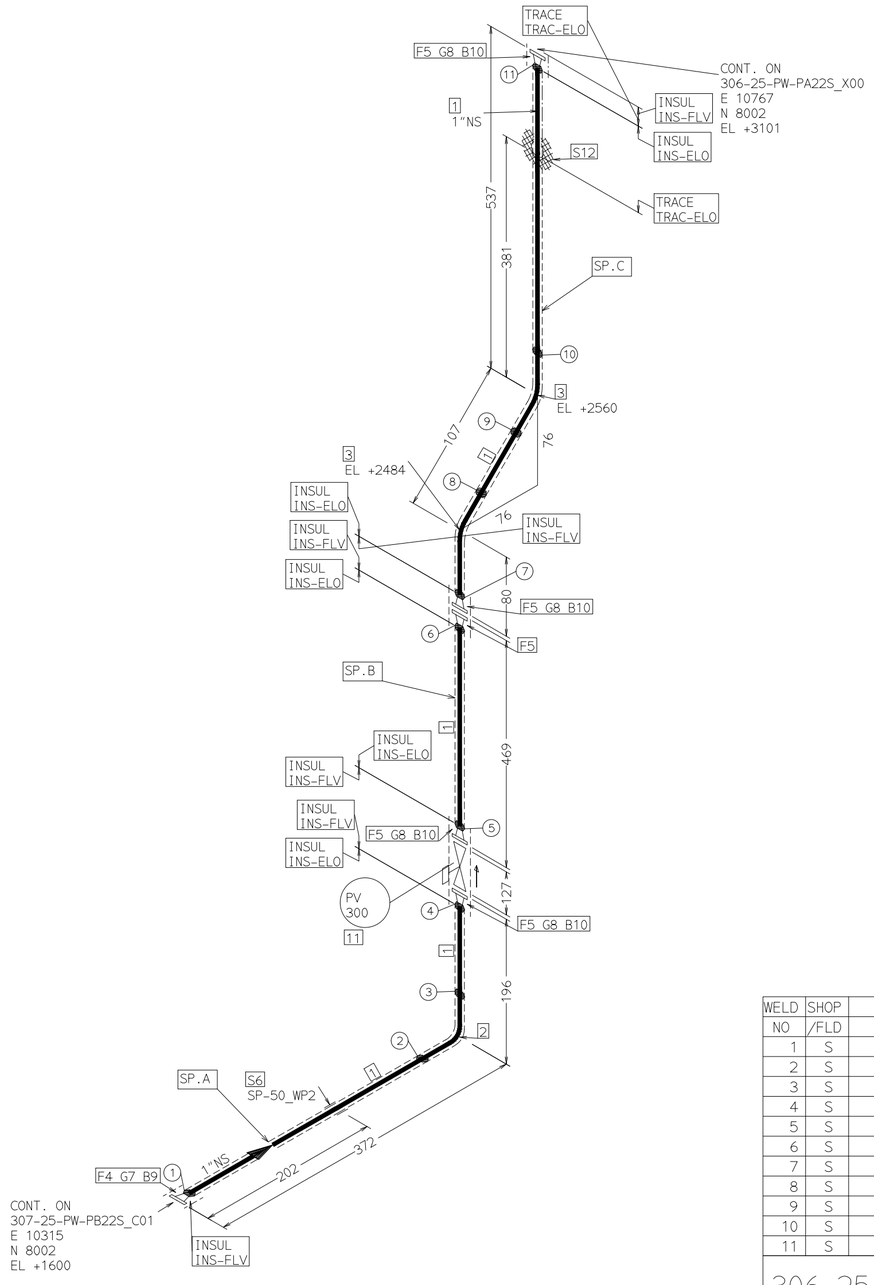
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 06

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.3M	3.09
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E45RSS00860100	2	0.14
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	5	5.50
	SUPPORTS				
6	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		15.28

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	4	0.24
	BOLTS				
9	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
10	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	16	2.48
	INSTRUMENTS				
11	ON/OFF VALVE, SFERACO 515 + ACTREG, CL.150 RF PV 300	1	BY CLIENT	1	7.80
	SUPPORTS				
12	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		14.91
			TOTAL WEIGHT		30.19

SPOOL NUMBERS:

SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

306-25-PW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):		TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid	thk =25		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-306	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

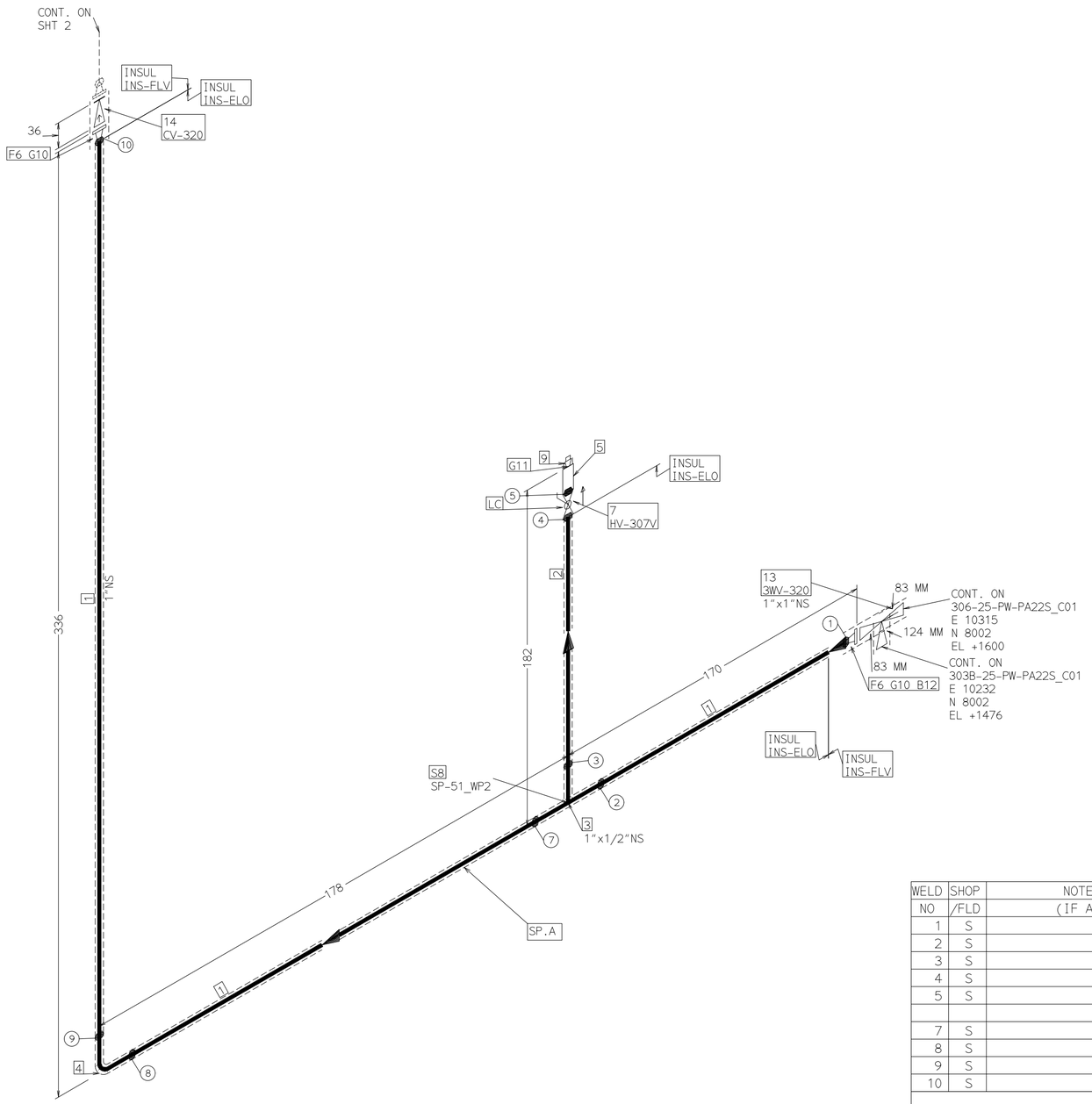
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-004		224J10-DDL-PP-DI-00002	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	07	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.4M	1.00
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.06
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	2	4.00
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
8	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		10.99

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
12	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	VALVES / IN-LINE ITEMS				
13	BALL VALVE 3-WAY, HABONIM SERIES D47, 10FHD47W-6666ATG/300-180-LDN ASTM A182 Gr.F316/316L	1 x 1	BY CLIENT	1	4.60
14	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67

TOTAL ERECTION WEIGHT 6.41

TOTAL WEIGHT 17.40

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
7	S	
8	S	
9	S	
10	S	

307-25-PW-PB22S_C01

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid	thk =25		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-307	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

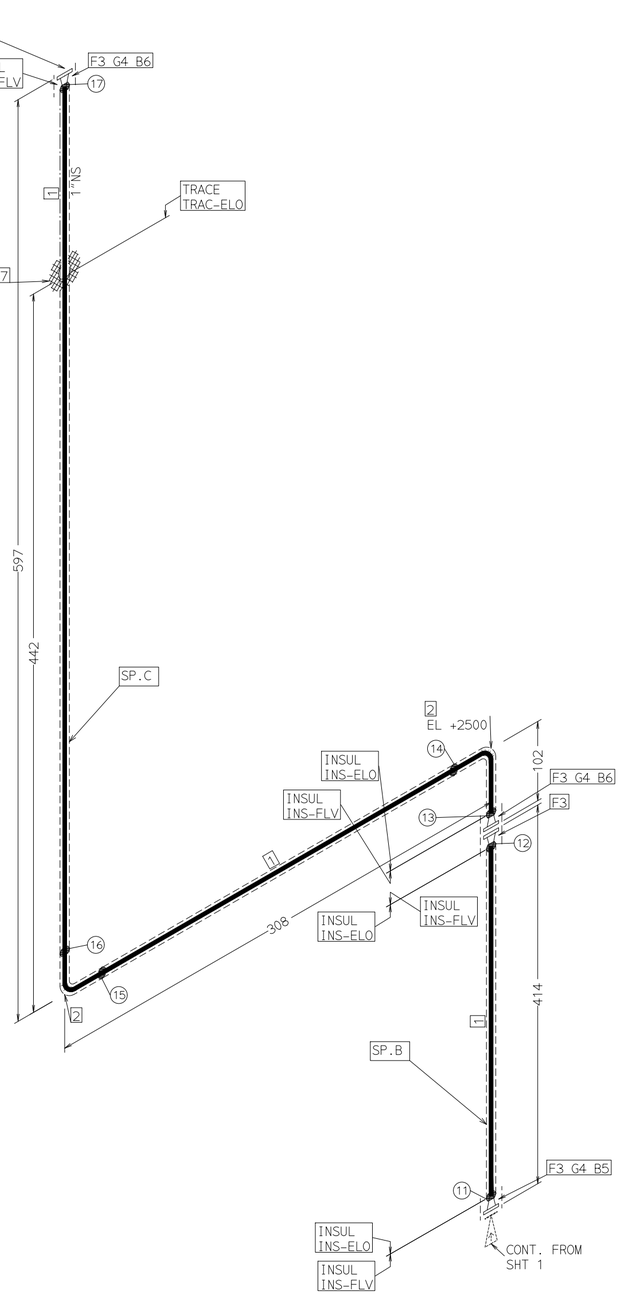
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 08

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.1M	2.55
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	4	8.00
			TOTAL FABRICATION WEIGHT		10.85

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	3	0.21
	BOLTS				
5	120 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.16
6	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
	SUPPORTS				
7	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		6.61
			TOTAL WEIGHT		17.46

SPOOL NUMBERS:
SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	

307-25-PW-PB22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid	thk =25		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-307	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

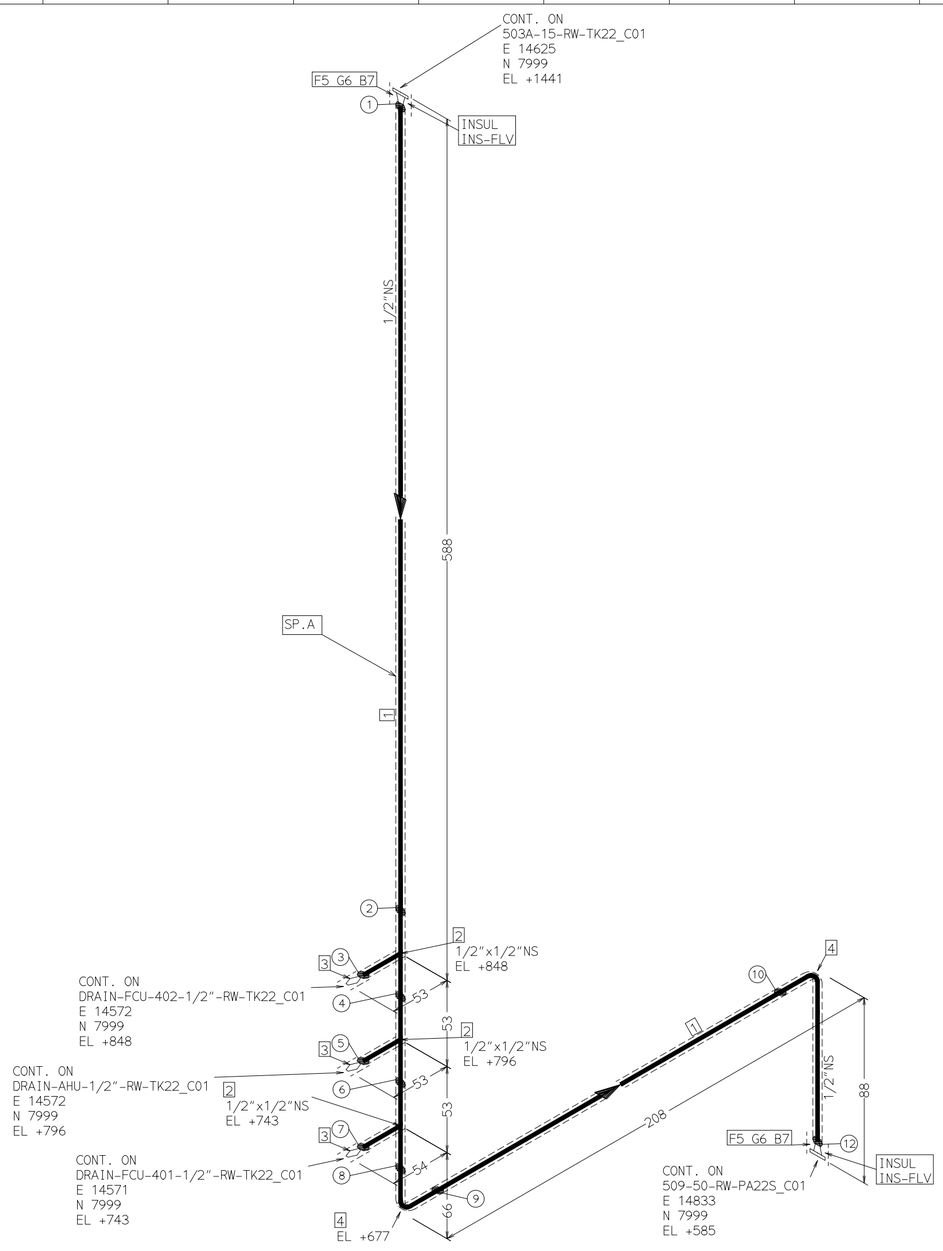
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004
FORES DOC. Nr.: 224J10-DDL-PP-DI-00002
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022
ISO Nr.: 08
SHEET - OF: 2 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.7M	1.04
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2 x 1/2	TEE0SS01490H00	3	0.75
3	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	3	0.30
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	2	0.36
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
			TOTAL FABRICATION WEIGHT		3.65

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
7	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
			TOTAL ERECTION WEIGHT		1.19
			TOTAL WEIGHT		4.84

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
12	S	

503-15-RW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/013/010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	981	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004

FORES DOC. Nr.: 224J10-DDL-PP-DI-00002

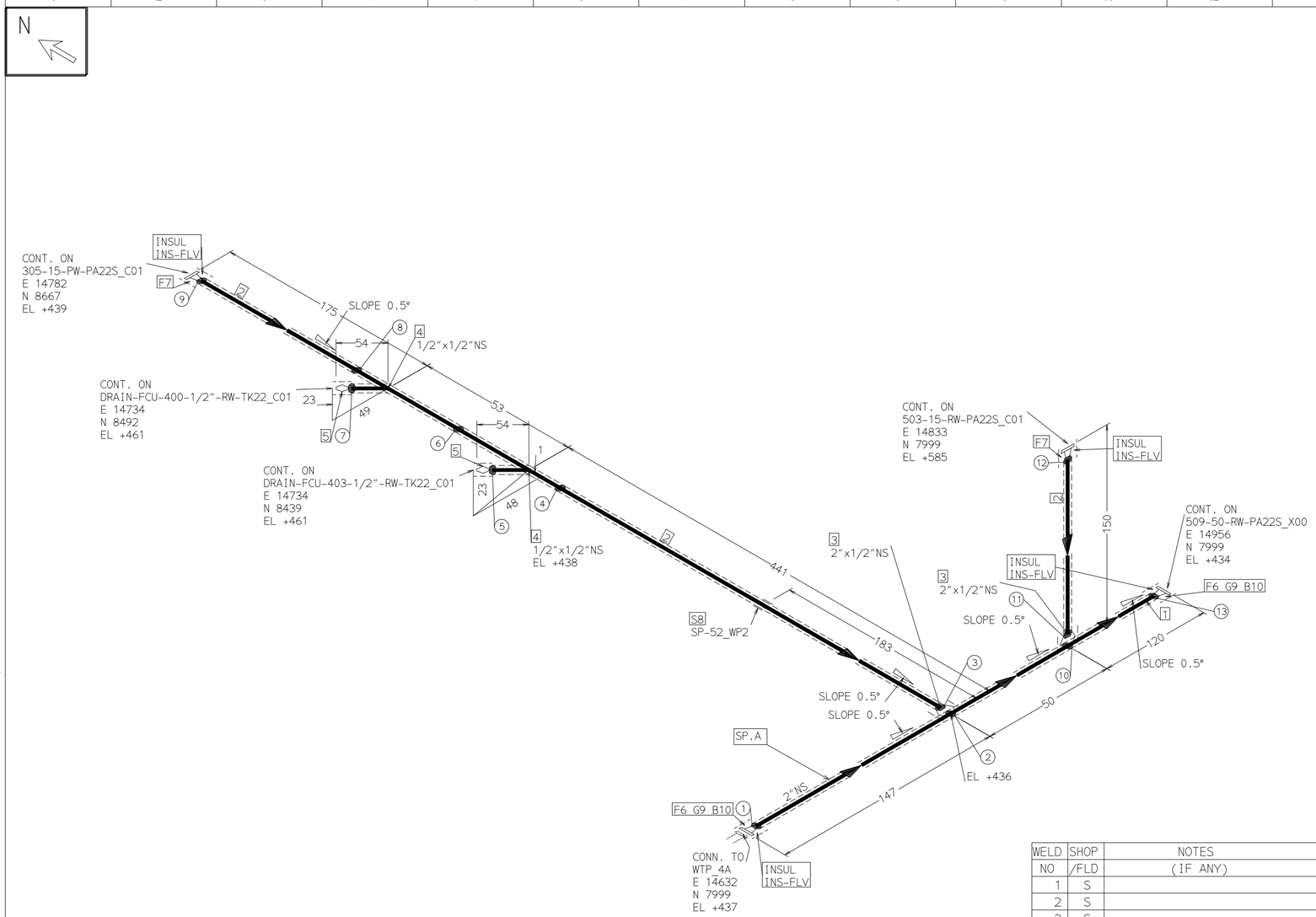
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022

ISO Nr.: 09

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.2M	1.00
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.6M	0.82
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	2 x 1/2	OWELSS0944020H	2	0.20
4	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2 x 1/2	TEE0SS01490H00	2	0.50
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	2	0.20
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	2	5.40
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
	SUPPORTS				
8	PIPE SHOE, S-64-DN15-70-200, Carbon Steel	1/2	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		13.72

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	2	0.20
	BOLTS				
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	8	1.90
			TOTAL ERECTION WEIGHT		2.10
			TOTAL WEIGHT		15.82

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

509-50-RW-PA22S_C01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	981	THICKNESS (mm):		TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-509	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

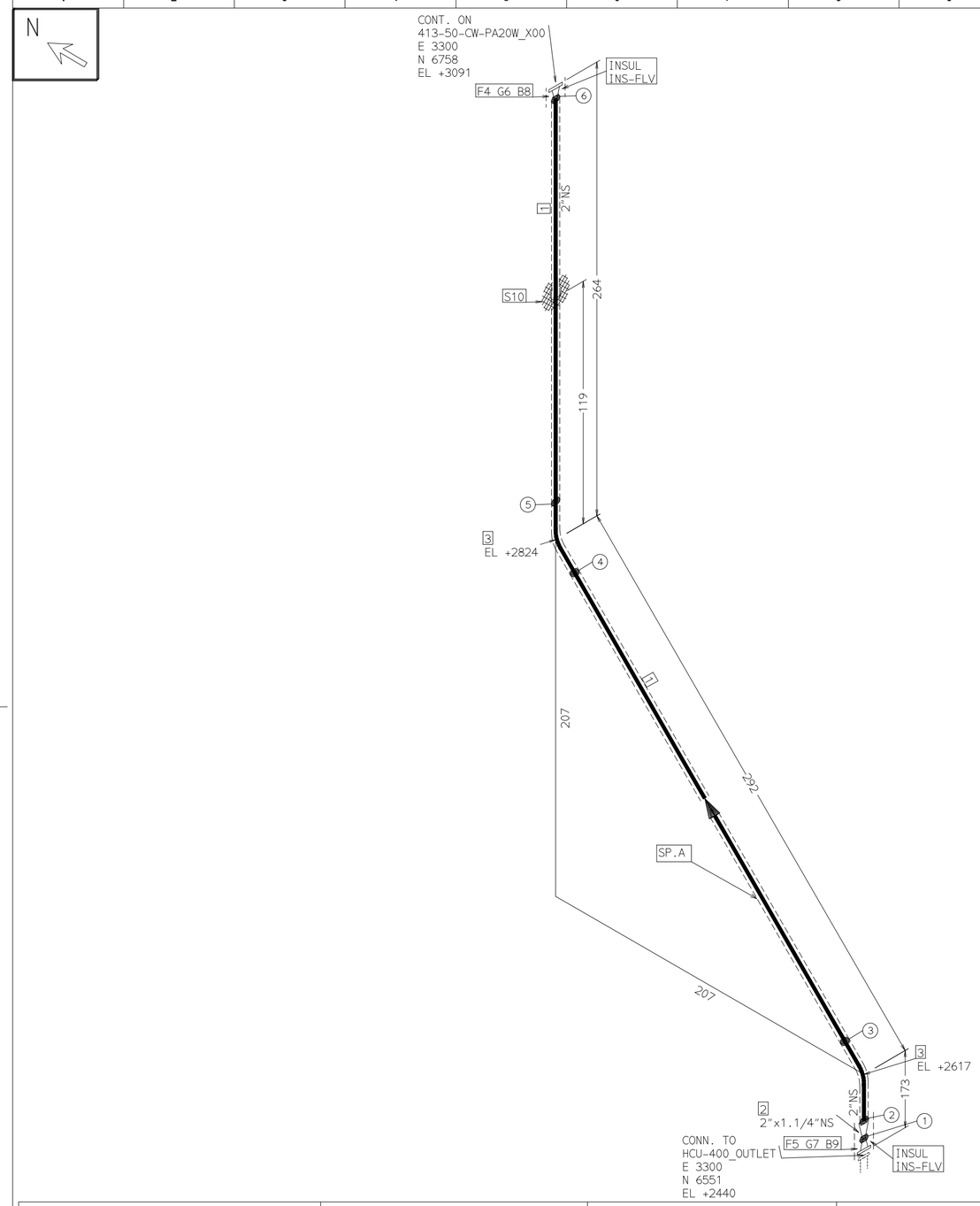
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-004
FORES DOC. Nr.: 224J10-DDL-PP-DI-00002
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00022
ISO Nr.: 10
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.4M	2.05
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 1.1/4	RECOSS103102UQ	1	0.36
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	2	0.64
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/4	FLW0SS0757UQ00	1	1.40
			TOTAL FABRICATION WEIGHT		7.15

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	1	0.10
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0064UQ00	1	0.07
	BOLTS				
8	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	4	0.95
9	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
	SUPPORTS				
10	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 48-80	2	2MCTZFR-2	1	6.20
			TOTAL ERECTION WEIGHT		7.97

SPOOL NUMBERS:

SP.A

TOTAL WEIGHT 15.12

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	

413-50-CW-PA20W_B01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

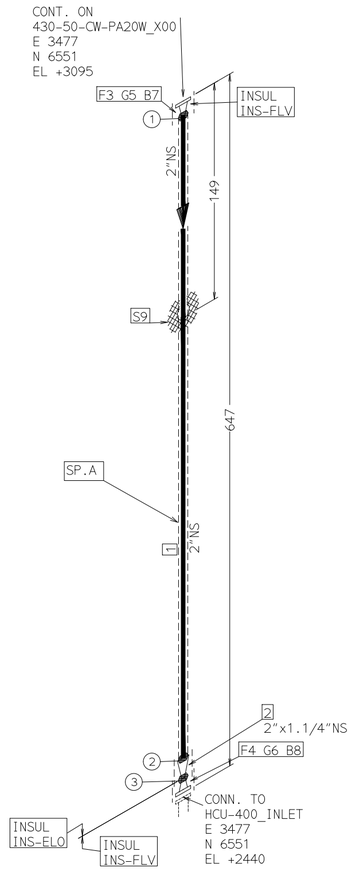
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-004	224J10-DDL-PP-DI-00002		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	11	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.5M	2.40
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 1.1/4	REC0SS103102UQ	1	0.36
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/4	FLW0SS0757UQ00	1	1.40

TOTAL FABRICATION WEIGHT 6.86

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	1	0.10
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0064UQ00	1	0.07
	BOLTS				
7	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	4	0.95
8	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
	SUPPORTS				
9	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 48-80	2	2MCTZFR-2	1	6.20

TOTAL ERECTION WEIGHT 7.97

SPOOL NUMBERS:

SP.A

TOTAL WEIGHT 14.83

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	

430-50-CW-PA20W_B01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-004	224J10-DDL-PP-DI-00002		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00022	12	1 / 1	C.B.

File Name:

ISOMETRIC BOOKLET WP3
(incl. heat tracing)

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DATE	DESCRIPTION
-0B	24/10/2024	INTERNAL ISSUE
-0A	04/10/2024	INTERNAL ISSUE
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

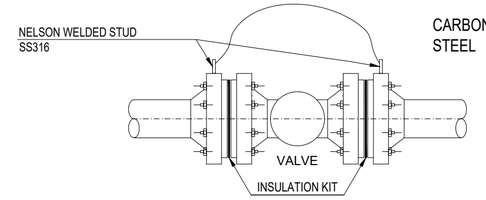
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CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	A	-	C.B.

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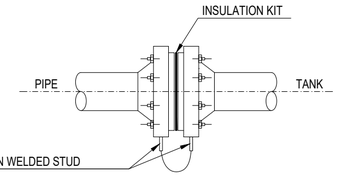
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02	25.09.24				404−50−CW−PA20W_A10
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04	25.09.24	04.10.24			406−50−CW−PA20W_A10
05	25.09.24				407−50−CW−PA20W_A10
06	25.09.24				422−40−CW−PA20W_A10
07	25.09.24	04.10.24			425−40−CW−PA20W_A10
08	25.09.24		24.10.24		500−25−PWH2−PB22S_A10
09	25.09.24				501−20−DPWH2−PA22S_A10
10	25.09.24				502−15−PWH2−PB22S_A10
11	25.09.24				600A−150−PWO2−PA22S_A10
12	25.09.24				606−200−PWO2−PA22S_A10
13	25.09.24				610−20−PWO2−PA22S_A10
14	25.09.24				611−20−PWO2−PA22S_A10
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16	25.09.24				613−50−02−PA22S_A10
17	25.09.24				616A−80−02−PA22S_A10
18	25.09.24				617−40−02−PA22S_A10
19	25.09.24				618−40−02−PA22S_A10
20	25.09.24				619−80−02−PA22S_A10
21	25.09.24				620A−100−PWH2−PB22S_A10
22	25.09.24				625−150−PWH2−PB22S_A10
23	25.09.24				630−25−H2−PB22S_A10
24	25.09.24				630A−25−H2−PB22S_A10
25	25.09.24				631−25−H2−PB22S_A10
26	25.09.24				631A−25−H2−PB22S_A10
27	25.09.24				632−20−H2−PB22S_A10
28	25.09.24				633−20−H2−PB22S_A10_A10
29	25.09.24				633B−20−H2−PB22S_A10
30	25.09.24				634−20−H2−PB22S_A10
31	25.09.24				635−50−PWH2−PB22S_A10
32	25.09.24				636A−25−H2−PB22S_A10
33	25.09.24				638−25−H2−PB22S_A10
34	25.09.24				639−25−H2−PB22S_A10
35	25.09.24				639B−25−H2−PB22S_A10
36	25.09.24				640−25−PWH2−PB22S_A10

ISO Nr.	REVISIONS 00	−0A	−0B	03	DESCRIPTION
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39	25.09.24				641A−25−PWH2−PB22S_A10
40	25.09.24				644−50−H2−PB22S_A10
41	25.09.24				646A−25−H2−PB22S_A10
42	25.09.24				900−15−N2−PA22S_A10
43	25.09.24	04.10.24			900A−40−N2−PA22S_A10
44	25.09.24				901−15−N2−PA22S_A10
45	25.09.24				902−25−N2−PA22S_A10
46	25.09.24				902A−25−N2−PA22S_A10
47	25.09.24				906−25−N2−PA22S_A10
48	25.09.24				906A−50−N2−PA22S_A10
49	25.09.24				910−25−N2−PA22S_A10
50	25.09.24				920−15−N2−PA22S_A10
51	25.09.24				920A−40−N2−PB22S_A10
52	25.09.24				921−15−N2−PA22S_A10
53	25.09.24				922−25−N2−PB22S_A10
54	25.09.24				922A−25−N2−PB22S_A10
55	25.09.24		24.10.24		940−25−N2−PA22S_A10
56	25.09.24				940B−25−N2−PB22S_A10
57	25.09.24				941−25−N2−PB22S_A10
58	25.09.24				TRIM−LINE_ST−620_LSL−620
59	25.09.24				TRIM−LINE_ST−620_LT−620
60	25.09.24				TRIM−LINE_CS−630_LSH−630
61	25.09.24				TRIM−LINE_CS−630_LSH−631
62	25.09.24				TRIM−LINE_CS−630_LSL−630
63	25.09.24				TRIM−LINE_ST−600_LSL−600
64	25.09.24				TRIM−LINE_DG−640_LSL−641
65	25.09.24				TRIM−LINE_DG−640_LSL−640
66	25.09.24				TRIM−LINE_DG−640_LSH−631
67	25.09.24				TRIM−LINE_CS−610_LSH−610
68	25.09.24				TRIM−LINE_CS−610_LSH−611
69	25.09.24				TRIM−LINE_ST−620_DRAIN
70	25.09.24				TRIM−LINE_ST−600_DRAIN
71	25.09.24				TRIM−LINE_ST−600_LT−600
72	25.09.24				TRIM−LINE_CS−610_LSL−610
73	25.09.24				TRIM−LINE_ST−600_LSH−600

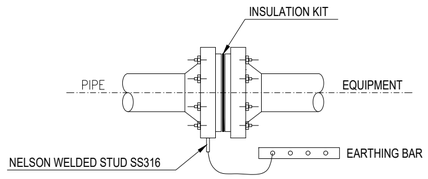
TYPICAL EARTHING DETAILS



CARBON STEEL / STAINLESS STEEL



CARBON STEEL / STAINLESS STEEL
TANK



CARBON STEEL / STAINLESS STEEL
GENERAL EQUIPMENT

FLANGED JOINTS IN METALLIC PIPELINES THAT HAVE NEITHER INSULATION KIT NOR PTFE GASKET ARE CONSIDERED INHERENTLY CONTINUOUS.

NOTES:

- ALL DIMENSIONS MUST BE VERIFIED DURING CONSTRUCTION;
- ALL VALVE DIMENSIONS MUST BE CHECKED ON SITE BEFORE ASSEMBLY;
- ALL THE WELDED COMPONENTS WILL BE CHECKED ON SITE BEFORE THE ASSEMBLY;
- VALVE HANDWHEEL ORIENTATION TO BE CHECKED AND DEFINED DURING ERECTION PHASE BY CONSTRUCTION COMPANY.

REV.	DATE	DESCRIPTION
-0B	24/10/2024	INTERNAL ISSUE
-0A	04/10/2024	INTERNAL ISSUE
00	25/09/2024	ISSUE FOR REVIEW

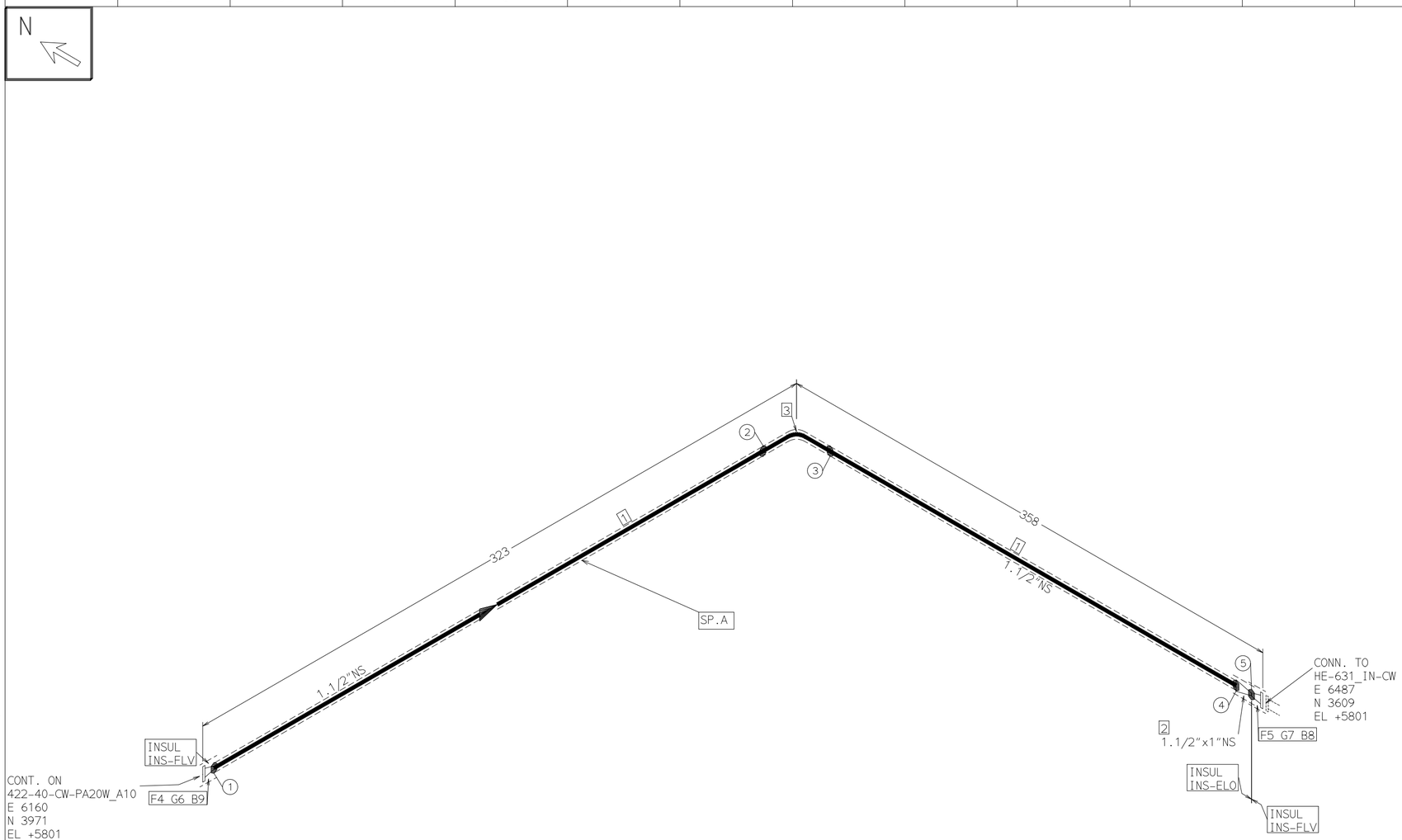
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	B	-	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	0.4M	1.49
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1	RECOSS08431H01	1	0.26
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	1	0.40
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLWOSS07531H00	1	1.80
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLWOSS06960100	1	2.00

TOTAL FABRICATION WEIGHT 5.95

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	1	0.07
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00480100	1	0.07
	BOLTS				
8	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062980300	4	0.92
9	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65

TOTAL ERECTION WEIGHT 1.71

TOTAL WEIGHT 7.66

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

403-40-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

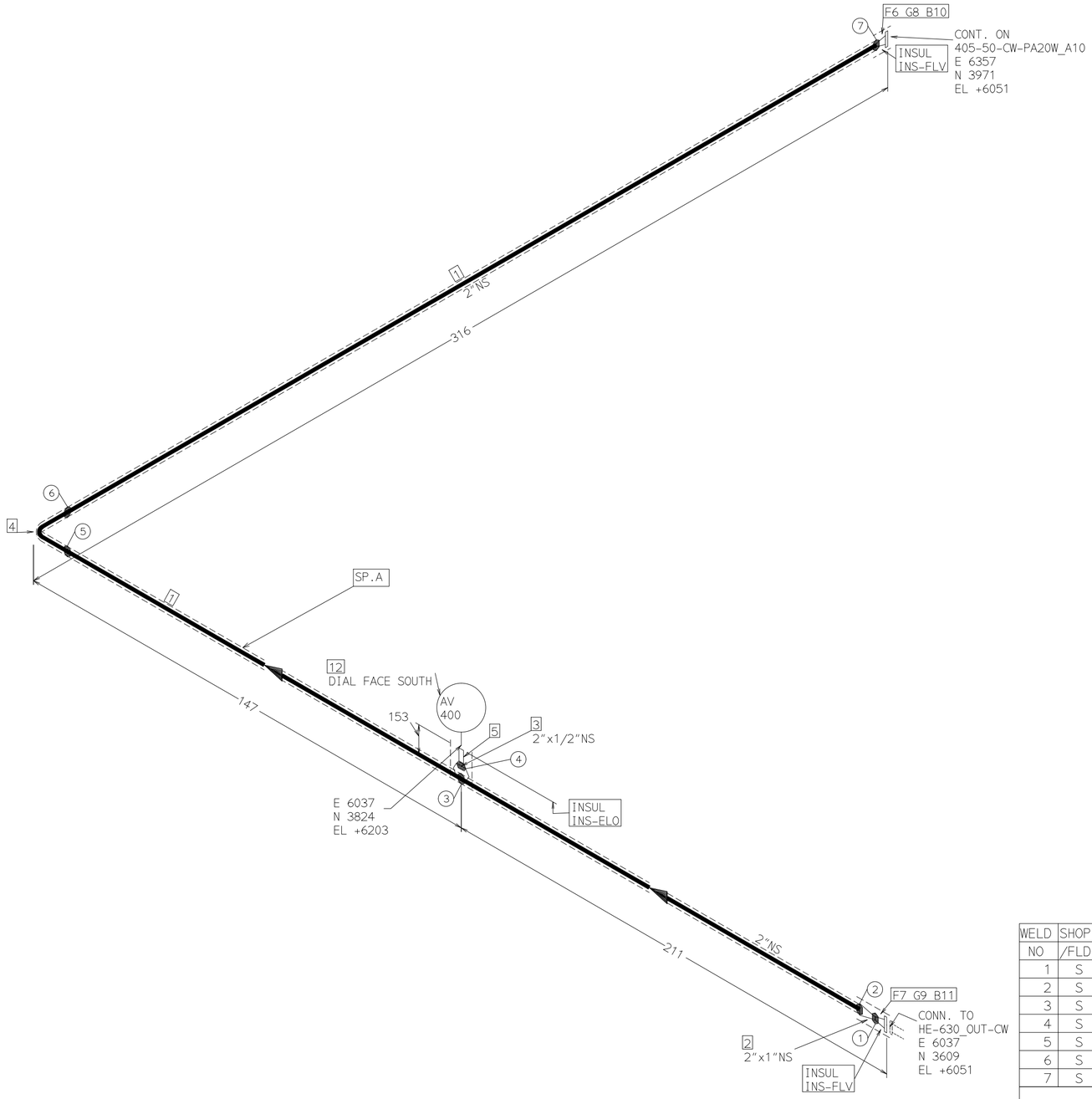
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 01

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.4M	1.69
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 1	RECOSS10300201	1	0.36
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	2 x 1/2	OWELSS0980020H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
5	NIPPLE POE/TOE NPT 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS01830H00	1	0.16
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS06960100	1	2.00
			TOTAL FABRICATION WEIGHT		7.66

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	1	0.10
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00480100	1	0.07
	BOLTS				
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	4	0.95
11	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062980300	4	0.92
	INSTRUMENTS				
12	ARMSTRON AIR VENT, MODEL 11-AV ASTM A182 Gr.F304/304L AV 400	1/2	BY CLIENT	1	0.80
			TOTAL ERECTION WEIGHT		2.84
			TOTAL WEIGHT		10.50

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

404-50-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

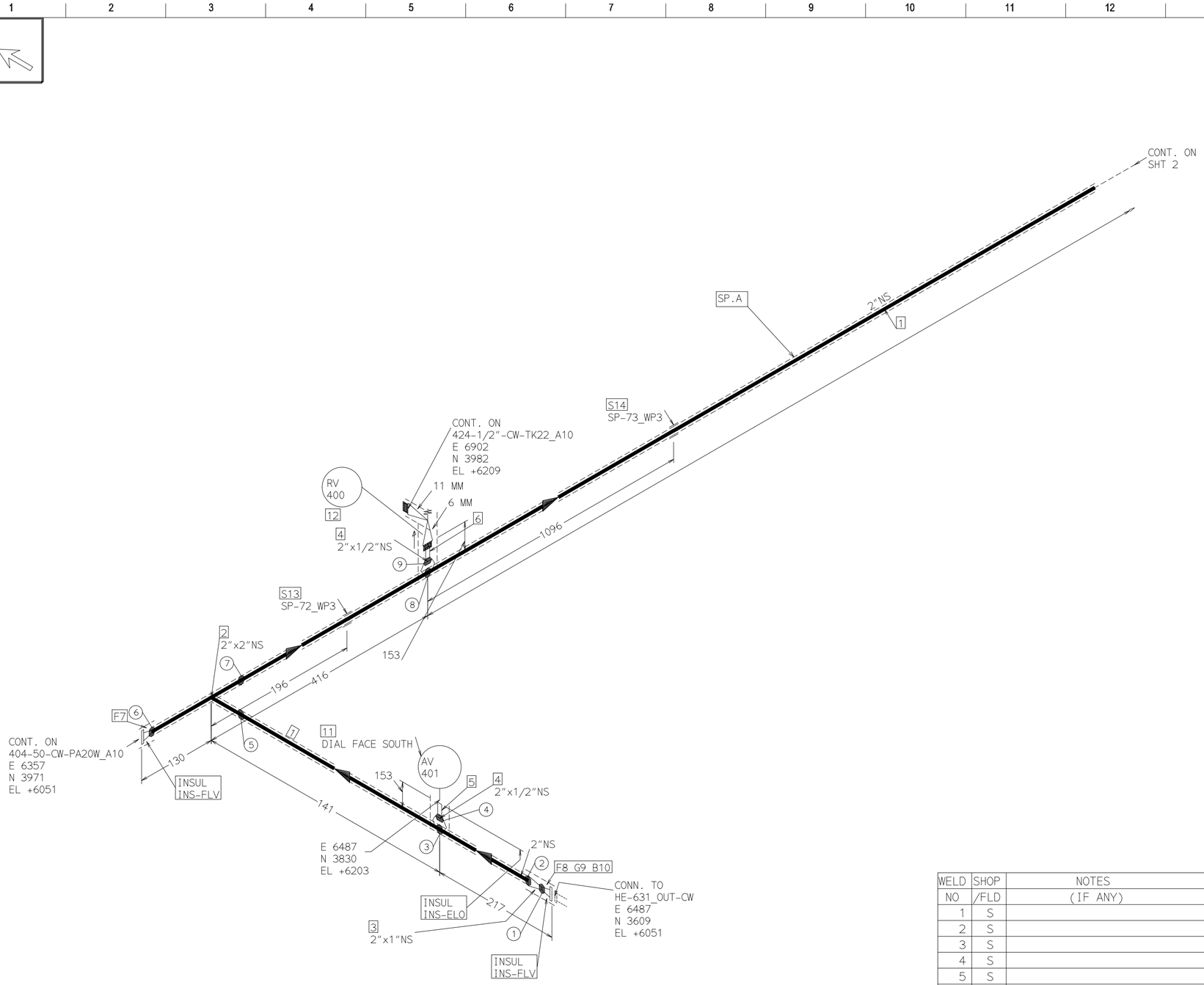
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	02	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	4.2M	22.34
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 2	TEE0SS02320200	1	1.90
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 1	REC0SS10300201	1	0.36
4	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	2 x 1/2	OWELSS0980020H	2	0.20
5	NIPPLE POE/TOE NPT 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS01830H00	1	0.16
6	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS06960100	1	2.00
			TOTAL FABRICATION WEIGHT		29.82

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00480100	1	0.07
	BOLTS				
10	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062980300	4	0.92
	INSTRUMENTS				
11	ARMSTRON AIR VENT, MODEL 11-AV ASTM A182 Gr.F304/304L AV 401	1/2	BY CLIENT	1	0.80
12	PSV HEROSE TYPE 06370, BSPP-FxBSPP-F BRONZE RV 400	1/2	BY CLIENT	1	0.24
	SUPPORTS				
13	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
14	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
			TOTAL ERECTION WEIGHT		11.63
			TOTAL WEIGHT		41.45

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

405-50-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) : 8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID : WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6	PED CATEGORY :	2	TRACING :	NDT : 100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

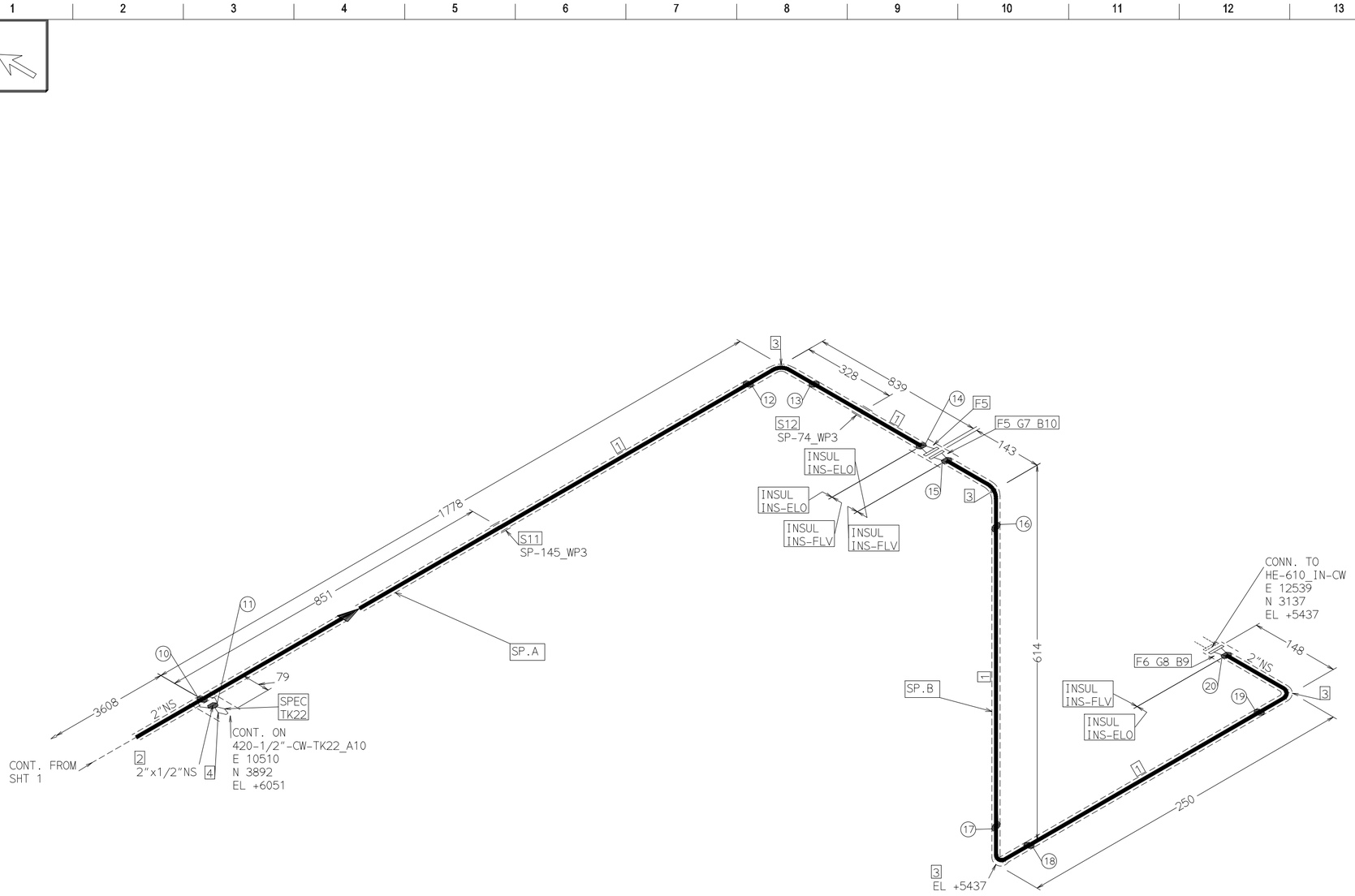
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 03

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	3.0M	16.11
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	2 x 1/2	OWELSS0980020H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	4	2.60
4	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	2	5.40
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06400200	1	4.00

TOTAL FABRICATION WEIGHT 28.31

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	1	0.10
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00500200	1	0.13
	BOLTS				
9	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B063000300	8	1.96
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	4	0.95
	SUPPORTS				
11	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
12	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80

TOTAL ERECTION WEIGHT 12.74

TOTAL WEIGHT 41.05

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	

405-50-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) : 8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID : WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6	PED CATEGORY :	2	TRACING :	NDT : 100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

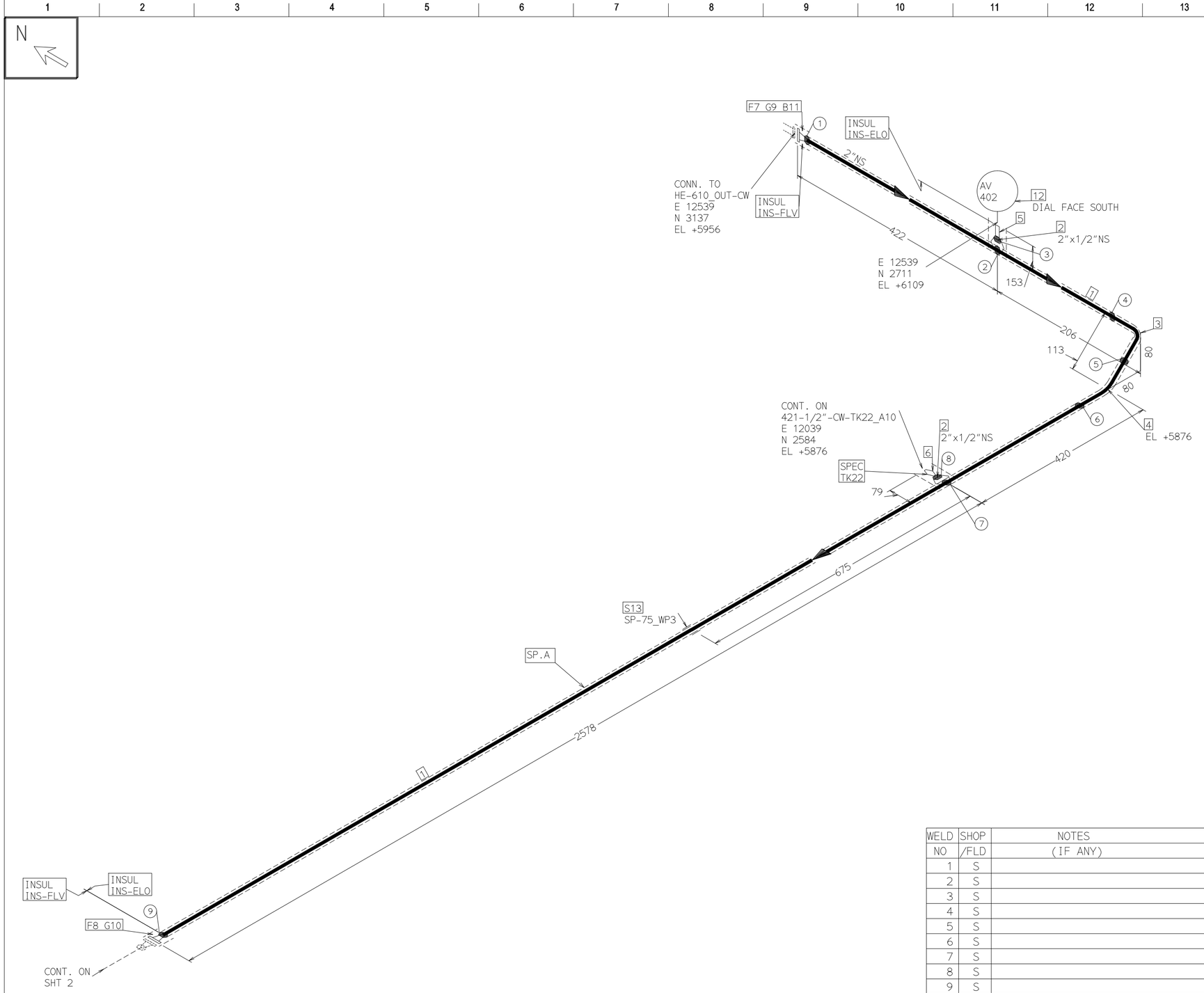
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 03

SHEET - OF 2 / 2

COMP. C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	3.4M	18.35
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	2 x 1/2	OWELSS0980020H	2	0.20
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
4	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	1	0.32
5	NIPPLE POE/TOE NPT 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS01830H00	1	0.16
6	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06400200	1	4.00
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
			TOTAL FABRICATION WEIGHT		26.48

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00500200	1	0.13
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	1	0.10
	BOLTS				
11	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B063000300	8	1.96
	INSTRUMENTS				
12	ARMSTRON AIR VENT, MODEL 11-AV ASTM A182 Gr.F304/304L AV 402	1/2	BY CLIENT	1	0.80
	SUPPORTS				
13	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
			TOTAL ERECTION WEIGHT		7.79
			TOTAL WEIGHT		34.27

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

406-50-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6,6	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

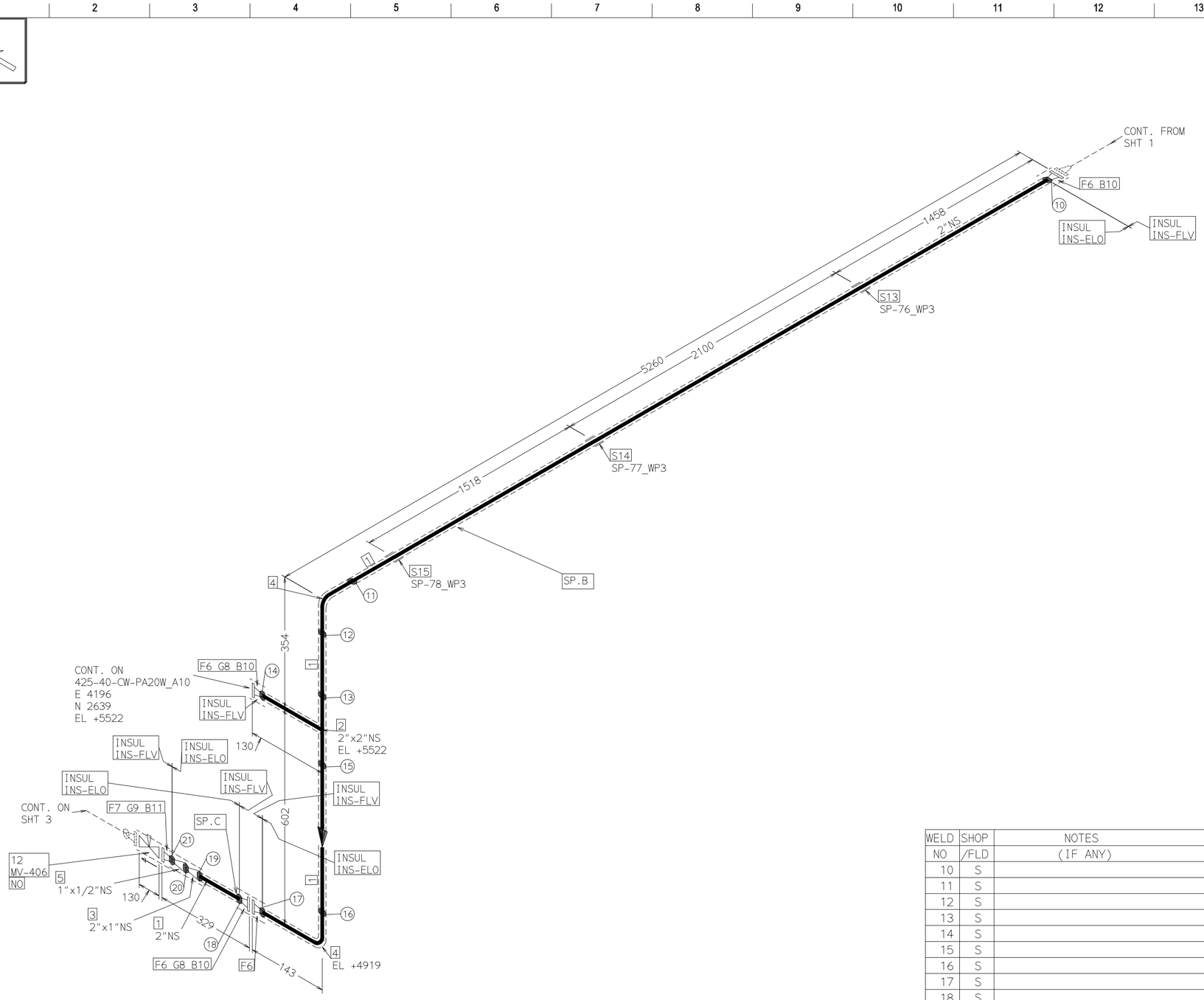
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 04
SHEET - OF: 1 / 4
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	5.9M	32.00
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 2	TEE0SS02320200	1	1.90
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 1	REC0SS10300201	1	0.36
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	2	1.30
5	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 1/2	REC0SS1062010H	1	0.16
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	4	10.80
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	1/2	FLW0SS07550H00	1	0.60
			TOTAL FABRICATION WEIGHT		47.12

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	2	0.20
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00280H00	1	0.03
	BOLTS				
10	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
11	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062940200	4	0.56
	VALVES / IN-LINE ITEMS				
12	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A351 Gr.CF3/CF8	1/2	BY CLIENT	1	3.20
	SUPPORTS				
13	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
14	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
15	PIPE SHOE, S-64-DN50-50-200, Carbon Steel	2	SUPPORT	1	4.80
			TOTAL ERECTION WEIGHT		21.25
			TOTAL WEIGHT		68.37

WELD NO	SHOP /FLD	NOTES (IF ANY)
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	

406-50-CW-PA20W_A10

SPOOL NUMBERS:

SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6,6	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION · INSUL INS-FLV = THERMAL JACKET INSULATION · PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

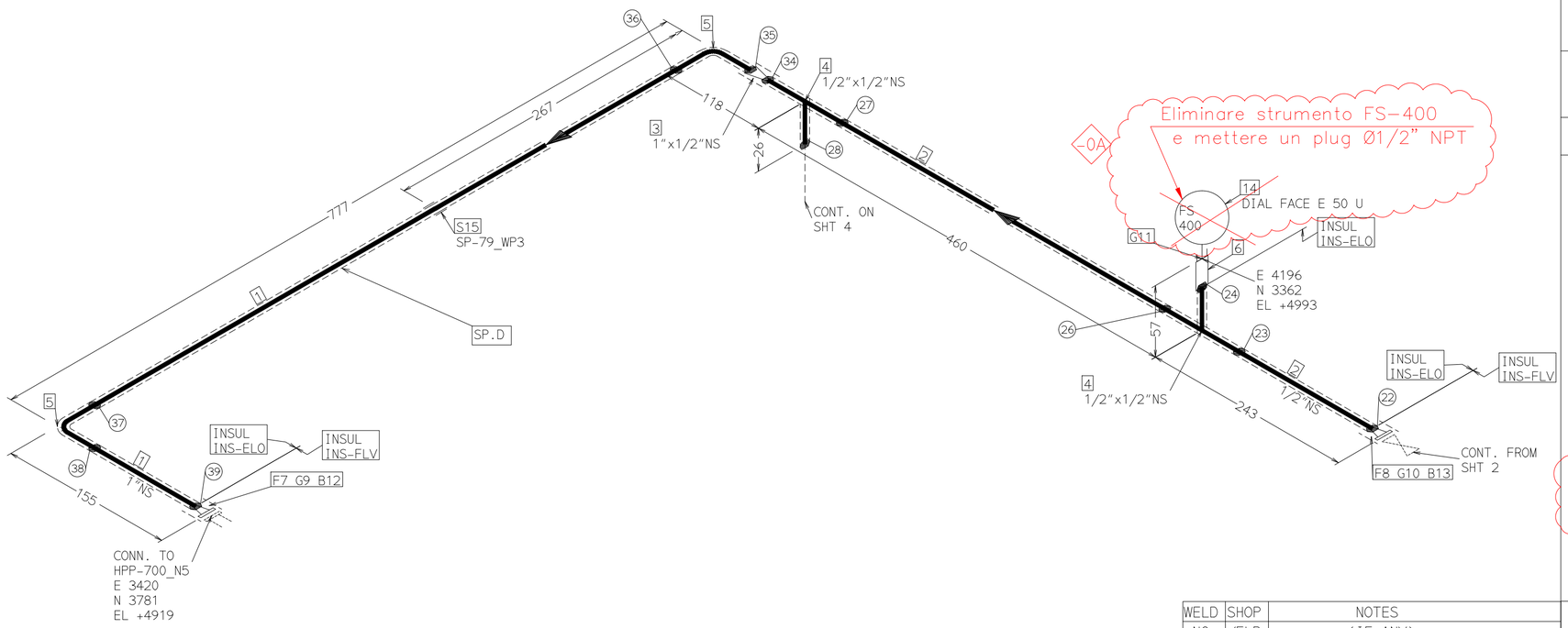
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 04
SHEET - OF: 2 / 4
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.8M	1.90
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.6M	0.94
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 1/2	REC0SS1062010H	1	0.16
4	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2 x 1/2	TEE0SS02780H00	2	0.50
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	2	0.30
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	1	1.10
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	1/2	FLW0SS07550H00	1	0.60
			TOTAL FABRICATION WEIGHT		5.60

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00280H00	1	0.03
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
12	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
13	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062940200	4	0.56
	INSTRUMENTS				
~~14~~	~~FLOW SWITCH, E+H FLOWPHANT T DTT31 + TA50-CB FS 400~~	~~1/2~~	~~BY CLIENT~~	~~1~~	~~1.00~~
	SUPPORTS				
15	PIPE SHOE, S-64-DN25-50-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		6.68
			TOTAL WEIGHT		12.28

-0A

WELD NO	SHOP /FLD	NOTES (IF ANY)
22	S	
23	S	
24	S	
26	S	
27	S	
28	S	
34	S	
35	S	
36	S	
37	S	
38	S	
39	S	

406-50-CW-PA20W_A10

SPOOL NUMBERS:
SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6,6	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

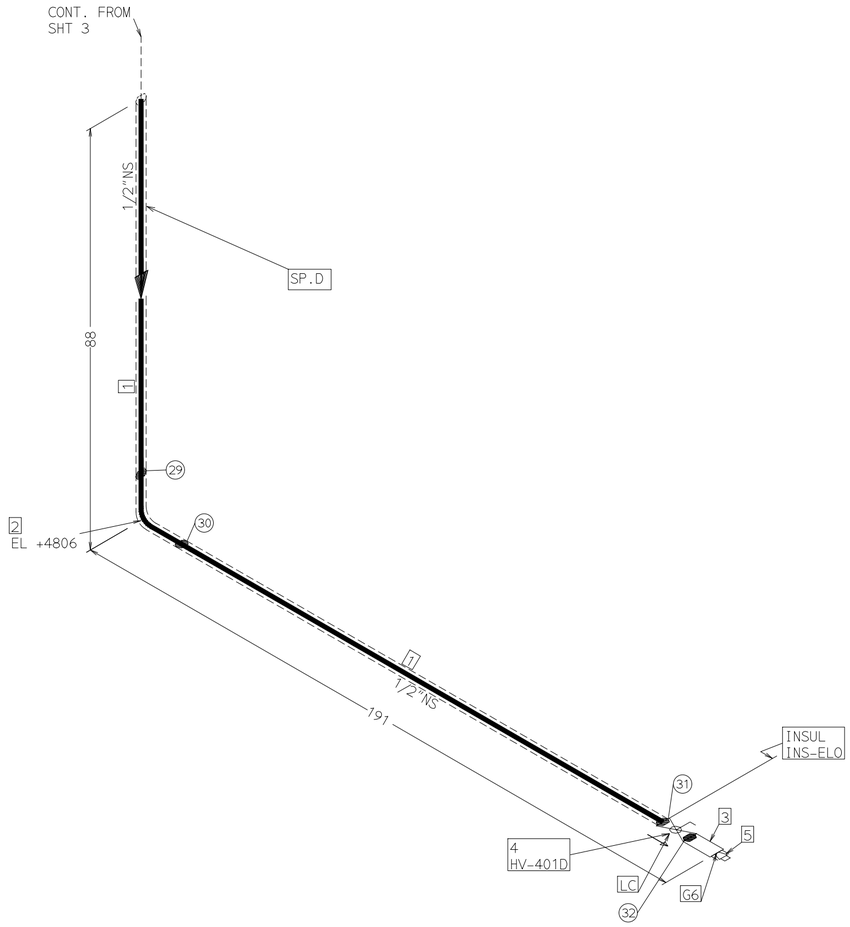
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 04

SHEET - OF: 3 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.2M	0.17
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
3	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
	VALVES / IN-LINE ITEMS				
4	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F304/304L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		1.33

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
5	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
6	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
			TOTAL ERECTION WEIGHT		0.08
			TOTAL WEIGHT		1.41

SPOOL NUMBERS:

SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
29	S	
30	S	
31	S	
32	S	

406-50-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6,6	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

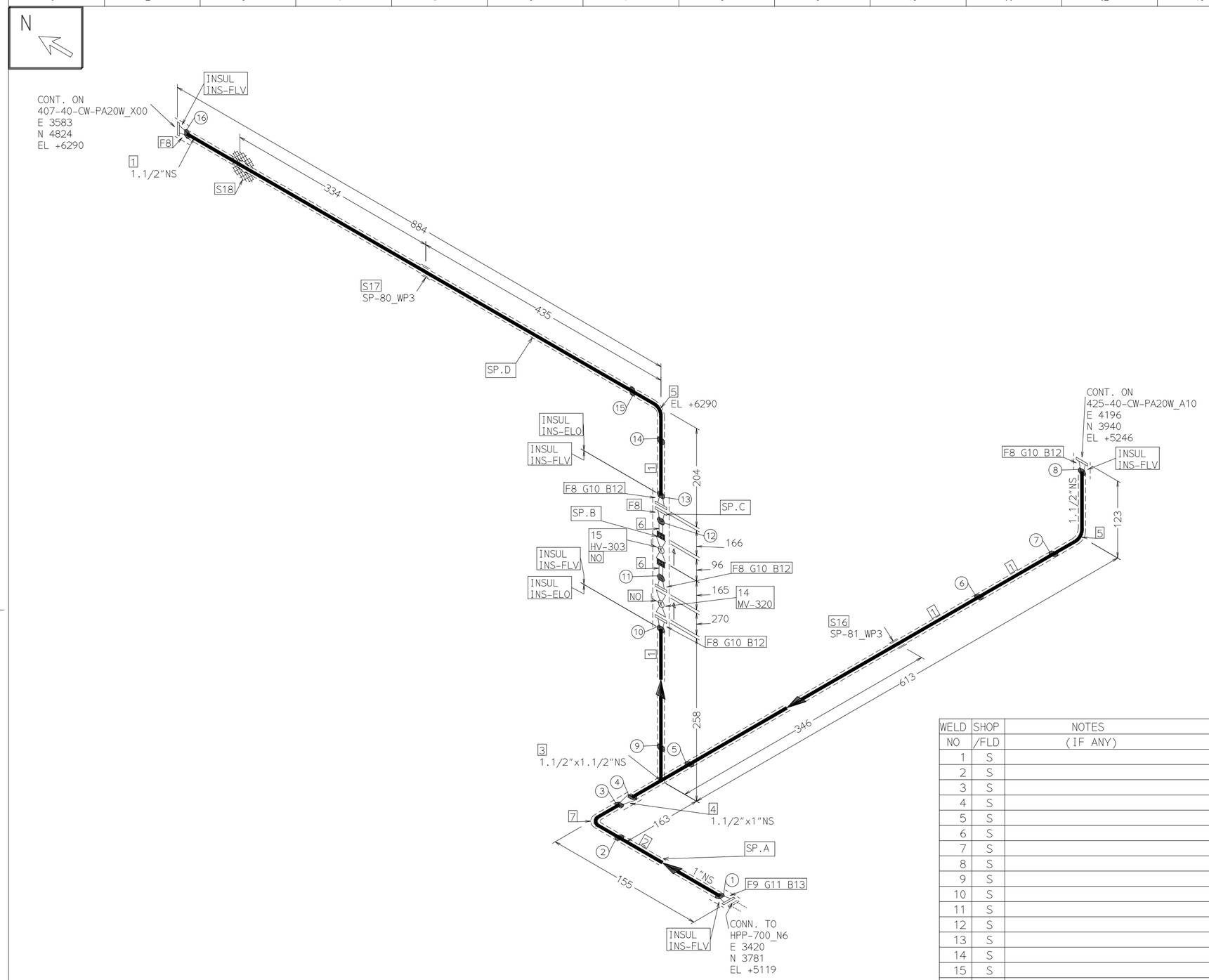
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	04	4 / 4	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

407-40-CW-PA20W_A10

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	1.5M	5.94
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.1M	0.14
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1.1/2	TEE0SS02431H00	1	0.77
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1	REC0SS08431H01	1	0.26
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	2	0.80
6	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 304/304L	1.1/2	N100SS02771H00	2	1.08
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	1	0.15
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLW0SS07531H00	6	10.80
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	1	1.10

TOTAL FABRICATION WEIGHT 21.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	4	0.28
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
	BOLTS				
12	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	16	2.59
13	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
	VALVES / IN-LINE ITEMS				
14	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	1.1/2	BY CLIENT	1	5.80
15	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1.1/2	BY CLIENT	1	1.32
	SUPPORTS				
16	PIPE SHOE, S-64-DN40-50-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
17	PIPE SHOE, S-64-DN40-50-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
18	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-150 AISI316 + R 150 AISI316 WITH NET + RM 80 48-71 + 2 RM 10/0x12	1.1/2	2MCTZFR-1.5	1	3.90

TOTAL ERECTION WEIGHT 23.37

TOTAL WEIGHT 44.41

SPOOL NUMBERS:

SP.A SP.B SP.C SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

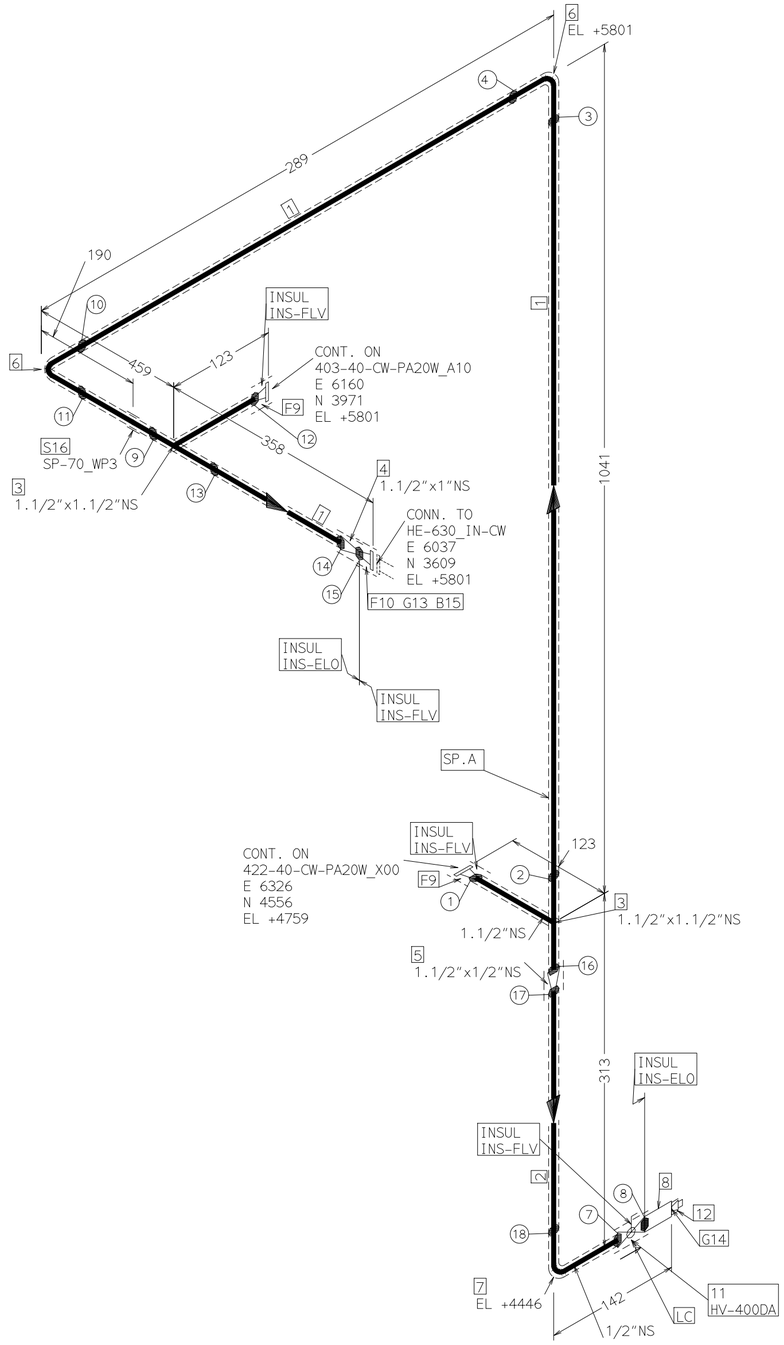
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 05

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	

422-40-CW-PA20W_A10

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	1.7M	6.53
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.2M	0.24
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1.1/2	TEE0SS02431H00	2	1.54
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1	REC0SS08431H01	1	0.26
5	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1/2	REC0SS10261H0H	1	0.26
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	2	0.80
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
8	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
	FLANGES				
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLW0SS07531H00	2	3.60
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS06960100	1	2.00
	VALVES / IN-LINE ITEMS				
11	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F304/304L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 16.39

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
12	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00480100	1	0.07
14	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
15	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062980300	4	0.92
	SUPPORTS				
16	PIPE SHOE, S-64-DN40-70-200, Carbon Steel	1.1/2	SUPPORT	1	4.40

TOTAL ERECTION WEIGHT 5.47

TOTAL WEIGHT 21.86

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

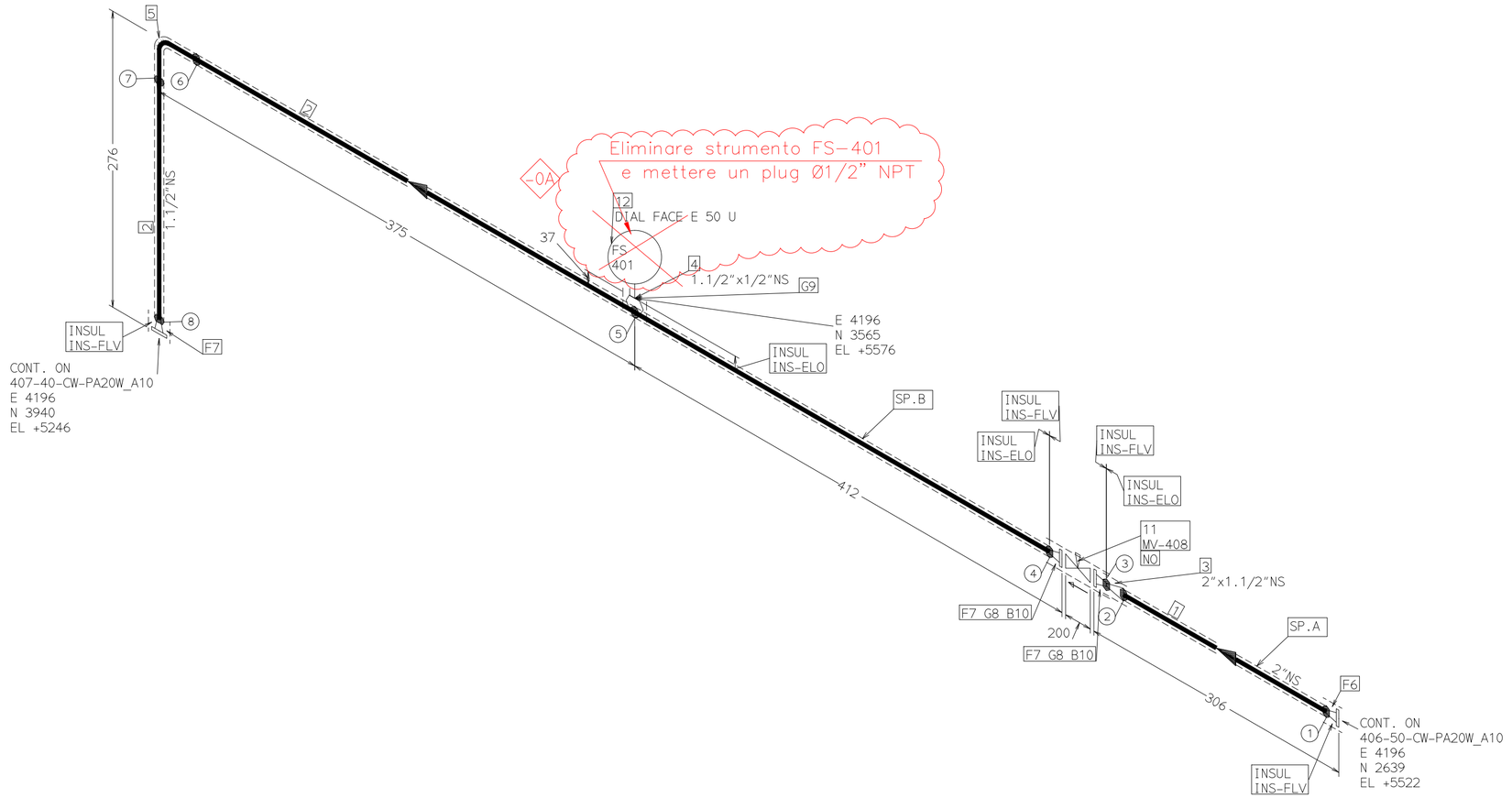
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 06

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.1M	0.52
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	0.9M	3.30
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	2 x 1.1/2	REC0SS1032021H	1	0.36
4	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F304/304L	1.1/2 x 1/2	OTHESS04151H0H	1	0.13
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	1	0.40
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLW0SS07531H00	3	5.40
			TOTAL FABRICATION WEIGHT		12.81

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	2	0.14
9	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
10	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	8	1.30
	VALVES / IN-LINE ITEMS				
11	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A351 Gr.CF3/CF8	1.1/2	BY CLIENT	1	8.90
	INSTRUMENTS				
-0A 12	~~FLOW SWITCH, E+H FLOWPHANT T DTT31 + TA50-CB FS 401~~	1/2	BY CLIENT	1	1.00
			TOTAL ERECTION WEIGHT		11.35
			TOTAL WEIGHT		24.16

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

425-40-CW-PA20W_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1013	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	6,6	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

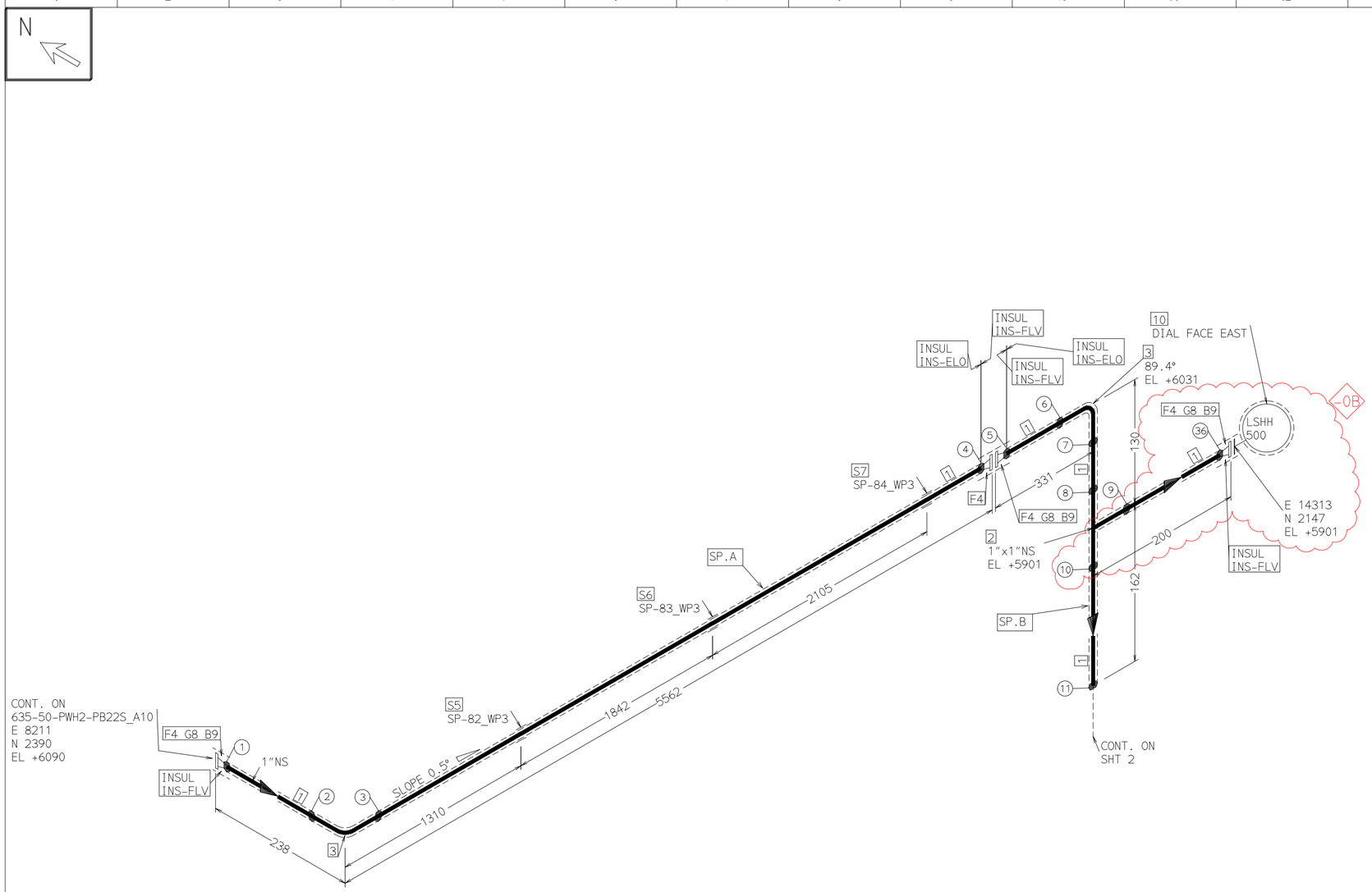
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 07
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	6.1M	15.21 -0B
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	4	8.00
	SUPPORTS				
5	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
6	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
7	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40

TOTAL FABRICATION WEIGHT 37.00 -0B

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	3	0.21
	BOLTS				
9	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	12	2.76
	INSTRUMENTS				
10	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSHH 500	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 6.47

TOTAL WEIGHT 43.47 -0B

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
36	S	-0B

500-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0B	24/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

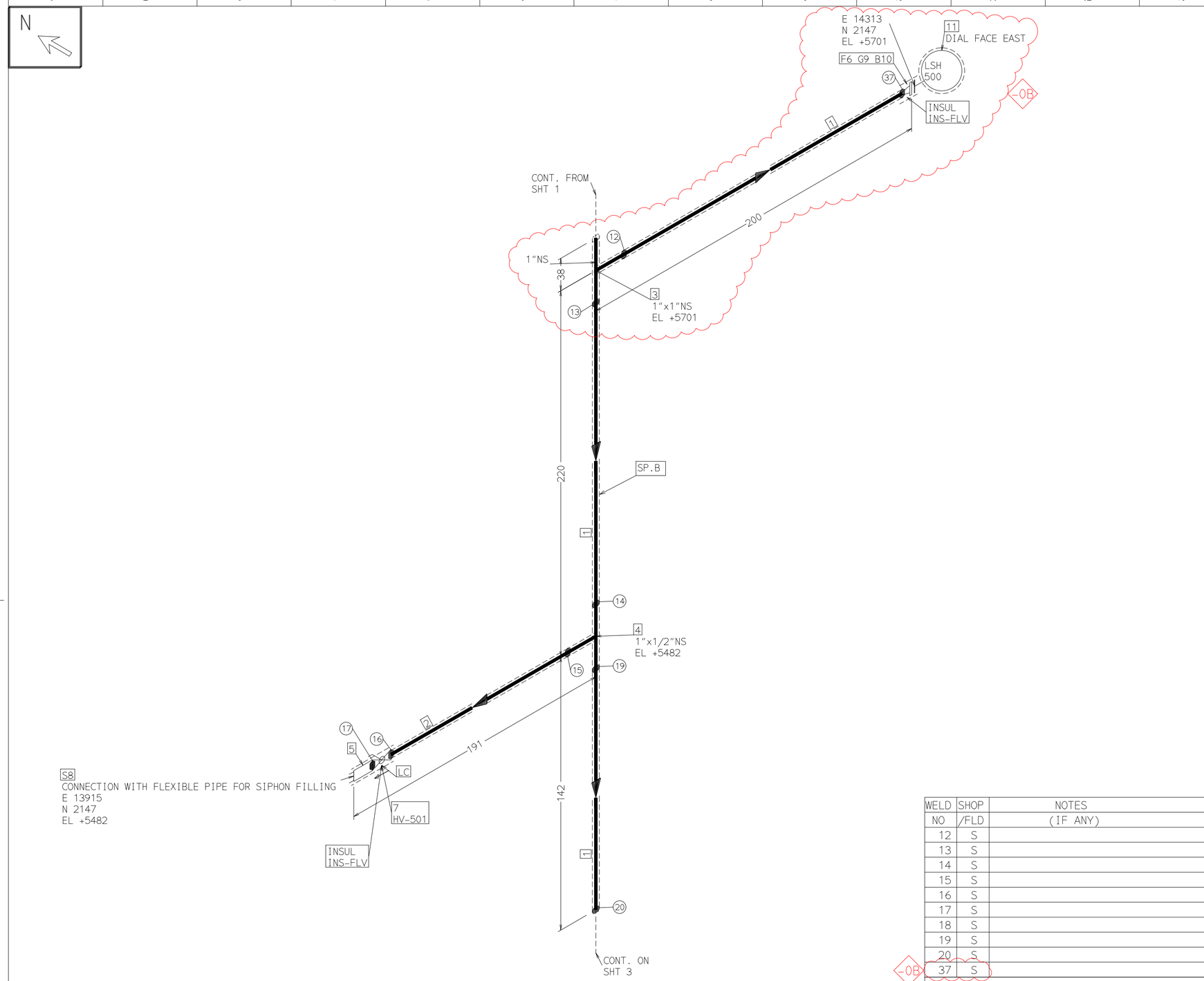
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 08

SHEET - OF 1 / 4

COMP. C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.4M	0.87 -0B
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.08
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
8	General purpose ATTA SS 316	1/2	-	1	0.00

TOTAL FABRICATION WEIGHT 4.62 -0B

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
10	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
11	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, CL.300 RF LSH 500	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 9.11 -0B

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
-0B 37	S	

500-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0B	24/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

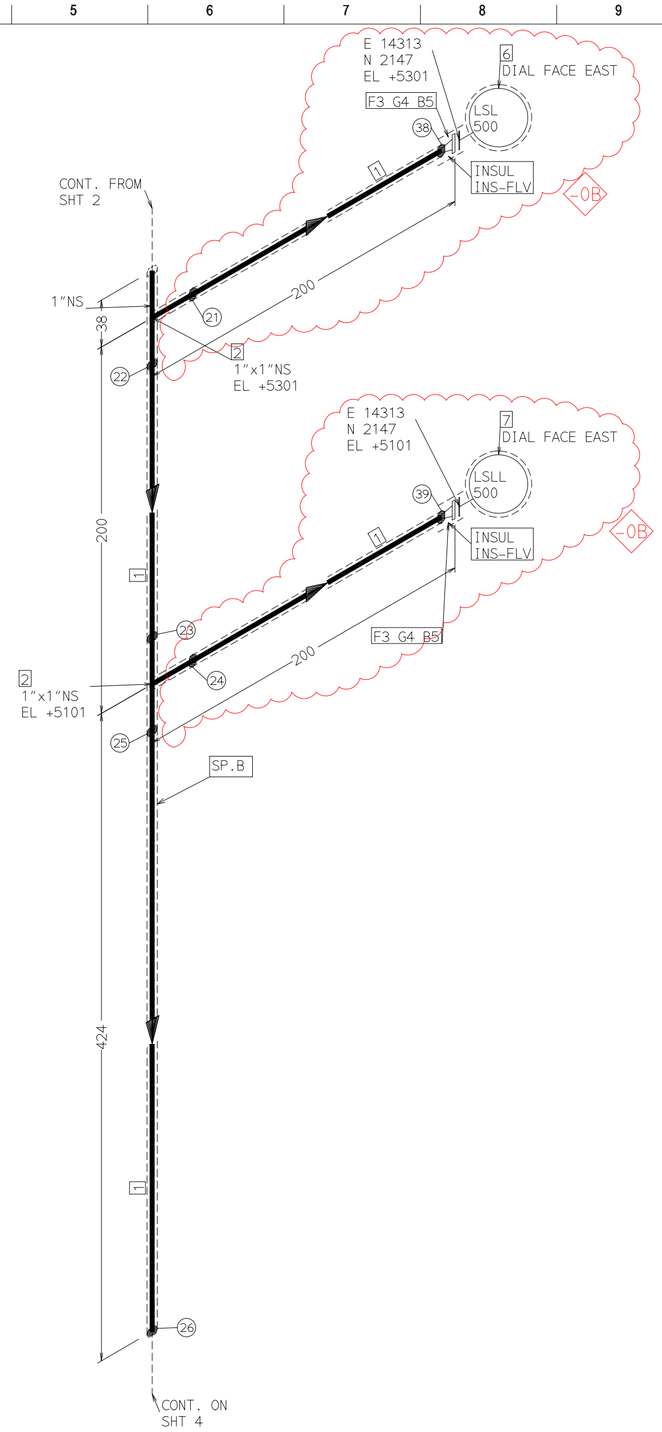
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 08

SHEET - OF 2 / 4

COMP. C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.8M	1.78 -0B
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	2	0.58
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		6.36 -0B

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
5	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
	INSTRUMENTS				
6	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSL 500	1	BY CLIENT	1	3.50
7	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSLL 500	1	BY CLIENT	1	3.50
			TOTAL ERECTION WEIGHT		8.98
			TOTAL WEIGHT		15.34 -0B

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
38	S	
39	S	

500-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0B	24/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

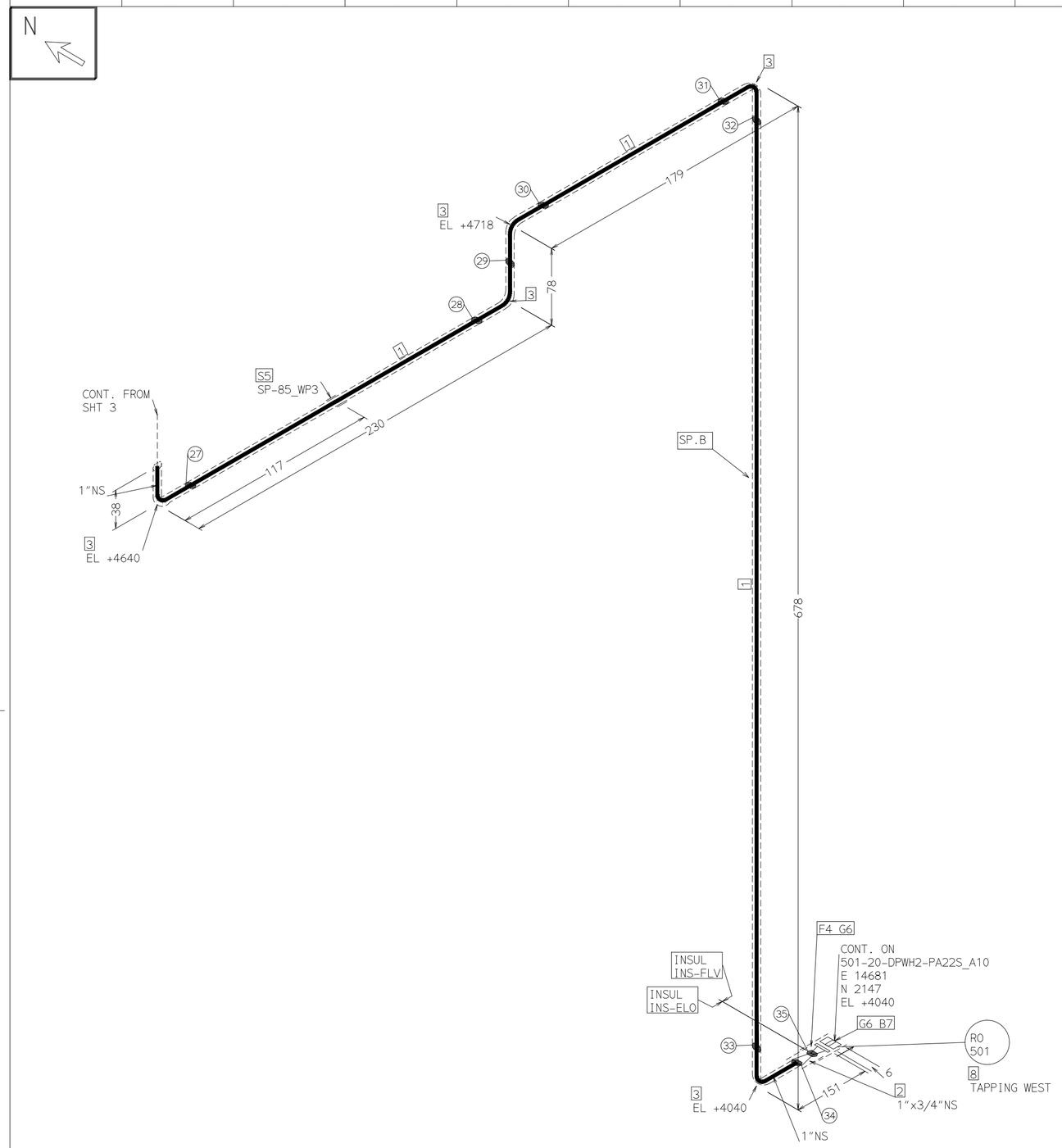
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	08	3 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.9M	2.15
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 3/4	REC0SS01610130	1	0.16
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	5	0.75
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
	SUPPORTS				
5	PIPE SHOE, S-64-DN25-70-150, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		9.26

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
	BOLTS				
7	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.95
	INSTRUMENTS				
8	RESTRICTION ORIFICE PLATE, DELTAFLUID, CL 300 SS 316 RO 501	3/4	BY CLIENT	1	0.14
			TOTAL ERECTION WEIGHT		1.23
			TOTAL WEIGHT		10.49

SPOOL NUMBERS:
SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
27	S	
28	S	
29	S	
30	S	
31	S	
32	S	
33	S	
34	S	
35	S	

500-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0B	24/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

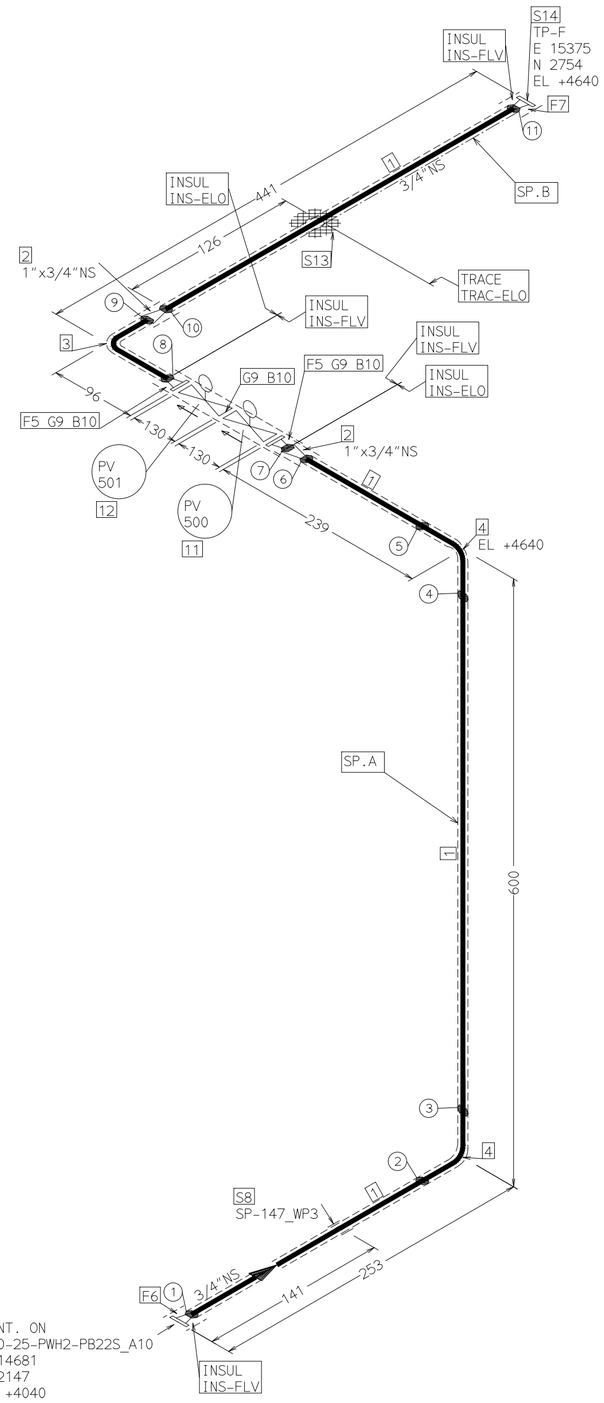
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 08

SHEET - OF: 4 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	1.1M	2.31
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 3/4	RECOSS0161013Q	2	0.32
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	2	0.40
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS00930100	2	2.20
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLWOSS06503Q00	1	1.80
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLWOSS03973Q00	1	0.80
	SUPPORTS				
8	PIPE SHOE, S-64-DN20-83-150, Carbon Steel	3/4	SUPPORT	1	4.40

TOTAL FABRICATION WEIGHT 12.38

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	3	0.18
	BOLTS				
10	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	12	1.86
	INSTRUMENTS				
11	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T290, CL150 RF PV 500	1	BY CLIENT	1	2.50
12	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T290, CL150 RF PV 501	1	BY CLIENT	1	2.50
	SUPPORTS				
13	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
14	General purpose ATTA SS 316	3/4	-	1	0.00

TOTAL ERECTION WEIGHT 10.44

TOTAL WEIGHT 22.82

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

501-20-DPWH2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/007	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	981	THICKNESS (mm):		TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid + Gas	thk =25		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	HR-501	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

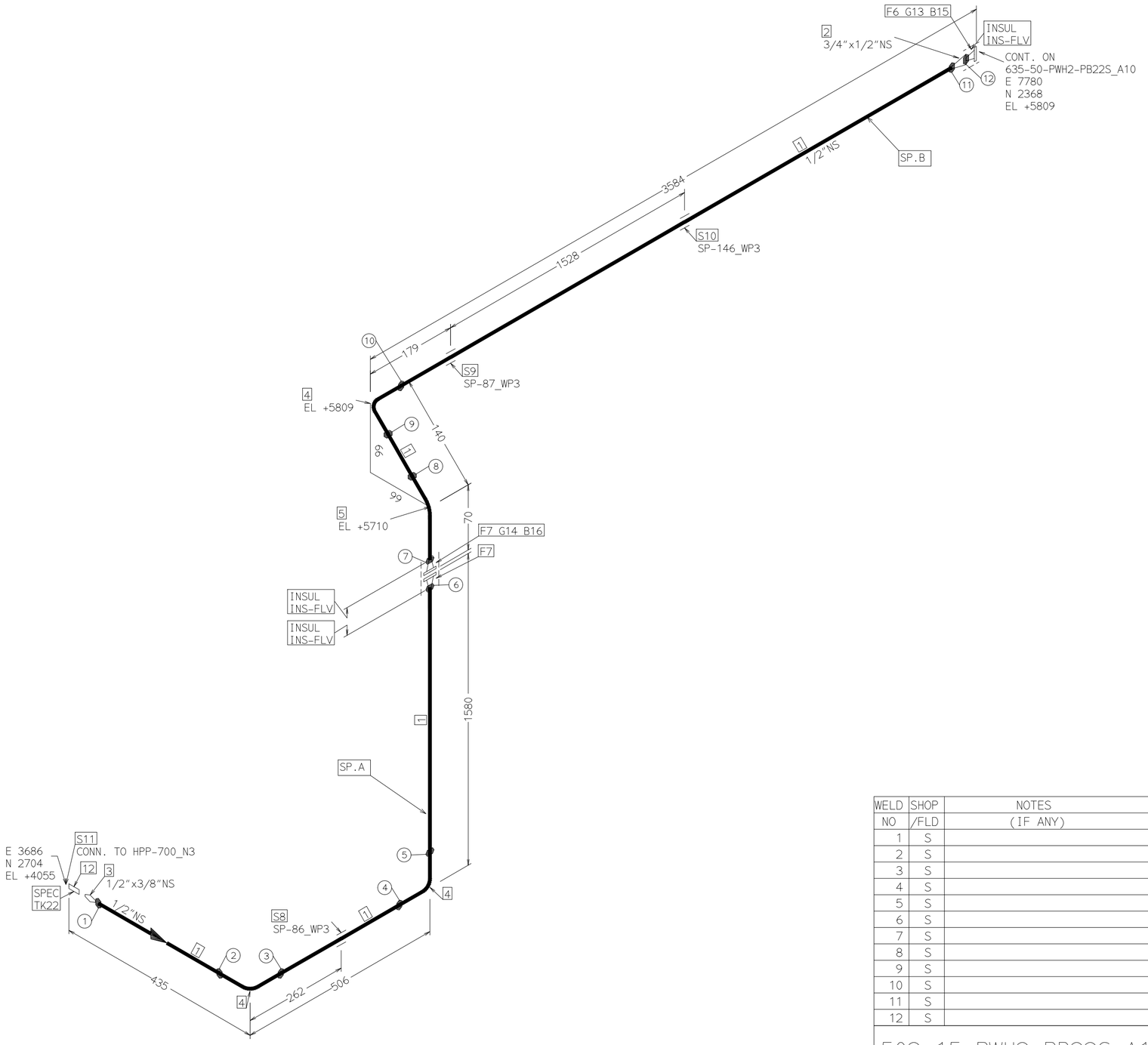
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 09

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	5.8M	9.33
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
3	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2 x 3/8	2CFDF316IN999	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	3	0.54
5	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E45RSS01480H00	1	0.08
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS06490H00	2	3.00
	SUPPORTS				
8	U-BOLT FOR GUIDE, S-211-15mm,	1/2	SUPPORT	1	0.02
9	U-BOLT FOR GUIDE, S-211-15mm,	1/2	SUPPORT	1	0.02
10	U-BOLT FOR GUIDE, S-211-15mm,	1/2	SUPPORT	1	0.02
11	General purpose ATTA	1/4	-	1	0.00

TOTAL FABRICATION WEIGHT 15.01

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
12	TUBE END REDUCER, SWAGELOK, M:TUB x M:NPT, INCH ASTM A276 316	3/8	2CFDF316IN958	1	0.10
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	1	0.07
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00550H00	1	0.05
	BOLTS				
15	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.89
16	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62

TOTAL ERECTION WEIGHT 1.73

TOTAL WEIGHT 16.74

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	

502-15-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	981	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

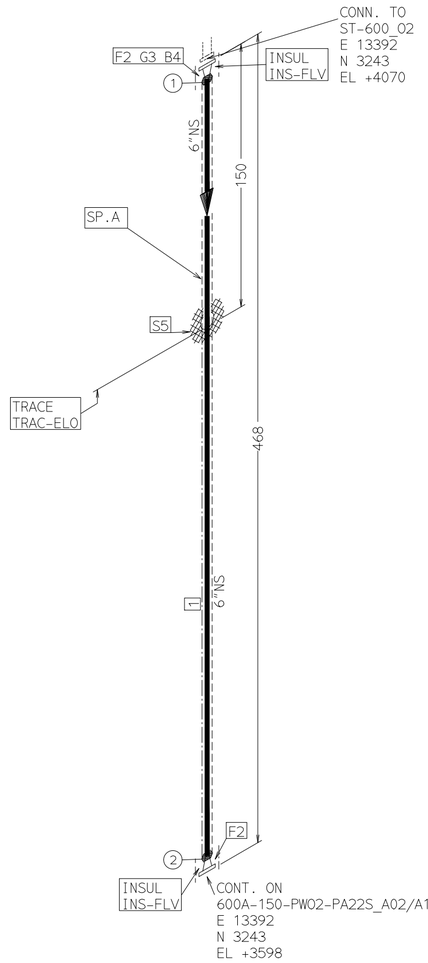
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	10	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.3M	8.08
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLWOSS04200600	2	21.60
			TOTAL FABRICATION WEIGHT		29.68

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00440600	1	0.20
	BOLTS				
4	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029270400	8	3.71
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-300/168/60/F3, AS PER DRAWING S1606157	6	2MCTZFR-6a	1	7.30
			TOTAL ERECTION WEIGHT		11.21
			TOTAL WEIGHT		40.89

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

600A-150-PW02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) : 22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	thk =40	FLUID : WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-600A	NDT : 100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

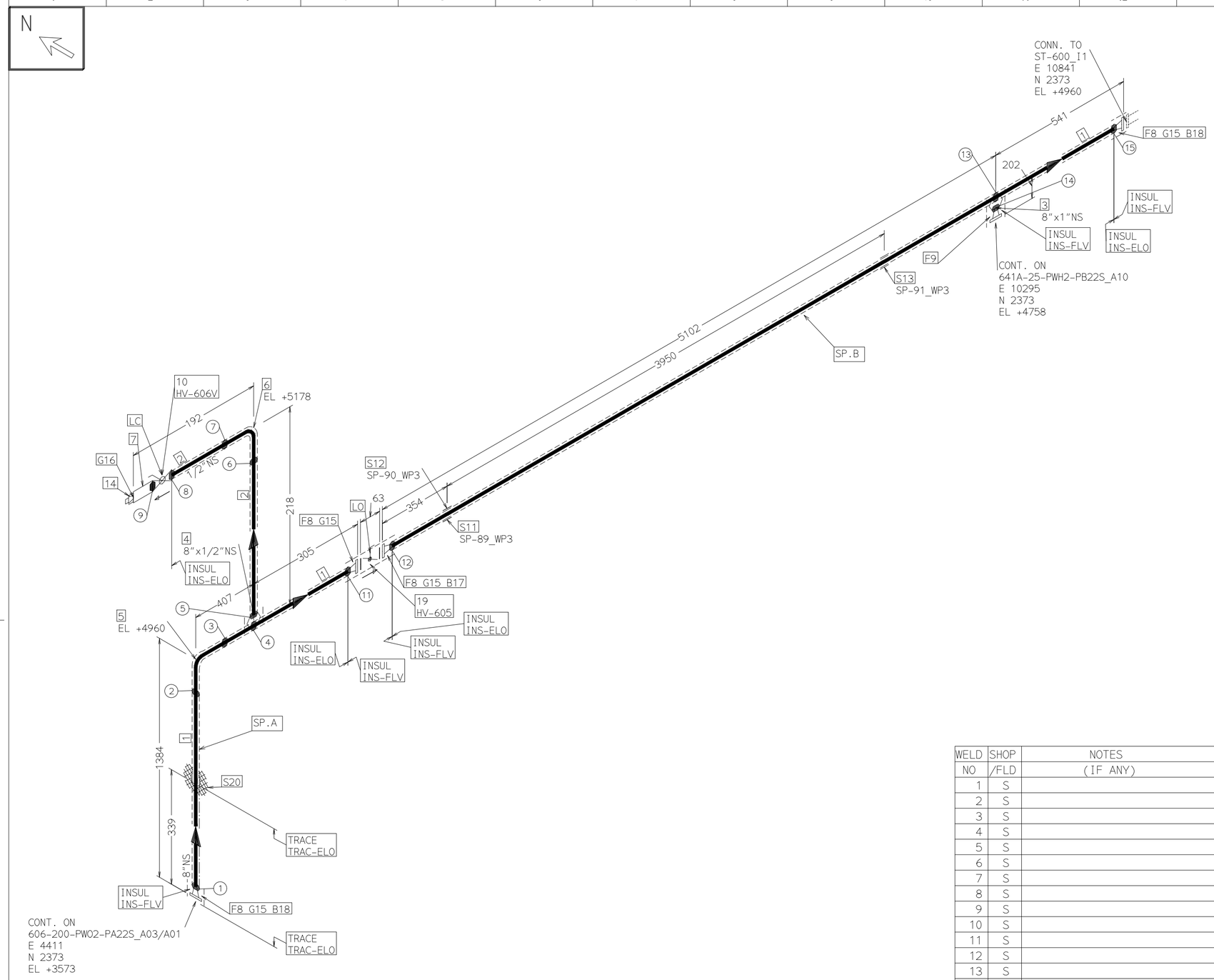
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 11

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.10S ASTM A312 Gr.TP 316/316L	8	PIPESS00870800	6.8M	112.34
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.15
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.10S x 40S ASTM A182 Gr.F316/316L	8 x 1	OWELSS02370801	1	0.23
4	WELDOLET MSS SP-97, Sch.10S x 80S ASTM A182 Gr.F316/316L	8 x 1/2	OWELSS0948080H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.10S ASTM A403 Gr.WP 316/316L-S	8	E90RSS00690800	1	10.60
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
7	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.10S ASTM A182 Gr.F316/316L	8	FLWOSS00070800	4	72.00
9	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	1	2.00
	VALVES / IN-LINE ITEMS				
10	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
11	PIPE SHOE, S-64-DN200-100-300, Carbon Steel	8	SUPPORT	1	16.50
12	BOLTED GUIDE FOR SHOE, C-34-4-I-2mm, Carbon Steel	8	SUPPORT	1	3.30
13	PIPE SHOE, S-64-DN200-100-300, Carbon Steel	8	SUPPORT	1	16.50

TOTAL FABRICATION WEIGHT 234.88

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
14	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
15	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	8	GENEGK00450800	4	1.24
16	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
17	180 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	8	5.37
18	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B009590400	16	7.65
	VALVES / IN-LINE ITEMS				
19	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, G.O., EXT. STEM, WITH LIMIT SWITCH ASTM A351 Gr.CF3M/CF8M	8	BY CLIENT	1	31.00
	SUPPORTS				
20	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-350/219/60/F3, AS PER DRAWING S1041059	8	2MCTZFR-8	1	8.60

SPOOL NUMBERS:
SP.A SP.B

TOTAL ERECTION WEIGHT 53.94

TOTAL WEIGHT 288.82

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

606-200-PW02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):		TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-606	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

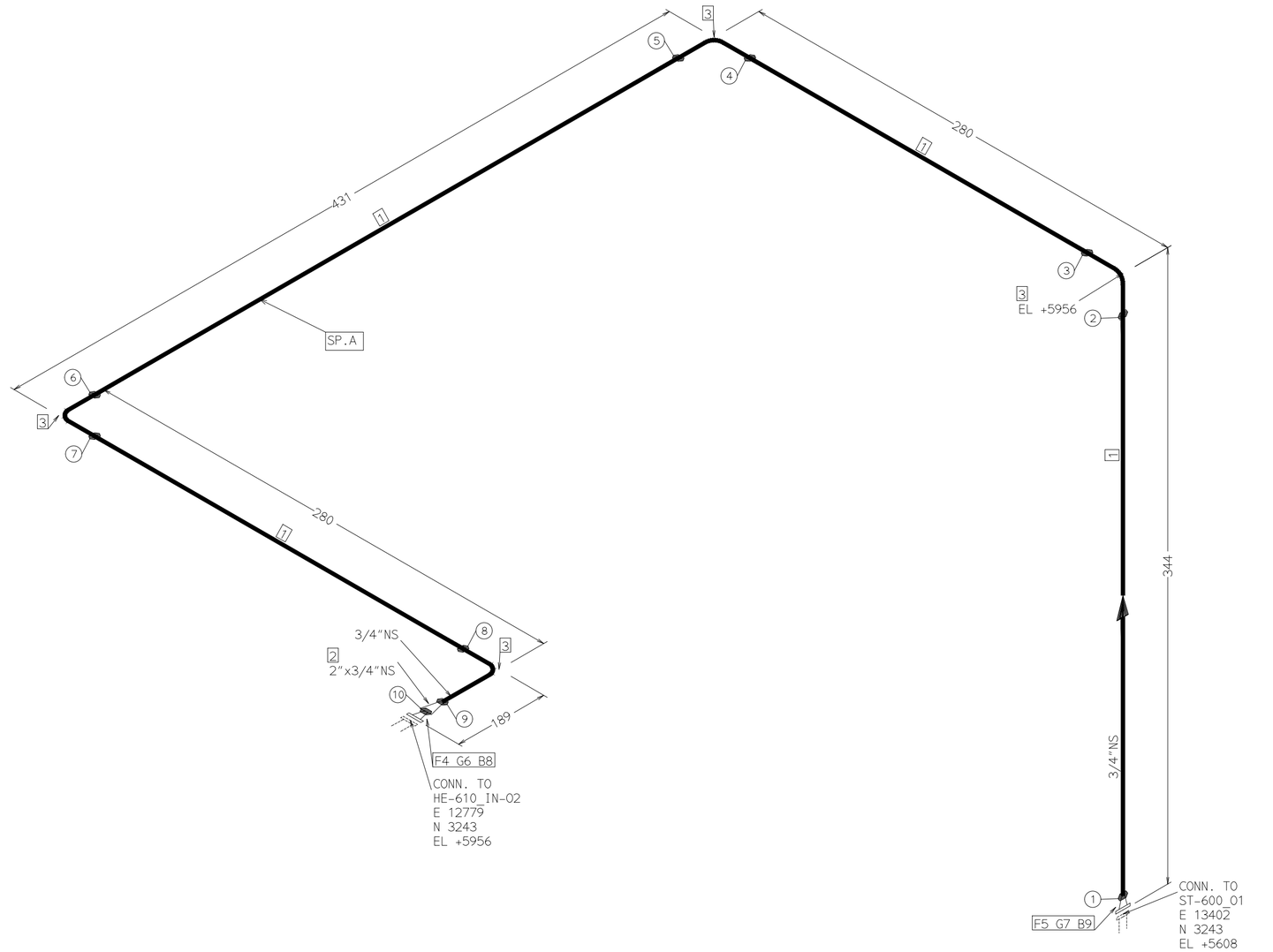
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 12
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	1.0M	2.19
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	2 x 3/4	RECOSS0283023Q	1	0.57
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	4	0.80
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWOSS00500200	1	4.00
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLWOSS03973Q00	1	0.80

TOTAL FABRICATION WEIGHT 8.36

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00383Q00	1	0.05
	BOLTS				
8	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
9	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.59

TOTAL ERECTION WEIGHT 2.73

TOTAL WEIGHT 11.09

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

610-20-PW02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	13.65	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

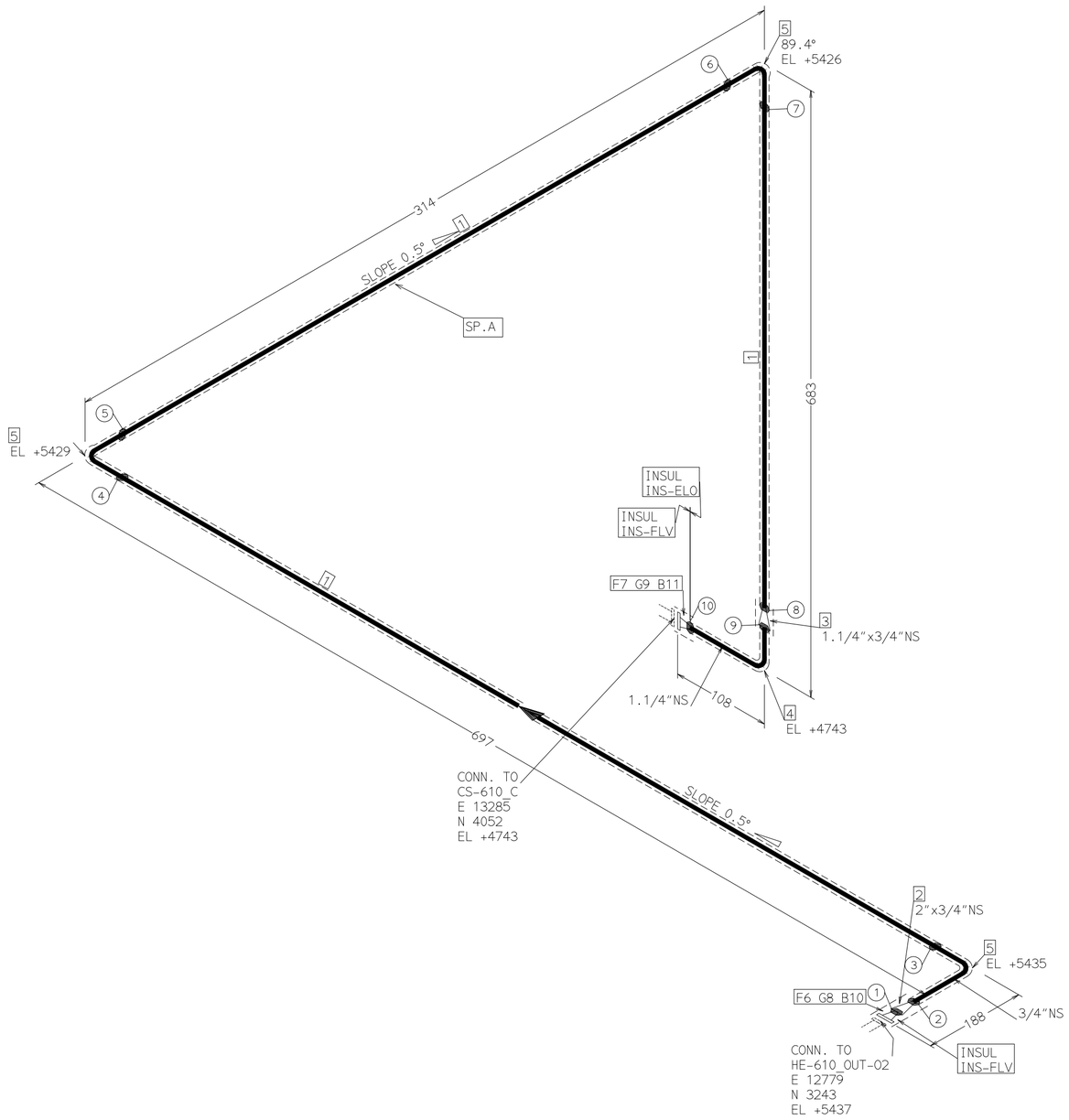
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	13	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	1.4M	3.05
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	2 x 3/4	REC0SS02830230	1	0.57
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/4 x 3/4	REC0SS1078UQ3Q	1	0.23
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/4	E90RSS0095UQ00	1	0.25
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	3	0.60
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/4	FLW0SS0355UQ00	1	1.40

TOTAL FABRICATION WEIGHT 10.10

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0073UQ00	1	0.07
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
11	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B012760200	4	0.65

TOTAL ERECTION WEIGHT 2.81

TOTAL WEIGHT 12.91

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

611-20-PW02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	16.37	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,5	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

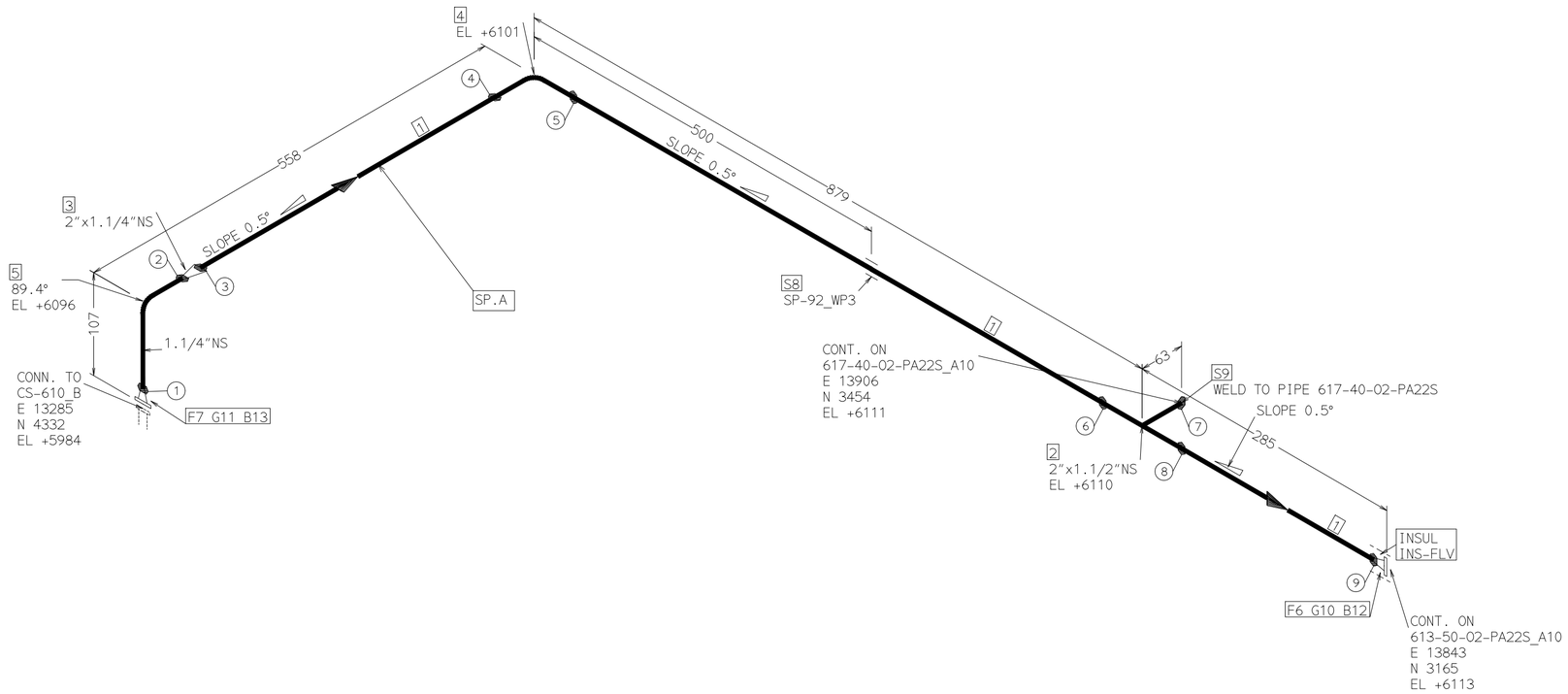
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	14	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	1.3M	6.72
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1.1/2	TER0SS0138021H	1	1.50
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1.1/4	REC0SS054802UQ	1	0.36
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E90RSS01000200	1	0.65
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/4	E90RSS0095UQ00	1	0.25
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/4	FLW0SS0355UQ00	1	1.40
	SUPPORTS				
8	U-BOLT FOR GUIDE, S-211-50mm,	2	SUPPORT	1	0.14
9	General purpose ATTA SS 316	1.1/2	-	1	0.00
			TOTAL FABRICATION WEIGHT		15.02

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0073UQ00	1	0.07
	BOLTS				
12	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
13	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B012760200	4	0.65
			TOTAL ERECTION WEIGHT		2.81
			TOTAL WEIGHT		17.83

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

612-50-02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	16.37	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,5	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	10,8					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

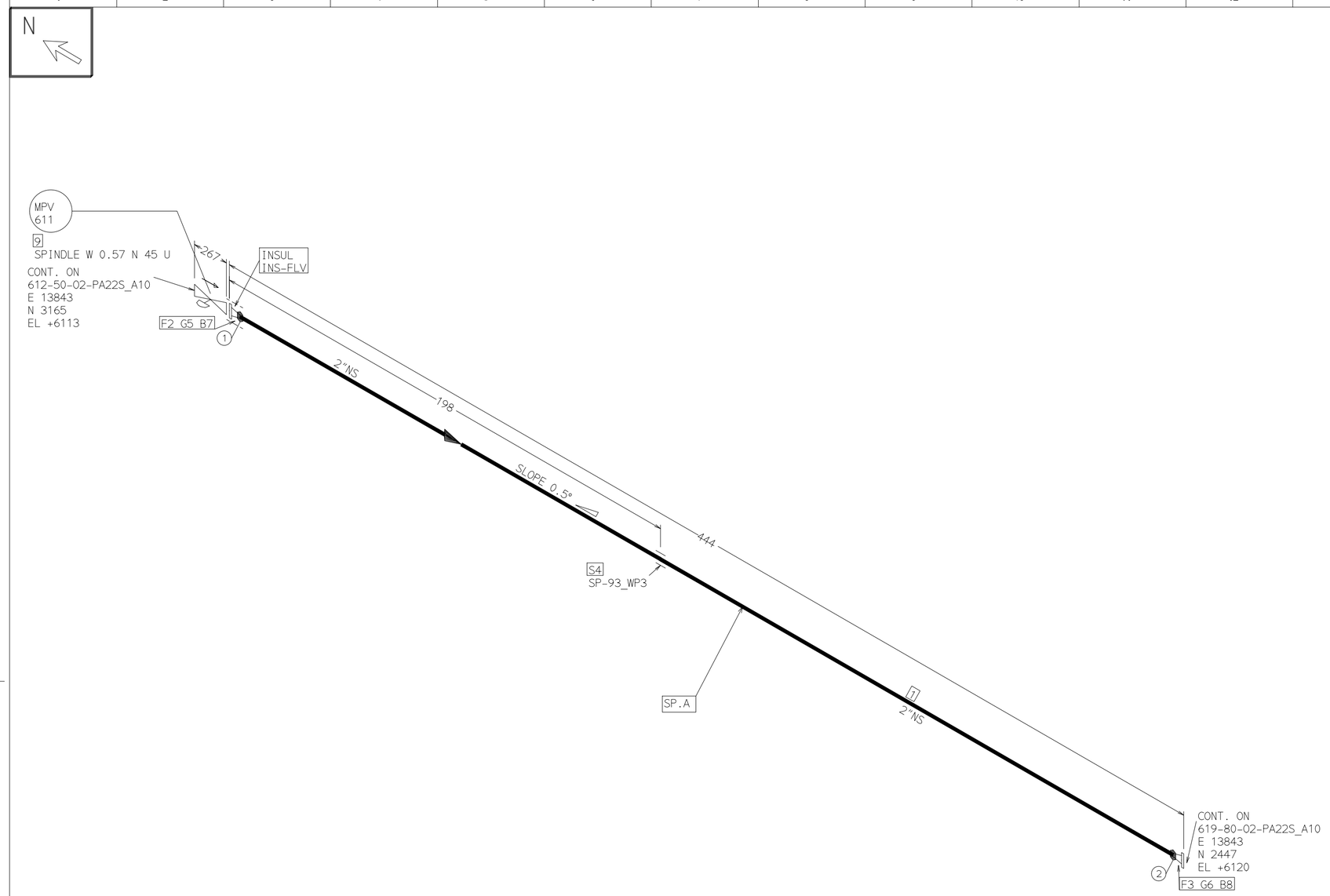
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 15

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.4M	1.66
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWOSS00500200	1	4.00
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWOSS02950200	1	2.70
	SUPPORTS				
4	U-BOLT FOR GUIDE, S-211-50mm,	2	SUPPORT	1	0.14
			TOTAL FABRICATION WEIGHT		8.50

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
	BOLTS				
7	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
8	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
	INSTRUMENTS				
9	SAMSON CONTROL VALVE, TYPE 3241-1, Cl.300 RF MPV 611	2	BY CLIENT	1	35.00
			TOTAL ERECTION WEIGHT		38.14
			TOTAL WEIGHT		46.64

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

613-50-02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.05	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,5	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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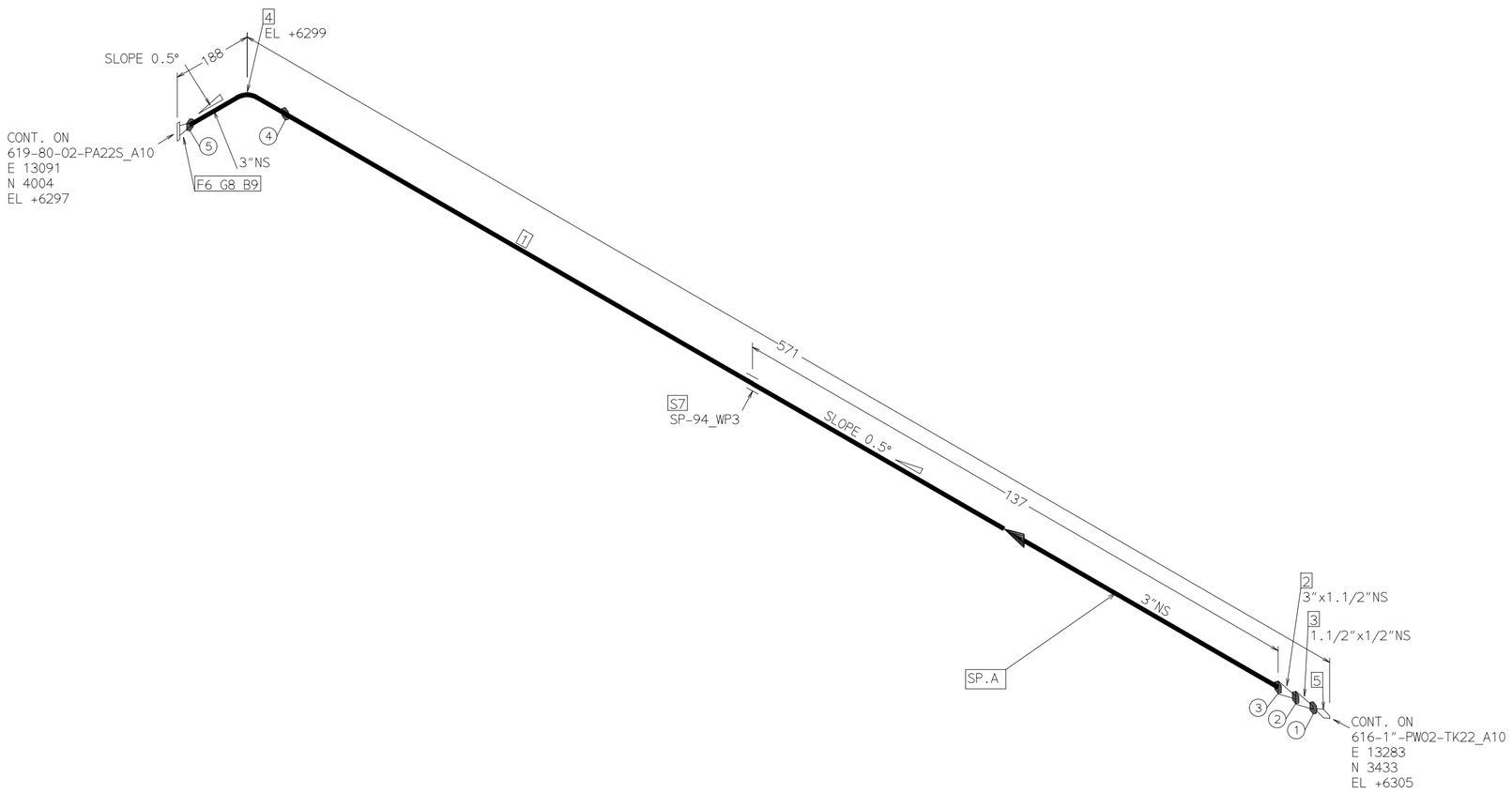
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	16	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	0.3M	3.05
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	3 x 1.1/2	REC0SS0514031H	1	1.00
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1/2	REC0SS05131H0H	1	0.35
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	3	E90RSS01110300	1	2.00
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS03190300	1	4.50
	SUPPORTS				
7	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29

TOTAL FABRICATION WEIGHT 11.29

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00420300	1	0.13
	BOLTS				
9	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	4	1.01

TOTAL ERECTION WEIGHT 1.14

TOTAL WEIGHT 12.43

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

616A-80-02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1000	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

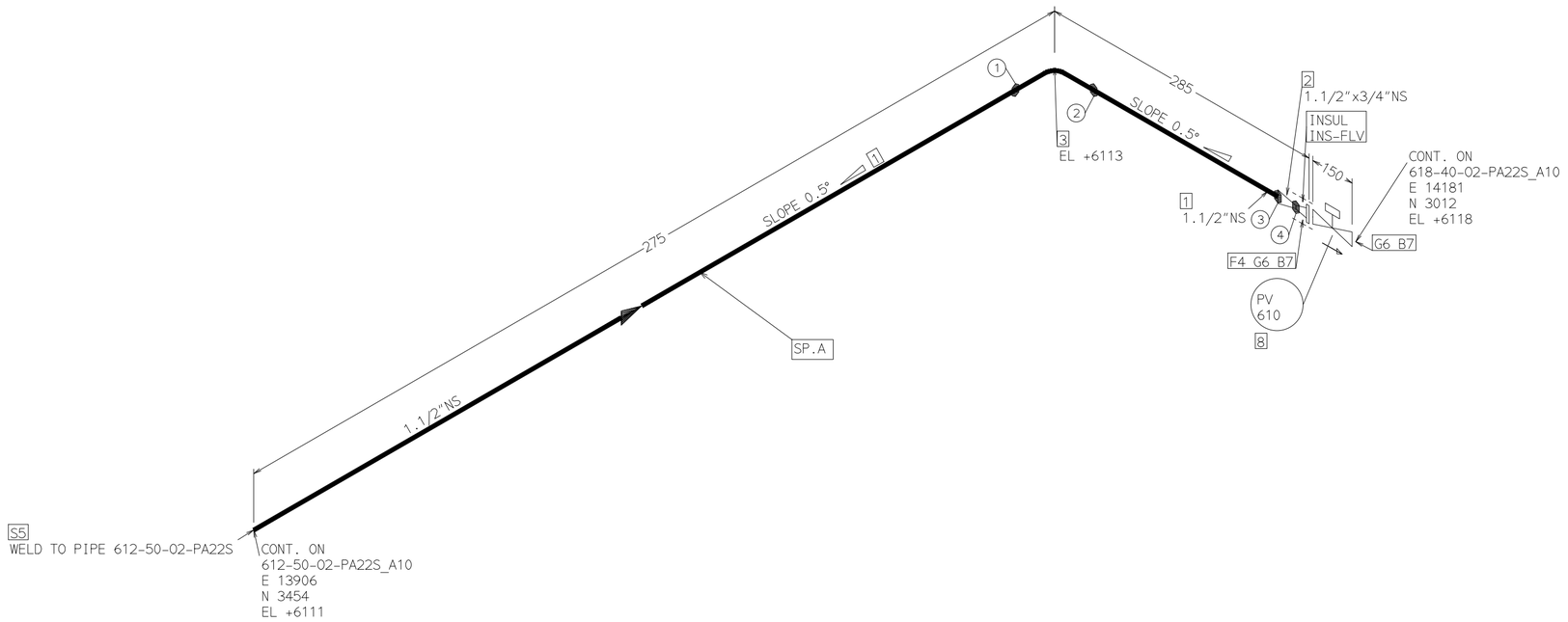
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	17	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	0.4M	1.28
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 3/4	RECOSS02811H3Q	1	0.35
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2	E90RSS00681H00	1	0.40
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLWOSS06503Q00	1	1.80
	SUPPORTS				
5	General purpose ATTA SS 316	1.1/2	-	1	0.00
			TOTAL FABRICATION WEIGHT		3.83

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
	BOLTS				
7	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	8	1.78
	INSTRUMENTS				
8	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 610	3/4	BY CLIENT	1	5.90
			TOTAL ERECTION WEIGHT		7.82
			TOTAL WEIGHT		11.65

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

617-40-02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	16.37	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,5	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	10,8				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL / INS-ELO = STANDARD INSULATION

INSUL / INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

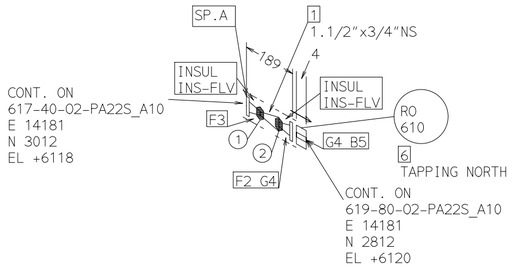
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	18	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
1	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 3/4	REC0SS02811H3Q	1	0.35
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS00941H00	1	1.80
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
			TOTAL FABRICATION WEIGHT		3.95

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00401H00	2	0.14
	BOLTS				
5	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B012760200	4	0.68
	INSTRUMENTS				
6	RESTRICTION ORIFICE PLATE, DELTAFLUID, CL 150 ASTM A240 GR.316 RO 610	1.1/2	BY CLIENT	1	0.23
			TOTAL ERECTION WEIGHT		1.05
			TOTAL WEIGHT		5.00

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

618-40-02-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	16.37	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,5	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

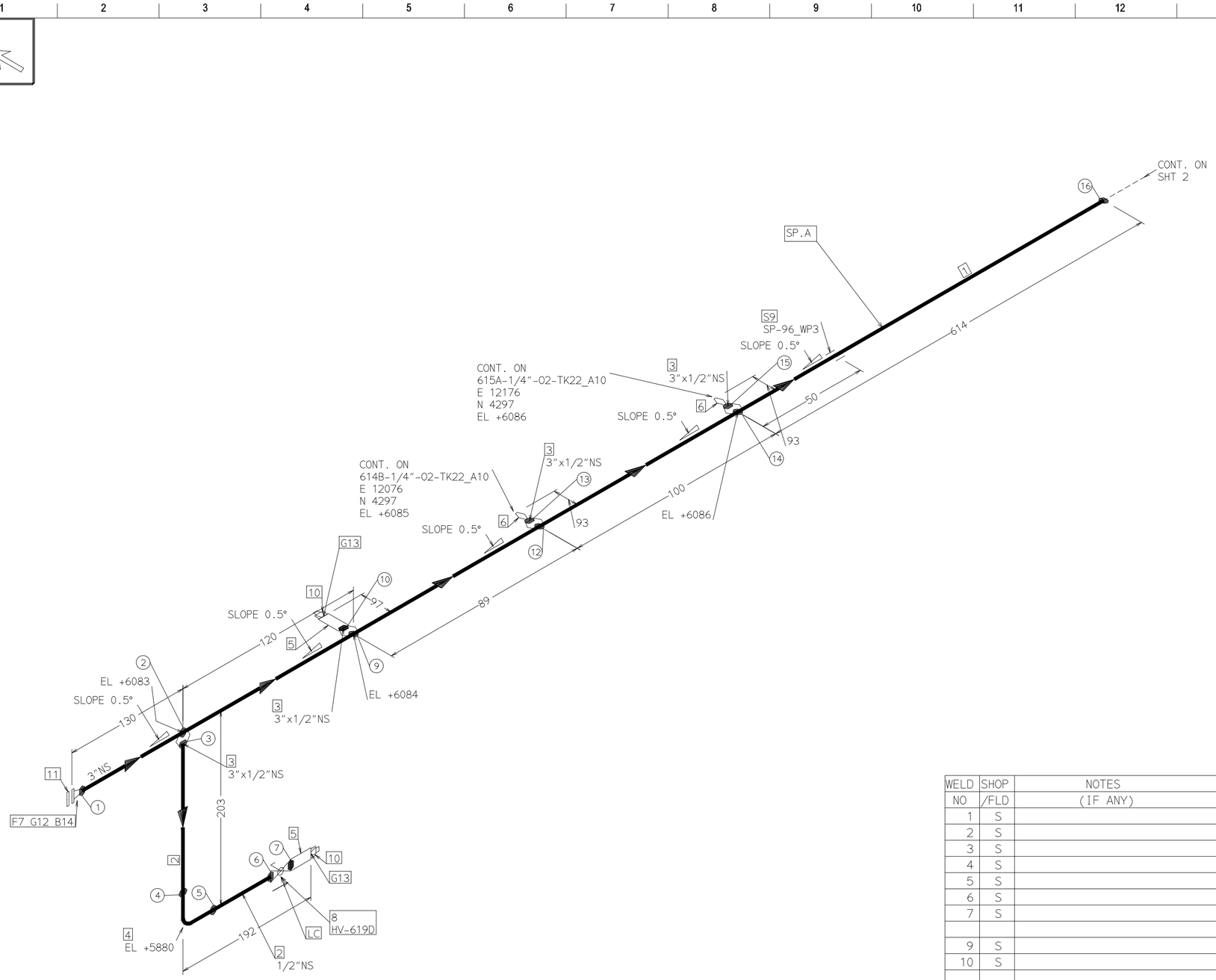
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 19

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
9	S	
10	S	
12	S	
13	S	
14	S	
15	S	
16	S	

619-80-02-PA22S_A10

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	1.0M	11.03
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.23
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	3 x 1/2	OWELSS0833030H	4	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	2	0.20
6	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	2	0.20
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS03190300	1	4.50
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
9	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
			TOTAL FABRICATION WEIGHT		17.91

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	2	0.14
	FLANGES				
11	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F316/316L	3	FLB0SS00030300	1	5.50
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00420300	1	0.13
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	2	0.02
	BOLTS				
14	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	4	1.01
			TOTAL ERECTION WEIGHT		6.80
			TOTAL WEIGHT		24.71

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1000	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	Amb	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

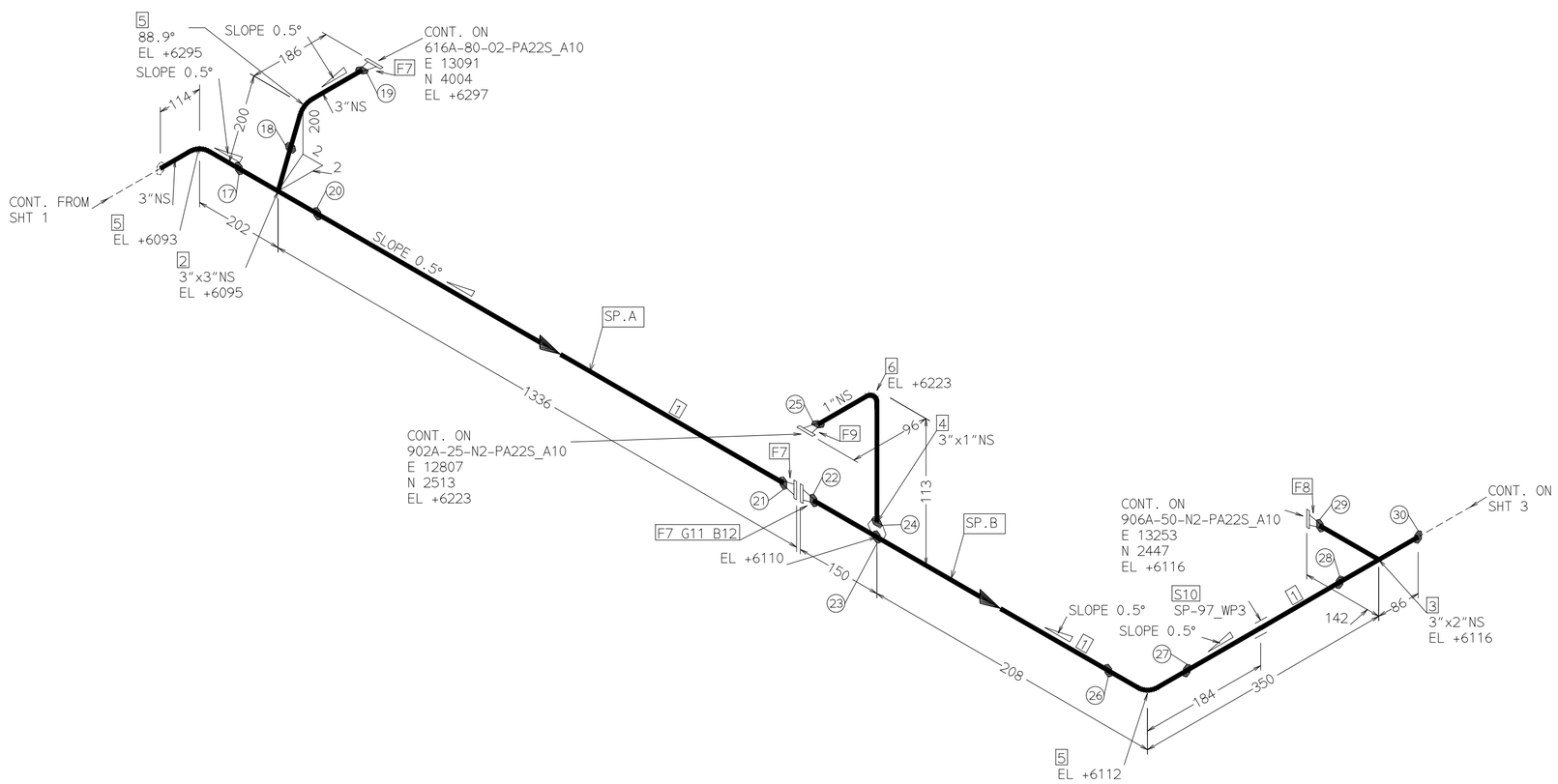
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	20	1 / 3	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	
29	S	
30	S	

619-80-02-PA22S_A10

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	1.5M	16.93
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	3 x 3	TEE0SS00890300	1	3.80
3	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	3 x 2	TER0SS03270302	1	2.90
4	WELDOLET MSS SP-97, Sch.40S ASTM A182 Gr.F316/316L	3 x 1	OWELSS05330301	1	0.23
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	3	E90RSS01110300	3	6.00
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS03190300	3	13.50
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
	SUPPORTS				
10	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
			TOTAL FABRICATION WEIGHT		47.60

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00420300	1	0.13
	BOLTS				
12	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	4	1.01
			TOTAL ERECTION WEIGHT		1.14
			TOTAL WEIGHT		48.74

SPOOL NUMBERS:
SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1000	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	Amb	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION · INSUL INS-FLV = THERMAL JACKET INSULATION · PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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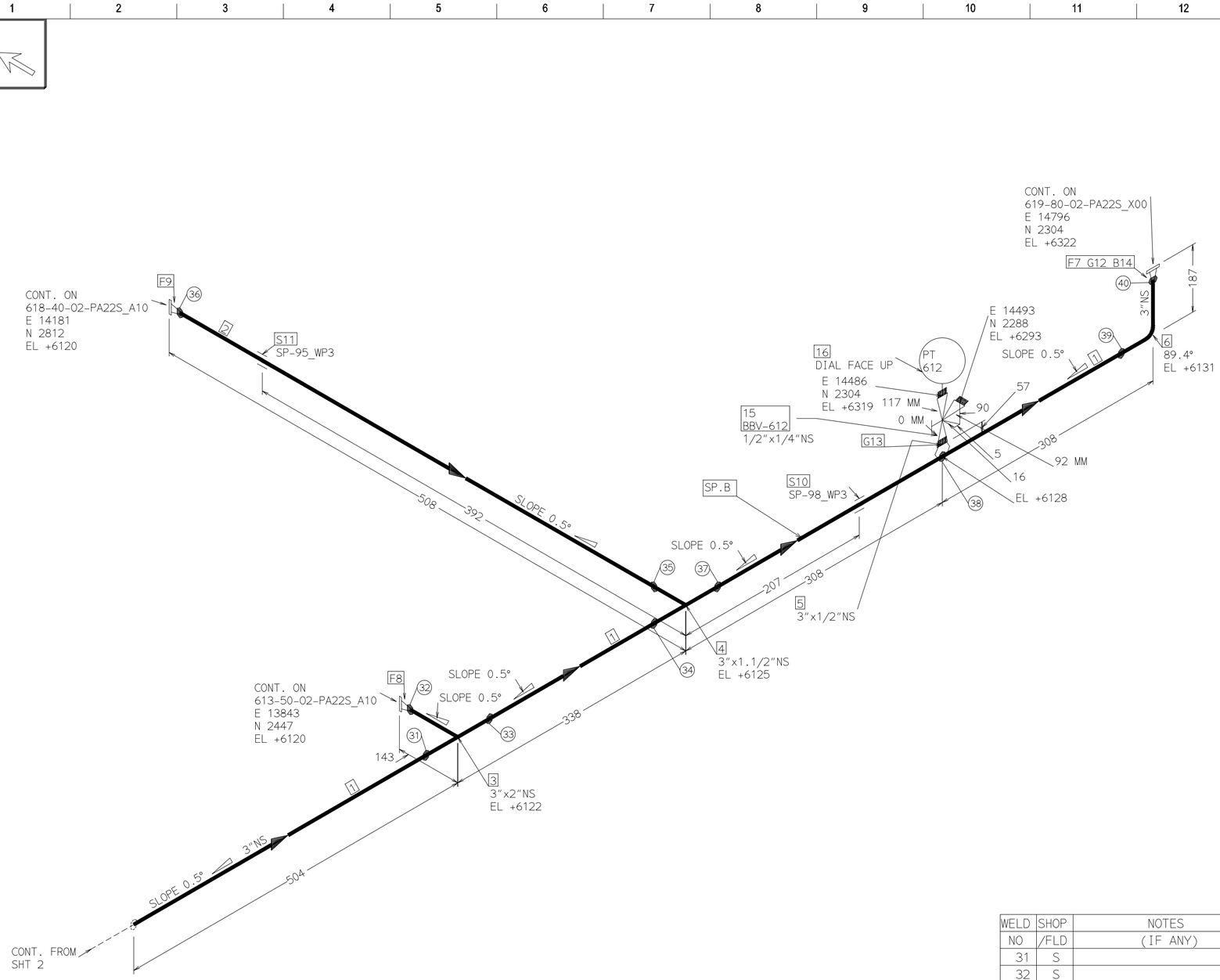
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 20
SHEET - OF: 2 / 3
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	1.1M	11.30
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	0.4M	1.50
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	3 x 2	TERSS03270302	1	2.90
4	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	3 x 1.1/2	TERSS0620031H	1	2.90
5	THREDOLET MSS SP-97, CL.3000, BSPP ASTM A182 Gr.F316/316L	3 x 1/2	OTHESS0327030H	1	0.13
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	3	E90RSS01110300	1	2.00
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLWSS03190300	1	4.50
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWSS02950200	1	2.70
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLWSS00941H00	1	1.80
	SUPPORTS				
10	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
11	U-BOLT FOR GUIDE, S-211-40mm,	1.1/2	SUPPORT	1	0.12
			TOTAL FABRICATION WEIGHT		30.14

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00420300	1	0.13
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
14	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	4	1.01
	VALVES / IN-LINE ITEMS				
15	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
16	PRESSURE TRANSMITTER, CERABAR PMP71B PT 612	1/2	BY CLIENT	1	1.73

TOTAL ERECTION WEIGHT 3.88

TOTAL WEIGHT 34.02

WELD NO	SHOP /FLD	NOTES (IF ANY)
31	S	
32	S	
33	S	
34	S	
35	S	
36	S	
37	S	
38	S	
39	S	
40	S	

619-80-02-PA22S_A10

SPOOL NUMBERS:

SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1000	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	Amb	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

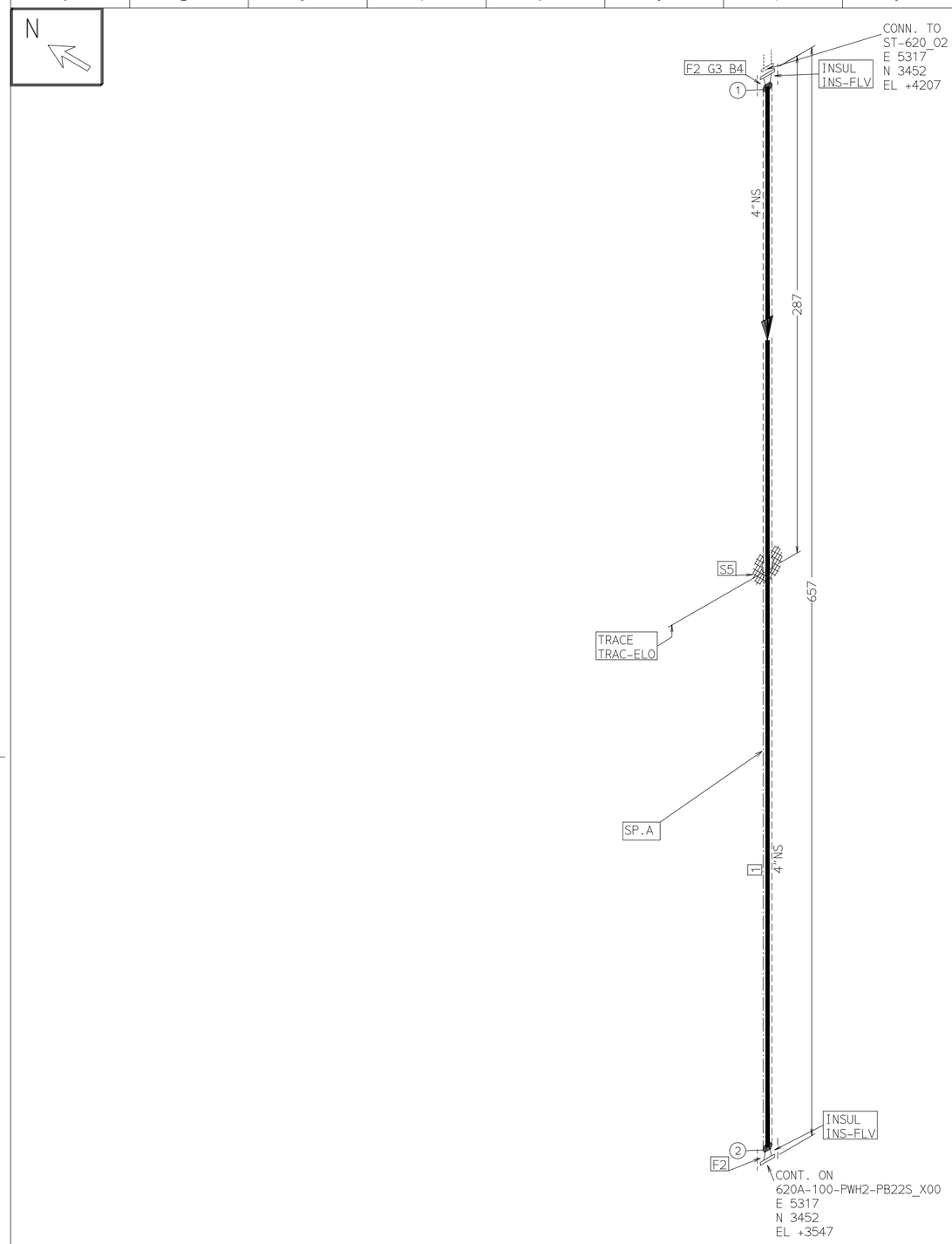
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	20	3 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.5M	7.34
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLWOSS00520400	2	22.00
			TOTAL FABRICATION WEIGHT		29.34

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	1	0.29
	BOLTS				
4	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029280400	8	3.93
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SEAL RS-300/114/60, AS PER DRAWING S1022388	4	2MCTZFR-4	1	7.30
			TOTAL ERECTION WEIGHT		11.52
			TOTAL WEIGHT		40.86

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

620A-100-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-620A	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

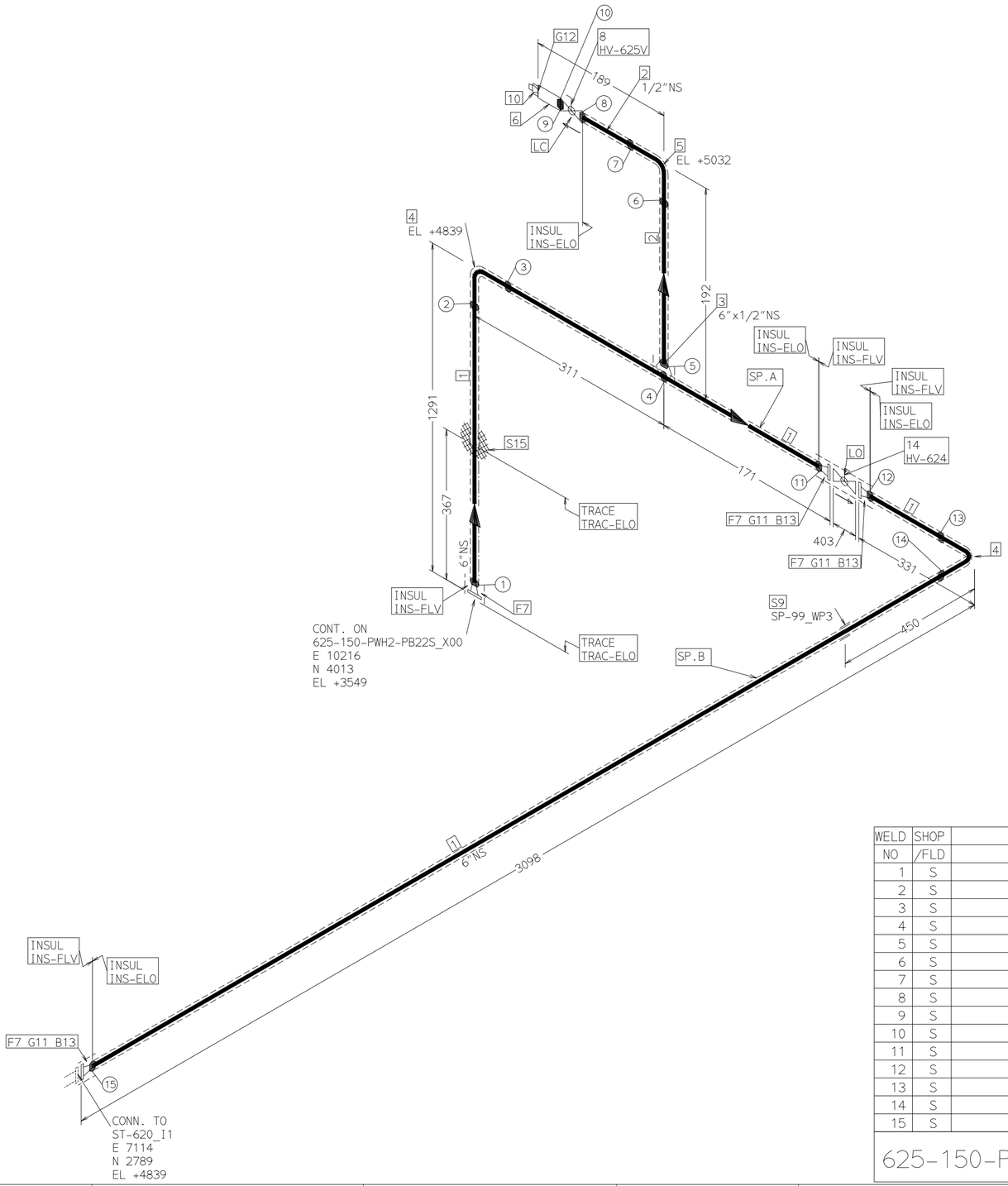
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	21	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	3.9M	109.54
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.15
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F316/316L	6 x 1/2	OWELSS0946060H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	6	E90RSS01120600	2	20.40
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLW0SS03290600	4	76.00
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
9	PIPE SHOE, S-64-DN150-100-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL FABRICATION WEIGHT		221.85

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00620600	3	1.50
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
13	125 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029290400	36	18.68
	VALVES / IN-LINE ITEMS				
14	BALL VALVE SFERACO 530 IIT, CL300 RF, FULL BORE, L.O., WITH LIMIT SWITCH ASTM A351 Gr.CF3M/CF8M	6	BY CLIENT	1	105.00
	SUPPORTS				
15	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-350/168/60/F3, AS PER DRAWING S1606153	6	2MCTZFR-6b	1	7.30
			TOTAL ERECTION WEIGHT		132.56
			TOTAL WEIGHT		354.41

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

625-150-PWH2-PB22S_A10

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-625	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	31,1					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

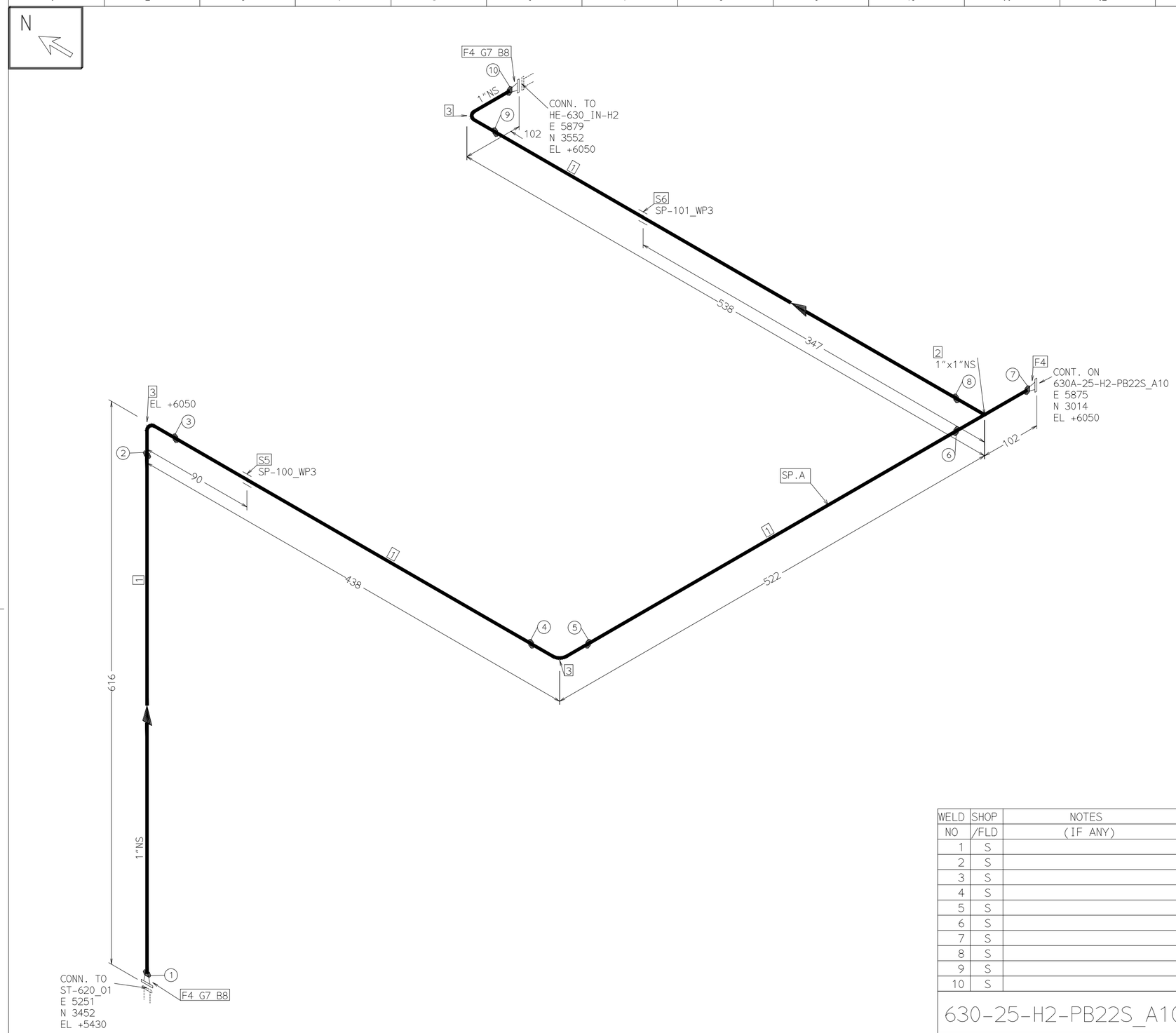
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 22

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.8M	4.42
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	3	6.00
	SUPPORTS				
5	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
6	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		11.20

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
8	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
			TOTAL ERECTION WEIGHT		1.98
			TOTAL WEIGHT		13.18

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

630-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.3	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

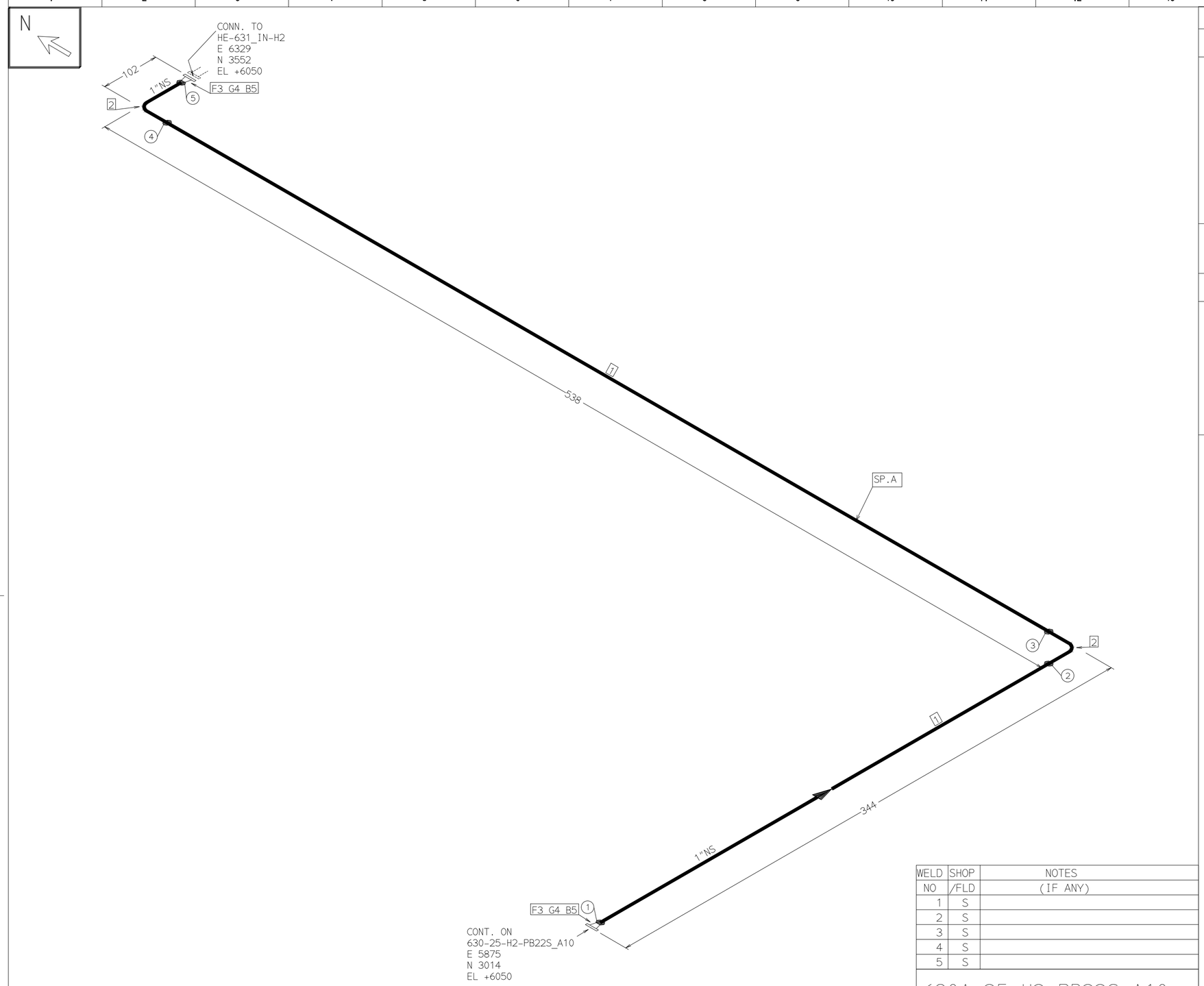
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 23

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.7M	1.74
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		6.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
5	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
			TOTAL ERECTION WEIGHT		1.98
			TOTAL WEIGHT		8.02

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

630A-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.3	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

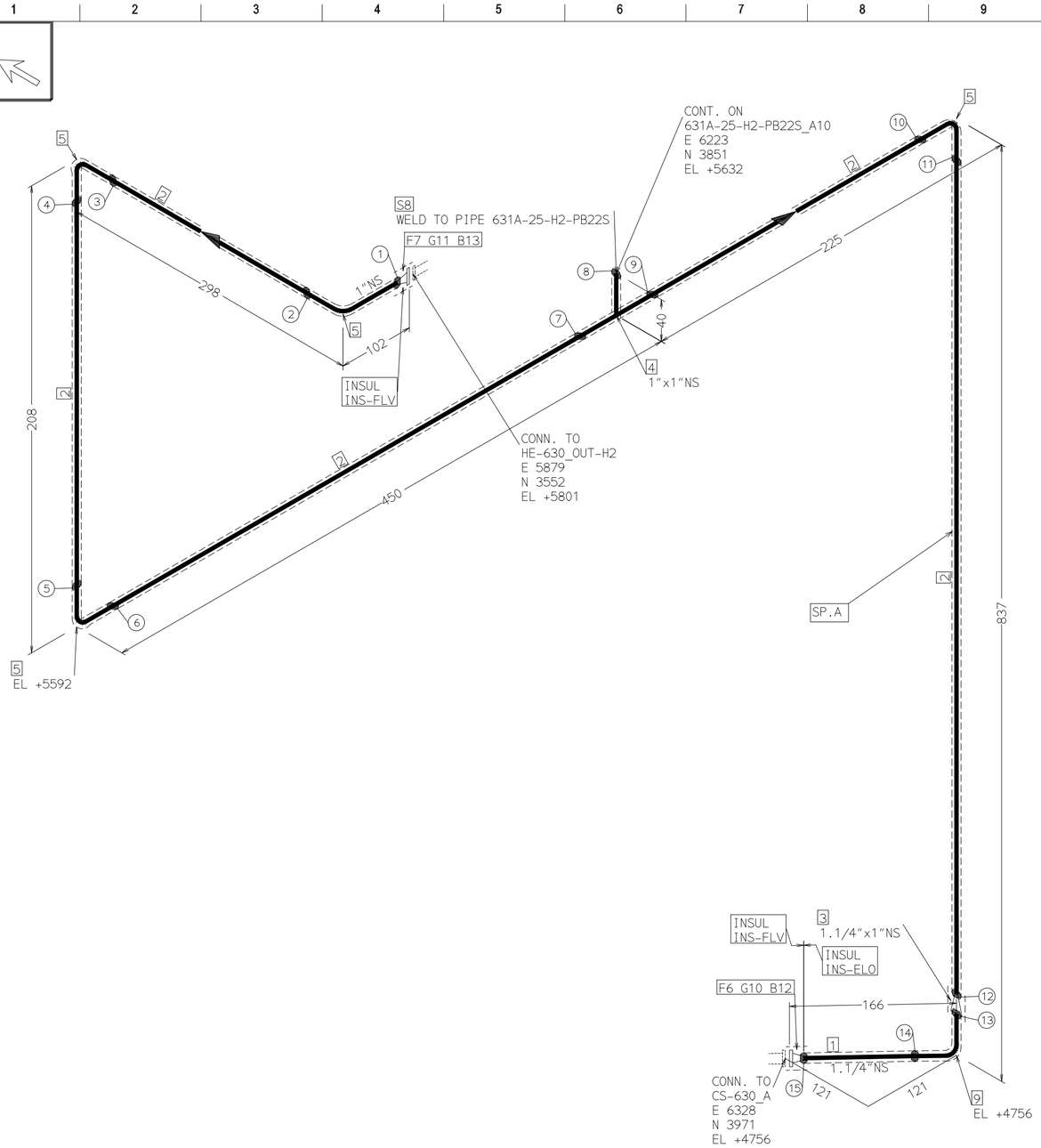
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 24

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/4	PIPESS0248UQ00	0.1M	0.12
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.6M	3.88
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/4 x 1	REC0SS0229UQ01	1	0.13
4	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	4	0.60
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/4	FLW0SS0573UQ00	1	2.50
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	SUPPORTS				
8	General purpose ATTA SS 316	1	-	1	0.00

TOTAL FABRICATION WEIGHT 9.52

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/4	E90RSS0095UQ00	1	0.25
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0091UQ00	1	0.07
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	1.00
13	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92

TOTAL ERECTION WEIGHT 2.31

TOTAL WEIGHT 11.83

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

631-25-H2-PB22S_A10

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

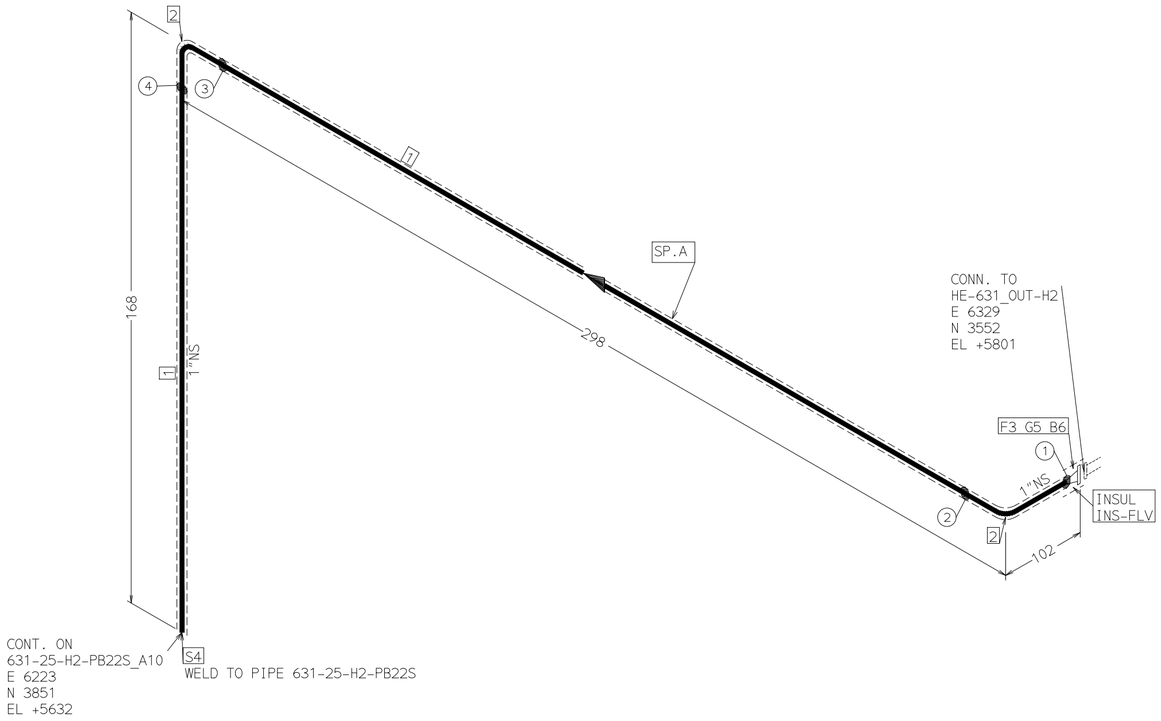
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 25

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.4M	0.86
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	1	2.00
	SUPPORTS				
4	General purpose ATTA SS 316	1	-	1	0.00
			TOTAL FABRICATION WEIGHT		3.16

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
6	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
			TOTAL ERECTION WEIGHT		0.99
			TOTAL WEIGHT		4.15

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

631A-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

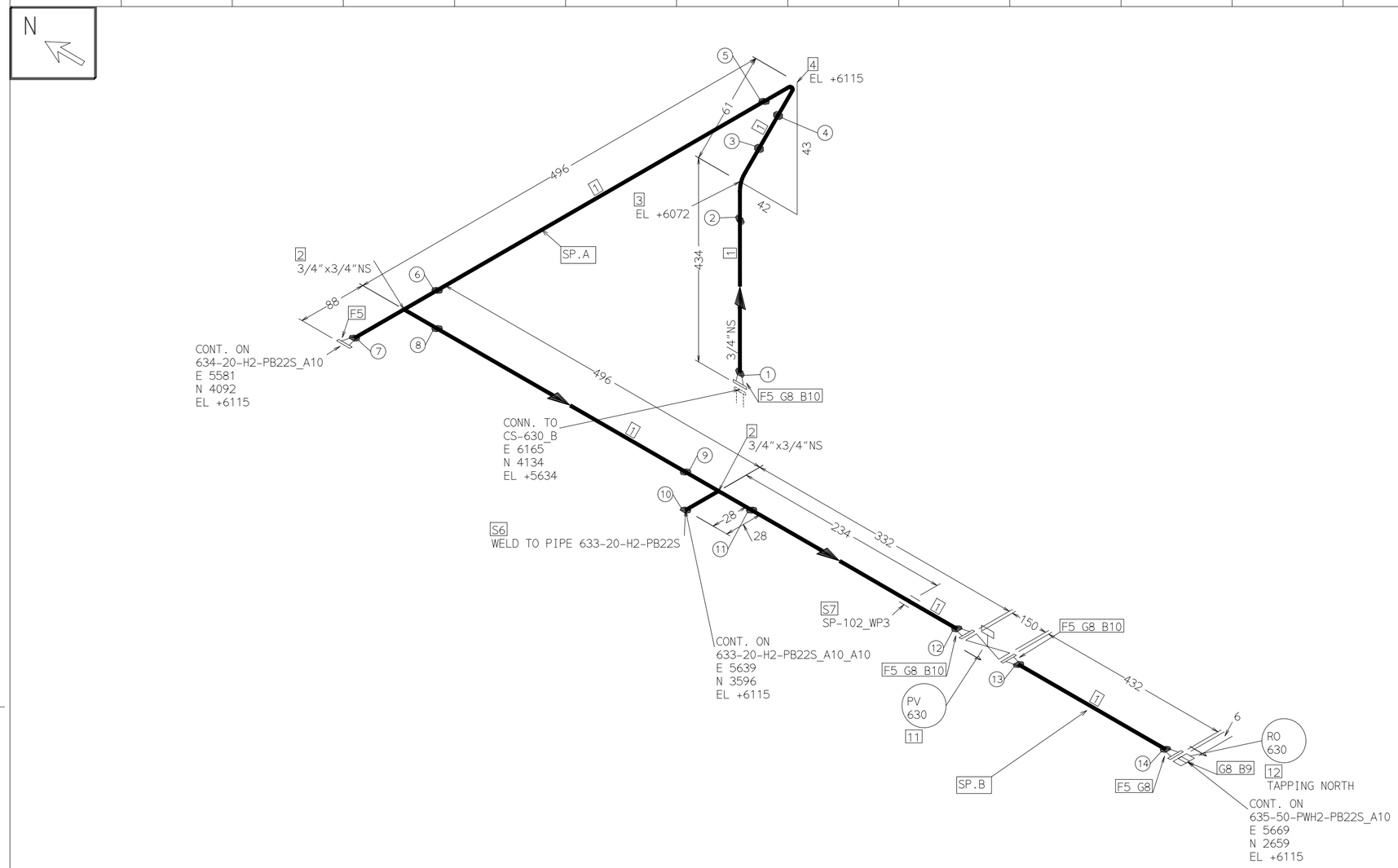
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	26	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	1.8M	3.88
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 3/4	TEE0SS00923Q00	2	0.54
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E45RSS00893Q00	1	0.08
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	1	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	5	9.00
	SUPPORTS				
6	General purpose ATTA SS 316	3/4	-	1	0.00
7	U-BOLT FOR GUIDE, S-211-20mm,	3/4	SUPPORT	1	0.02

TOTAL FABRICATION WEIGHT 13.72

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	5	0.35
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.95
10	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	12	2.66
	INSTRUMENTS				
11	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 630	3/4	BY CLIENT	1	5.90
12	RESTRICTION ORIFICE PLATE, DELTAFLUID, CL 300 SS 316 RO 630	3/4	BY CLIENT	1	0.14

TOTAL ERECTION WEIGHT 10.00

TOTAL WEIGHT 23.72

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

632-20-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

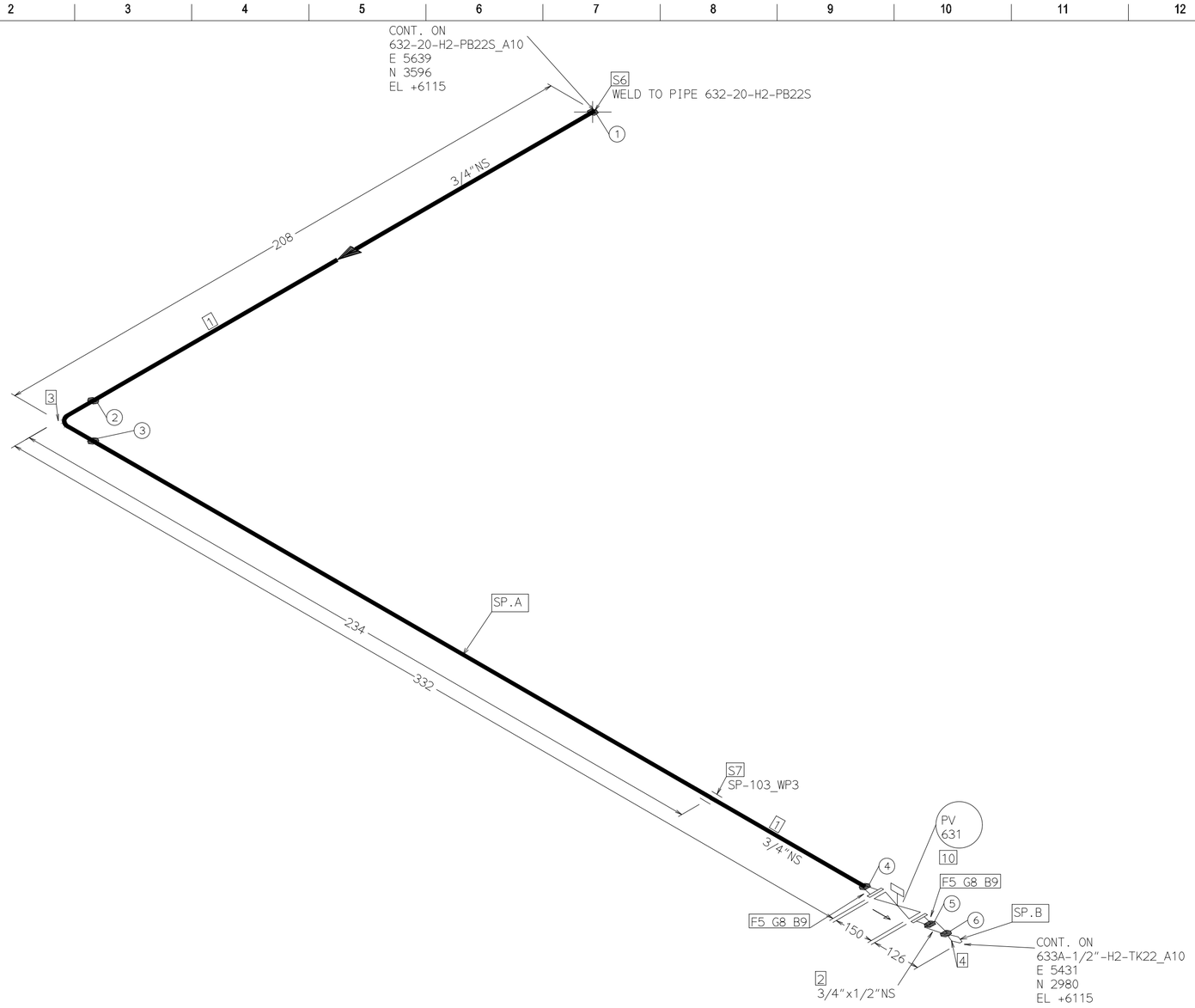
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 27

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	0.4M	0.88
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	RECOSS05113Q0H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	1	0.20
4	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	2	3.60
	SUPPORTS				
6	General purpose ATTA SS 316	3/4	-	1	0.00
7	U-BOLT FOR GUIDE, S-211-20mm,	3/4	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		4.90

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
	BOLTS				
9	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	8	1.78
	INSTRUMENTS				
10	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 631	3/4	BY CLIENT	1	5.90
			TOTAL ERECTION WEIGHT		7.82
			TOTAL WEIGHT		12.72

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	F	
2	S	
3	S	
4	S	
5	S	
6	S	

633-20-H2-PB22S_A10_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

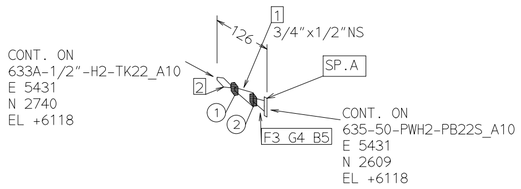
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	28	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
1	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
2	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
			TOTAL FABRICATION WEIGHT		2.00

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	1	0.07
	BOLTS				
5	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.89
			TOTAL ERECTION WEIGHT		0.96
			TOTAL WEIGHT		2.96

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

633B-20-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1.42	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	57	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

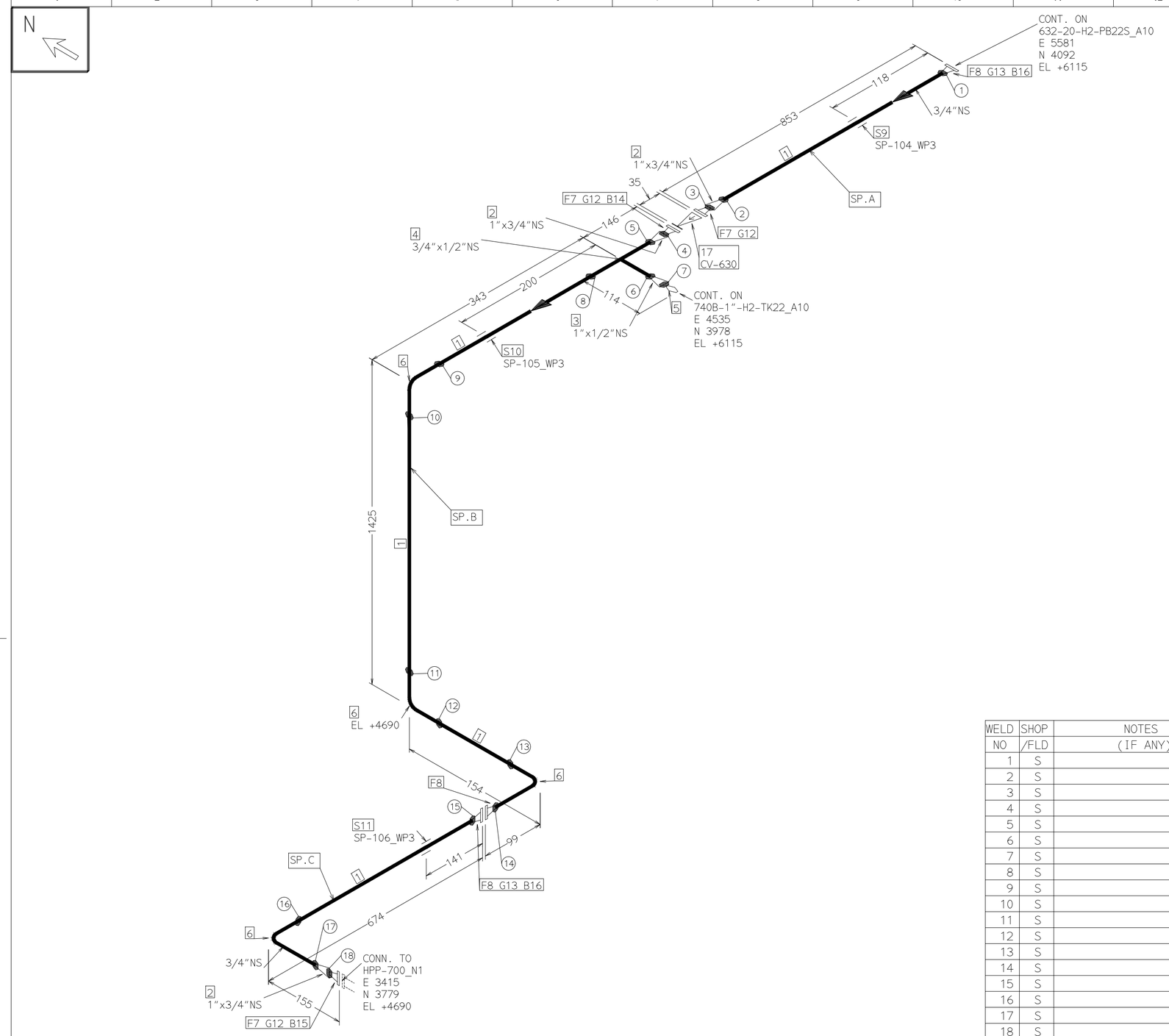
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 29

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	3.0M	6.44
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 3/4	REC0SS0161013Q	3	0.48
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	TER0SS05993Q0H	1	0.34
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1	2CFDF316IN886	1	0.10
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	4	0.80
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	3	6.00
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	3	5.40
	SUPPORTS				
9	U-BOLT FOR GUIDE, S-211-20mm,	3/4	SUPPORT	1	0.02
10	U-BOLT FOR GUIDE, S-211-20mm,	3/4	SUPPORT	1	0.02
11	U-BOLT FOR GUIDE, S-211-20mm,	3/4	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		19.78

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	3	0.21
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
	BOLTS				
14	120 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.16
15	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
16	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	8	1.78
	VALVES / IN-LINE ITEMS				
17	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
			TOTAL ERECTION WEIGHT		4.88
			TOTAL WEIGHT		24.66

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	

634-20-H2-PB22S_A10

SPOOL NUMBERS:

SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

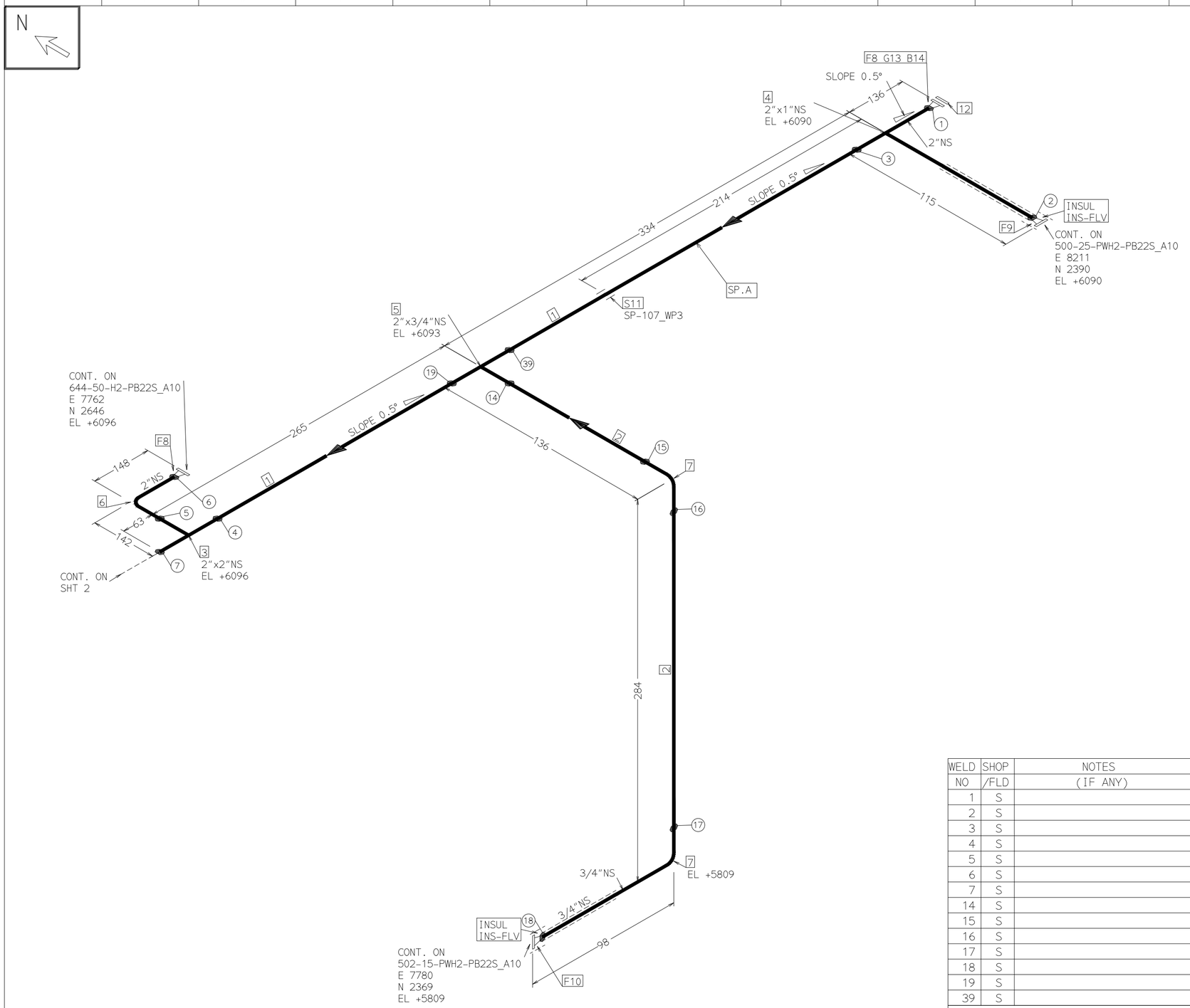
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	30	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.4M	1.83
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	0.3M	0.55
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 2	TEE0SS00800200	1	1.90
4	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1	TER0SS03190201	1	1.30
5	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	2 x 3/4	TER0SS0332023Q	1	2.05
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E90RSS01000200	1	0.65
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	2	0.40
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	2	8.00
9	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
	SUPPORTS				
11	U-BOLT FOR GUIDE, S-211-50mm,	2	SUPPORT	1	0.14

TOTAL FABRICATION WEIGHT 20.62

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
12	FLANGE BLIND ASME B16.5, CL300 RF ASTM A182 Gr.F316/316L	2	FLB0SS00780200	1	3.50
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
14	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96

TOTAL ERECTION WEIGHT 5.59

TOTAL WEIGHT 26.21

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
39	S	

635-50-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.13	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

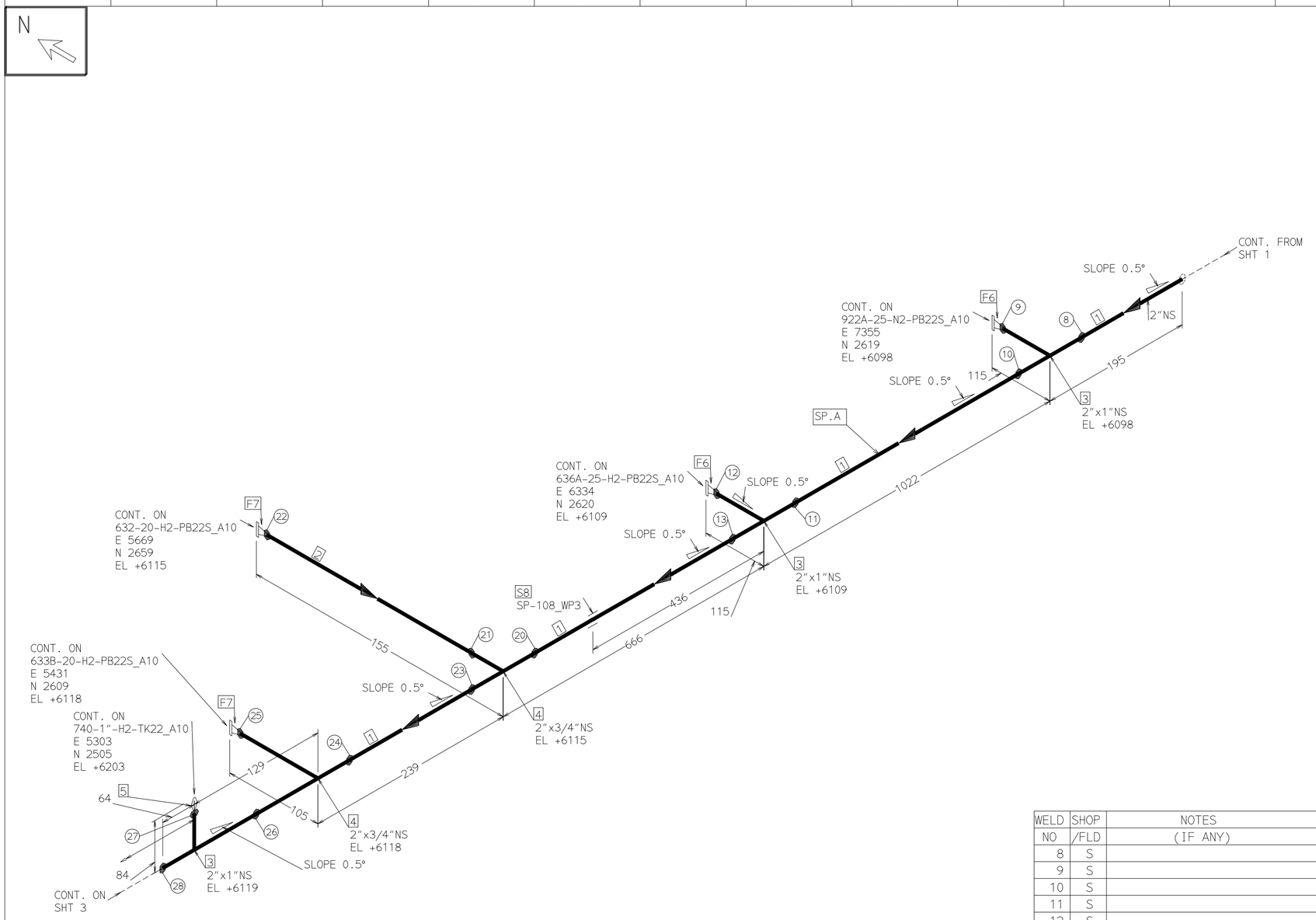
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 31

SHEET - OF: 1 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	1.7M	9.12
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	0.1M	0.11
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1	TER0SS03190201	3	3.90
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	2 x 3/4	TER0SS0332023Q	2	4.10
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1	2CFDF316IN886	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	2	4.00
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	2	3.60
	SUPPORTS				
8	U-BOLT FOR GUIDE, S-211-50mm,	2	SUPPORT	1	0.14

TOTAL FABRICATION WEIGHT 25.07

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	

635-50-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.13	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

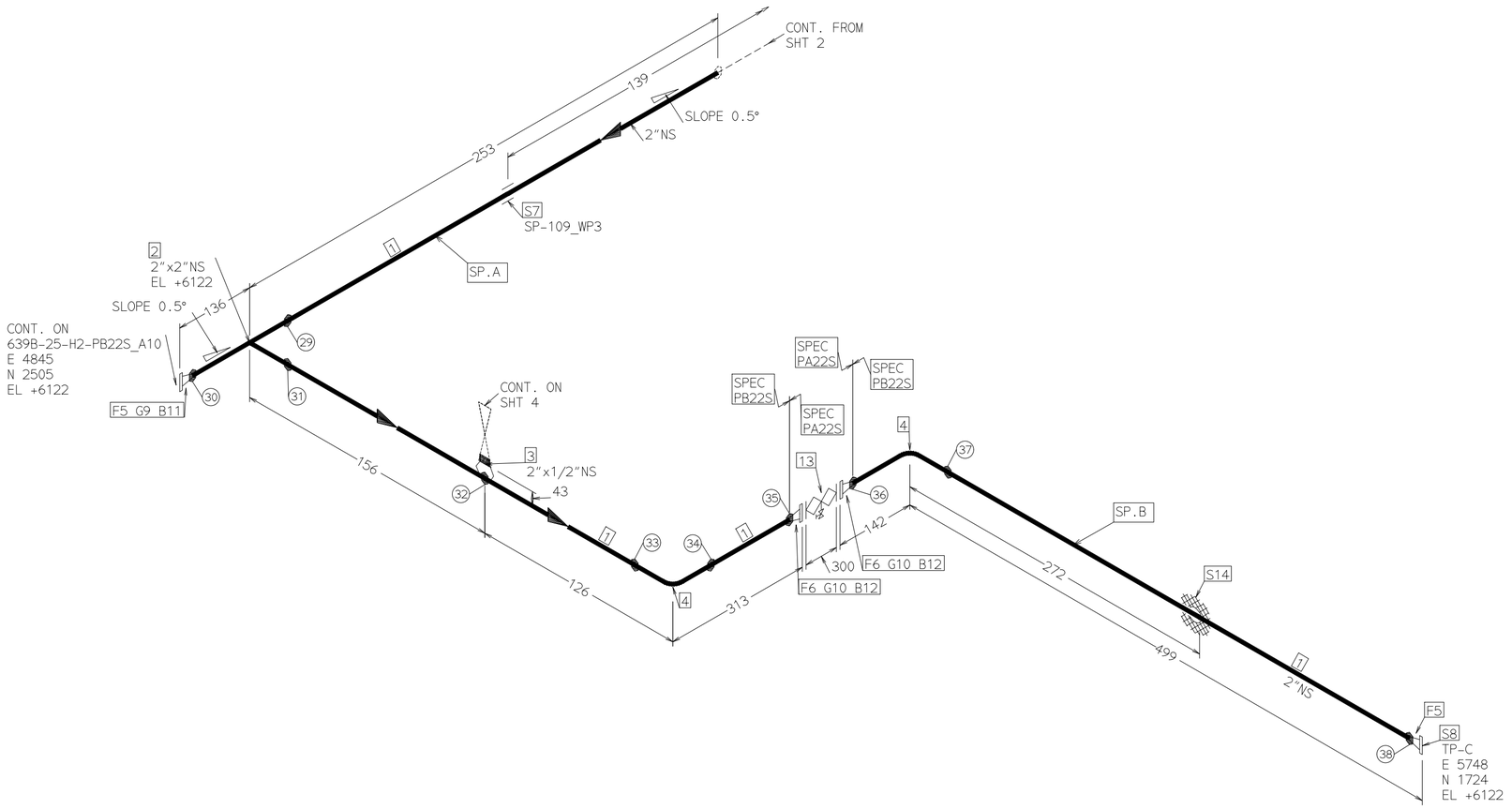
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	31	2 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.9M	4.66
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 2	TEE0SS00800200	1	1.90
3	THREDOLET MSS SP-97, CL.3000, BSPP ASTM A182 Gr.F316/316L	2 x 1/2	OTHESS0320020H	1	0.13
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	2	E90RSS01000200	2	1.30
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	2	8.00
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	2	5.40
	SUPPORTS				
7	U-BOLT FOR GUIDE, S-211-50mm,	2	SUPPORT	1	0.14
8	General purpose ATTA SS 316	2	-	1	0.00

TOTAL FABRICATION WEIGHT 21.53

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	2	0.20
	BOLTS				
11	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96
12	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	8	1.90
	VALVES / IN-LINE ITEMS				
13	MODULAR BLOCK AND BLEED VALVE, BALL TYPE, ASME B16.34, CL150 RF, RED. BORE, L.O. ASTM A182 Gr.F316/316L	2	BY CLIENT	1	31.50
	SUPPORTS				
14	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 48-80	2	2MCTZFR-2	1	6.20

TOTAL ERECTION WEIGHT 41.89

TOTAL WEIGHT 63.42

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
29	S	
30	S	
31	S	
32	S	
33	S	
34	S	
35	S	
36	S	
37	S	
38	S	

635-50-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.13	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

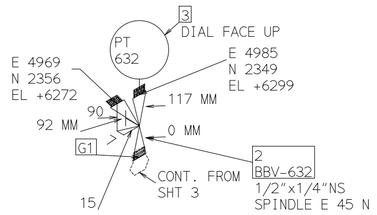
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 31

SHEET - OF: 3 / 4

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	VALVES / IN-LINE ITEMS				
2	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
3	PRESSURE TRANSMITTER, CERABAR PMP71B PT 632	1/2	BY CLIENT	1	1.73

TOTAL ERECTION WEIGHT 2.74

TOTAL WEIGHT 2.74

WELD NO	SHOP /FLD	NOTES (IF ANY)
635-50-PWH2-PB22S_A10		

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.13	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

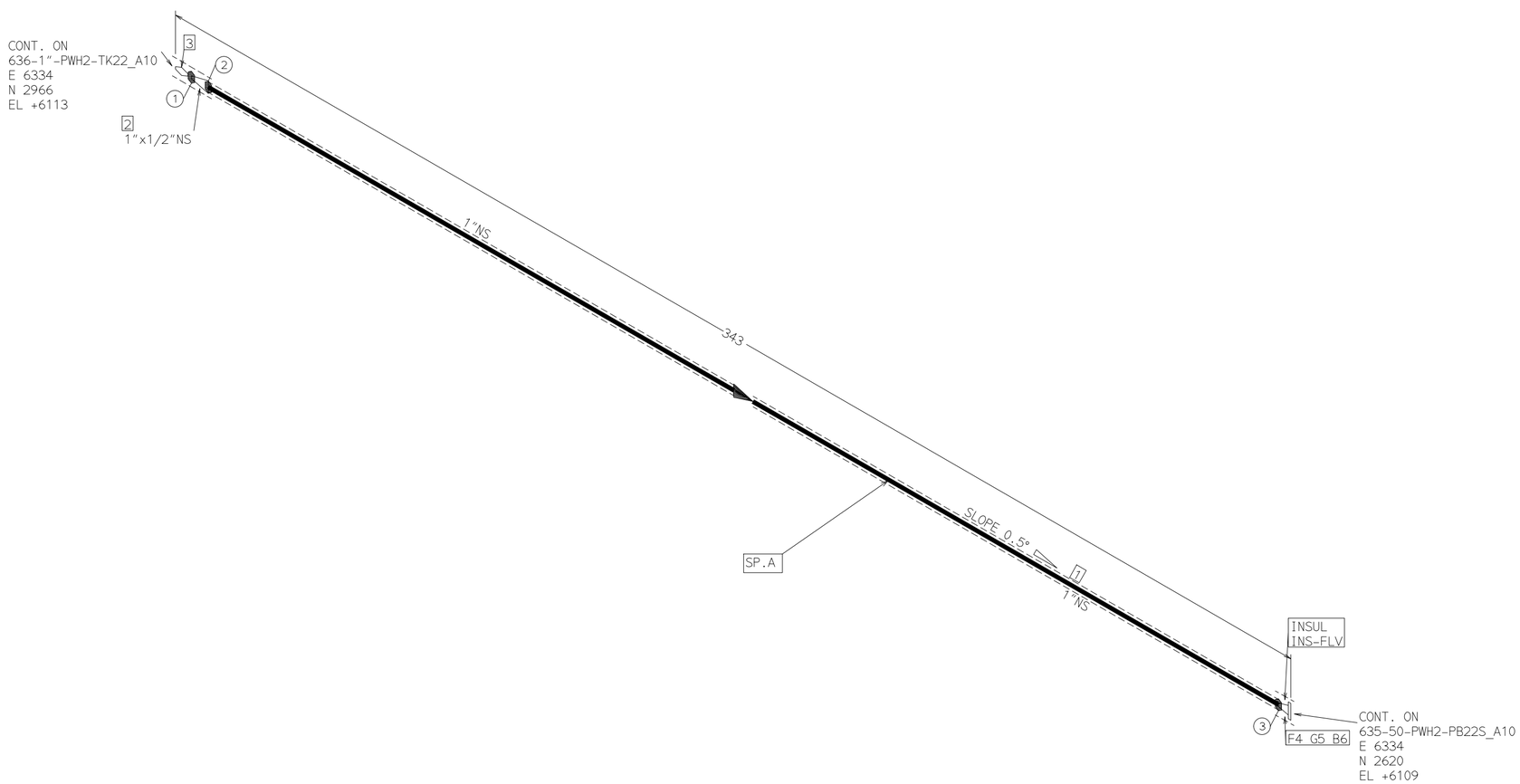
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 31

SHEET - OF 4 / 4

COMP. C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.2M	0.49
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
3	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
			TOTAL FABRICATION WEIGHT		2.75

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
6	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
			TOTAL ERECTION WEIGHT		0.99
			TOTAL WEIGHT		3.74

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	

636A-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006/007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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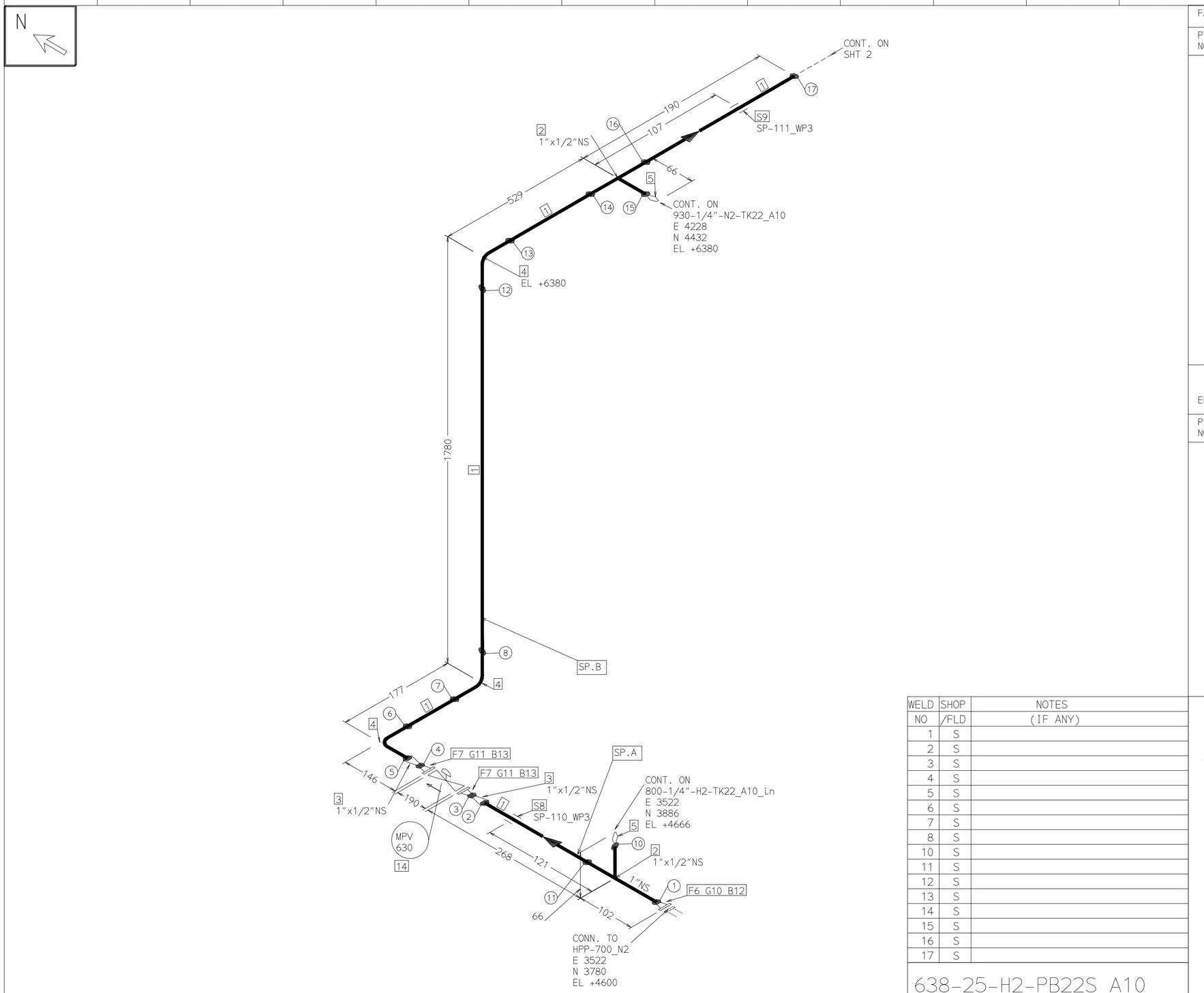
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	32	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	2.6M	6.29
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	2	0.80
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	2	0.32
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	2	0.20
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS06490H00	2	3.00
	SUPPORTS				
8	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
9	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		13.10

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00550H00	2	0.10
	BOLTS				
12	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
13	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	INSTRUMENTS				
14	SAMSON CONTROL VALVE, TYPE 3241-1, Cl.300 RF MPV 630	1/2	BY CLIENT	1	13.00

TOTAL ERECTION WEIGHT 15.33

TOTAL WEIGHT 28.43

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	

638-25-H2-PB22S_A10

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008/011	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	AMB	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

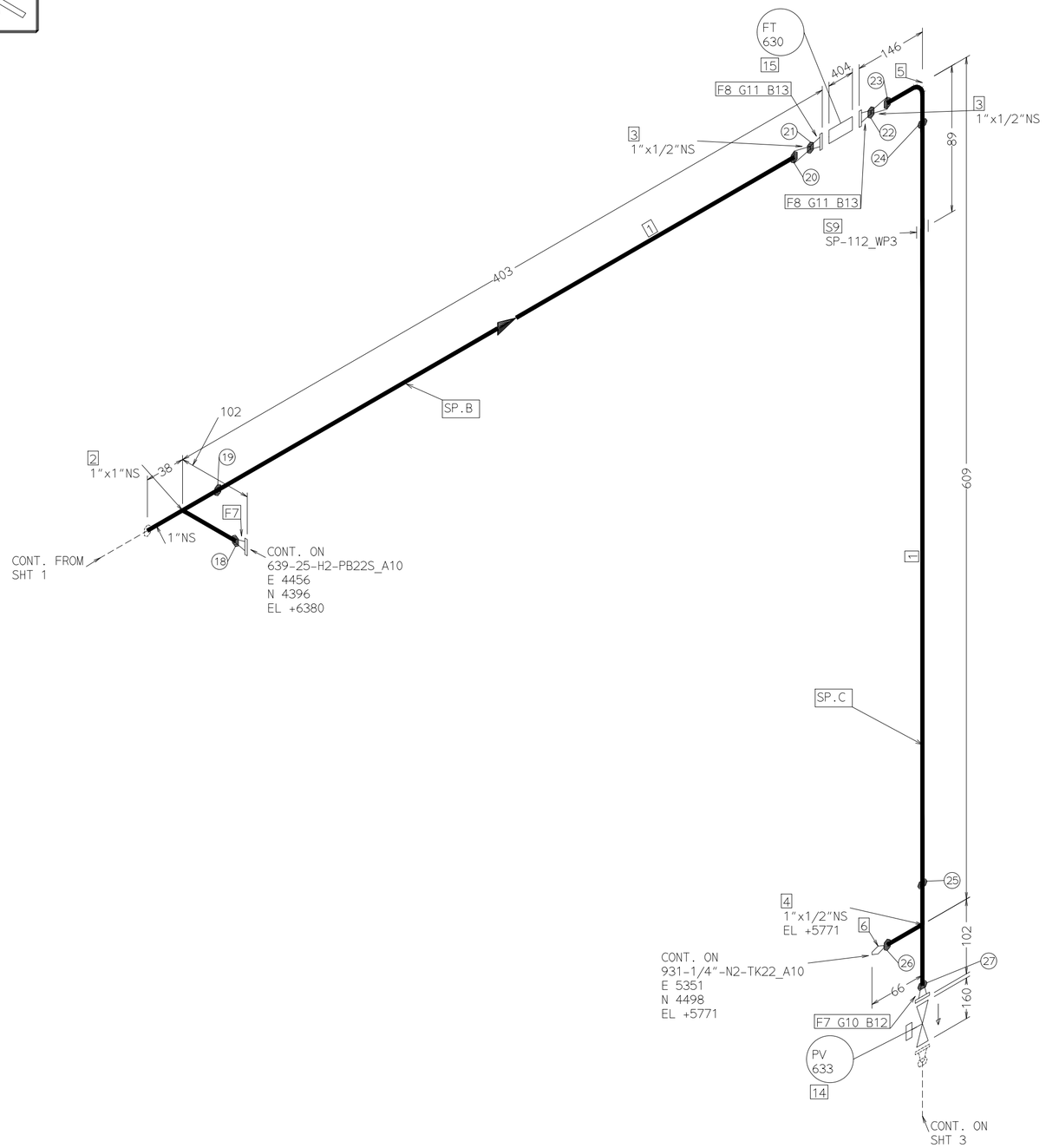
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 33

SHEET - OF: 1 / 5

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.8M	1.98
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	2	0.32
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
6	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	2	4.00
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS06490H00	2	3.00
	SUPPORTS				
9	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		10.26

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00550H00	2	0.10
	BOLTS				
12	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
13	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	INSTRUMENTS				
14	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 633	1	BY CLIENT	1	7.20
15	FLOW TRANSMITTER, ENDRESS HAUSER, CORIOLIS TYPE F300, CL.300 RF FT 630	1/2	BY CLIENT	1	12.00
			TOTAL ERECTION WEIGHT		21.53
			TOTAL WEIGHT		31.79

WELD NO	SHOP /FLD	NOTES (IF ANY)
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	

638-25-H2-PB22S_A10

SPOOL NUMBERS:

SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008/011	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	AMB	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

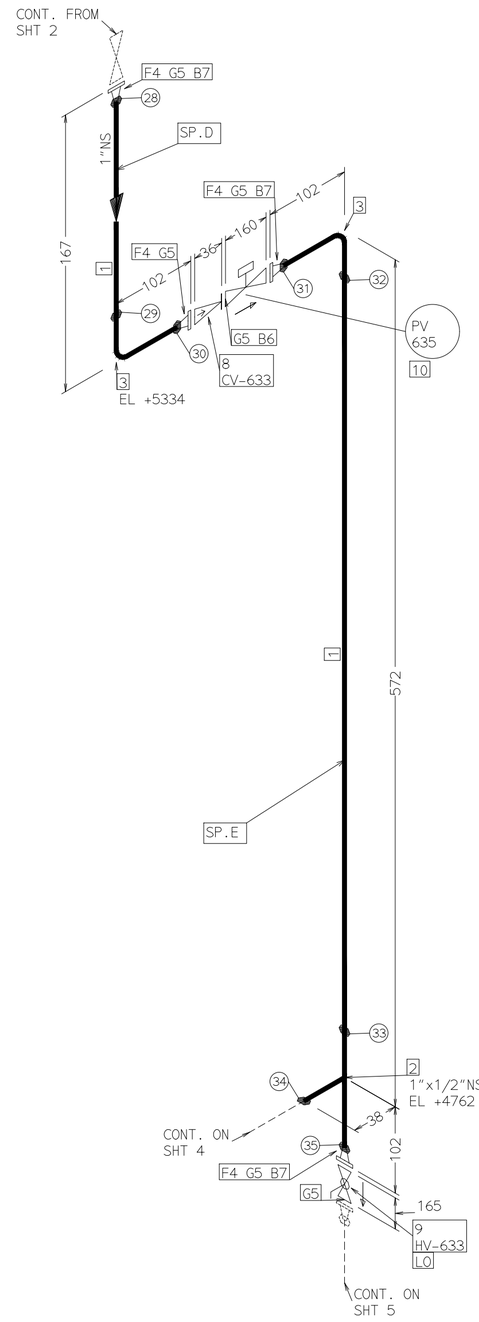
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	33	2 / 5	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.6M	1.41
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	4	8.00
			TOTAL FABRICATION WEIGHT		10.11

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	6	0.42
	BOLTS				
6	120 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.16
7	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	12	2.76
	VALVES / IN-LINE ITEMS				
8	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
9	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	1	4.60
	INSTRUMENTS				
10	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 635	1	BY CLIENT	1	7.20
			TOTAL ERECTION WEIGHT		16.81
			TOTAL WEIGHT		26.92

SPOOL NUMBERS:

SP.D SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
28	S	
29	S	
30	S	
31	S	
32	S	
33	S	
34	S	
35	S	

638-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008/011	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	AMB	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

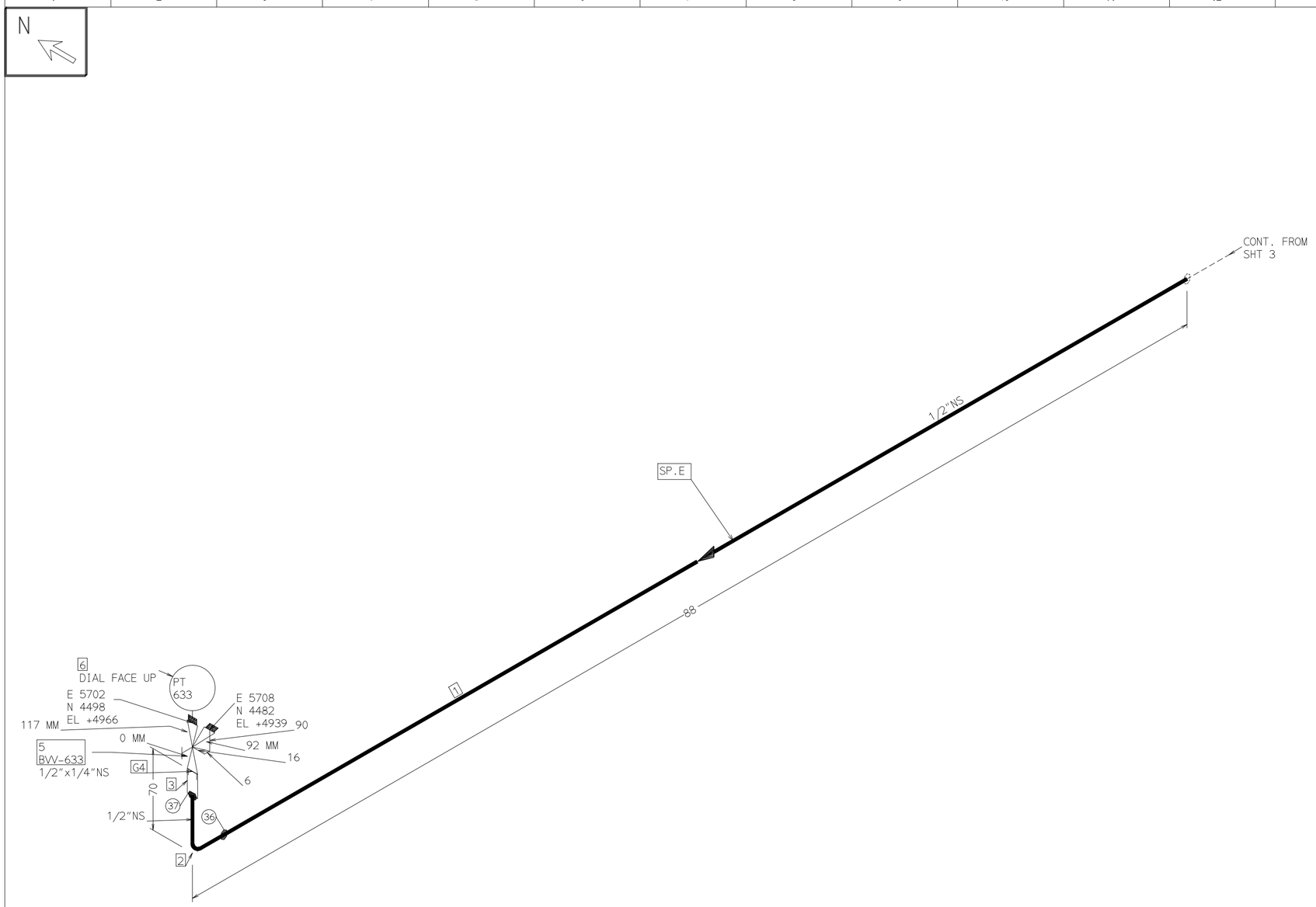
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	33	3 / 5	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.08
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
3	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
			TOTAL FABRICATION WEIGHT		0.36

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	VALVES / IN-LINE ITEMS				
5	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
6	PRESSURE TRANSMITTER, CERABAR PMP71B PT 633	1/2	BY CLIENT	1	1.73
			TOTAL ERECTION WEIGHT		2.74
			TOTAL WEIGHT		3.10

SPOOL NUMBERS:

SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
36	S	
37	S	

638-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008/011	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	AMB	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

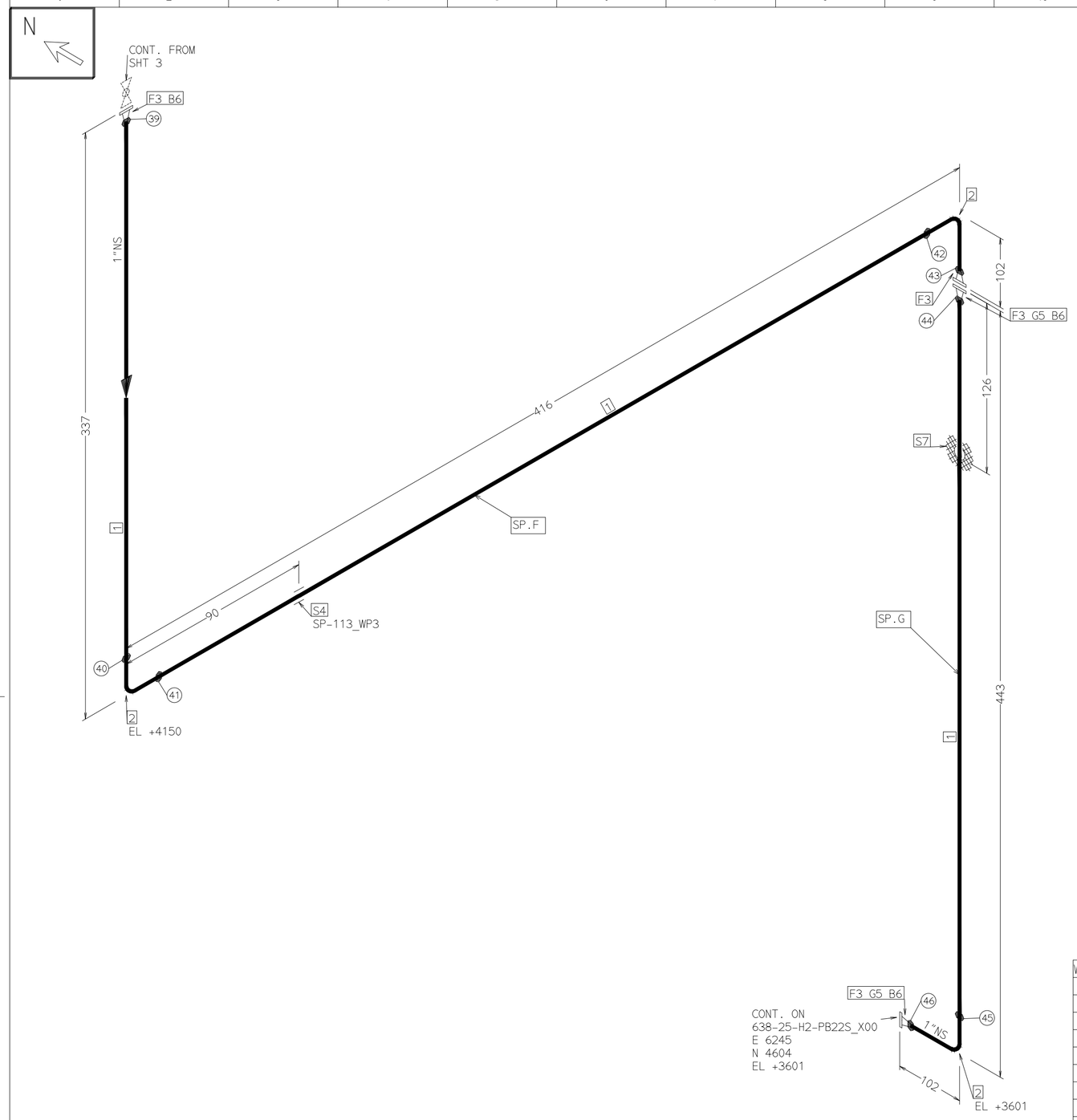
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	33	4 / 5	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.0M	2.30
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	4	8.00
	SUPPORTS				
4	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		10.77

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
6	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	12	2.76
	SUPPORTS				
7	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		6.30
			TOTAL WEIGHT		17.07

SPOOL NUMBERS:

SP.F SP.G

WELD NO	SHOP /FLD	NOTES (IF ANY)
39	S	
40	S	
41	S	
42	S	
43	S	
44	S	
45	S	
46	S	

638-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008/011	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	AMB	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

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PROJECT:

C63 - CROSSWIND PROJECT

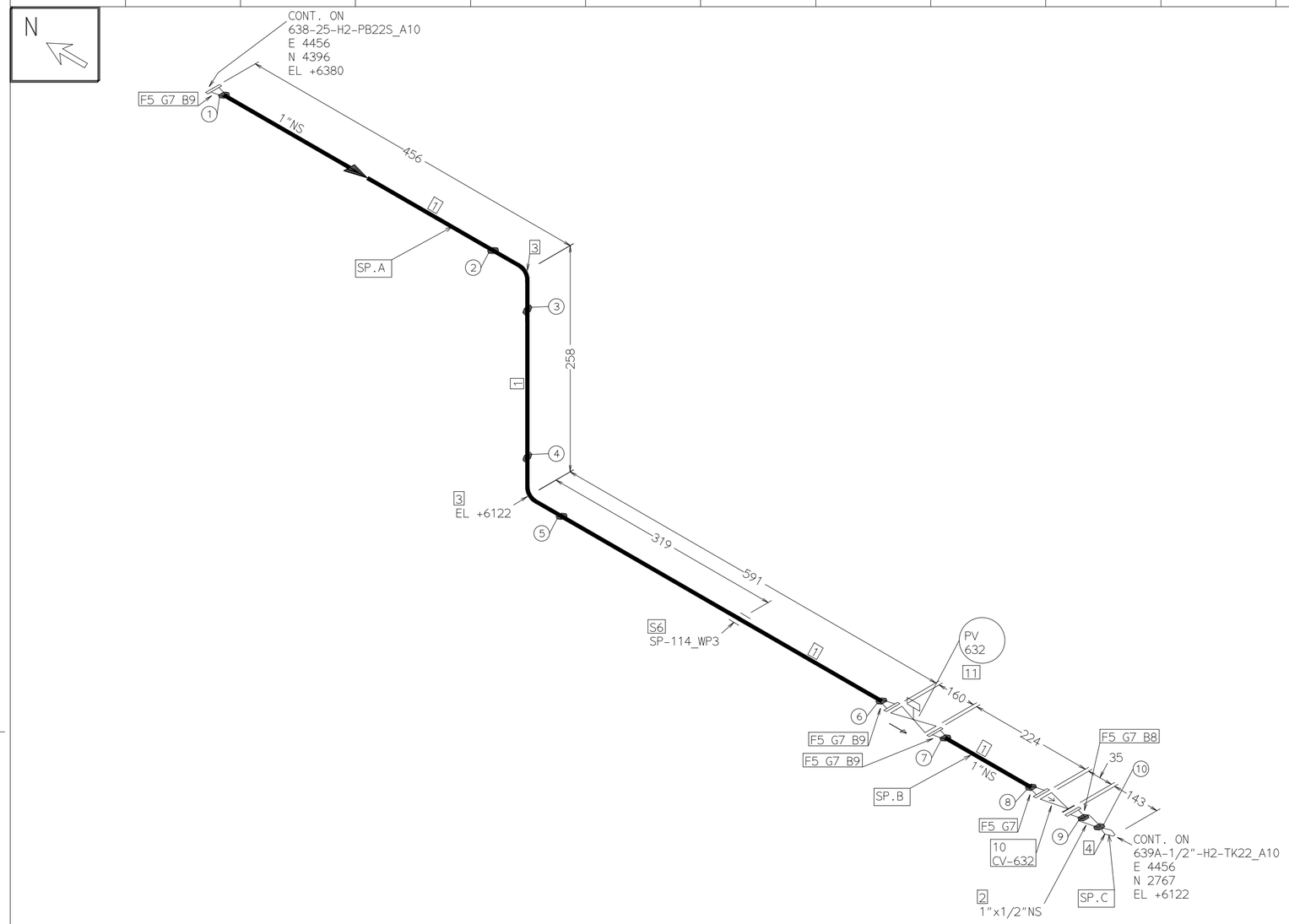
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	33	5 / 5	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.2M	2.78
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	RECOSS0512010H	1	0.16
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
4	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	5	10.00
	SUPPORTS				
6	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02

TOTAL FABRICATION WEIGHT 13.36

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	5	0.35
	BOLTS				
8	120 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.16
9	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	12	2.76
	VALVES / IN-LINE ITEMS				
10	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
	INSTRUMENTS				
11	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 632	1	BY CLIENT	1	7.20

TOTAL ERECTION WEIGHT 12.14

TOTAL WEIGHT 25.50

SPOOL NUMBERS:

SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

639-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

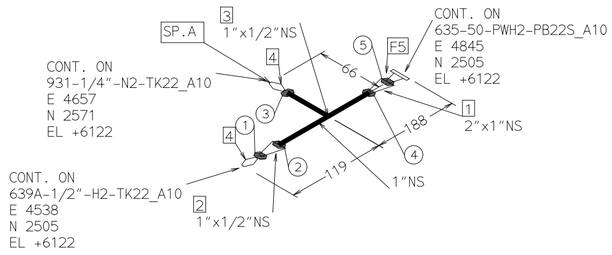
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	34	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
1	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1	REC0SS03550201	1	0.36
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	2	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
			TOTAL FABRICATION WEIGHT		5.12

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

639B-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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REV.	DATE	DESCRIPTION
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PROJECT:

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ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

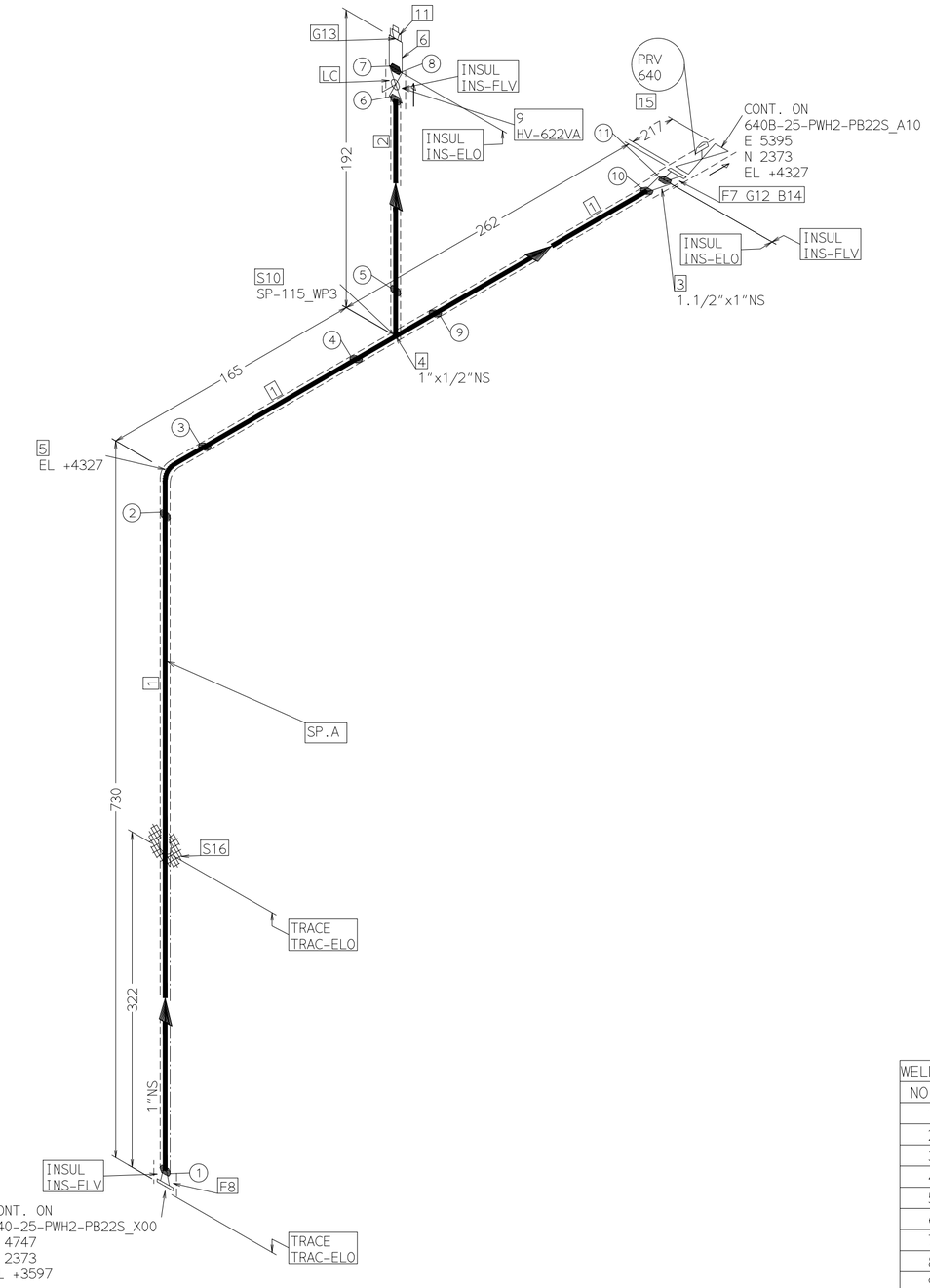
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 35

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.8M	1.99
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.08
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	REC0SS03191H01	1	0.26
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS03481H00	1	3.50
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	VALVES / IN-LINE ITEMS				
9	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
10	PIPE SHOE, S-64-DN25-50-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		13.76

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
11	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	1	0.11
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
14	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	4	1.74
	INSTRUMENTS				
15	PRESSURE REDUCING VALVE, SWAGELOK RHPS, CL.300 RF PRV 640	1.1/2	BY CLIENT	1	11.00
	SUPPORTS				
16	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		16.33
			TOTAL WEIGHT		30.09

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

640-25-PWH2-PB22S_A10

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-640	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	31,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

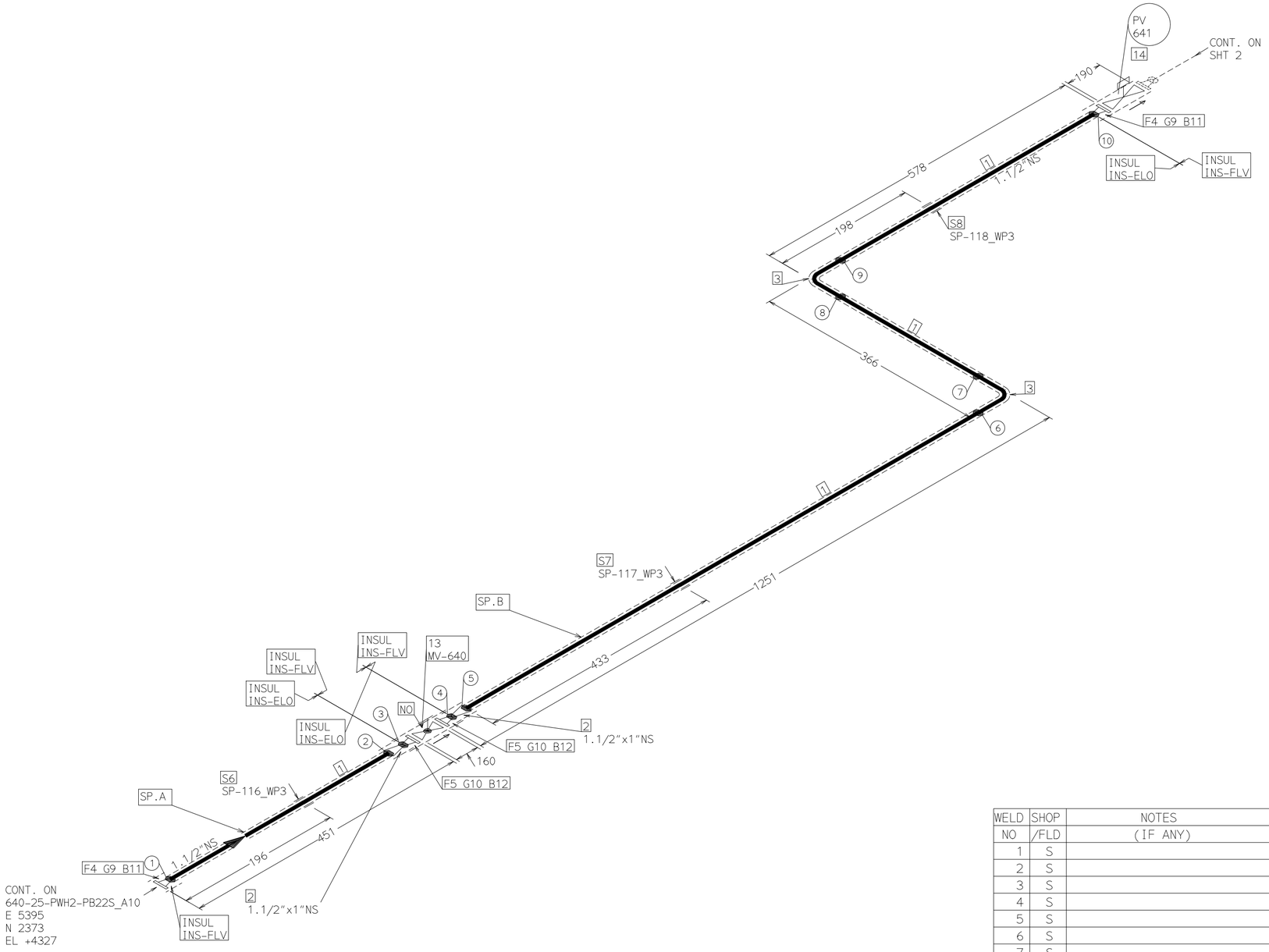
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 36

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	2.1M	8.14
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	RECOSS03191H01	2	0.52
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2	E90RSS00681H00	2	0.80
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLWOSS03481H00	2	7.00
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	2	4.00
	SUPPORTS				
6	PIPE SHOE, S-64-DN40-50-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
7	PIPE SHOE, S-64-DN40-50-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
8	PIPE SHOE, S-64-DN40-100-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		33.66

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	2	0.22
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
11	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	8	3.49
12	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
	VALVES / IN-LINE ITEMS				
13	GLOBE VALVE HEROSE, TYPE 03331, CL300 RF, HANDWHEEL OPERATED ASTM A351 Gr.CF3M	1	BY CLIENT	1	4.50
	INSTRUMENTS				
14	ON/OFF VALVE, SFERACO 515 + ACTREG, CL.150 RF PV 641	1.1/2	BY CLIENT	1	16.70
			TOTAL ERECTION WEIGHT		26.89
			TOTAL WEIGHT		60.55

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

640B-25-PWH2-PB22S_A10

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	13				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

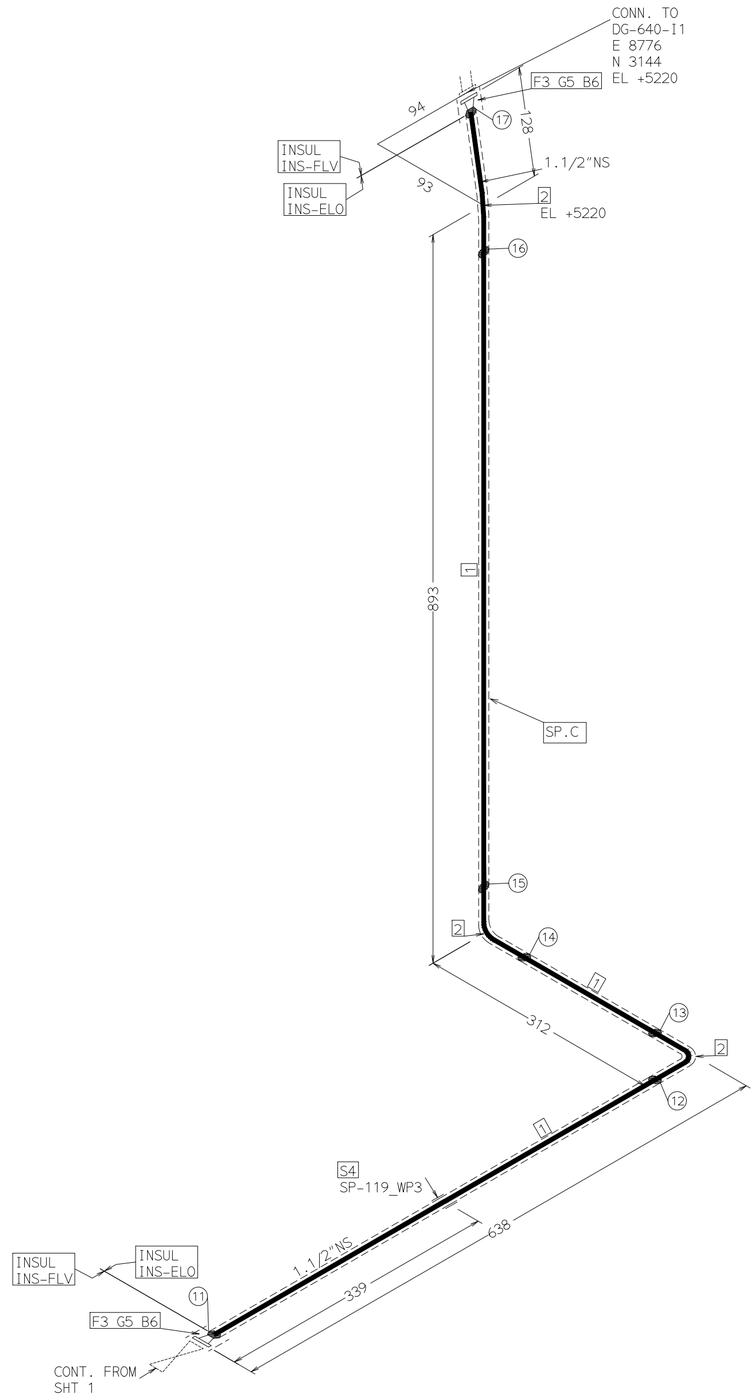
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	37	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	1.5M	6.03
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2	E90RSS00681H00	3	1.20
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLWOSS03481H00	2	7.00
	SUPPORTS				
4	PIPE SHOE, S-64-DN40-100-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		18.63

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	2	0.22
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	8	3.49
			TOTAL ERECTION WEIGHT		3.71
			TOTAL WEIGHT		22.34

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	

640B-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	13				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

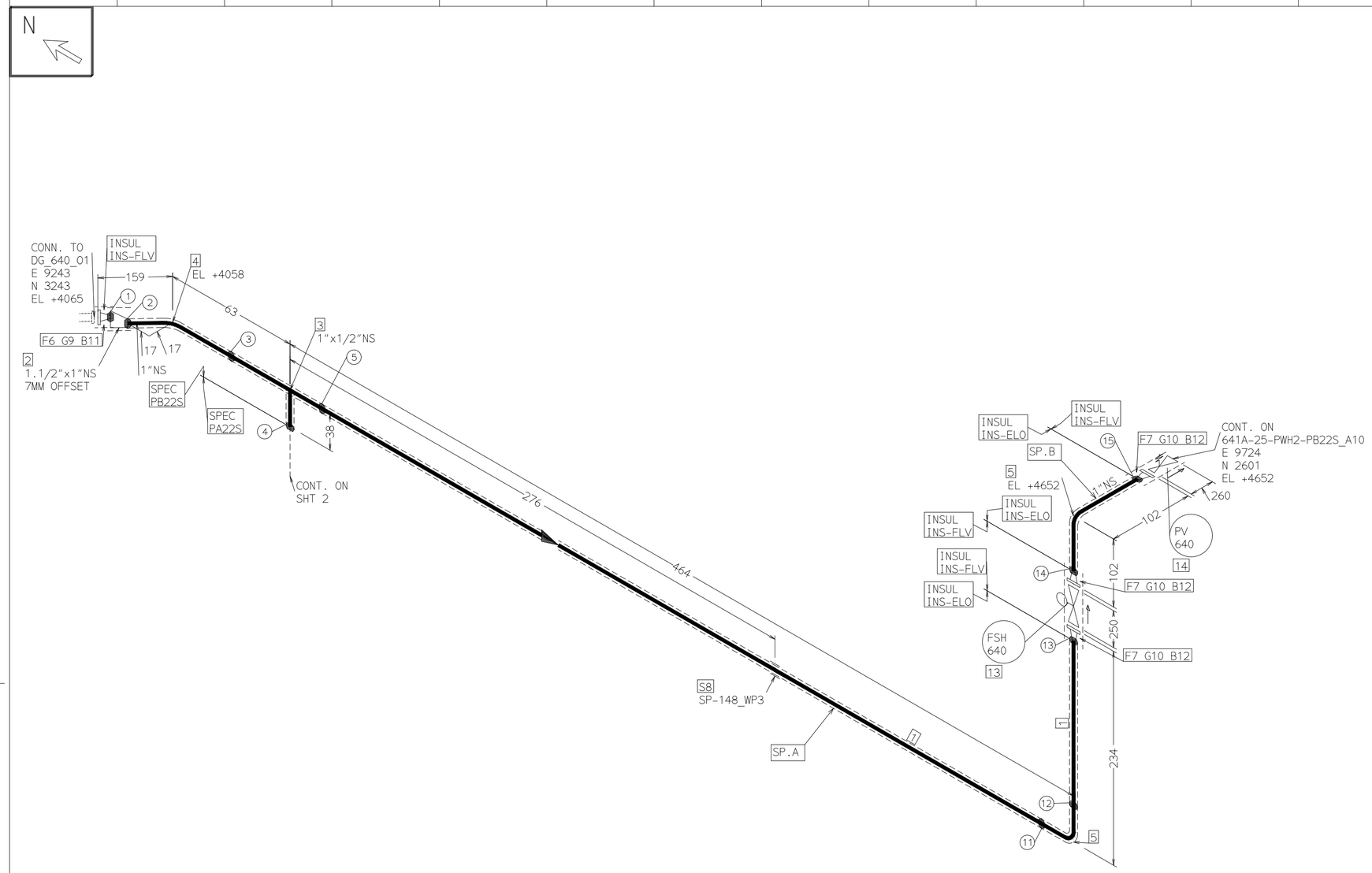
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 37

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FABRICATION MATERIALS				
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.6M	1.28
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	REE0SS02871H01	1	0.26
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E45RSS00860100	1	0.07
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS03481H00	1	3.50
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	3	6.00
	SUPPORTS				
8	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		16.21
	ERECTION MATERIALS				
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	1	0.11
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	3	0.21
	BOLTS				
11	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	4	1.74
12	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	12	2.76
	INSTRUMENTS				
13	FLOW SWITCH, KHRONE H250 M40, CL.300 RF FSH 640	1	BY CLIENT	1	5.00
14	PNEUMATIC VALVE, SCHUBERT & SALZER MOD. 7031, CL.300 RF PV 640	1	BY CLIENT	1	5.70
			TOTAL ERECTION WEIGHT		15.52
			TOTAL WEIGHT		31.73

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
11	S	
12	S	
13	S	
14	S	
15	S	

641-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

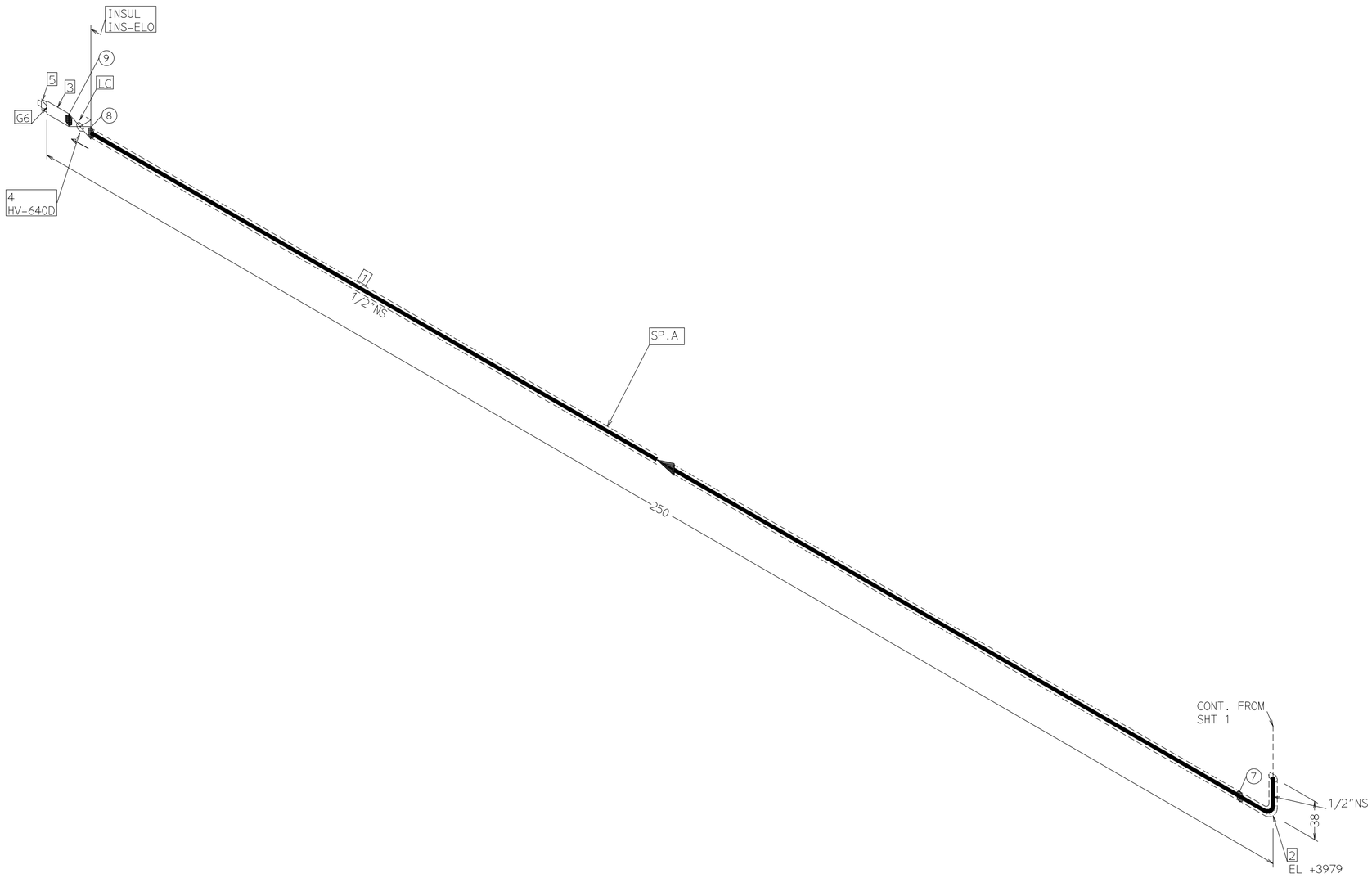
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	38	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.18
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
3	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	VALVES / IN-LINE ITEMS				
4	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		1.34

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
5	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
6	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
			TOTAL ERECTION WEIGHT		0.08
			TOTAL WEIGHT		1.42

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
7	S	
8	S	
9	S	

641-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

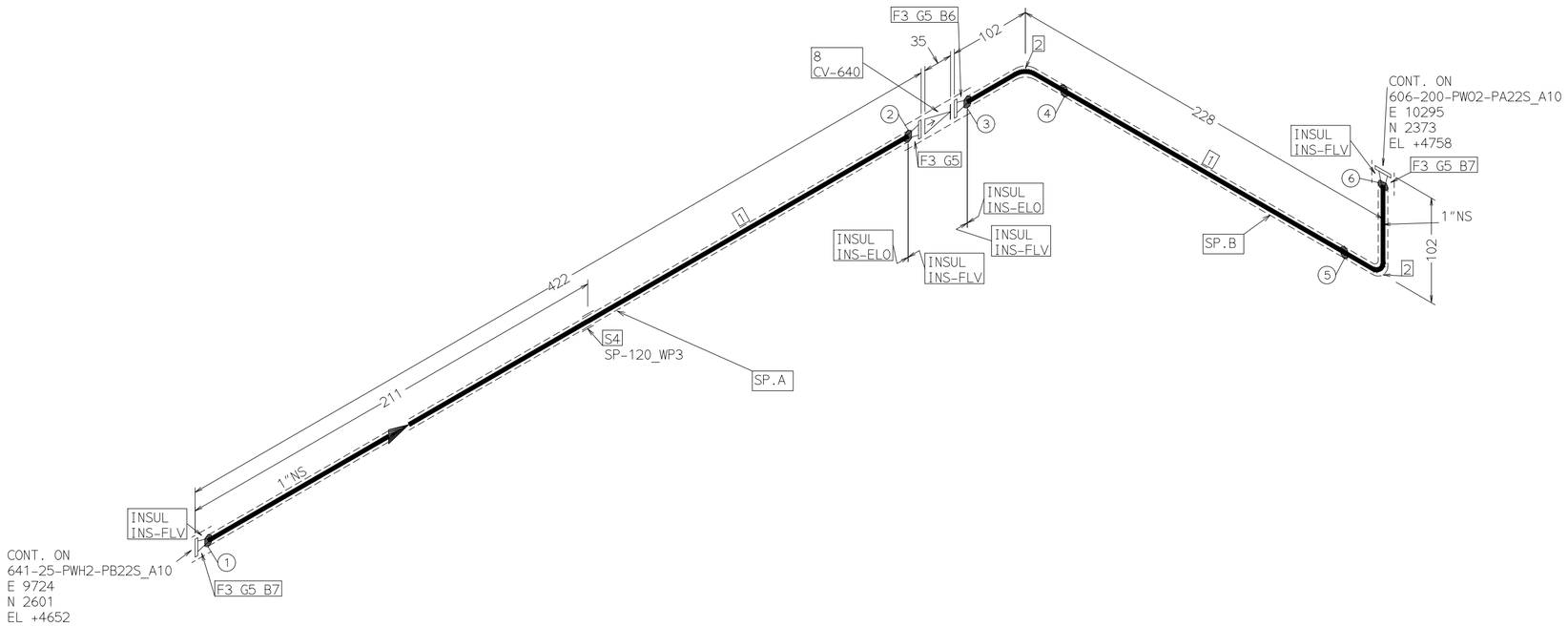
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 38

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.5M	1.10
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	4	8.00
	SUPPORTS				
4	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		13.80

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	4	0.28
	BOLTS				
6	120 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.16
7	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
	VALVES / IN-LINE ITEMS				
8	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
			TOTAL ERECTION WEIGHT		3.95
			TOTAL WEIGHT		17.75

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	

641A-25-PWH2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

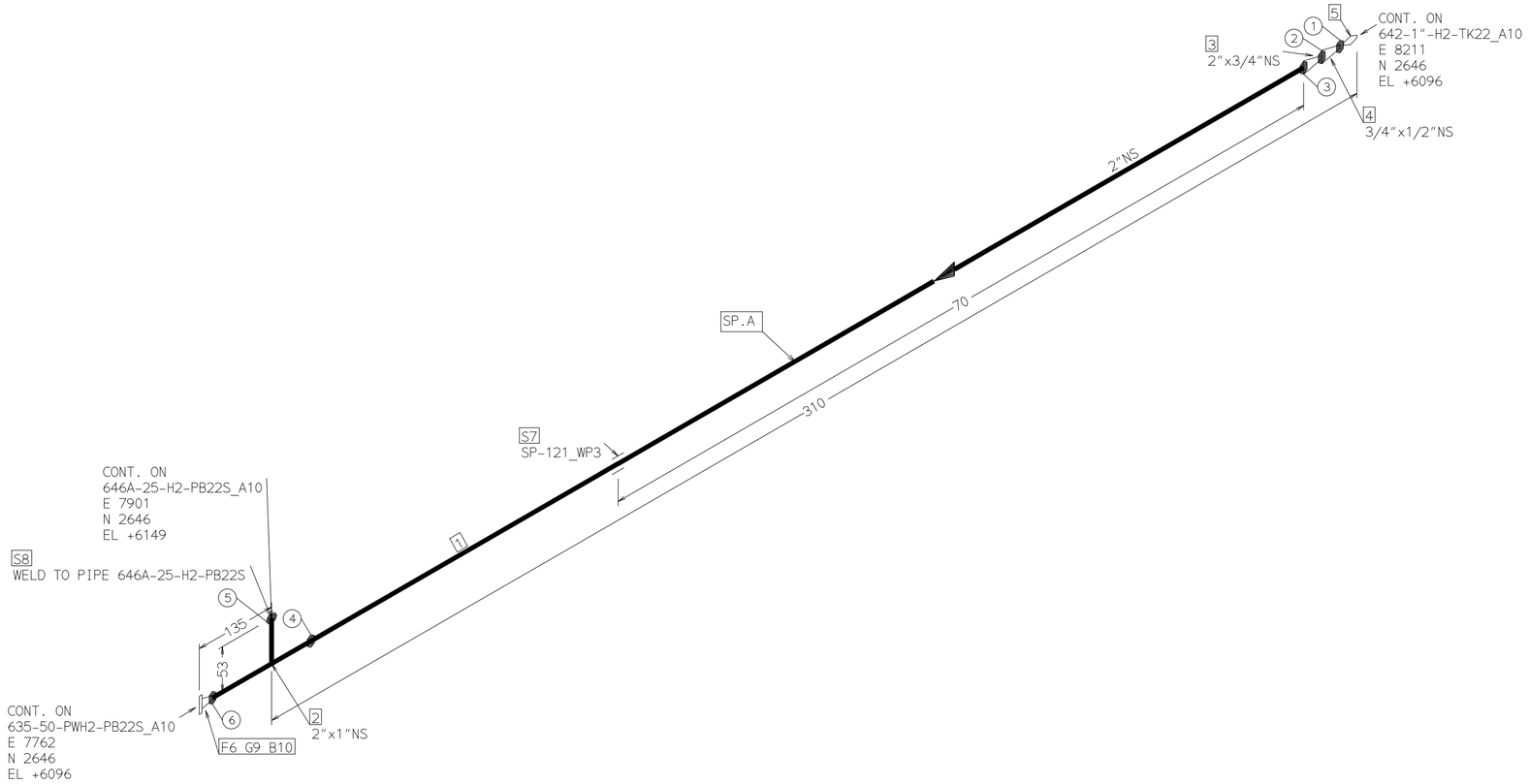
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 39

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.1M	0.53
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1	TER0SS03190201	1	1.30
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	2 x 3/4	REC0SS0283023Q	1	0.57
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS00500200	1	4.00
	SUPPORTS				
7	U-BOLT FOR GUIDE, S-211-50mm,	2	SUPPORT	1	0.14
8	General purpose ATTA SS 316	1	-	1	0.00

TOTAL FABRICATION WEIGHT 6.74

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00590200	1	0.13
	BOLTS				
10	90 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B018560300	8	1.96

TOTAL ERECTION WEIGHT 2.09

TOTAL WEIGHT 8.83

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	

644-50-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.13	THICKNESS (mm):	TEST PRESS. (barg) :	57,2		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

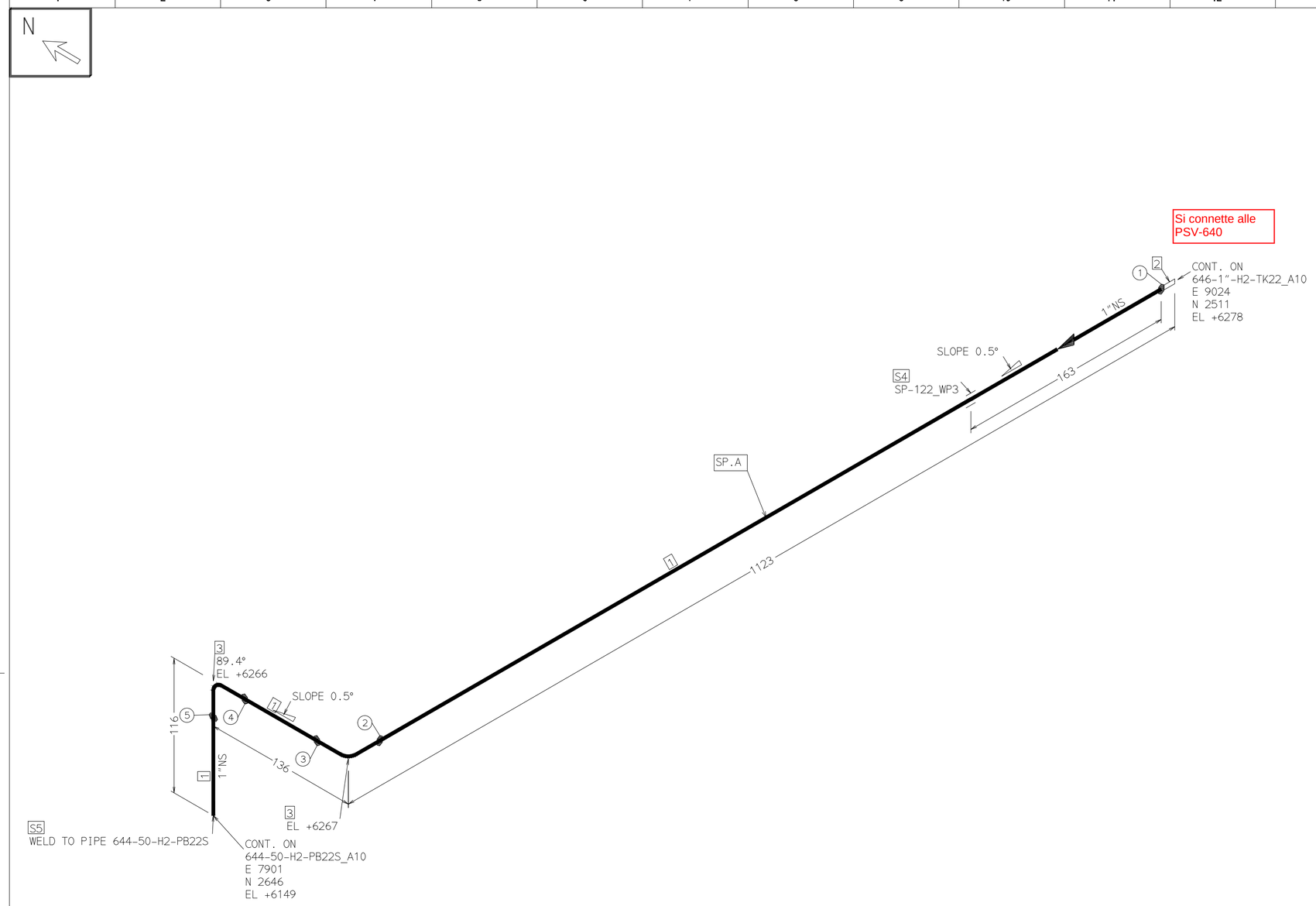
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 40
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.2M	2.78
	FITTINGS				
2	NIPPLE POE/TOE NPT 100MM LONG, SCH.40S ASTM A312 Gr.TP 316/316L	1	N100SS01180100	1	0.32
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	SUPPORTS				
4	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
5	General purpose ATTA SS 316	1	-	1	0.00
			TOTAL FABRICATION WEIGHT		3.42

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

646A-25-H2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

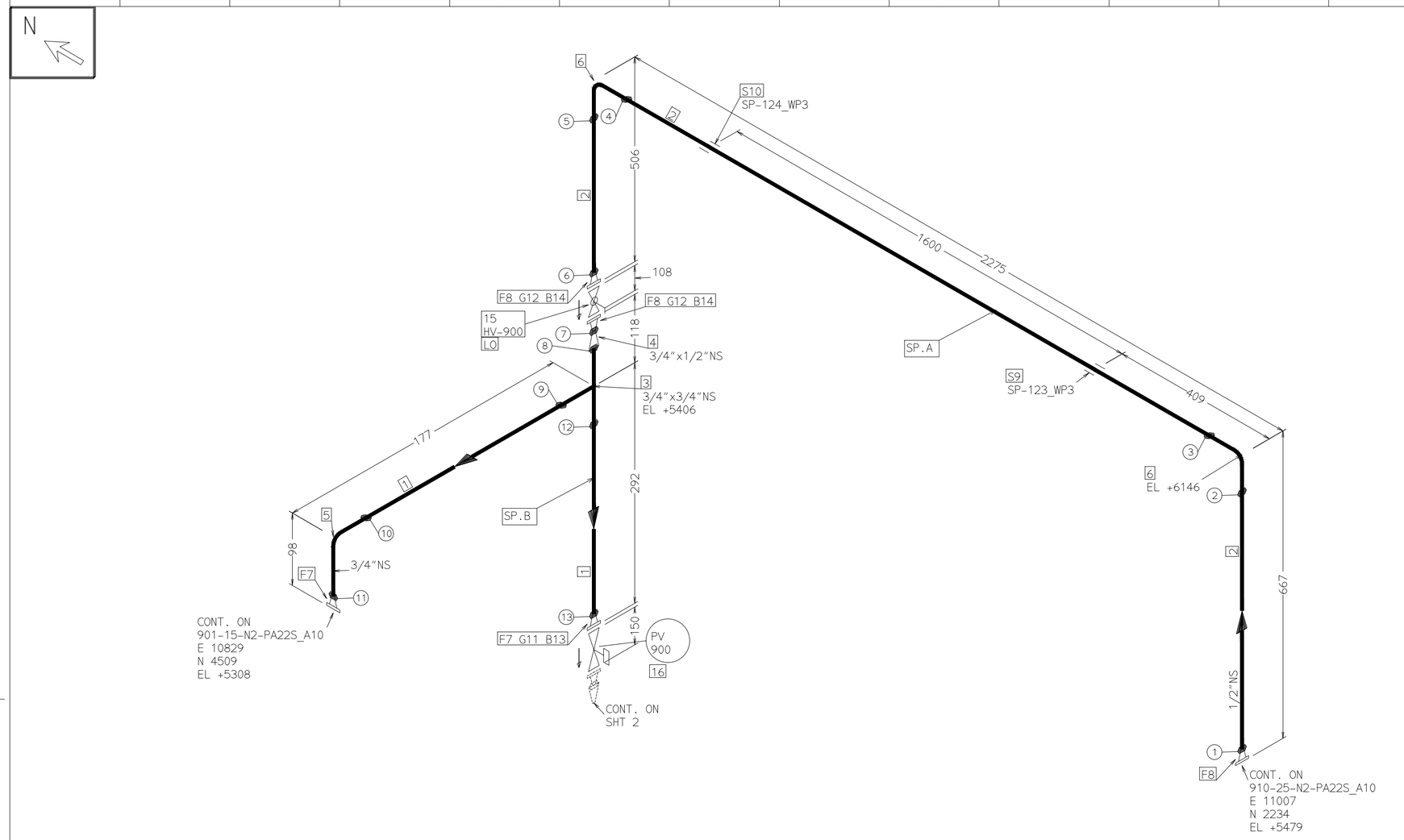
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 41

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	0.4M	0.68
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	3.2M	5.16
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 3/4	TEE0SS00923Q00	1	0.27
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	1	0.20
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	2	0.36
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	2	3.60
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	3	1.80
	SUPPORTS				
9	U-BOLT FOR STOP, S-212-15mm,	1/2	SUPPORT	1	0.02
10	U-BOLT FOR STOP, S-212-15mm,	1/2	SUPPORT	1	0.02

TOTAL FABRICATION WEIGHT 12.21

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	1	0.07
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
13	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.89
14	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
15	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	1.80
	INSTRUMENTS				
16	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 900	3/4	BY CLIENT	1	5.90

TOTAL ERECTION WEIGHT 9.85

TOTAL WEIGHT 22.06

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

900-15-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

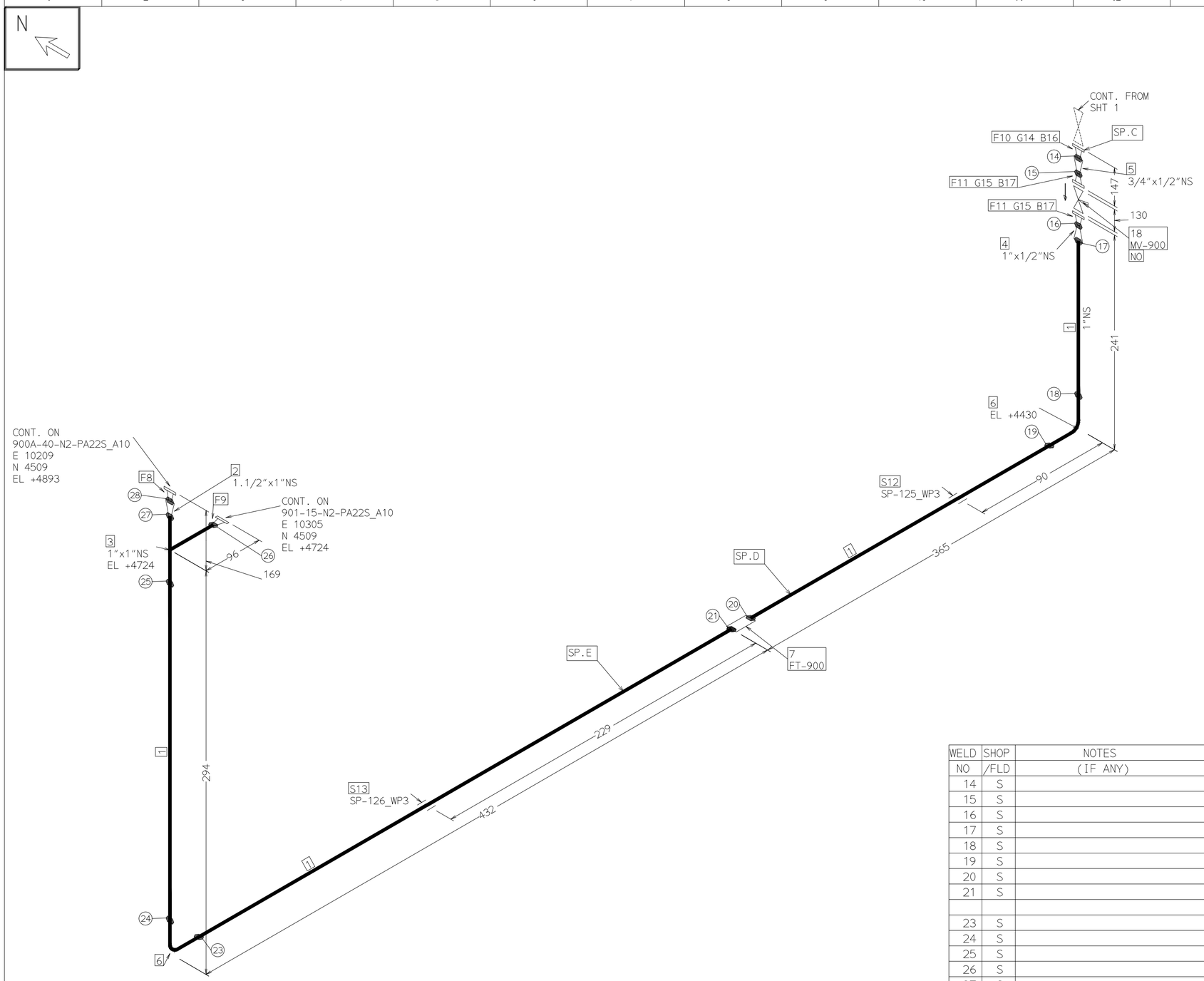
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	42	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.0M	2.28
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	RECOSS03191H01	1	0.26
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEEOSS00550100	1	0.29
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	RECOSS0512010H	1	0.16
5	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	RECOSS05113Q0H	1	0.10
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
7	FLANGE & ORIF PLATE ASSEMBLY, WN ANSI B16.36 Cl.300.RF, Sch.80S, 1/2" NPTF TAPPING	1	BY CLIENT	1	4.20
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS00941H00	1	1.80
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
11	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
	SUPPORTS				
12	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
13	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		13.53

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	1	0.07
15	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
16	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.89
17	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
18	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	3.20

TOTAL ERECTION WEIGHT 5.35

TOTAL WEIGHT 18.88

SPOOL NUMBERS:

SP.C SP.D SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	

900-15-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION · INSUL INS-FLV = THERMAL JACKET INSULATION · PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

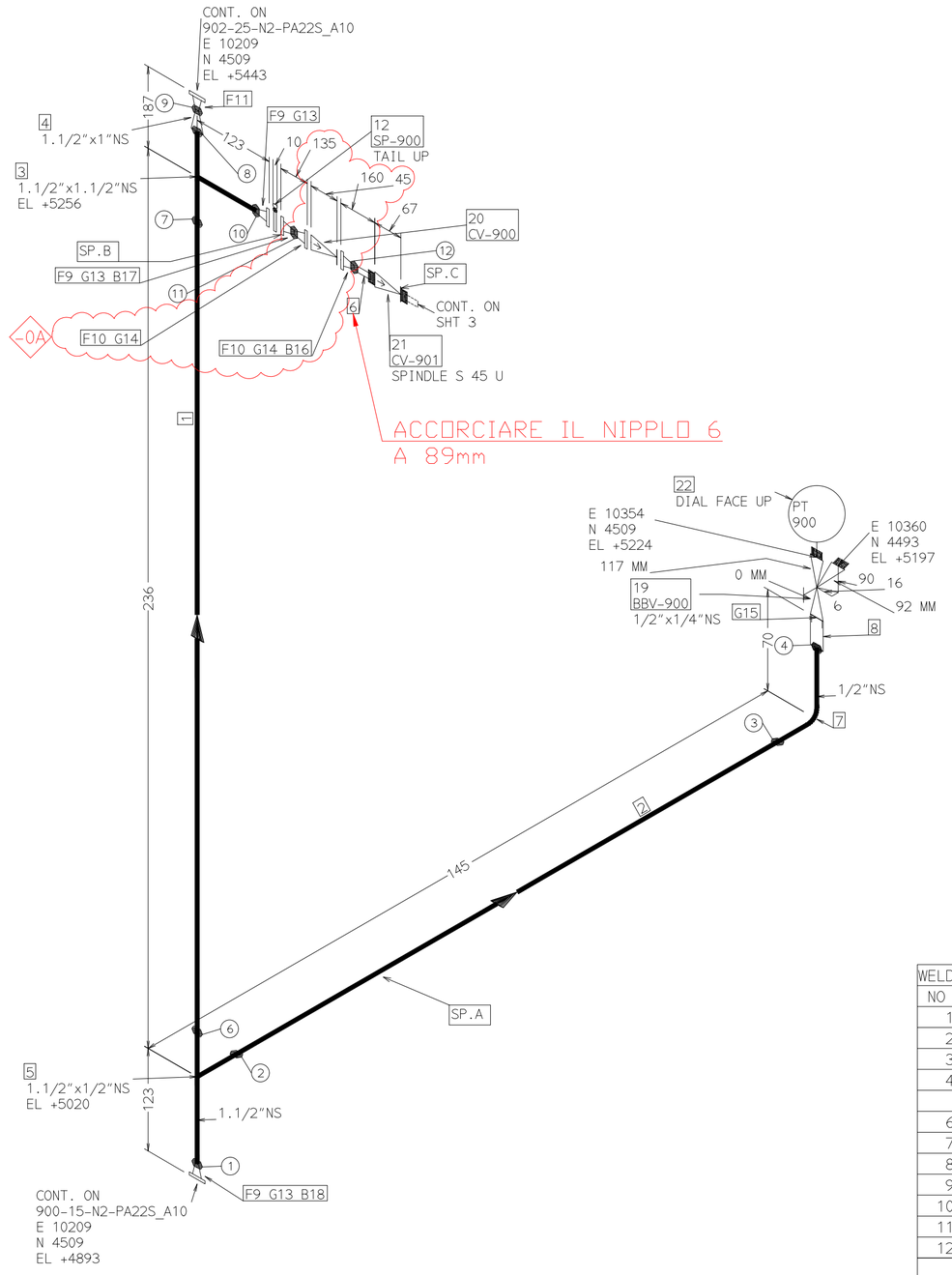
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	42	2 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)	
	PIPE					
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	0.2M	0.48	
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.07	
	FITTINGS					
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1.1/2	TEE0SS00561H00	1	0.77	
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	REC0SS03191H01	1	0.26	
5	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1/2	TER0SS06191H0H	1	1.50	
6	NIPPLE POE/TOE BSPP 89mmMM LONG, SCH.40S ASTM A312 Gr.TP 316/316L	1.1/2	N100SS02821H00	1	0.54	-0A
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18	
8	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10	
	FLANGES					
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS00941H00	3	5.40	
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS03481H00	2	7.00	-0A
11	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00	

TOTAL FABRICATION WEIGHT 18.30

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)	
	FITTINGS					
12	SPECTACLE BLIND ASME B16.48, CL150 RF ASTM A240 TP 316/316L	1.1/2	BSPESS00701H00	1	0.72	
	GASKETS					
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00401H00	3	0.21	
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	2	0.22	-0A
15	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01	
	BOLTS					
16	145 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	4	2.30	-0A
17	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B012760200	4	0.70	
18	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B012760200	4	0.65	
	VALVES / IN-LINE ITEMS					
19	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00	
20	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1.1/2	BY CLIENT	1	1.12	
21	CHECK VALVE, SFERACO 325, PISTON TYPE, BSPPF ISO 228-1 ASTM A182 Gr.F316/316L	1.1/2	BY CLIENT	1	1.58	
	INSTRUMENTS					
22	PRESSURE TRANSMITTER, CERABAR PMP71B PT 900	1/2	BY CLIENT	1	1.73	

TOTAL ERECTION WEIGHT 10.24 -0A
TOTAL WEIGHT 28.54 -0A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	

900A-40-N2-PA22S_A10

SPOOL NUMBERS:
SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/009	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

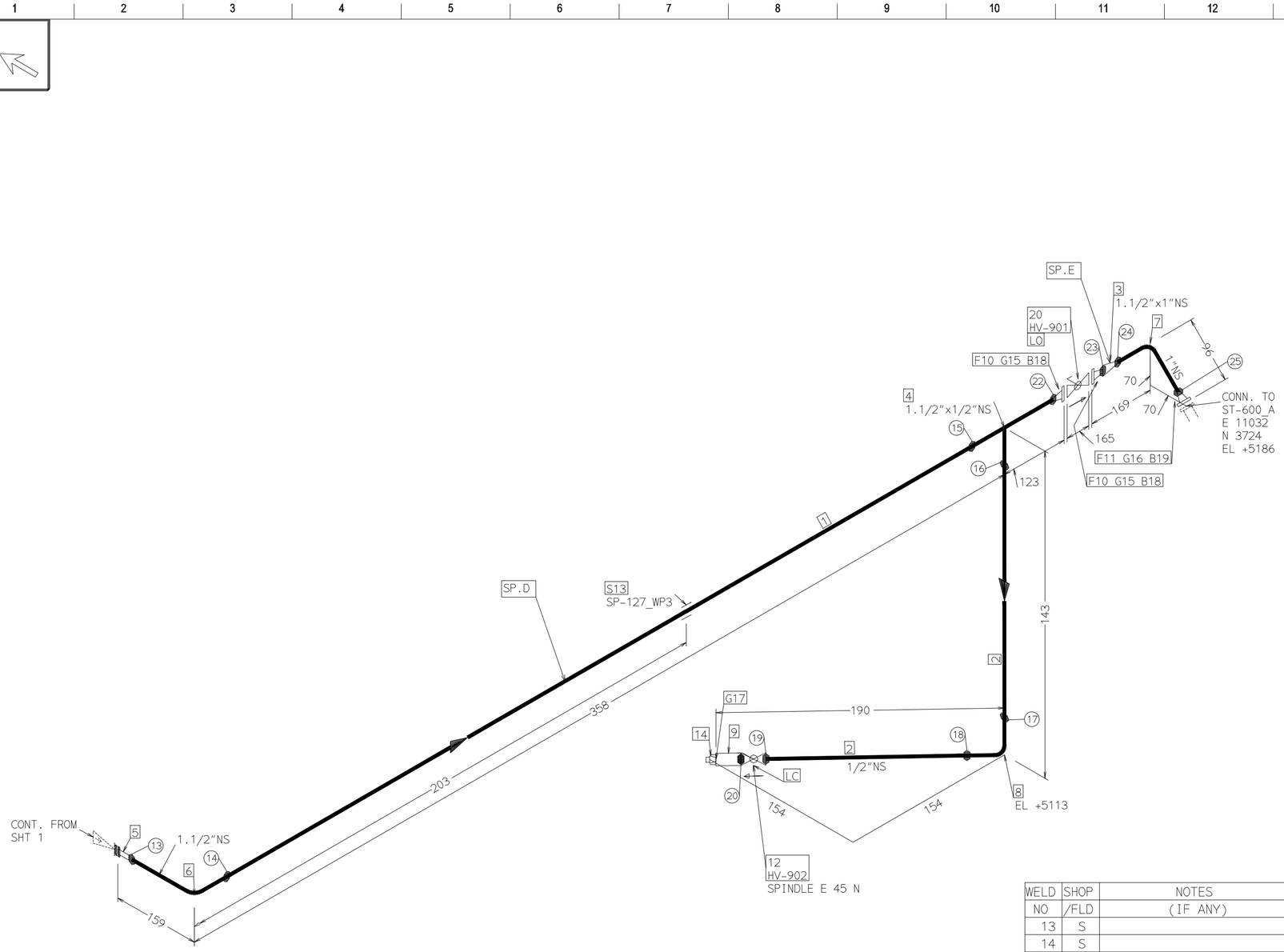
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 43
SHEET - OF: 1 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	0.3M	0.99
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.16
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	REC0SS03191H01	1	0.26
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1/2	TER0SS06191H0H	1	1.50
5	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 316/316L	1.1/2	N100SS02821H00	1	0.54
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2	E90RSS00681H00	1	0.40
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
8	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
9	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
10	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS00941H00	2	3.60
11	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
	VALVES / IN-LINE ITEMS				
12	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
13	U-BOLT FOR GUIDE, S-211-40mm,	1.1/2	SUPPORT	1	0.12
			TOTAL FABRICATION WEIGHT		9.98

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
14	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
15	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00401H00	2	0.14
16	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
17	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
18	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B012760200	8	1.30
19	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	VALVES / IN-LINE ITEMS				
20	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1.1/2	BY CLIENT	1	6.60
			TOTAL ERECTION WEIGHT		8.80
			TOTAL WEIGHT		18.78

WELD NO	SHOP /FLD	NOTES (IF ANY)
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
22	S	
23	S	
24	S	
25	S	

900A-40-N2-PA22S_A10

SPOOL NUMBERS:
SP.D SP.E

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/009	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/10/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

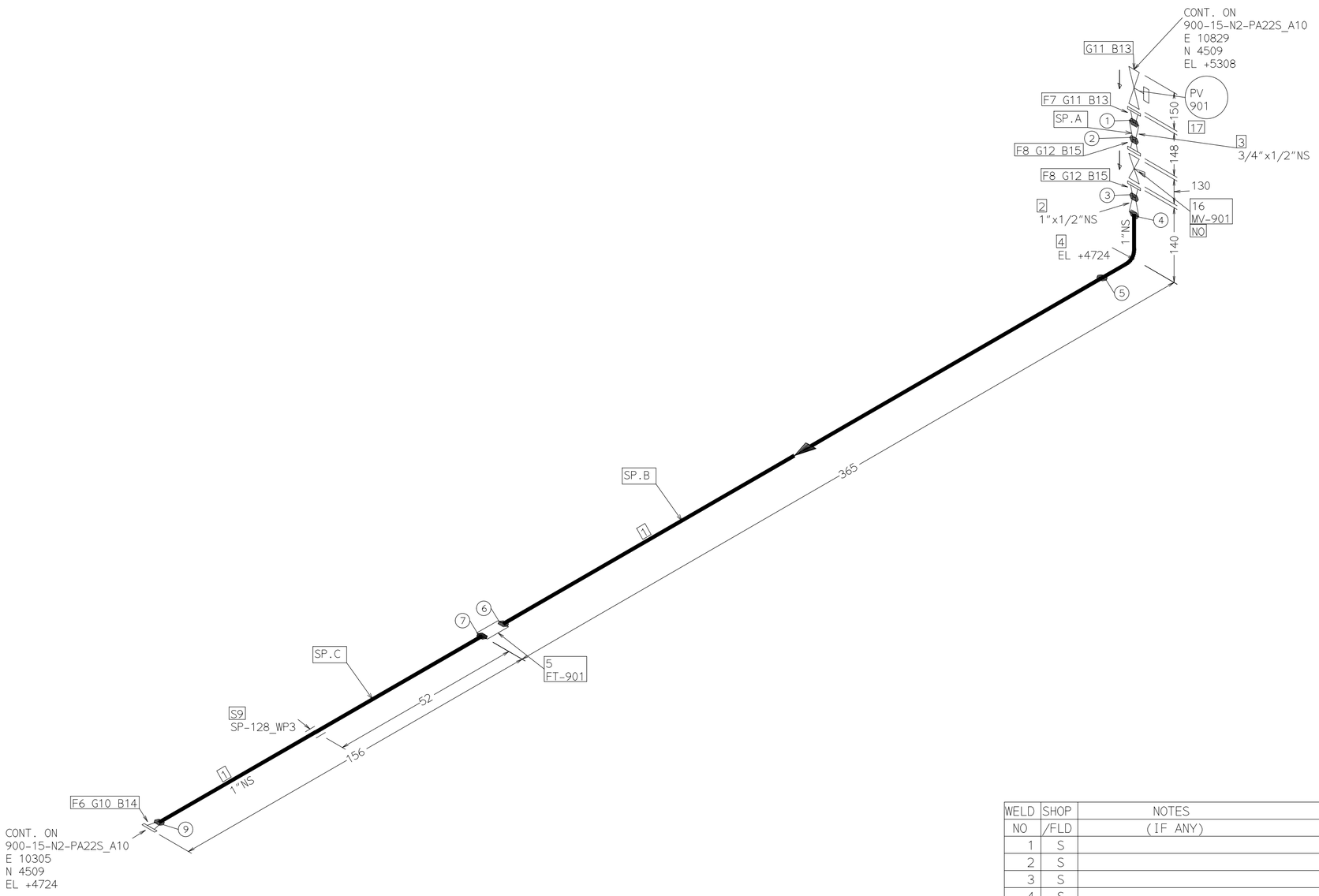
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 43
SHEET - OF: 2 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.3M	0.73
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
5	FLANGE & ORIF PLATE ASSEMBLY, WN ANSI B16.36 Cl.300.RF, Sch.80S, 1/2" NPTF TAPPING	1	BY CLIENT	1	4.20
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	1	1.80
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
	SUPPORTS				
9	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		9.46

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
13	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	8	1.78
14	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
15	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
16	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	3.20
	INSTRUMENTS				
17	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 901	3/4	BY CLIENT	1	5.90
			TOTAL ERECTION WEIGHT		12.89
			TOTAL WEIGHT		22.35

SPOOL NUMBERS:

SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
9	S	

901-15-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL / INS-ELO = STANDARD INSULATION

INSUL / INS-FLY = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

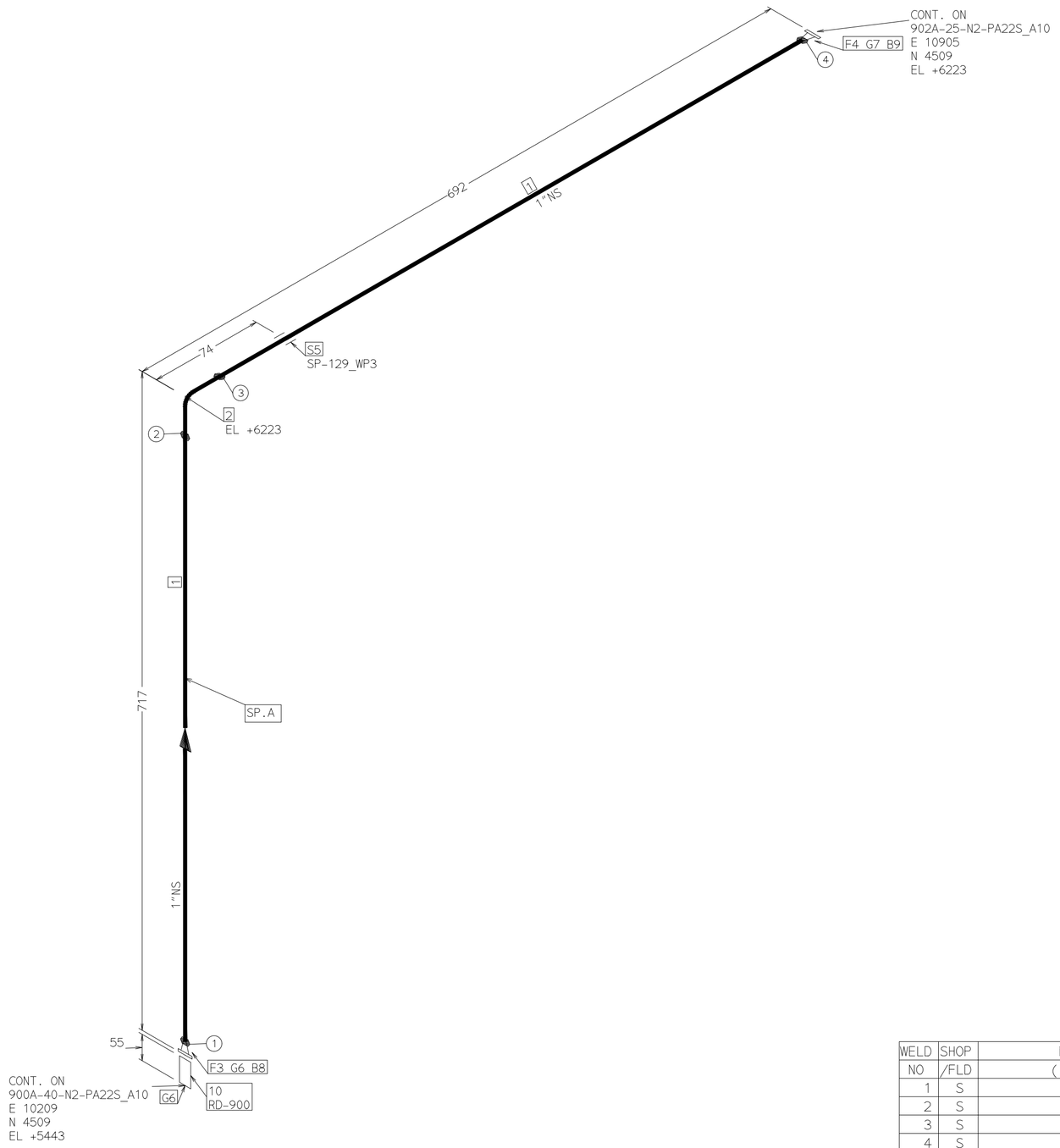
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 44

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.3M	3.02
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	1	2.00
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS00930100	1	1.10
	SUPPORTS				
5	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		6.29

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
8	140 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.28
9	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	VALVES / IN-LINE ITEMS				
10	RUPTURE DISK, SOLYRO TYPE GI-XLO, Cl.300 ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.50
			TOTAL ERECTION WEIGHT		2.60
			TOTAL WEIGHT		8.89

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

902-25-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	10				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

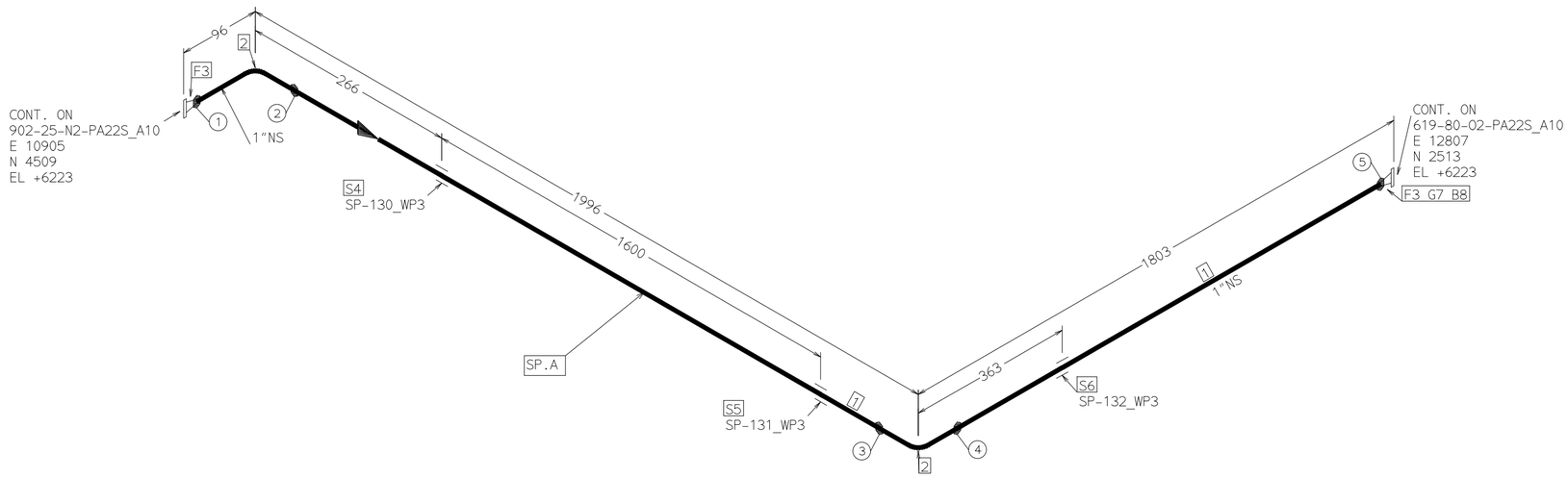
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	45	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	3.7M	9.05
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS00930100	2	2.20
	SUPPORTS				
4	U-BOLT FOR STOP, S-212-25mm,	1	SUPPORT	1	0.02
5	U-BOLT FOR STOP, S-212-25mm,	1	SUPPORT	1	0.02
6	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02

TOTAL FABRICATION WEIGHT 11.61

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
8	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62

TOTAL ERECTION WEIGHT 0.68

TOTAL WEIGHT 12.29

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

902A-25-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003/005/006	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

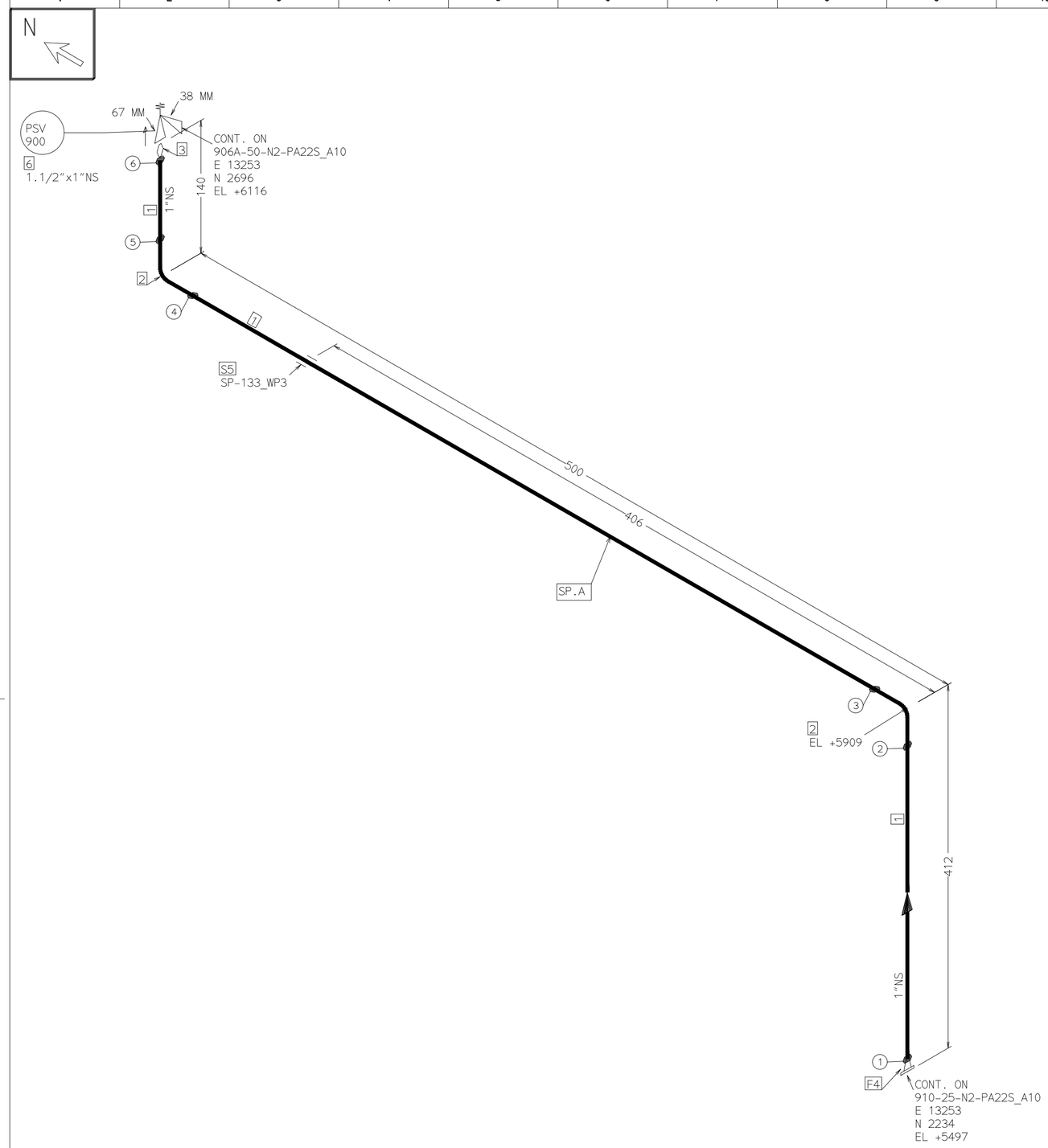
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 46

SHEET - OF 1 / 1

COMP. C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.8M	1.97
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
3	ADAPTER , FEMALE BSPP x BW, CL.3000 x SCH.40S ASTM A182 Gr.F316/316L	1	ADAPSS00260101	1	0.20
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
	SUPPORTS				
5	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		3.59

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	INSTRUMENTS				
6	PSV HEROSE TYPE 06850, CODE 1846, BSPP-MxBSPP-F ASTM A351 Gr.CF8M PSV 900	1.1/2 x 1	BY CLIENT	1	3.90
			TOTAL ERECTION WEIGHT		3.90
			TOTAL WEIGHT		7.49

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	

906-25-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

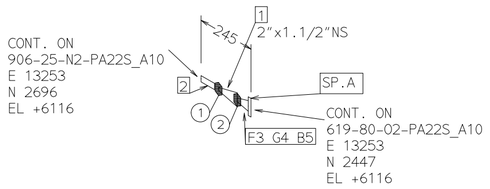
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 47

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
1	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	2 x 1.1/2	REC0SS0356021H	1	0.36
2	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 316/316L	1.1/2	N100SS02821H00	1	0.54
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLW0SS02950200	1	2.70
			TOTAL FABRICATION WEIGHT		3.60

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
	BOLTS				
5	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009570300	4	0.95
			TOTAL ERECTION WEIGHT		1.05
			TOTAL WEIGHT		4.65

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

906A-50-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005/009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	1.25	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL / INS-ELO = STANDARD INSULATION

INSUL / INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

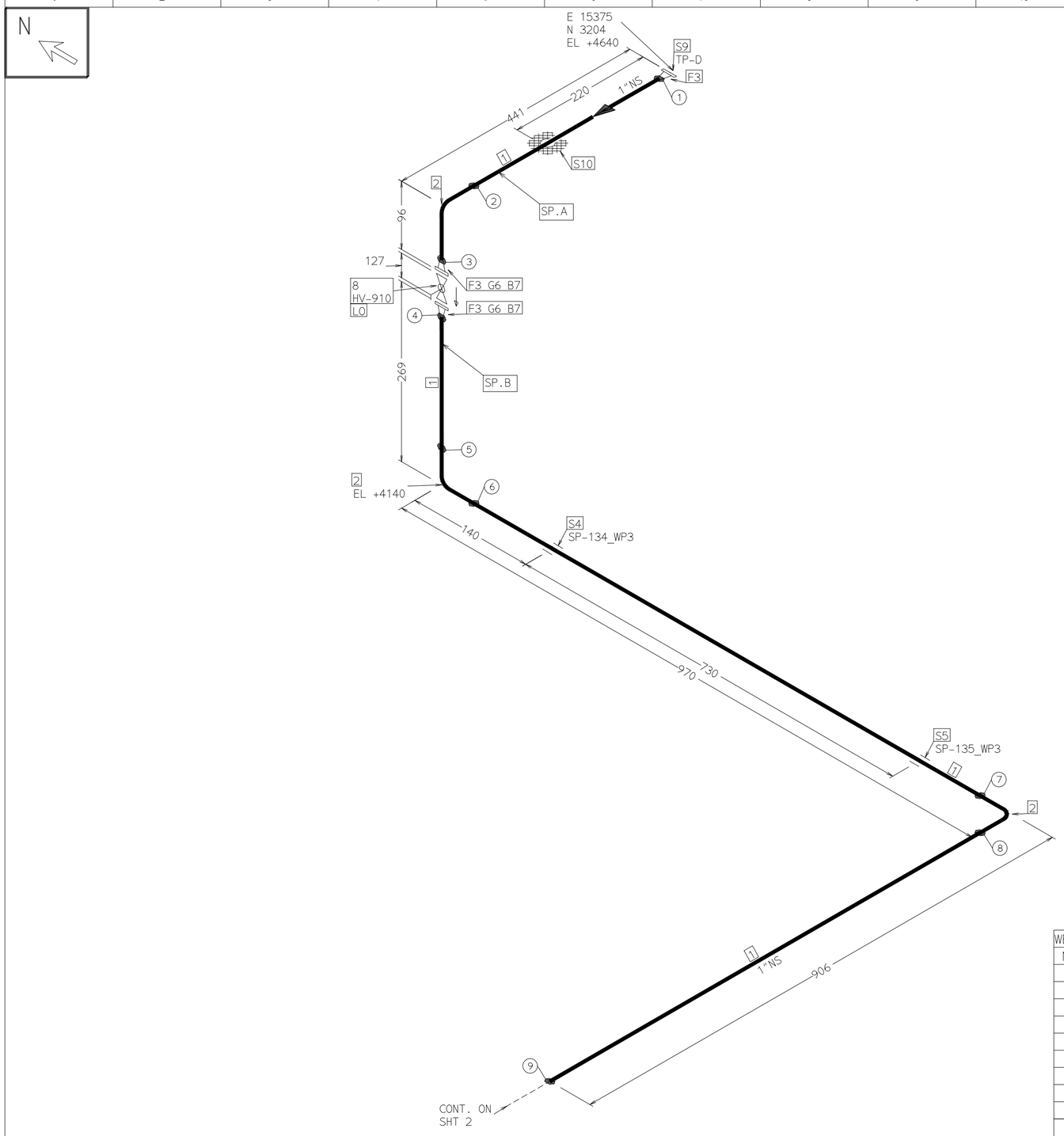
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	48	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	2.3M	5.67
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS00930100	3	3.30
	SUPPORTS				
4	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
5	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		9.46

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	2	0.12
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	VALVES / IN-LINE ITEMS				
8	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	1	3.20
	SUPPORTS				
9	General purpose ATTA SS 316	1	-	1	0.00
10	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		7.96
			TOTAL WEIGHT		17.42

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	

910-25-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

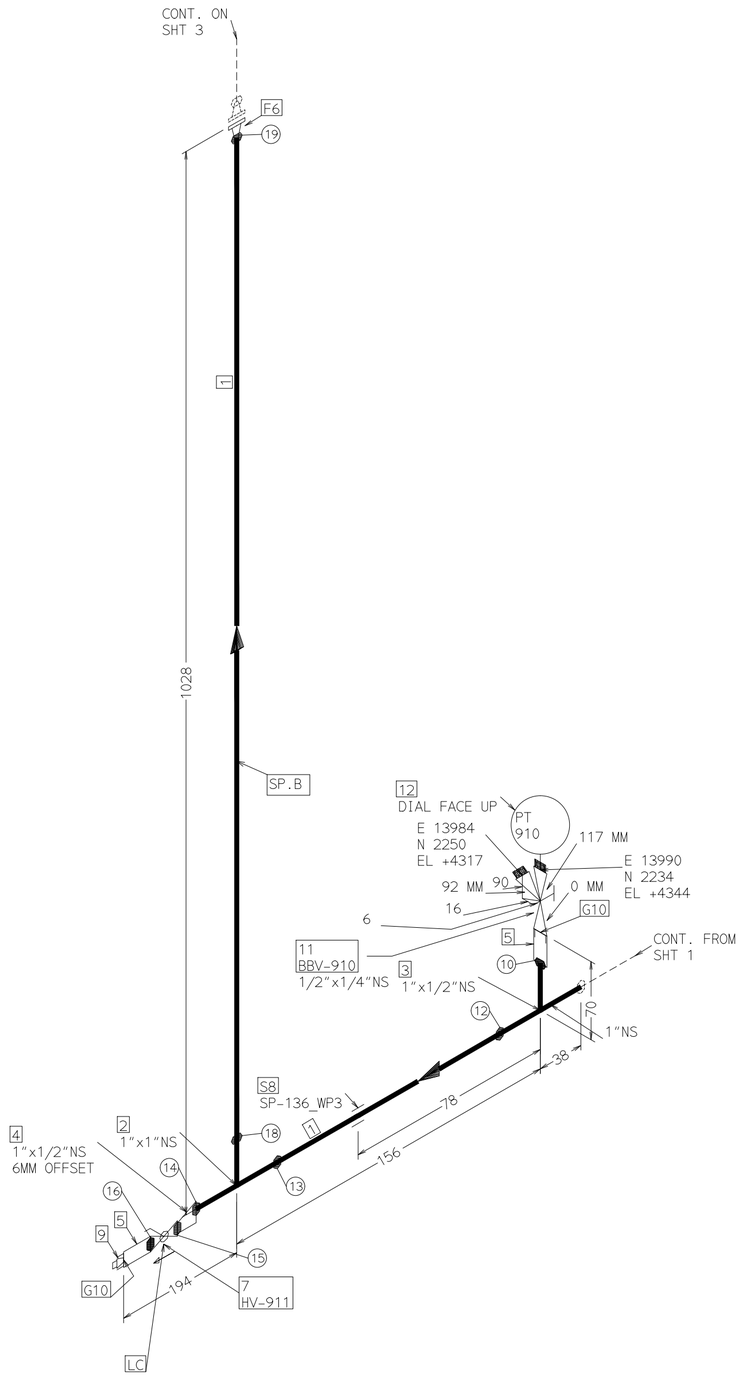
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 49

SHEET - OF: 1 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.1M	2.53
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ECCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REE0SS0474010H	1	0.16
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	2	0.20
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
	VALVES / IN-LINE ITEMS				
7	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
8	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02

TOTAL FABRICATION WEIGHT 5.58

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	2	0.02
	VALVES / IN-LINE ITEMS				
11	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
	INSTRUMENTS				
12	PRESSURE TRANSMITTER, CERABAR PMP71B PT 910	1/2	BY CLIENT	1	1.73

TOTAL ERECTION WEIGHT 2.82

TOTAL WEIGHT 8.40

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
10	S	
12	S	
13	S	
14	S	
15	S	
16	S	
18	S	
19	S	

910-25-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

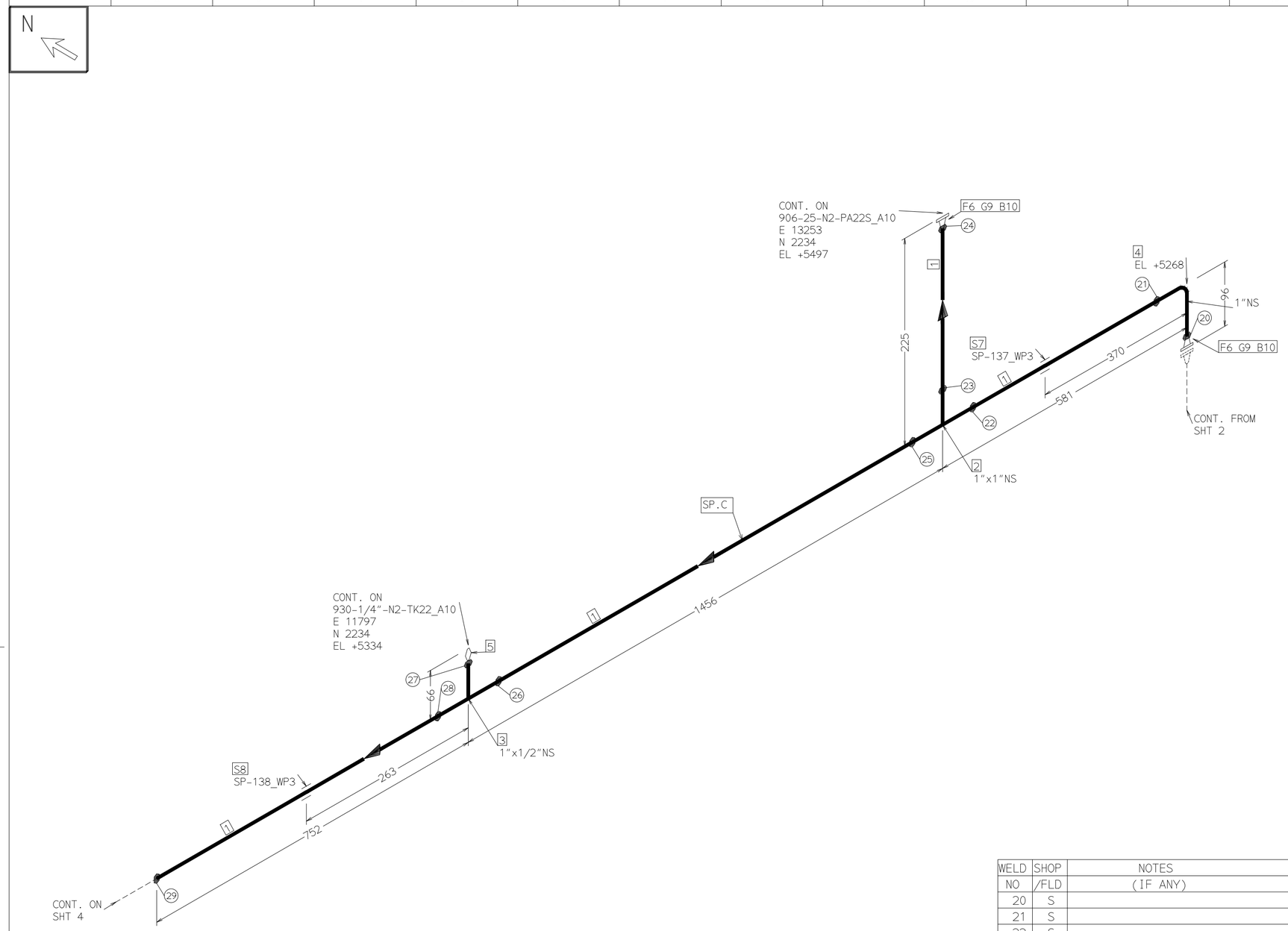
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 49

SHEET - OF: 2 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	2.8M	6.82
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
5	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	2	2.20
	SUPPORTS				
7	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
8	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		10.00

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	2	0.12
	BOLTS				
10	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
			TOTAL ERECTION WEIGHT		1.36
			TOTAL WEIGHT		11.36

SPOOL NUMBERS:
SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	
29	S	

910-25-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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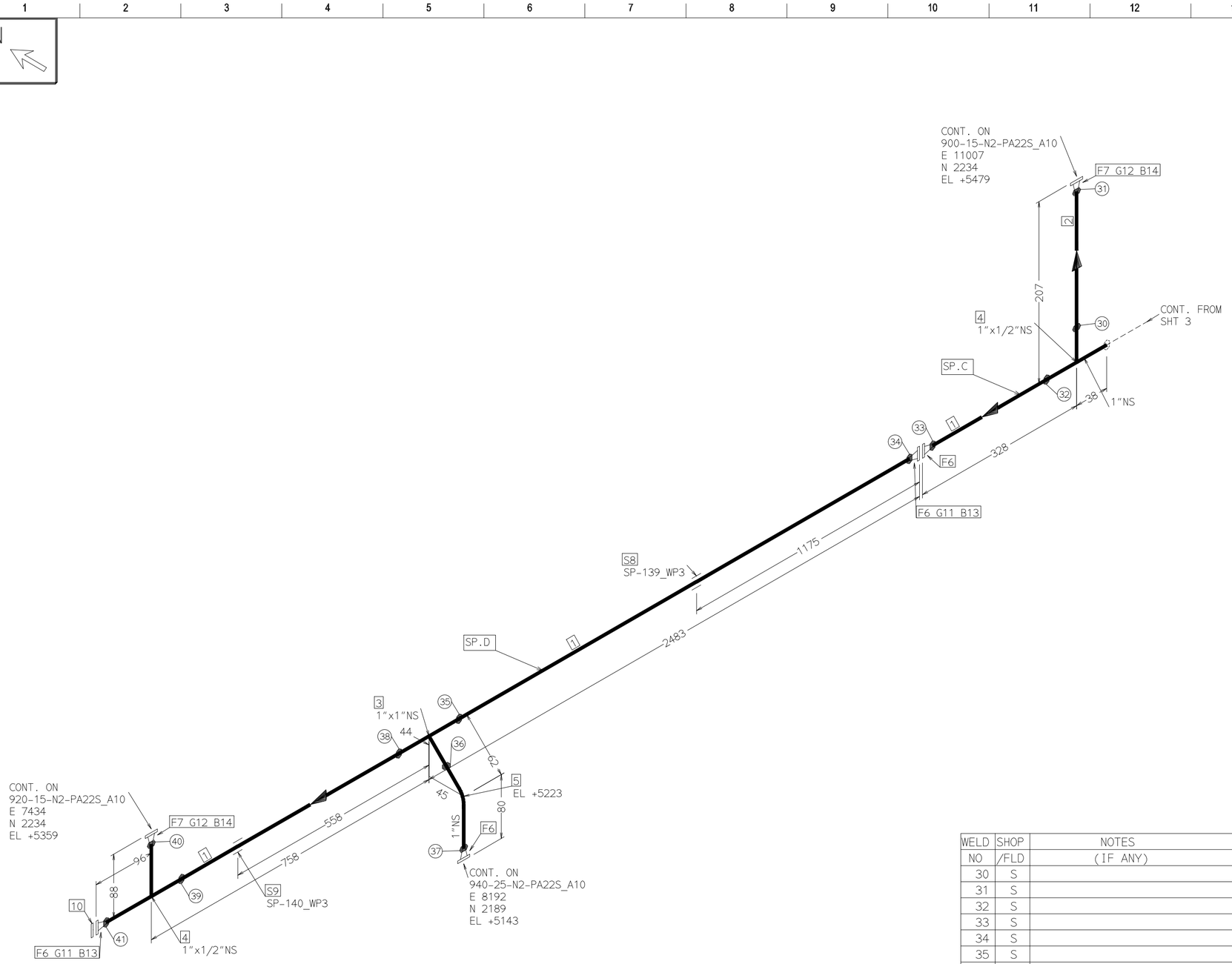
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005
FORES DOC. Nr.: 224J10-DDL-PP-DI-00003
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023
ISO Nr.: 49
SHEET - OF: 3 / 4
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	3.4M	8.26
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.2M	0.20
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TER0SS0600010H	2	0.80
5	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E45RSS00860100	1	0.07
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	4	4.40
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
	SUPPORTS				
8	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
9	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		15.26

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
10	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F316/316L	1	FLB0SS00490100	1	1.40
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	2	0.12
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
13	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
14	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
			TOTAL ERECTION WEIGHT		3.95
			TOTAL WEIGHT		19.21

WELD NO	SHOP /FLD	NOTES (IF ANY)
30	S	
31	S	
32	S	
33	S	
34	S	
35	S	
36	S	
37	S	
38	S	
39	S	
40	S	
41	S	

910-25-N2-PA22S_A10

SPOOL NUMBERS:

SP.C SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

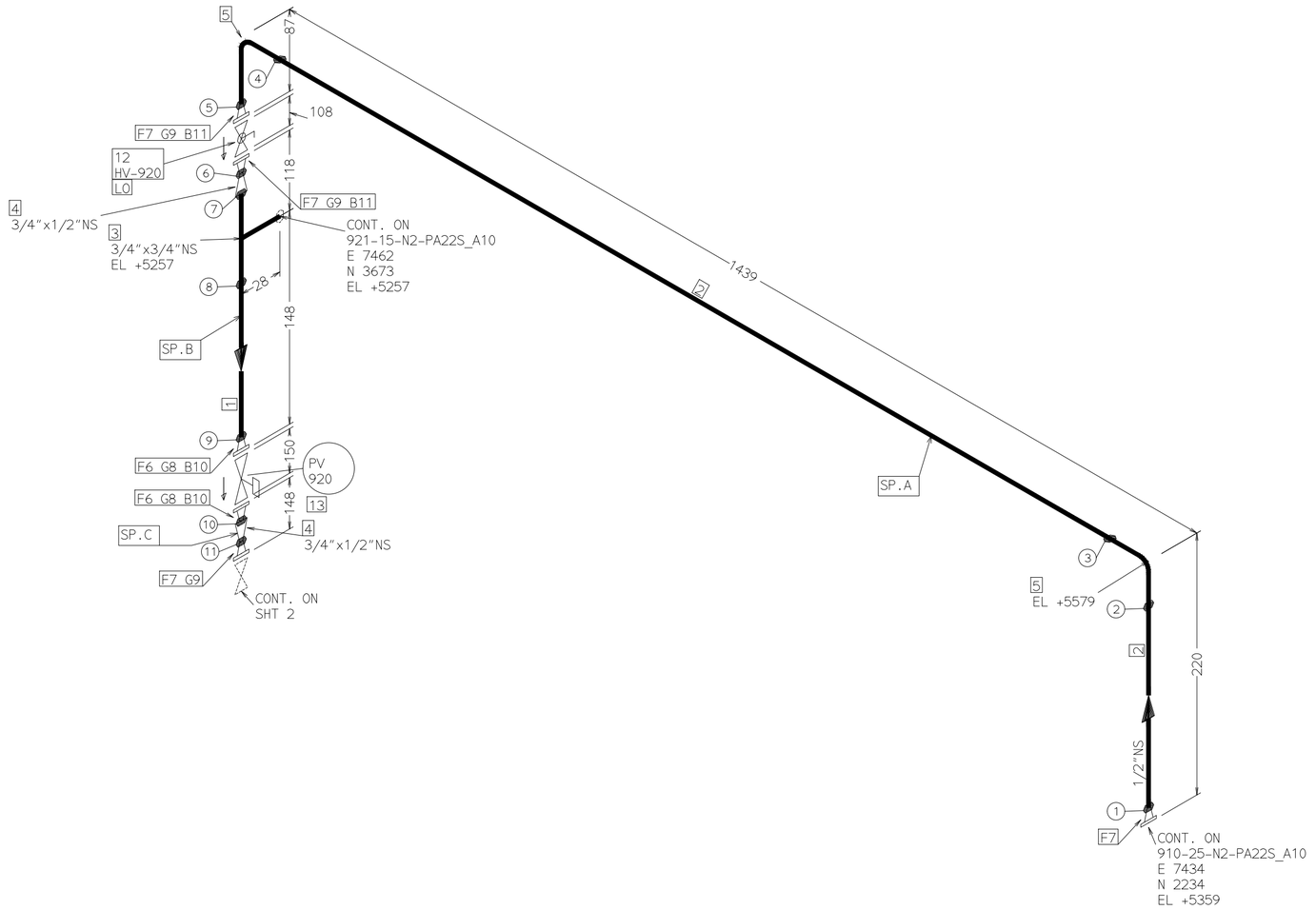
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 49

SHEET - OF: 4 / 4

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	0.1M	0.12
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	1.5M	2.41
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 3/4	TEE0SS00923Q00	1	0.27
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	2	0.20
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	2	0.36
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	2	3.60
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	4	2.40
			TOTAL FABRICATION WEIGHT		9.36

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	3	0.09
	BOLTS				
10	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	8	1.78
11	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
12	BALL VALVE HABONIM SERIE 73, CL150 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	1.80
	INSTRUMENTS				
13	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 920	3/4	BY CLIENT	1	5.90
			TOTAL ERECTION WEIGHT		10.84
			TOTAL WEIGHT		20.20

SPOOL NUMBERS:

SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

920-15-N2-PA22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

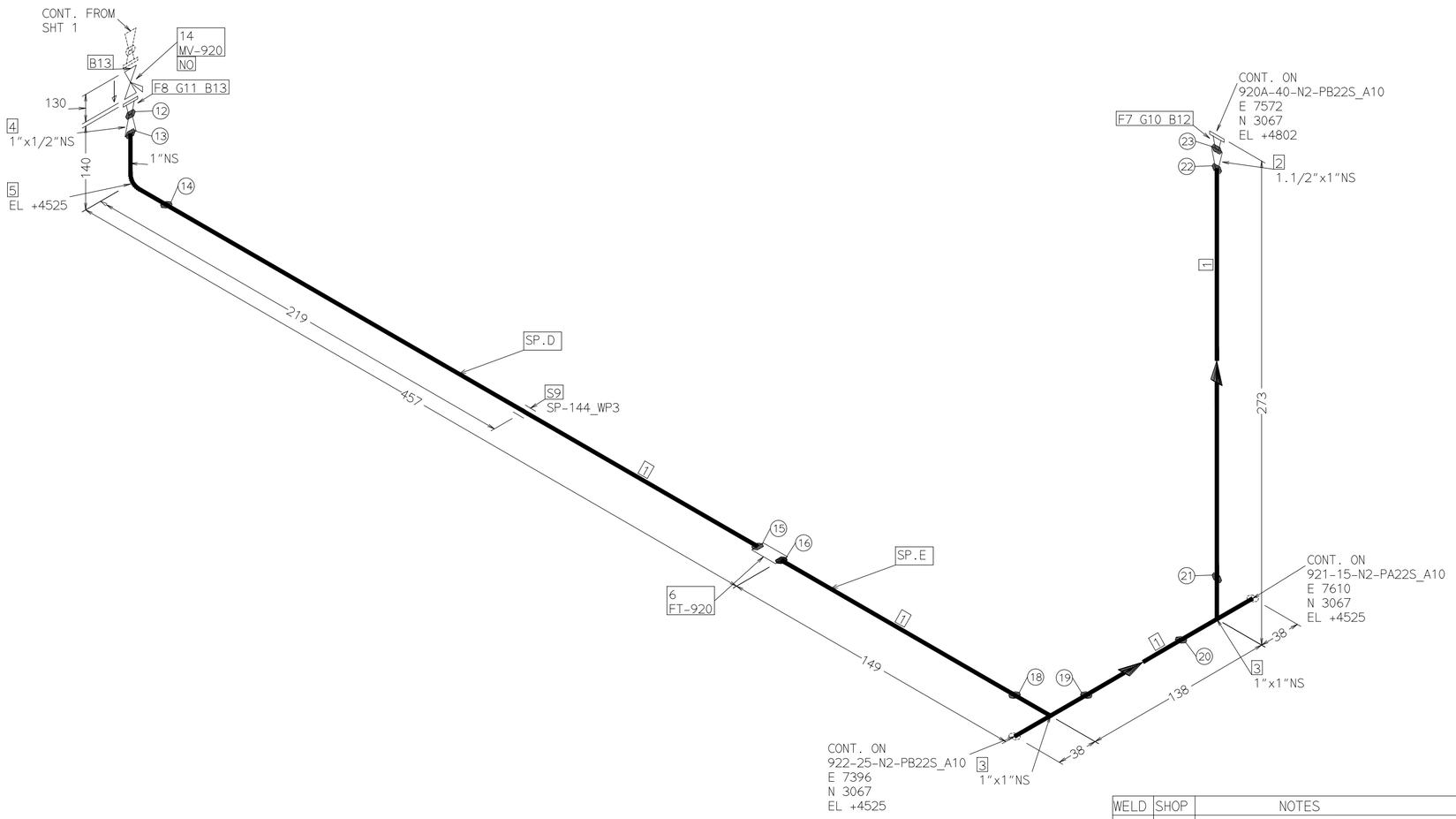
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 50

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.6M	1.42
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	RECOSS03191H01	1	0.26
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEEOSS00550100	2	0.58
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	RECOSS0512010H	1	0.16
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
6	FLANGE & ORIF PLATE ASSEMBLY, WN ANSI B16.36 CL.300.RF, Sch.80S, 1/2" NPTF TAPPING	1	BY CLIENT	1	4.20
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLWOSS03481H00	1	3.50
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLWOSS04680H00	1	0.60
	SUPPORTS				
9	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		10.89

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	1	0.11
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	1	0.03
	BOLTS				
12	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	4	1.74
13	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
14	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	3.20
			TOTAL ERECTION WEIGHT		6.21
			TOTAL WEIGHT		17.10

WELD NO	SHOP /FLD	NOTES (IF ANY)
12	S	
13	S	
14	S	
15	S	
16	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	

920-15-N2-PA22S_A10

SPOOL NUMBERS:

SP.D SP.E

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-009	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

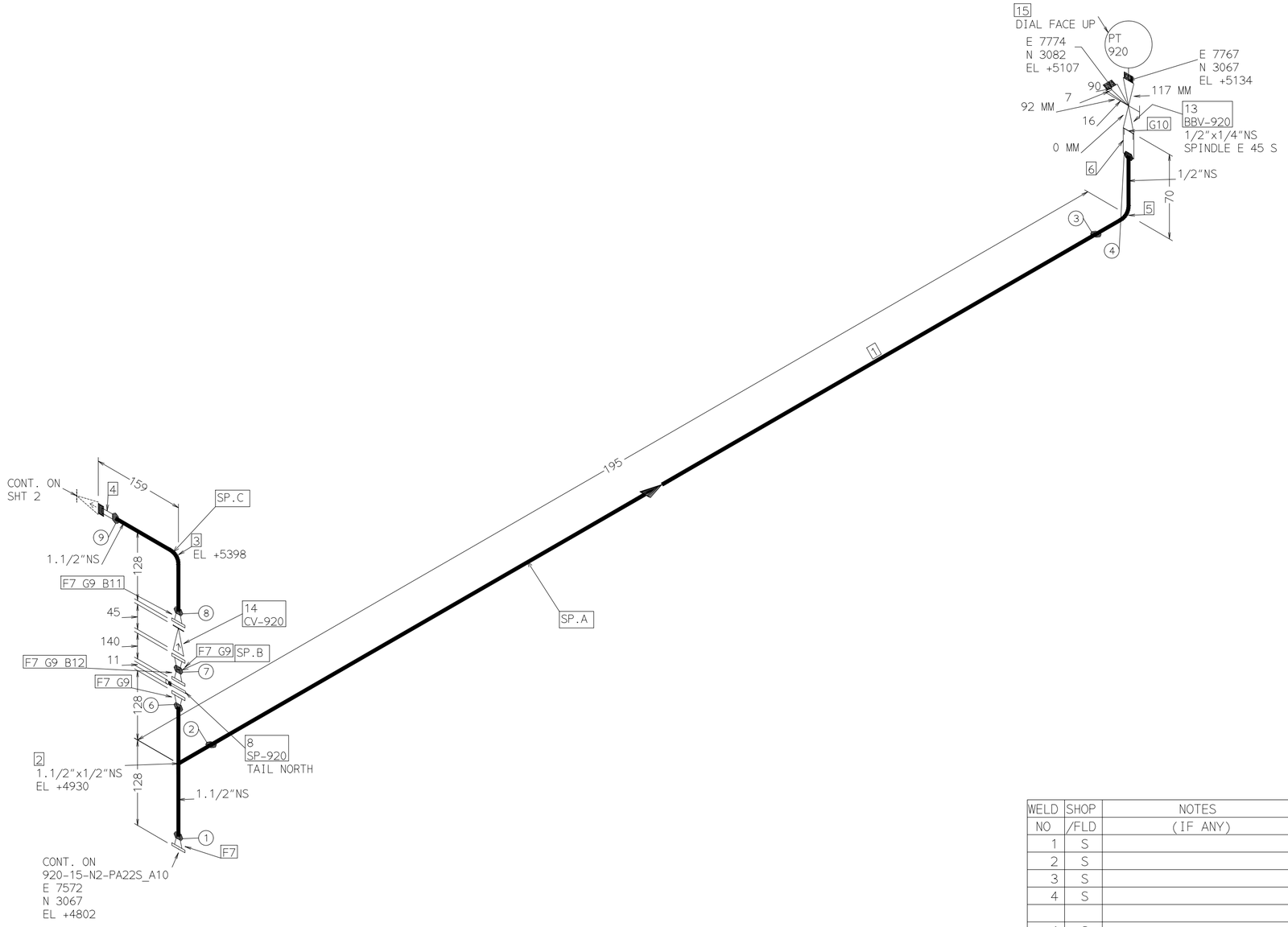
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 50

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.16
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1/2	TERSS06191H0H	1	1.50
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2	E90RSS00681H00	1	0.40
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 316/316L	1.1/2	N100SS02821H00	1	0.54
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLWOSS03481H00	5	17.50
			TOTAL FABRICATION WEIGHT		20.38

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	SPECTACLE BLIND ASME B16.48, CL300 RF ASTM A240 TP 316/316L	1.1/2	BSPESS02131H00	1	0.84
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	4	0.44
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
11	145 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	4	2.30
12	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	4	1.91
	VALVES / IN-LINE ITEMS				
13	BLOCK AND BLEED MANIFOLD, ENDRESS HAUSER, DA63M, GAS ASTM A182 Gr.F316/316L	1/2 x 1/4	BY CLIENT	1	1.00
14	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1.1/2	BY CLIENT	1	1.12
	INSTRUMENTS				
15	PRESSURE TRANSMITTER, CERABAR PMP71B PT 920	1/2	BY CLIENT	1	1.73
			TOTAL ERECTION WEIGHT		9.35
			TOTAL WEIGHT		29.73

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
6	S	
7	S	
8	S	
9	S	

920A-40-N2-PB22S_A10

SPOOL NUMBERS:

SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

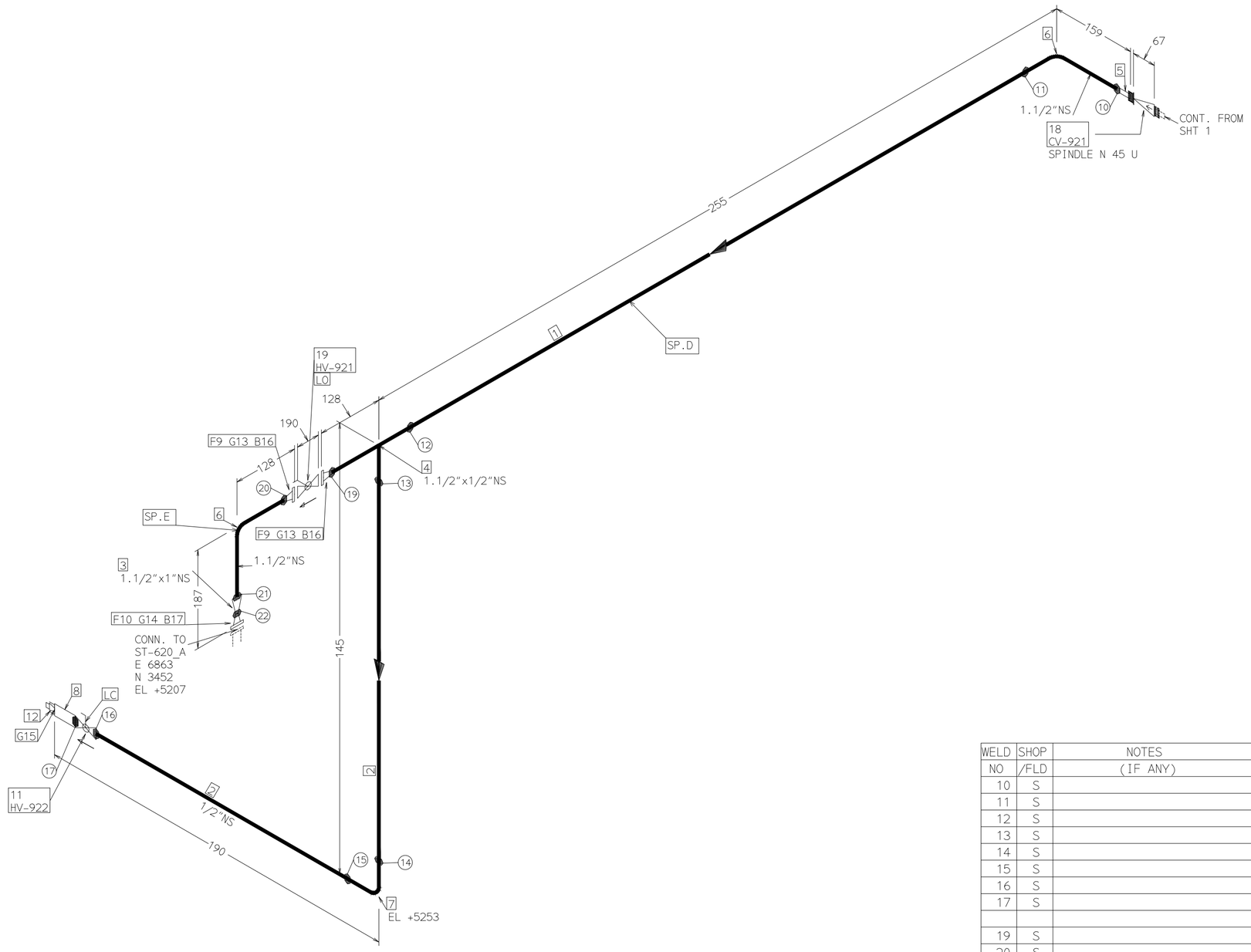
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 51

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1.1/2	PIPESS00531H00	0.2M	0.57
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.16
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1	REC0SS03191H01	1	0.26
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1.1/2 x 1/2	TER0SS06191H0H	1	1.50
5	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 316/316L	1.1/2	N100SS02821H00	1	0.54
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1.1/2	E90RSS00681H00	2	0.80
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
8	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
9	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1.1/2	FLW0SS03481H00	2	7.00
10	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
	VALVES / IN-LINE ITEMS				
11	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88

TOTAL FABRICATION WEIGHT 13.99

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
12	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00581H00	2	0.22
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
15	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
16	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029260400	8	3.49
17	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	VALVES / IN-LINE ITEMS				
18	CHECK VALVE, SFERACO 325, PISTON TYPE, BSPPF ISO 228-1 ASTM A182 Gr.F316/316L	1.1/2	BY CLIENT	1	1.58
19	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1.1/2	BY CLIENT	1	9.80

TOTAL ERECTION WEIGHT 16.16

TOTAL WEIGHT 30.15

WELD NO	SHOP /FLD	NOTES (IF ANY)
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
19	S	
20	S	
21	S	
22	S	

920A-40-N2-PB22S_A10

SPOOL NUMBERS:

SP.D SP.E

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION · INSUL INS-FLV = THERMAL JACKET INSULATION · PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

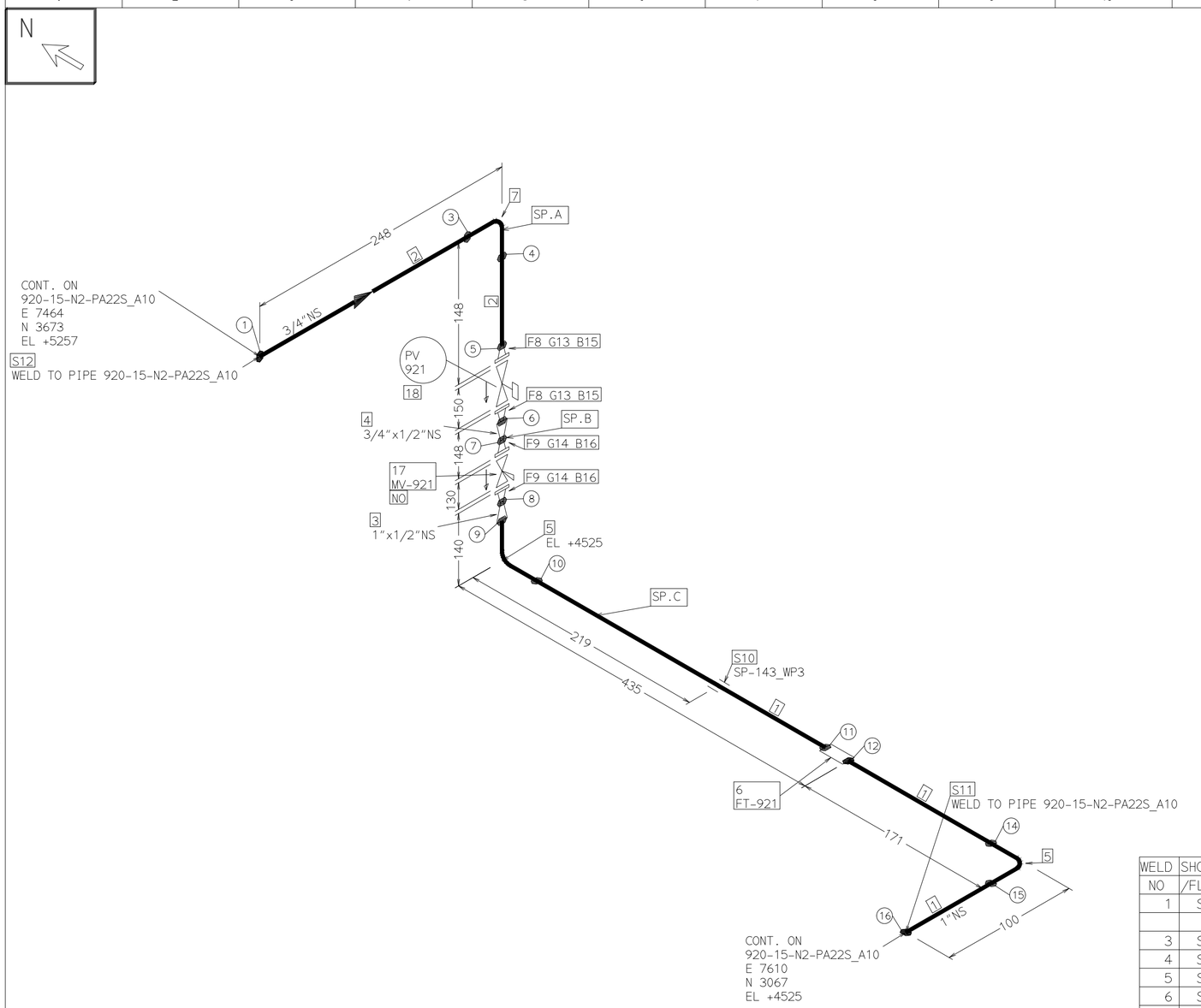
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	51	2 / 2	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
14	S	
15	S	
16	S	

921-15-N2-PA22S_A10

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.5M	1.13
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	3/4	PIPESS01643Q00	0.3M	0.56
	FITTINGS				
3	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4 x 1/2	REC0SS05113Q0H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
6	FLANGE & ORIF PLATE ASSEMBLY, WN ANSI B16.36 CL.300.RF, Sch.80S, 1/2" NPTF TAPPING	1	BY CLIENT	1	4.20
7	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	3/4	E90RSS00563Q00	1	0.20
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.80S ASTM A182 Gr.F316/316L	3/4	FLW0SS06503Q00	2	3.60
9	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
	SUPPORTS				
10	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
11	General purpose ATTA SS 316	1	-	1	0.00
12	General purpose ATTA SS 316	3/4	-	1	0.00

TOTAL FABRICATION WEIGHT 11.47

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
13	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	2	0.14
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
15	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	8	1.78
16	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
17	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	3.20
	INSTRUMENTS				
18	PNEUMATIC STRAIGHT SEAT VALVE, EMERSON ASCO T298, CL300 RF PV 921	3/4	BY CLIENT	1	5.90

TOTAL ERECTION WEIGHT 12.21

TOTAL WEIGHT 23.68

SPOOL NUMBERS:

SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

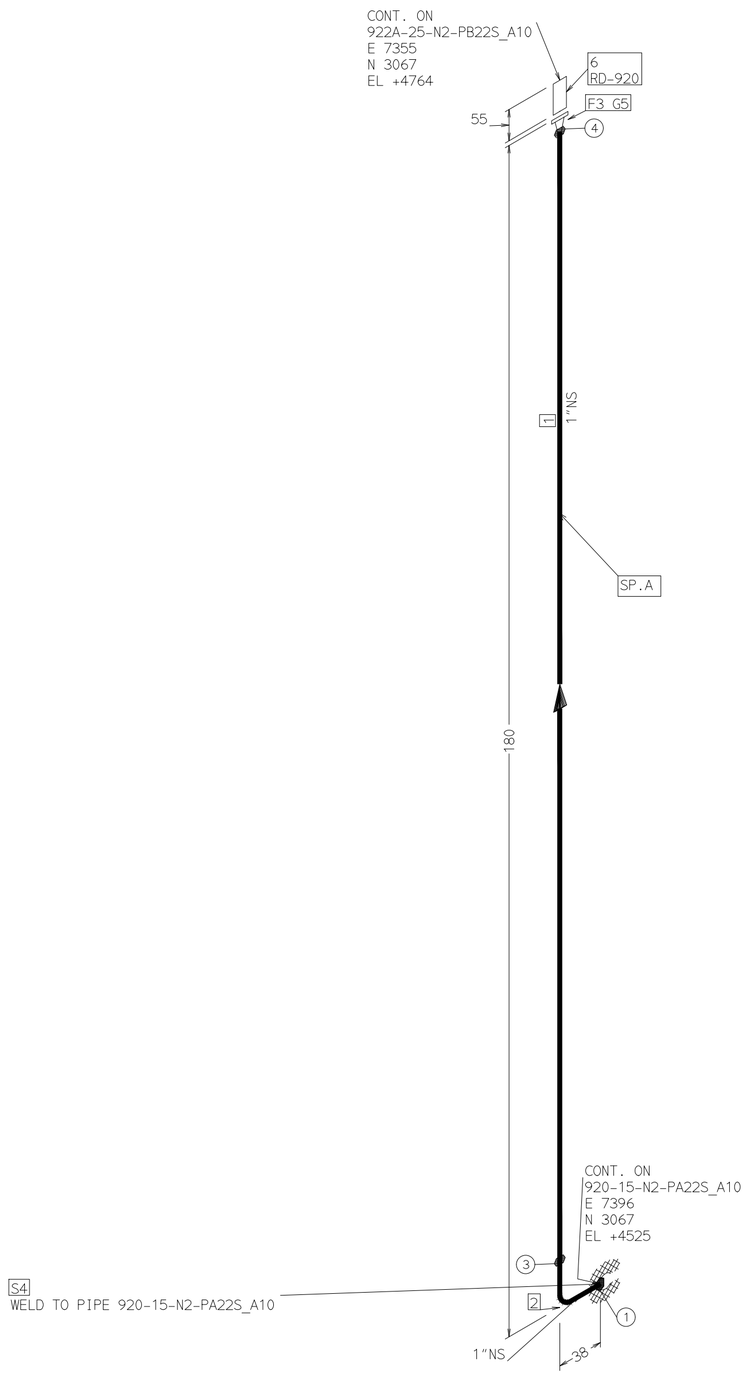
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 52

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.1M	0.19
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	1	2.00
	SUPPORTS				
4	Penetration ATTA SS 316	1	-	1	0.00
			TOTAL FABRICATION WEIGHT		2.34

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	VALVES / IN-LINE ITEMS				
6	RUPTURE DISK, SOLYRO TYPE GI-XLO, Cl.300 ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.50
			TOTAL ERECTION WEIGHT		0.57
			TOTAL WEIGHT		2.91

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
3	S	
4	S	

922-25-N2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

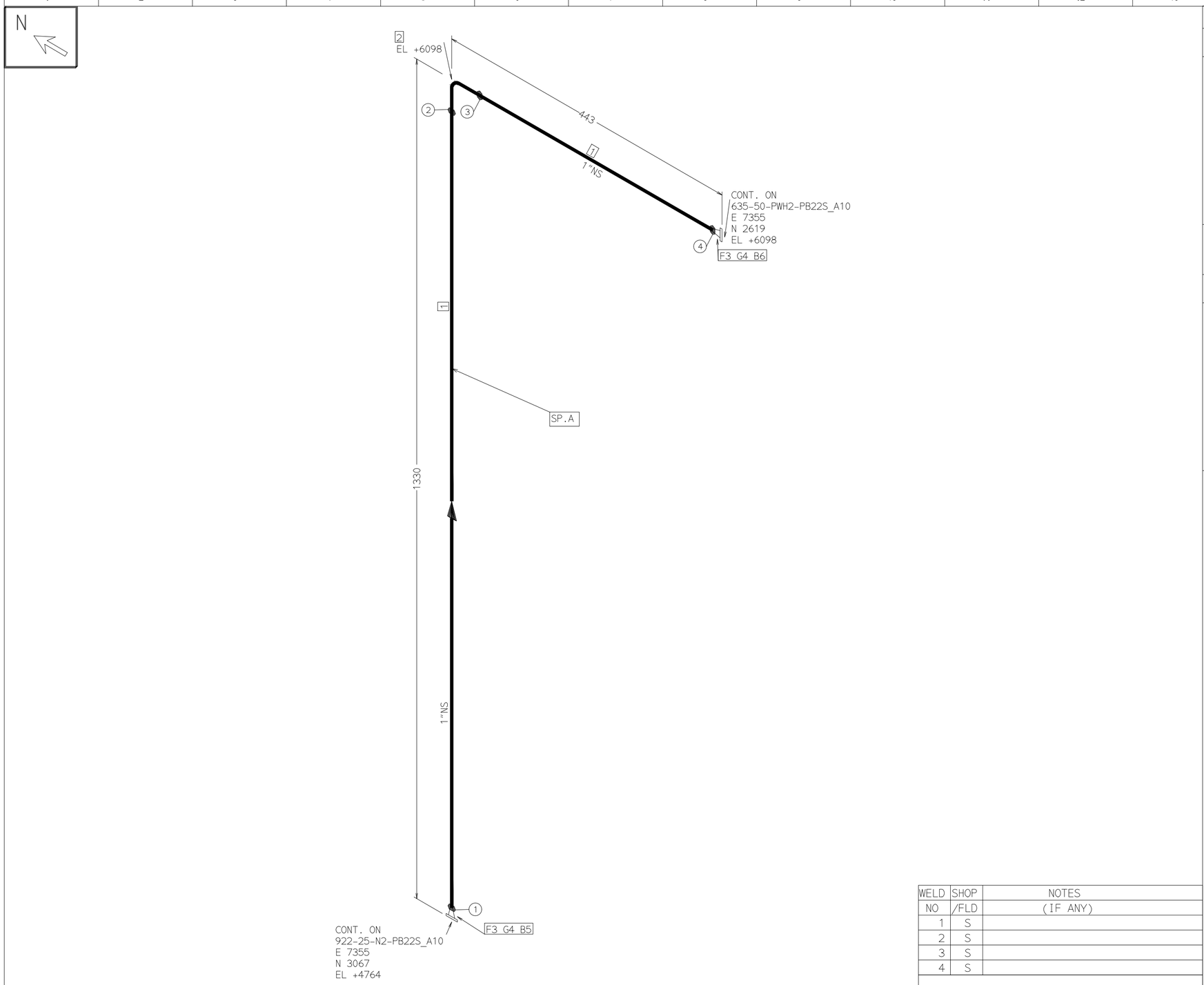
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 53

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.6M	3.91
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		8.06

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
5	140 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.28
6	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
			TOTAL ERECTION WEIGHT		2.34
			TOTAL WEIGHT		10.40

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

922A-25-N2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006/007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.0899	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

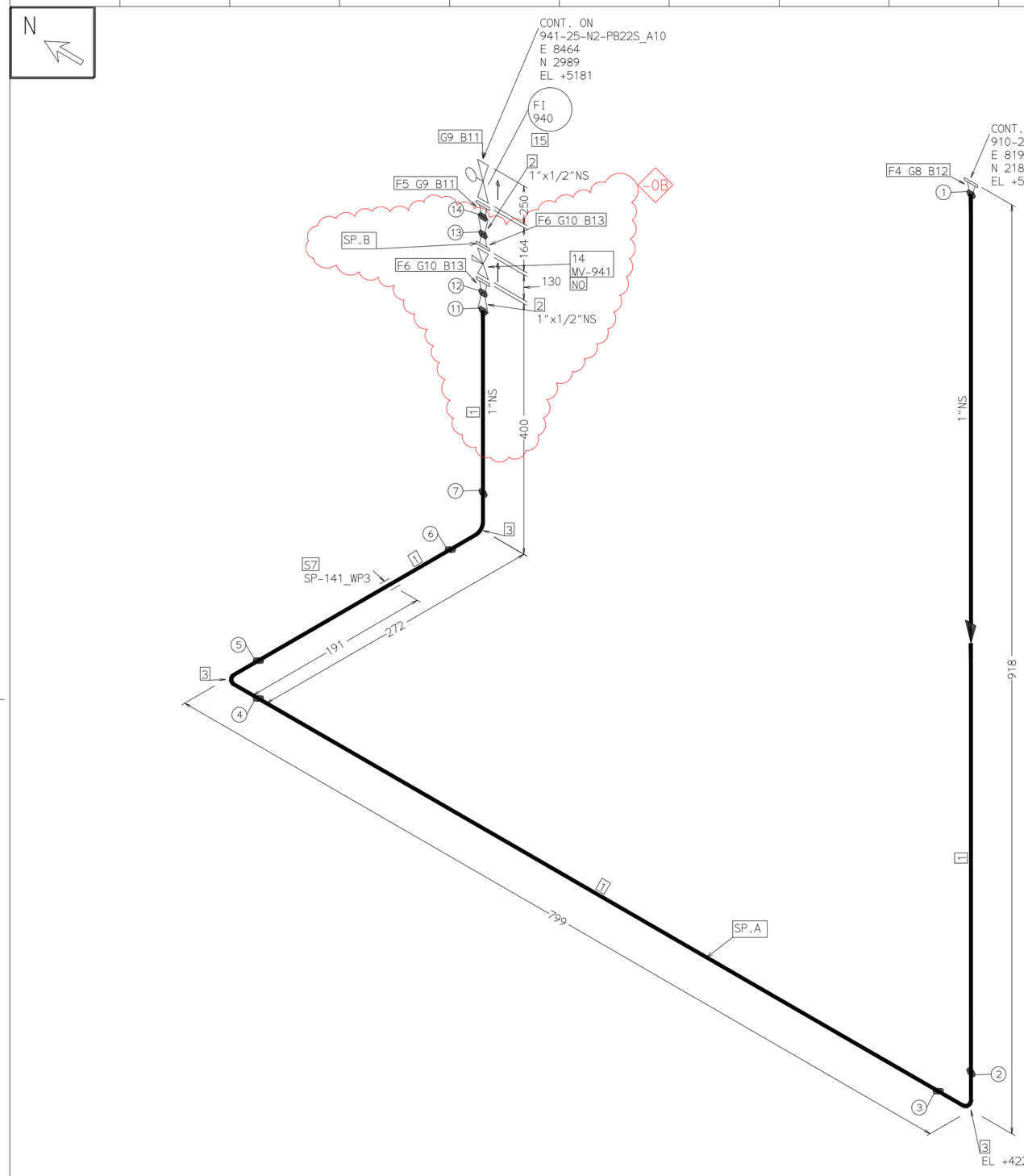
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 54

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	2.0M	4.97 -0B
	FITTINGS				
-0B 2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	RECOSS0512010H	2	0.32
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	1	2.00
-0B 6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	2	1.20
	SUPPORTS				
7	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		10.06 -0B

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
-0B 10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
11	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
12	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
-0B 13	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	VALVES / IN-LINE ITEMS				
14	NEEDLE VALVE GEMU, TYPE 537, CL150 RF, HANDWHEEL OPERATED ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	3.20 -0B
	INSTRUMENTS				
15	FLOW SWITCH, KHRONE H250 M40, CL.300 RF FI 940	1	BY CLIENT	1	5.00
			TOTAL ERECTION WEIGHT		12.05 -0B
			TOTAL WEIGHT		22.11

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
11	S	
-0B 12	S	
13	S	
14	S	

940-25-N2-PA22S_A10

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007/009	DES. TEMP. (°C) :	45	FLUID DENSITY(kg/m3) :	10.96	THICKNESS (mm):	TEST PRESS. (barg) :	14,3	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	10	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0B	24/10/24	ISSUE FOR REVIEW
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

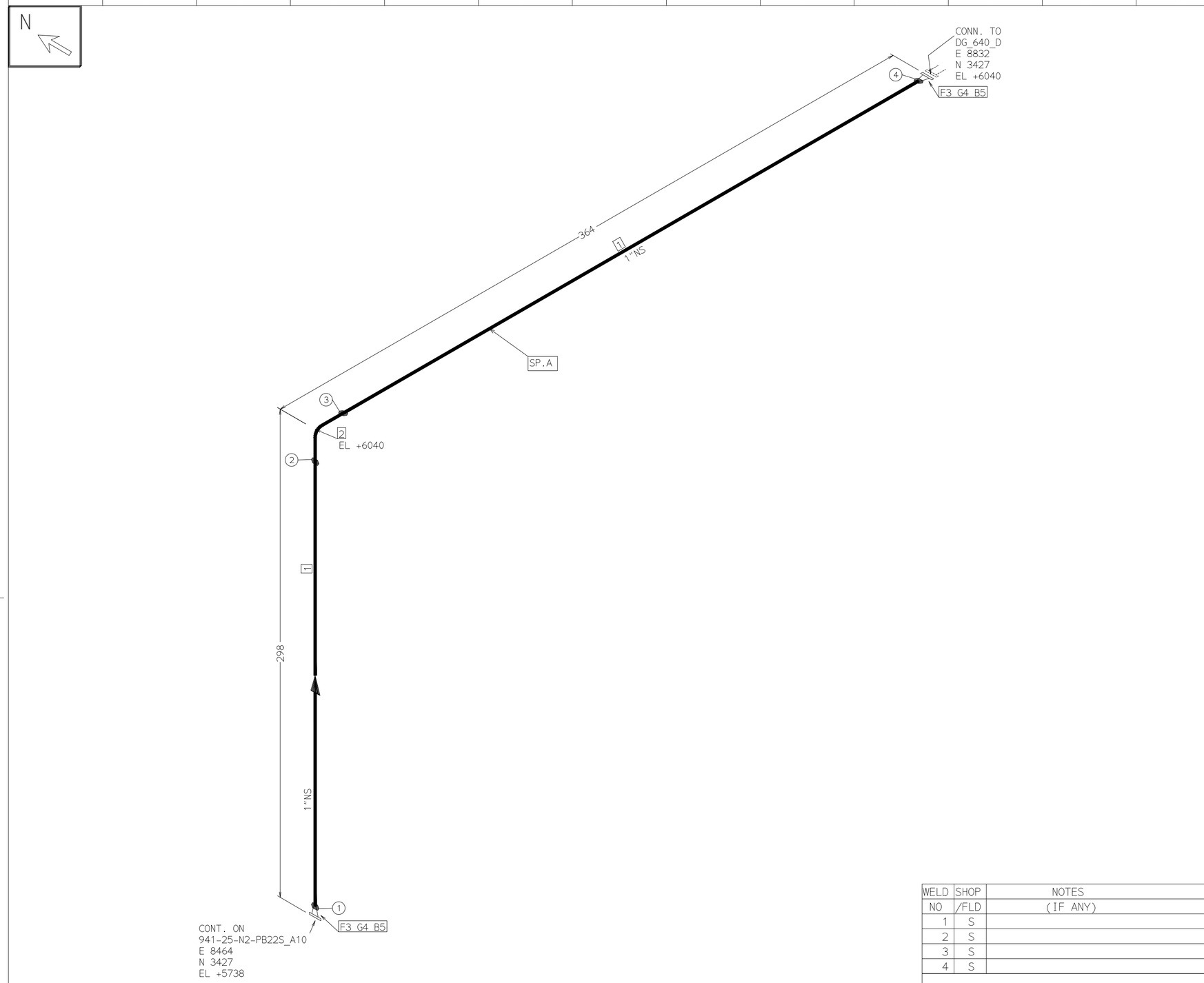
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 55

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.5M	1.14
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		5.29

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
5	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
			TOTAL ERECTION WEIGHT		1.98
			TOTAL WEIGHT		7.27

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

940B-25-N2-PB22S_A10

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1.1687	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	13				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

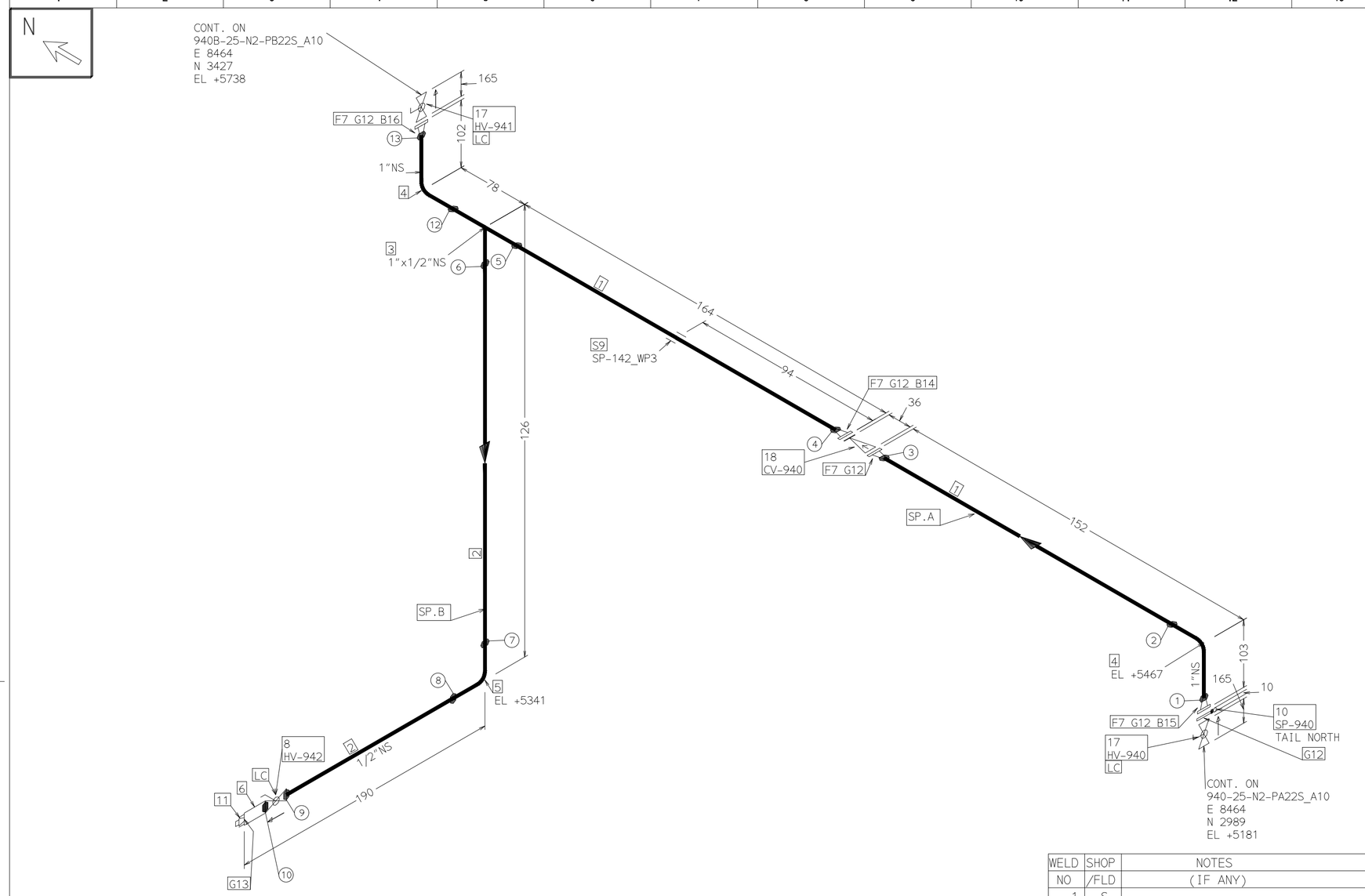
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 56

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
12	S	
13	S	

941-25-N2-PB22S_A10

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.2M	0.27
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.1M	0.15
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	TERSS0600010H	1	0.40
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	2	0.30
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP 316/316L-S	1/2	E90RSS01580H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F316/316L	1/2	ADAPSS00060H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	4	8.00
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F316/316L	1/2	BY CLIENT	1	0.88
	SUPPORTS				
9	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
			TOTAL FABRICATION WEIGHT		10.30

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
10	SPECTACLE BLIND ASME B16.48, CL300 RF ASTM A240 TP 316/316L	1	BSPESS02120100	1	0.49
11	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F316/316L	1/2	PLGHSS00160H00	1	0.07
	GASKETS				
12	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	5	0.35
13	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T316 + 7DF2075	1/2	GORIGK00090H00	1	0.01
	BOLTS				
14	120 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.16
15	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	1.01
16	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	VALVES / IN-LINE ITEMS				
17	BALL VALVE HABONIM SERIE 74, CL300 RF, FULL BORE, L.O., FLOATING ASTM A182 Gr.F316/316L	1	BY CLIENT	2	9.20
18	CHECK VALVE ASME B16.10, DISC TYPE SPIRAX SARCO DCV6, CL300 RF ASTM A182 Gr.F316/316L	1	BY CLIENT	1	0.67
			TOTAL ERECTION WEIGHT		13.88
			TOTAL WEIGHT		24.18

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1.1687	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	7				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

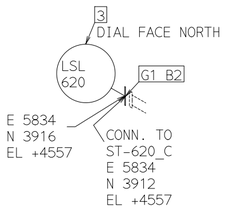
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-005		224J10-DDL-PP-DI-00003	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	57	1 / 1	C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSL 620	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_ST-620_LSL-620

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-625	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

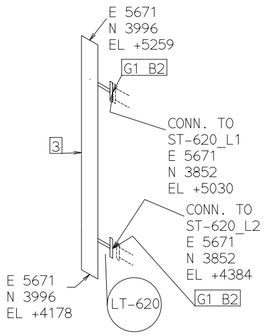
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 58

SHEET - OF 1 / 1

COMP. C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00550H00	2	0.10
	BOLTS				
2	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	INSTRUMENTS				
3	LEVEL TRANSMITTER RADAR TYPE, ENDRESS HAUSER FMP51, WITH CHAMBER Cl.300 LT-620	1/2	BY CLIENT	1	24.50

TOTAL ERECTION WEIGHT 25.84

TOTAL WEIGHT 25.84

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_ST-620_LT-620

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-625	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

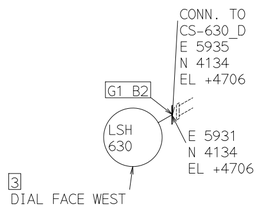
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	59	1 / 1	C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSH 630	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_CS-630_LSH-630

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

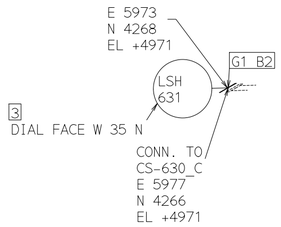
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 60

SHEET - OF 1 / 1

COMP. C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSH 631	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_CS-630_LSH-631

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

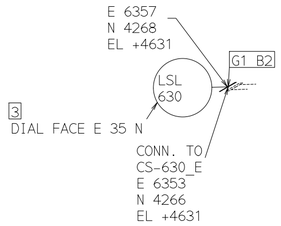
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 61

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSL 630	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_CS-630_LSL-630

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	7	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

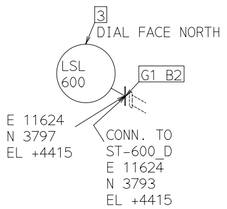
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 62

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
2	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.150 RF LSL 600	1	BY CLIENT	1	2.70

TOTAL ERECTION WEIGHT 3.38

TOTAL WEIGHT 3.38

WELD NO	SHOP /FLD	NOTES (IF ANY)
TRIM-LINE_ST-600_LSL-600		

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):		TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-602	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-003

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

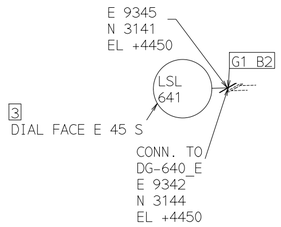
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 63

SHEET - OF 1 / 1

COMP. C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSL 641	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_DG-640_LSL-641

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

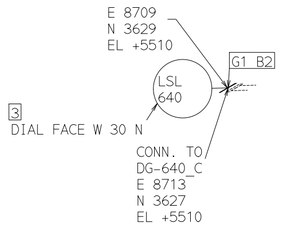
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 64

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSL 640	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_DG-640_LSL-640

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

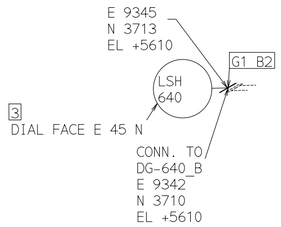
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 65

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	1	0.07
	BOLTS				
2	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	4	0.92
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.300 RF LSH 640	1	BY CLIENT	1	3.50

TOTAL ERECTION WEIGHT 4.49

TOTAL WEIGHT 4.49

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_DG-640_LSH-631

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	11,3				VISUAL 100% ALL WELDS			

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00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

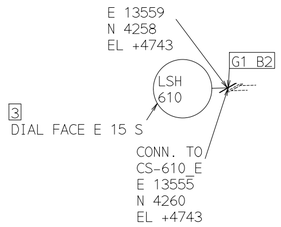
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 66

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
2	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.150 RF LSH 610	1	BY CLIENT	1	2.70

TOTAL ERECTION WEIGHT 3.38

TOTAL WEIGHT 3.38

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_CS-610_LSH-610

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,3	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

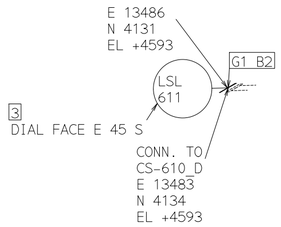
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 67

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
2	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.150 RF LSL 611	1	BY CLIENT	1	2.70

TOTAL ERECTION WEIGHT 3.38

TOTAL WEIGHT 3.38

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_CS-610_LSH-611

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,3	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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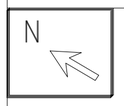
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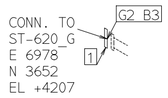
PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	68	1 / 1	C.B.

File Name:





ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
1	FLANGE BLIND ASME B16.5, CL300 RF ASTM A182 Gr.F316/316L	3/4	FLB0SS00503Q00	1	1.60
	GASKETS				
2	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00563Q00	1	0.07
	BOLTS				
3	75 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029240300	4	0.89

TOTAL ERECTION WEIGHT 2.56

TOTAL WEIGHT 2.56

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_ST-620_DRAIN

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-625	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	30,9					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

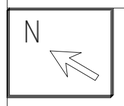
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

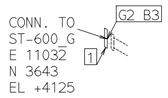
ISO Nr. 69

SHEET - OF 1 / 1

COMP. C.B.

File Name:





ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
1	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F316/316L	3/4	FLB0SS00483Q00	1	1.30
	GASKETS				
2	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00383Q00	1	0.05
	BOLTS				
3	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.59

TOTAL ERECTION WEIGHT 1.94

TOTAL WEIGHT 1.94

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_ST-600_DRAIN

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-602	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

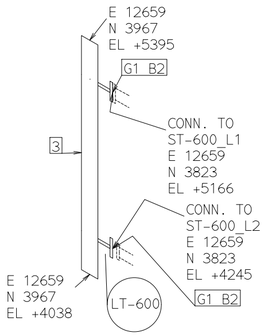
CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 70

SHEET - OF 1 / 1

COMP. C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1/2	GENEGK00370H00	2	0.06
	BOLTS				
2	60 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B047640200	8	1.13
	INSTRUMENTS				
3	LEVEL TRANSMITTER RADAR TYPE, ENDRESS HAUSER FMP51, WITH CHAMBER Cl.150 LT-600	1/2	BY CLIENT	1	22.50

TOTAL ERECTION WEIGHT 23.69

TOTAL WEIGHT 23.69

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_ST-600_LT-600

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	22,88		SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-602	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	11					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

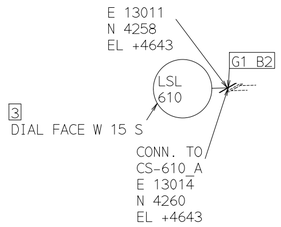
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-005	224J10-DDL-PP-DI-00003		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00023	71	1 / 1	C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
2	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.150 RF LSL 610	1	BY CLIENT	1	2.70

TOTAL ERECTION WEIGHT 3.38

TOTAL WEIGHT 3.38

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_CS-610_LSL-610

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	8,3	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-005

FORES DOC. Nr.: 224J10-DDL-PP-DI-00003

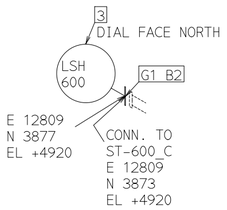
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00023

ISO Nr.: 72

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
1	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	1	0.06
	BOLTS				
2	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	4	0.62
	INSTRUMENTS				
3	LEVEL SWITCH, ENDRESS+HAUSER LIQUIPHANT FTL51B, Cl.150 RF LSH 600	1	BY CLIENT	1	2.70

TOTAL ERECTION WEIGHT 3.38

TOTAL WEIGHT 3.38

WELD NO	SHOP /FLD	NOTES (IF ANY)
		TRIM-LINE_ST-600_LSH-600

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.45	THICKNESS (mm):	TEST PRESS. (barg) :	N.A.	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-602	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	11				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr. C0063-FOR-DTB-MP-005

FORES DOC. Nr. 224J10-DDL-PP-DI-00003

CROSSWIND DOC. Nr. FORES-INN-BPH-DWG-00023

ISO Nr. 73

SHEET - OF 1 / 1

COMP. C.B.

File Name:

ISOMETRICS BOOKLET WP4
(incl. heat tracing)

AS-BUILT

DATE 21/03/2025 | SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DATE	DESCRIPTION
-0A	04/11/2024	INTERNAL ISSUE
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006

FORES DOC. Nr.: 224J10-DDL-PP-DI-00004

CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024

ISO Nr.: A

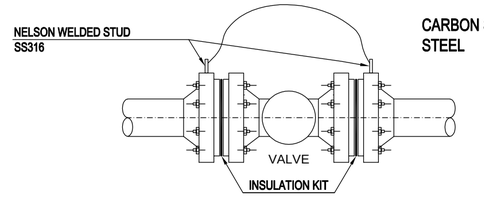
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COMP.: C.B.

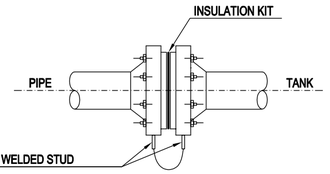
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SHEET	REVISIONS						DESCRIPTION
	00	-0A	02	03	04	05	
A	25.09.24	04.11.24					COVER SHEET
B	25.09.24	04.11.24					INDEX & REVISIONS
1	25.09.24						209-150-CW-PA20W_E01
2	25.09.24						210-150-CW-PA20W_E01
3	25.09.24						408-80-CW-PA20W_E01
4	25.09.24						410-50-CW-PA20W_E01
5	25.09.24	04.11.24					411-50-CW-PA20W_E01
6	25.09.24						426-80-CW-PA20W_E01

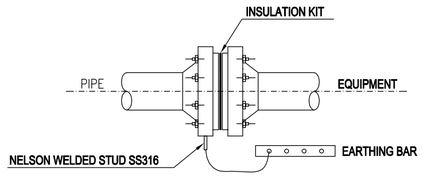
TYPICAL EARTHING DETAILS



CARBON STEEL / STAINLESS STEEL



CARBON STEEL / STAINLESS STEEL
TANK



CARBON STEEL / STAINLESS STEEL
GENERAL EQUIPMENT

FLANGED JOINTS IN METALLIC PIPELINES THAT HAVE NEITHER INSULATION KIT NOR PTFE GASKET ARE CONSIDERED INHERENTLY CONTINUOUS.

NOTES:

- ALL DIMENSIONS MUST BE VERIFIED DURING CONSTRUCTION;
- ALL VALVE DIMENSIONS MUST BE CHECKED ON SITE BEFORE ASSEMBLY;
- ALL THE WELDED COMPONENTS WILL BE CHECKED ON SITE BEFORE THE ASSEMBLY;
- VALVE HANDWHEEL ORIENTATION TO BE CHECKED AND DEFINED DURING ERECTION PHASE BY CONSTRUCTION COMPANY.

REV.	DATE	DESCRIPTION
-0A	04/11/2024	INTERNAL ISSUE
00	25/09/2024	ISSUE FOR REVIEW

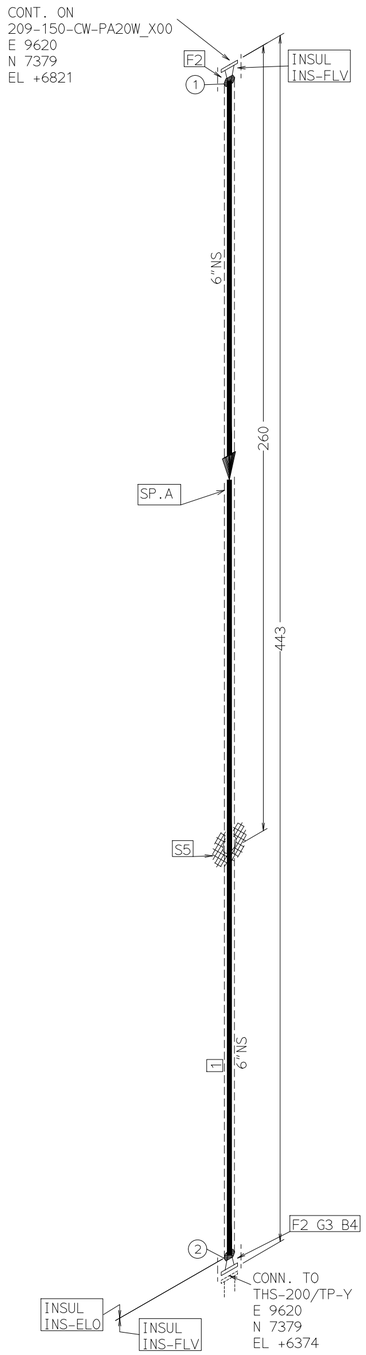
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-006		224J10-DDL-PP-DI-00004	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00024	B	-	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.3M	7.38
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLWOSS07590600	2	21.60
			TOTAL FABRICATION WEIGHT		28.98

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
	BOLTS				
4	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-300/168/60/F3, AS PER DRAWING S1606157	6	2MCTZFR-6a	1	7.30
			TOTAL ERECTION WEIGHT		11.21
			TOTAL WEIGHT		40.19

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

209-150-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

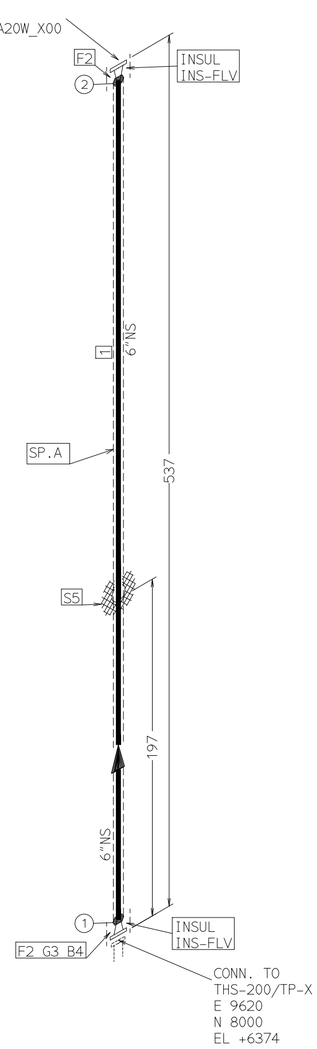
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-006		224J10-DDL-PP-DI-00004	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00024	01	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.4M	10.06
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLWOSS07590600	2	21.60
			TOTAL FABRICATION WEIGHT		31.66

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
	BOLTS				
4	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SEAL H1-300/168/60/F3, AS PER DRAWING S1606157	6	2MCTZFR-6a	1	7.30
			TOTAL ERECTION WEIGHT		11.21
			TOTAL WEIGHT		42.87

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

210-150-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006

FORES DOC. Nr.: 224J10-DDL-PP-DI-00004

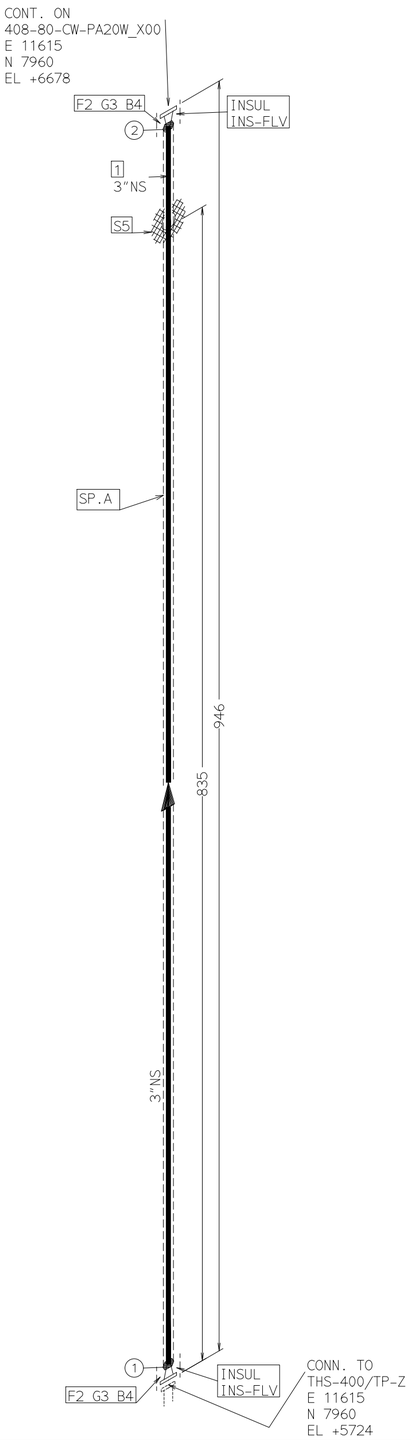
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024

ISO Nr.: 02

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	0.8M	9.02
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		18.02

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
4	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 WOC 67.5-99	3	2MCTZFR-3	1	6.20
			TOTAL ERECTION WEIGHT		8.48
			TOTAL WEIGHT		26.50

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

408-80-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

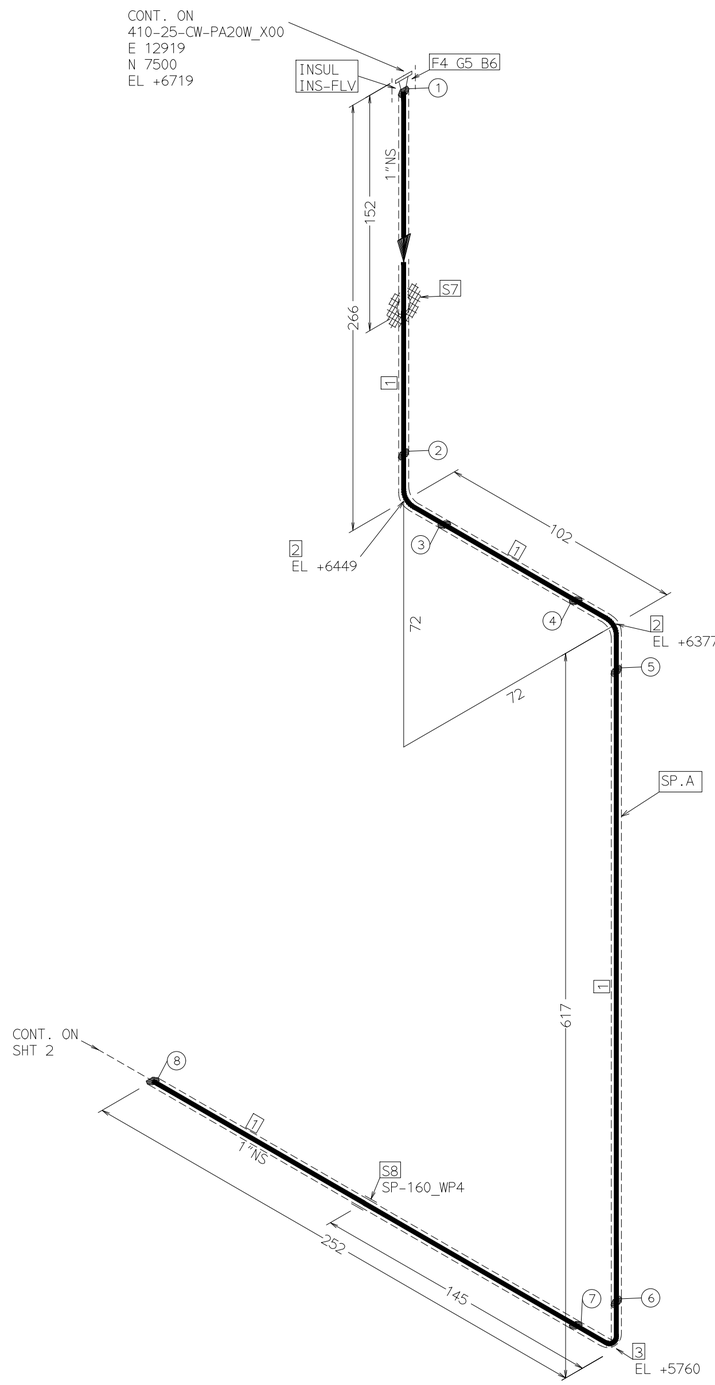
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-006		224J10-DDL-PP-DI-00004	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00024	03	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	1.0M	2.50
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E45RSS01640100	2	0.14
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	1	0.15
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	1	1.10
			TOTAL FABRICATION WEIGHT		3.89

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
	SUPPORTS				
7	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
8	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		8.48
			TOTAL WEIGHT		12.37

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

410-25-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

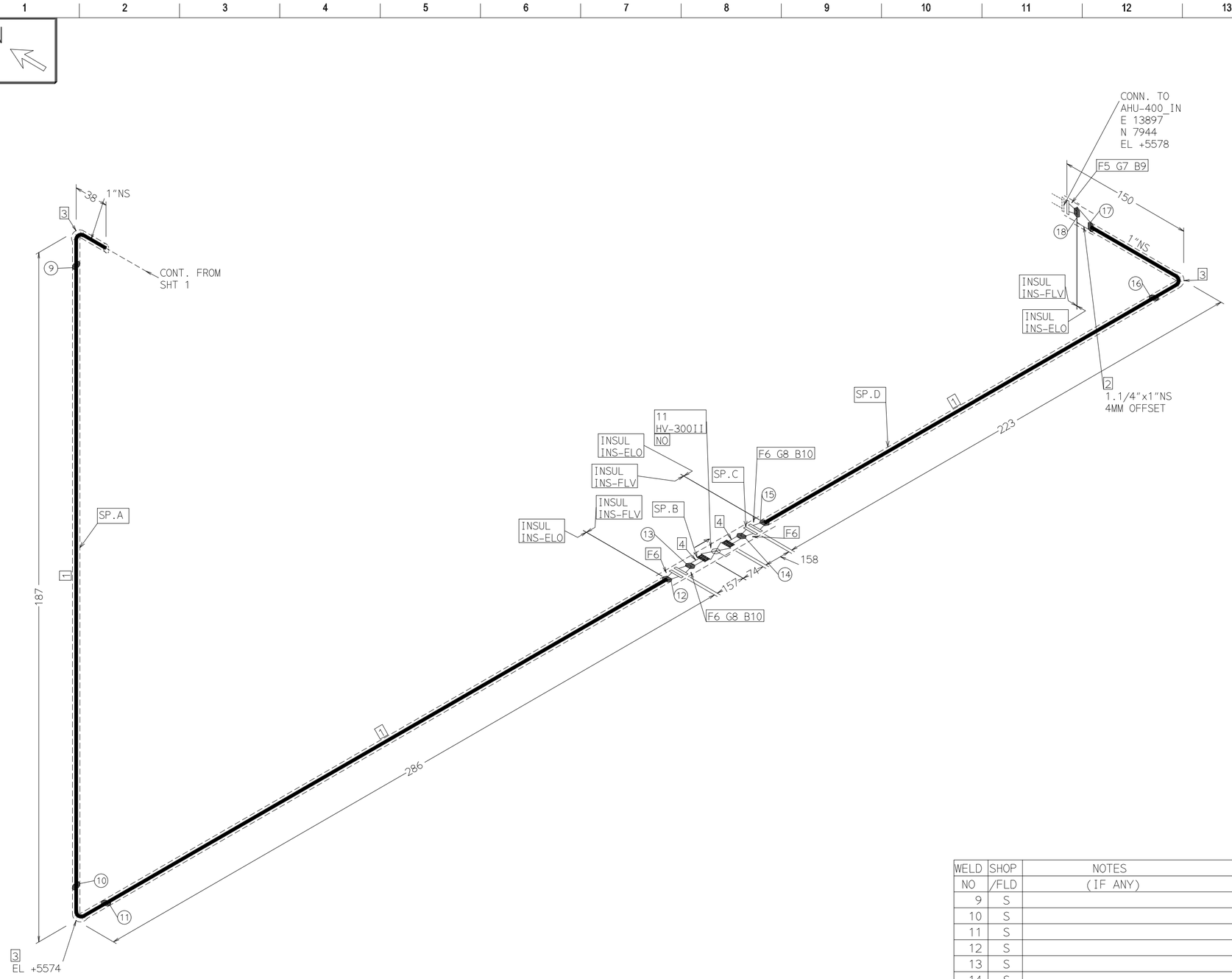
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006
FORES DOC. Nr.: 224J10-DDL-PP-DI-00004
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024
ISO Nr.: 04
SHEET - OF: 1 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.5M	1.08
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/4 x 1	REE0SS0986UQ01	1	0.17
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	3	0.45
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 304/304L	1	N100SS02750100	2	0.64
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/4	FLW0SS0757UQ00	1	1.40
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	4	4.40
			TOTAL FABRICATION WEIGHT		8.14

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0064UQ00	1	0.07
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	2	0.12
	BOLTS				
9	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
10	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.24
	VALVES / IN-LINE ITEMS				
11	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1	BY CLIENT	1	0.57
			TOTAL ERECTION WEIGHT		2.65
			TOTAL WEIGHT		10.79

SPOOL NUMBERS:
SP.A SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	

410-25-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

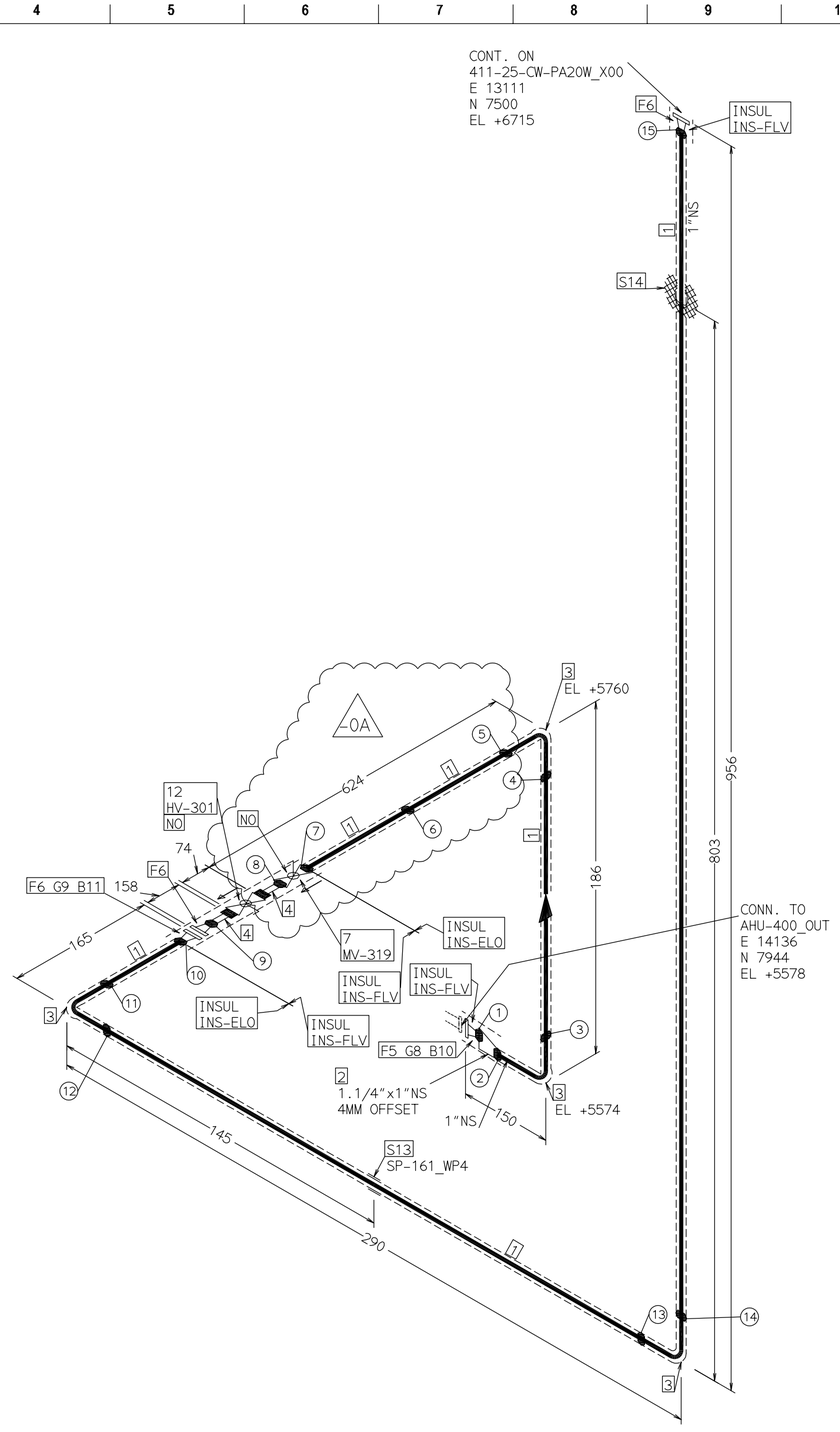
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006
FORES DOC. Nr.: 224J10-DDL-PP-DI-00004
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024
ISO Nr.: 04
SHEET - OF: 2 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

	PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
		PIPE				
-0A	1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	1.5M	3.72
		FITTINGS				
	2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/4 x 1	REE0SS0986UQ01	1	0.17
	3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	4	0.60
	4	NIPPLE POE/TOE BSPP 100mmMM LONG, SCH.40S ASTM A312 Gr.TP 304/304L	1	N100SS02750100	2	0.64
		FLANGES				
	5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/4	FLW0SS0757UQ00	1	1.40
-0A	6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	3	3.30
		VALVES / IN-LINE ITEMS				
-0A	7	METERING VALVE, IMI TA-BVS 240/243, CL150 BW	1	BY CLIENT	1	1.00
				TOTAL FABRICATION WEIGHT		10.83

ERECTION MATERIALS

	PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
		GASKETS				
	8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0064UQ00	1	0.07
-0A	9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
		BOLTS				
	10	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
-0A	11	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
		VALVES / IN-LINE ITEMS				
	12	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1	BY CLIENT	1	0.57
		SUPPORTS				
	13	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40
	14	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
				TOTAL ERECTION WEIGHT		9.77
				TOTAL WEIGHT		20.60

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

411-25-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	Thk=25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0A	04/11/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006

FORES DOC. Nr.: 224J10-DDL-PP-DI-00004

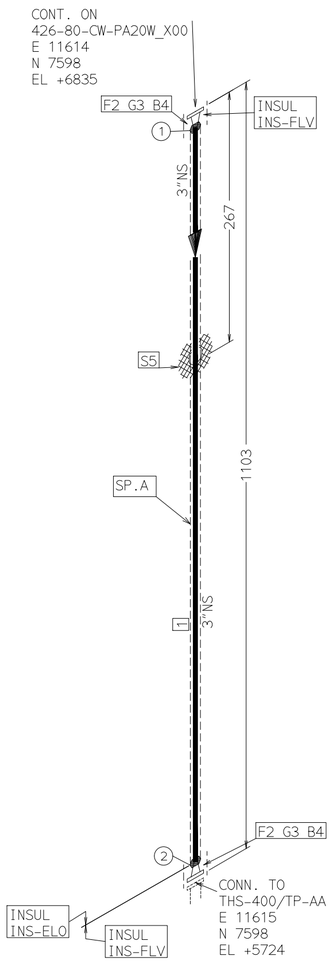
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024

ISO Nr.: 05

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	1.0M	10.78
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		19.78

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
4	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 WOC 67.5-99	3	2MCTZFR-3	1	6.20
			TOTAL ERECTION WEIGHT		8.48
			TOTAL WEIGHT		28.26

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

426-80-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1013	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	thk =25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006

FORES DOC. Nr.: 224J10-DDL-PP-DI-00004

CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024

ISO Nr.: 06

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:

ISOMETRIC BOOKLET INTERCONNECTION
(incl. heat tracing)

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.
C0063-FOR-DTB-MP-007

FORES DOC. Nr.
224J10-DDL-PP-DI-00005

CROSSWIND DOC. Nr.
FORES-INN-BPH-DWG-00025

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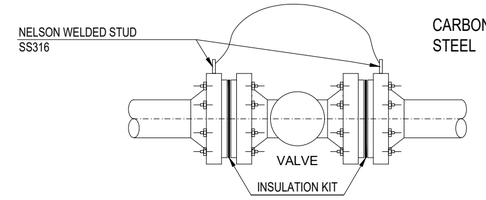
COMP.
C.B.

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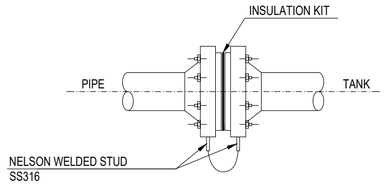
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B	25.09.24				INDEX & REVISIONS
01	25.09.24				200-150-CW-PA20W_X00
02	25.09.24				201-150-CW-PA20W_X00
03	25.09.24				202-80-CW-PA20W_X00
04	25.09.24				203-80-CW-PA20W_X00
05	25.09.24				204-150-CW-PA20W_X00
06	25.09.24				205-100-CW-PA20W_X00
07	25.09.24				206-100-CW-PA20W_X00
08	25.09.24				207-100-CW-PA20W_X00
09	25.09.24				208-100-CW-PA20W_X00
10	25.09.24				209-150-CW-PA20W_X00
11	25.09.24				210-150-CW-PA20W_X00
12	25.09.24				211-80-CW-PA20W_X00
13	25.09.24				212-80-CW-PA20W_X00
14	25.09.24				231-50-CW-PA20W_X00
15	25.09.24				232-50-CW-PA20W_X00
16	25.09.24				235-50-CW-PA20W_X00
17	25.09.24				236-50-CW-PA20W_X00
18	25.09.24				300-15-RW-PA22S_X00
19	25.09.24				306-25-PW-PA22S_X00
20	25.09.24				307-25-PW-PB22S_X00
21	25.09.24				400-50-CW-PA20W_X00
22	25.09.24				401-50-CW-PA20W_X00
23	25.09.24				402-80-CW-PA20W_X00
24	25.09.24				407-40-CW-PA20W_X00
25	25.09.24				408-80-CW-PA20W_X00
26	25.09.24				409-80-CW-PA20W_X00
27	25.09.24				410-25-CW-PA20W_X00
28	25.09.24				411-25-CW-PA20W_X00
29	25.09.24				412-25-CW-PA20W_X00
30	25.09.24				413-50-CW-PA20W_X00
31	25.09.24				414-20-CW-PA20W_X00
32	25.09.24				415-20-CW-PA20W_X00
33	25.09.24				416-20-CW-PA20W_X00
34	25.09.24				417-20-CW-PA20W_X00
35	25.09.24				418-20-CW-PA20W_X00
36	25.09.24				419-20-CW-PA20W_X00

ISO Nr.	REVISIONS 00	01	02	03	DESCRIPTION
37	25.09.24				420-20-CW-PA20W_X00
38	25.09.24				421-20-CW-PA20W_X00
39	25.09.24				422-40-CW-PA20W_X00
40	25.09.24				426-80-CW-PA20W_X00
41	25.09.24				427-50-CW-PA20W_X00
42	25.09.24				428-50-CW-PA20W_X00
43	25.09.24				429-50-CW-PA20W_X00
44	25.09.24				430-50-CW-PA20W_X00
45	25.09.24				431-25-CW-PA20W_X00
46	25.09.24				509-50-RW-PA22S_X00
47	25.09.24				619-80-02-PA22S_X00
48	25.09.24				620A-100-PWH2-PB22S_X00
49	25.09.24				625-150-PWH2-PB22S_X00
50	25.09.24				638-25-H2-PB22S_X00
51	25.09.24				640-25-PWH2-PB22S_X00
52	25.09.24				801-25-H2-PB22S_X00
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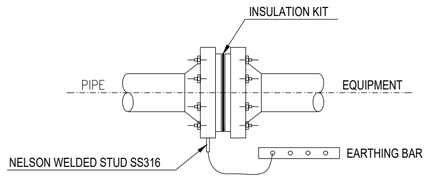
TYPICAL EARTHING DETAILS



CARBON STEEL / STAINLESS STEEL



CARBON STEEL / STAINLESS STEEL
TANK



CARBON STEEL / STAINLESS STEEL
GENERAL EQUIPMENT

FLANGED JOINTS IN METALLIC PIPELINES THAT HAVE NEITHER INSULATION KIT NOR PTFE GASKET ARE CONSIDERED INHERENTLY CONTINUOUS.

NOTES:

- ALL DIMENSIONS MUST BE VERIFIED DURING CONSTRUCTION;
- ALL VALVE DIMENSIONS MUST BE CHECKED ON SITE BEFORE ASSEMBLY;
- ALL THE WELDED COMPONENTS WILL BE CHECKED ON SITE BEFORE THE ASSEMBLY;
- VALVE HANDWHEEL ORIENTATION TO BE CHECKED AND DEFINED DURING ERECTION PHASE BY CONSTRUCTION COMPANY.

REV.	DATE	DESCRIPTION
00	25/09/2024	ISSUE FOR REVIEW

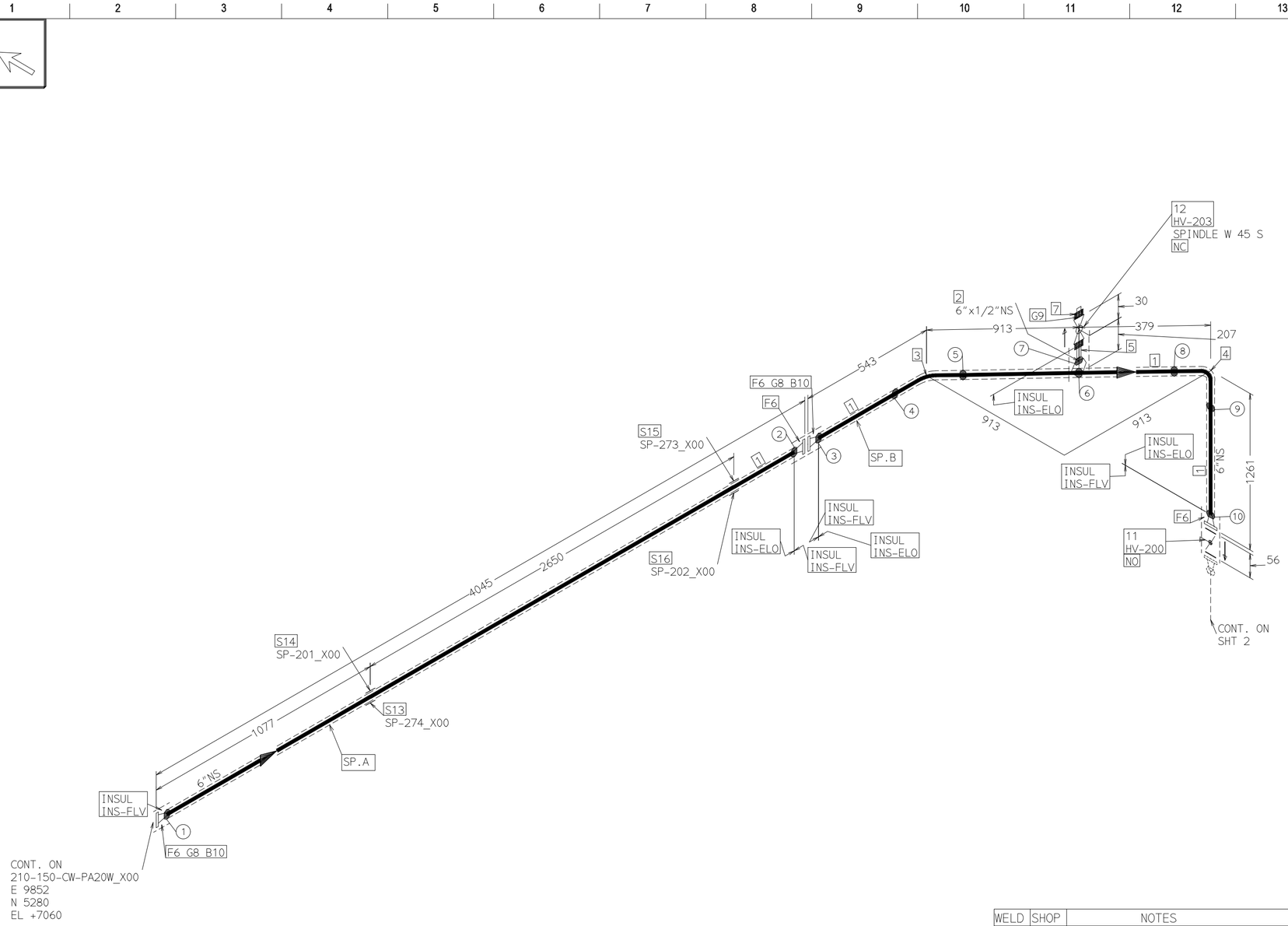
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	B	-	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	6.2M	173.09
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	1	10.20
5	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLWOSS07590600	4	43.20
			TOTAL FABRICATION WEIGHT		231.85

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	2	0.40
9	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
10	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	16	7.42
	VALVES / IN-LINE ITEMS				
11	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O. ASTM A351 Gr.CF3/CF8	6	BY CLIENT	1	10.20
12	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	SUPPORTS				
13	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-2mm, Carbon Steel	6	SUPPORT	1	1.10
14	PIPE SHOE, S-64-DN150-110-350, Carbon Steel	6	SUPPORT	1	14.50
15	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	6	SUPPORT	1	3.40
16	PIPE SHOE, S-64-DN150-110-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		51.88
			TOTAL WEIGHT		283.73

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

200-150-CW-PA20W_X00

SPOOL NUMBERS:
SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING : HR-201	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	2,6				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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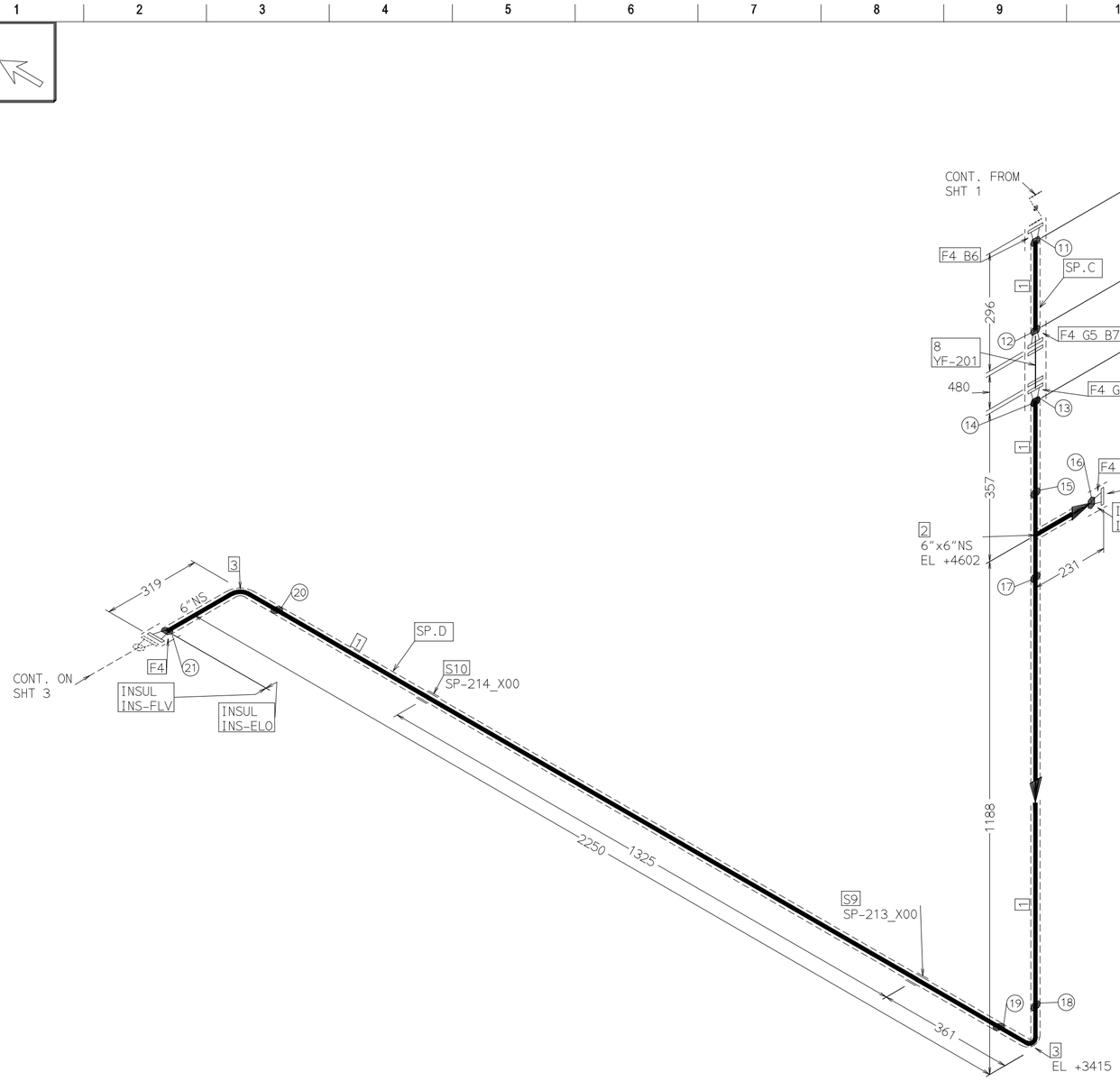
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 01
SHEET - OF: 1 / 3
COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	

200-150-CW-PA20W_X00

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	2.9M	80.57
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 6	TEE0SS02450600	1	16.50
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	2	20.40
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	5	54.00
			TOTAL FABRICATION WEIGHT		171.47

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	3	0.60
	BOLTS				
6	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	5.03
7	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	24	11.14
	VALVES / IN-LINE ITEMS				
8	Y-STRAINER, ADTS TYPE 240, PN16 RF ASTM A351 Gr.CF8M	6	BY CLIENT	1	45.10
	SUPPORTS				
9	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
10	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		90.87
			TOTAL WEIGHT		262.34

SPOOL NUMBERS:
SP.C SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING : HR-201	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	2,6				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
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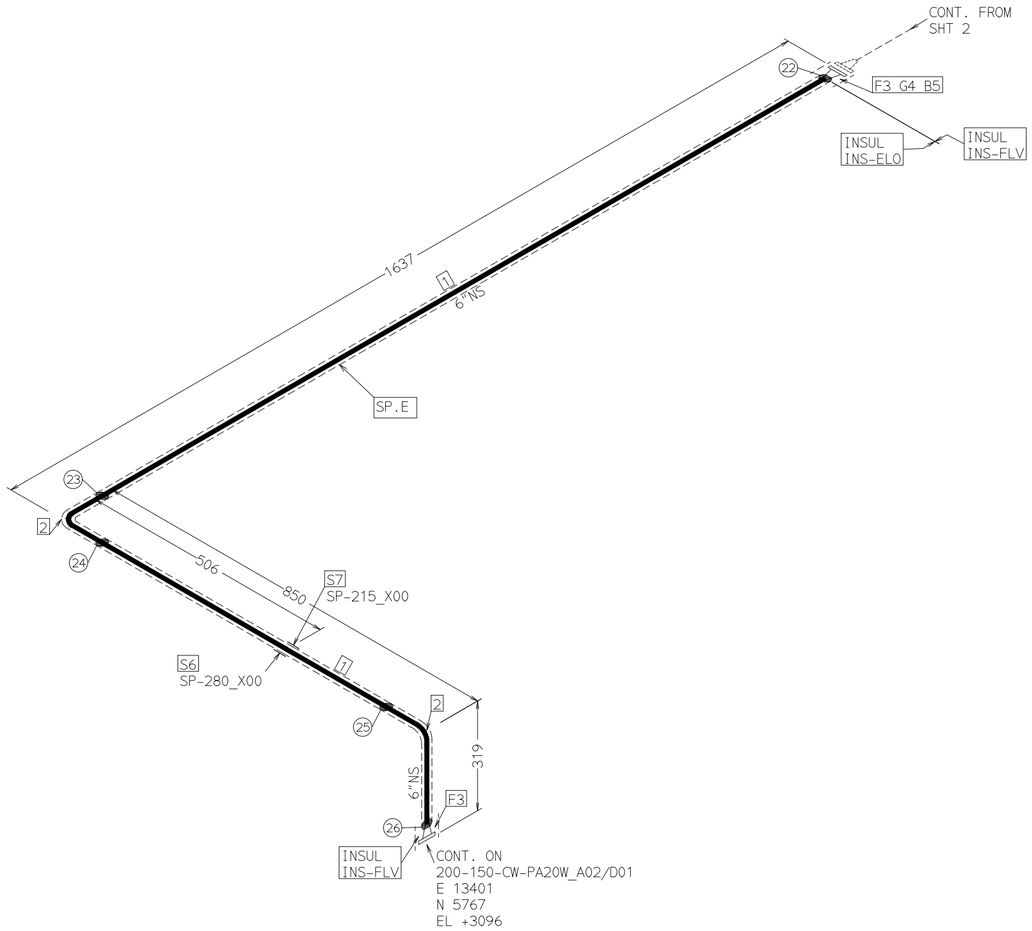
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 01
SHEET - OF: 2 / 3
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	1.8M	48.41
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	2	20.40
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLWOSS07590600	2	21.60
			TOTAL FABRICATION WEIGHT		90.41

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
	BOLTS				
5	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
	SUPPORTS				
6	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	6	SUPPORT	1	3.40
7	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		21.81
			TOTAL WEIGHT		112.22

SPOOL NUMBERS:
SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
22	S	
23	S	
24	S	
25	S	
26	S	

200-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING : HR-201	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	2,6				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
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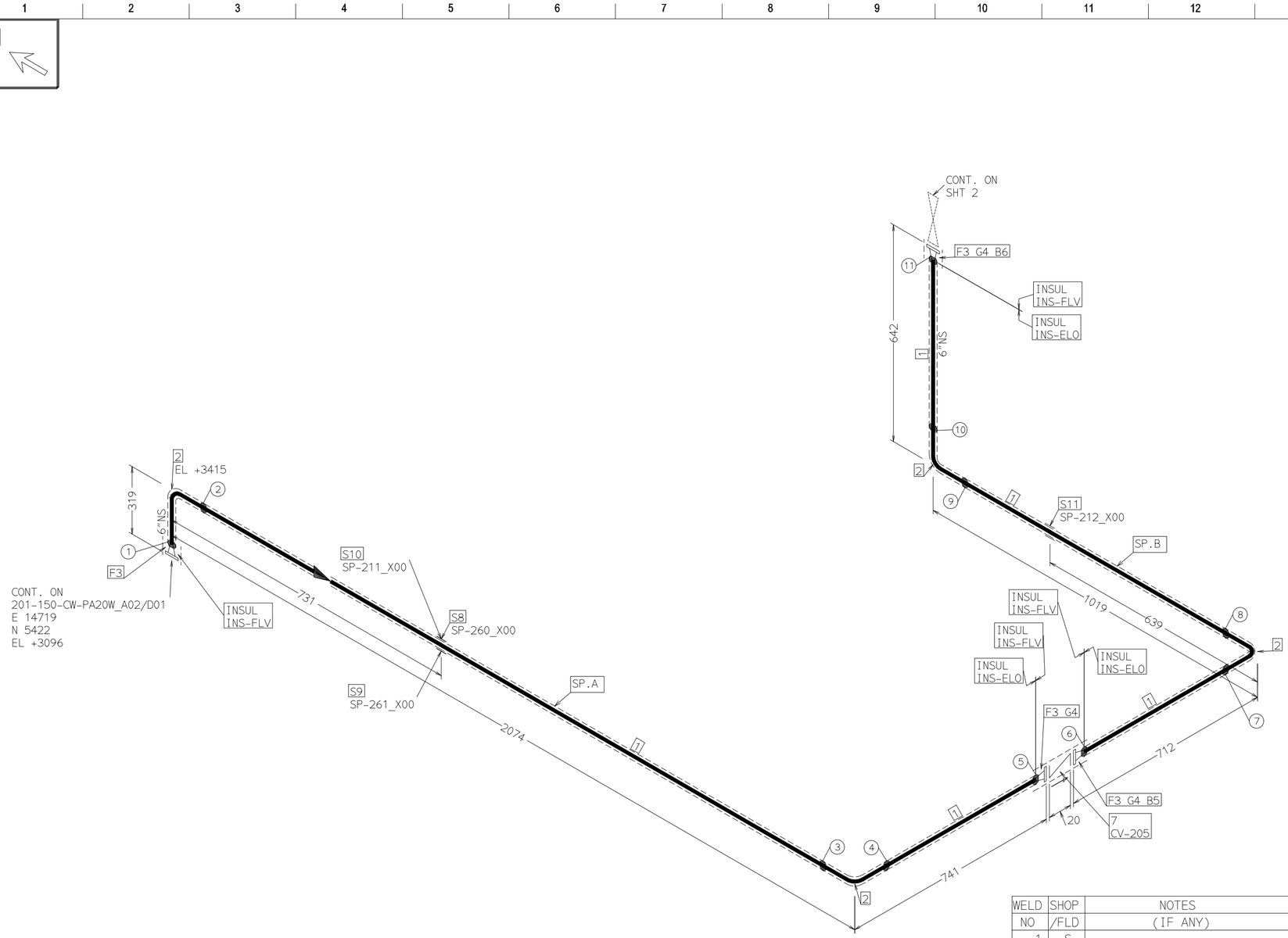
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	01	3 / 3	C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

201-150-CW-PA20W_X00

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	3.4M	93.29
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	4	40.80
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLWOSS07590600	4	43.20
			TOTAL FABRICATION WEIGHT		177.29

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	3	0.60
	BOLTS				
5	130 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	4.26
6	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
	VALVES / IN-LINE ITEMS				
7	SWING CHECK VALVE, ADTS REF.351, WAFER TYPE, PN16 ASTM A351 Gr.CF3/CF8	6	BY CLIENT	1	4.70
	SUPPORTS				
8	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	6	SUPPORT	1	3.40
9	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-2mm, Carbon Steel	6	SUPPORT	1	1.10
10	PIPE SHOE, S-64-DN150-100-350, Carbon Steel	6	SUPPORT	1	14.50
11	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		46.77
			TOTAL WEIGHT		224.06

SPOOL NUMBERS:

SP.A SP.B

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

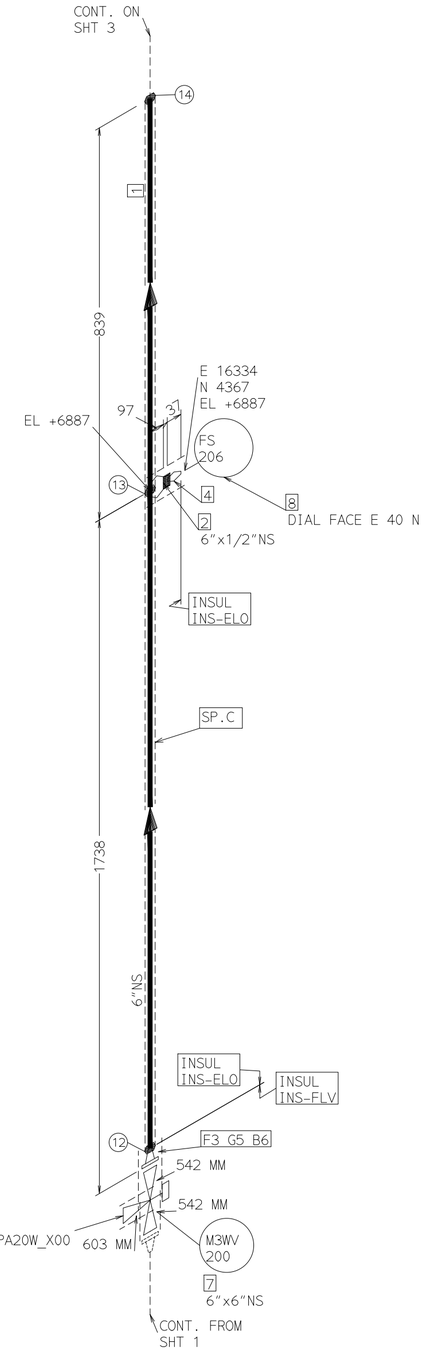
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	02	1 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	2.5M	70.34
	FITTINGS				
2	THREDOLET MSS SP-97, Cl.3000, BSPP ASTM A182 Gr.F304/304L	6 x 1/2	OTHESS03950630	1	0.13
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLWOSS07590600	1	10.80
			TOTAL FABRICATION WEIGHT		81.27

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
4	HEXAGONAL ADAPTOR, M18 x 1.5 PITCH to 1/2" BSPPM ASTM A182 Gr.F304/304L	1/2	2STRUACCESS	1	0.10
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
	BOLTS				
6	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
	INSTRUMENTS				
7	3-WAY VALVE, PAUMIER WITH ACTUATOR db 343, FLANGED ASME B16.5, CL150 RF M3WV 200	6 x 6	BY CLIENT	1	110.00
8	FLOW SENSOR, SAD10XDBFRKG/US-100 FS 206	1/2	BY CLIENT	1	1.00
			TOTAL ERECTION WEIGHT		115.01
			TOTAL WEIGHT		196.28

SPOOL NUMBERS:
SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
12	S	
13	S	
14	S	

201-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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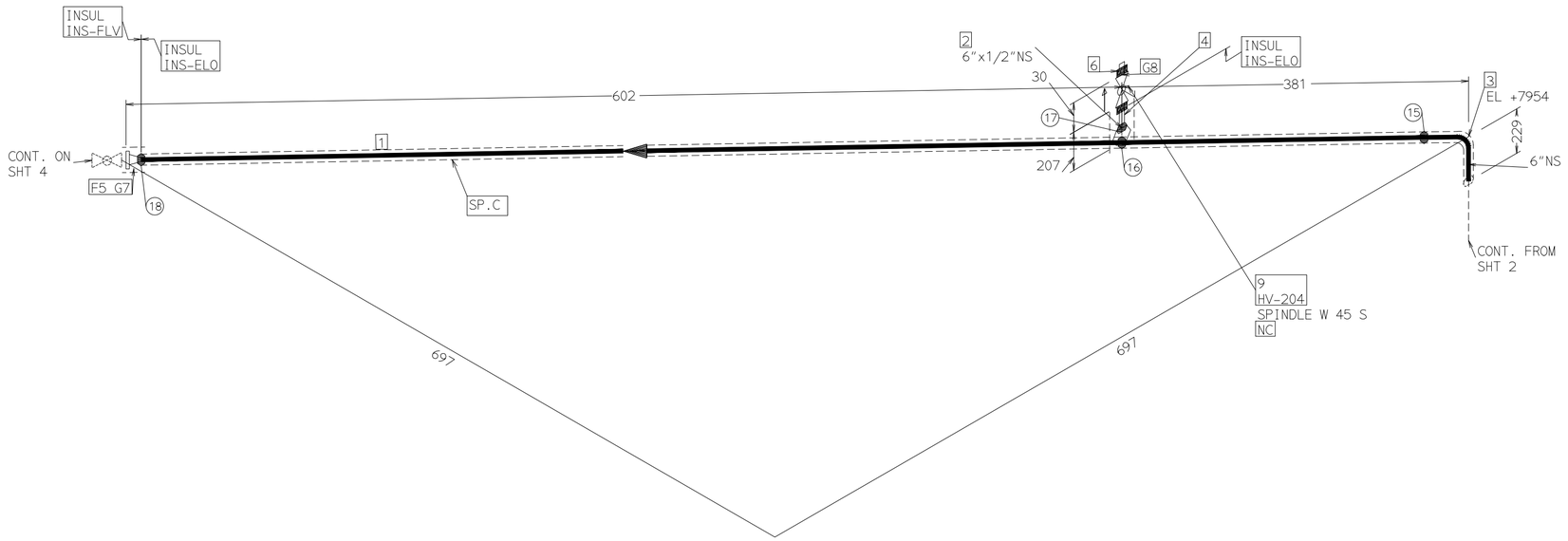
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	02	2 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.7M	18.79
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	1	10.20
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	1	10.80
			TOTAL FABRICATION WEIGHT		40.05

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
6	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
8	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	VALVES / IN-LINE ITEMS				
9	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
			TOTAL ERECTION WEIGHT		0.56
			TOTAL WEIGHT		40.61

SPOOL NUMBERS:
SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
15	S	
16	S	
17	S	
18	S	

201-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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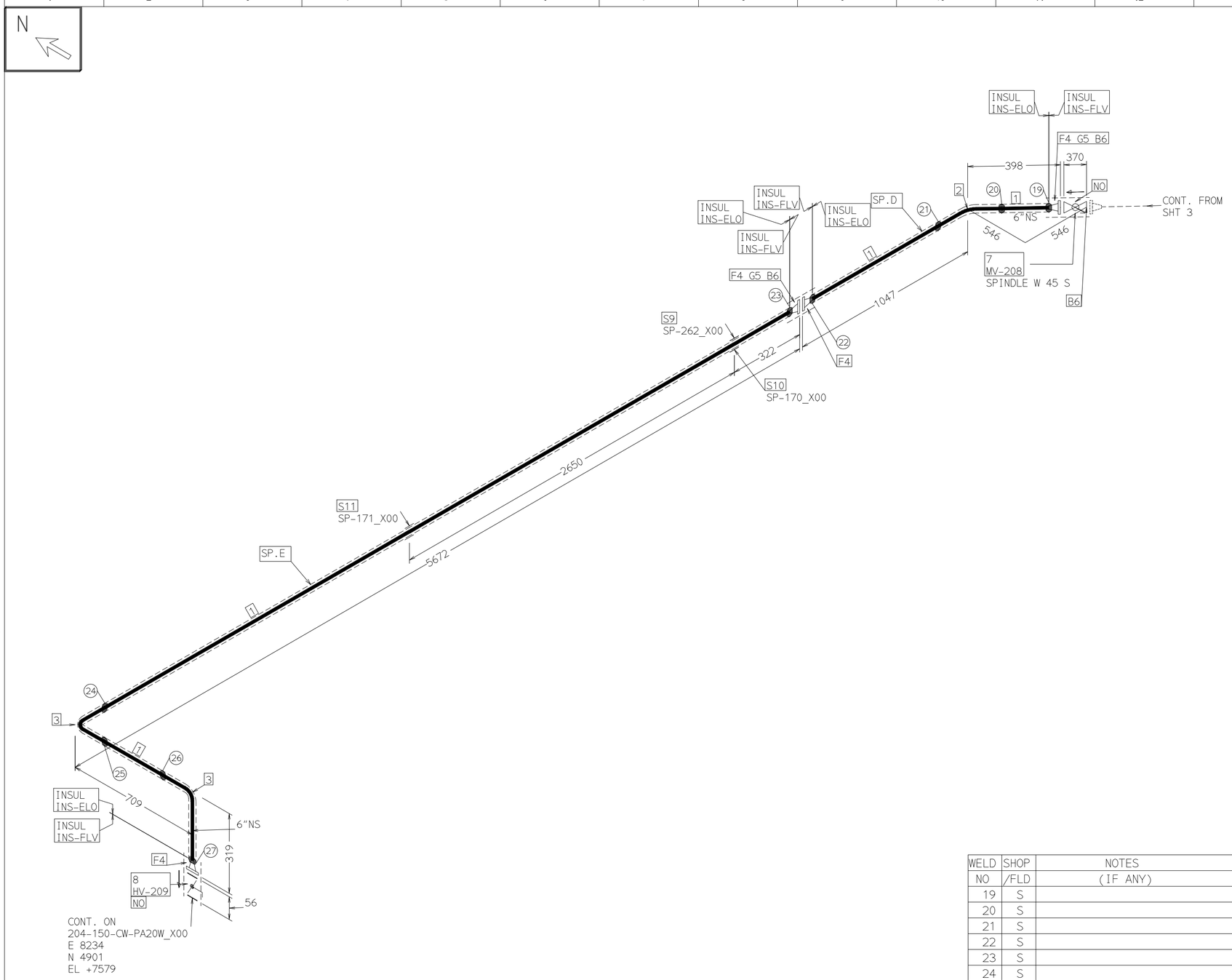
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 02
SHEET - OF: 3 / 4
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	6.7M	188.89
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	2	20.40
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	4	43.20
			TOTAL FABRICATION WEIGHT		257.59

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	2	0.40
	BOLTS				
6	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	24	11.14
	VALVES / IN-LINE ITEMS				
7	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	6	BY CLIENT	1	30.00
8	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O. ASTM A351 Gr.CF3/CF8	6	BY CLIENT	1	10.20
	SUPPORTS				
9	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	6	SUPPORT	1	3.40
10	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
11	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		84.14
			TOTAL WEIGHT		341.73

SPOOL NUMBERS:

SP.D SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	

201-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-004/010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	DN<100 thk=25, DN>80 thk=40	FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

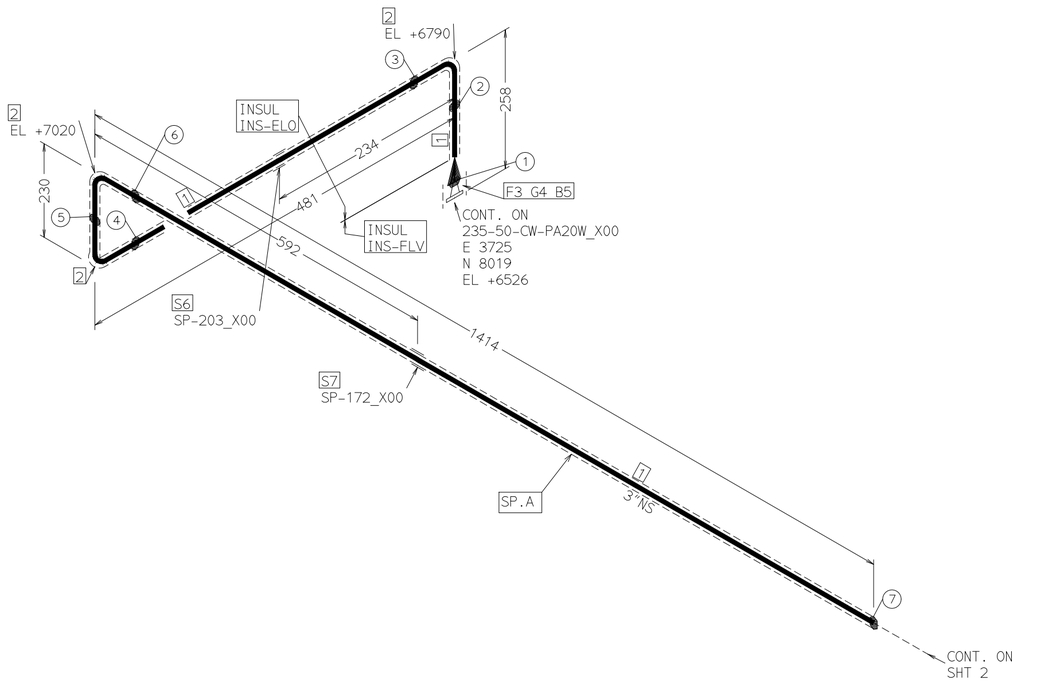
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	02	4 / 4	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	1.7M	18.26
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	3	6.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
			TOTAL FABRICATION WEIGHT		28.76

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
5	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	SUPPORTS				
6	PIPE SHOE, S-64-DN80-100-200, Carbon Steel	3	SUPPORT	1	5.30
7	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		11.74
			TOTAL WEIGHT		40.50

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

202-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

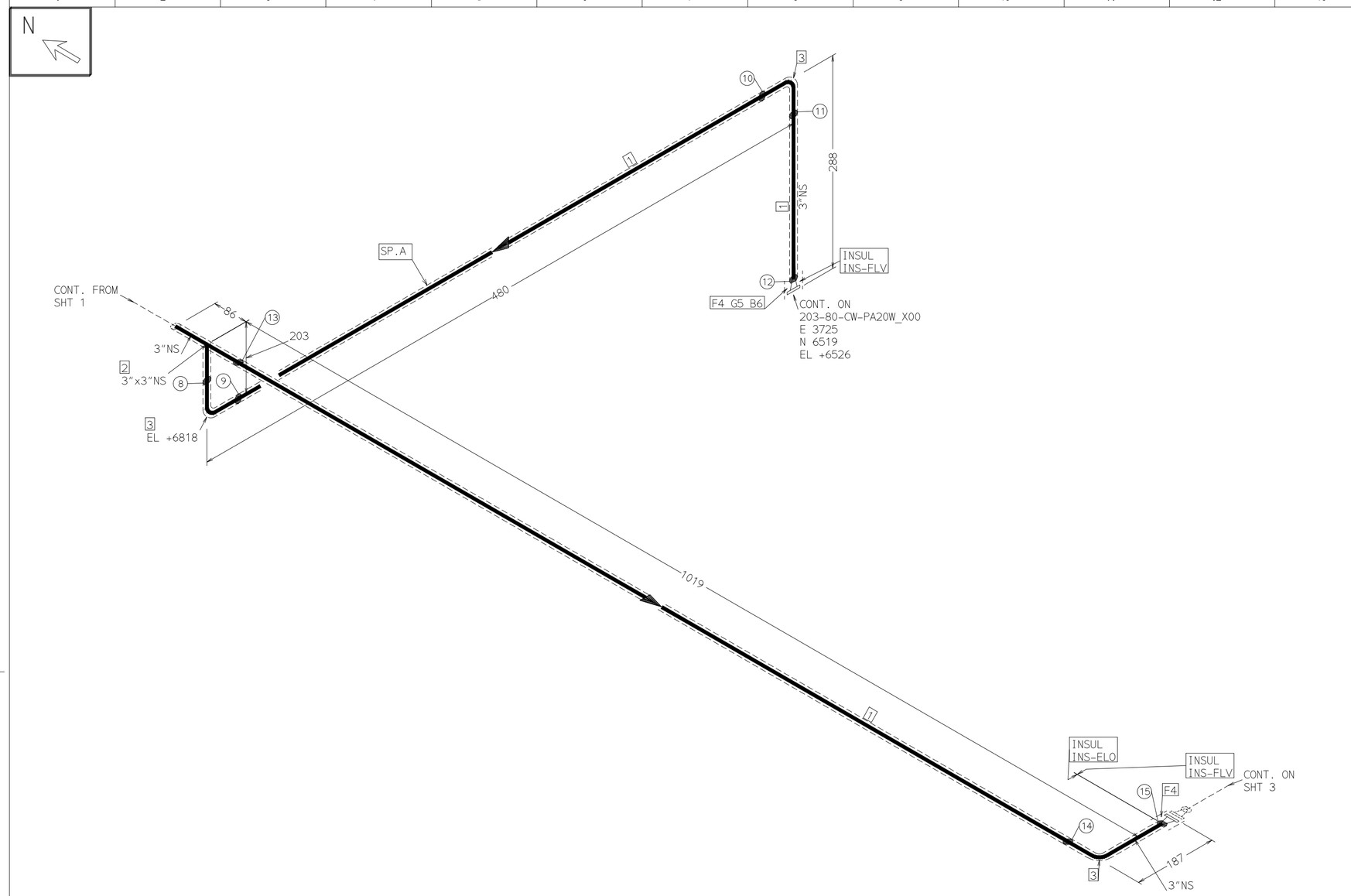
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	03	1 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	1.2M	13.24
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 3	TEE0SS02330300	1	3.80
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	3	6.00
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		32.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
			TOTAL ERECTION WEIGHT		1.14
			TOTAL WEIGHT		33.18

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

202-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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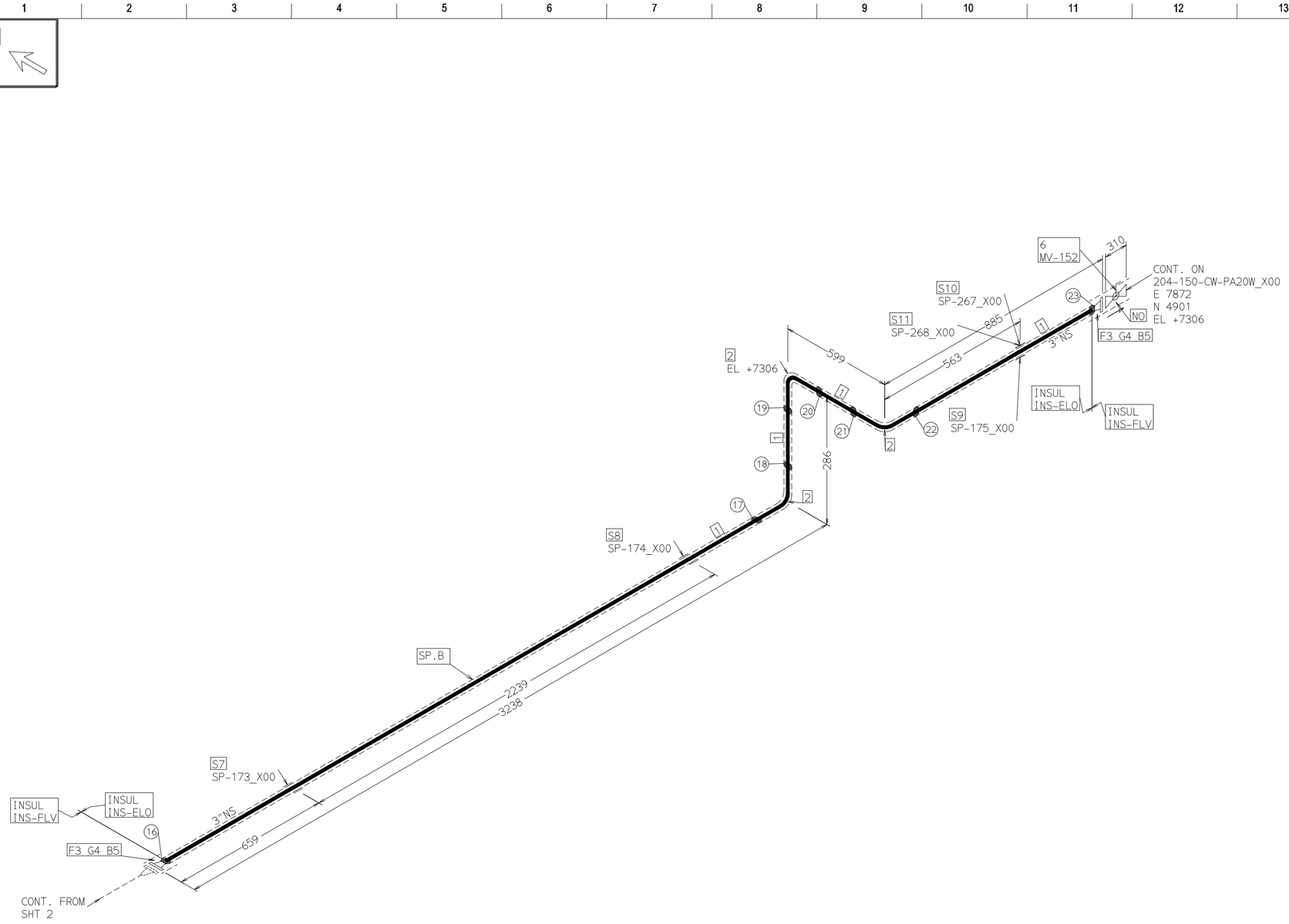
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	03	2 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	4.2M	47.16
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	3	6.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		62.16

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
5	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	VALVES / IN-LINE ITEMS				
6	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	3	BY CLIENT	1	12.00
	SUPPORTS				
7	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
8	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
9	PIPE SHOE, S-64-DN80-110-350, Carbon Steel	3	SUPPORT	1	5.30
10	BOLTED AXIAL STOP FOR SHOE, C-37-3-A-2mm, Carbon Steel	3	SUPPORT	1	1.00
11	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	3	SUPPORT	1	3.40
			TOTAL ERECTION WEIGHT		34.58
			TOTAL WEIGHT		96.74

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	

202-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD; FIELD WELD; SOCKET WELD; SCREWED JOINT; COMPR.N JOINT; SITE CONNECTION; PIPE SUPPORT / ATTACHMENT; PIPE INSULATION; PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
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PROJECT:

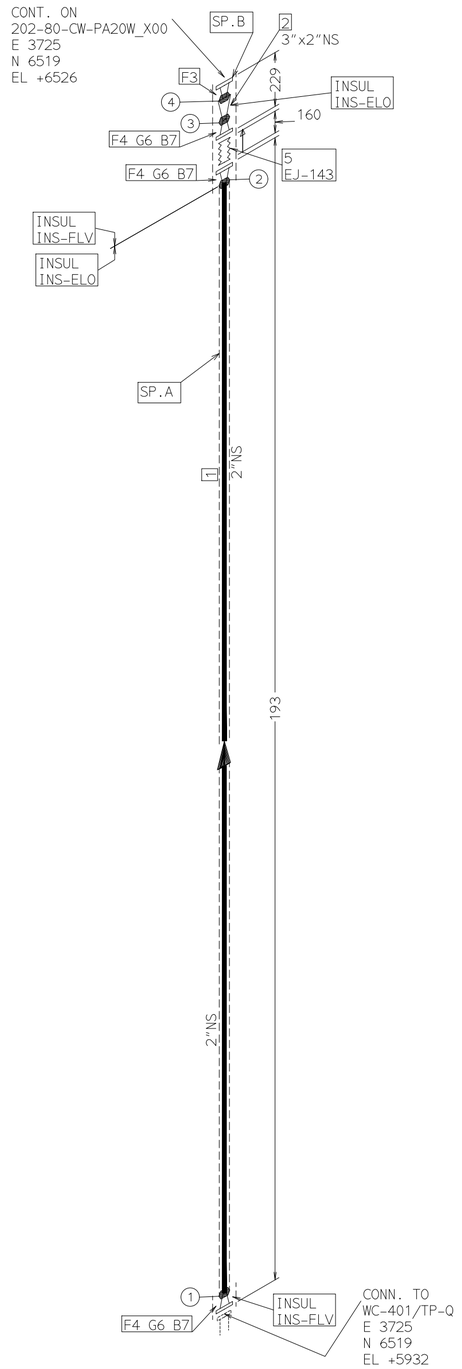
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	03	3 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.1M	0.33
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		13.93

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
5	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
7	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		22.59

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

203-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

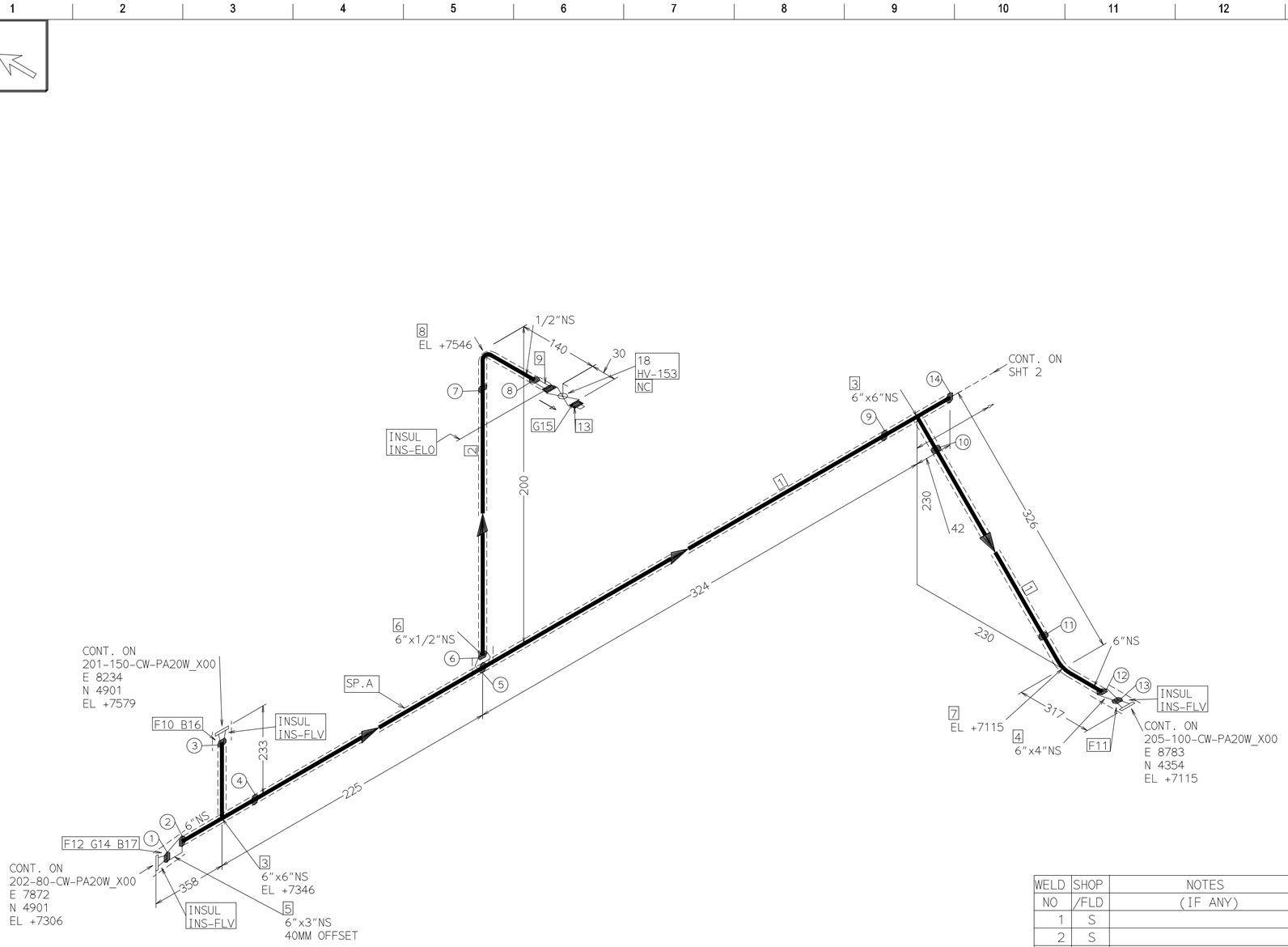
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	04	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.4M	9.69
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.1M	0.09
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 6	TEE0SS02450600	2	33.00
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 4	REC0SS10440604	1	3.90
5	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 3	REE0SS10040603	1	3.90
6	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	1	0.10
7	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
8	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
9	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
10	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	1	10.80
11	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00
12	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	1	4.50

TOTAL FABRICATION WEIGHT 78.42

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
13	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
14	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
15	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
16	165 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	5.03
17	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	VALVES / IN-LINE ITEMS				
18	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28

TOTAL ERECTION WEIGHT 6.53

TOTAL WEIGHT 84.95

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

204-150-CW-PA20W_X00

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

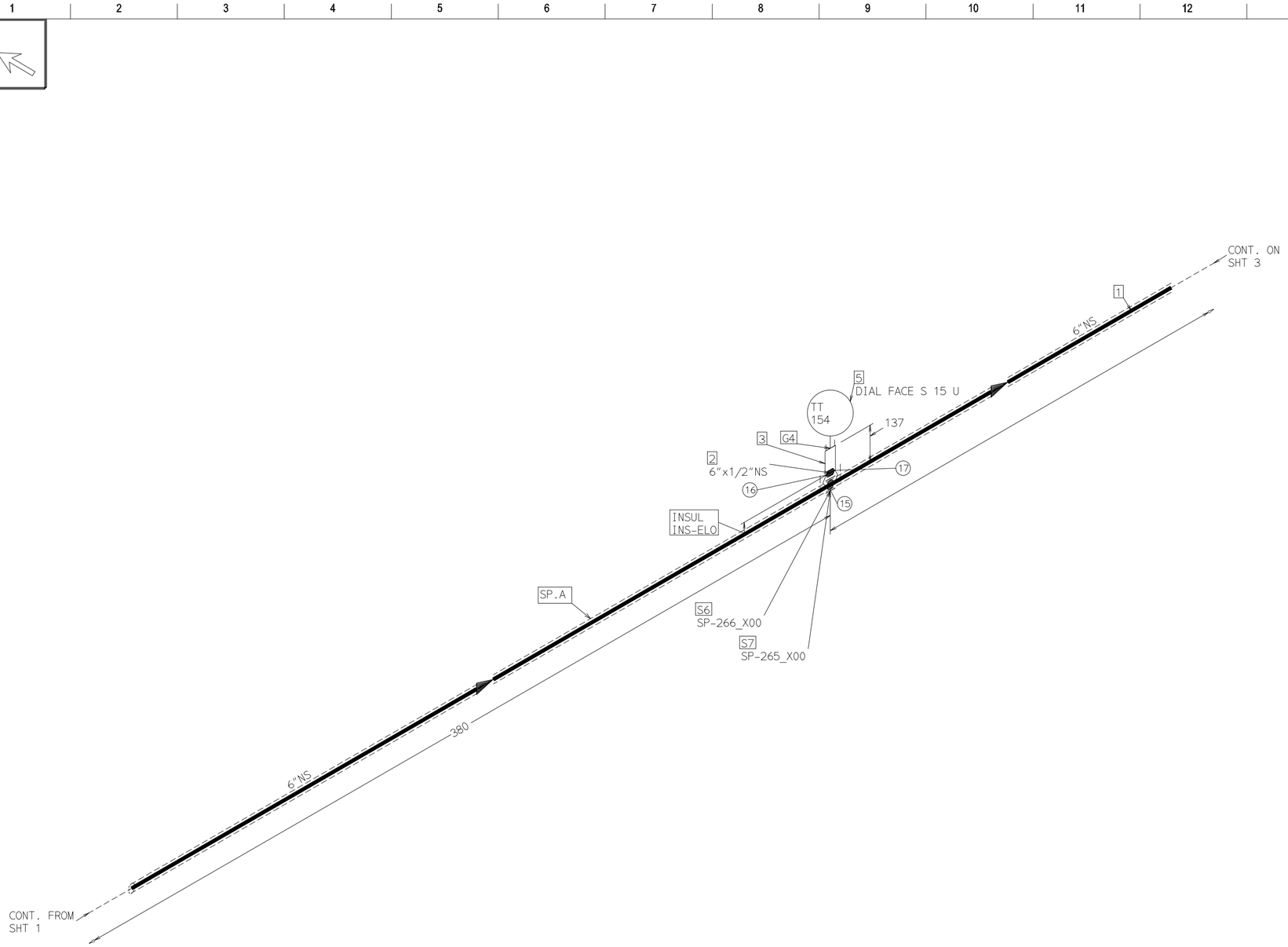
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 05

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.4M	9.47
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	1	0.10
3	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
			TOTAL FABRICATION WEIGHT		9.67

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	INSTRUMENTS				
5	TEMPERATURE TRANSMITTER, PRODUAL TEAT LL, BSPTM TT 154	1/2	BY CLIENT	1	1.00
	SUPPORTS				
6	BOLTED AXIAL STOP FOR SHOE, C-37-3-B-2mm, Carbon Steel	6	SUPPORT	1	1.10
7	PIPE SHOE, S-64-DN150-110-400, Carbon Steel	6	SUPPORT	1	14.50
			TOTAL ERECTION WEIGHT		16.61
			TOTAL WEIGHT		26.28

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
15	S	
16	S	
17	S	

204-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

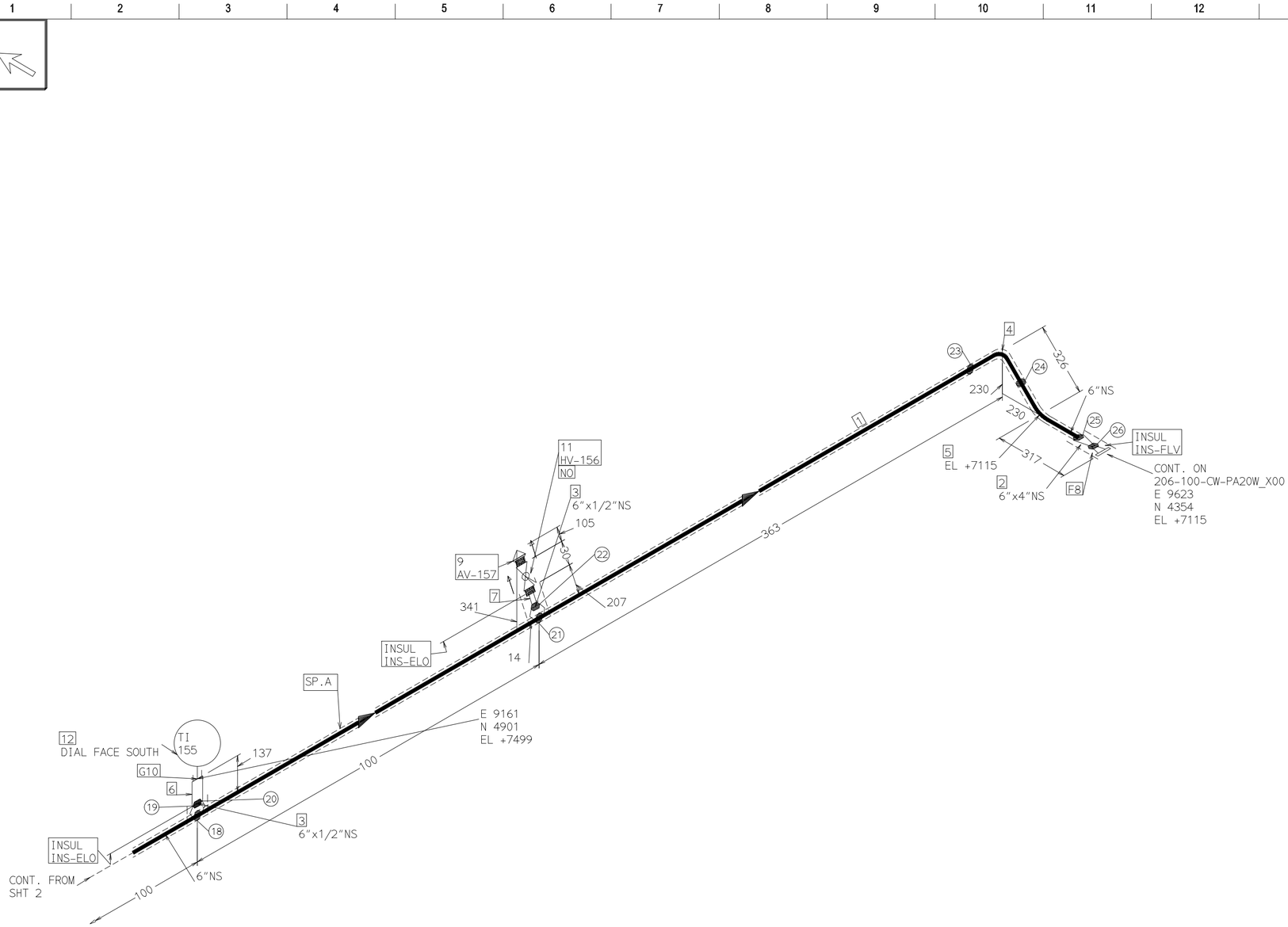
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 05

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	0.3M	6.64
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 4	RECOSS10440604	1	3.90
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	6 x 1/2	OWELSS0988060H	2	0.20
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	1	10.20
5	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
7	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLWOSS06390400	1	7.00
			TOTAL FABRICATION WEIGHT		33.30

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	AUTOMATIC AIR BLEEDER, CGR R3, BSPP-M	1/2	BY CLIENT	1	0.30
	GASKETS				
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	VALVES / IN-LINE ITEMS				
11	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	INSTRUMENTS				
12	TEMPERATURE INDICATOR, CGR 293C, BSPPM TI 155	1/2	BY CLIENT	1	0.34
			TOTAL ERECTION WEIGHT		0.93
			TOTAL WEIGHT		34.23

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
18	S	
19	S	
20	S	
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	

204-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

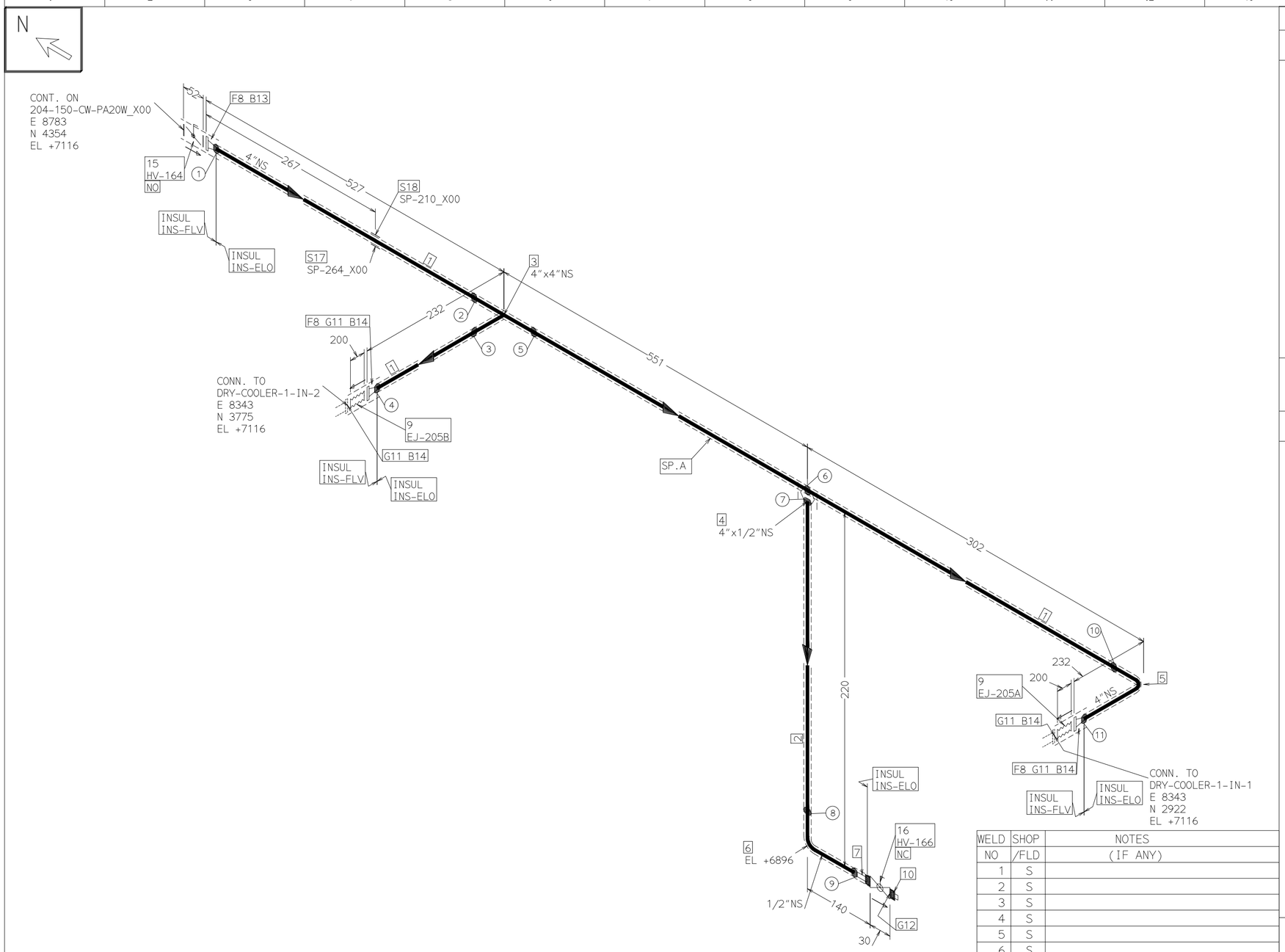
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 05

SHEET - OF: 3 / 3

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

205-100-CW-PA20W_X00

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	1.0M	14.92
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.1M	0.16
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	4 x 4	TEE0SS02340400	1	5.30
4	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	4 x 1/2	OWELSS0985040H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	1	3.90
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
7	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	3	21.00
			TOTAL FABRICATION WEIGHT		45.72

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	LATERAL SPHERIC EXPANSION JOINT, MAX_TRANSV_STIFF = 100 N/mm, MAX_LAT_DISPL. = +- 5 mm, ASME B36.10/B36.19, CL150 RF SS 304	4	1MECH014-100-304	2	30.00
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	4	0.92
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
13	150 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.70
14	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	32	8.10
	VALVES / IN-LINE ITEMS				
15	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O. ASTM A351 Gr.CF3/CF8	4	BY CLIENT	1	6.70
16	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	SUPPORTS				
17	BOLTED GUIDE WITH HOLD DOWN FOR SHOE, C-33-2-A-2mm, Carbon Steel	4	SUPPORT	1	1.60
18	PIPE SHOE, S-64-DN100-110-200, Carbon Steel	4	SUPPORT	1	7.80
			TOTAL ERECTION WEIGHT		58.18
			TOTAL WEIGHT		103.90

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

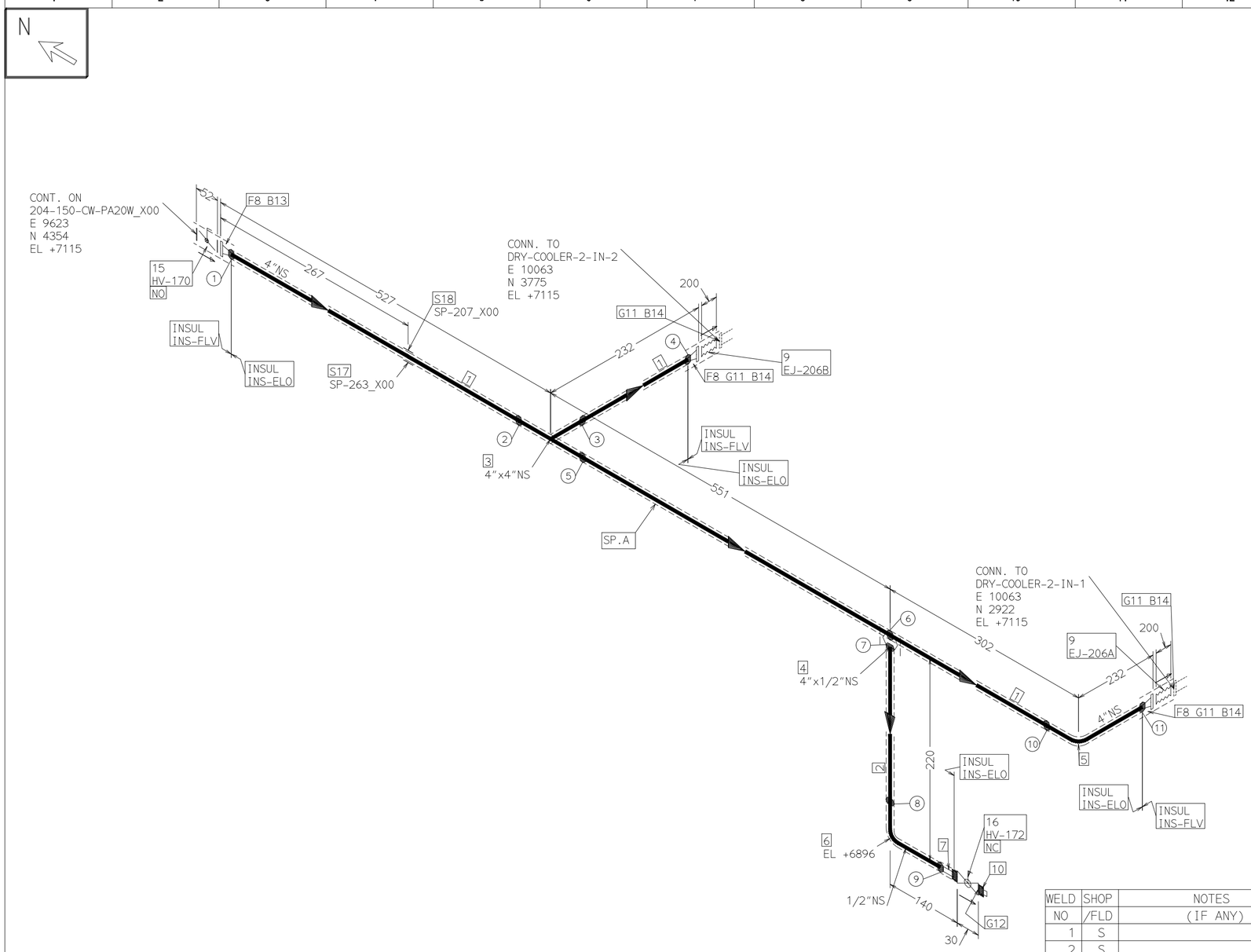
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 06

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

206-100-CW-PA20W_X00

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	1.0M	14.92
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.1M	0.16
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	4 x 4	TEE0SS02340400	1	5.30
4	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	4 x 1/2	OWELSS0985040H	1	0.10
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	1	3.90
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
7	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	3	21.00
			TOTAL FABRICATION WEIGHT		45.72

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	LATERAL SPHERIC EXPANSION JOINT, MAX_TRANSV_STIFF = 100 N/mm, MAX_LAT_DISPL. = +- 5 mm, ASME B36.10/B36.19, CL150 RF SS 304	4	1MECH014-100-304	2	30.00
10	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	4	0.92
12	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
13	150 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.70
14	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	32	8.10
	VALVES / IN-LINE ITEMS				
15	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O. ASTM A351 Gr.CF3/CF8	4	BY CLIENT	1	6.70
16	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	SUPPORTS				
17	BOLTED GUIDE WITH HOLD DOWN FOR SHOE, C-33-2-A-2mm, Carbon Steel	4	SUPPORT	1	1.60
18	PIPE SHOE, S-64-DN100-110-200, Carbon Steel	4	SUPPORT	1	7.80

TOTAL ERECTION WEIGHT 58.18

TOTAL WEIGHT 103.90

SPOOL NUMBERS:

SP.A

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

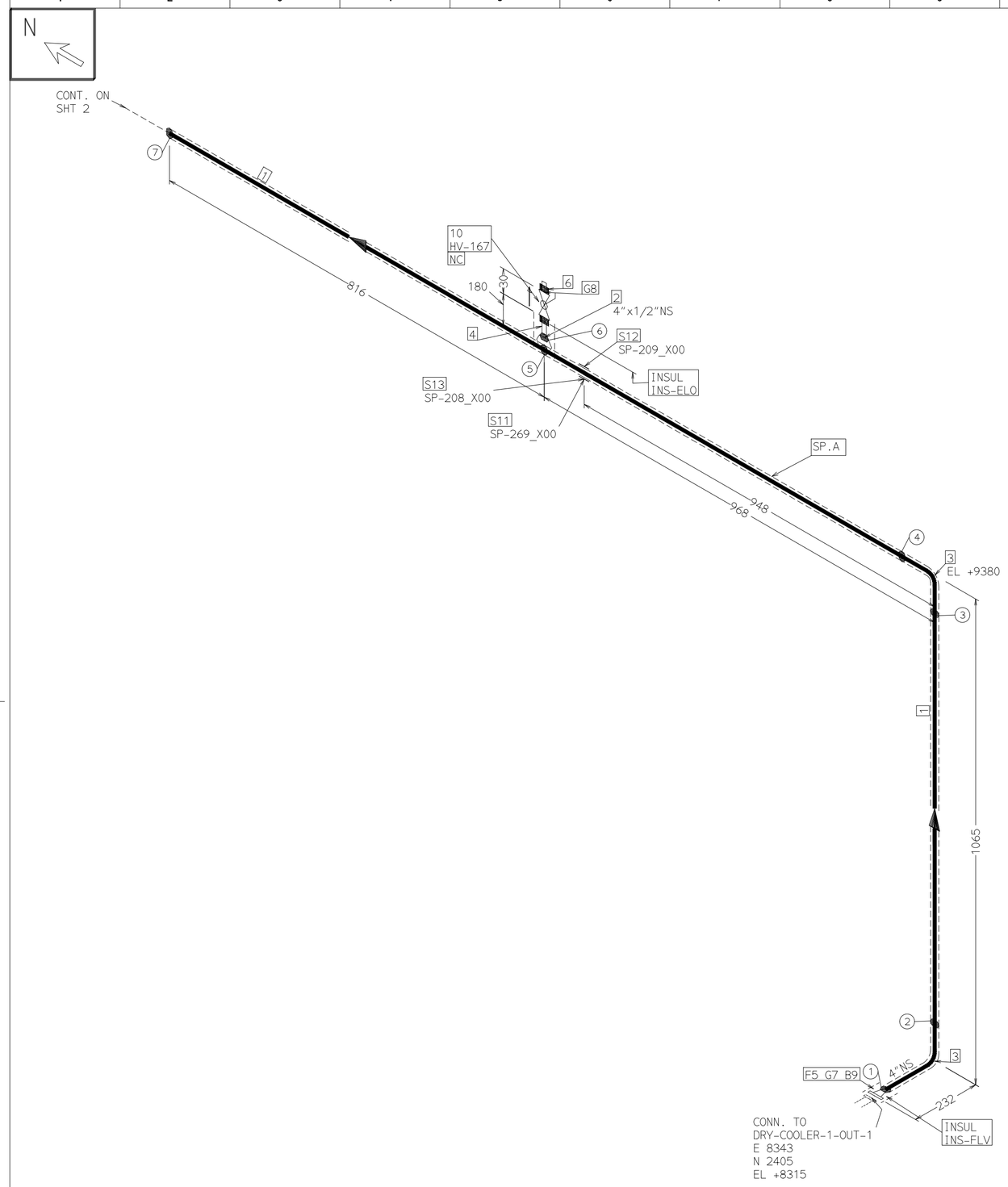
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 07

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	2.4M	36.42
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	4 x 1/2	OWELSS0985040H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	2	7.80
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00

TOTAL FABRICATION WEIGHT 51.48

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
6	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	1	0.23
8	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
9	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	VALVES / IN-LINE ITEMS				
10	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	SUPPORTS				
11	BOLTED AXIAL STOP FOR SHOE, C-37-3-A-2mm, Carbon Steel	4	SUPPORT	1	1.00
12	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	4	SUPPORT	1	3.40
13	PIPE SHOE, S-64-DN100-110-350, Carbon Steel	4	SUPPORT	1	7.80

TOTAL ERECTION WEIGHT 14.81

TOTAL WEIGHT 66.29

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

207-100-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

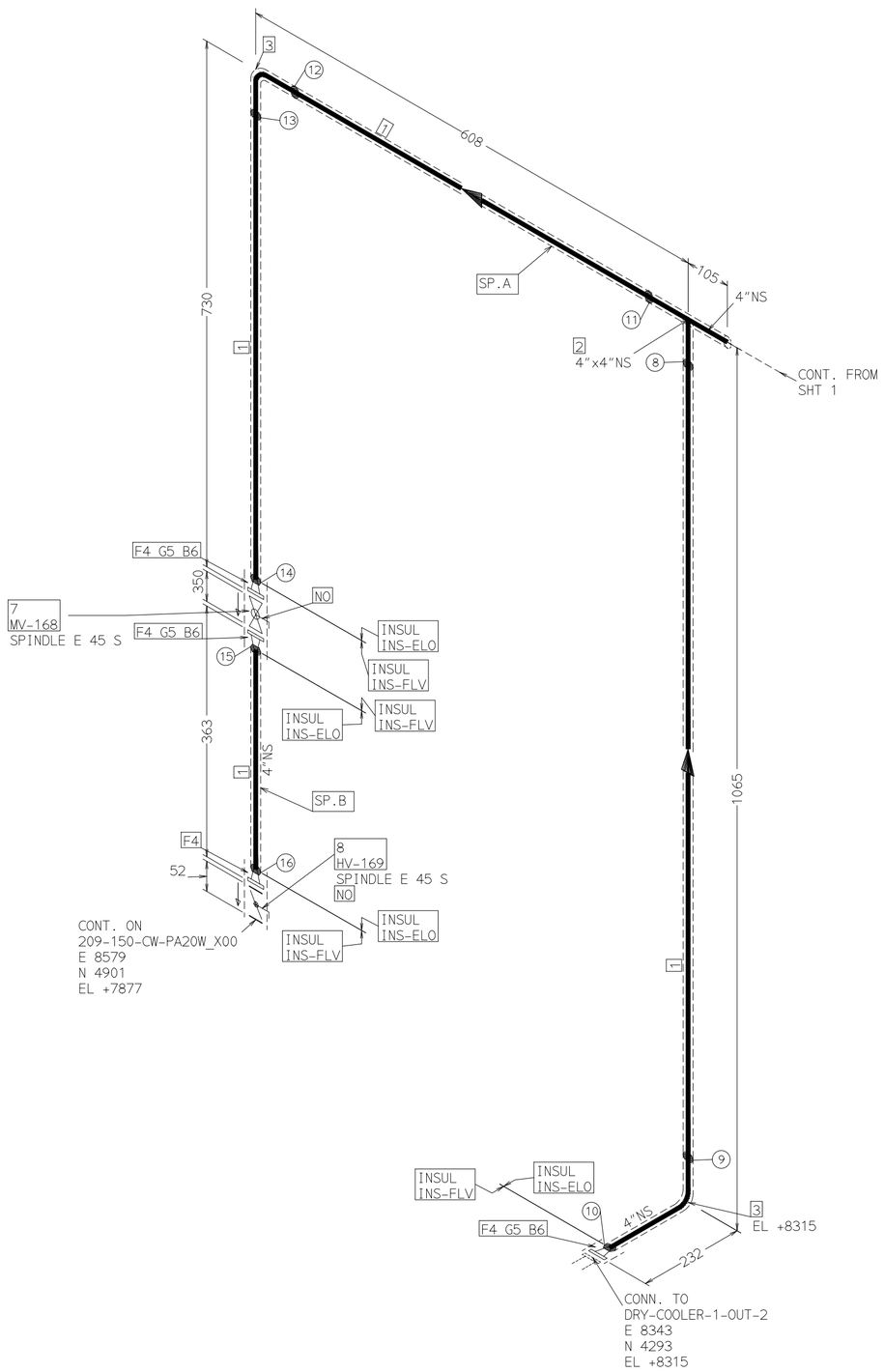
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 08

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	1.9M	28.51
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	4 x 4	TEE0SS02340400	1	5.30
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	2	7.80
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	4	28.00
			TOTAL FABRICATION WEIGHT		69.61

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	3	0.69
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	24	6.07
	VALVES / IN-LINE ITEMS				
7	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	4	BY CLIENT	1	16.00
8	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O. ASTM A351 Gr.CF3/CF8	4	BY CLIENT	1	6.70
			TOTAL ERECTION WEIGHT		29.46
			TOTAL WEIGHT		99.07

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

207-100-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
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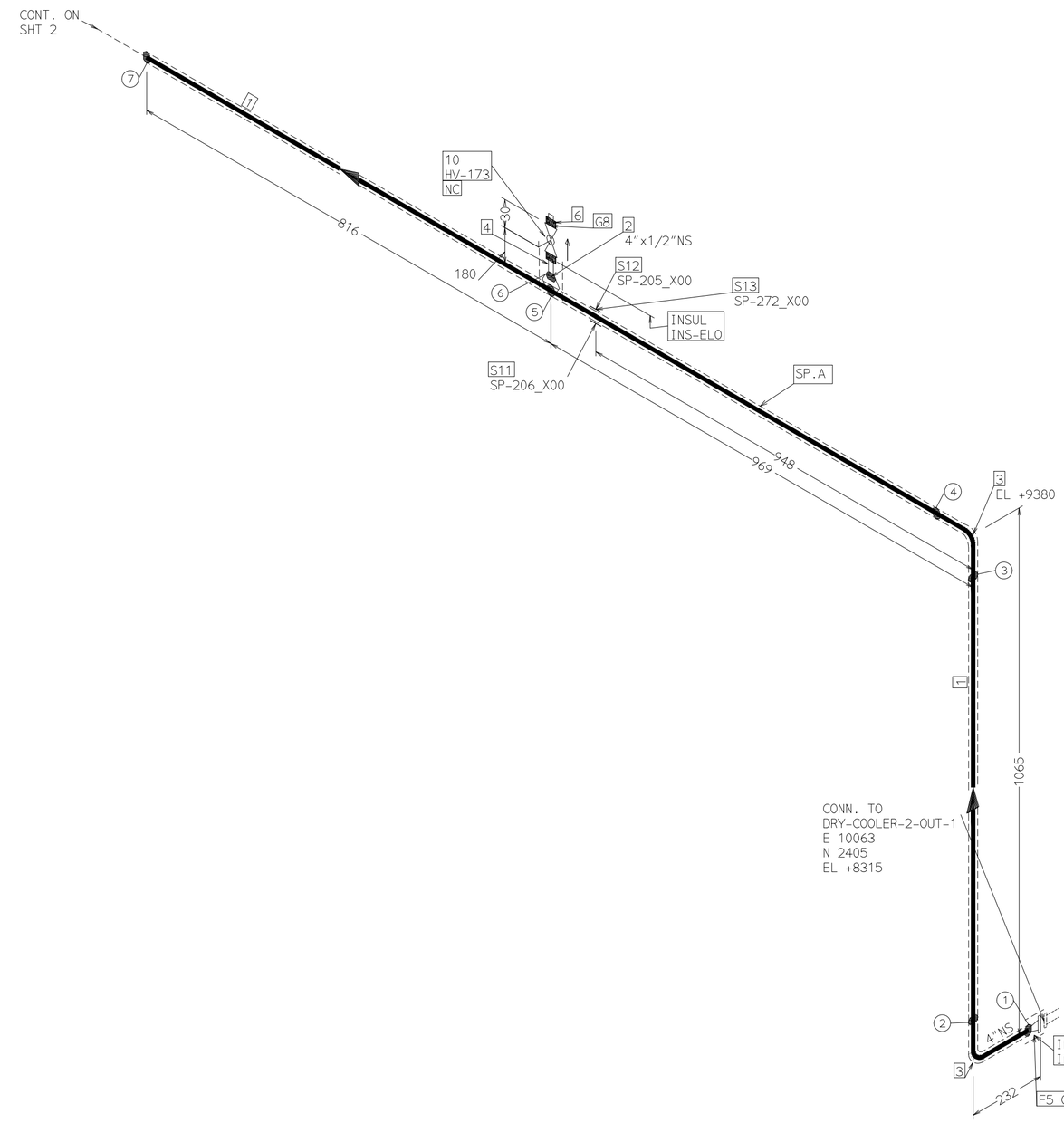
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	08	2 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	2.4M	36.42
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	4 x 1/2	OWELSS0985040H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	2	7.80
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00

TOTAL FABRICATION WEIGHT 51.48

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
6	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	1	0.23
8	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
9	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	VALVES / IN-LINE ITEMS				
10	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	SUPPORTS				
11	BOLTED GUIDE FOR SHOE, C-34-3-A-2mm, Carbon Steel	4	SUPPORT	1	1.80
12	PIPE SHOE, S-64-DN100-110-350, Carbon Steel	4	SUPPORT	1	7.80
13	BOLTED AXIAL STOP FOR SHOE, C-37-3-A-2mm, Carbon Steel	4	SUPPORT	1	1.00

TOTAL ERECTION WEIGHT 13.21

TOTAL WEIGHT 64.69

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

208-100-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

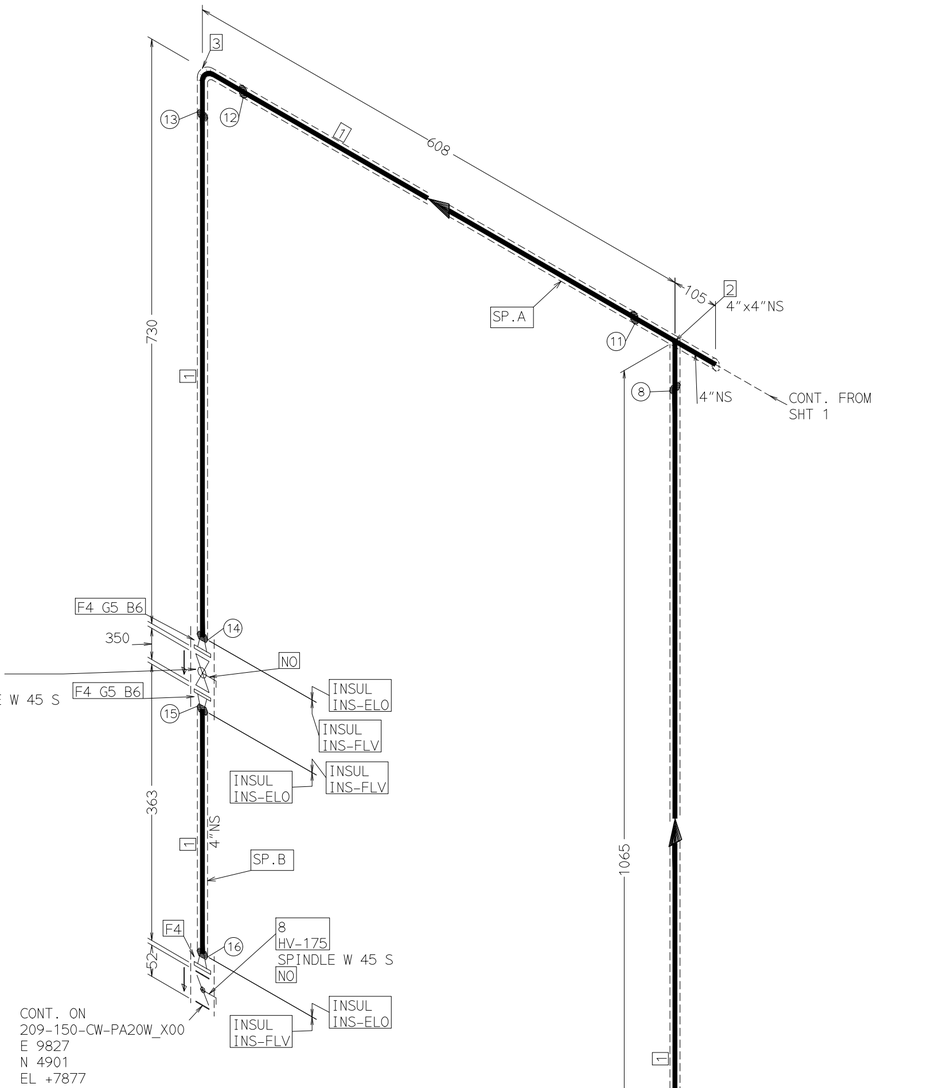
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 09

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	1.9M	28.51
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	4 x 4	TEE0SS02340400	1	5.30
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	2	7.80
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	4	28.00
			TOTAL FABRICATION WEIGHT		69.61

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	GENEGK00340400	3	0.69
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	24	6.07
	VALVES / IN-LINE ITEMS				
7	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	4	BY CLIENT	1	16.00
8	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O. ASTM A351 Gr.CF3/CF8	4	BY CLIENT	1	6.70
			TOTAL ERECTION WEIGHT		29.46
			TOTAL WEIGHT		99.07

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

208-100-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD; FIELD WELD; SOCKET WELD; SCREWED JOINT; COMPR.N JOINT; SITE CONNECTION; PIPE SUPPORT / ATTACHMENT; PIPE INSULATION; PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

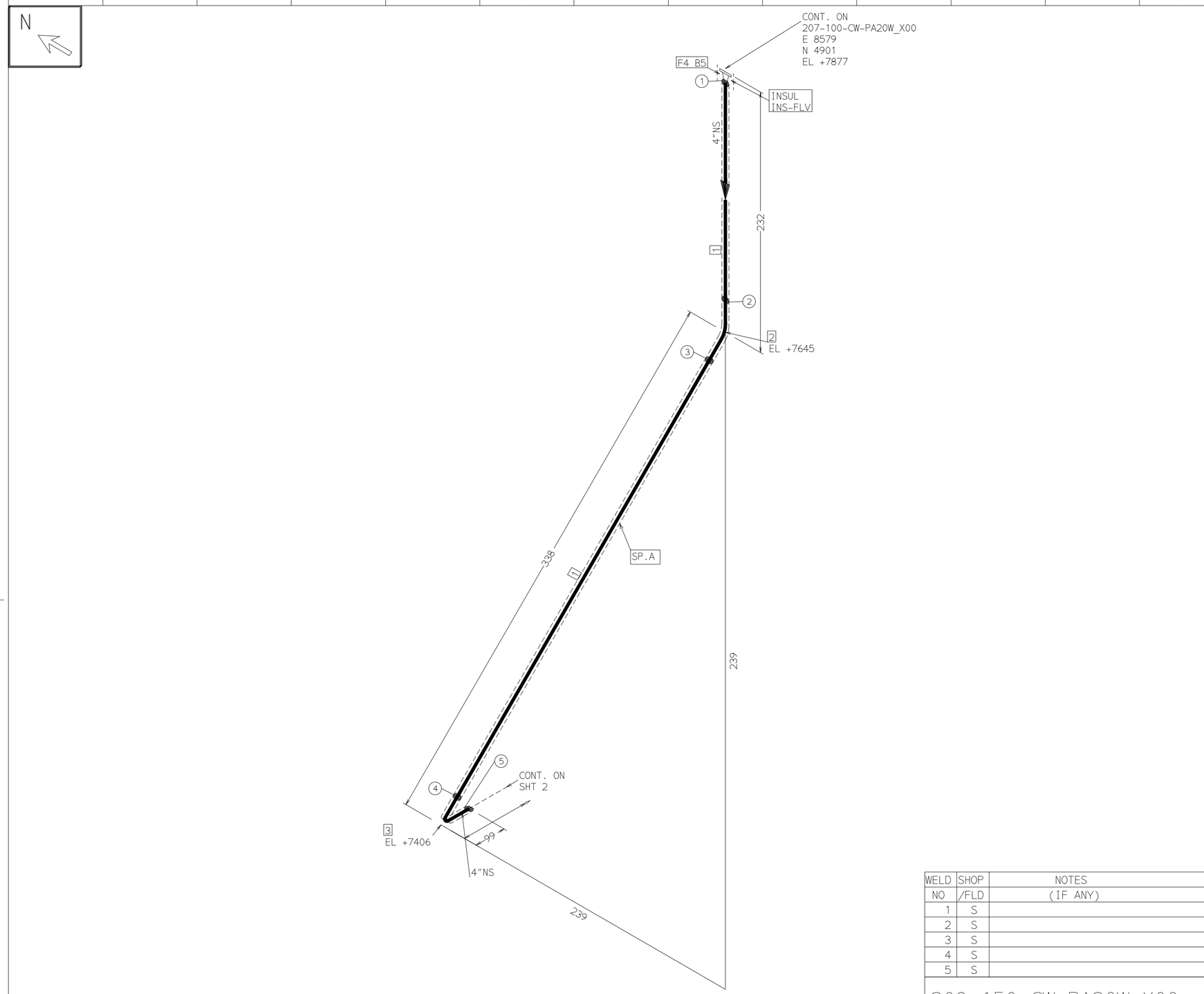
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 09
SHEET - OF: 2 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	0.3M	3.12
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E45RSS02030400	1	2.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	1	3.90
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00
			TOTAL FABRICATION WEIGHT		16.12

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	BOLTS				
5	150 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.70
			TOTAL ERECTION WEIGHT		2.70
			TOTAL WEIGHT		18.82

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

209-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

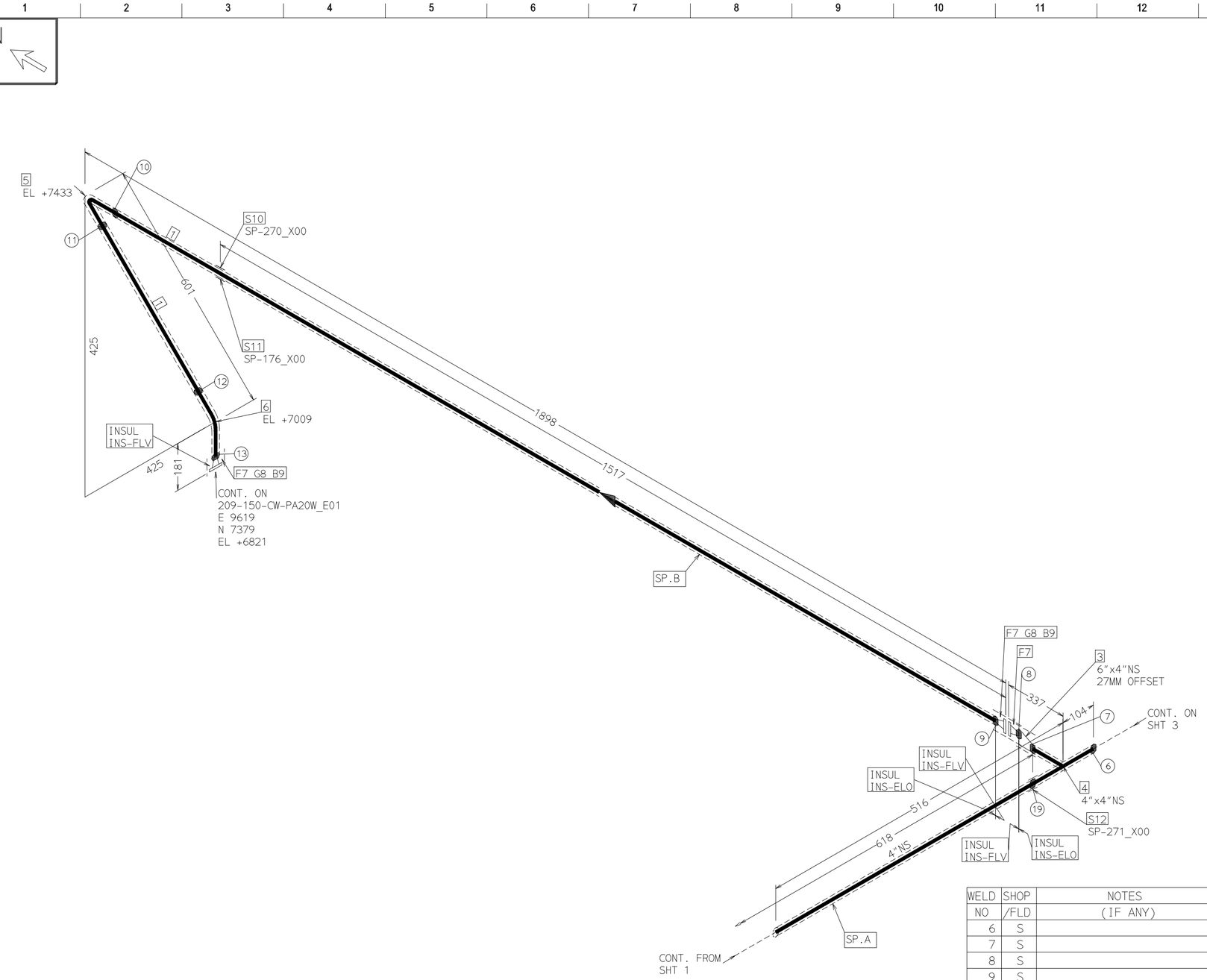
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 10

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	1.9M	52.54
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	0.5M	7.09
	FITTINGS				
3	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 4	REE0SS10050604	1	3.90
4	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	4 x 4	TEE0SS02340400	1	5.30
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	1	10.20
6	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	3	32.40

TOTAL FABRICATION WEIGHT 116.53

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	2	0.40
	BOLTS				
9	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	16	7.42
	SUPPORTS				
10	BOLTED GUIDE WITH HOLD DOWN FOR SHOE, C-33-2-A-2mm, Carbon Steel	6	SUPPORT	1	1.60
11	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
12	PIPE SHOE, S-64-DN100-110-350, Carbon Steel	4	SUPPORT	1	7.80

TOTAL ERECTION WEIGHT 31.72

TOTAL WEIGHT 148.25

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
19	S	

209-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

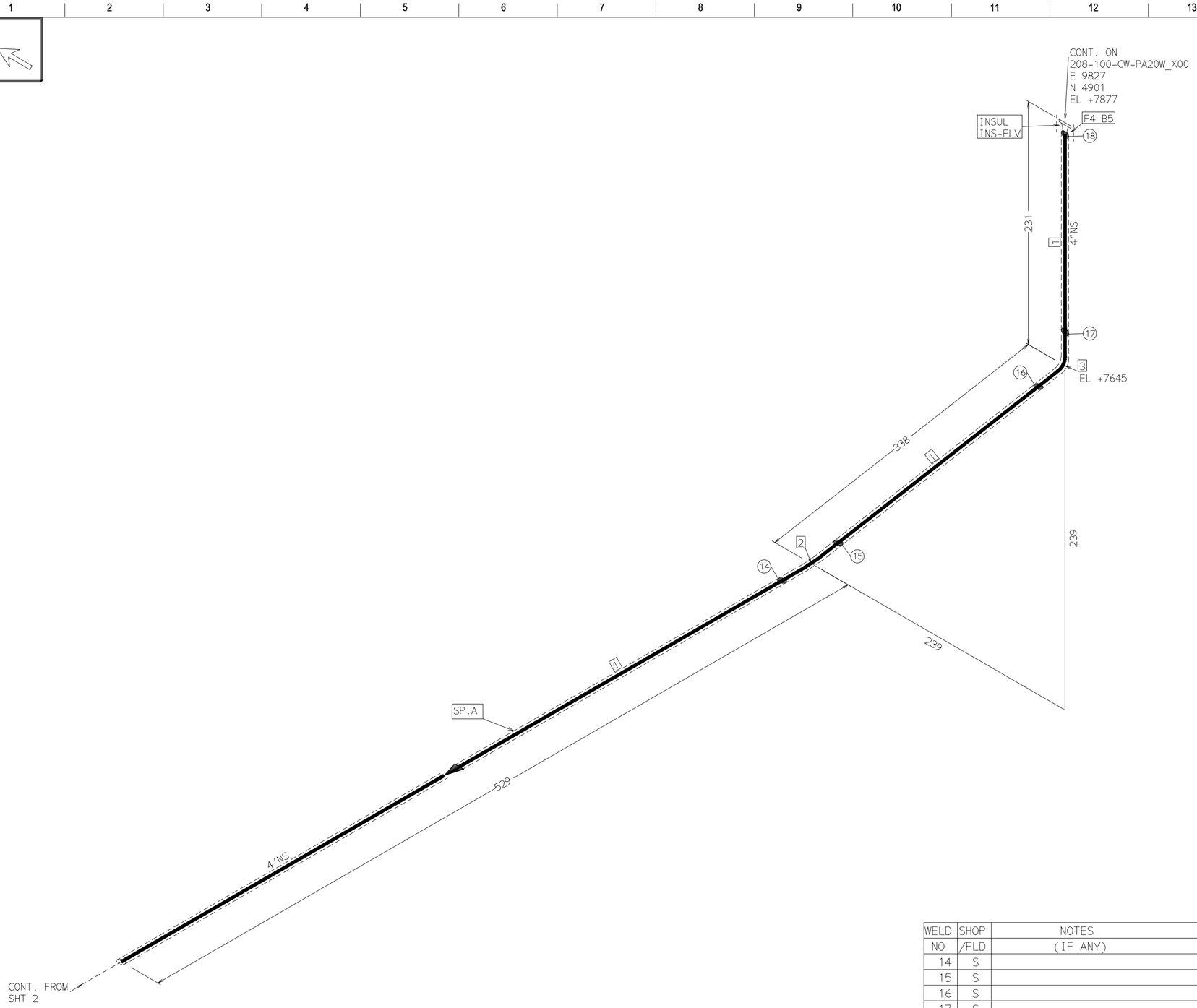
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	10	2 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	4	PIPESS03400400	0.6M	8.99
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E90RSS02150400	1	3.90
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	4	E45RSS02030400	1	2.10
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	4	FLW0SS06390400	1	7.00
			TOTAL FABRICATION WEIGHT		21.99

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	BOLTS				
5	150 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.70
			TOTAL ERECTION WEIGHT		2.70
			TOTAL WEIGHT		24.69

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	

209-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	1,4				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

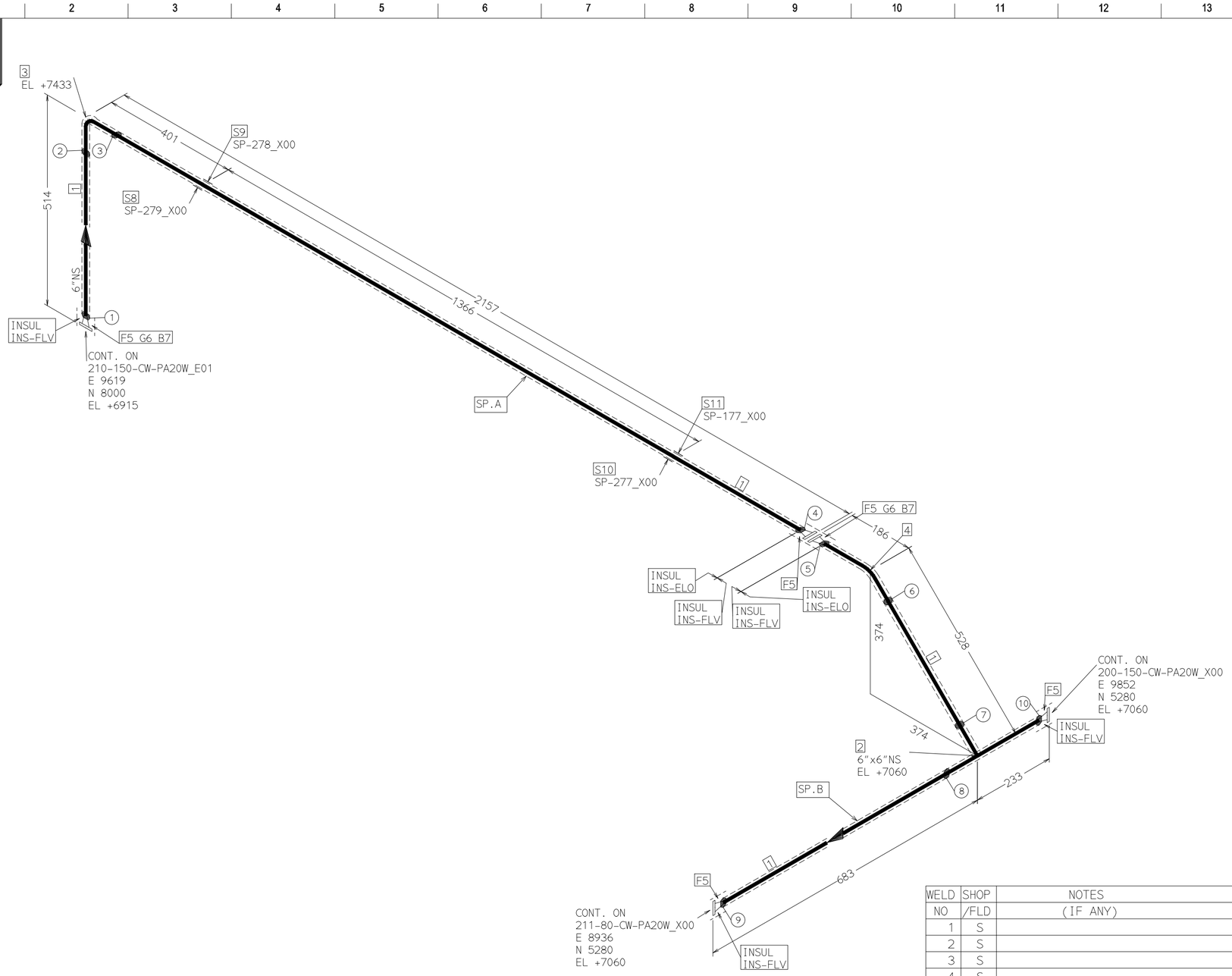
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 10

SHEET - OF: 3 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	6	PIPESS01330600	2.8M	78.05
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 6	TEE0SS02450600	1	16.50
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E90RSS00370600	1	10.20
4	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	6	E45RSS02110600	1	5.10
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	5	54.00

TOTAL FABRICATION WEIGHT 163.85

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	2	0.40
	BOLTS				
7	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	16	7.42
	SUPPORTS				
8	BOLTED GUIDE WITH HOLD DOWN FOR SHOE, C-33-2-A-2mm, Carbon Steel	6	SUPPORT	1	1.60
9	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50
10	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	6	SUPPORT	1	3.40
11	PIPE SHOE, S-64-DN150-135-200, Carbon Steel	6	SUPPORT	1	14.50

TOTAL ERECTION WEIGHT 41.82

TOTAL WEIGHT 205.67

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

210-150-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

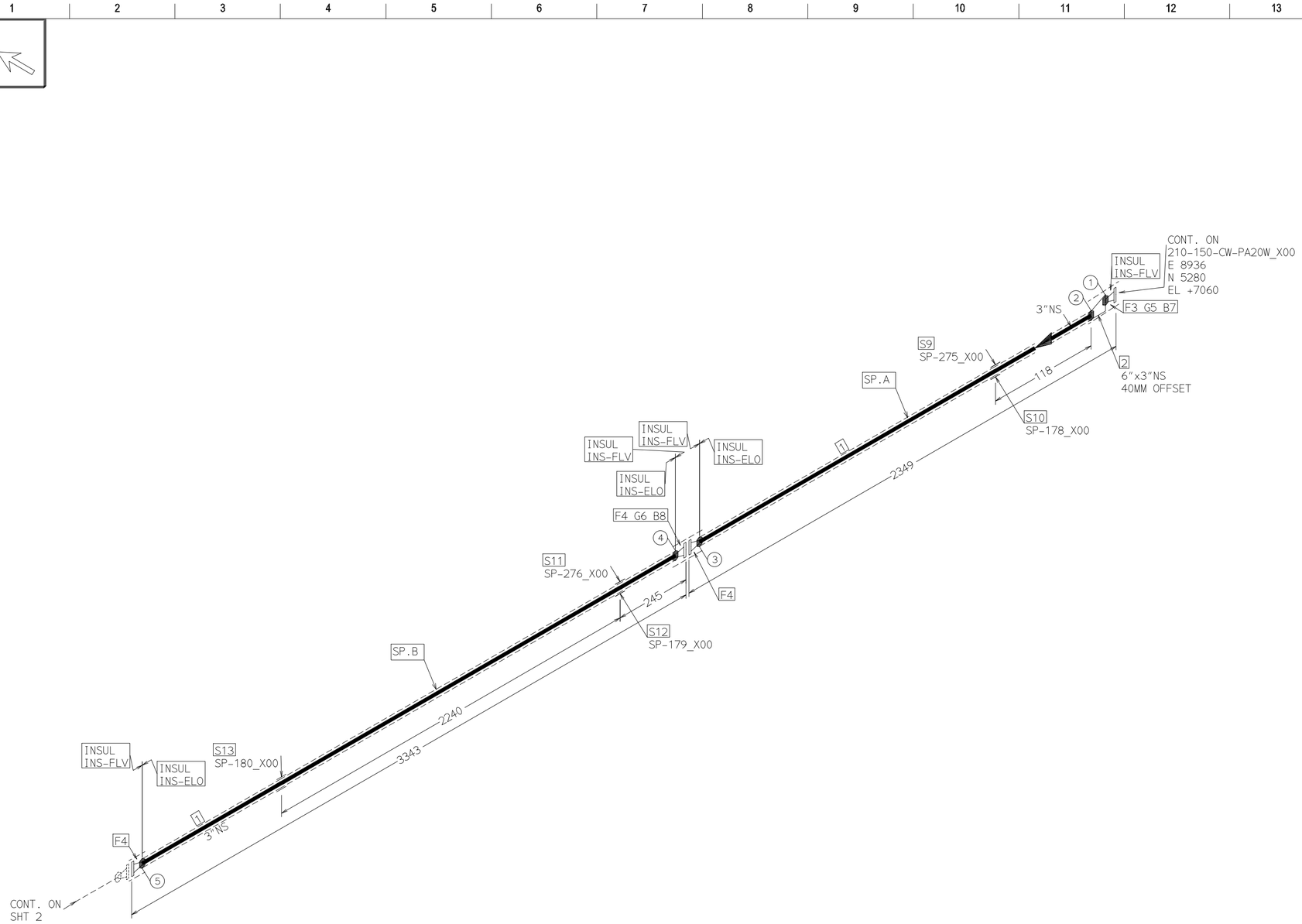
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	11	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	5.3M	59.15
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	6 x 3	REE0SS10040603	1	3.90
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	6	FLW0SS07590600	1	10.80
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	3	13.50
			TOTAL FABRICATION WEIGHT		87.35

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	6	GENEGK00350600	1	0.20
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
7	105 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063020400	8	3.71
8	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	SUPPORTS				
9	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	3	SUPPORT	1	3.40
10	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
11	BOLTED GUIDE FOR SHOE, C-34-4-A-2mm, Carbon Steel	3	SUPPORT	1	3.40
12	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
13	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		27.75
			TOTAL WEIGHT		115.10

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

211-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

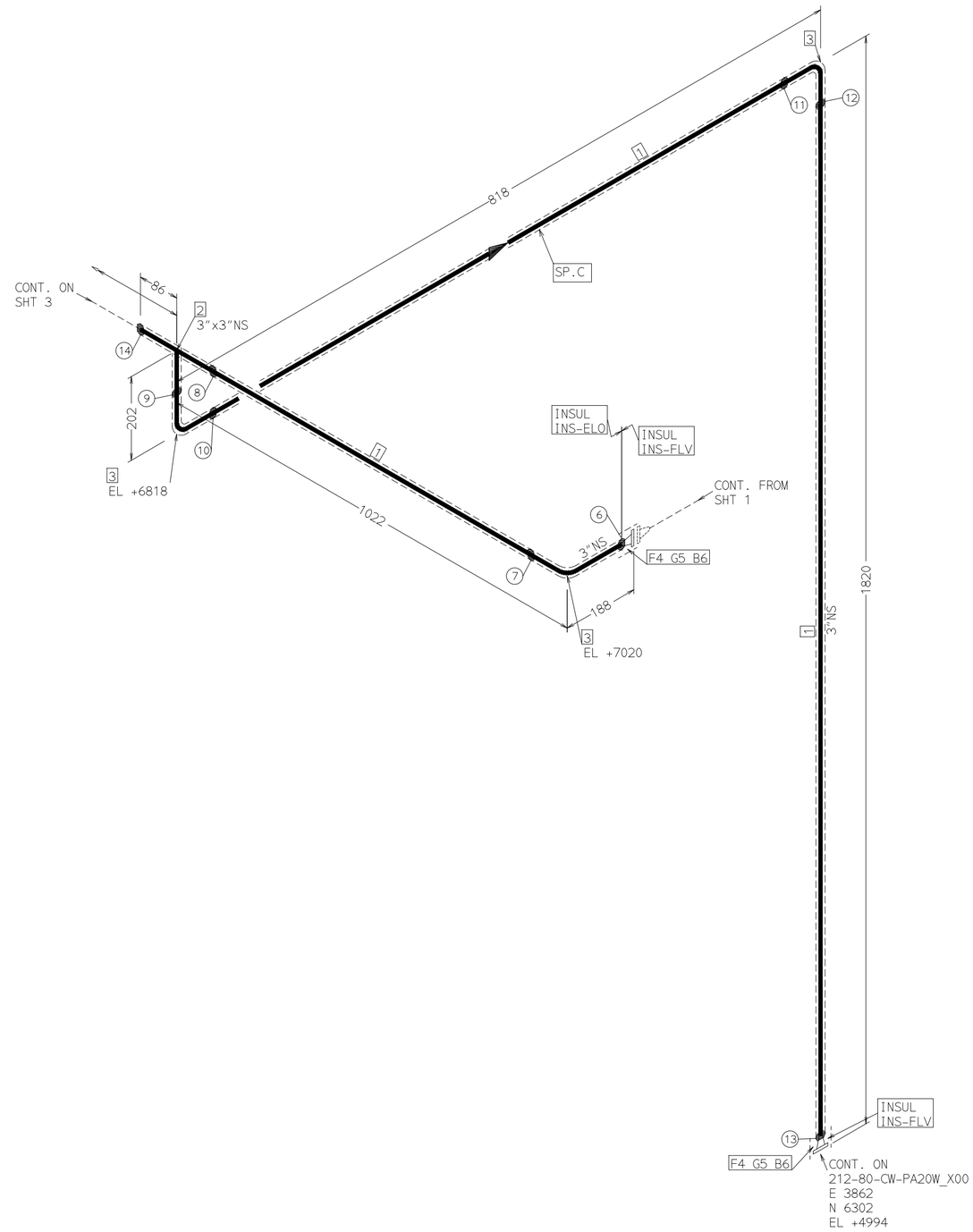
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 12

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	3.1M	34.39
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 3	TEE0SS02330300	1	3.80
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	3	6.00
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		53.19

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
			TOTAL ERECTION WEIGHT		2.28
			TOTAL WEIGHT		55.47

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

211-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

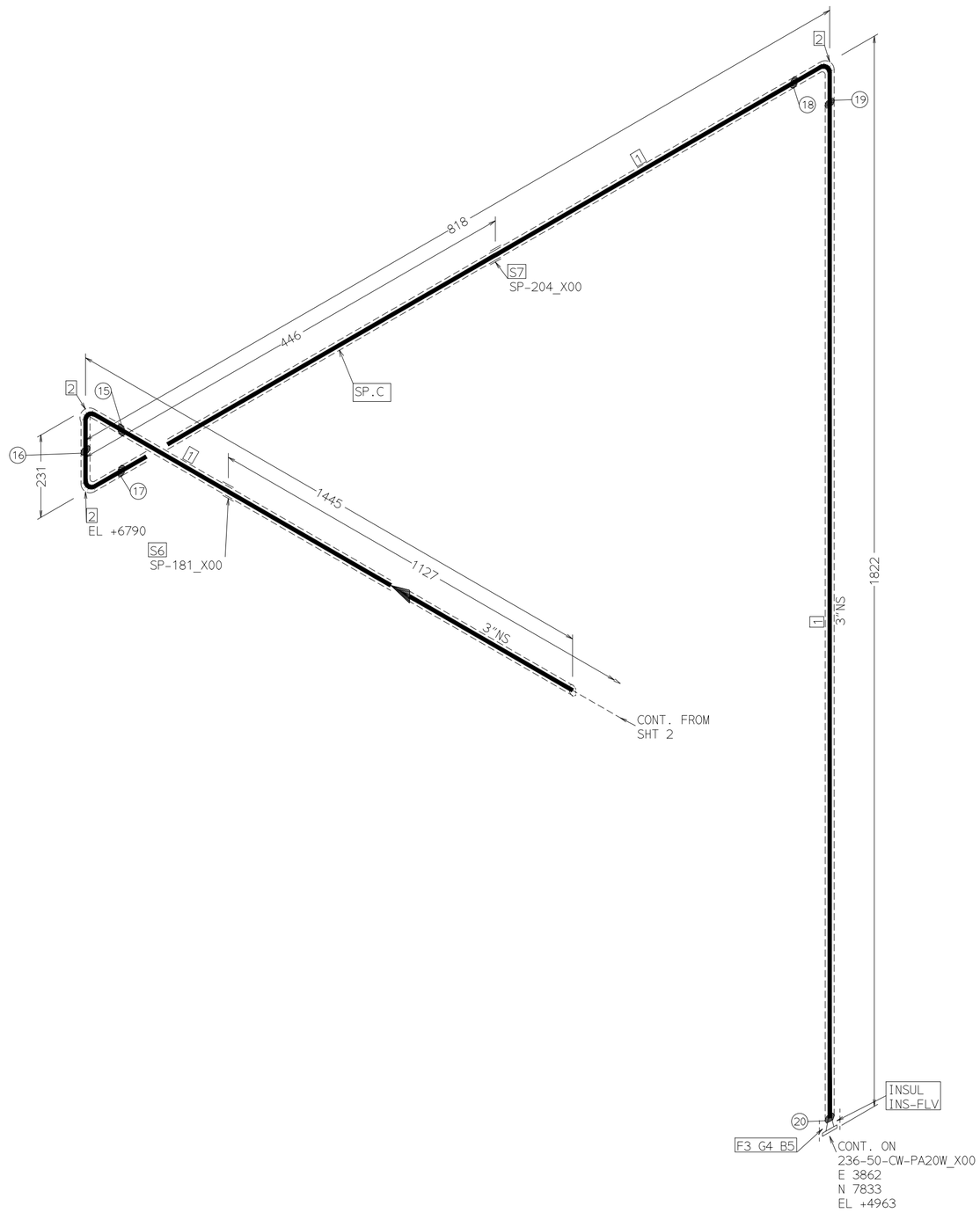
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 12

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	3.6M	40.17
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	3	6.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
			TOTAL FABRICATION WEIGHT		50.67

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
5	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	SUPPORTS				
6	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
7	PIPE SHOE, S-64-DN80-100-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		11.74
			TOTAL WEIGHT		62.41

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	

211-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

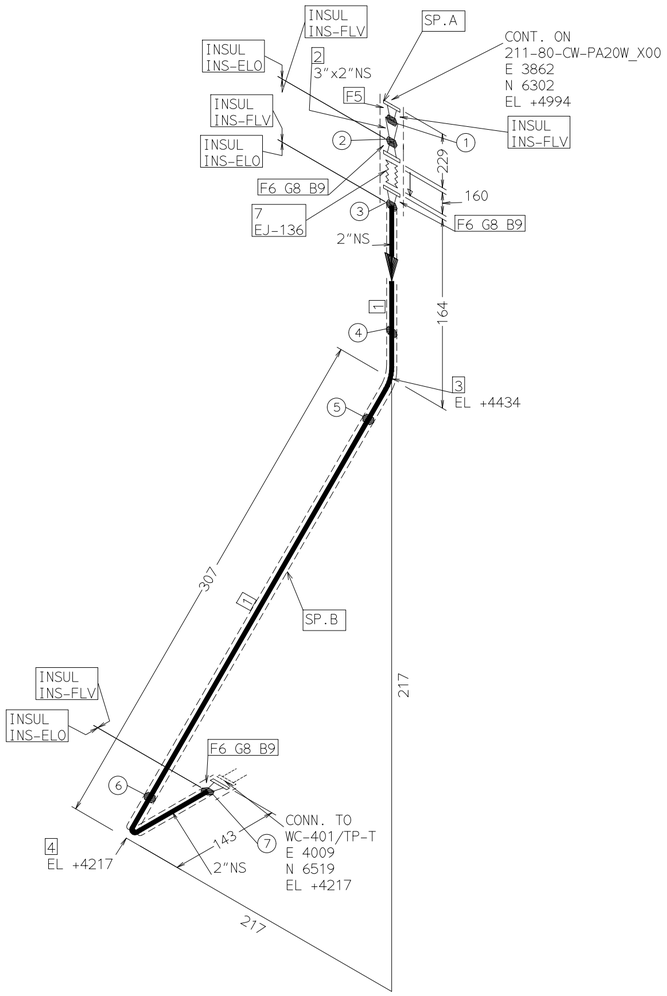
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 12

SHEET - OF: 3 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.3M	1.37
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	1	0.32
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		15.94

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		24.60

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

212-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

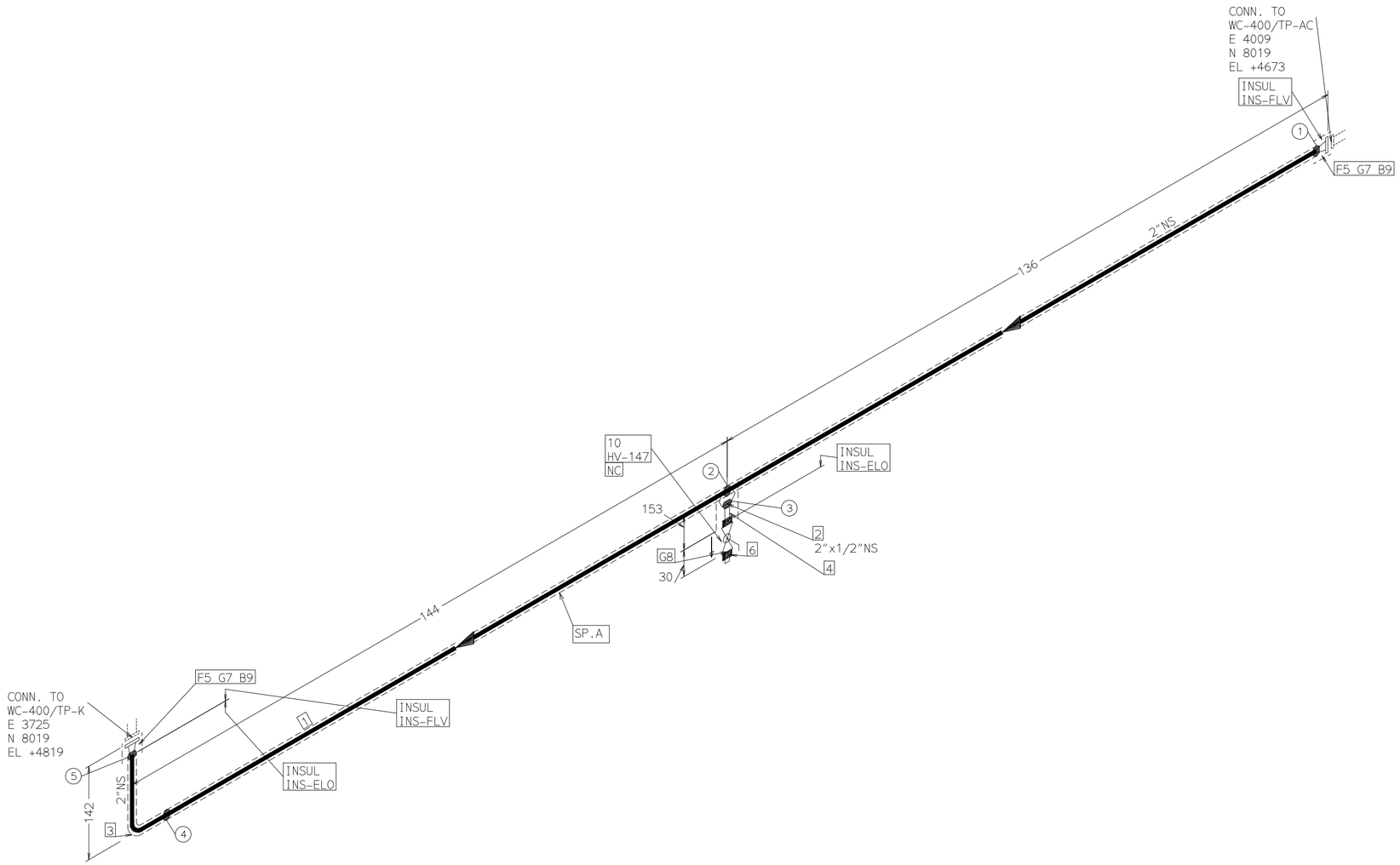
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	26	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.2M	0.73
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	2 x 1/2	OWELSS0980020H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	2	5.40
			TOTAL FABRICATION WEIGHT		7.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
6	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	2	0.20
8	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	8	1.90
	VALVES / IN-LINE ITEMS				
10	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
			TOTAL ERECTION WEIGHT		2.46
			TOTAL WEIGHT		9.50

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

231-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

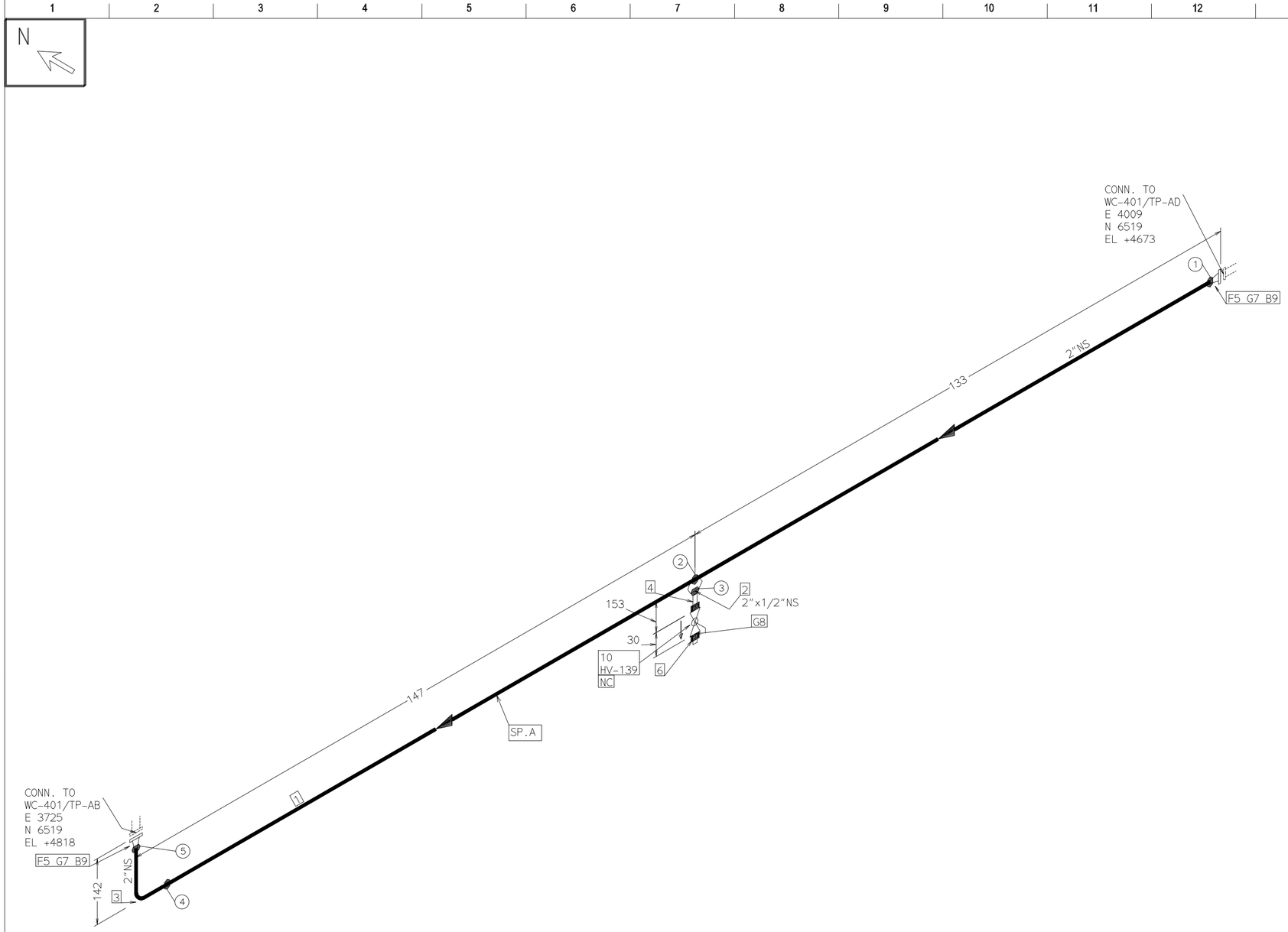
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	14	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.2M	0.73
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	2 x 1/2	OWELSS0980020H	1	0.10
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	2	5.40
			TOTAL FABRICATION WEIGHT		7.04

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
6	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	2	0.20
8	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	8	1.90
	VALVES / IN-LINE ITEMS				
10	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
			TOTAL ERECTION WEIGHT		2.46
			TOTAL WEIGHT		9.50

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

232-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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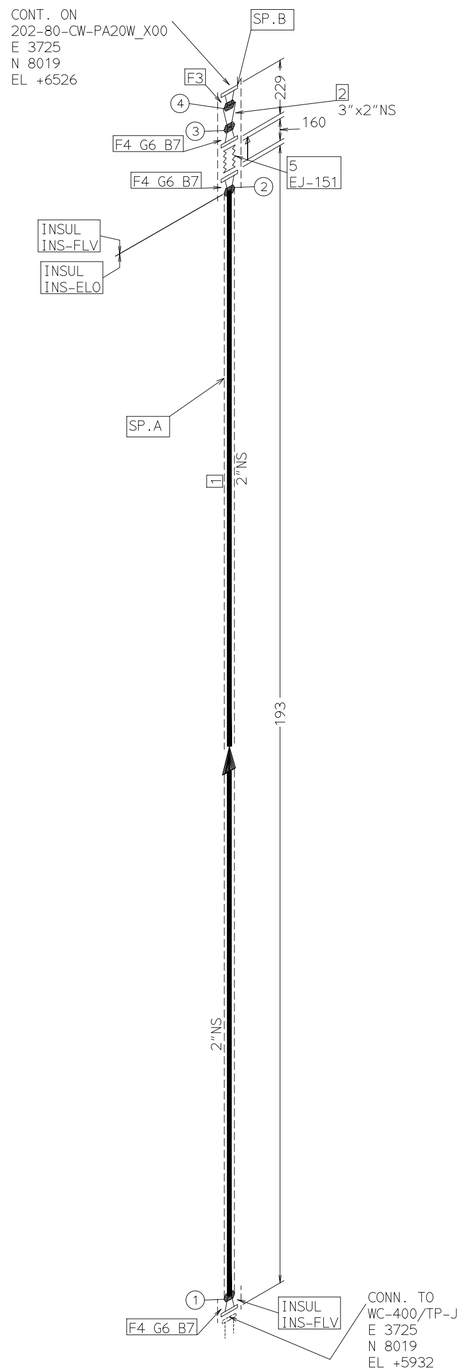
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	15	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.1M	0.33
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		13.93

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
5	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
7	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		22.59

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

235-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	45	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS		

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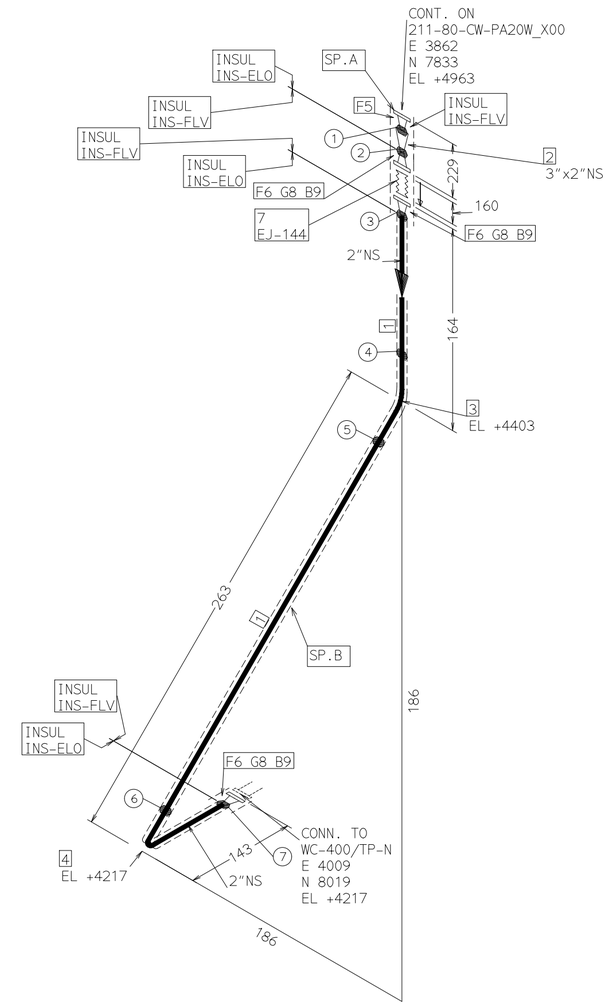
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 16
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.3M	1.13
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	1	0.32
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		15.70

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		24.36

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

236-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	70	FLUID DENSITY(kg/m3) :	1016	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	35	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

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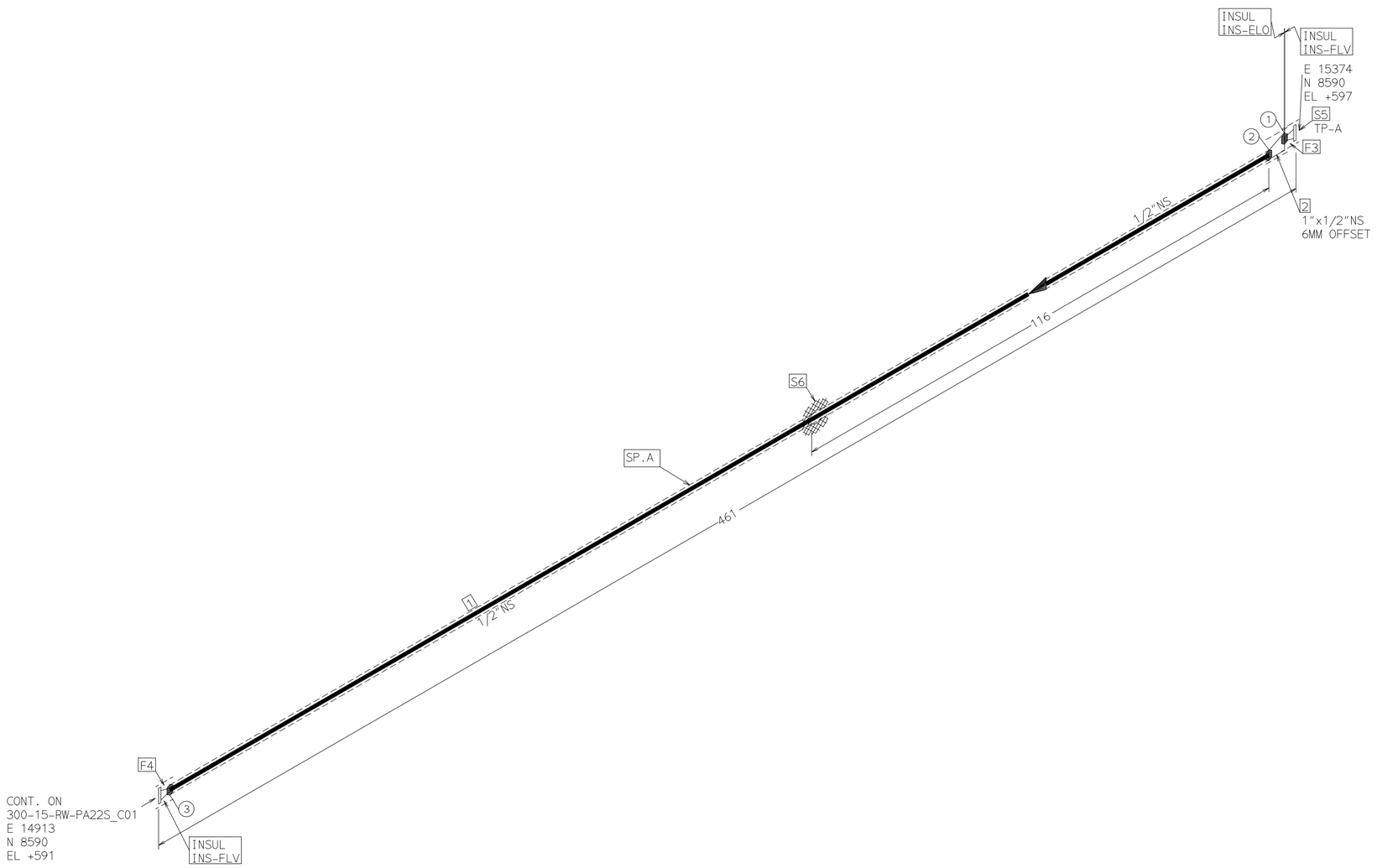
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 43
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 316/316L	1/2	PIPESS00980H00	0.4M	0.49
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REE0SS0474010H	1	0.16
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS00930100	1	1.10
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F316/316L	1/2	FLW0SS04680H00	1	0.60
			TOTAL FABRICATION WEIGHT		2.35

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	SUPPORTS				
5	General purpose ATTA SS 316	1	-	1	0.00
6	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-100 AISI316 + R 100 AISI316 WITH NET + RM 60 10-25	1/2	2MCTZFR-0.5a	1	2.30
			TOTAL ERECTION WEIGHT		2.30
			TOTAL WEIGHT		4.65

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	

300-15-RW-PA22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	50	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	15	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	4					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

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PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

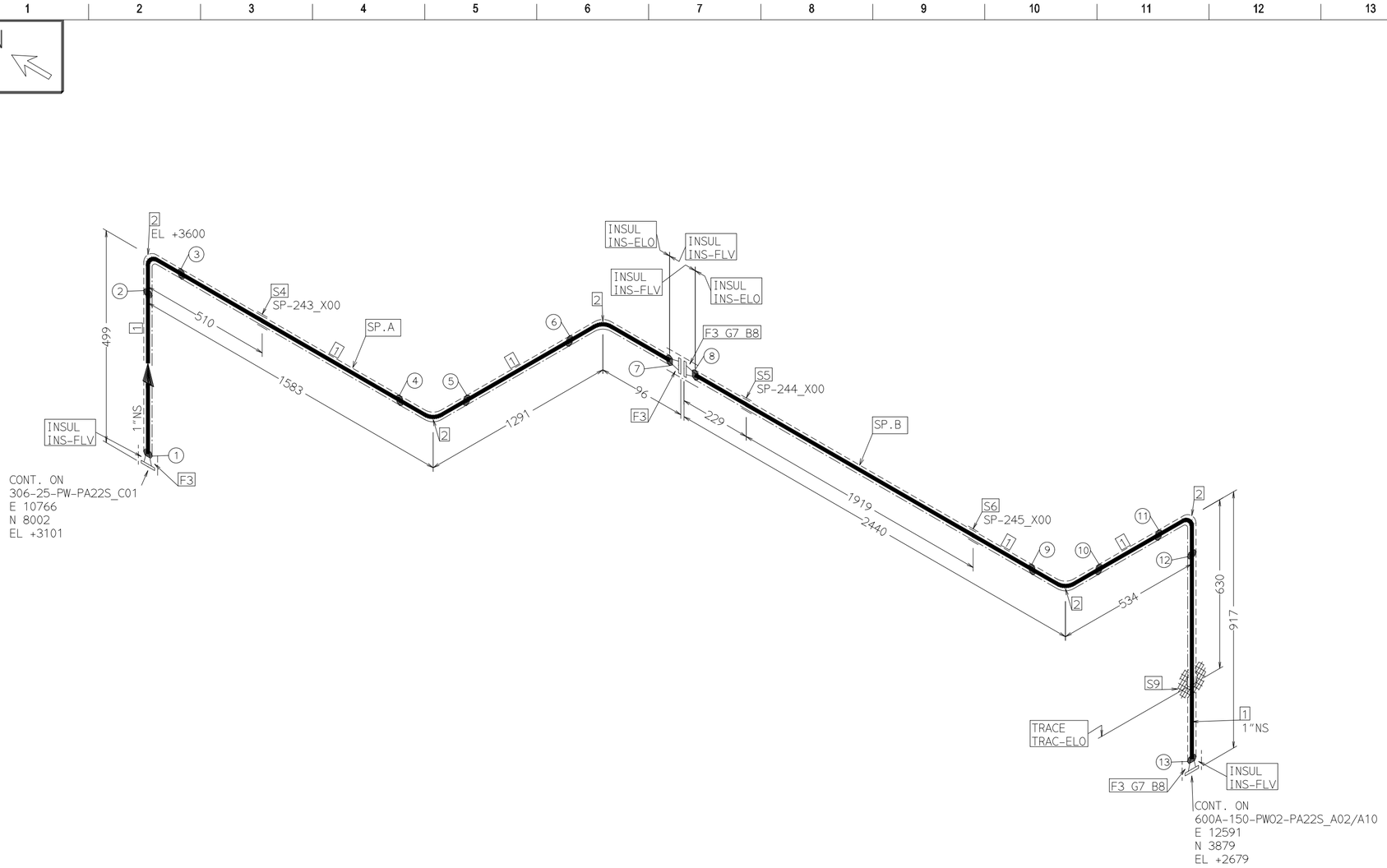
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 18

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	6.8M	16.82
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	5	0.75
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS00930100	4	4.40
	SUPPORTS				
4	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
5	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
6	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		35.17

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00390100	2	0.12
	BOLTS				
8	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	1/2	SB20B029220200	8	1.24
	SUPPORTS				
9	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		4.76
			TOTAL WEIGHT		39.93

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

TRACING SPEC: TRAC-ELO

306-25-PW-PA22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-001/003	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):		TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-306	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	12					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

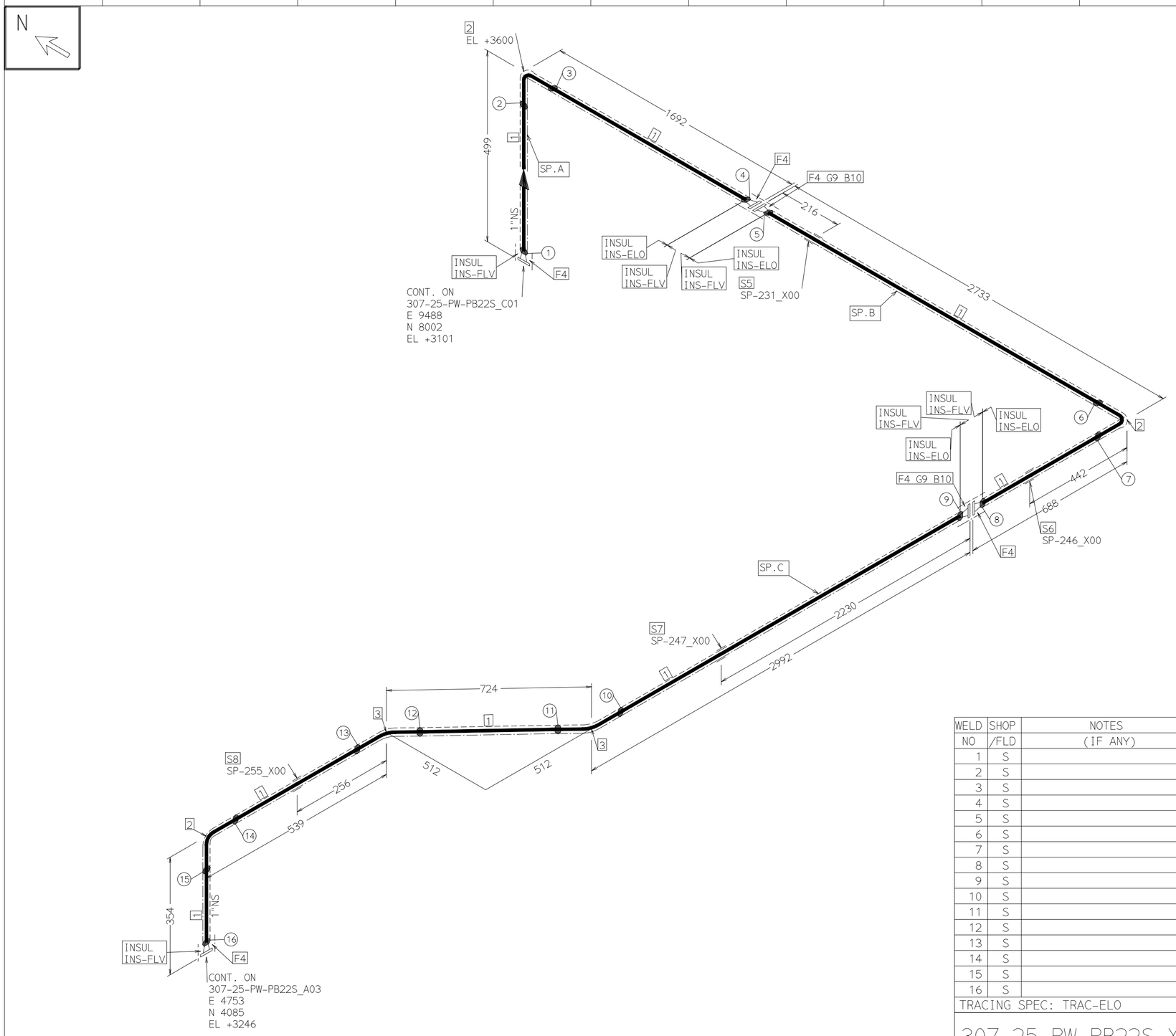
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	19	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	9.5M	23.75
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	3	0.45
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E45RSS00860100	2	0.14
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLW0SS03270100	6	12.00
	SUPPORTS				
5	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
6	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
7	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
8	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL FABRICATION WEIGHT		53.94

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
10	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
			TOTAL ERECTION WEIGHT		1.98
			TOTAL WEIGHT		55.92

SPOOL NUMBERS:
SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

TRACING SPEC: TRAC-ELO

307-25-PW-PB22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS	
P&ID :	C63-PID-001-001/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	997	THICKNESS (mm):		TEST PRESS. (barg) :	57,2
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid			FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-307	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :		OP. PRESS. (barg) :	12						VISUAL 100% ALL WELDS

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

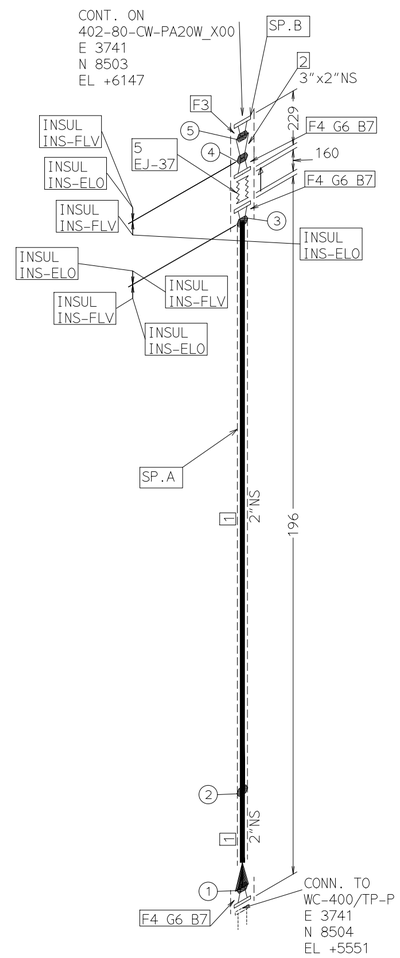
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	20	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.1M	0.34
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		13.94

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
5	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
7	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		22.60

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	

400-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

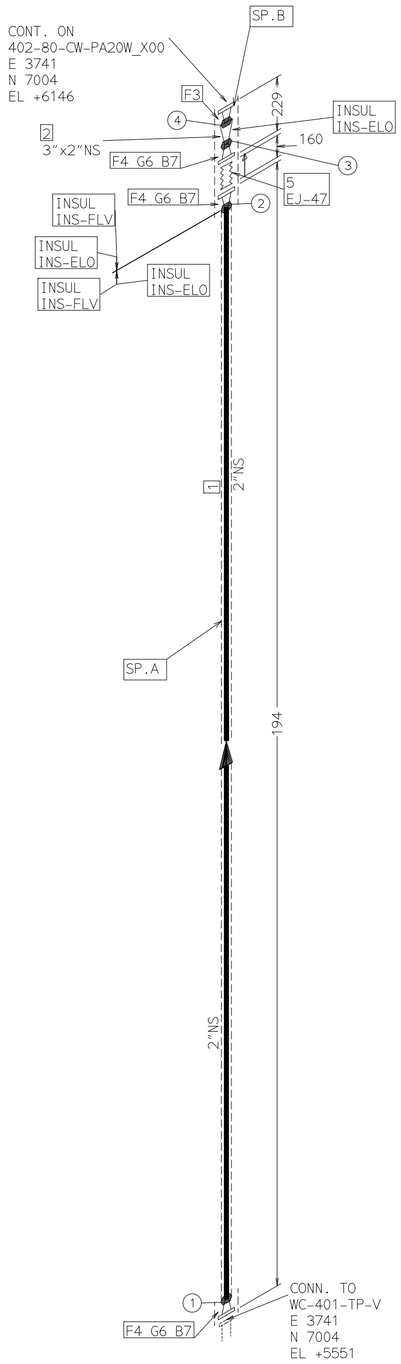
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	21	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.1M	0.33
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10

TOTAL FABRICATION WEIGHT 13.93

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
5	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
7	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86

TOTAL ERECTION WEIGHT 8.66

TOTAL WEIGHT 22.59

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

401-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

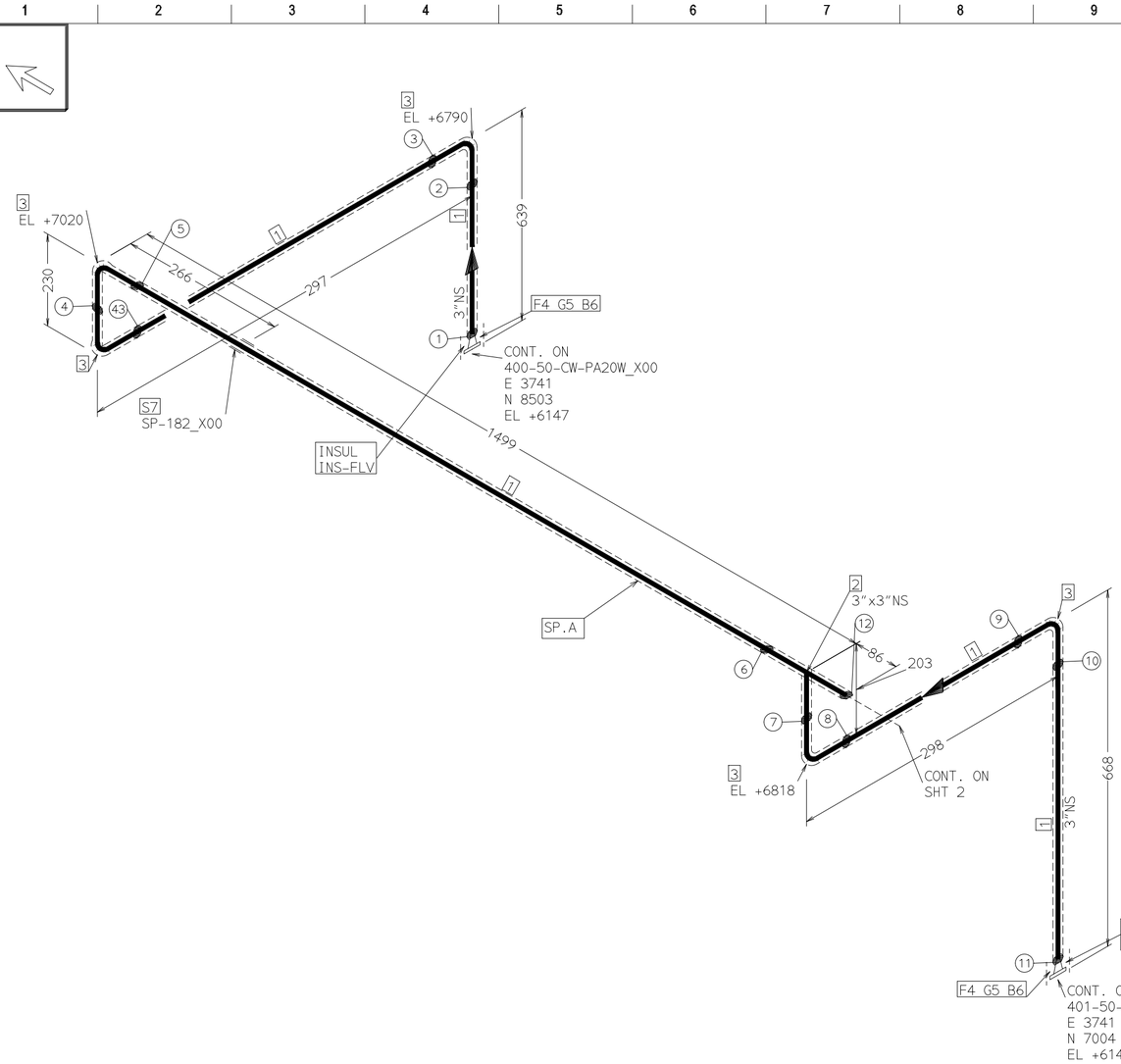
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	22	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	2.4M	26.53
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 3	TEE0SS02330300	1	3.80
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	5	10.00
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		49.33

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
7	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		7.58
			TOTAL WEIGHT		56.91

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
43	S	

402-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

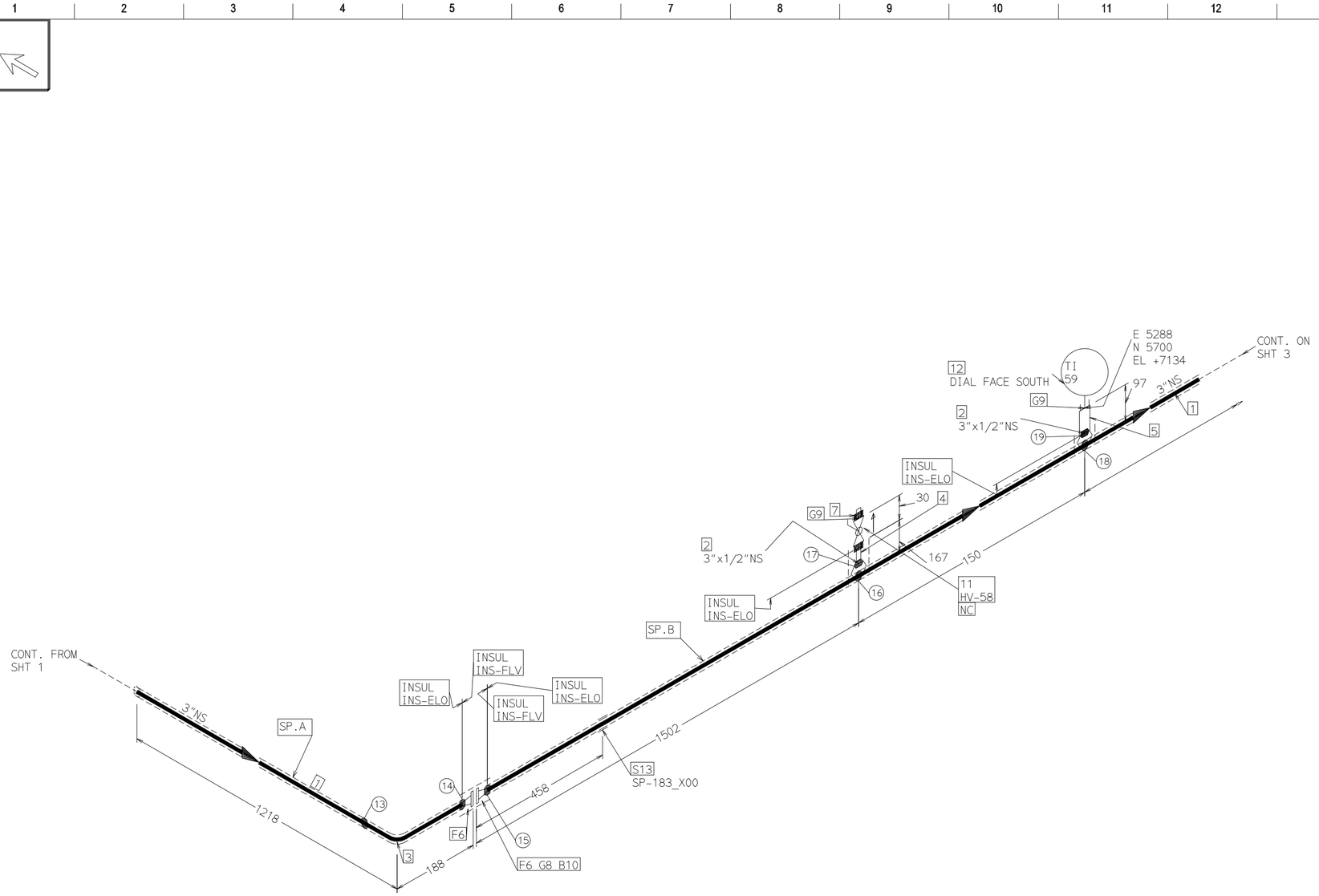
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 23
SHEET - OF: 1 / 5
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	2.9M	31.98
	FITTINGS				
2	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	3 x 1/2	OWELSS0982030H	2	0.20
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	1	2.00
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
5	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		43.44

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
9	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	2	0.02
	BOLTS				
10	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	VALVES / IN-LINE ITEMS				
11	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	INSTRUMENTS				
12	TEMPERATURE INDICATOR, CGR 293C, BSPPM TI 59	1/2	BY CLIENT	1	0.34
	SUPPORTS				
13	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		7.15
			TOTAL WEIGHT		50.59

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	

402-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

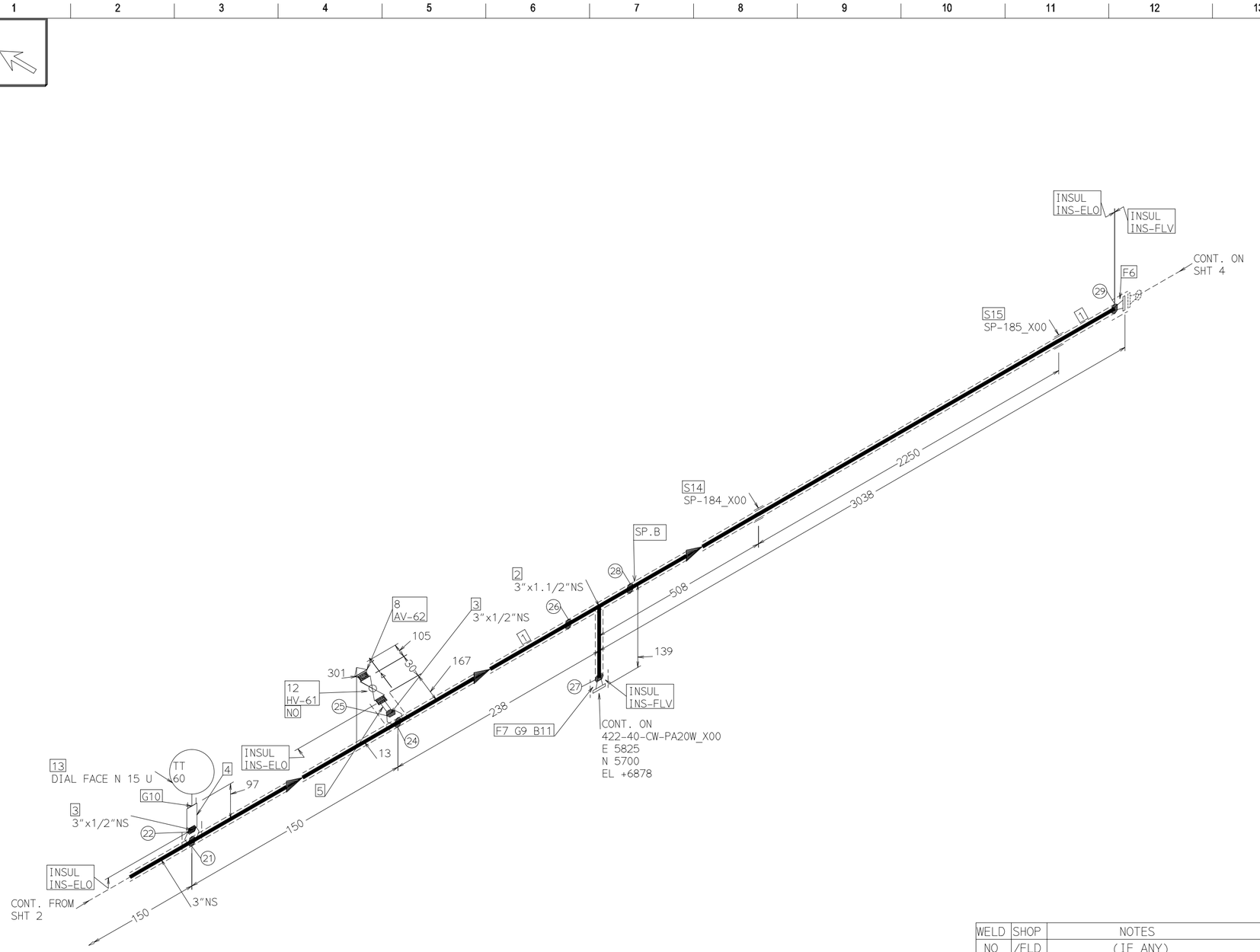
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	23	2 / 5	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	3.2M	35.94
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 1.1/2	TERSS1117031H	1	2.90
3	WELDOLET MSS SP-97, Sch.40S x 80S ASTM A182 Gr.F304/304L	3 x 1/2	OWELSS0982030H	2	0.20
4	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
5	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	1/2	N100SS02730H00	1	0.16
	FLANGES				
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	1	4.50
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLW0SS07531H00	1	1.80
			TOTAL FABRICATION WEIGHT		45.60

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
8	AUTOMATIC AIR BLEEDER, CGR R3, BSPP-M	1/2	BY CLIENT	1	0.30
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	1	0.07
10	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
11	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
	VALVES / IN-LINE ITEMS				
12	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1/2	BY CLIENT	1	0.28
	INSTRUMENTS				
13	TEMPERATURE TRANSMITTER, PRODUAL TEAT LL, BSPTM TT 60	1/2	BY CLIENT	1	1.00
	SUPPORTS				
14	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
15	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30

TOTAL ERECTION WEIGHT 12.91

TOTAL WEIGHT 58.51

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
21	S	
22	S	
24	S	
25	S	
26	S	
27	S	
28	S	
29	S	

402-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

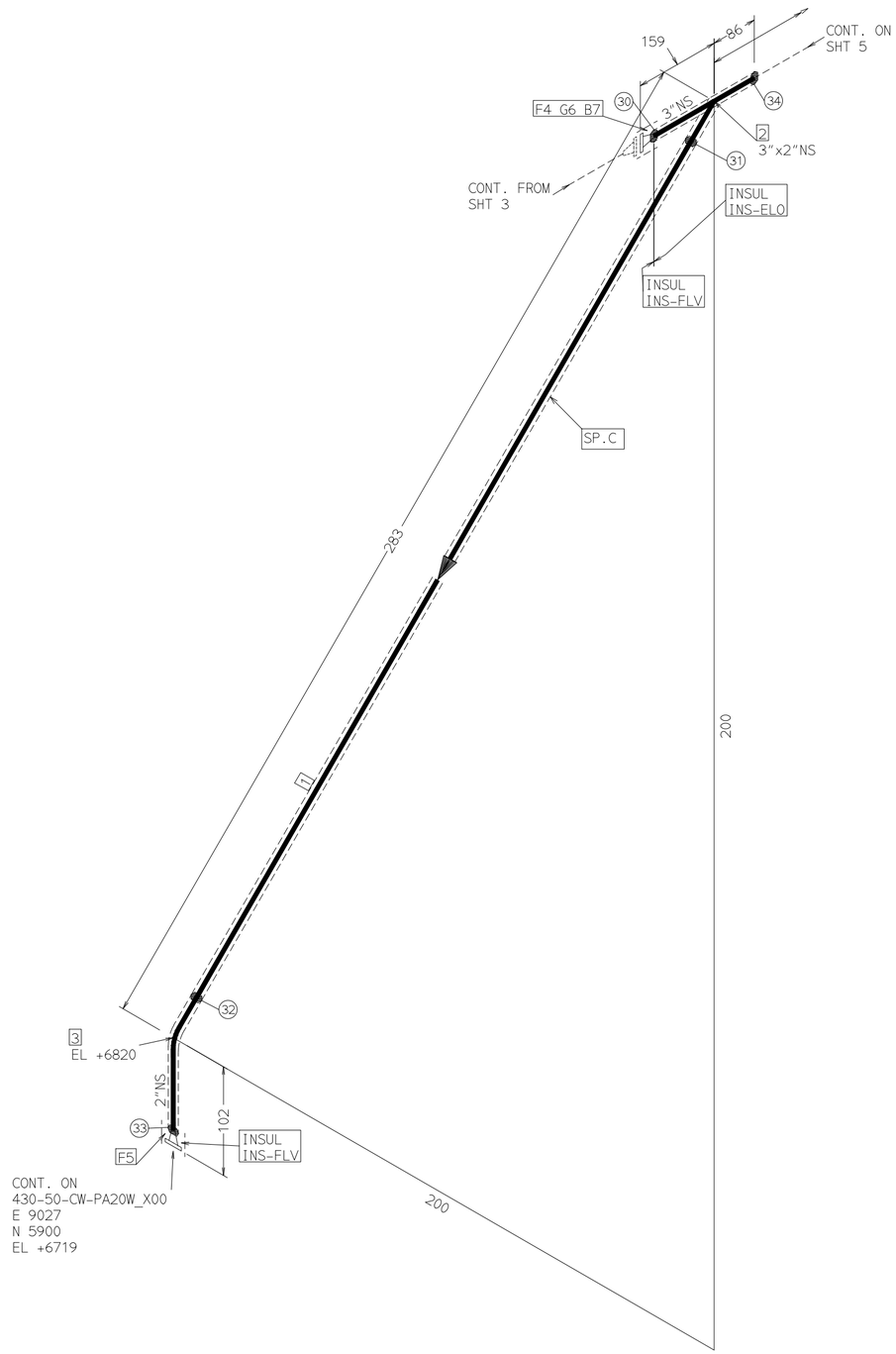
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 23

SHEET - OF: 3 / 5

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.2M	0.94
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	TERSS09300302	1	2.90
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	1	0.32
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	1	2.70
			TOTAL FABRICATION WEIGHT		11.36

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
7	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
			TOTAL ERECTION WEIGHT		1.14
			TOTAL WEIGHT		12.50

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
30	S	
31	S	
32	S	
33	S	
34	S	

402-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

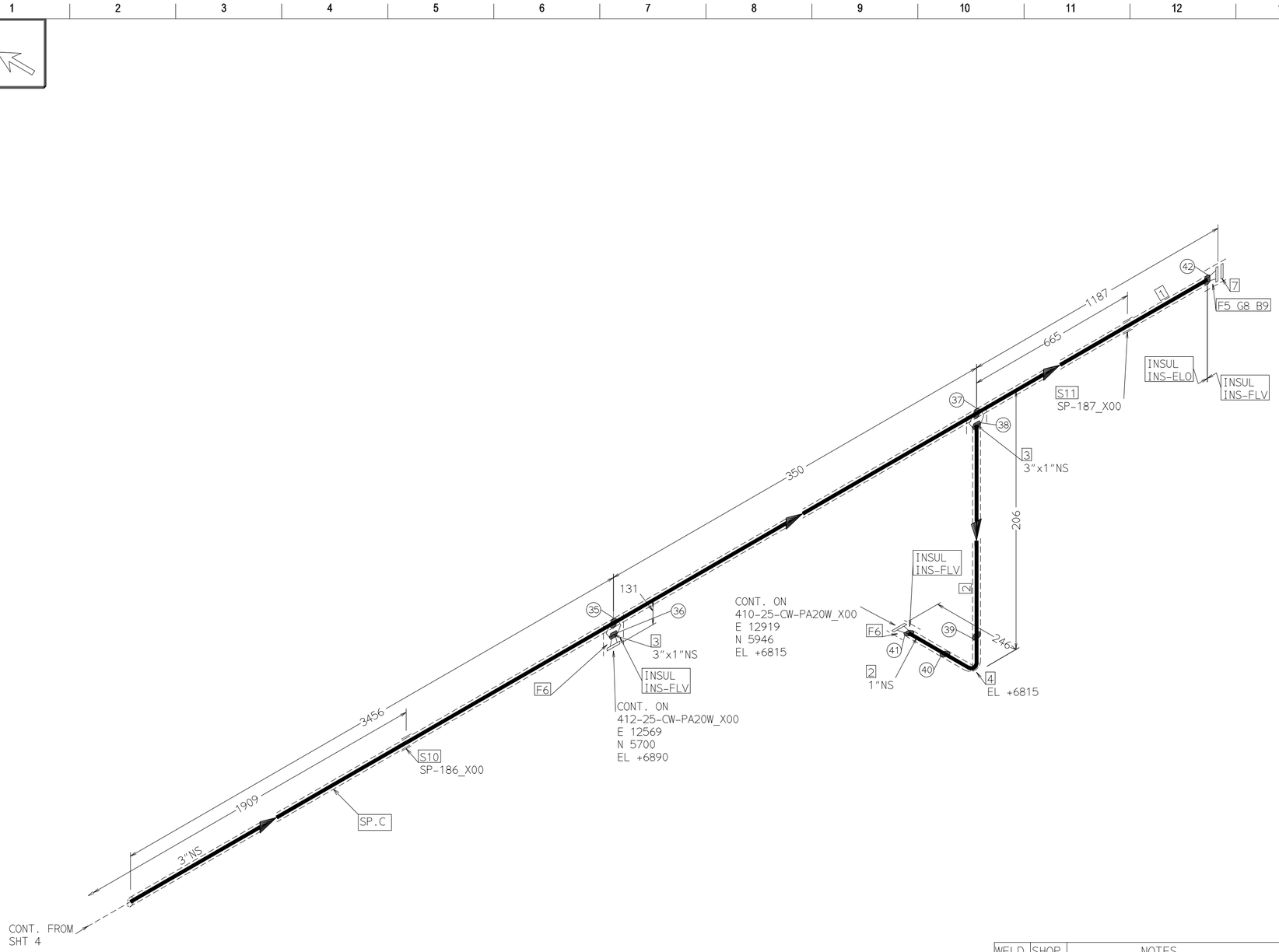
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 23

SHEET - OF: 4 / 5

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	5.0M	55.56
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.3M	0.62
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S ASTM A182 Gr.F304/304L	3 x 1	OWELSS09840301	2	0.46
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	1	0.15
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	2	2.20
			TOTAL FABRICATION WEIGHT		63.49

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
7	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F304/304L	3	FLB0SS02110300	1	5.50
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
9	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	SUPPORTS				
10	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
11	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		17.24
			TOTAL WEIGHT		80.73

SPOOL NUMBERS:

SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
35	S	
36	S	
37	S	
38	S	
39	S	
40	S	
41	S	
42	S	

402-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

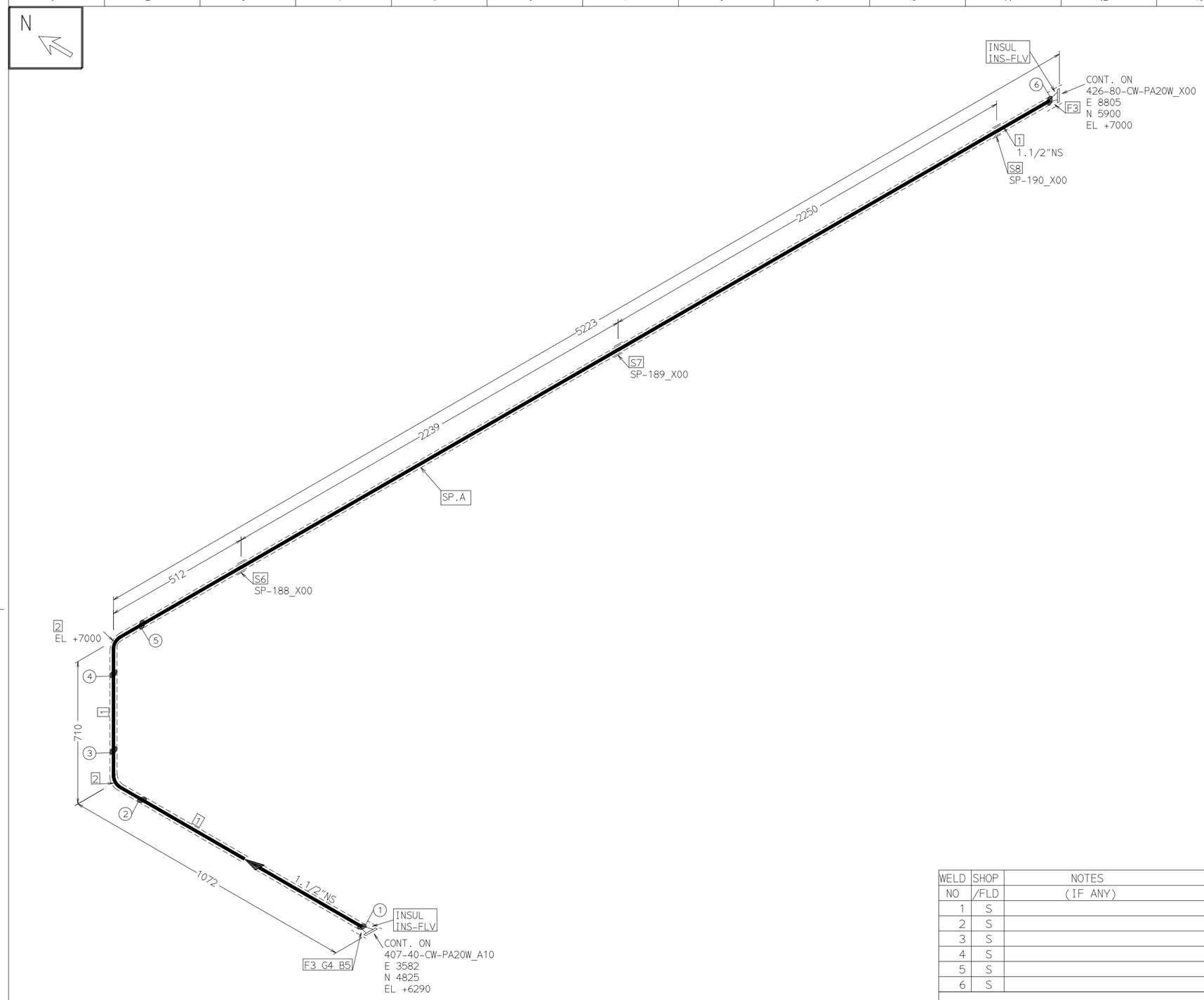
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	23	5 / 5	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	6.7M	26.88
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	2	0.80
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLWOSS07531H00	2	3.60
			TOTAL FABRICATION WEIGHT		31.28

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	1	0.07
	BOLTS				
5	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
	SUPPORTS				
6	PIPE SHOE, S-64-DN40-110-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
7	PIPE SHOE, S-64-DN40-110-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
8	PIPE SHOE, S-64-DN40-110-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		13.92
			TOTAL WEIGHT		45.20

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	

407-40-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,9					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

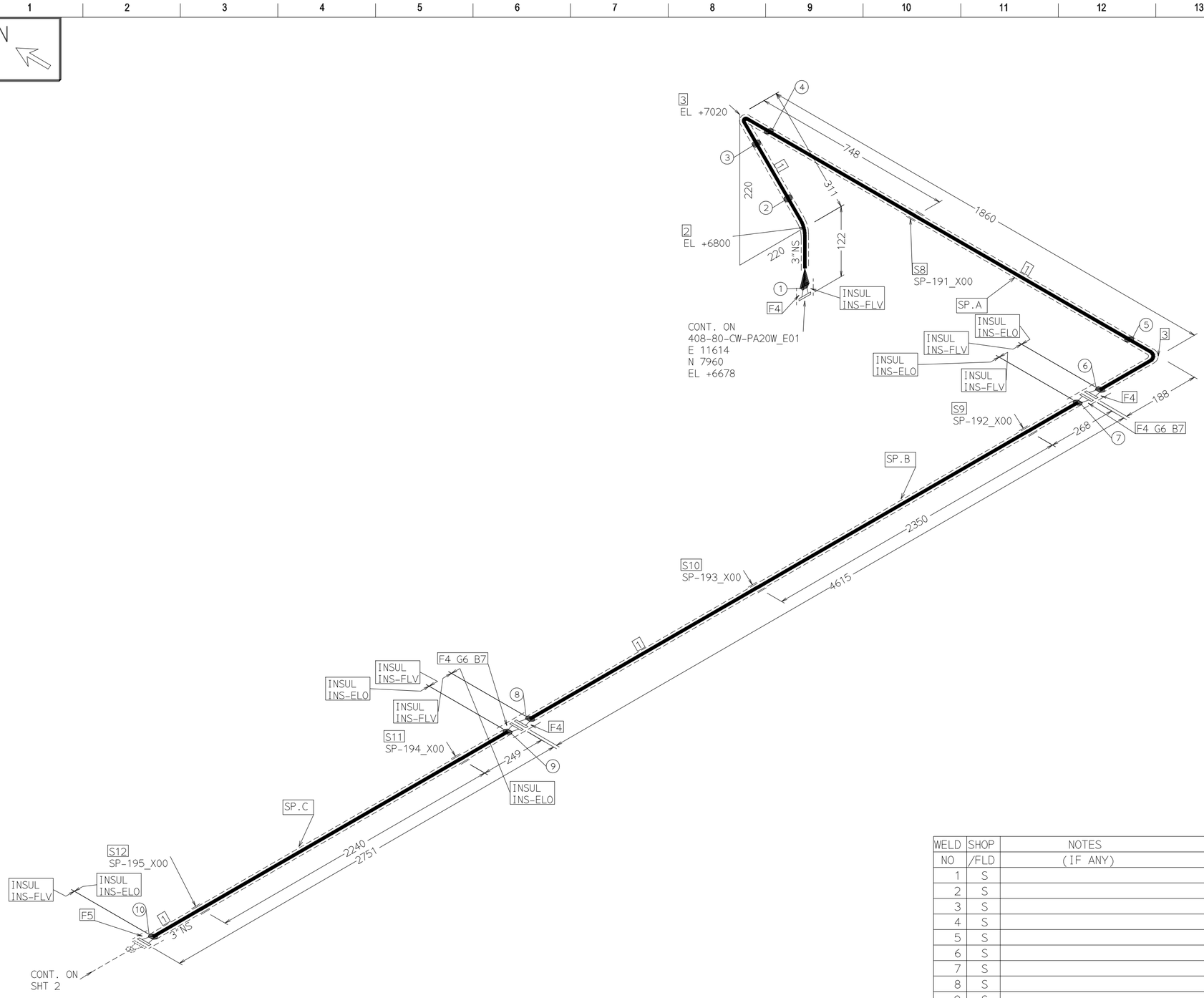
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	24	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	8.9M	99.74
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E45RSS02020300	1	1.00
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	2	4.00
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	5	22.50
5	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06410300	1	7.00

TOTAL FABRICATION WEIGHT 134.24

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
7	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
8	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
9	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
10	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
11	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
12	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30

TOTAL ERECTION WEIGHT 28.78

TOTAL WEIGHT 163.02

SPOOL NUMBERS:
SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

408-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):		TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	HR-408	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD | FIELD WELD | SOCKET WELD | SCREWED JOINT | COMPR.N JOINT | SITE CONNECTION | PIPE SUPPORT / ATTACHMENT | PIPE INSULATION | PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

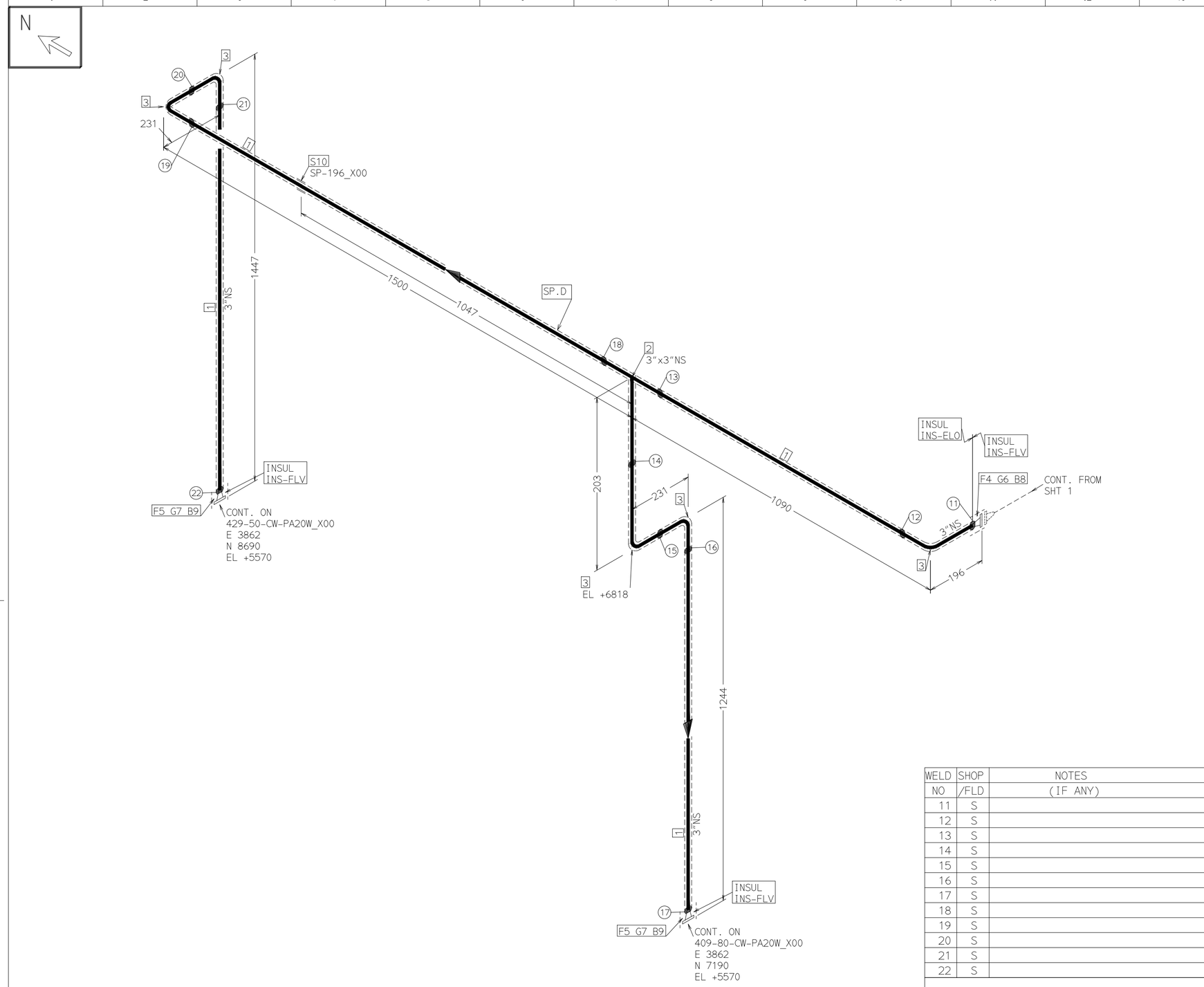
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 25

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	4.6M	50.90
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 3	TEE0SS02330300	1	3.80
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	5	10.00
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06410300	1	7.00
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	2	9.00
			TOTAL FABRICATION WEIGHT		80.70

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00510300	1	0.21
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
8	110 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	3/4	SB20B063030400	8	3.82
9	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
10	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		11.61
			TOTAL WEIGHT		92.31

SPOOL NUMBERS:
SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	
22	S	

408-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS	NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) : 8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID : WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING : HR-408	NDT : 100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

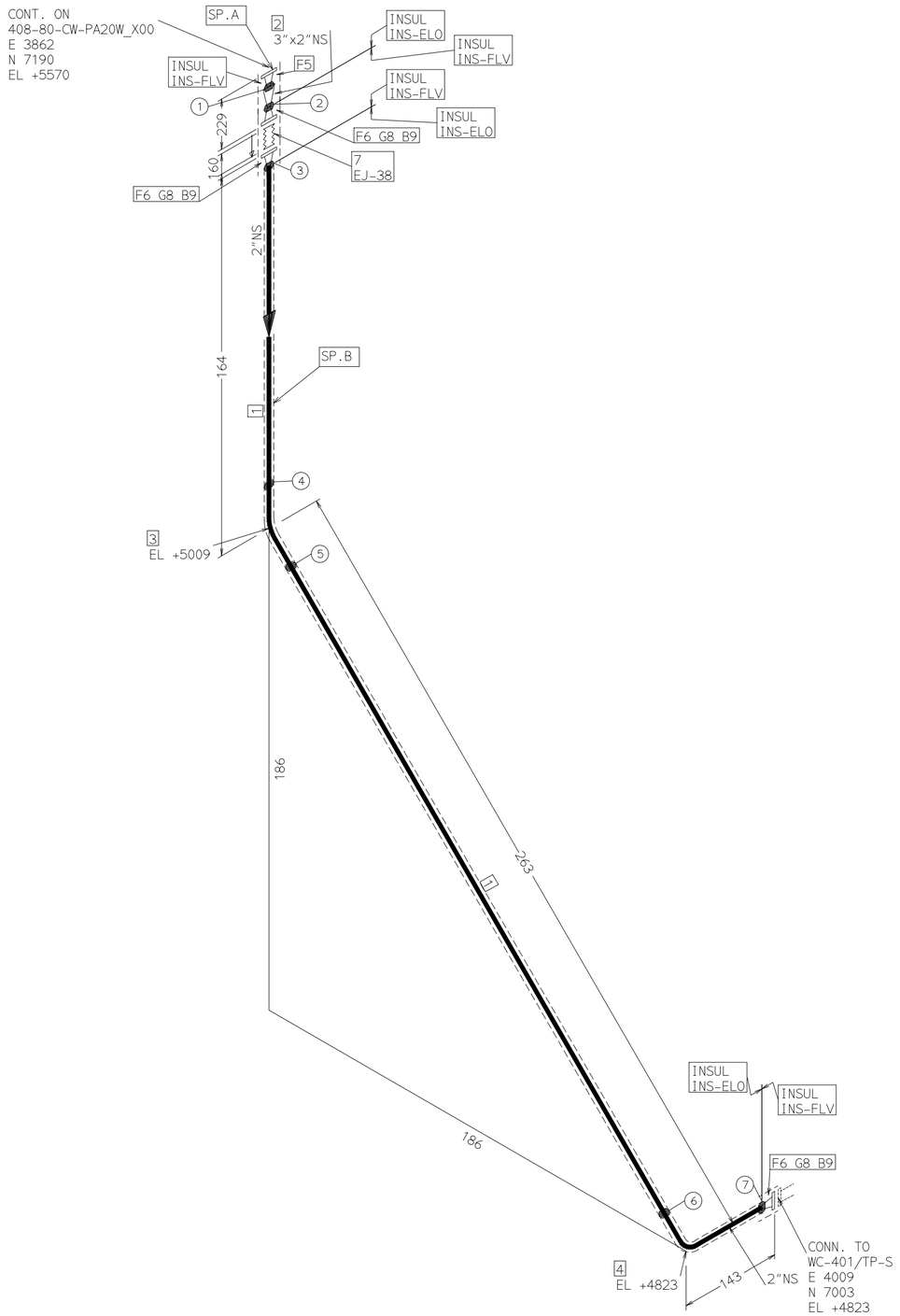
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	25	2 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.3M	1.13
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	1	0.32
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		15.70

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		24.36

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

409-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

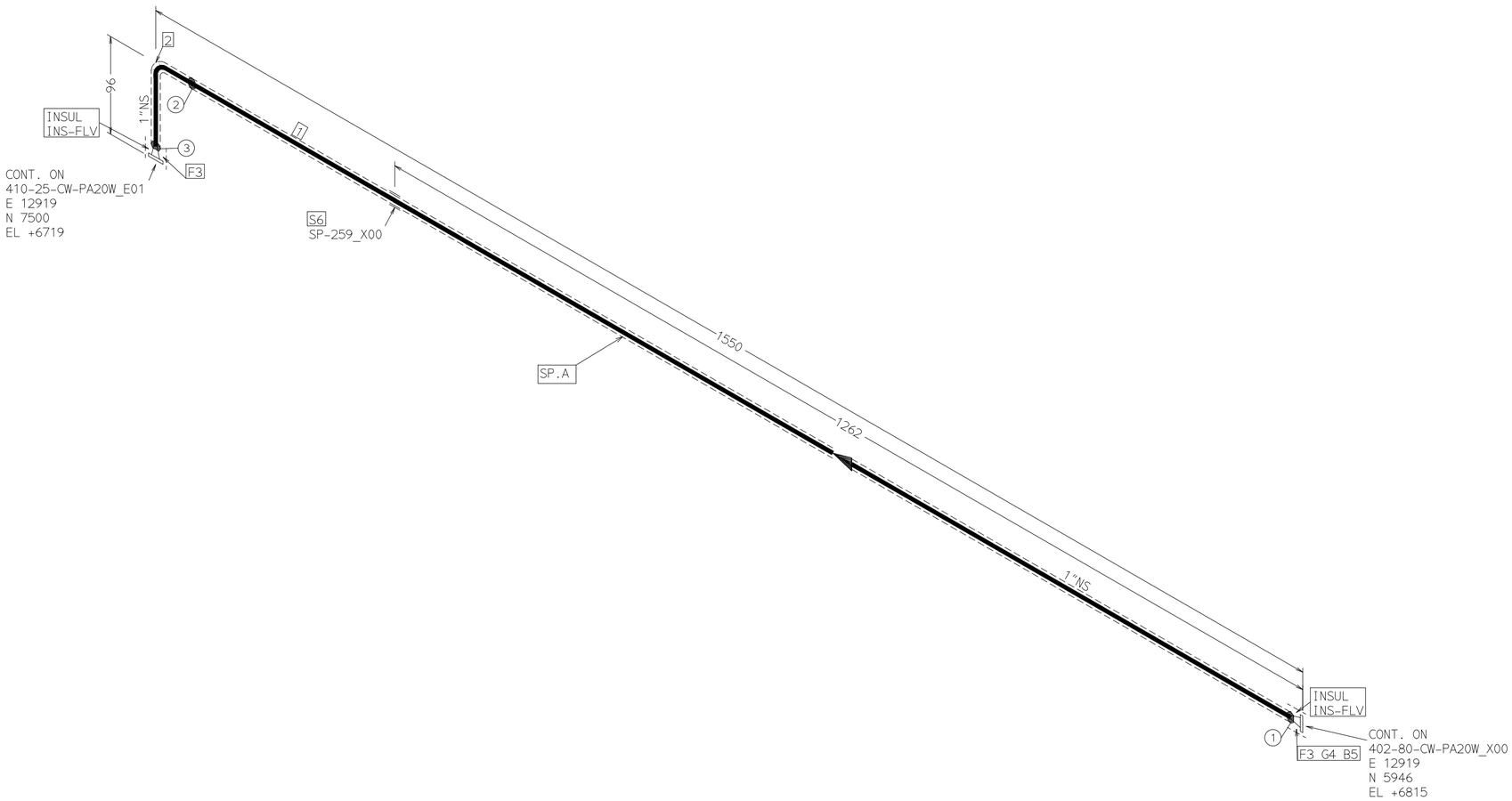
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 13
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	1.5M	3.63
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	1	0.15
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLWOSS07520100	2	2.20
			TOTAL FABRICATION WEIGHT		5.98

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
	BOLTS				
5	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
	SUPPORTS				
6	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		5.08
			TOTAL WEIGHT		11.06

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	

410-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

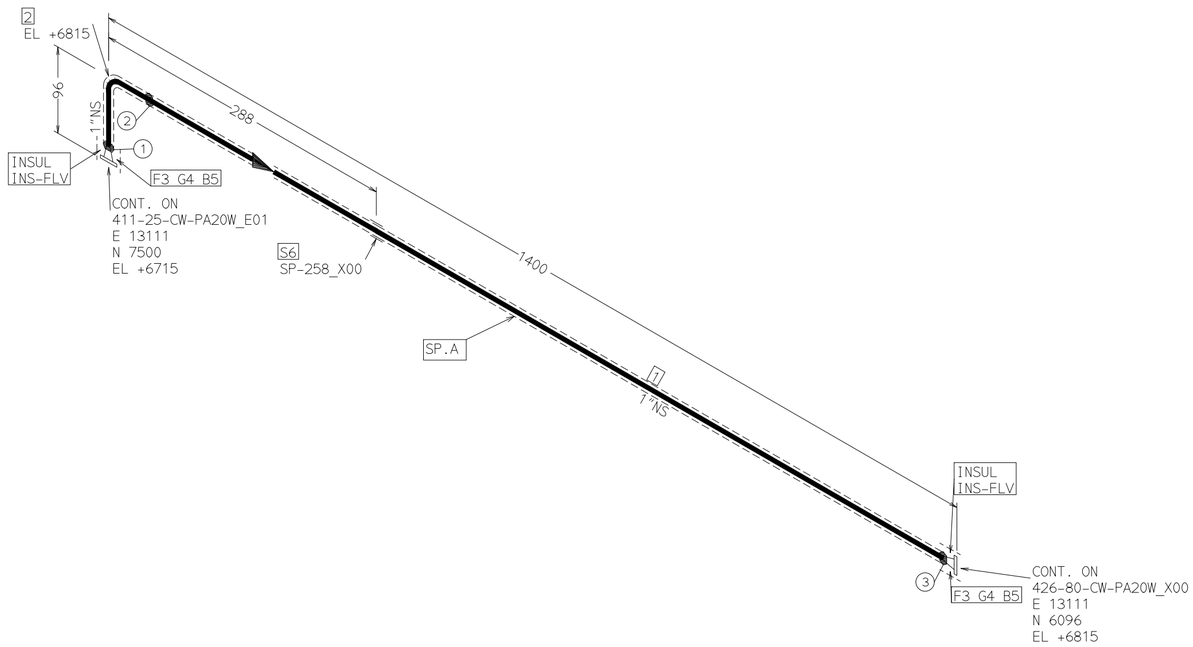
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	27	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	1.4M	3.26
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	1	0.15
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLWOSS07520100	2	2.20
			TOTAL FABRICATION WEIGHT		5.61

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	2	0.12
	BOLTS				
5	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.24
	SUPPORTS				
6	PIPE SHOE, S-64-DN25-70-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		5.76
			TOTAL WEIGHT		11.37

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	

411-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

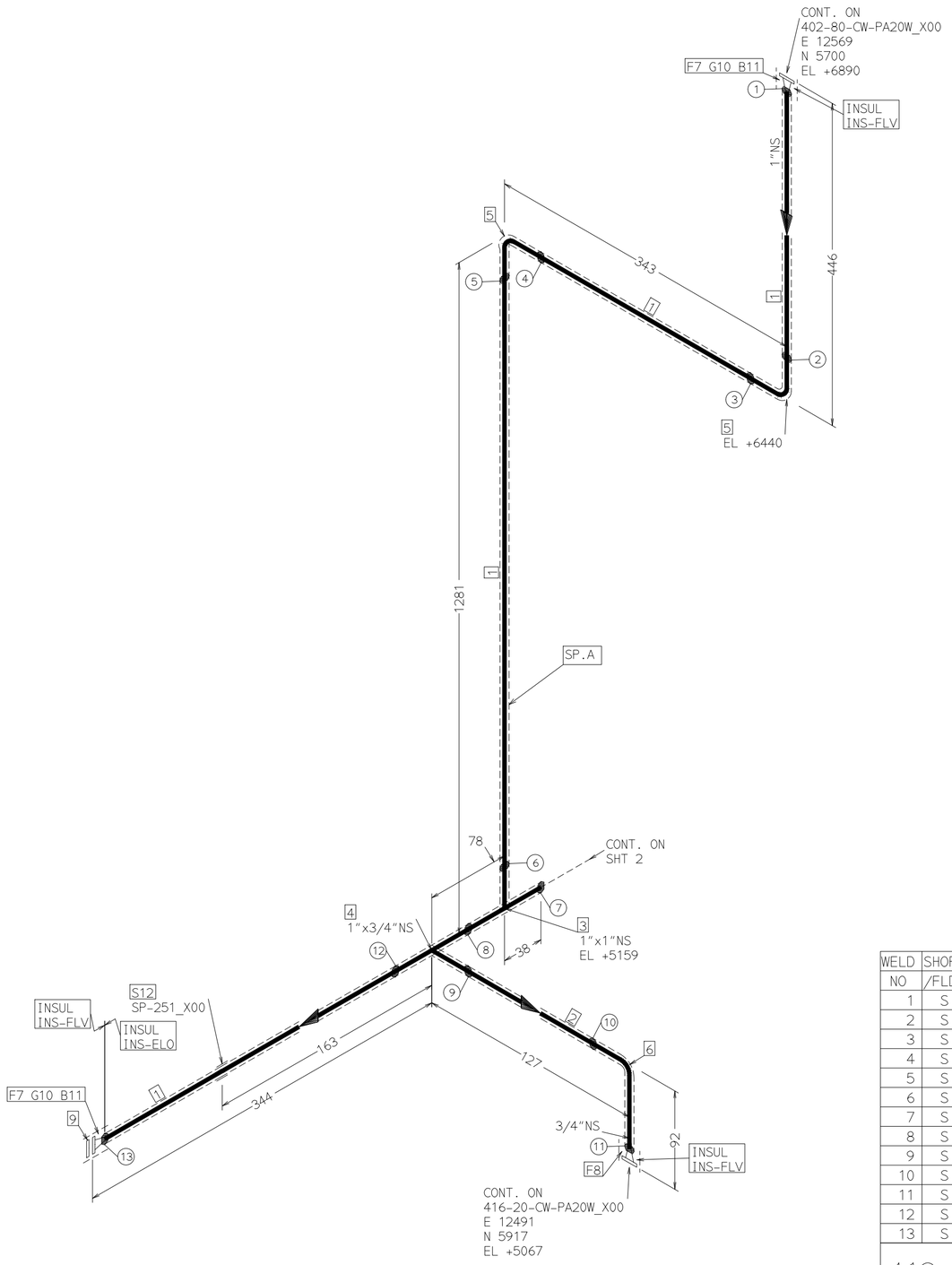
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	28	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	2.1M	5.14
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	0.1M	0.10
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1 x 1	TEE0SS01640100	1	0.29
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 3/4	TER0SS11010130	1	0.35
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	2	0.30
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	2	2.20
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	1	0.80

TOTAL FABRICATION WEIGHT 9.38

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
9	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F304/304L	1	FLB0SS02080100	1	1.40
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	2	0.12
	BOLTS				
11	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.24
	SUPPORTS				
12	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40

TOTAL ERECTION WEIGHT 7.16

TOTAL WEIGHT 16.54

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

412-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

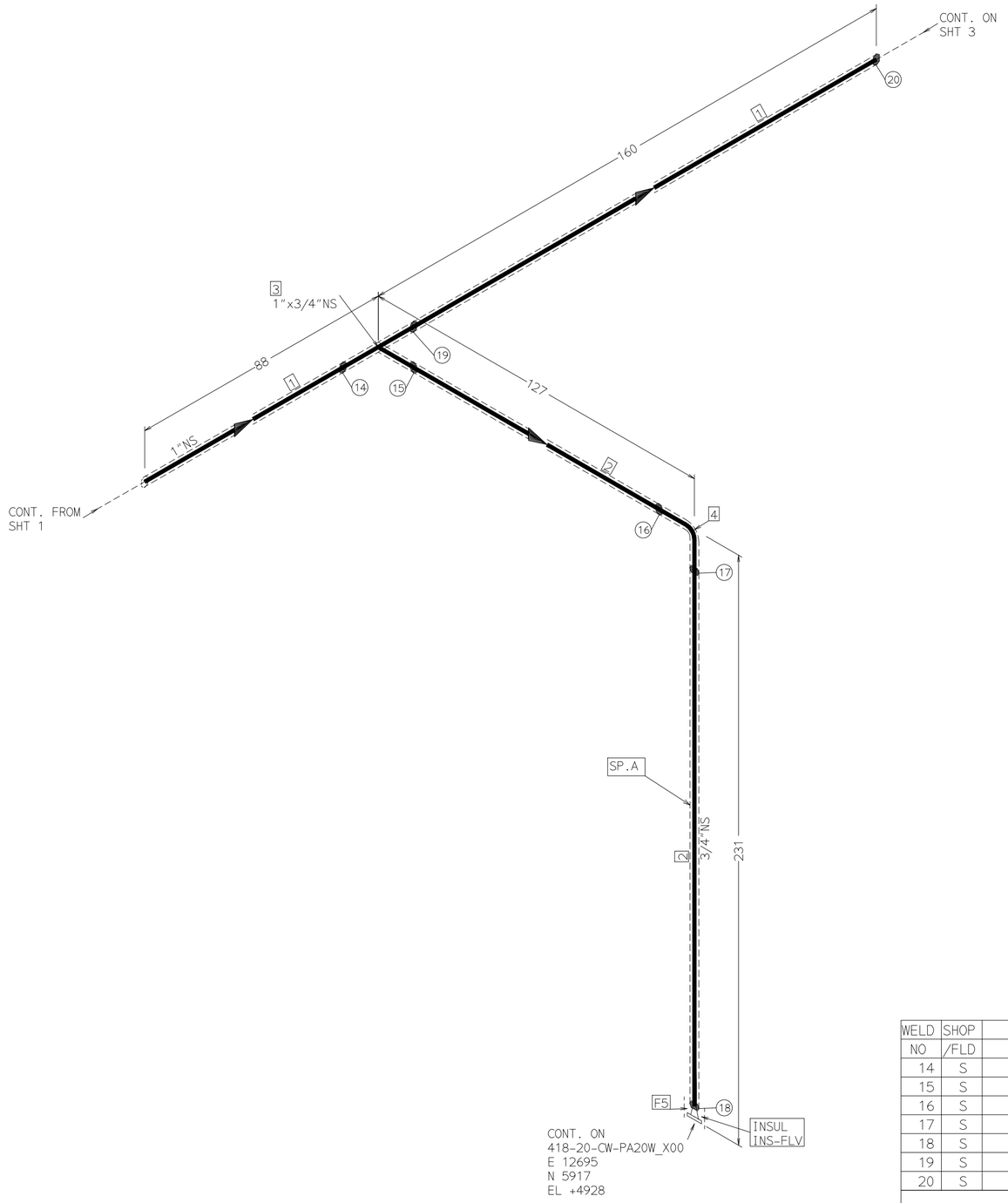
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 29

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.2M	0.43
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	0.2M	0.42
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 3/4	TEROSS1101013Q	1	0.35
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLWOSS07563Q00	1	0.80

TOTAL FABRICATION WEIGHT 2.20

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	

412-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

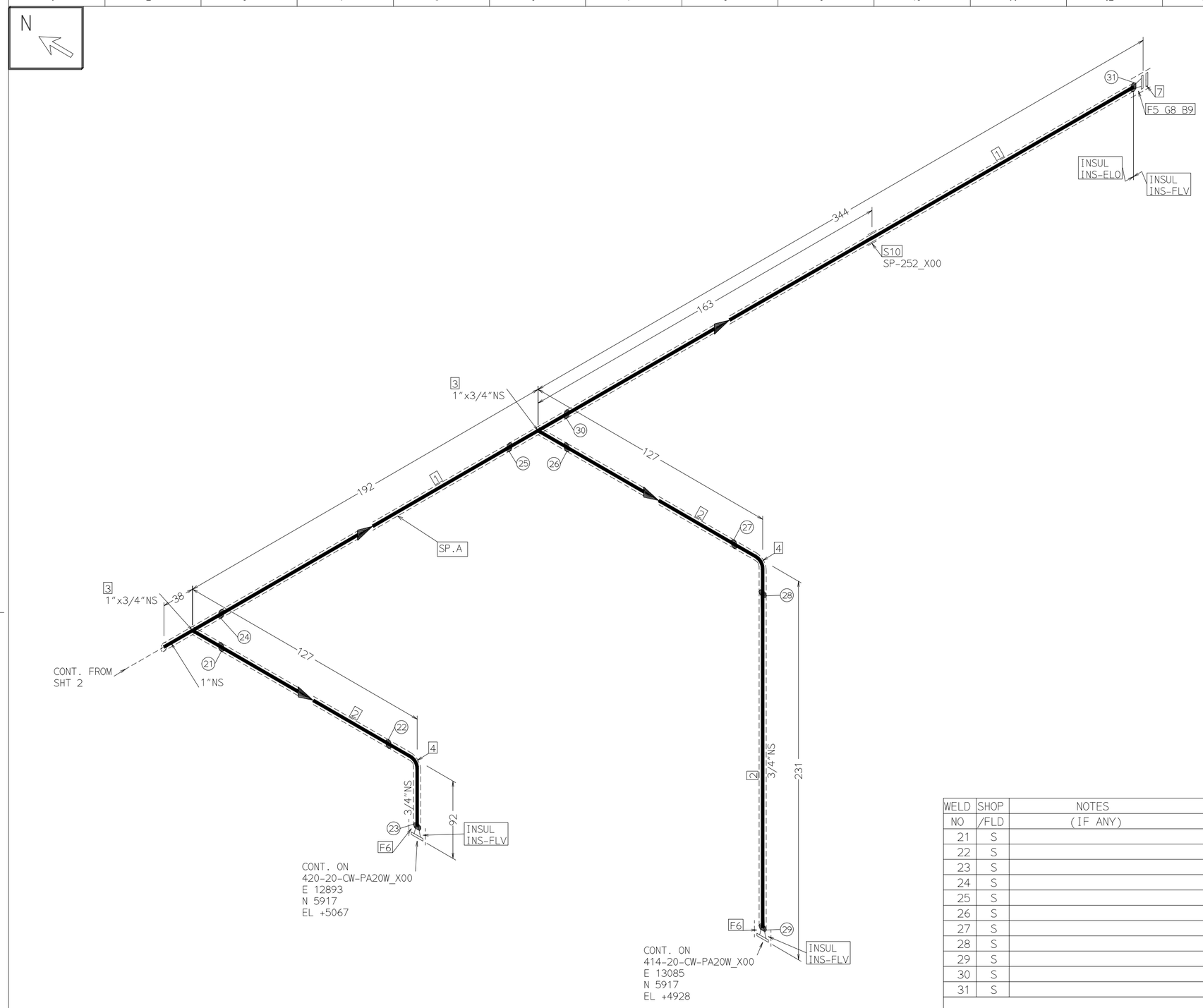
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 29

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.4M	0.91
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	0.3M	0.53
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 3/4	TERSS1101013Q	2	0.70
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	2	0.40
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLWOSS07520100	1	1.10
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLWOSS07563Q00	2	1.60
			TOTAL FABRICATION WEIGHT		5.24

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
7	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F304/304L	1	FLBOSS02080100	1	1.40
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
	BOLTS				
9	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
	SUPPORTS				
10	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		6.48
			TOTAL WEIGHT		11.72

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	
29	S	
30	S	
31	S	

412-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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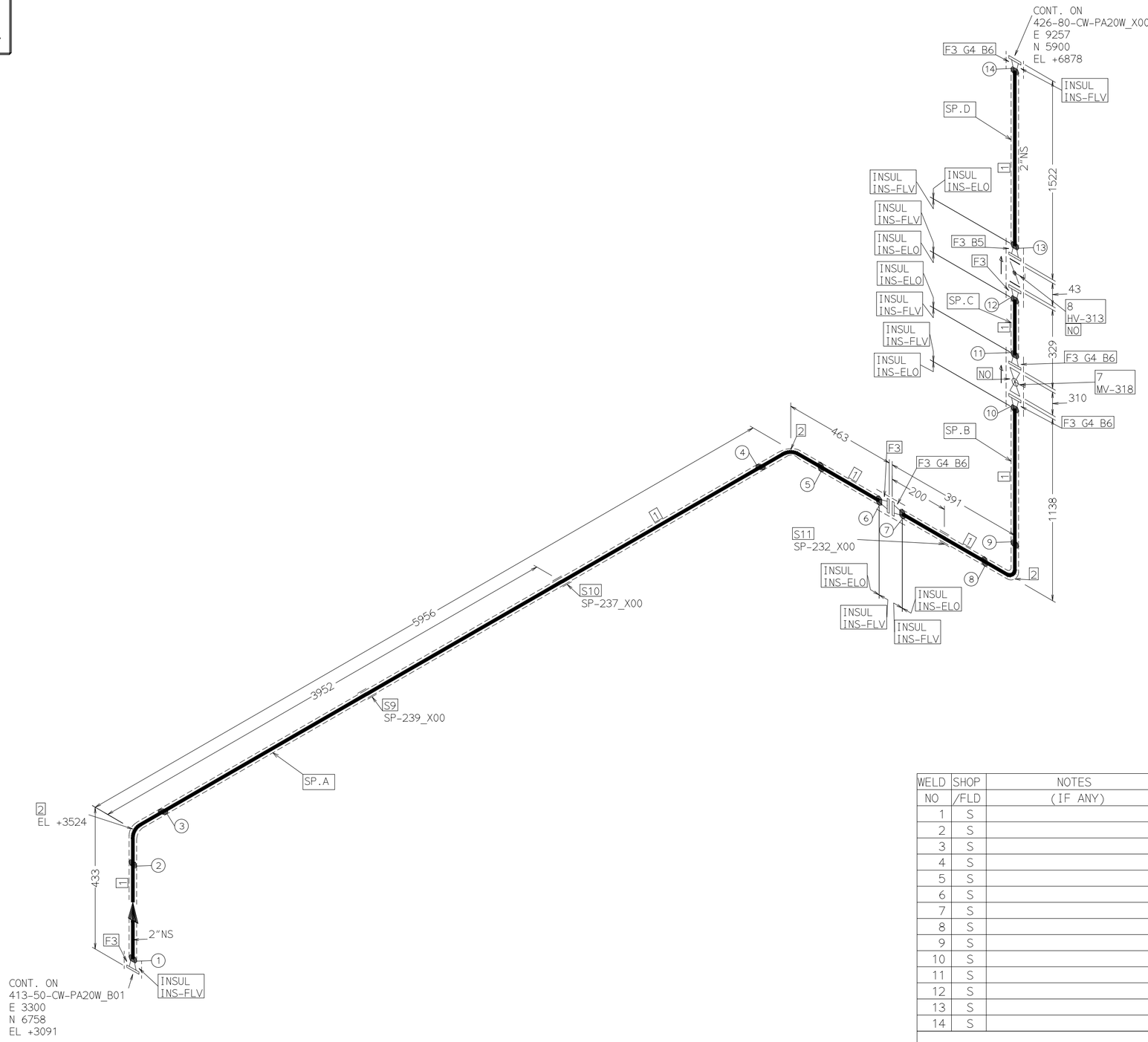
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	29	3 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	9.3M	50.21
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	3	1.95
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	8	21.60
			TOTAL FABRICATION WEIGHT		73.76

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	4	0.40
	BOLTS				
5	130 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	4	1.22
6	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	16	3.81
	VALVES / IN-LINE ITEMS				
7	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	2	BY CLIENT	1	7.70
8	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O.	2	BY CLIENT	1	4.00
	SUPPORTS				
9	PIPE SHOE, S-64-DN50-70-200, Carbon Steel	2	SUPPORT	1	4.80
10	PIPE SHOE, S-64-DN50-70-200, Carbon Steel	2	SUPPORT	1	4.80
11	PIPE SHOE, S-64-DN50-70-200, Carbon Steel	2	SUPPORT	1	4.80
			TOTAL ERECTION WEIGHT		31.53
			TOTAL WEIGHT		105.29

SPOOL NUMBERS:

SP.A SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

413-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

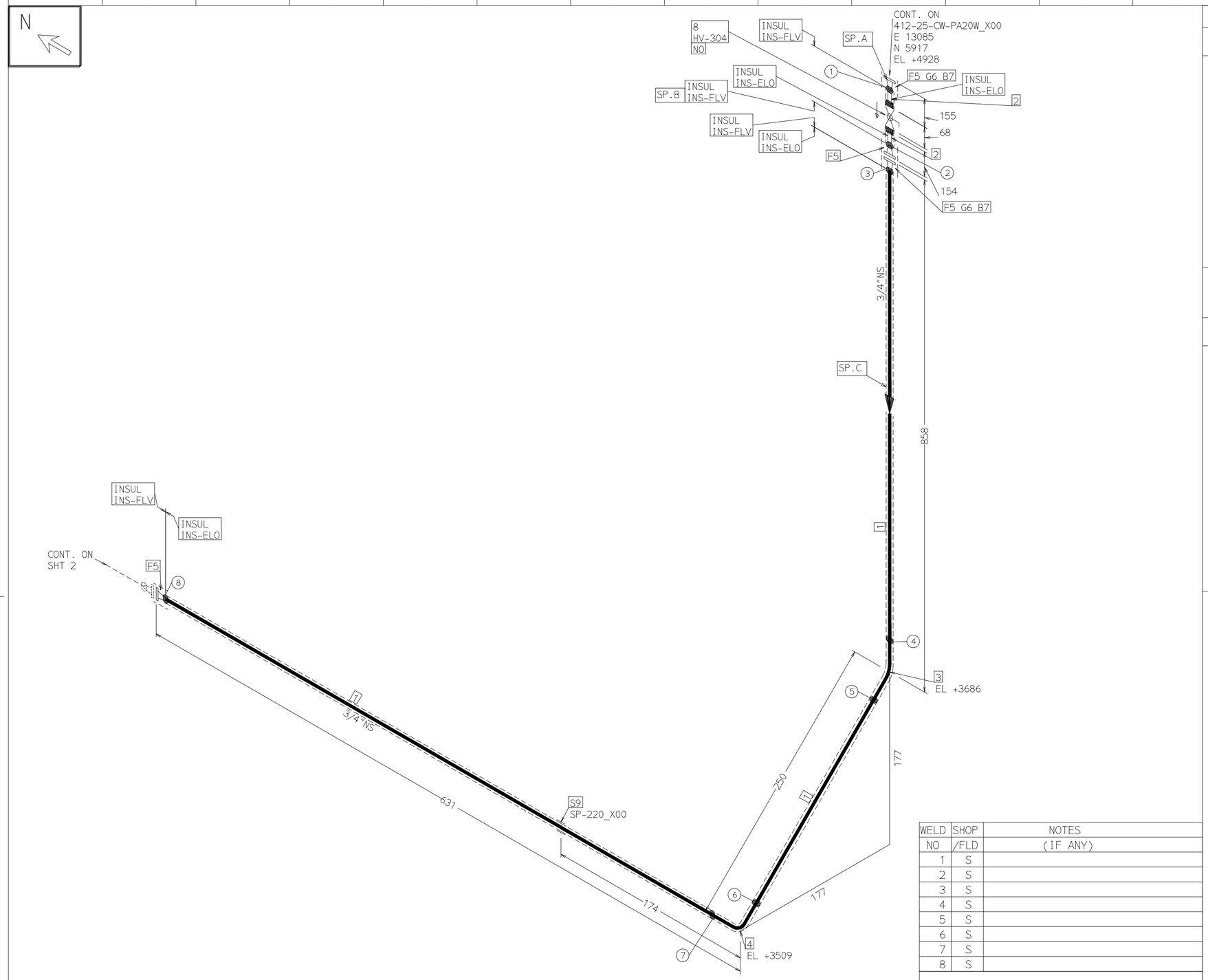
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 30

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

414-20-CW-PA20W_X00

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.6M	3.30
	FITTINGS				
2	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		7.22

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	2	0.10
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.18
	VALVES / IN-LINE ITEMS				
8	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		6.09
			TOTAL WEIGHT		13.31

SPOOL NUMBERS:
SP.A SP.B SP.C

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

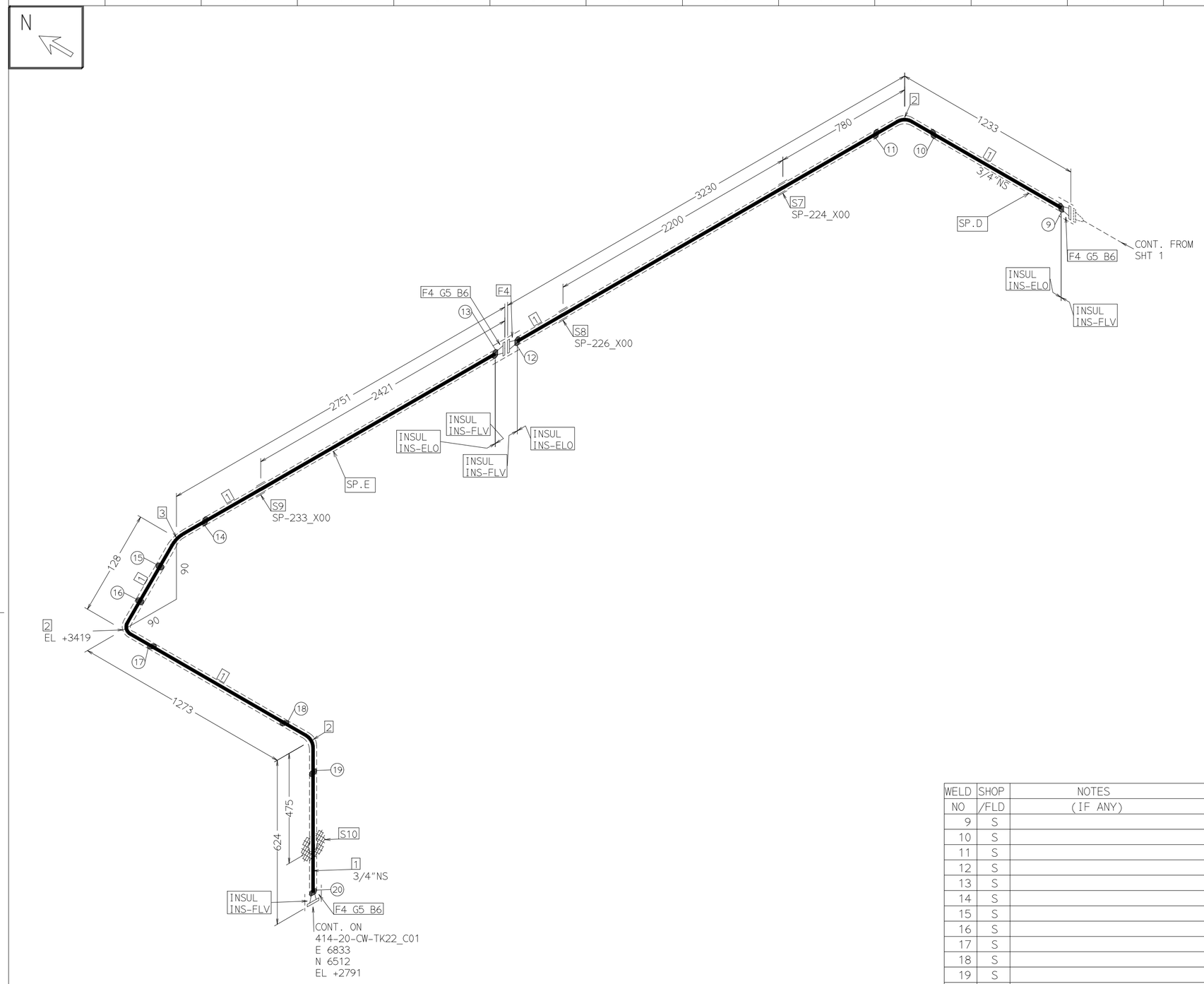
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 31

SHEET - OF: 1 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	8.8M	19.18
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	3	0.60
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		23.06

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	3	0.15
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	12	1.78
	SUPPORTS				
7	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
8	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
10	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
			TOTAL ERECTION WEIGHT		18.53
			TOTAL WEIGHT		41.59

SPOOL NUMBERS:
SP.D SP.E

WELD NO	SHOP /FLD	NOTES (IF ANY)
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	

414-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

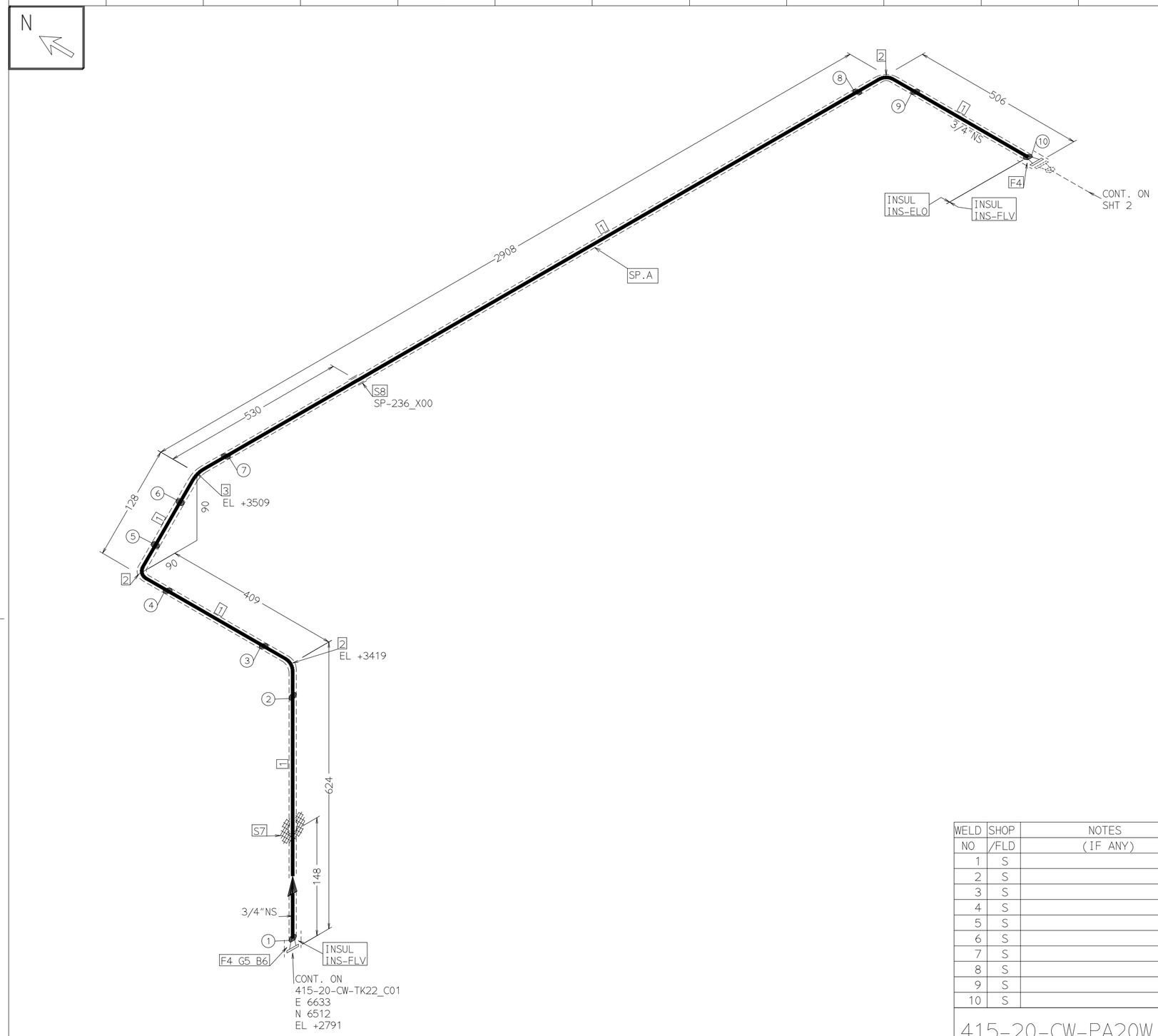
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 31
SHEET - OF: 2 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	4.2M	9.16
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	3	0.60
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	2	1.60
			TOTAL FABRICATION WEIGHT		11.44

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	1	0.05
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.59
	SUPPORTS				
7	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
8	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		8.44
			TOTAL WEIGHT		19.88

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

415-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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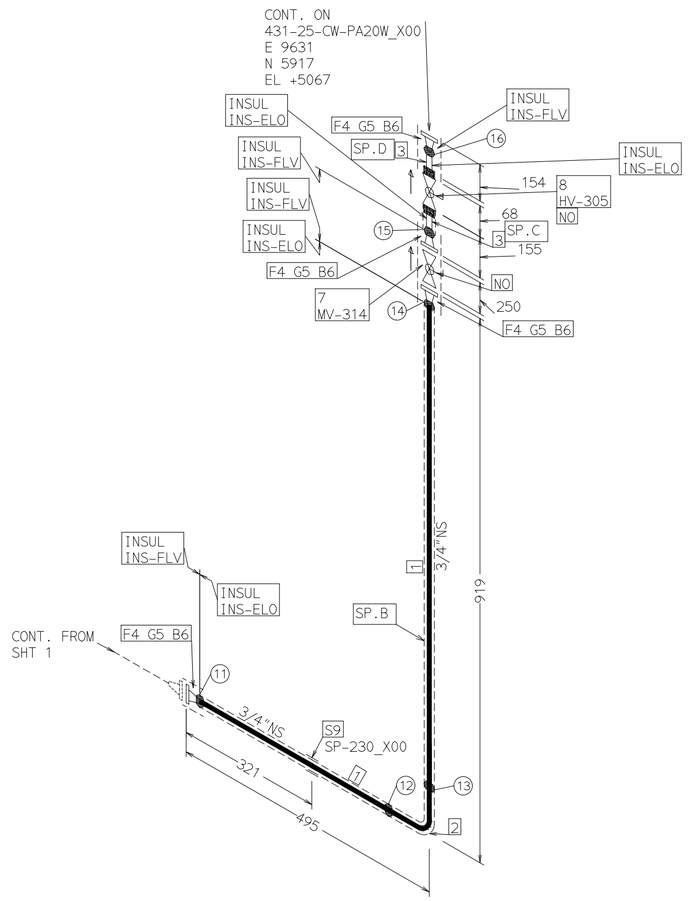
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	32	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.3M	2.70
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
3	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		6.54

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	4	0.20
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	16	2.37
	VALVES / IN-LINE ITEMS				
7	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	3/4	BY CLIENT	1	2.50
8	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		9.88
			TOTAL WEIGHT		16.42

SPOOL NUMBERS:
SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

415-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

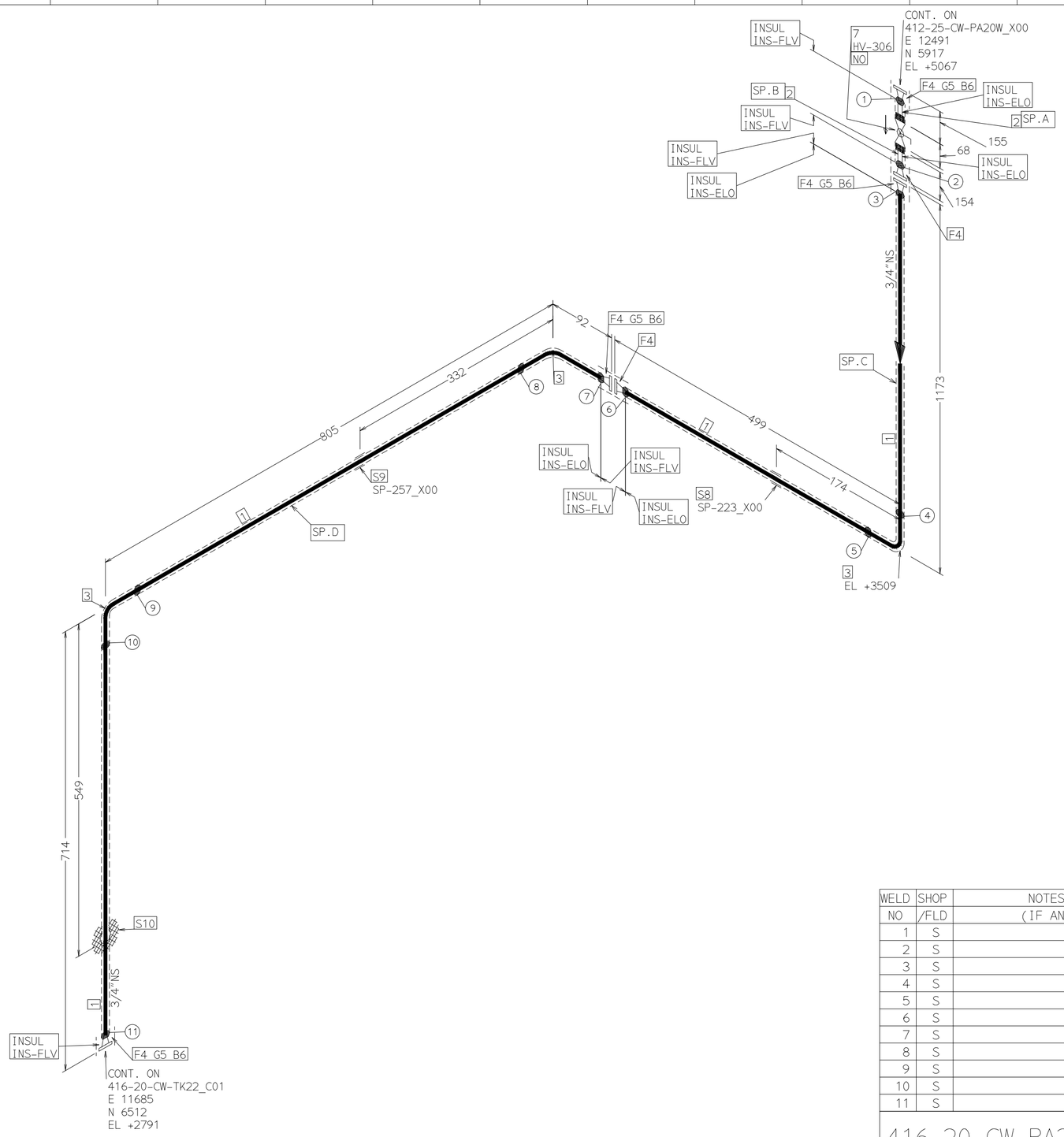
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 32
SHEET - OF: 2 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	2.9M	6.19
	FITTINGS				
2	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	3	0.60
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	6	4.80

TOTAL FABRICATION WEIGHT 12.03

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	4	0.20
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	16	2.37
	VALVES / IN-LINE ITEMS				
7	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
8	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
10	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40

TOTAL ERECTION WEIGHT 15.18

TOTAL WEIGHT 27.21

SPOOL NUMBERS:
SP.A SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

416-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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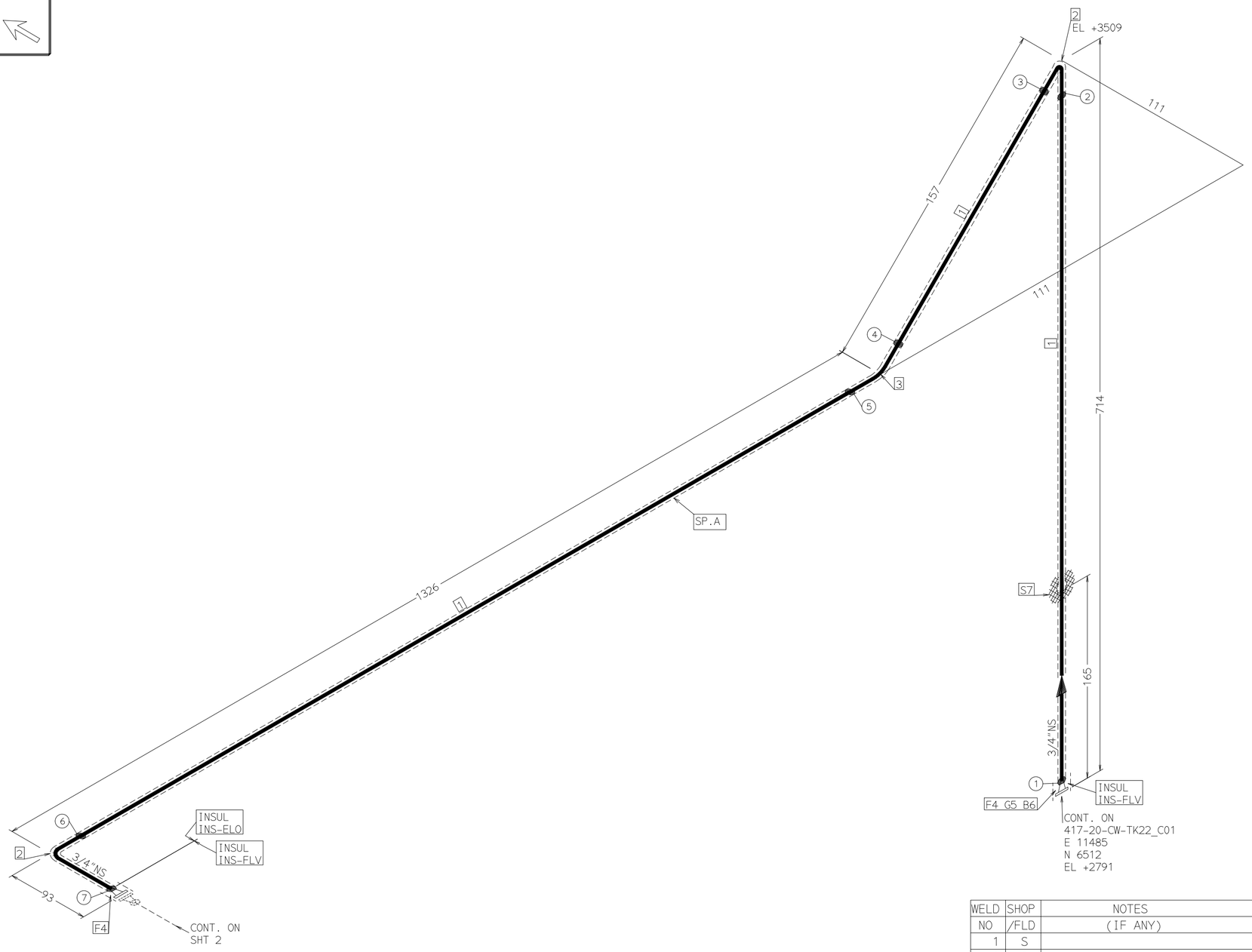
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 33
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	2.0M	4.34
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	2	0.40
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	2	1.60

TOTAL FABRICATION WEIGHT 6.42

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	1	0.05
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.59
	SUPPORTS				
7	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40

TOTAL ERECTION WEIGHT 4.04

TOTAL WEIGHT 10.46

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

417-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS			

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PROJECT:

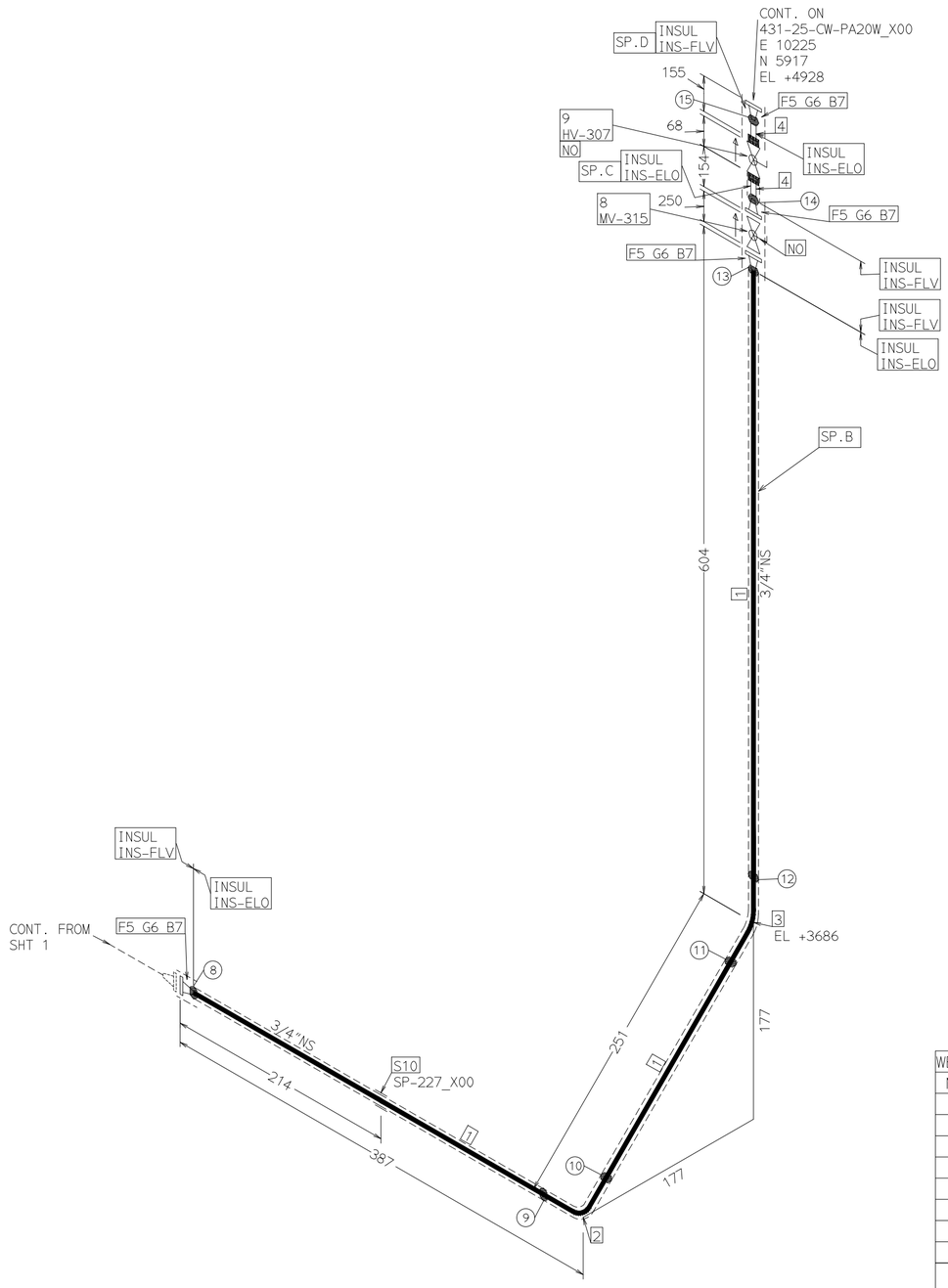
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	34	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.1M	2.24
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		6.16

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	4	0.20
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	16	2.37
	VALVES / IN-LINE ITEMS				
8	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	3/4	BY CLIENT	1	2.50
9	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
10	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		9.88
			TOTAL WEIGHT		16.04

SPOOL NUMBERS:
SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

417-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	2					VISUAL 100% ALL WELDS		

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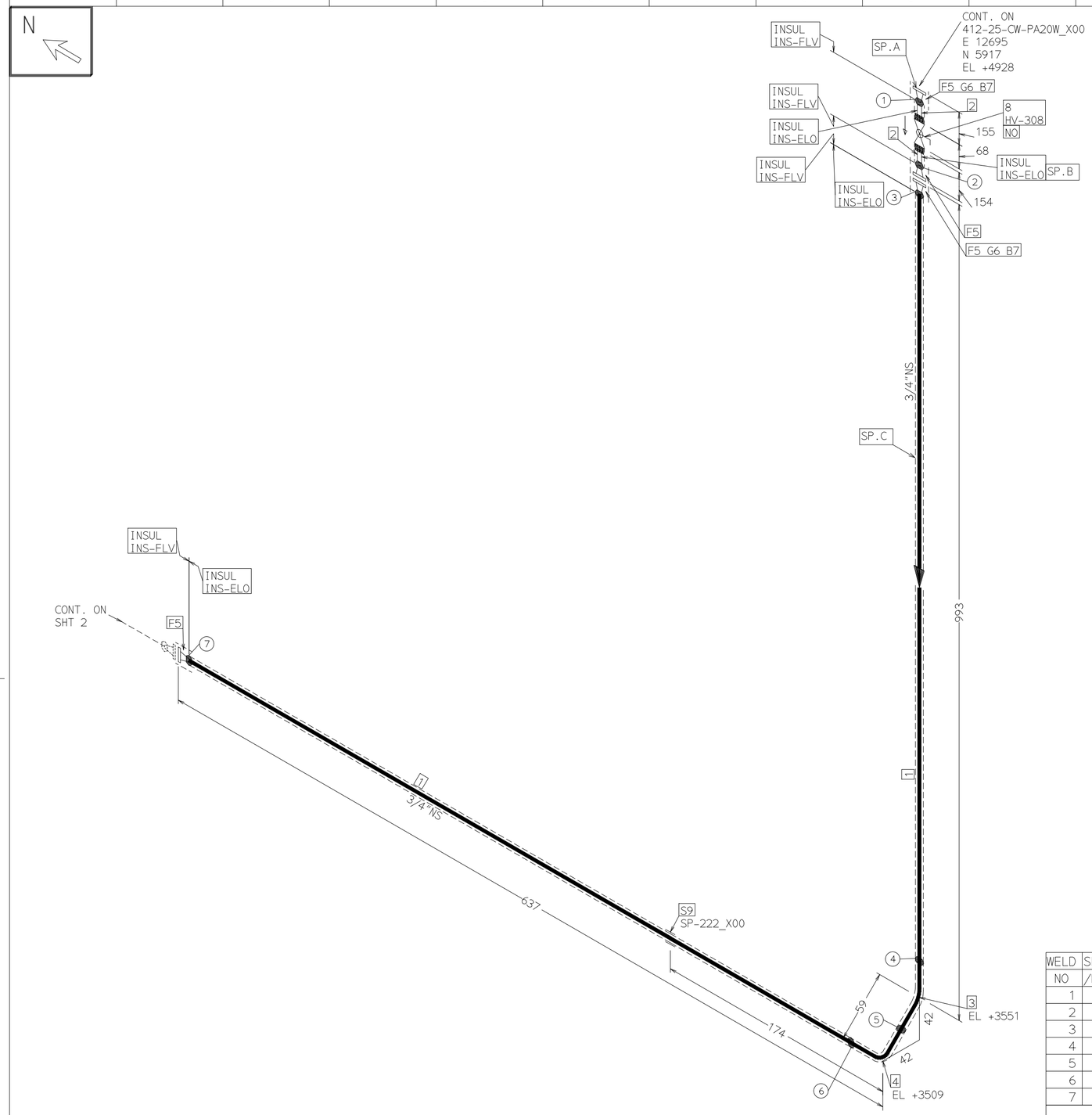
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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	34	2 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.5M	3.20
	FITTINGS				
2	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		7.12

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	2	0.10
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.18
	VALVES / IN-LINE ITEMS				
8	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		6.09
			TOTAL WEIGHT		13.21

SPOOL NUMBERS:
SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

418-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

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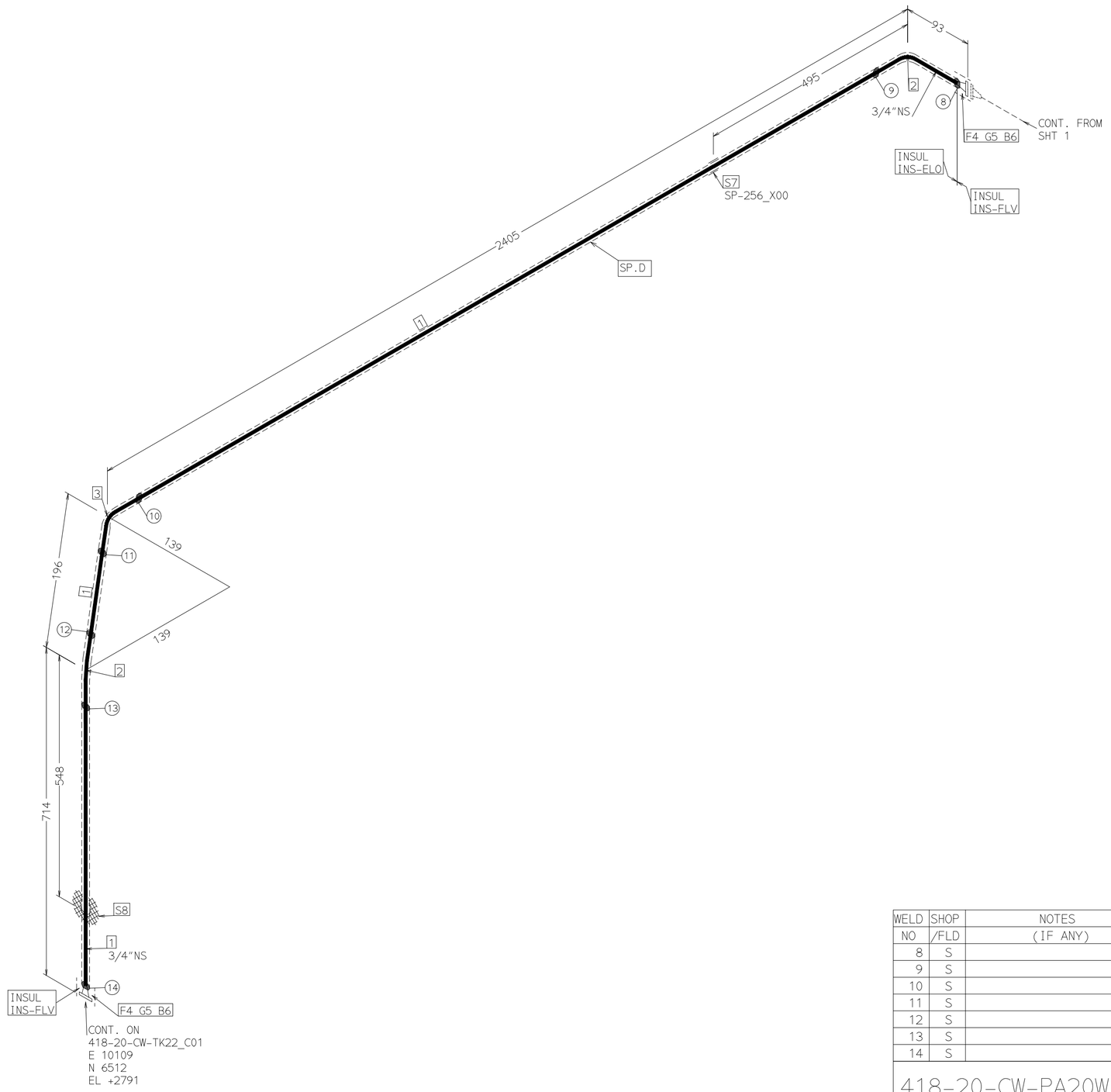
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	35	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	3.2M	6.81
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	2	0.40
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	2	1.60
			TOTAL FABRICATION WEIGHT		8.89

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	2	0.10
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.18
	SUPPORTS				
7	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
8	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
			TOTAL ERECTION WEIGHT		9.08
			TOTAL WEIGHT		17.97

SPOOL NUMBERS:

SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	

418-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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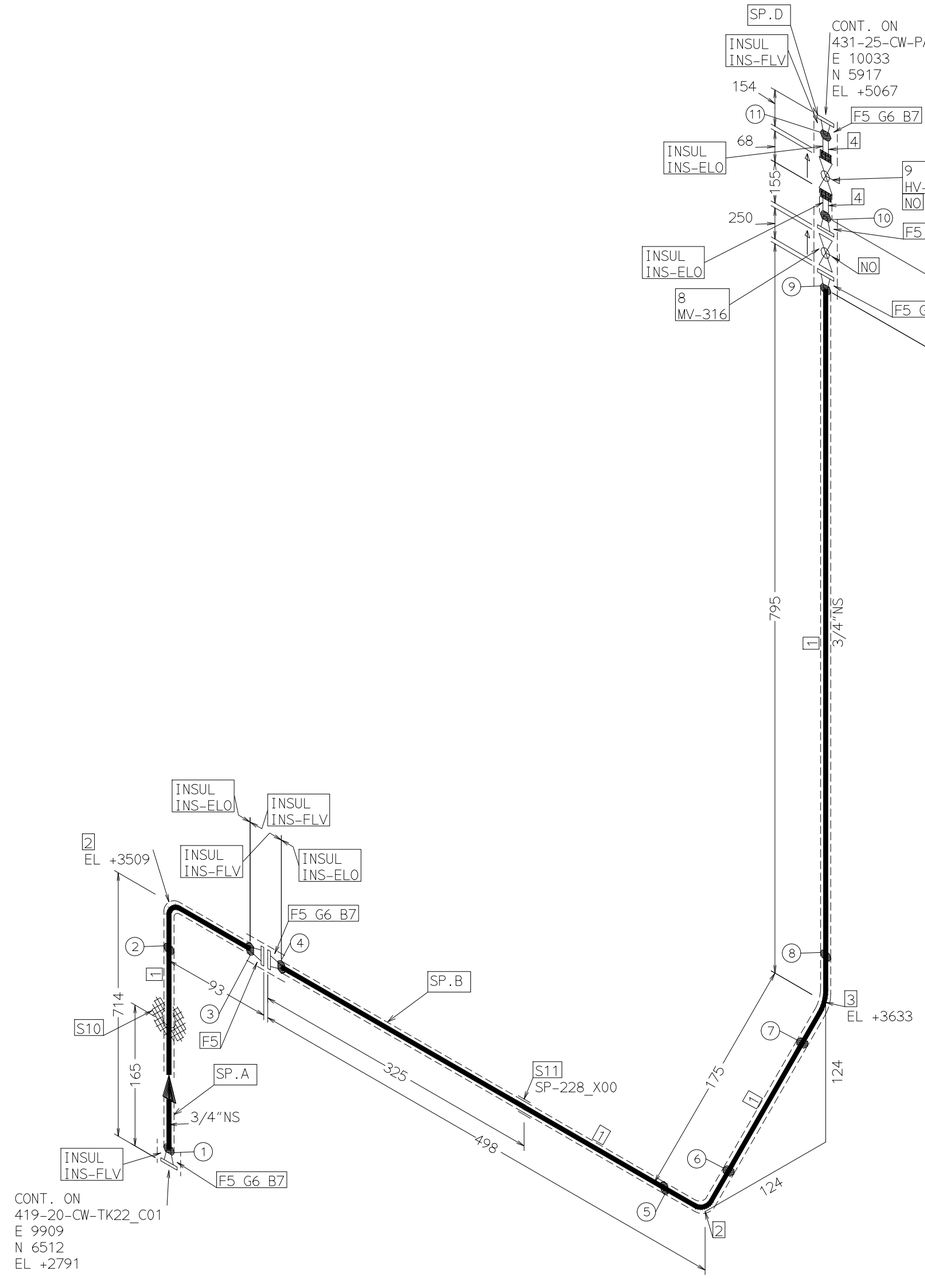
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	35	2 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.9M	4.07
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	2	0.40
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	6	4.80
			TOTAL FABRICATION WEIGHT		9.79

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	5	0.25
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	20	2.96
	VALVES / IN-LINE ITEMS				
8	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	3/4	BY CLIENT	1	2.50
9	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
10	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
11	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		13.92
			TOTAL WEIGHT		23.71

SPOOL NUMBERS:

SP.A SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

419-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

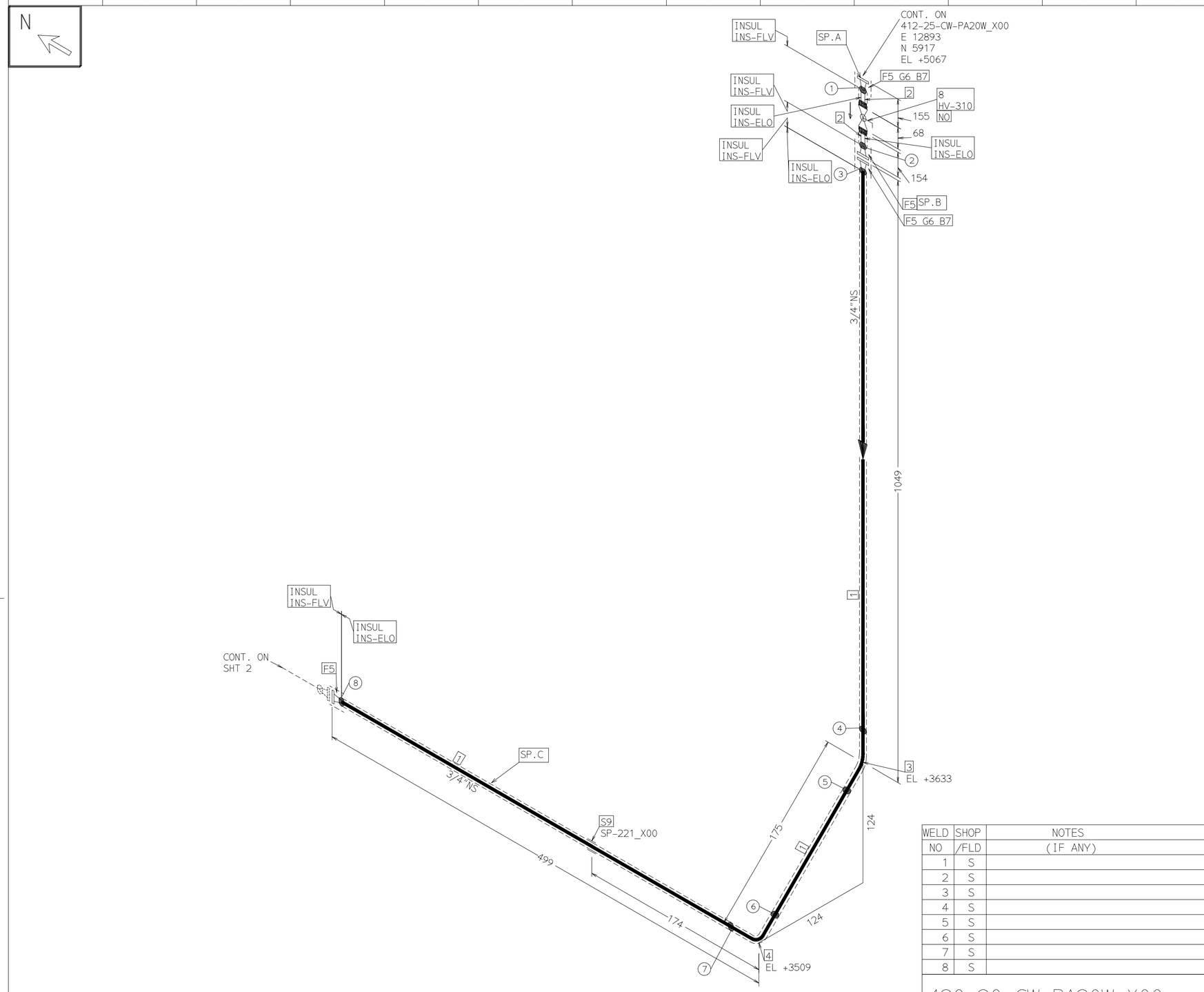
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	36	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.5M	3.27
	FITTINGS				
2	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		7.19

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	2	0.10
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.18
	VALVES / IN-LINE ITEMS				
8	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		6.09
			TOTAL WEIGHT		13.28

SPOOL NUMBERS:
SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

420-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

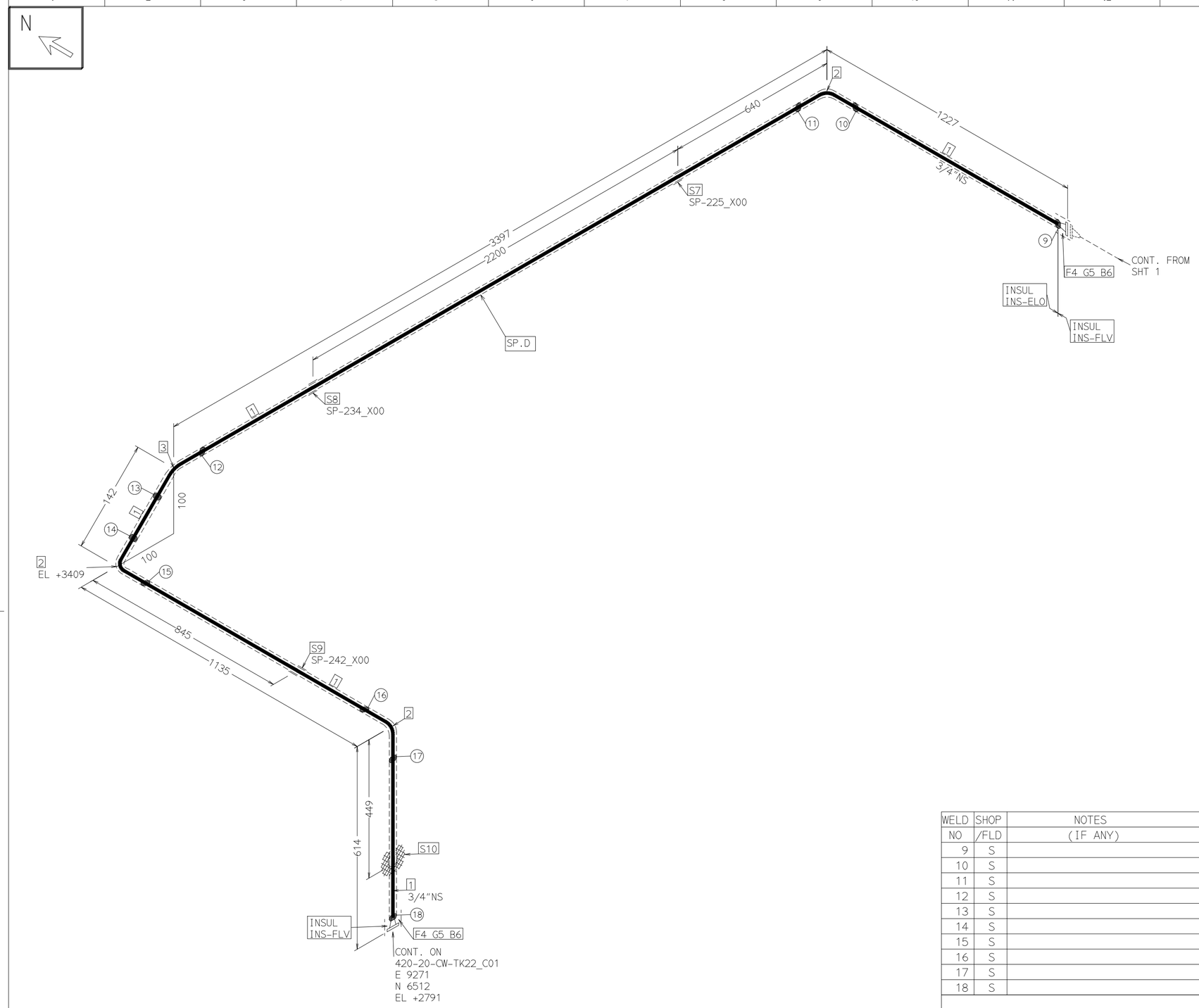
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 37
SHEET - OF: 1 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	6.2M	13.46
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	3	0.60
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	2	1.60
			TOTAL FABRICATION WEIGHT		15.74

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	2	0.10
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.18
	SUPPORTS				
7	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
8	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
9	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
10	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
			TOTAL ERECTION WEIGHT		17.88
			TOTAL WEIGHT		33.62

SPOOL NUMBERS:
SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	

420-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

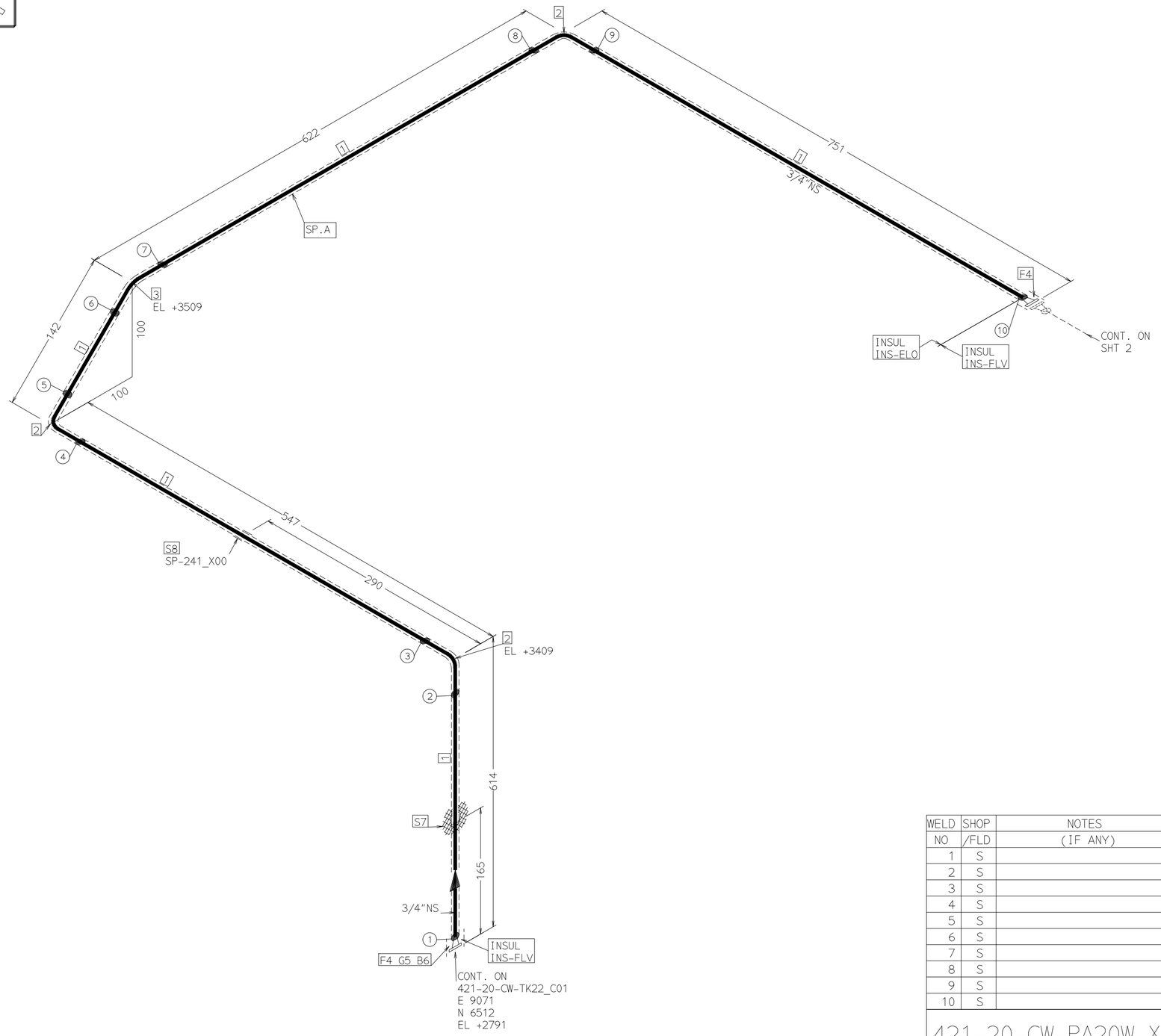
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 37

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	2.3M	5.00
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	3	0.60
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	2	1.60
			TOTAL FABRICATION WEIGHT		7.28

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	1	0.05
	BOLTS				
6	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.59
	SUPPORTS				
7	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	3/4	2MCTZFR-0.75	1	3.40
8	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		8.44
			TOTAL WEIGHT		15.72

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	

421-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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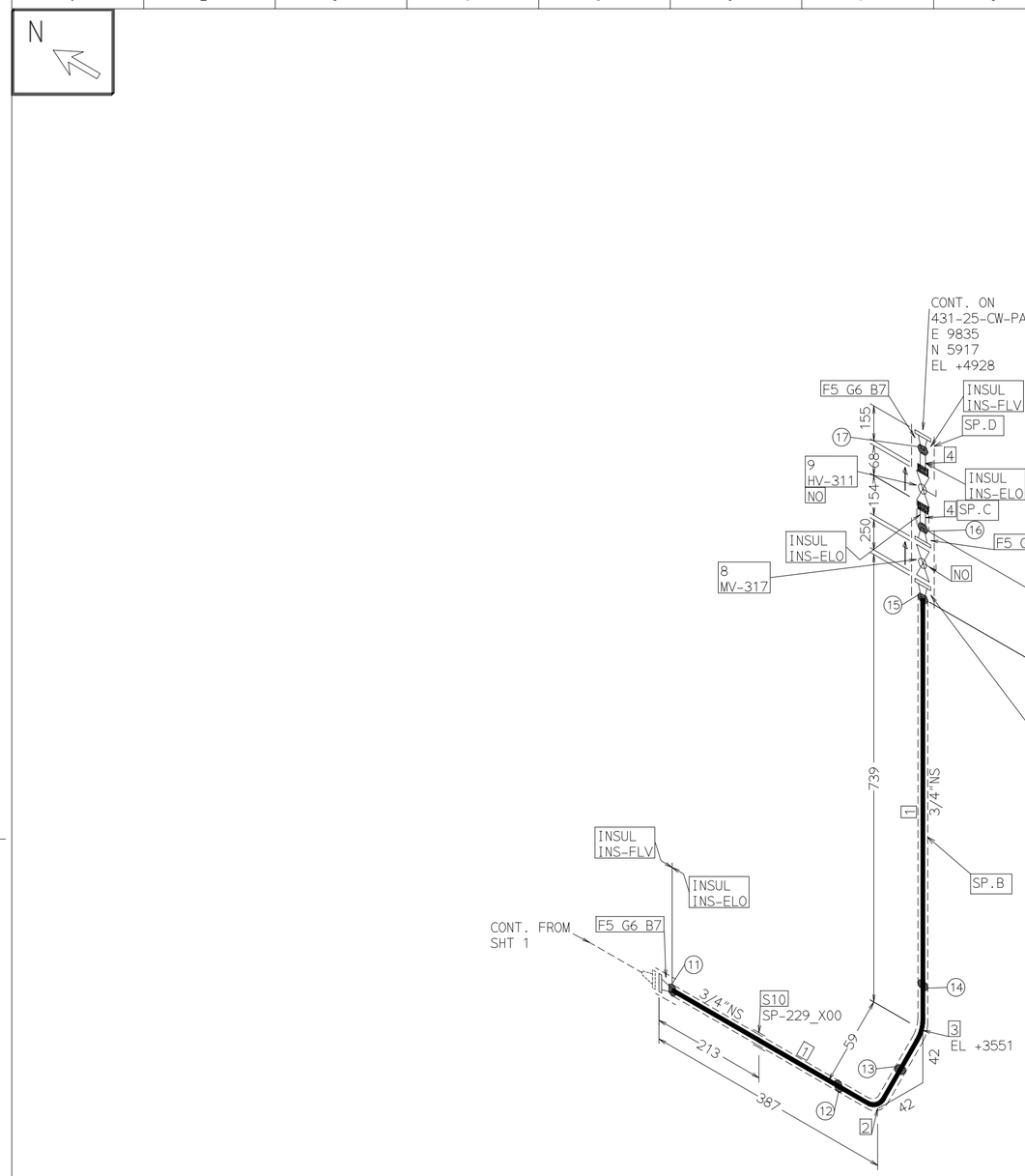
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 38
SHEET - OF: 1 / 2
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	1.0M	2.11
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E45RSS02303Q00	1	0.08
4	NIPPLE POE/TOE BSPP 100MM LONG, SCH.80S ASTM A312 Gr.TP 304/304L	3/4	N100SS02743Q00	2	0.44
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	4	3.20
			TOTAL FABRICATION WEIGHT		6.03

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
6	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3/4	GENEGK00293Q00	4	0.20
	BOLTS				
7	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	16	2.37
	VALVES / IN-LINE ITEMS				
8	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	3/4	BY CLIENT	1	2.50
9	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	3/4	BY CLIENT	1	0.41
	SUPPORTS				
10	PIPE SHOE, S-64-DN20-70-200, Carbon Steel	3/4	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		9.88
			TOTAL WEIGHT		15.91

SPOOL NUMBERS:
SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	

421-20-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-010/012	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	2					VISUAL 100% ALL WELDS		

REV.	DATE	DESCRIPTION
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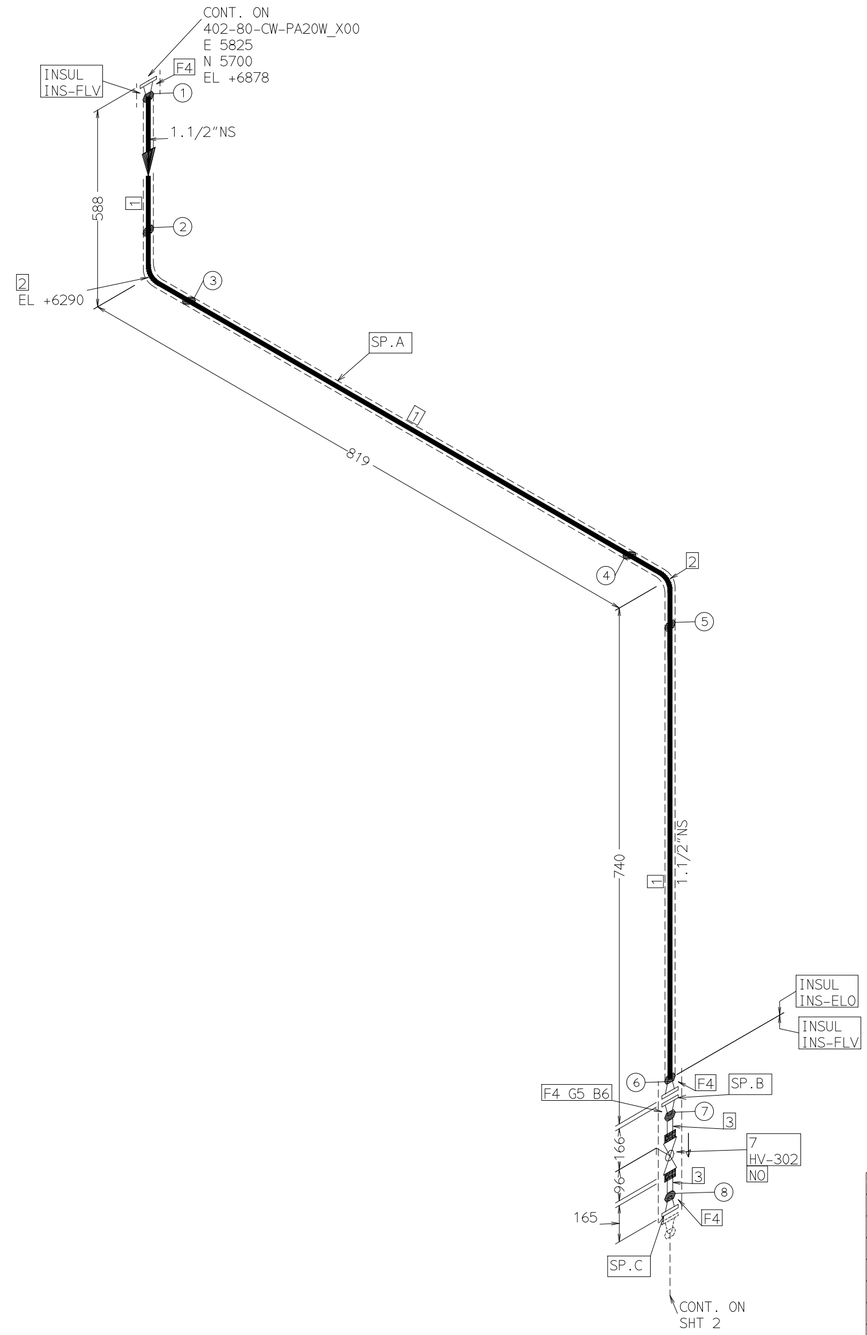
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	38	2 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	1.8M	7.20
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	2	0.80
3	NIPPLE POE/TOE BSPP 100MM LONG, SCH.40S ASTM A312 Gr.TP 304/304L	1.1/2	N100SS02771H00	2	1.08
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLW0SS07531H00	4	7.20
			TOTAL FABRICATION WEIGHT		16.28

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	1	0.07
	BOLTS				
6	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
	VALVES / IN-LINE ITEMS				
7	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1.1/2	BY CLIENT	1	1.32
			TOTAL ERECTION WEIGHT		2.04
			TOTAL WEIGHT		18.32

SPOOL NUMBERS:

SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

422-40-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE	GRAPHIC LEGEND
P&ID :	C63-PID-001-011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.	SHOP WELD, FIELD WELD, SOCKET WELD, SCREWED JOINT, COMPR.N JOINT, SITE CONNECTION, PIPE SUPPORT / ATTACHMENT, PIPE INSULATION, PIPE TRACING; INSUL INS-ELO = STANDARD INSULATION; INSUL INS-FLV = THERMAL JACKET INSULATION; PIPE INSULATION + TRACING
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER		
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T		
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5				VISUAL 100% ALL WELDS			

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

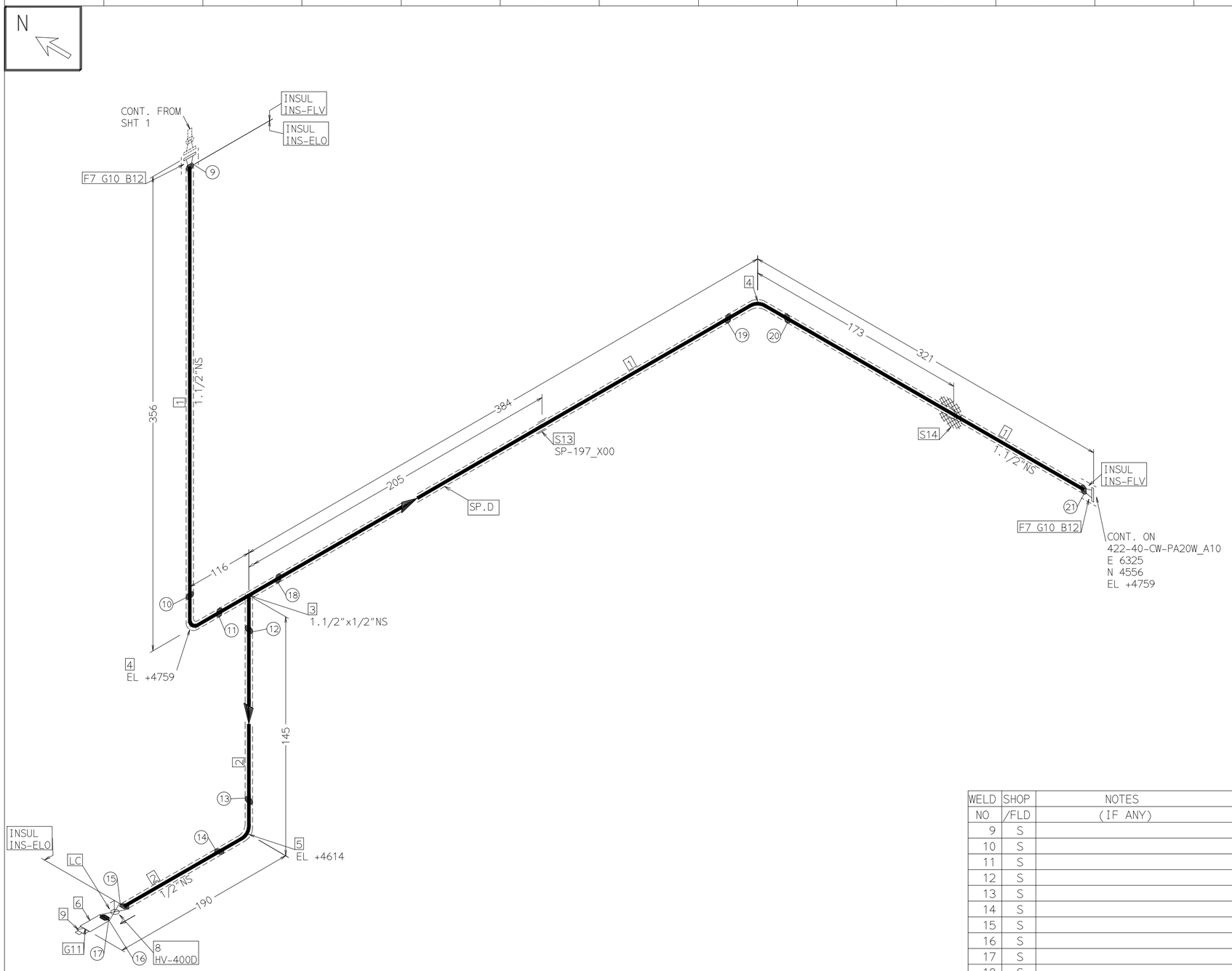
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	39	1 / 2	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1.1/2	PIPESS02571H00	0.8M	2.85
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	1/2	PIPESS03340H00	0.2M	0.16
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.40S x 80S ASTM A403 Gr.WP304/304L-S	1.1/2 x 1/2	TERSS11051H0H	1	1.00
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/2	E90RSS02211H00	2	0.80
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	1/2	E90RSS02400H00	1	0.18
6	STRAIGHT FEMALE CONNECTOR, SCH.80S BW x BSPP, CL.3000 ASTM A182 Gr.F304/304L	1/2	ADAPSS00090H0H	1	0.10
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLWOSS07531H00	2	3.60
	VALVES / IN-LINE ITEMS				
8	BALL VALVE SFERACO TYPE ELITBW, PN63 BE, FULL BORE, L.O. ASTM A182 Gr.F304/304L	1/2	BY CLIENT	1	0.88
			TOTAL FABRICATION WEIGHT		9.57

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
9	HEXAGONAL HEAD PLUG, BSPP ISO 228/1 ASTM A182 Gr.F304/304L	1/2	PLGHSS00220H00	1	0.07
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	2	0.14
11	HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2 STAINLESS STEEL T304 + 7DF2075	1/2	GORIGK00030H00	1	0.01
	BOLTS				
12	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	8	1.30
	SUPPORTS				
13	PIPE SHOE, S-64-DN40-70-200, Carbon Steel	1.1/2	SUPPORT	1	4.40
14	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-150 AISI316 + R 150 AISI316 WITH NET + RM 80 48-71 + 2 RM 10/0x12	1.1/2	2MCTZFR-1.5	1	3.90

WELD NO	SHOP /FLD	NOTES (IF ANY)
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	

422-40-CW-PA20W_X00

TOTAL ERECTION WEIGHT 9.82

TOTAL WEIGHT 19.39

SPOOL NUMBERS:

SP.D

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-011	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

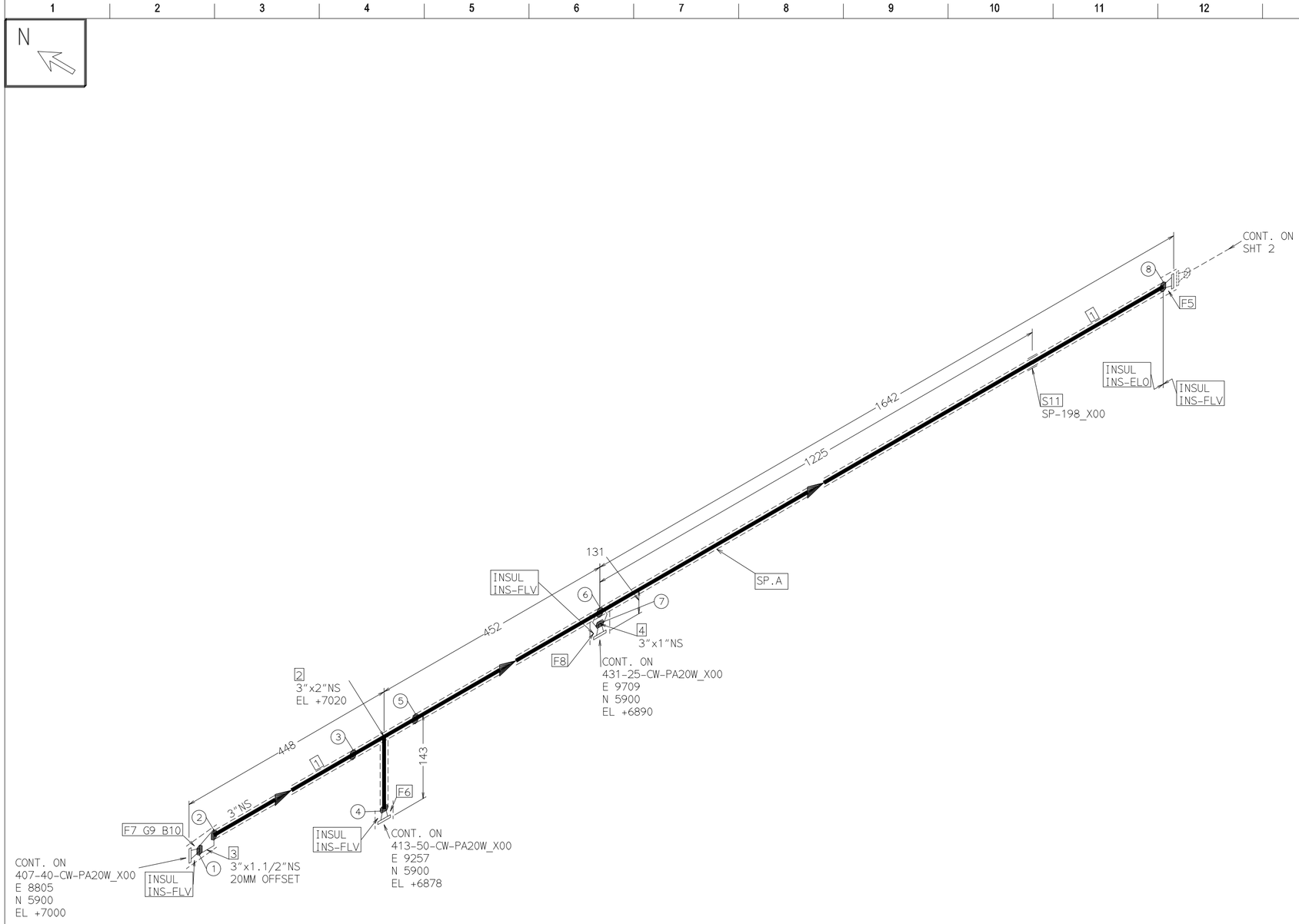
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 39

SHEET - OF: 2 / 2

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	2.2M	24.12
	FITTINGS				
2	REDUCING TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	TER0SS09300302	1	2.90
3	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 1.1/2	REE0SS0999031H	1	1.00
4	WELDOLET MSS SP-97, Sch.40S ASTM A182 Gr.F304/304L	3 x 1	OWELSS09840301	1	0.23
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLW0SS06370200	1	2.70
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/2	FLW0SS07531H00	1	1.80
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	1	1.10
			TOTAL FABRICATION WEIGHT		38.35

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
9	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/2	GENEGK00311H00	1	0.07
	BOLTS				
10	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	4	0.65
	SUPPORTS				
11	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		6.02
			TOTAL WEIGHT		44.37

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	

426-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1013	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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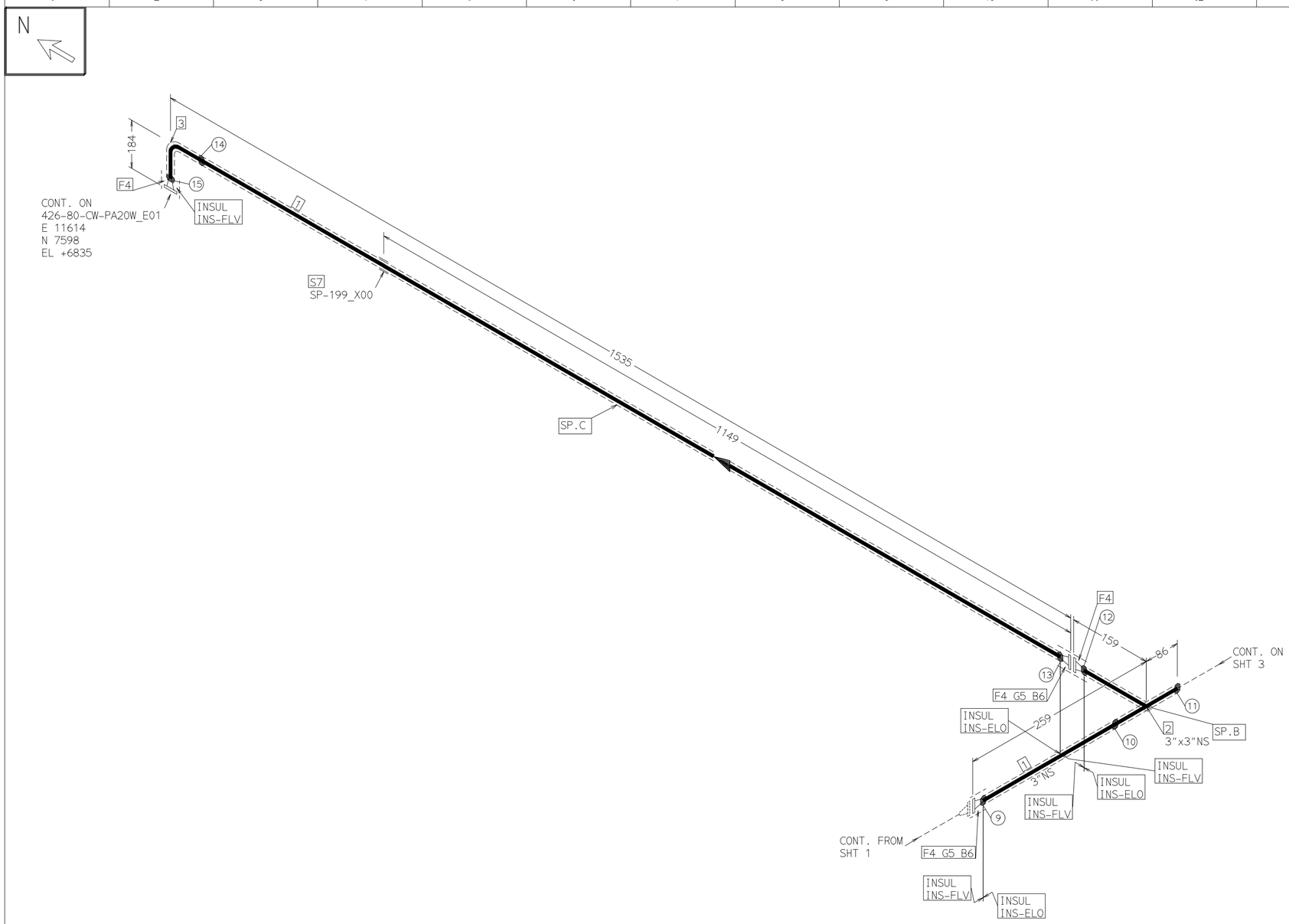
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 40
SHEET - OF: 1 / 3
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	1.5M	16.38
	FITTINGS				
2	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 3	TEE0SS02330300	1	3.80
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	3	E90RSS02140300	1	2.00
	FLANGES				
4	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	4	18.00
			TOTAL FABRICATION WEIGHT		40.18

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
5	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	2	0.26
	BOLTS				
6	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	8	2.02
	SUPPORTS				
7	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		7.58
			TOTAL WEIGHT		47.76

SPOOL NUMBERS:
SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	

426-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1013	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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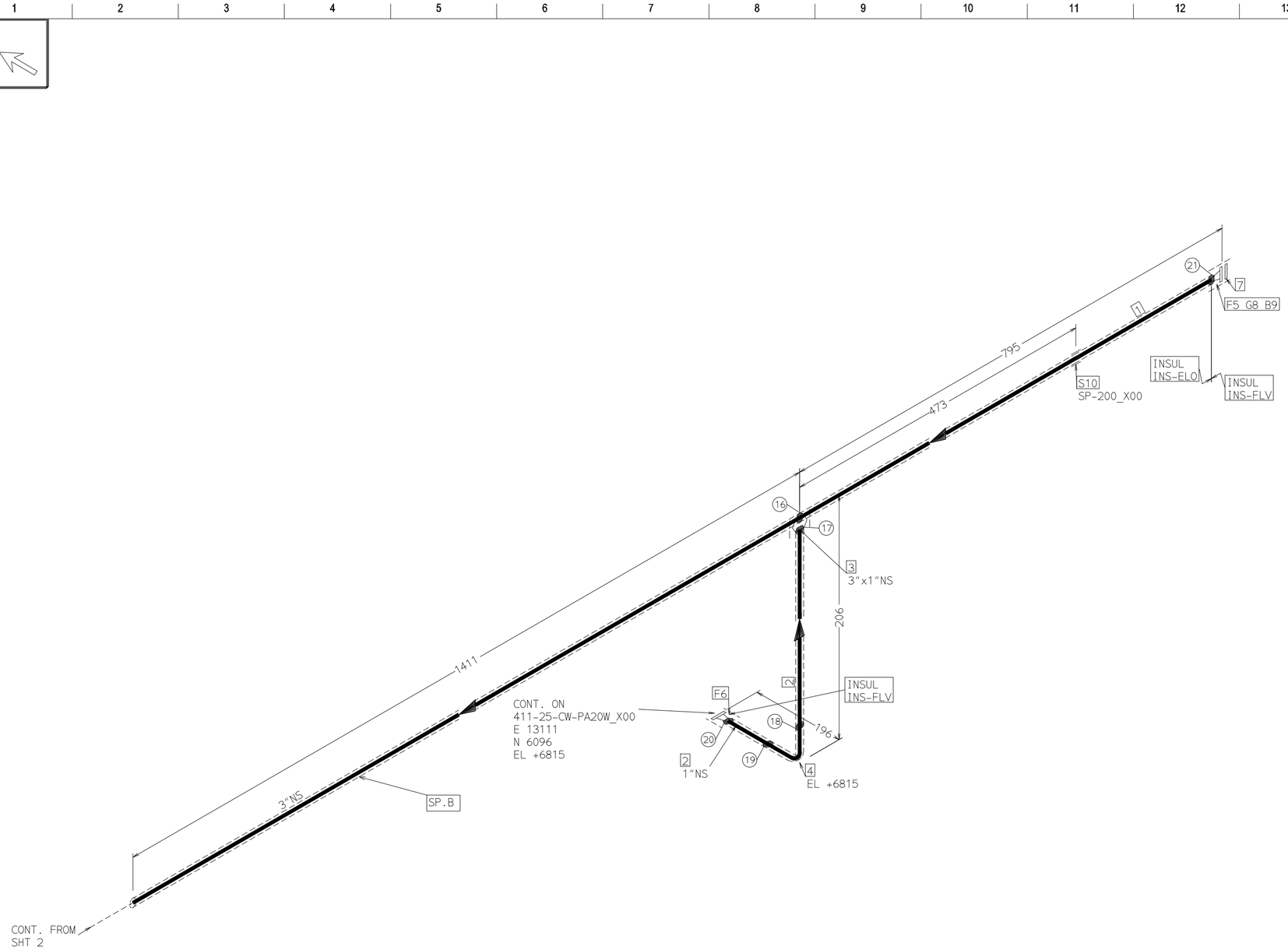
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 40
SHEET - OF: 2 / 3
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	3	PIPESS03390300	2.2M	24.09
2	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.2M	0.49
	FITTINGS				
3	WELDOLET MSS SP-97, Sch.40S ASTM A182 Gr.F304/304L	3 x 1	OWELSS09840301	1	0.23
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	1	0.15
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLW0SS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	1	1.10
			TOTAL FABRICATION WEIGHT		30.56

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
7	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F304/304L	3	FLB0SS02110300	1	5.50
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	GENEGK00330300	1	0.13
	BOLTS				
9	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	da configurare	4	1.01
	SUPPORTS				
10	PIPE SHOE, S-64-DN80-110-200, Carbon Steel	3	SUPPORT	1	5.30
			TOTAL ERECTION WEIGHT		11.94
			TOTAL WEIGHT		42.50

SPOOL NUMBERS:

SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
16	S	
17	S	
18	S	
19	S	
20	S	
21	S	

426-80-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1013	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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PROJECT:

C63 - CROSSWIND PROJECT

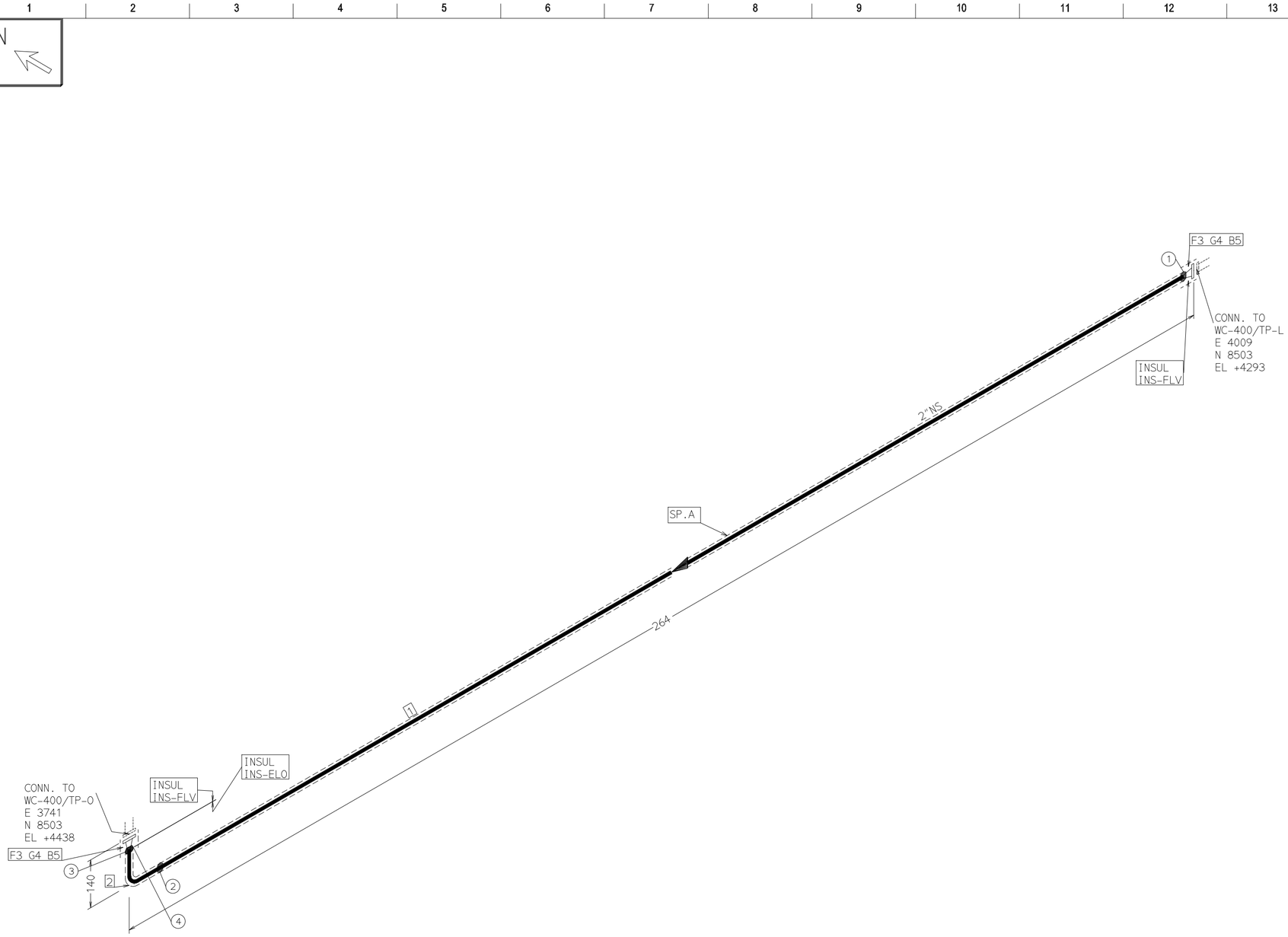
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	40	3 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.2M	0.64
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	2	5.40
			TOTAL FABRICATION WEIGHT		6.69

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	2	0.20
	BOLTS				
5	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	8	1.90
			TOTAL ERECTION WEIGHT		2.10
			TOTAL WEIGHT		8.79

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

427-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

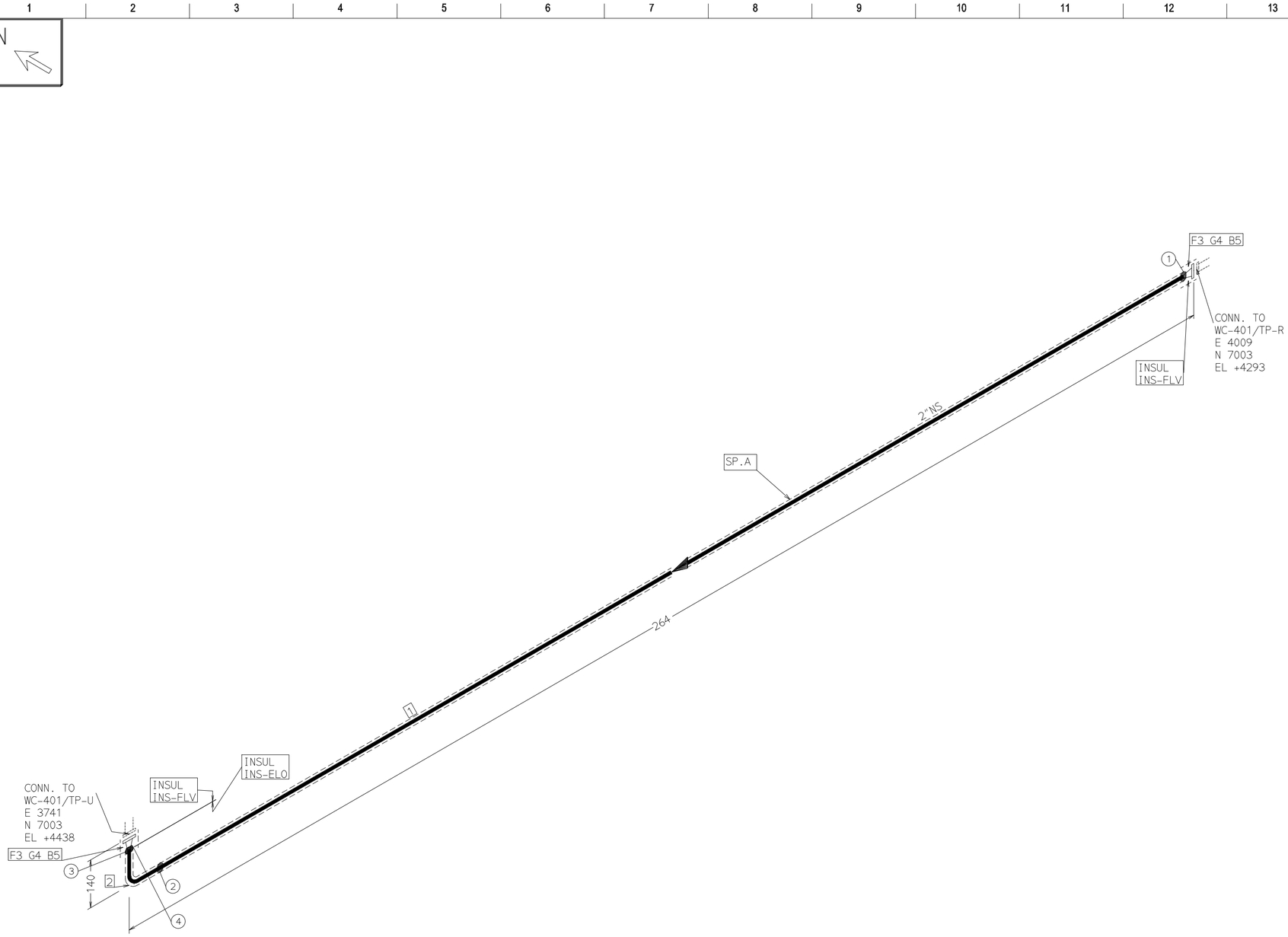
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 41

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.2M	0.64
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	2	5.40
			TOTAL FABRICATION WEIGHT		6.69

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	2	0.20
	BOLTS				
5	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	8	1.90
			TOTAL ERECTION WEIGHT		2.10
			TOTAL WEIGHT		8.79

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	

428-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

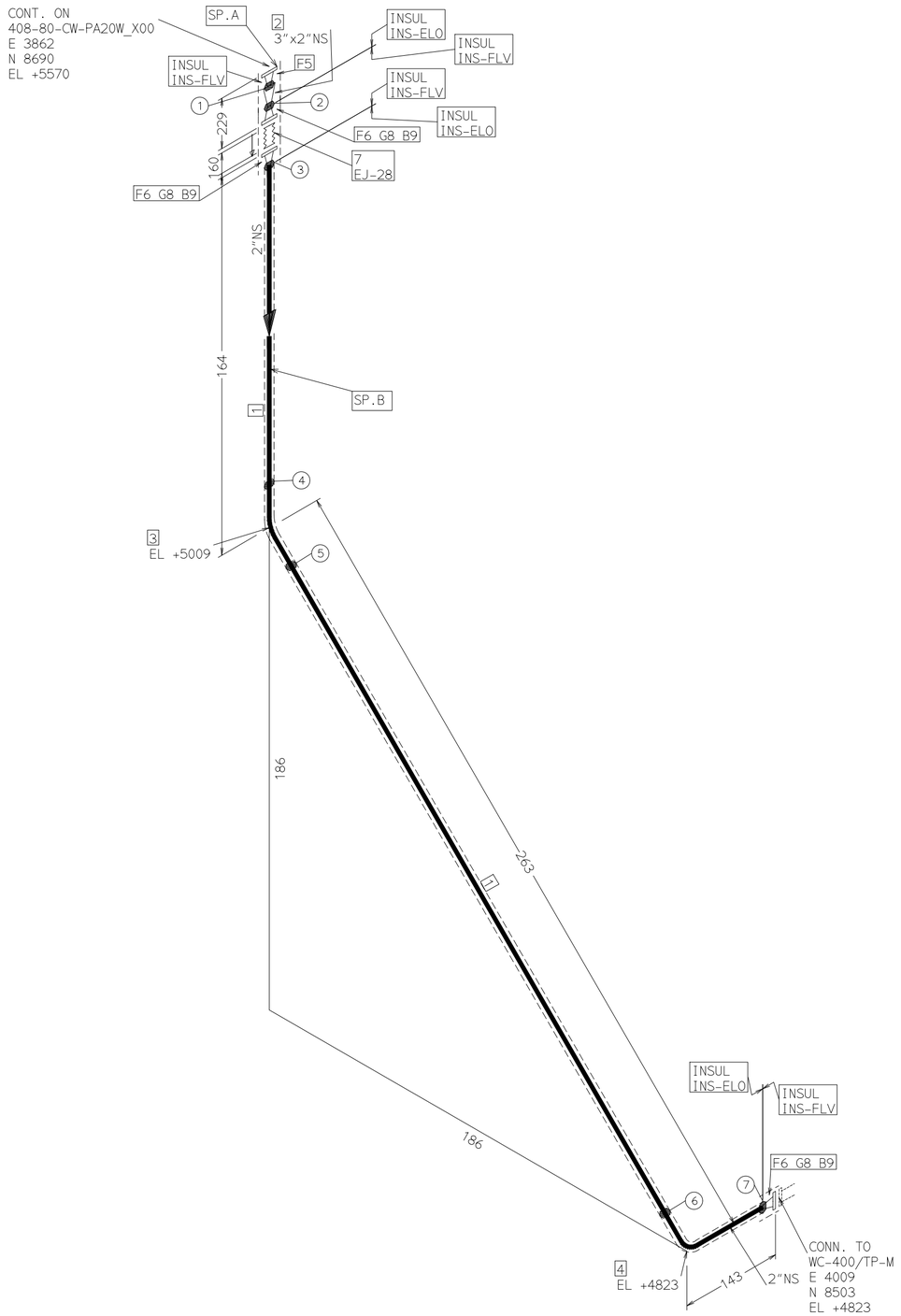
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 42

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	0.3M	1.13
	FITTINGS				
2	CONCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	3 x 2	RECOSS08180302	1	1.00
3	ELBOW L.R. ASME B16.9, BE, 45 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E45RSS02010200	1	0.32
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	1	0.65
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	3	FLWOSS06380300	1	4.50
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	3	8.10
			TOTAL FABRICATION WEIGHT		15.70

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FITTINGS				
7	EXPANSION JOINT, TYPE SF-10, CL150 RF	2	BY CLIENT	1	5.50
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	3	0.30
	BOLTS				
9	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	12	2.86
			TOTAL ERECTION WEIGHT		8.66
			TOTAL WEIGHT		24.36

SPOOL NUMBERS:
SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

429-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	3				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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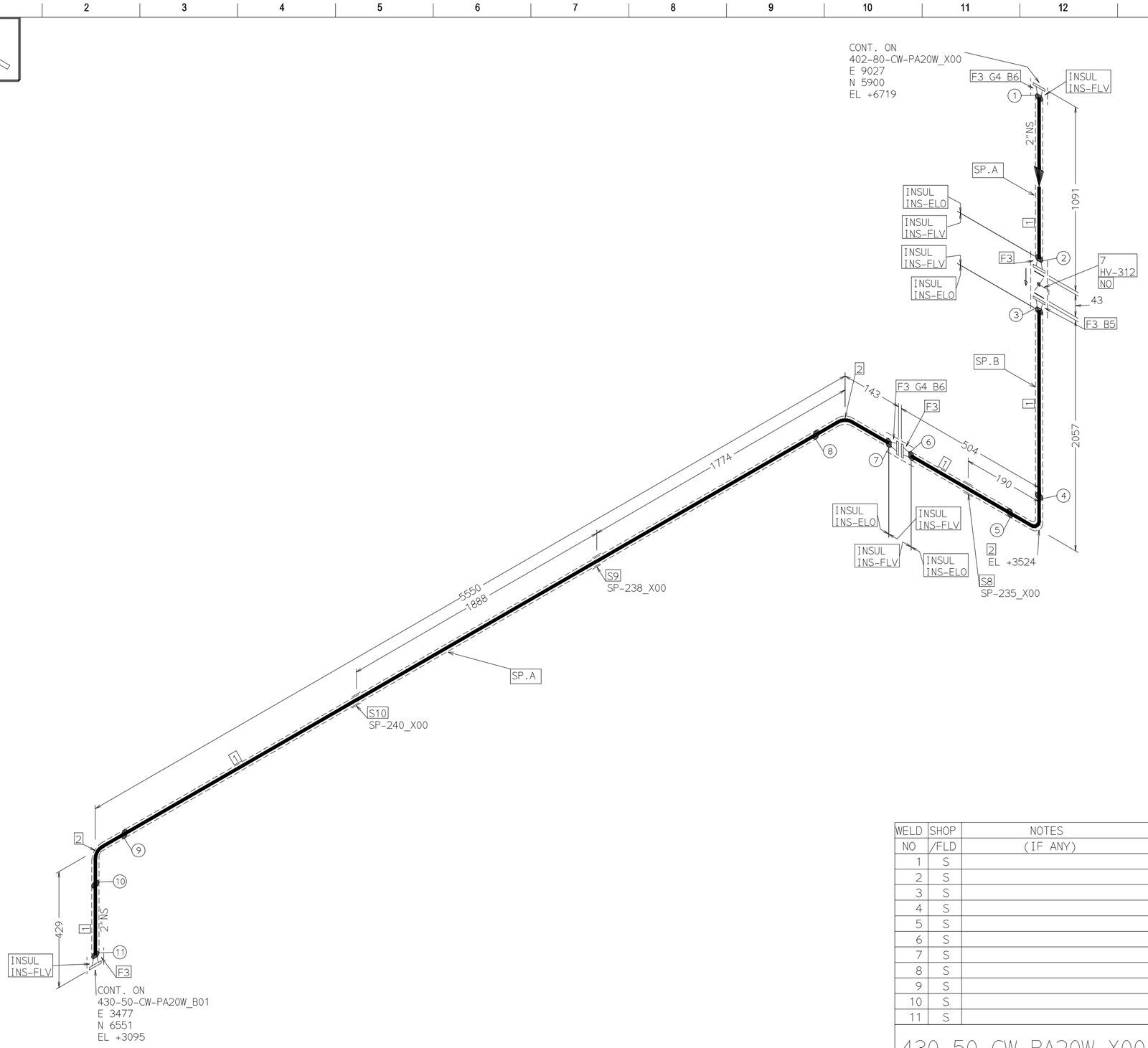
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 17
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	2	PIPESS03380200	9.0M	48.45
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	2	E90RSS02130200	3	1.95
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	2	FLWOSS06370200	6	16.20
			TOTAL FABRICATION WEIGHT		66.60

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	GENEGK00320200	2	0.20
	BOLTS				
5	130 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	4	1.22
6	85 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	5/8	SB20B062990300	8	1.90
	VALVES / IN-LINE ITEMS				
7	BUTTERFLY VALVE API 609, WAFER TYPE, CL150, L.O.	2	BY CLIENT	1	4.00
	SUPPORTS				
8	PIPE SHOE, S-64-DN50-70-200, Carbon Steel	2	SUPPORT	1	4.80
9	PIPE SHOE, S-64-DN50-70-200, Carbon Steel	2	SUPPORT	1	4.80
10	PIPE SHOE, S-64-DN50-70-200, Carbon Steel	2	SUPPORT	1	4.80
			TOTAL ERECTION WEIGHT		21.72
			TOTAL WEIGHT		88.32

SPOOL NUMBERS:
SP.A SP.B SP.C

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

430-50-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	5	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	2,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION
INSUL INS-FLV = THERMAL JACKET INSULATION
PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

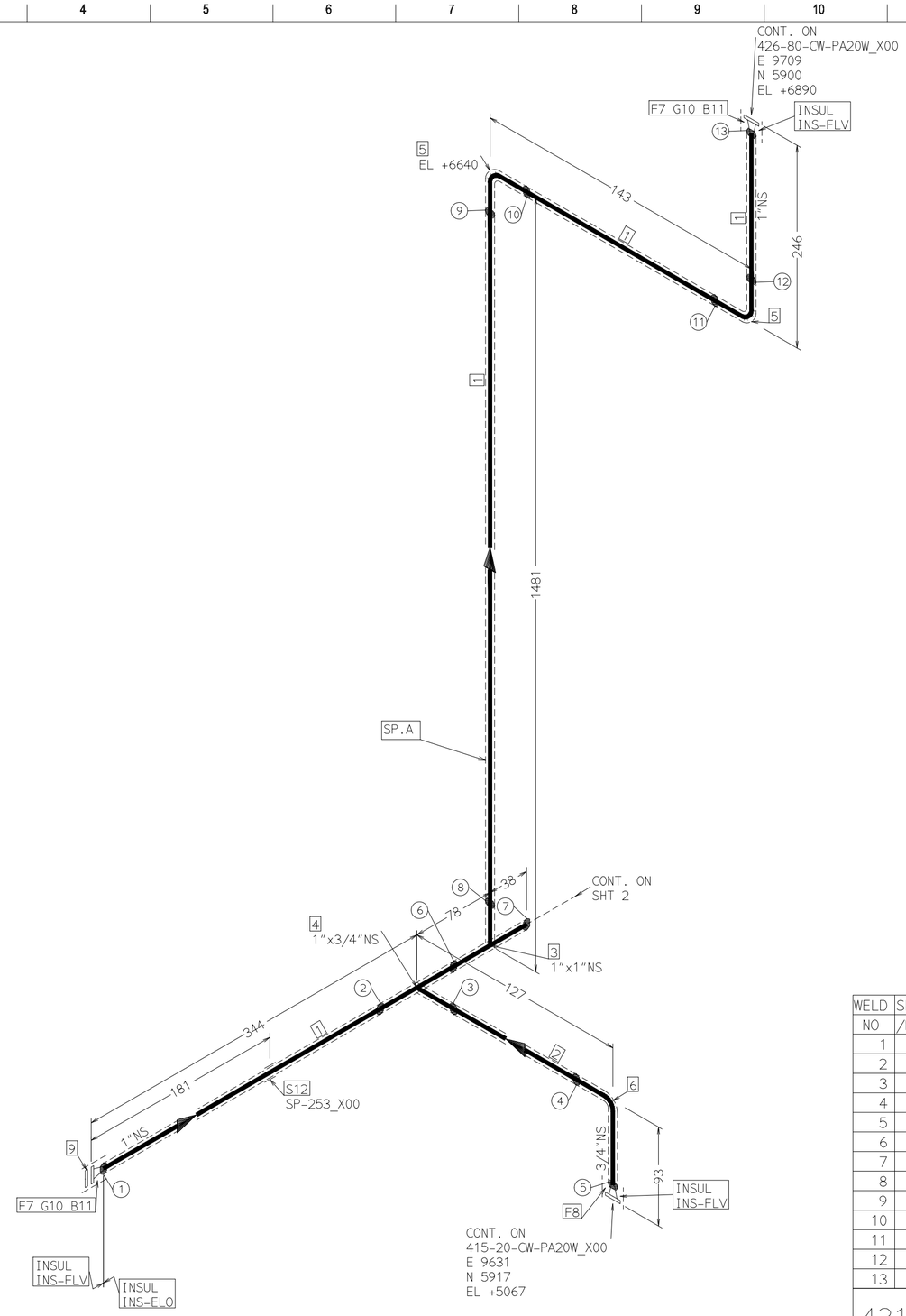
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007
FORES DOC. Nr.: 224J10-DDL-PP-DI-00005
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025
ISO Nr.: 44
SHEET - OF: 1 / 1
COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	1.9M	4.64
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	0.1M	0.10
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1 x 1	TEE0SS01640100	1	0.29
4	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 3/4	TER0SS11010013Q	1	0.35
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	2	0.30
6	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
7	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	2	2.20
8	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	1	0.80

TOTAL FABRICATION WEIGHT 8.88

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
9	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F304/304L	1	FLB0SS02080100	1	1.40
	GASKETS				
10	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	2	0.12
	BOLTS				
11	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	8	1.24
	SUPPORTS				
12	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40

TOTAL ERECTION WEIGHT 7.16

TOTAL WEIGHT 16.04

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	

431-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

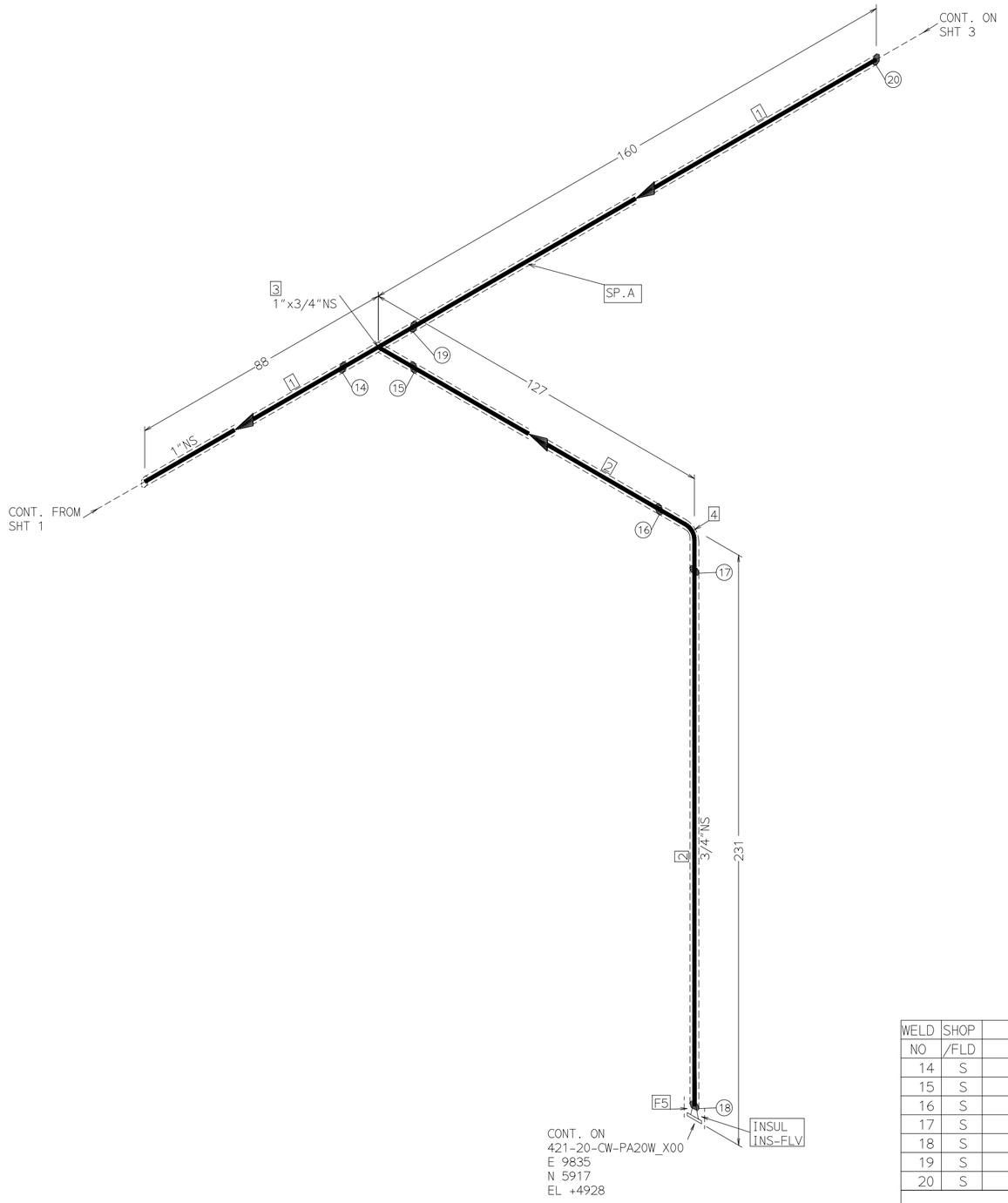
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 45

SHEET - OF: 1 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.2M	0.43
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	0.2M	0.42
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 3/4	TER0SS1101013Q	1	0.35
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	1	0.20
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLW0SS07563Q00	1	0.80

TOTAL FABRICATION WEIGHT 2.20

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
14	S	
15	S	
16	S	
17	S	
18	S	
19	S	
20	S	

431-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

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PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

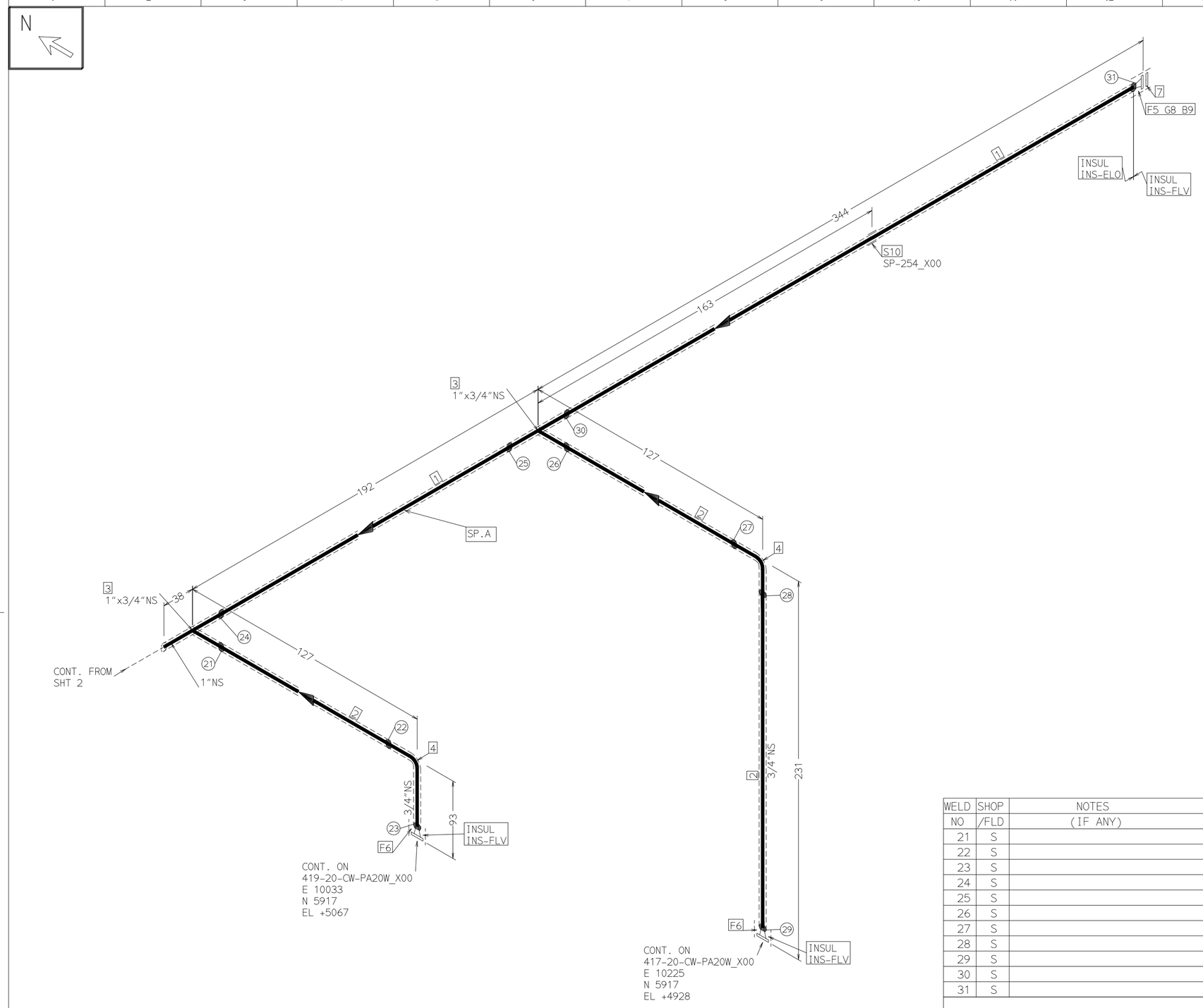
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 45

SHEET - OF: 2 / 3

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	0.4M	0.91
2	PIPE SMLS, ASME B36.19M, Sch.80S ASTM A312 Gr.TP 304/304L	3/4	PIPESS03353Q00	0.3M	0.53
	FITTINGS				
3	REDUCING TEE ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP304/304L-S	1 x 3/4	TERSS1101013Q	2	0.70
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.80S ASTM A403 Gr.WP304/304L-S	3/4	E90RSS02413Q00	2	0.40
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLWOSS07520100	1	1.10
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.80S ASTM A182 Gr.F304/304L	3/4	FLWOSS07563Q00	2	1.60
			TOTAL FABRICATION WEIGHT		5.24

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	FLANGES				
7	FLANGE BLIND ASME B16.5, CL150 RF ASTM A182 Gr.F304/304L	1	FLBOSS02080100	1	1.40
	GASKETS				
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
	BOLTS				
9	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
	SUPPORTS				
10	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40
			TOTAL ERECTION WEIGHT		6.48
			TOTAL WEIGHT		11.72

SPOOL NUMBERS:
SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
21	S	
22	S	
23	S	
24	S	
25	S	
26	S	
27	S	
28	S	
29	S	
30	S	
31	S	

431-25-CW-PA20W_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

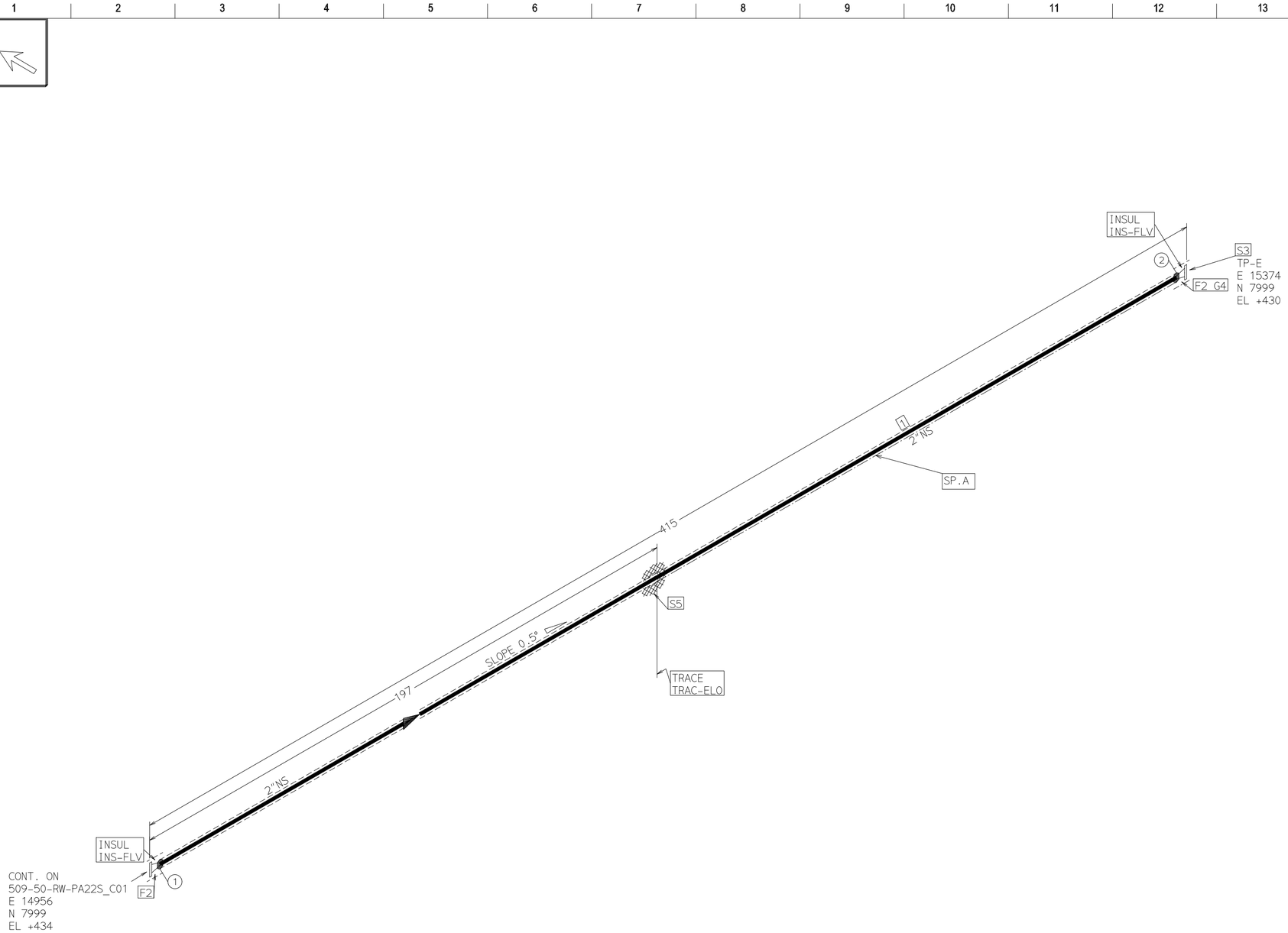
elogen

PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	45	3 / 3	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	2	PIPESS00500200	0.3M	1.53
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	2	FLWOSS02950200	2	5.40
	SUPPORTS				
3	General purpose ATTA SS 316	2	-	1	0.00
			TOTAL FABRICATION WEIGHT		6.93

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	GENEGK00410200	1	0.10
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 48-80	2	2MCTZFR-2	1	6.20
			TOTAL ERECTION WEIGHT		6.30
			TOTAL WEIGHT		13.23

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

509-50-RW-PA22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS	
P&ID :	C63-PID-001-001	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	981	THICKNESS (mm):		TEST PRESS. (barg) :	8,58
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid			FLUID :	WATER
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	2	TRACING :	HR-509	NDT :	100% RX (BW) / DYE PEN.T
STRESS ANALYSIS :		OP. PRESS. (barg) :	0						VISUAL 100% ALL WELDS

NOTE

THIS LINE HAS BEEN STRESS ANALYSED.
DO NOT ALTER THE ROUTING
OR MODIFY THE SUPPORTS
WITHOUT PRIOR APPROVAL OF FORES.

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE
PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

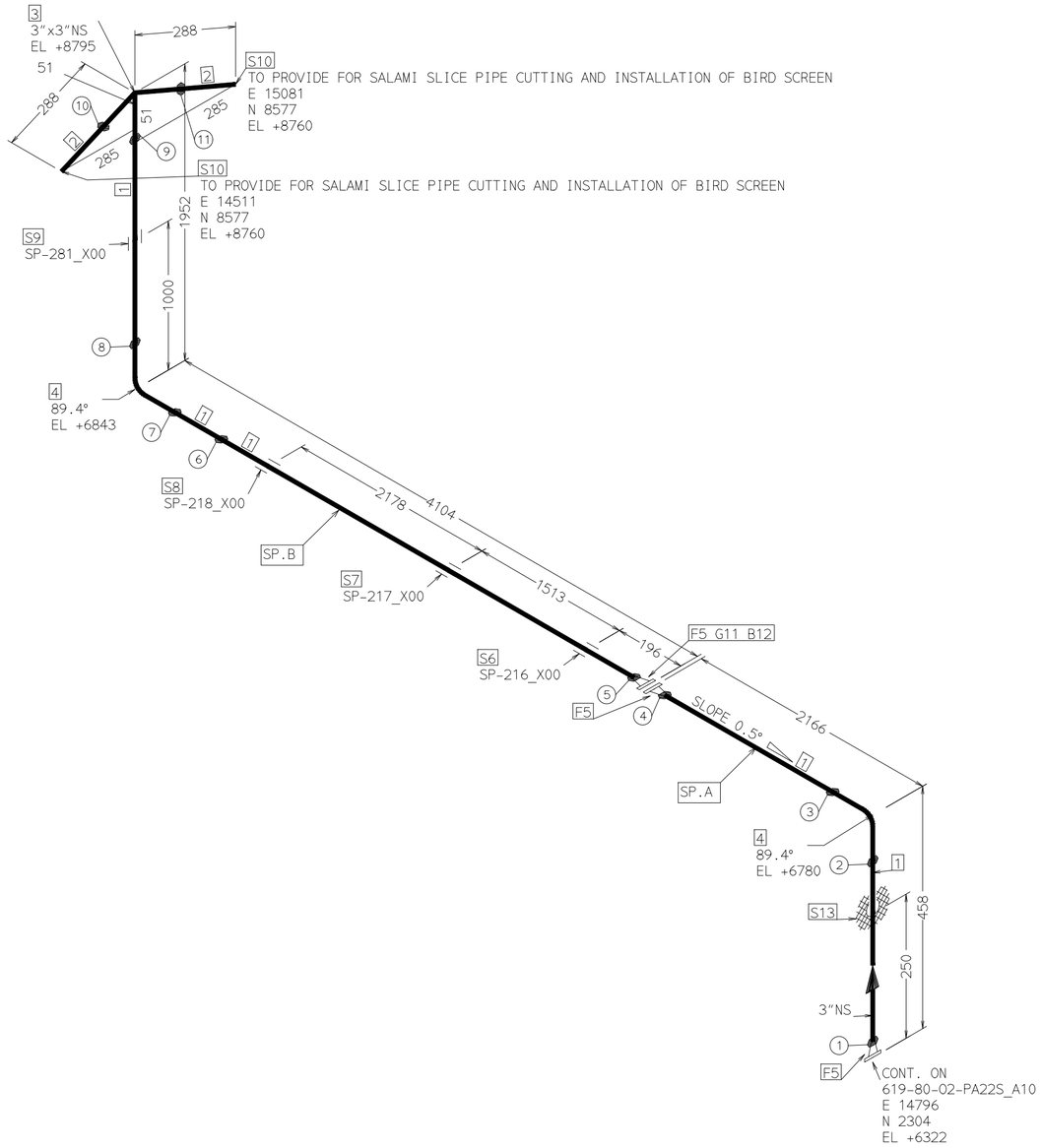
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 46

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	8.0M	89.30
2	PIPE ASME B36.19M, SCH.40S, SLOPE 10degree, END TRIMMED AT -10degree, OVERALL LENGTH 207.718661497mm ASTM A312 Gr.TP 316/316L	3	PIPESS01000300	0.4M	4.39
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	3 x 3	TEE0SS00890300	1	3.80
4	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	3	E90RSS01110300	2	4.00
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F316/316L	3	FLW0SS03190300	3	13.50
	SUPPORTS				
6	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
7	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
8	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
9	U-BOLT FOR GUIDE, S-211-80mm,	3	SUPPORT	1	0.29
10	General purpose ATTA SS 316	3	-	2	0.00

TOTAL FABRICATION WEIGHT 116.15

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
11	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	GENEGK00420300	1	0.13
	BOLTS				
12	95 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B009580300	4	1.01
	SUPPORTS				
13	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-200 AISI316 + R 200 AISI316 WITH NET + RM 120 WOC 67.5-99	3	2MCTZFR-3	1	6.20

TOTAL ERECTION WEIGHT 7.34

TOTAL WEIGHT 123.49

SPOOL NUMBERS:

SP.A SP.B

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	
8	S	
9	S	
10	S	
11	S	

619-80-02-PA22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-005	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	1000	THICKNESS (mm):	TEST PRESS. (barg) :	22,88	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	16	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	Amb	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

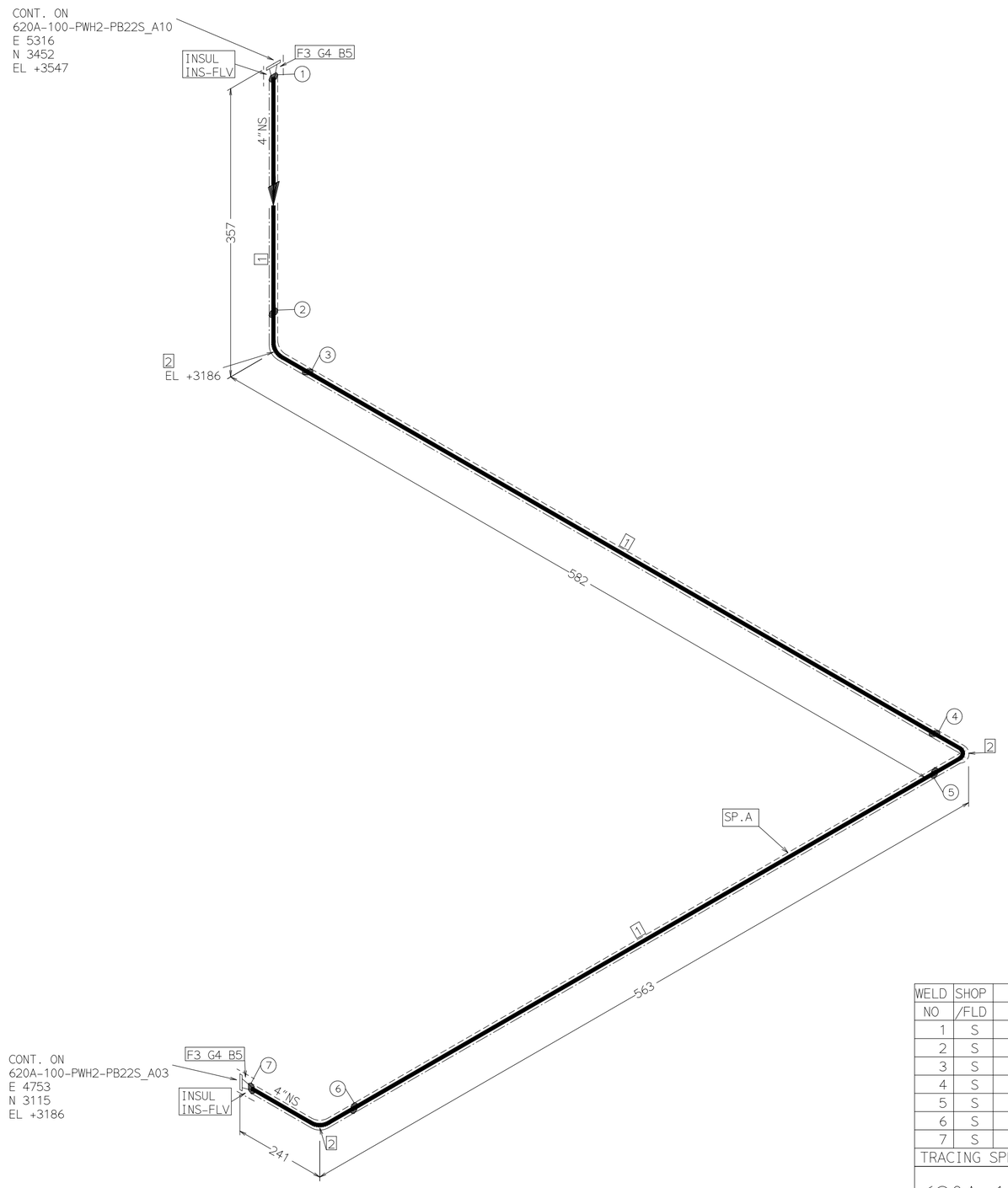
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 47

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	4	PIPESS01550400	0.7M	9.82
	FITTINGS				
2	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	4	E90RSS00070400	3	11.70
	FLANGES				
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	4	FLWOSS00520400	2	22.00
			TOTAL FABRICATION WEIGHT		43.52

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
4	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	GENEGK00610400	2	0.58
	BOLTS				
5	115 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20BO29280400	16	7.86
			TOTAL ERECTION WEIGHT		8.44
			TOTAL WEIGHT		51.96

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

TRACING SPEC: TRAC-ELO

620A-100-PWH2-PB22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-620A	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	30,9					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
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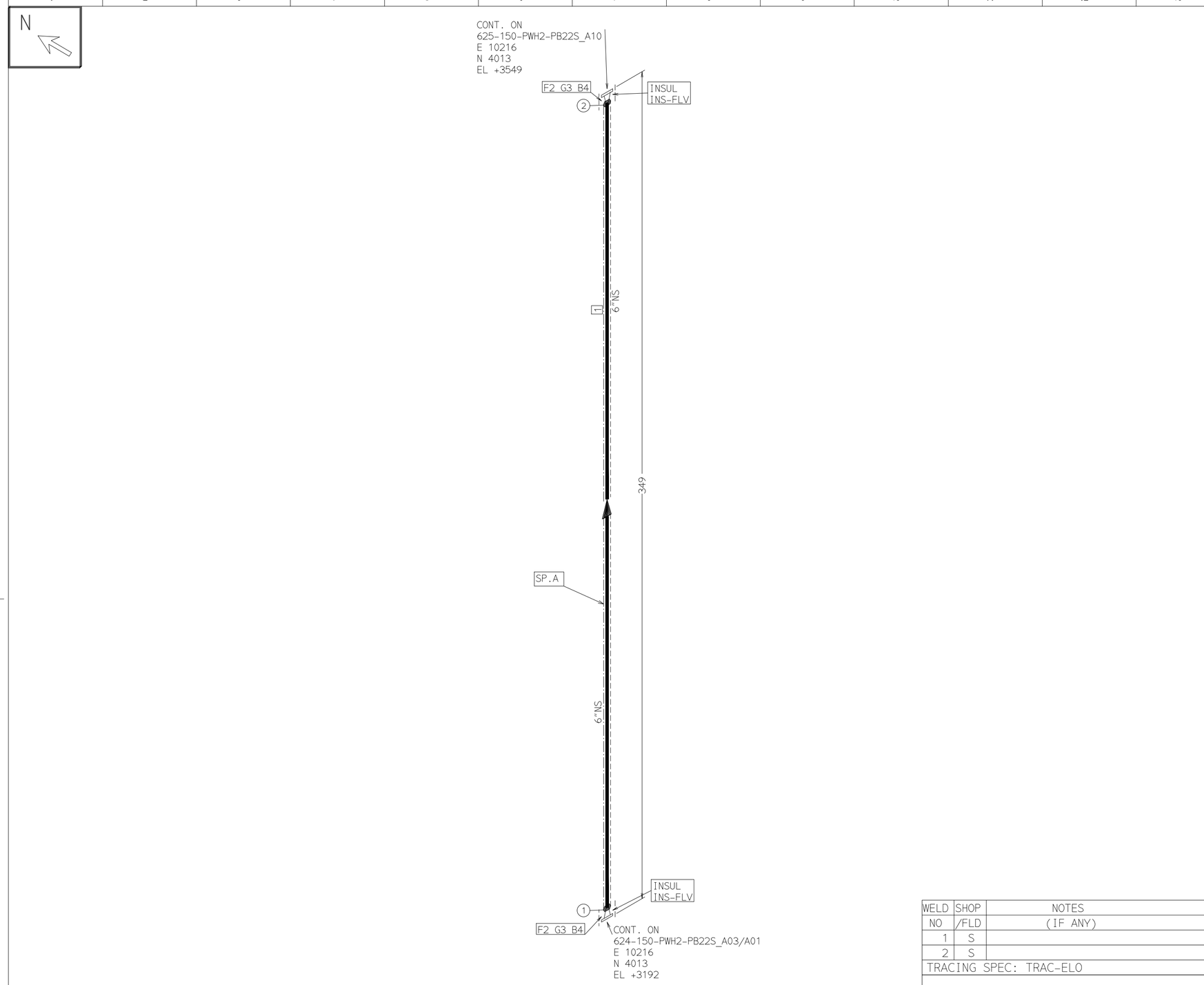
C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.	FORES DOC. Nr.		
C0063-FOR-DTB-MP-007	224J10-DDL-PP-DI-00005		
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	48	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	6	PIPESS01600600	0.2M	4.15
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	6	FLWOSS03290600	2	38.00
			TOTAL FABRICATION WEIGHT		42.15

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	GENEGK00620600	2	1.00
	BOLTS				
4	125 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	3/4	SB20B029290400	24	12.46
			TOTAL ERECTION WEIGHT		13.46
			TOTAL WEIGHT		55.61

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

TRACING SPEC: TRAC-ELO

625-150-PWH2-PB22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION		TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-002/006	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):		TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas			FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING :	HR-625	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :	C0063-FOR-CAL-MP-001	OP. PRESS. (barg) :	31,1					VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

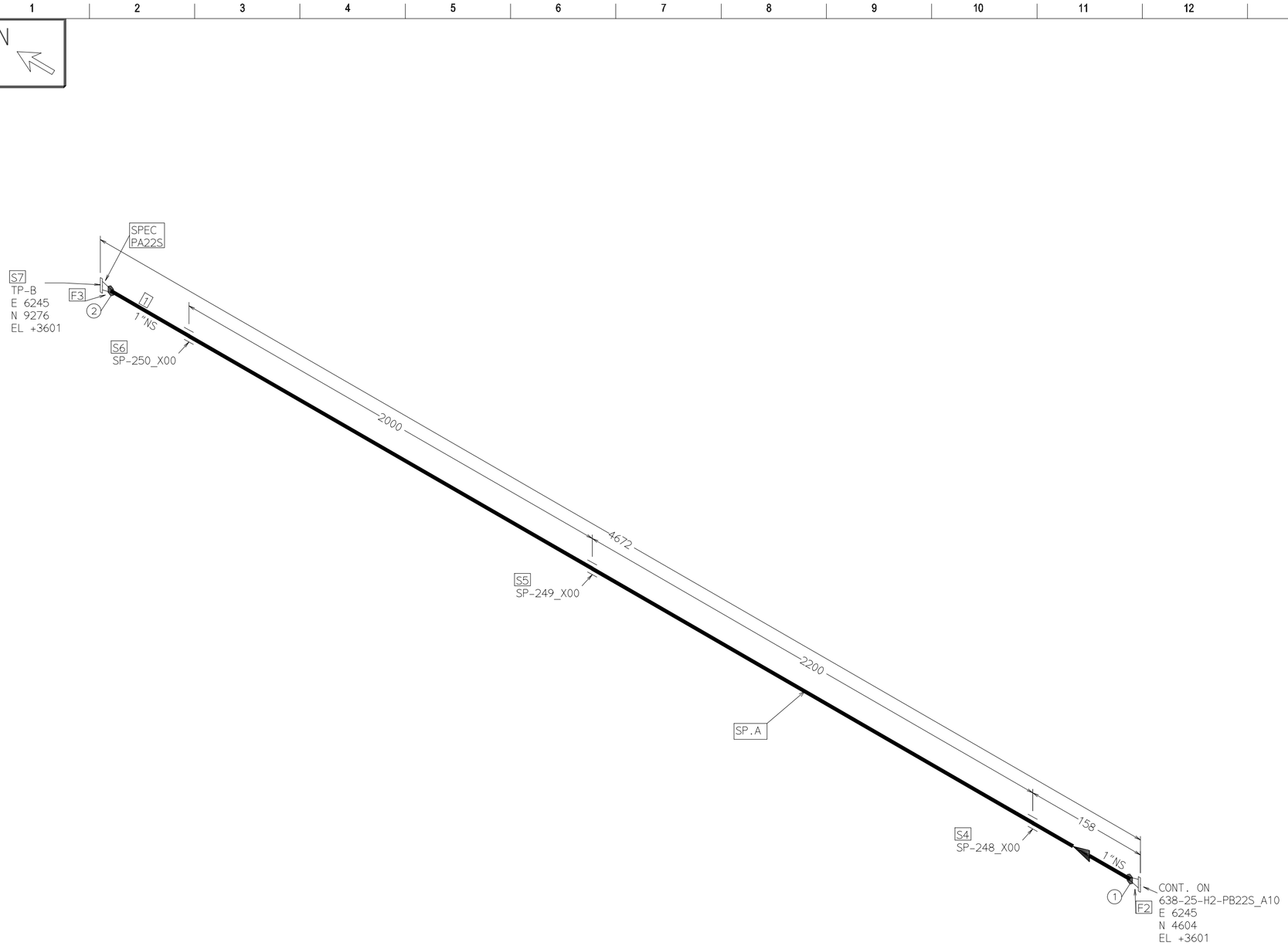
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.		FORES DOC. Nr.	
C0063-FOR-DTB-MP-007		224J10-DDL-PP-DI-00005	
CROSSWIND DOC. Nr.	ISO Nr.	SHEET - OF	COMP.
FORES-INN-BPH-DWG-00025	49	1 / 1	C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	4.6M	11.36
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	1	2.00
3	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	1	2.00
	SUPPORTS				
4	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
5	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
6	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02

TOTAL FABRICATION WEIGHT 15.42

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	SUPPORTS				
7	General purpose ATTA SS 316	1	-	1	0.00

TOTAL ERECTION WEIGHT 0.00

TOTAL WEIGHT 15.42

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

638-25-H2-PB22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008/011	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	2.7	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	AMB	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	30					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

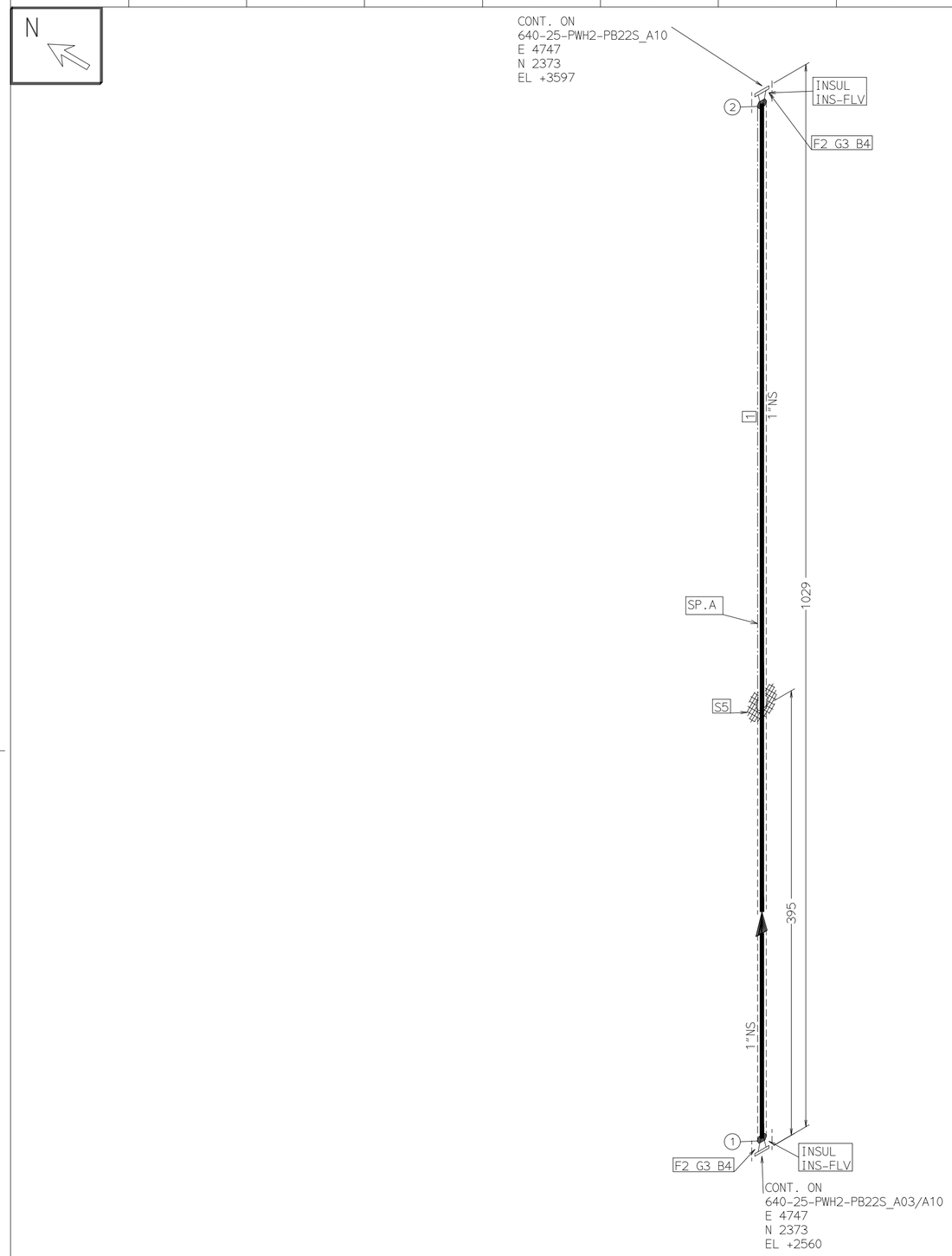
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 50

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	1.0M	2.25
	FLANGES				
2	FLANGE WELDING NECK ASME B16.5, CL300 RF, Sch.40S ASTM A182 Gr.F316/316L	1	FLWOSS03270100	2	4.00
			TOTAL FABRICATION WEIGHT		6.25

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
3	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300 SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	GENEGK00570100	2	0.14
	BOLTS				
4	80 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	5/8	SB20B029250300	8	1.84
	SUPPORTS				
5	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		5.38
			TOTAL WEIGHT		11.63

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	

TRACING SPEC: TRAC-ELO

640-25-PWH2-PB22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-004/007	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	980.5	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Liquid + Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	65	PED CATEGORY :	1	TRACING : HR-640	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	31,9				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

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PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

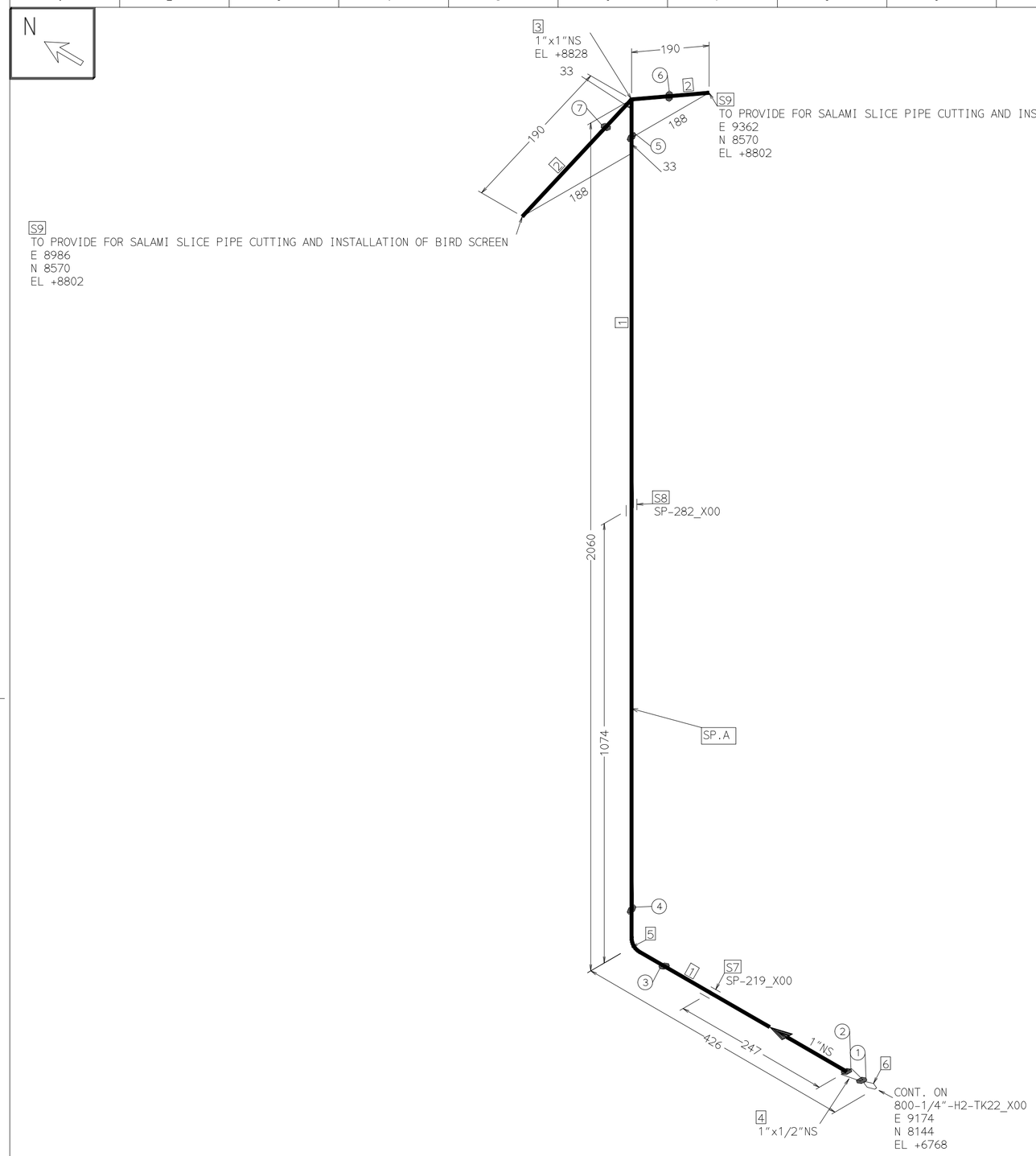
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 51

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	2.3M	5.71
2	PIPE ASME B36.19M, SCH.40S, SLOPE 10degree, END TRIMMED AT -10degree, OVERALL LENGTH 152.899924567mm ASTM A312 Gr.TP 316/316L	1	PIPESS00480100	0.3M	0.68
	FITTINGS				
3	TEE ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP 316/316L-S	1 x 1	TEE0SS00550100	1	0.29
4	CONCENTRIC REDUCER ASME B16.9, BE, Sch.80S ASTM A403 Gr.WP 316/316L-S	1 x 1/2	REC0SS0512010H	1	0.16
5	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP 316/316L-S	1	E90RSS00670100	1	0.15
6	MALE CONNECTOR, SWAGELOK, F :DF x M:BWD, INCH ASTM A276 316	1/2	2CFDF316IN800	1	0.10
	SUPPORTS				
7	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
8	U-BOLT FOR GUIDE, S-211-25mm,	1	SUPPORT	1	0.02
9	General purpose ATTA SS 316	1	-	2	0.00

TOTAL FABRICATION WEIGHT 7.13

SPOOL NUMBERS:

SP.A

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
6	S	
7	S	

801-25-H2-PB22S_X00

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-008	DES. TEMP. (°C) :	80	FLUID DENSITY(kg/m3) :	0.0899	THICKNESS (mm):	TEST PRESS. (barg) :	57,2	THIS LINE HAS BEEN STRESS ANALYSED. DO NOT ALTER THE ROUTING OR MODIFY THE SUPPORTS WITHOUT PRIOR APPROVAL OF FORES.
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	40	FLUID PHASE :	Gas		FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	25	PED CATEGORY :	1	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	0,5				VISUAL 100% ALL WELDS		

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT

ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-007

FORES DOC. Nr.: 224J10-DDL-PP-DI-00005

CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00025

ISO Nr.: 52

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:

C0063-FOR-DWG-MP-001

Pressure Vessels Detailed Drawings

(Phase 2)

C63- CrossWind Project

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
01	*Issue for Approval*	*27-JUN-2024*	*M. MILUCCI*	*M. CHIARUCCI*	*L. MAIOLI*
00	*Issue for Approval*	*06-JUN-2024*	*M. MILUCCI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	C0063-FOR-DWG-MP-001
Elogen Project Document Title	Pressure Vessels Detailed Drawings
Crosswind Project Document Number	FORES-INN-BPH-DWG-00015
Fores Project Document Number	224J10-DDL-VS-DD-00001

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REVISION LIST	
REV.	**DESCRIPTION**
00	***Issue for Approval***
01	***Issue for Approval***

HOLD RECORD	
REV. ITEM	**REV. DESCRIPTION**

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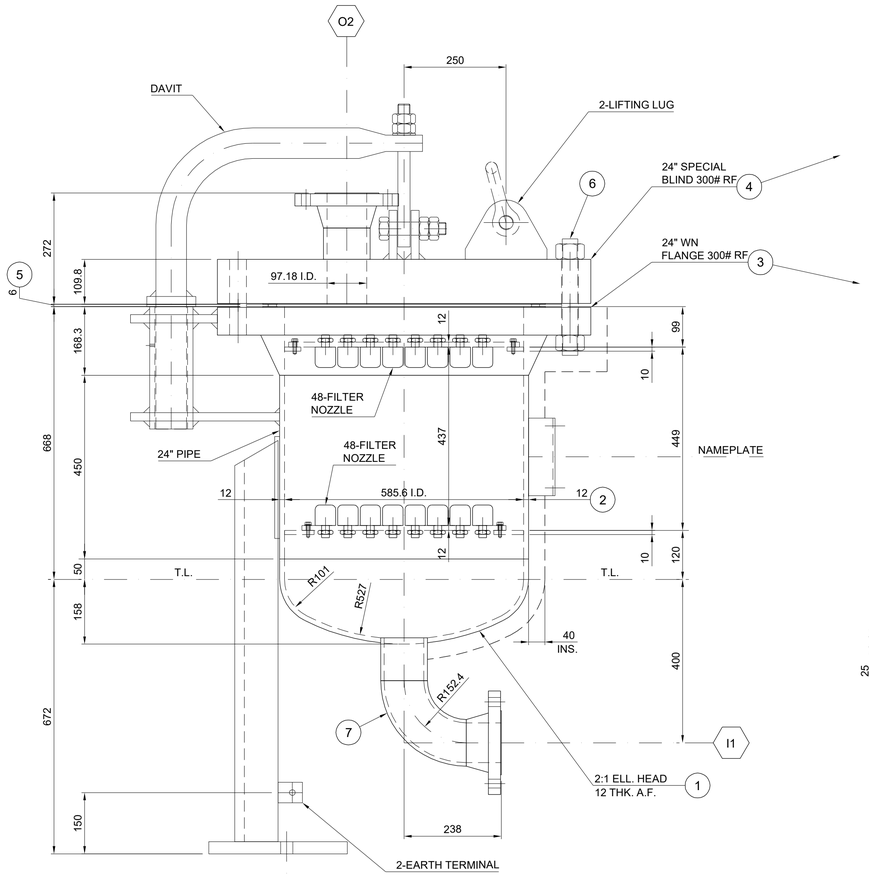
Pag.	Description
1	***Cover***
2	***Revision page***
3	***Index***
4	***H_2 Loop Resin Filter Housing FH-620***
5	***O_2 Loop Resin Filter Housing FH-600***
6	***H_2 Separator Tank ST-620***
7	***O_2 Separator Tank ST-600***
8	***H_2 Condensate Separator CS-630***
9	***H_2 High Pressure Degasser DG-640***
10	***O_2 Condensate Separator CS-610***

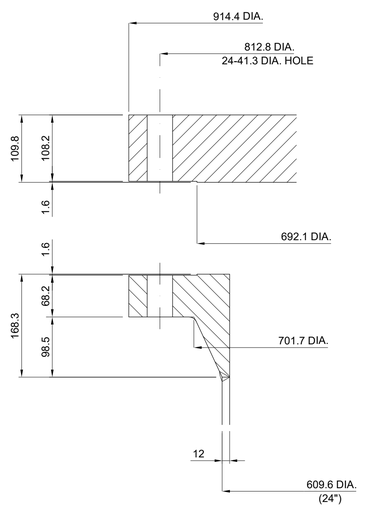
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FH-620

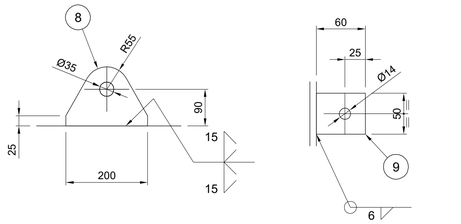
H_2 Loop Resin Filter Housing

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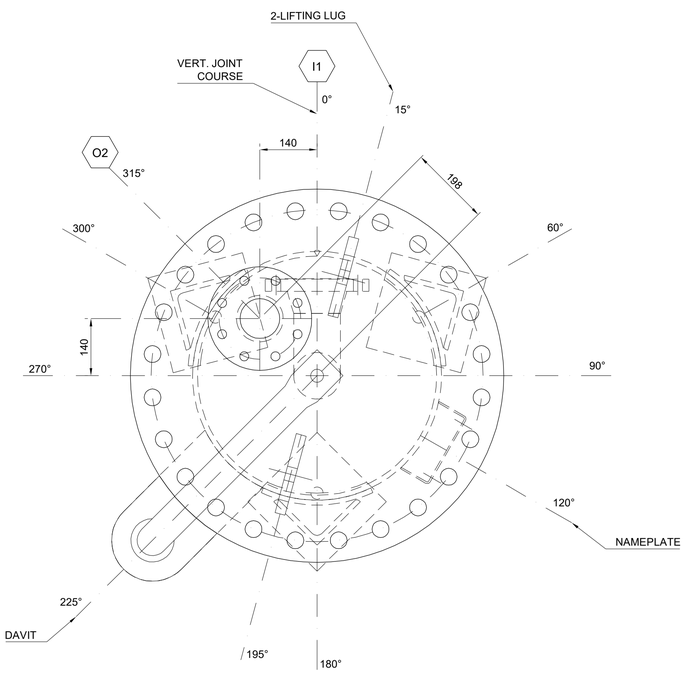




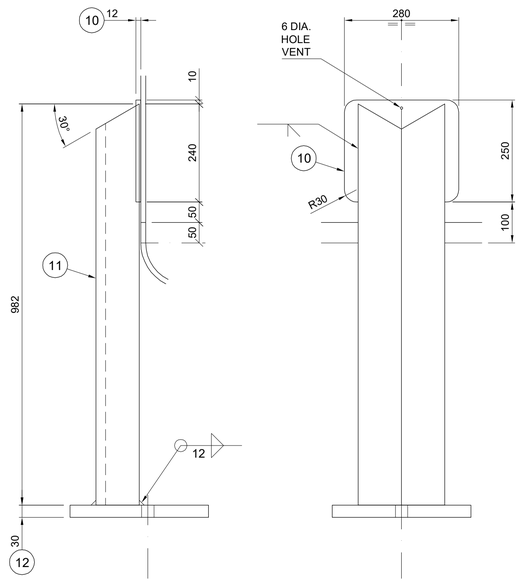
LIFTING LUG DETAIL

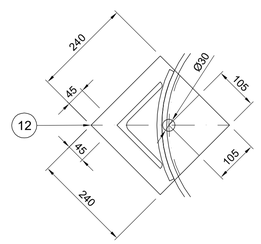


EARTHING LUG DETAIL



ORIENTATION





SUPPORT LEG DETAIL

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
I1	INLET (PURE WATER + H2)	SEE DWG.	1	4"	WN 300# RF	8.56	SA182 F316/316L	◑	1	4"	8.56	104	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		15
02	OUTLET (PURE WATER + H2)	SEE DWG.	1	4"	WN 300# RF	8.56	SA182 F316/316L	◑	1	4"	8.56	76	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		14

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ○ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN PASSO D'UOMO AVENTE UN DIAMETRO INTERNO DI 585 mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A MANHOLE HAVING AN INTERNAL DIA. OF 585 mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 40 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 40 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE: (FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm, DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING) LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°, LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

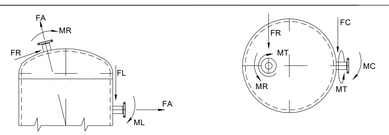
11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	1	2:1 ELL. HEAD 609.6 O.D. 12 Thk. (A.F.)	SA240 316/316L	◑	-	60	-
2	1	12 Thk. PLATE 450x1877	SA240 316/316L	◑	-	81	-
3	1	24" WN FLANGE 300# RF 12 Thk.	SA182 F316/316L	◑	-	238	-
4	1	24" SPECIAL BLIND 300# RF	SA182 F316/316L	◑	-	543	-
5	1	24" GASKET 300# RF 6 Thk.	KEMPCHEN	○	-	-	-
6	24	1.1/2"x285 STD BOLTS + NUTS	B8 Cl.1 / Gr.8 Cl.1	◑	3.8	91	-
7	1	4" ELBOW 90° LR 8.56 Thk.	SA403 WP316/316L	◑	-	6	-
8	2	25 Thk. PLATE 145x200	SA240 316/316L	◑	6	12	-
9	2	8 Thk. PLATE 50x60	SA240 316/316L	◑	-	-	-
10	3	12 Thk. PLATE 280x250	SA240 316/316L	◑	6.7	20	-
11	3	L150x150x12 L=982	SA240 316/316L	◑	29	87	-
12	3	30 Thk. PLATE 240x250	SA240 316/316L	◑	14	42	-

NOZZLE LOADS



NOZZLE	DIA.	FA (N)	FC (N)	FL (N)	FR (N)	MC (Nm)	ML (Nm)	MT (Nm)	MR (Nm)
I1-O2	4"	2600	-	-	3250	-	-	780	855

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO / CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE
PRESSIONE / PRESSURE	DI PROGETTO INTERNA / INTERNAL DESIGN	40 bar
	DI PROGETTO ESTERNA (VUOTO) / EXTERNAL DESIGN (VACUUM)	0.58 bar(a)
	DI ESERCIZIO / NORMAL OPERATING	35 bar
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA' / HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	57.2 bar
	PROVA IDR. (IN ORIZ.) / HYDROSTATIC TEST (HOR)	-
TEMPERATURA / TEMPERATURE	DI PROGETTO / DESIGN	80 °C (8)
	DI ESERCIZIO / NORMAL OPERATING	55 °C
SOVRASPESSORE DI CORROS. / CORROSION ALLOWANCE	MANTELLO / SHELL	0
	FONDI / HEADS	0
EFFICIENZA DEI GIUNTI / JOINTS EFFICIENCY	MANTELLO / SHELL	1
	FONDI / HEADS	1
TRASPORTO / TRANSPORT		ah=0.7g - av=0.5g
PRESS. DEL VENTO / WIND PRESSURE		N.A.
COEFFICENTE SISMICO / SEISMIC COEFFICIENT		N.A.
TRATTAMENTO TERMICO DOPO SALDATURA / POSTWELD HEAT TREATMENT		NO
CONTROLLI N.D.E.		FULL (12)
TRATTAMENTO SUPERFICIALE / SURFACE TREATMENT		PICKLING AND PASSIVATION
ISOLAMENTO / INSULATION		40 Thk. MINERAL WOOL + METALLIC COVER
PROTEZIONE FUOCO / FIREPROOFING		NO
POSIZIONE DEL RECIPIENTE / ORIENTATION OF VESSEL		VERTICAL
CAPACITA' / CAPACITY		206 Lt.
FLUIDO CONTENUTO / CONTAINED FLUID	NATURA / TYPE	PURE WATER + HYDROGEN
	STATO / STATE	LIQUID + GAS
	DENSITA' / DENSITY	985.69 Kg/dm3
PESI / WEIGHTS	VUOTO / EMPTY	1400 Kg
	PIENO D 'ACQUA / WATER FULL	1606 Kg
ENTE COLLAUDATORE / INSPECTION BY		ICIM
TALLONI DI PRODUZIONE / PRODUCTION SAMPLES		NO
OVALIZZAZIONE / OVALIZATION		1% MAX.
N° DI FABBRICA / SERIAL No.	24J033-NF01	ANNO DI COSTRUZ. / YEAR BUILT 2024

CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION

CATEGORIA FLUIDO / FLUID GROUP	1
CATEGORIA PED / PED CATEGORY	IV
MODULO PED / PED MODULE	G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME / MATERIALS ACCORDING TO CODE			ASME SECT. II PART "A" 2023 ED.
MANTELLO / SHELL			SA240 316/316L
FONDI / HEADS			SA240 316/316L
CONN FLANGIATE / FLANGED CONN.	FLANGE / FLANGES		SA182 F316/316L
	TRONCH. / NOZZLE		SA312 TP316/316L
PASSI D 'UOMO / MANHOLES	FLANGE / FLANGES		-
	TRONCH. P.U. / MANHOLES NOZZLE		-
TIRANTI / STUD BOLTS	SA193 B8 Cl.1	DADI / NUTS	SA194 Gr.8 C.l.1
GUARNIZIONI / GASKETS	KEMPCHEN - RUBBER STEEL GASKET		
SUPPORTI / SUPPORTS			SA240 316/316L
ACCESSORI INTERNI / INTERNAL FITTINGS			
LAMIERA / PLATE	SA240 316/316L	PROFILATI / IRON SECTIONS	-
GUARNIZIONI / GASKETS	EPDM	BULLONERIA / BOLTING	SS 316L
ACCESSORI ESTERNI / EXTERNAL FITTINGS			
LAMIERA / PLATE	-	PROFILATI / IRON SECTIONS	-
TUBO / PIPE	-	BULLONERIA / BOLTING	-

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO / DRAWING N°	DESCRIZIONE / DESCRIPTION
24J033-001-Sh.2	NAME PLATE AND SUPP.
24J033-001-Sh.3	LIFTING ARRANGEMENT
24J033-001-Sh.4	INTERNAL DETAIL
24J033-001-Sh.5	DAVIT DETAIL

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO / DOCUMENT N°	DESCRIZIONE / DESCRIPTION
C63-MDS-001	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

FH-620 H2 LOOP RESIN FILTER HOUSING

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

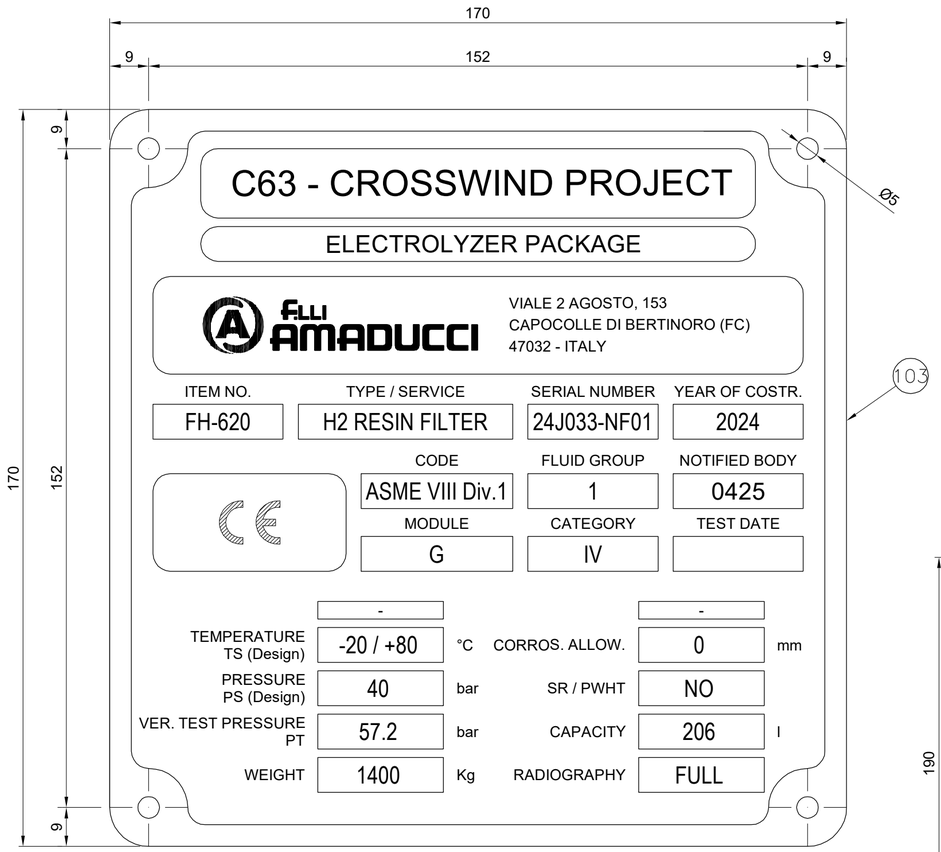
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-001
SH. OF 1 / 5

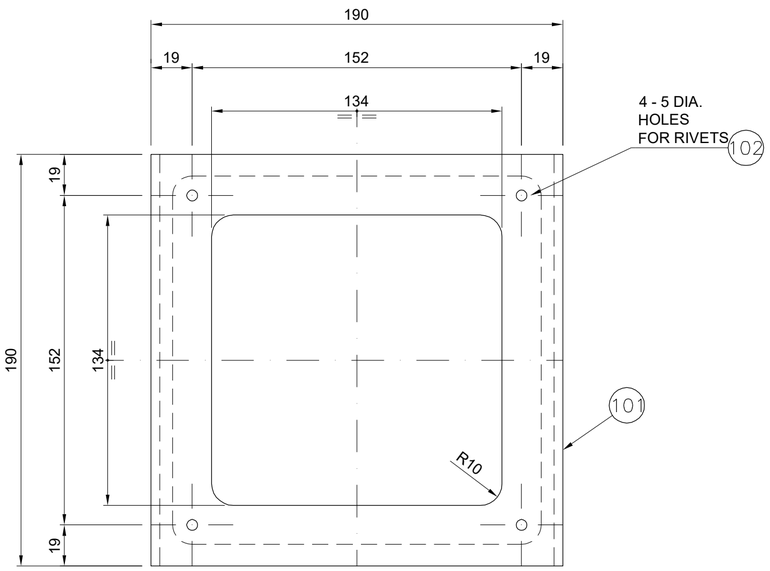
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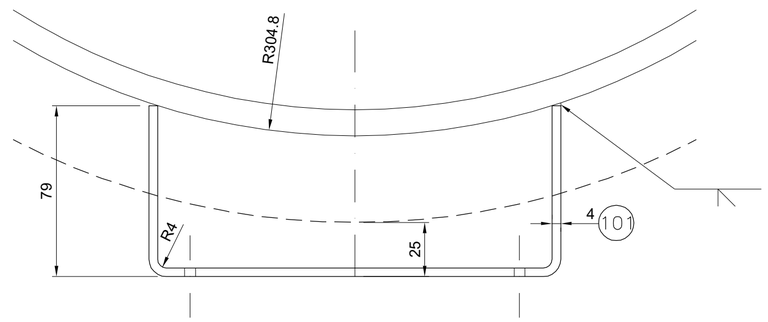
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1





NAMEPLATE SUPPORT
1:2

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
101	1	4 Thk. PLATE	SA240 316/316L	◑	-	2	-
102	4	4 DIA. RIVET	SS 316	◑	-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L	◑	-	0.5	-

NAMEPLATE NOTES

1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.

FH-620 H2 LOOP RESIN FILTER HOUSING

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

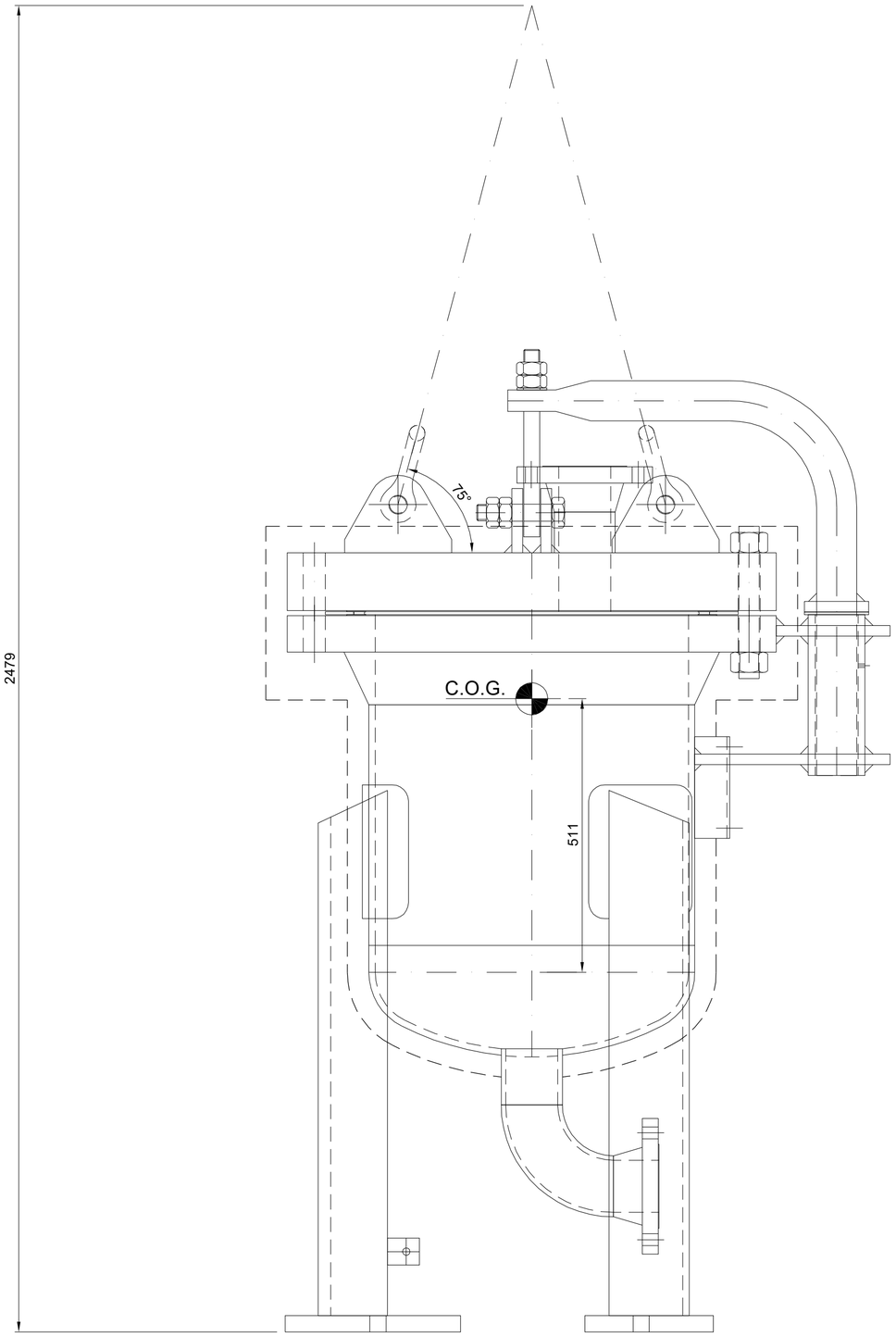
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
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DWG. Nr. 24J033-001
SH. OF 2 / 5

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 1400 kg

FH-620 H2 LOOP RESIN FILTER HOUSING

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0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

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VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033

DWG. Nr. 24J033-001 | SH. OF 3 / 5

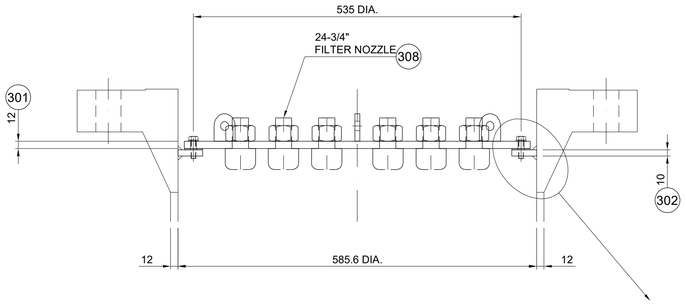
elogen

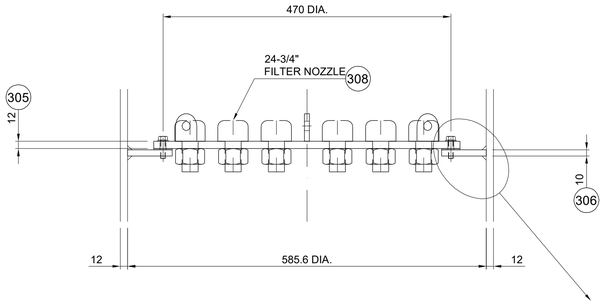
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

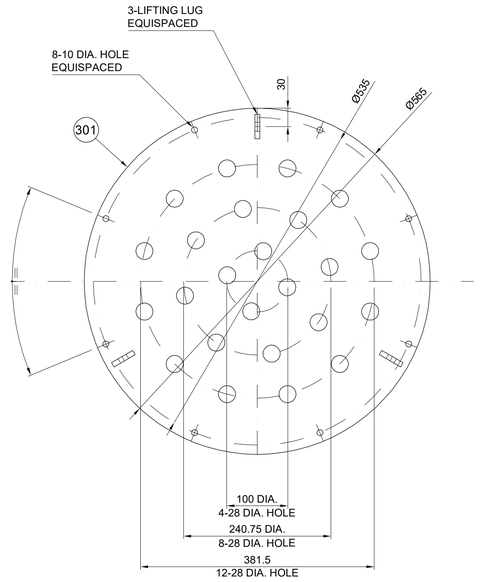
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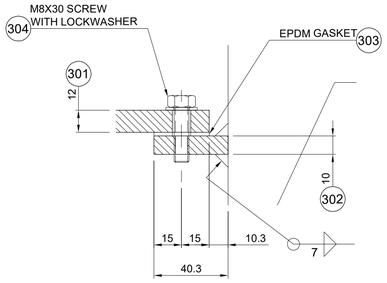
ELENCO MATERIALI / MATERIAL LIST

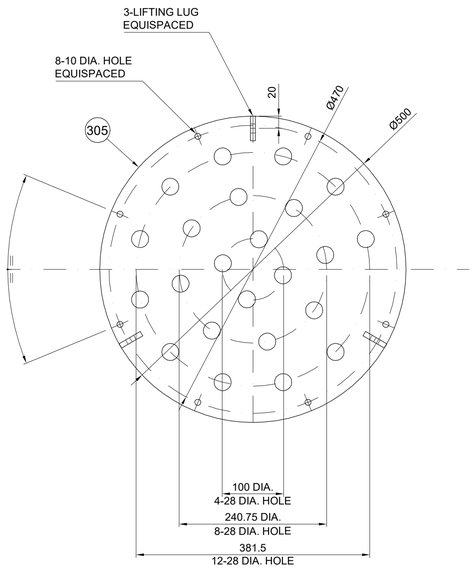
POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
301	1	12 Thk. PLATE 565 DIA.	SA240 316/316L	◑	-	24	-
302	1	10 Thk. RING PLATE 505 ID / 585 OD	SA240 316/316L	◑	-	5	-
303	1	GASKET 505 ID / 565 OD	EPDM	○	-	-	-
304	16	M8x30 SCREW WITH LOCKWASHER	SS 316L	◑	-	1	-
305	1	12 Thk. PLATE 500 DIA.	SA240 316/316L	◑	-	19	-
306	1	10 Thk. RING PLATE 440 ID / 585 OD	SA240 316/316L	◑	-	9	-
307	1	GASKET 440 ID / 500 OD	EPDM	○	-	-	-
308	48	3/4" FILTER NOZZLE	SS 316L		-	-	BY FORES
309	6	8 Thk. PLATE 40x40	SA240 316/316L	◑	-	1	-

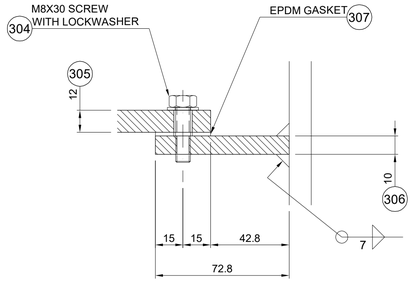


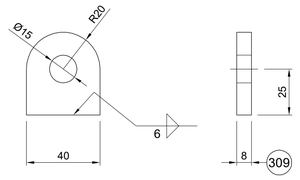




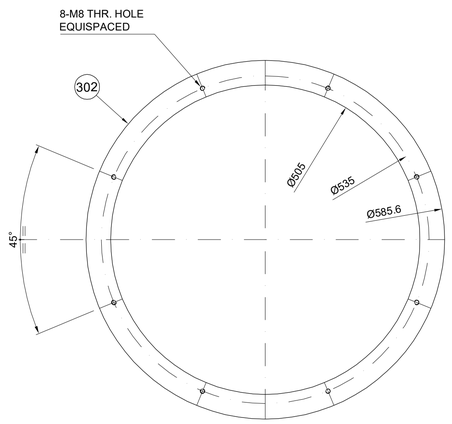




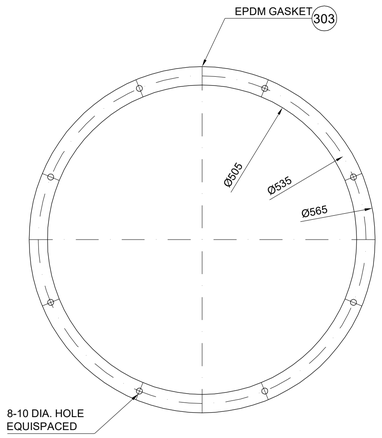


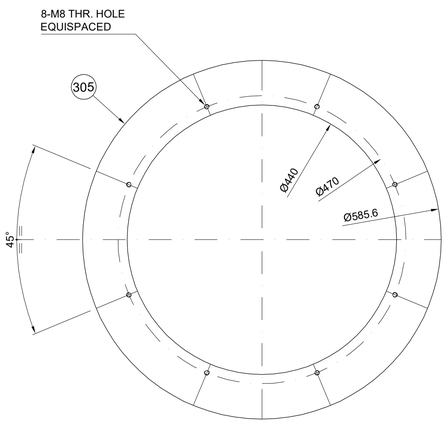


LIFTING LUG DETAIL

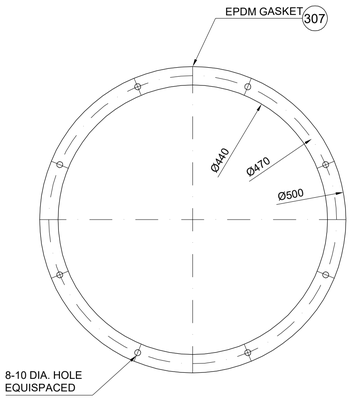


"UPPER " DISTRIBUTOR





"LOWER " DISTRIBUTOR



FH-620 H2 LOOP RESIN FILTER HOUSING

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

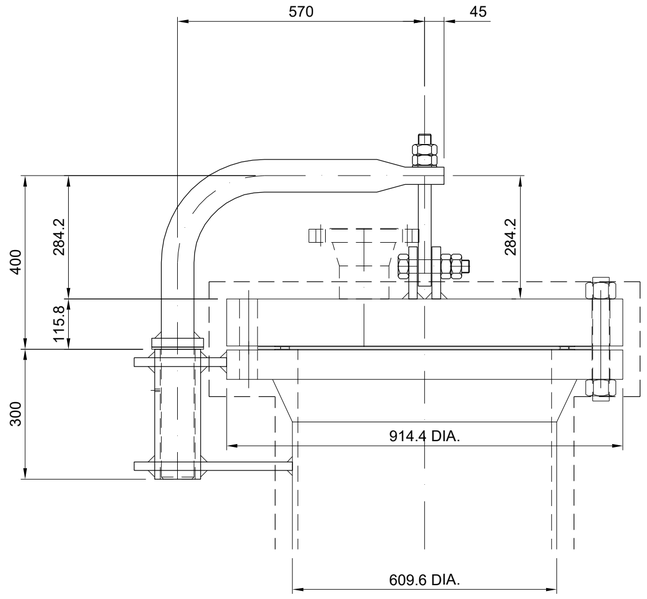
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

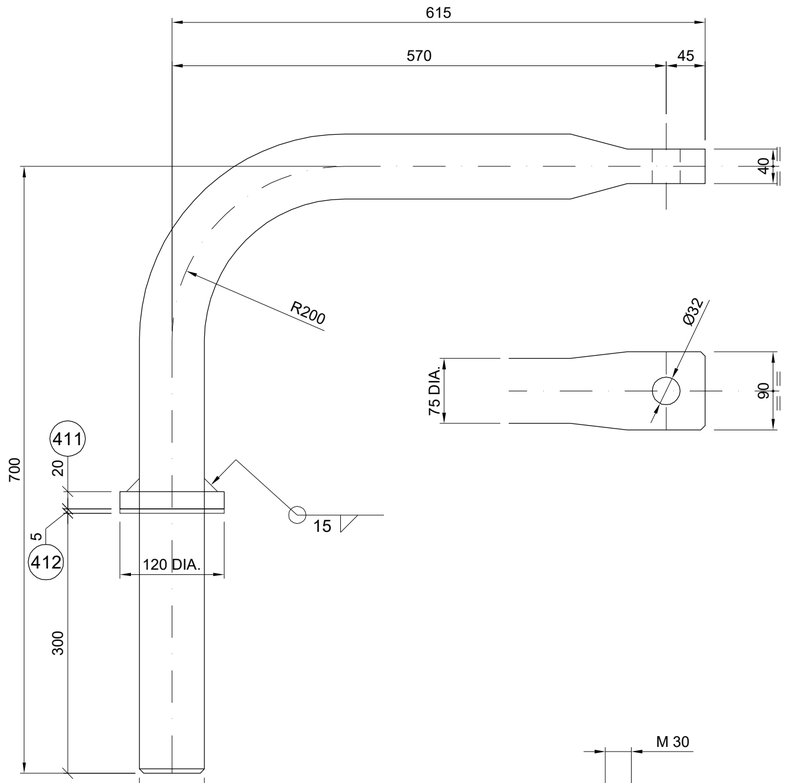
JOB Nr. 24J033
DWG. Nr. 24J033-001
SH. 4 / 5 OF

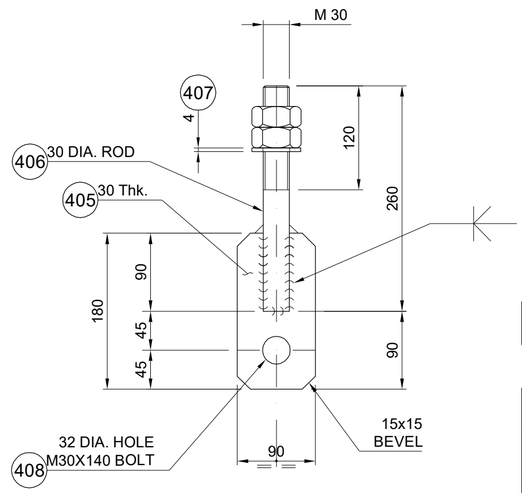
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
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FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

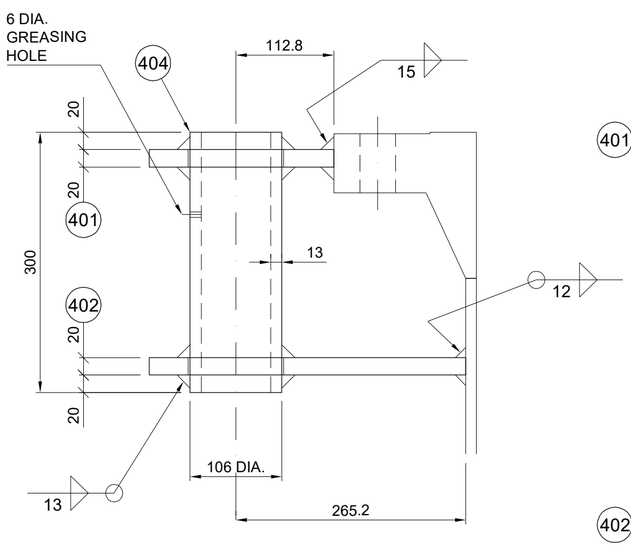
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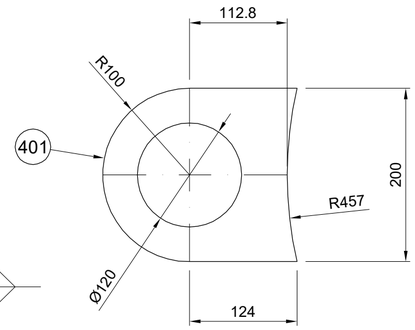


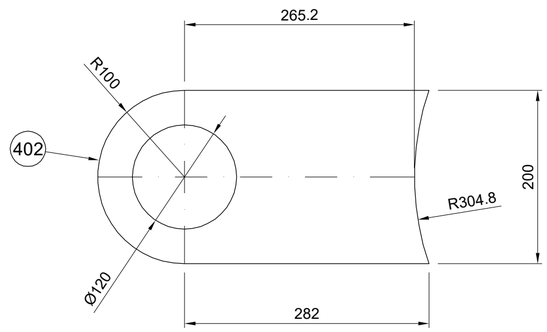




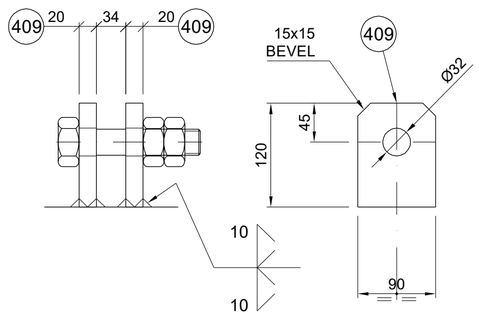
STUD DETAIL







SLEEVE DETAIL



LUG DETAIL

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
401	1	20 Thk. SKETCH PLATE 200x224	SA240 316/316L	◑	-	6.2	-
402	1	20 Thk. SKETCH PLATE 200x382	SA240 316/316L	◑	-	11.0	-
403	-	-	-		-	-	-
404	1	106 OD PIPE 13 Thk. L=300	SS 316	◑	-	9.0	-
405	1	30 Thk. PLATE 90x180	SA240 316/316L	◑	-	4	-
406	1	M 30 STUD L=260 WITH 2 NUTS	SS 316	◑	-	1.9	-
407	1	4 Thk. PLATE 31 I.D. / 56 O.D.	SS 316	◑	-	0.1	UNI6592
408	1	M30x140 WITH 2 NUTS	SS 316	◑	-	1.2	-
409	2	20 Thk. PLATE 90x120	SA240 316/316L	◑	1.7	3	-
410	1	75 DIA. ROD L=1230	SA 36 or EQ.	◑	-	42.7	-
411	1	20 Thk. PLATE 77 I.D. / 120 O.D.	SA 36 or EQ.	◑	-	0.5	-
412	1	5 Thk. WASHER 77 I.D. / 120 O.D.	BRASS	○	-	0.4	-

FH-620 H2 LOOP RESIN FILTER HOUSING

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SH. OF 5 / 5

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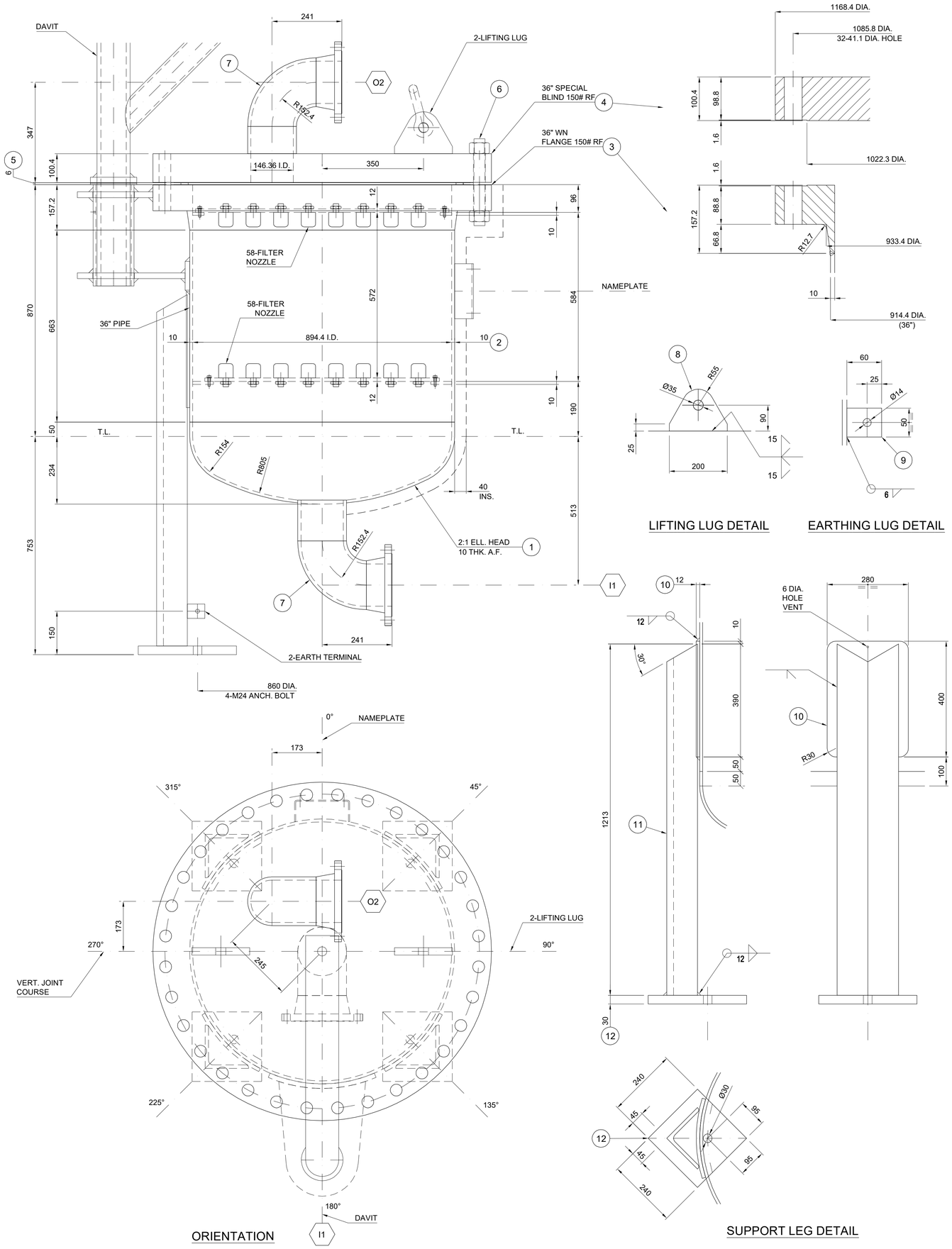
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FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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FH-600

O_2 Loop Resin Filter Housing

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LIFTING LUG DETAIL

EARTHING LUG DETAIL

SUPPORT LEG DETAIL

ORIENTATION

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
I1	INLET (PURE WATER + O2)	SEE DWG.	1	6"	WN 150# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	141	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		17
02	OUTLET (PURE WATER + O2)	SEE DWG.	1	6"	WN 150# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	94	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		15

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ○ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN PASSO D'UOMO AVENTE UN DIAMETRO INTERNO DI 894 mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A MANHOLE HAVING AN INTERNAL DIA. OF 894 mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 16 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 16 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE:
(FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm,
DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING)
LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°,
LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

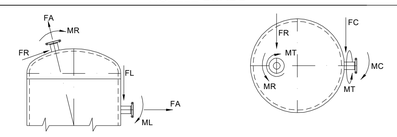
11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	1	2:1 ELL. HEAD 914.4 O.D 10 Thk. (A.F.)	SA240 316/316L	◑	-	100	-
2	1	10 Thk. PLATE 663x2841	SA240 316/316L	◑	-	151	-
3	1	36" WN FLANGE 150# RF 10 Thk.	SA182 F316/316L	◑	-	316	B16.47-A
4	1	36" SPECIAL BLIND 150# RF	SA182 F316/316L	◑	-	814	-
5	1	36" GASKET 150# RF 6 Thk.	KEMPCHEN	○	-	-	-
6	32	1.1/2"x300 STD BOLTS + NUTS	B8 Cl.1 / Gr.8 Cl.1	◑	4	128	-
7	2	6" ELBOW 90° SR 10.97 Thk.	SA403 WP316/316L	◑	10	20	-
8	2	25 Thk. PLATE 145x200	SA240 316/316L	◑	6	12	-
9	2	8 Thk. PLATE 50x60	SA240 316/316L	◑	-	-	-
10	4	12 Thk. PLATE 280x400	SA240 316/316L	◑	11	44	-
11	4	L150x150x12 L=1213	SA240 316/316L	◑	34	136	-
12	4	30 Thk. PLATE 240x240	SA240 316/316L	◑	14	56	-

NOZZLE LOADS



NOZZLE	DIA.	FA (N)	FC (N)	FL (N)	FR (N)	MC (Nm)	ML (Nm)	MT (Nm)	MR (Nm)
I1-O2	6"	3300	-	-	4125	-	-	1485	2577

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE	
PRESSIONE PRESSURE	DI PROGETTO INTERNA INTERNAL DESIGN	16 bar	
	DI PROGETTO ESTERNA (VUOTO) EXTERNAL DESIGN (VACUUM)	0.58 bar(a)	
	DI ESERCIZIO NORMAL OPERATING	14 bar	
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	22.88 bar	
	PROVA IDR. (IN ORIZ.) HYDROSTATIC TEST (HOR)	-	
TEMPERATURA TEMPERATURE	DI PROGETTO DESIGN	80 °C (8)	
	DI ESERCIZIO NORMAL OPERATING	55 °C	
SOVRASPESSORE DI CORROS. CORROSION ALLOWANCE	MANTELLO SHELL	0	
	FONDI HEADS	0	
EFFICIENZA DEI GIUNTI JOINTS EFFICIENCY	MANTELLO SHELL	1	
	FONDI HEADS	1	
TRASPORTO TRANSPORT		ah=0.7g - av=0.5g	
PRESS. DEL VENTO WIND PRESSURE		N.A.	
COEFFICENTE SISMICO SEISMIC COEFFICIENT		N.A.	
TRATTAMENTO TERMICO DOPO SALDATURA POSTWELD HEAT TREATMENT		NO	
CONTROLLI N.D. N.D.E.		FULL (12)	
TRATTAMENTO SUPERFICIALE SURFACE TREATMENT		PICKLING AND PASSIVATION	
ISOLAMENTO INSULATION		40 Thk. ROCKWOOL/GLASSWOOL + METALLIC COVER	
PROTEZIONE FUOCO FIREPROOFING		NO	
POSIZIONE DEL RECIPIENTE ORIENTATION OF VESSEL		VERTICAL	
CAPACITA' CAPACITY		640 Lt.	
FLUIDO CONTENUTO CONTAINED FLUID	NATURA TYPE	PURE WATER + OXYGEN	
	STATO STATE	LIQUID + GAS	
	DENSITA' DENSITY	985.69 Kg/dm3	
PESI WEIGHTS	VUOTO EMPTY	2100 Kg	
	PIENO D 'ACQUA WATER FULL	2740 Kg	
ENTE COLLAUDATORE INSPECTION BY		ICIM	
TALLONI DI PRODUZIONE PRODUCTION SAMPLES		NO	
OVALIZZAZIONE OVALIZATION		1% MAX.	
N° DI FABBRICA SERIAL No.	24J033-NF02	ANNO DI COSTRUZ. YEAR BUILT	2024

CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION

CATEGORIA FLUIDO FLUID GROUP	1
CATEGORIA PED PED CATEGORY	IV
MODULO PED PED MODULE	G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME MATERIALS ACCORDING TO CODE		ASME SECT. II PART "A" 2023 ED.
MANTELLO SHELL		SA240 316/316L
FONDI HEADS		SA240 316/316L
CONN FLANGIATE FLANGED CONN.	FLANGE FLANGES	SA182 F316/316L
	TRONCH. NOZZLE	SA312 TP316/316L
PASSI D 'UOMO MANHOLES	FLANGE FLANGES	-
	TRONCH. P.U. MANHOLES NOZZLE	-
TIRANTI STUD BOLTS	SA193 B8 Cl.1	DADI NUTS SA194 Gr.8 Cl.1
GUARNIZIONI GASKETS		KEMPCHEN - RUBBER-STEEL GASKET
SUPPORTI SUPPORTS		SA240 316/316L
ACCESSORI INTERNI INTERNAL FITTINGS		
LAMIERA PLATE	SA240 316/316L	PROFILATI IRON SECTIONS -
GUARNIZIONI GASKETS	EPDM	BULLONERIA BOLTING SS 316
ACCESSORI ESTERNI EXTERNAL FITTINGS		
LAMIERA PLATE	-	PROFILATI IRON SECTIONS -
TUBO PIPE	-	BULLONERIA BOLTING -

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO DRAWING N°	DESCRIZIONE DESCRIPTION
24J033-011-Sh.2	NAME PLATE AND SUPP.
24J033-011-Sh.3	LIFTING ARRANGEMENT
24J033-011-Sh.4	INTERNAL DETAIL
24J033-011-Sh.5	DAVIT DETAIL

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO DOCUMENT N°	DESCRIZIONE DESCRIPTION
C63-MDS-002	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

FH-600 O2 LOOP RESIN FILTER HOUSING

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

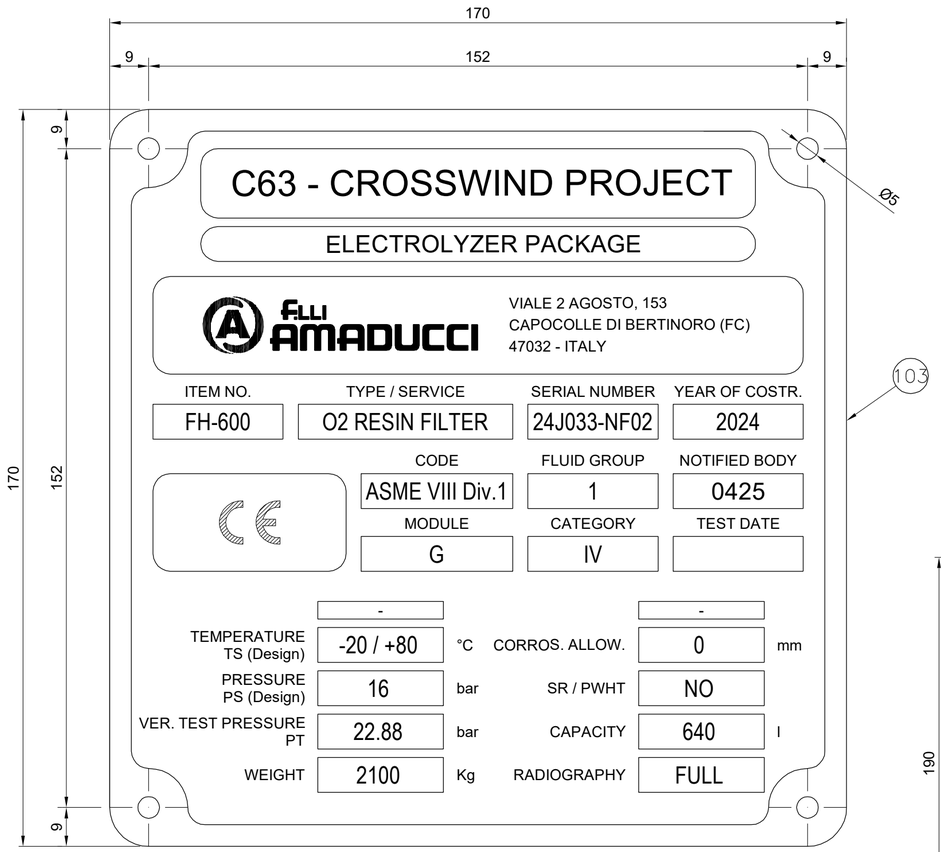
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-011
SH. 1 / 5 OF

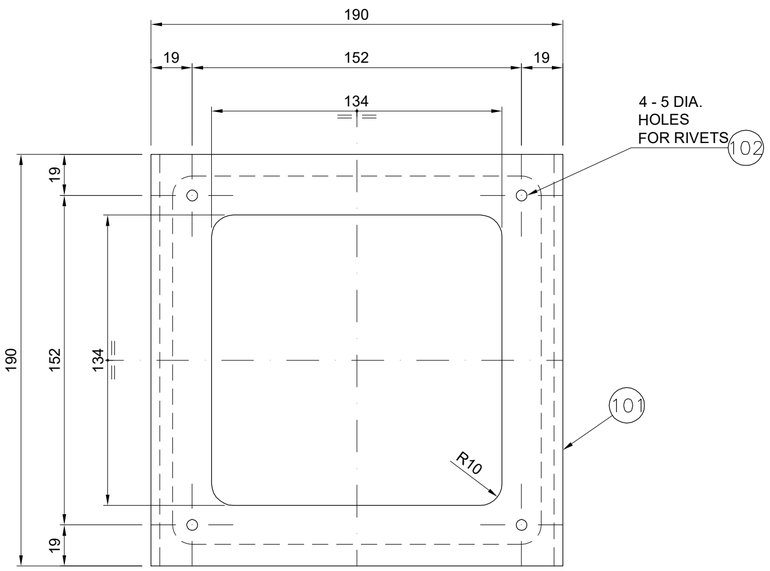
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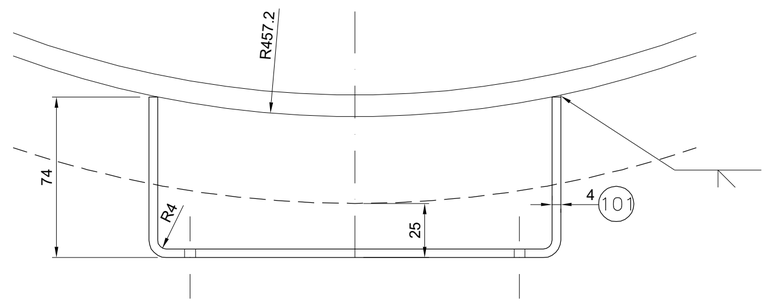
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1





NAMEPLATE SUPPORT
1:2

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
101	1	4 Thk. PLATE	SA240 316/316L	◑	-	2	-
102	4	4 DIA. RIVET	SS 316	◑	-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L	◑	-	0.5	-

NAMEPLATE NOTES

1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.

FH-600 O2 LOOP RESIN FILTER HOUSING

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0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

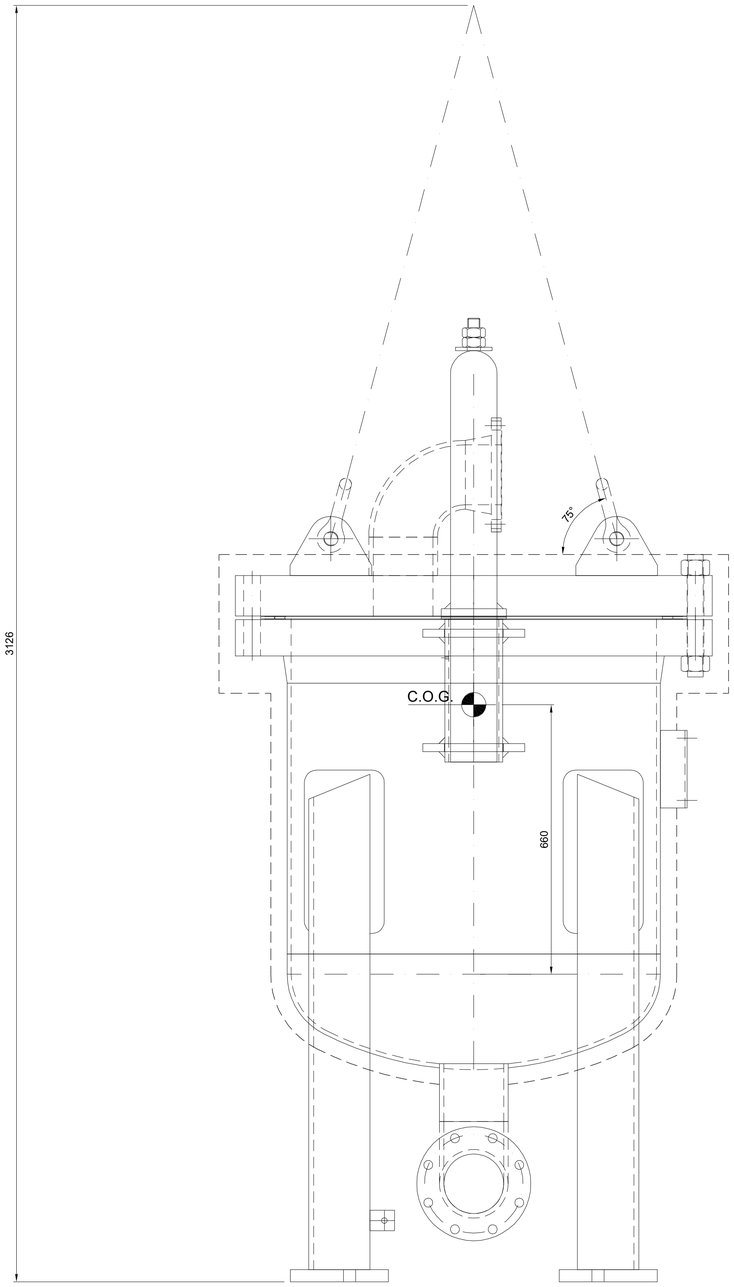
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-011
SH. OF 2 / 5

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 2100 kg

FH-600 O2 LOOP RESIN FILTER HOUSING

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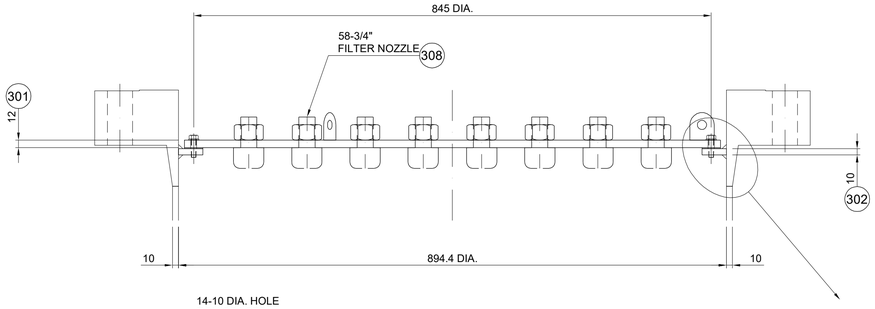
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

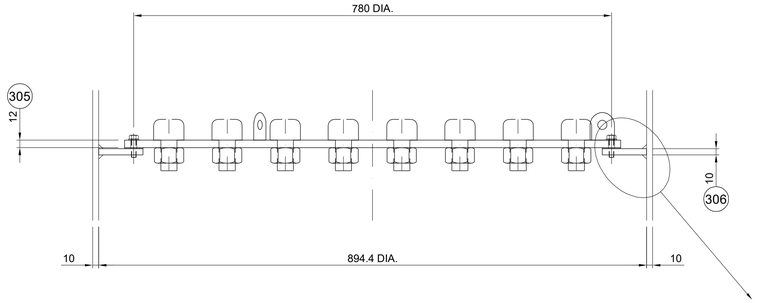
JOB Nr. 24J033
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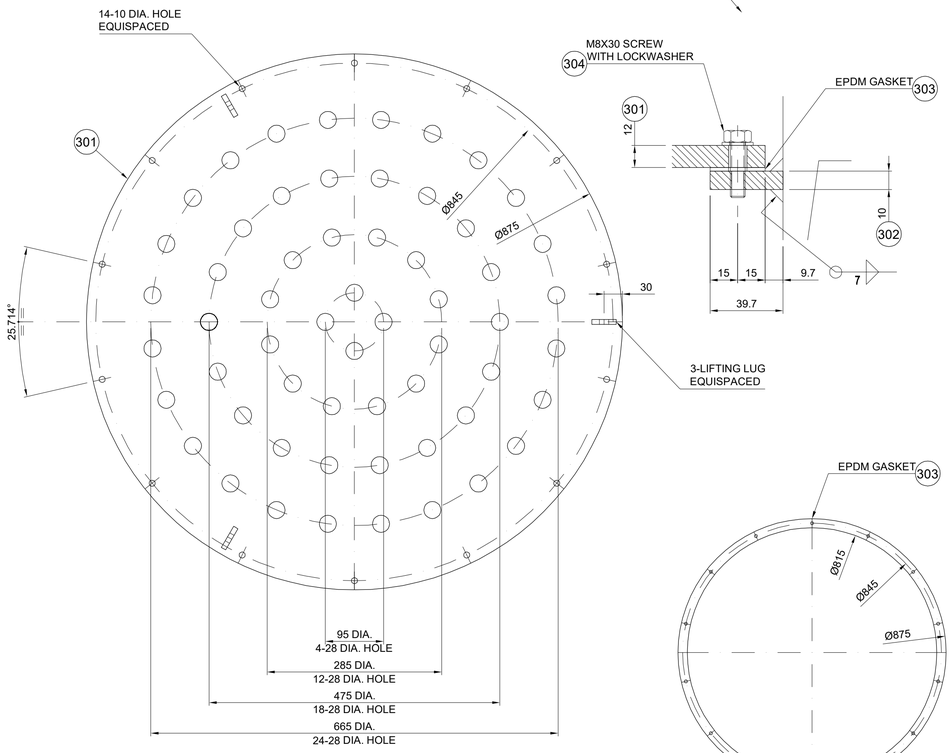
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

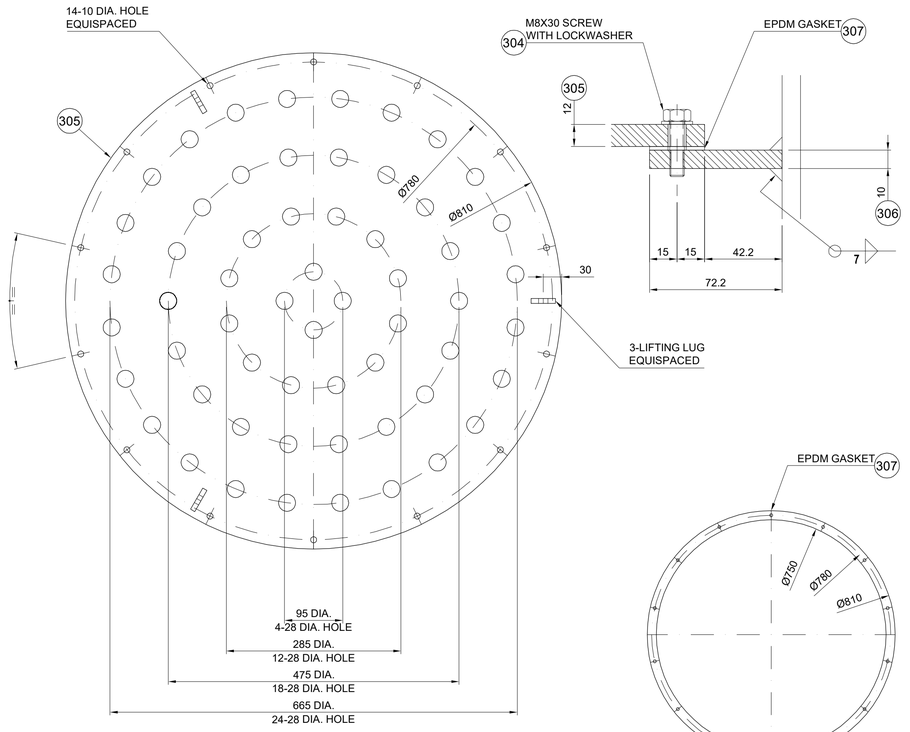
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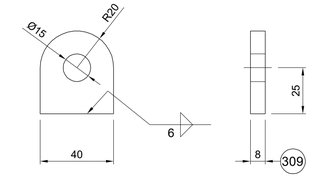




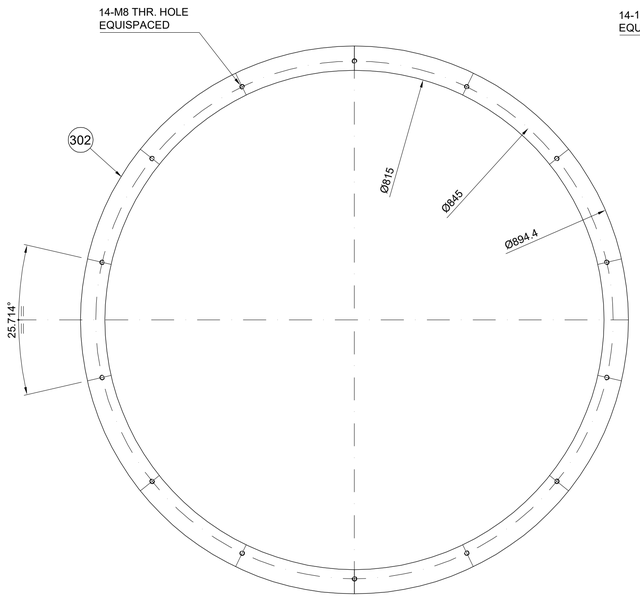
ELENCO MATERIALI / MATERIAL LIST							
POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
301	1	12 Thk. PLATE 875 DIA.	SA240 316/316L	◑	-	58	-
302	1	10 Thk. RING PLATE 815 ID / 894 OD	SA240 316/316L	◑	-	9	-
303	1	GASKET 815 ID / 875 OD	EPDM	○	-	-	-
304	28	M8x30 SCREW WITH LOCKWASHER	SS 316	◑	-	1	-
305	1	12 Thk. PLATE 810 DIA.	SA240 316/316L	◑	-	49	-
306	1	10 Thk. RING PLATE 750 ID / 894 OD	SA240 316/316L	◑	-	15	-
307	1	GASKET 750 ID / 810 OD	EPDM	○	-	-	-
308	116	3/4" FILTER NOZZLE	SS 316L		-	-	BY FORES
309	6	8 Thk. PLATE 40x40	SA240 316/316L	◑	-	1	-



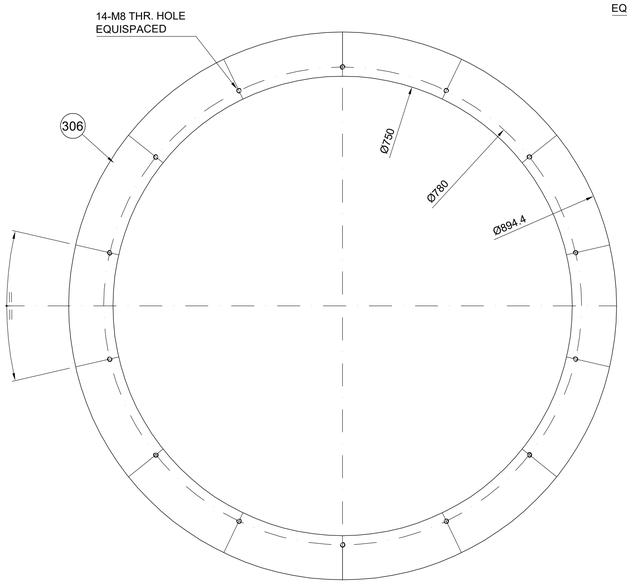




LIFTING LUG DETAIL



"UPPER " DISTRIBUTOR



"LOWER " DISTRIBUTOR

FH-600 O2 LOOP RESIN FILTER HOUSING

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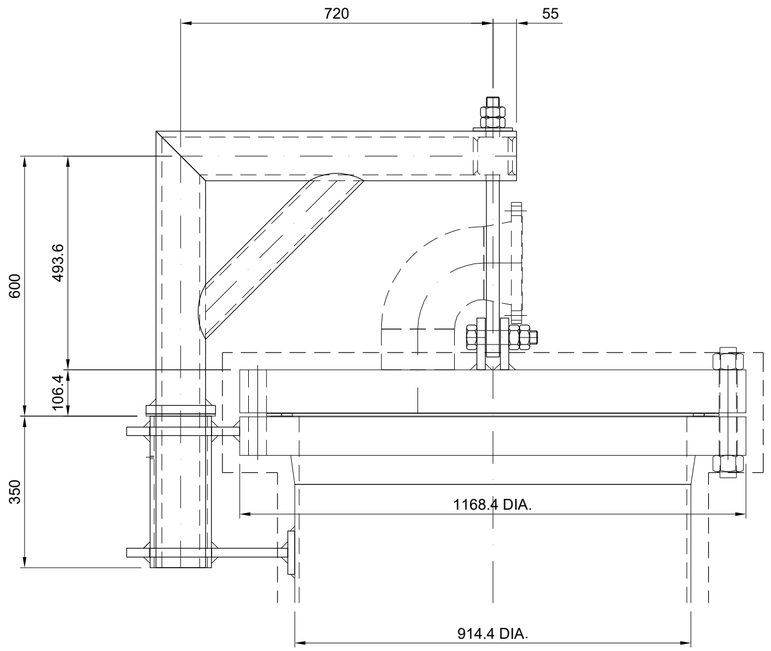
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

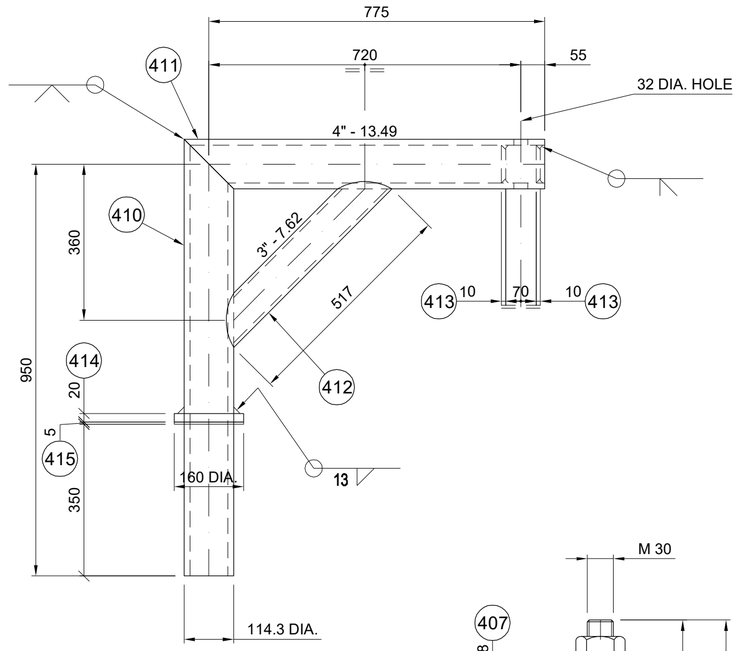
JOB Nr. 24J033
DWG. Nr. 24J033-011
SH. OF 4 / 5

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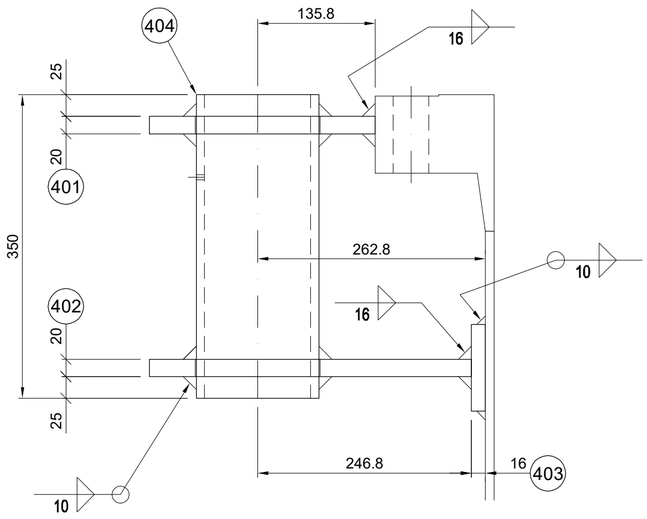
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

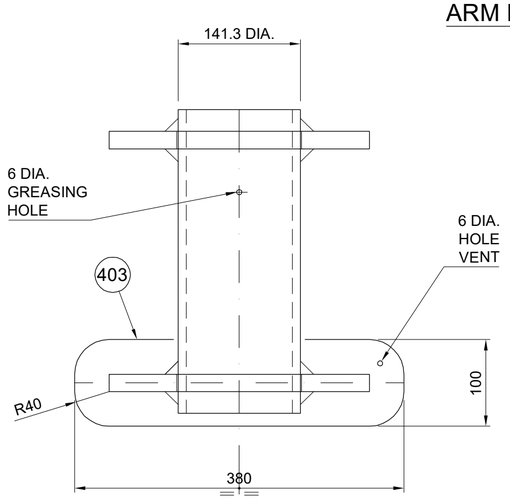
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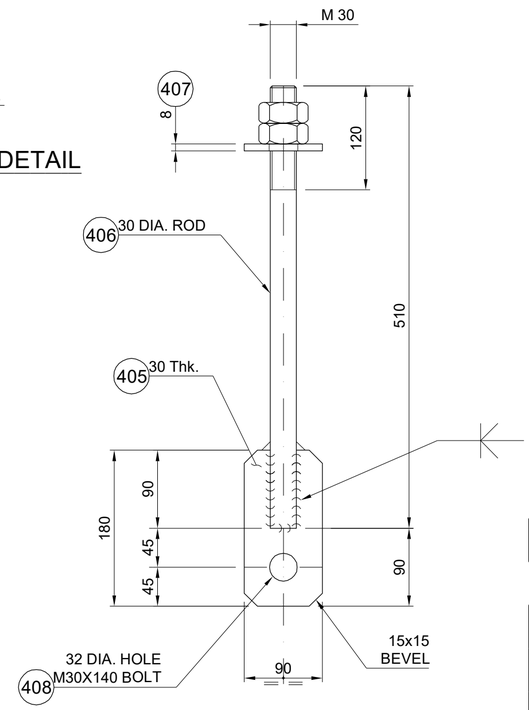




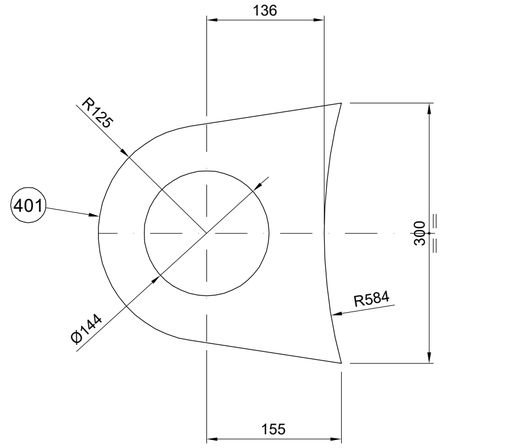
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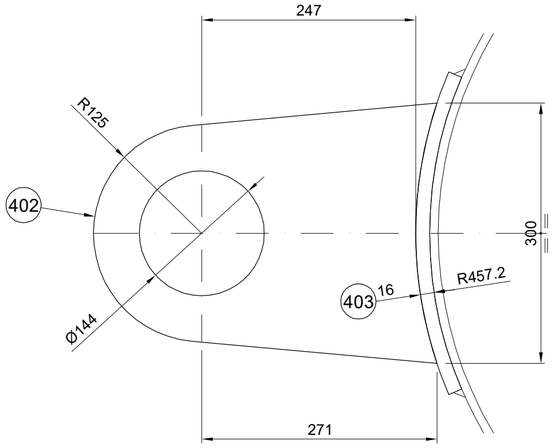




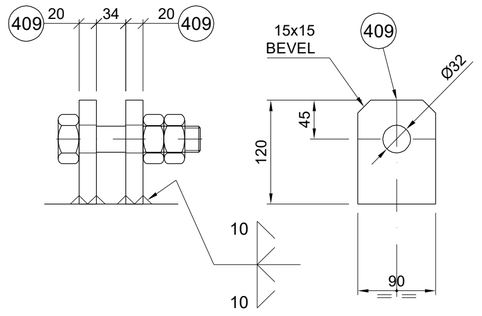


STUD DETAIL





SLEEVE DETAIL



LUG DETAIL

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
401	1	20 Thk. SKETCH PLATE 280x300	SA240 316/316L	◑	-	10	-
402	1	20 Thk. SKETCH PLATE 300x396	SA240 316/316L	◑	-	15	-
403	1	16 Thk. PLATE 100x400	SA240 316/316L	◑	-	5	-
404	1	5" PIPE 9.52 Thk. L=350	SA312 TP316/316L	◑	-	11	-
405	1	30 Thk. PLATE 90x180	SA240 316/316L	◑	-	4	-
406	1	M 30 STUD L=510 WITH 2 NUTS	SS 316	◑	-	3	-
407	1	8 Thk. PLATE 33 I.D. / 90 O.D.	SS 316	◑	-	0.4	UNI6593
408	1	M30x140 WITH 2 NUTS	SS 316	◑	-	1.2	-
409	2	20 Thk. PLATE 90x120	SA240 316/316L	◑	1.7	3	-
410	1	4" PIPE 13.49 Thk. L=1007	SA106 Gr.B	◑	-	34	-
411	1	4" PIPE 13.49 Thk. L=832	SA106 Gr.B	◑	-	28	-
412	1	3" PIPE 7.62 Thk. L=517	SA106 Gr.B	◑	-	8	-
413	2	10 Thk. PLATE 85 DIA.	SA516 Gr.60	◑	0.5	1	-
414	1	20 Thk. PLATE 116 I.D. / 160 O.D.	SA516 Gr.60	◑	-	1.5	-
415	1	5 Thk. WASHER 116 I.D. / 160 O.D.	BRASS	○	-	0.4	-

FH-600 O2 LOOP RESIN FILTER HOUSING

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0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

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VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-011
SH. OF 5 / 5

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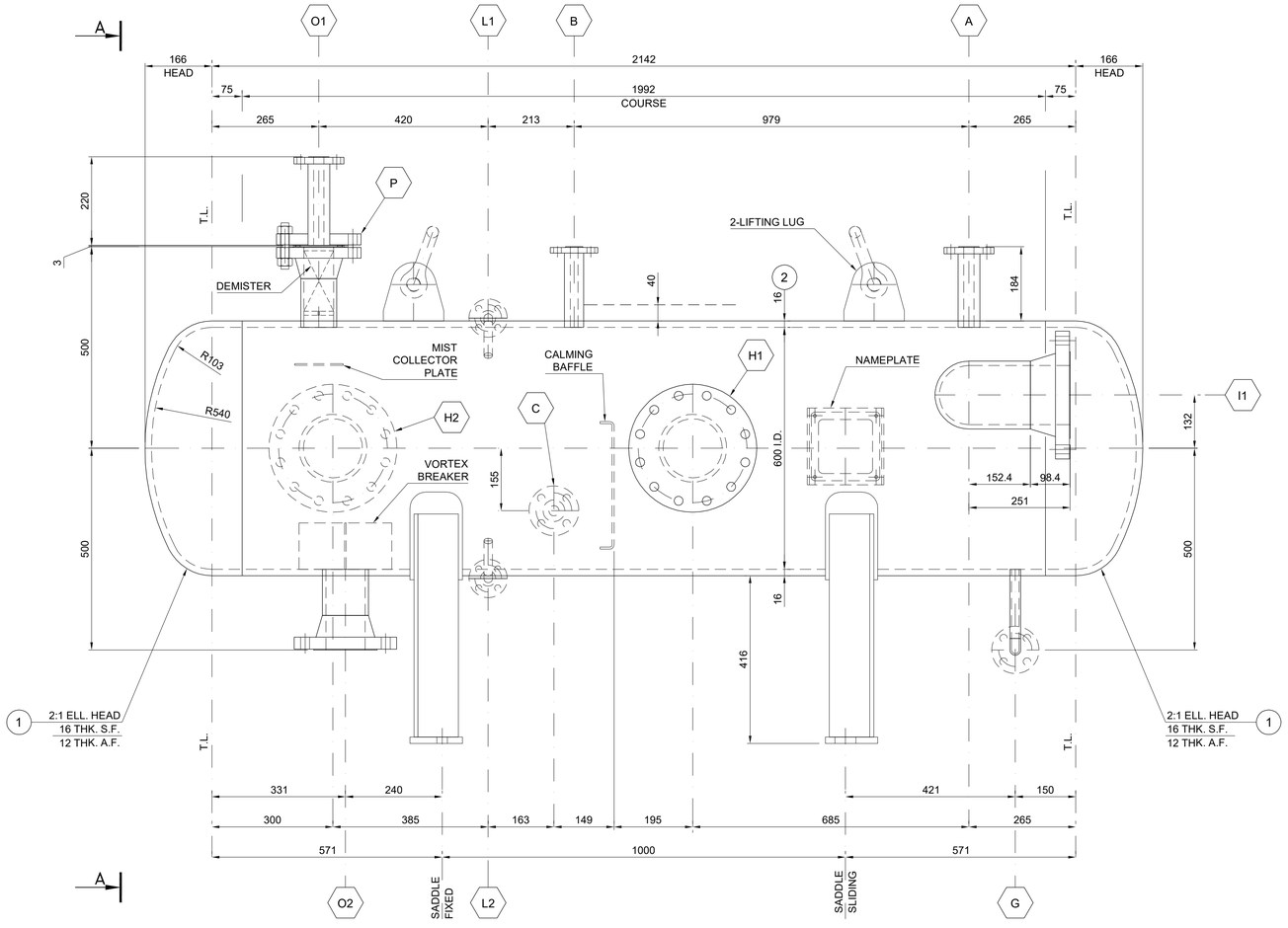
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
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CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

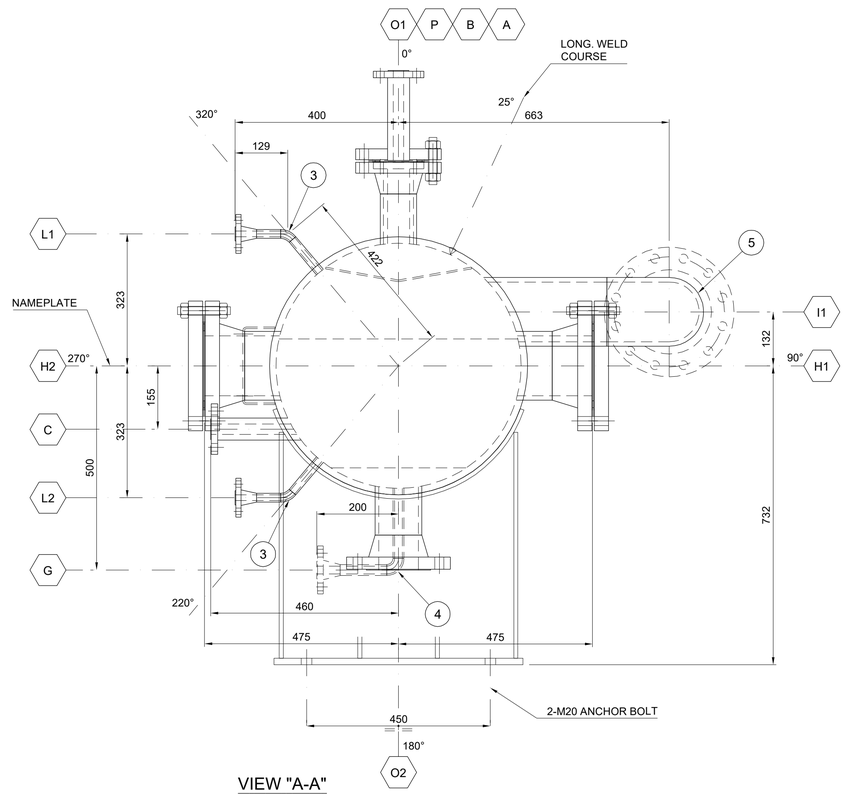
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ST-620

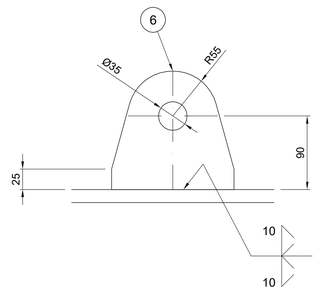
H_2 Separator Tank

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VIEW "A-A"



LIFTING LUG DETAIL

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
A	NITROGEN CONN. FOR IN.	500	1	1"	LWN 300# RF L=201	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
B	CIP SPRAY NOZZ. ACC. / PSV	500	1	3/4"	LWN 300# RF L=201	14.25	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		3
C	CONNECTION FOR LSL-620	SEE DWG.	1	1"	LWN 300# RF L=222	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
G	DRAIN	SEE DWG.	1	3/4"	WN 300# RF	3.91	SA182 F316/316L	◑	1	3/4"	3.91	114+171	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		2
I1	INLET FROM STACKS' COLL.	SEE DWG.	1	6"	WN 300# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	303	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		33
L1	LEVEL TRASMITTER UPPER	SEE DWG.	1	1/2"	WN 300# RF	3.73	SA182 F316/316L	◑	1	1/2"	3.73	59+104	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		2
L2	LEVEL TRASMITTER LOWER	SEE DWG.	1	1/2"	WN 300# RF	3.73	SA182 F316/316L	◑	1	1/2"	3.73	59+104	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		2
O1	HYDROGEN PROD. OUTLET	SEE DWG.	1	1"	LWN 300# RF L=220	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
O2	OUTLET TO CIRC. PUMP	500	1	4"	WN 300# RF	8.56	SA182 F316/316L	◑	1	4"	8.56	120	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		14
P	DEMISTER + BORED BLIND	500	1	3"	WN 300# RF	7.62	SA182 F316/316L	◑	1	3"	7.62	124	SA312 TP316/316L	◑	-	-	-	-	-		8	3/4"x115	B8 Cl.1 / Gr.8 Cl.1	◑	1	3" 300# RF	3	○	19
H1	HANHOLE + BLIND	475	1	6"	WN 300# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	89	SA312 TP316/316L	◑	-	-	-	-	-		12	3/4"x130	B8 Cl.1 / Gr.8 Cl.1	◑	1	6" 300# RF	3	○	50
H2	HANHOLE + BLIND	475	1	6"	WN 300# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	89	SA312 TP316/316L	◑	-	-	-	-	-		12	3/4"x130	B8 Cl.1 / Gr.8 Cl.1	◑	1	6" 300# RF	3	○	50

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ○ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN PASSO D'UOMO AVENTE UN DIAMETRO INTERNO DI - mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A MANHOLE HAVING AN INTERNAL DIA. OF - mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 40 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 40 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE: (FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm, DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING) LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°, LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	2	2:1 ELL. HEAD 600 I.D. 16 Thk.(S.F.) 12(A.F.)	SA240 316/316L	◑	85	170	-
2	1	16 Thk. PLATE 1992x1935	SA240 316/316L	◑	-	493	-
3	2	1/2" ELBOW 50° LR 3.73 Thk.	SA403 WP316/316L	◑	-	-	-
4	1	3/4" ELBOW 90° LR 3.91 Thk.	SA403 WP316/316L	◑	-	-	-
5	1	6" ELBOW 90° SR 10.97 Thk.	SA403 WP316/316L	◑	-	10	-
6	2	16 Thk. PLATE 145x150	SA240 316/316L	◑	3	6	-

NOZZLE LOADS

NOZZLE	DIA.	FA (N)	FC (N)	FL (N)	FR (N)	MC (Nm)	ML (Nm)	MT (Nm)	MR (Nm)
I1	6"	3900	2925	3900	-	1170	1520	1755	-
O2	4"	2600	1950	2600	-	520	675	780	-

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE
PRESSIONE PRESSURE	DI PROGETTO INTERNA INTERNAL DESIGN	40 bar
	DI PROGETTO ESTERNA (VUOTO) EXTERNAL DESIGN (VACUUM)	0.58 bar(a)
	DI ESERCIZIO NORMAL OPERATING	32 bar
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	57.2 bar
	PROVA IDR. (IN ORIZ.) HYDROSTATIC TEST (HOR)	-
TEMPERATURA TEMPERATURE	DI PROGETTO DESIGN	80 °C (8)
	DI ESERCIZIO NORMAL OPERATING	65 °C
SOVRASPESSORE DI CORROS. CORROSION ALLOWANCE	MANTELLO SHELL	0
	FONDI HEADS	0
EFFICIENZA DEI GIUNTI JOINTS EFFICIENCY	MANTELLO SHELL	1
	FONDI HEADS	1
TRASPORTO TRANSPORT		ah=0.7g - av=0.5g
PRESS. DEL VENTO WIND PRESSURE		N.A.
COEFFICENTE SISMICO SEISMIC COEFFICIENT		N.A.
TRATTAMENTO TERMICO DOPO SALDATURA POSTWELD HEAT TREATMENT		NO
CONTROLLI N.D. N.D.E.		FULL (12)
TRATTAMENTO SUPERFICIALE SURFACE TREATMENT		PICKLING AND PASSIVATION
ISOLAMENTO INSULATION		40 Thk. MINERAL WOOL + METALLIC COVER
PROTEZIONE FUOCO FIREPROOFING		NO
POSIZIONE DEL RECIPIENTE ORIENTATION OF VESSEL		HORIZONTAL
CAPACITA' CAPACITY		662 Lt.
FLUIDO CONTENUTO CONTAINED FLUID	NATURA TYPE	PURE WATER + HYDROGEN
	STATO STATE	LIQUID + GAS
	DENSITA' DENSITY	980.5 Kg/dm3
PESI WEIGHTS	VUOTO EMPTY	1100 Kg
	PIENO D 'ACQUA WATER FULL	1762 Kg
ENTE COLLAUDATORE INSPECTION BY		ICIM
TALLONI DI PRODUZIONE PRODUCTION SAMPLES		NO
OVALIZZAZIONE OVALIZATION		1% MAX.
N° DI FABBRICA SERIAL No.	24J033-NF03	ANNO DI COSTRUZ. YEAR BUILT 2024
CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION		
CATEGORIA FLUIDO FLUID GROUP		1
CATEGORIA PED PED CATEGORY		IV
MODULO PED PED MODULE		G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME MATERIALS ACCORDING TO CODE			ASME SECT. II PART "A" 2023 ED.
MANTELLO SHELL			SA240 316/316L
FONDI HEADS			SA240 316/316L
CONN FLANGIATE FLANGED CONN.	FLANGE FLANGES		SA182 F316/316L
	TRONCH. NOZZLE		SA312 TP316/316L
PASSI D 'UOMO MANHOLES	FLANGE FLANGES		-
	TRONCH. P.U. MANHOLES NOZZLE		-
TIRANTI STUD BOLTS	SA193 B8 Cl.1	DADI NUTS	SA194 Gr.8 C.l.1
GUARNIZIONI GASKETS	KEMPCHEN - RUBBER-STEEL GASKET		
SUPPORTI SUPPORTS			SA240 316/316L
ACCESSORI INTERNI INTERNAL FITTINGS			
LAMIERA PLATE	SA240 316/316L	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	SS 316L
ACCESSORI ESTERNI EXTERNAL FITTINGS			
LAMIERA PLATE	-	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	-

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO DRAWING N°	DESCRIZIONE DESCRIPTION
24J033-021-Sh.2	NAME PLATE AND SUPP.
24J033-021-Sh.3	LIFTING ARRANGEMENT
24J033-021-Sh.4	SADDLE DETAIL
24J033-021-Sh.5	INTERNAL DETAIL

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO DOCUMENT N°	DESCRIZIONE DESCRIPTION
C63-MDS-006	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

ST-620 H2 SEPARATOR TANK

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.
0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.

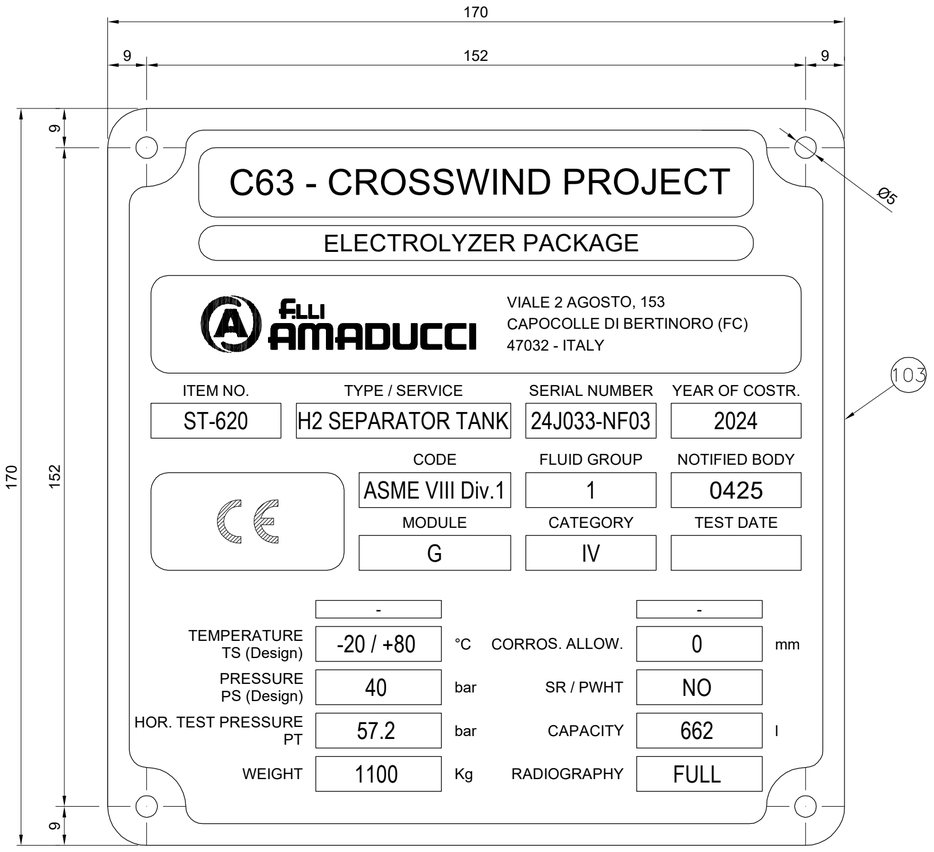
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VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-021
SH. OF 1 / 5

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1

ELENCO MATERIALI / MATERIAL LIST

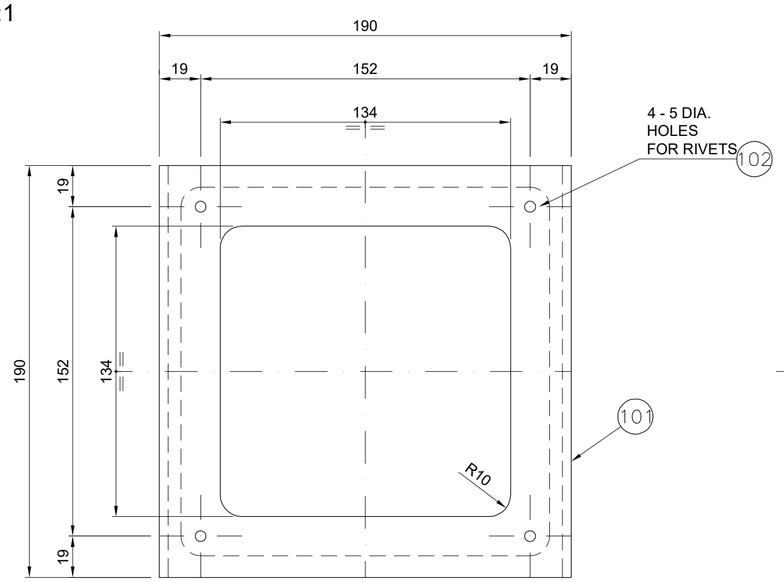
POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
101	1	4 Thk. PLATE	SA240 316/316L	◑	-	2	-
102	4	4 DIA. RIVET	SS 316	◑	-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L	◑	-	0.5	-

NAMEPLATE NOTES

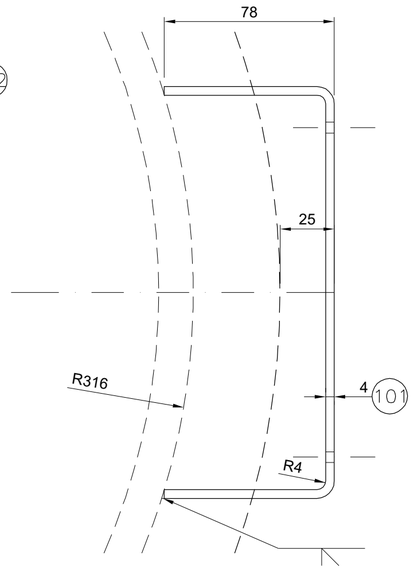
1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.



NAMEPLATE SUPPORT
1:2



ST-620 H2 SEPARATOR TANK

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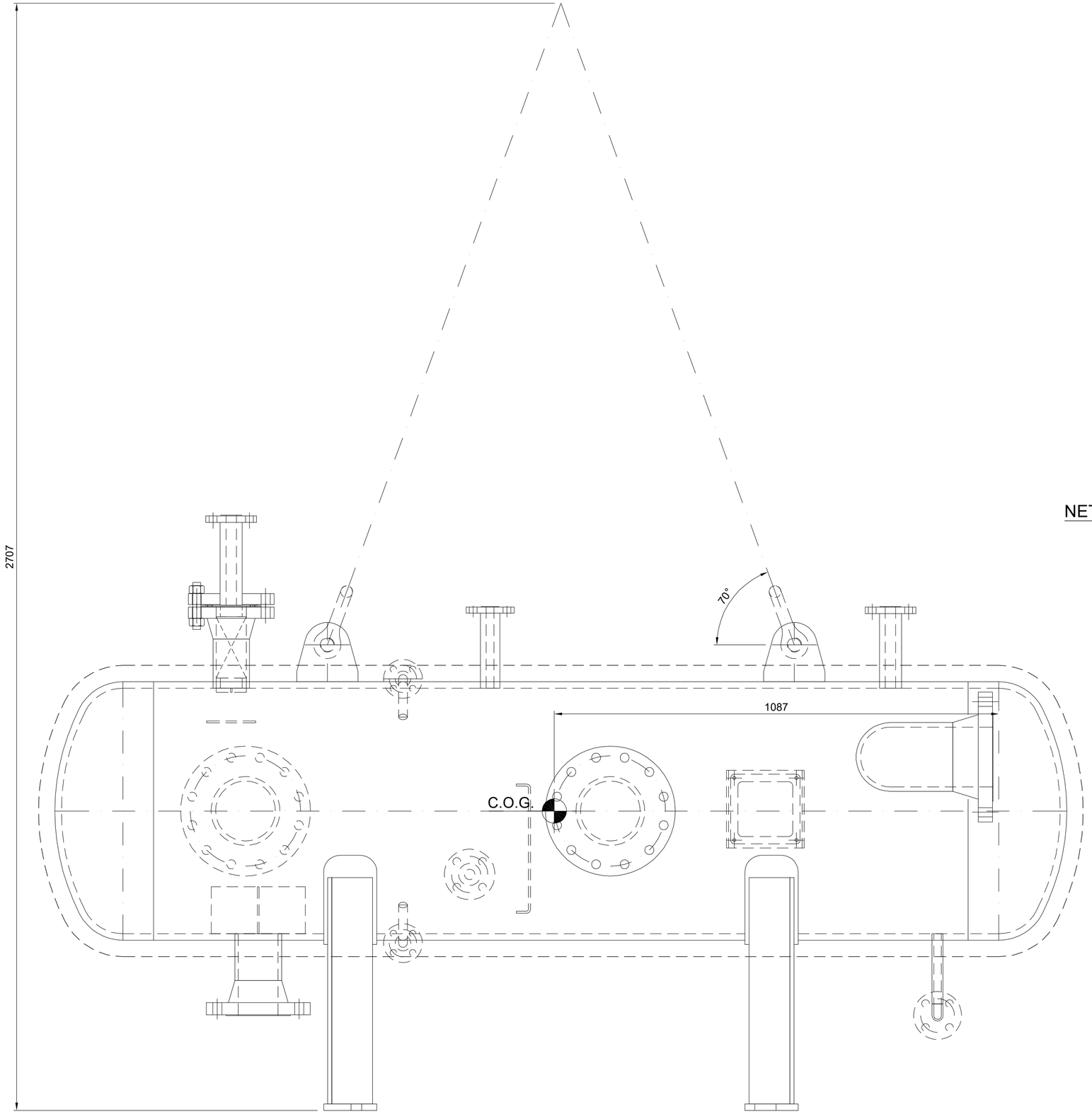
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VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 1100 kg

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0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.	-

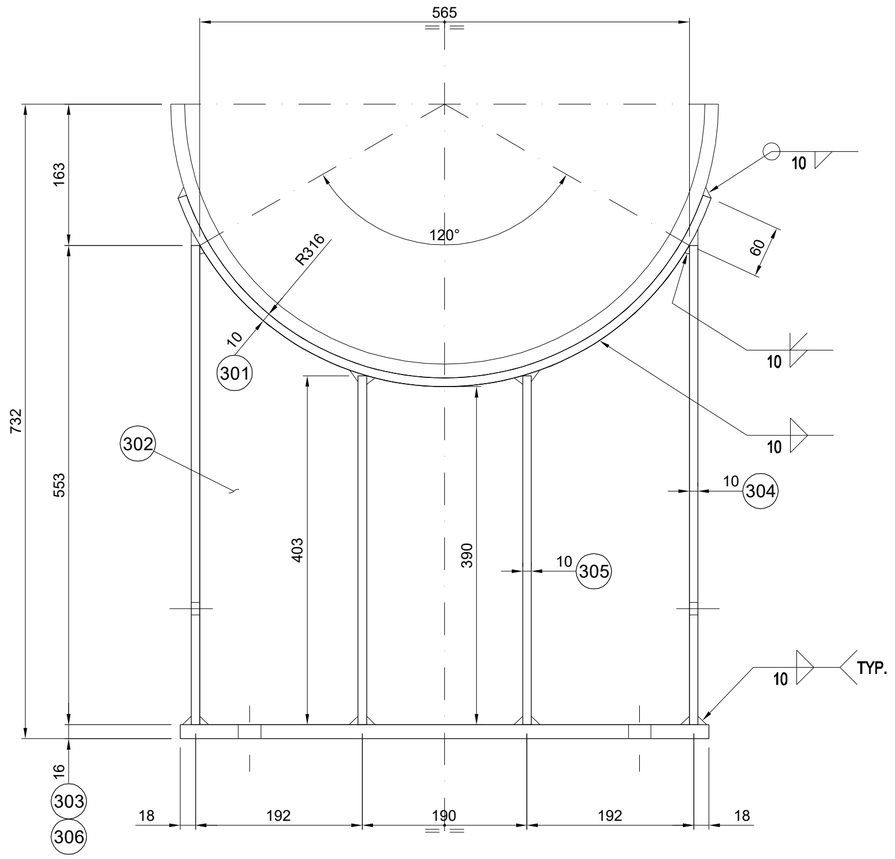
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VIALE 2 AGOSTO, 153
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47032 - ITALY

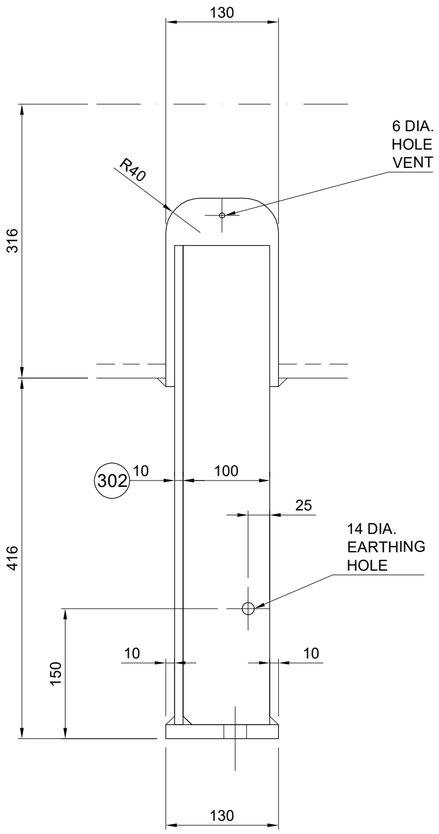
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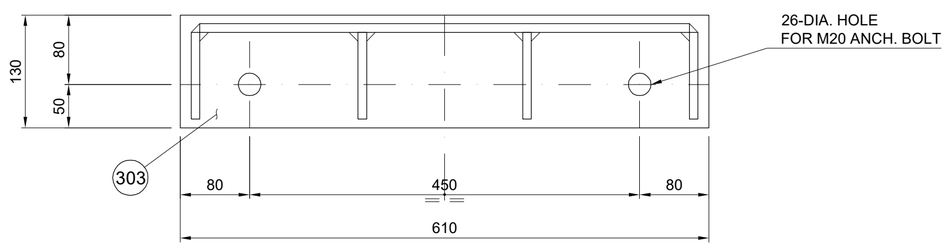
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

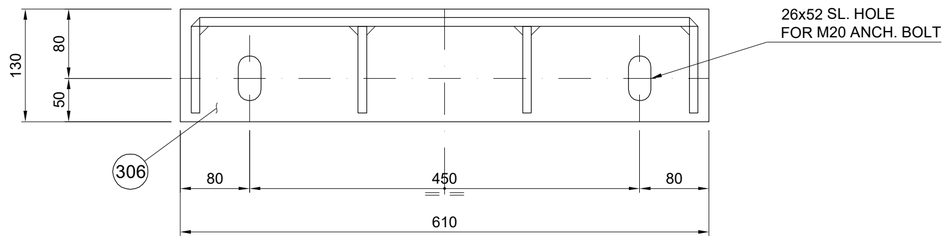
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FIXED SADDLE



SLIDING SADDLE

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
301	2	10 Thk. PLATE 130x790	SA240 316/316L	◑	8.2	16	-
302	2	10 Thk. PLATE 565x553	SA240 316/316L	◑	22.3	45	-
303	1	16 Thk. PLATE 130x610	SA240 316/316L	◑	-	10	-
304	4	10 Thk. PLATE 100x553	SA240 316/316L	◑	4.9	20	-
305	4	10 Thk. PLATE 100x403	SA240 316/316L	◑	3.7	15	-
306	1	16 Thk. PLATE 130x610	SA240 316/316L	◑	-	10	-

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0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.	-

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CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033

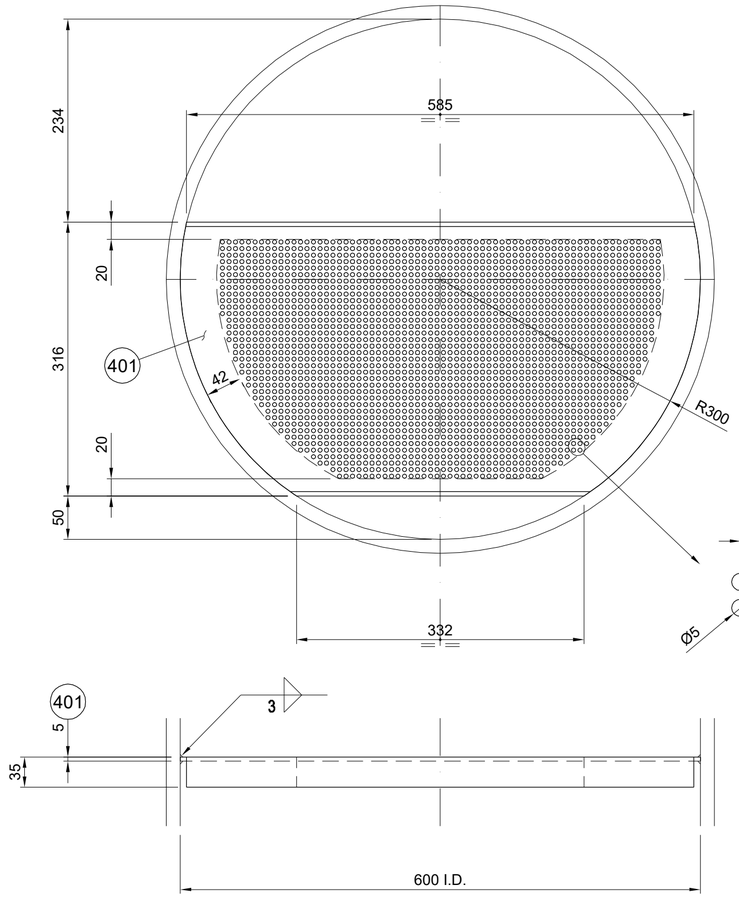
DWG. Nr. 24J033-021

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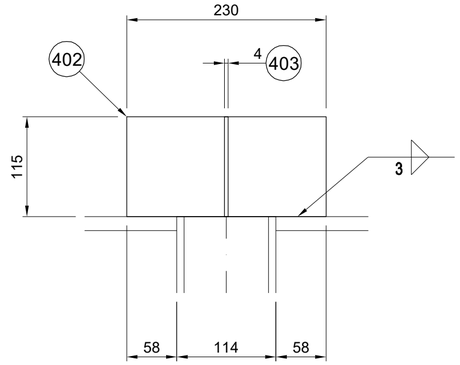
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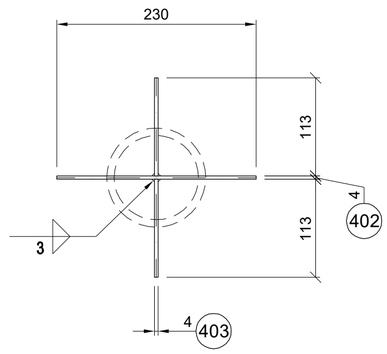
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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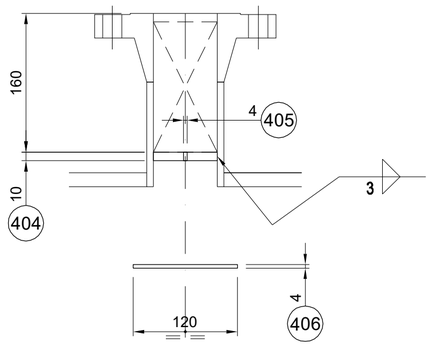


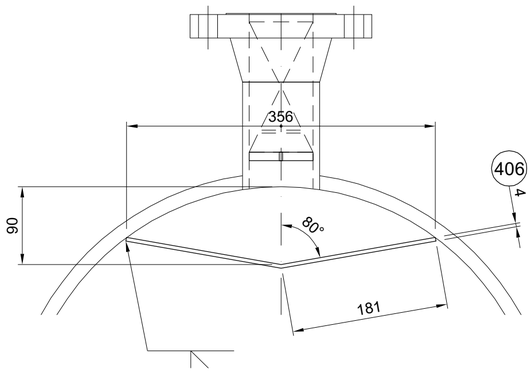
CALMING BAFFLE

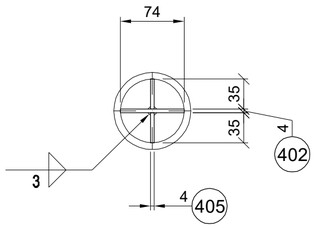




VORTEX BREAKER







DEMISTER SUPPORT AND MIST COLLECTOR PLATE

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
401	1	5 Thk. BORED PLATE	SA240 316/316L	◑	-	7.8	-
402	1	4 Thk. PLATE 115x230	SA240 316/316L	◑	-	0.8	-
403	2	4 Thk. PLATE 115x113	SA240 316/316L	◑	0.4	0.8	-
404	1	4 Thk. PLATE 10x74	SA240 316/316L	◑	-	-	-
405	2	4 Thk. PLATE 10x35	SA240 316/316L	◑	-	-	-
406	1	4 Thk. PLATE 120x362	SA240 316/316L	◑	-	1.4	-

ST-620 H2 SEPARATOR TANK

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.	-

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DWG. Nr. 24J033-021
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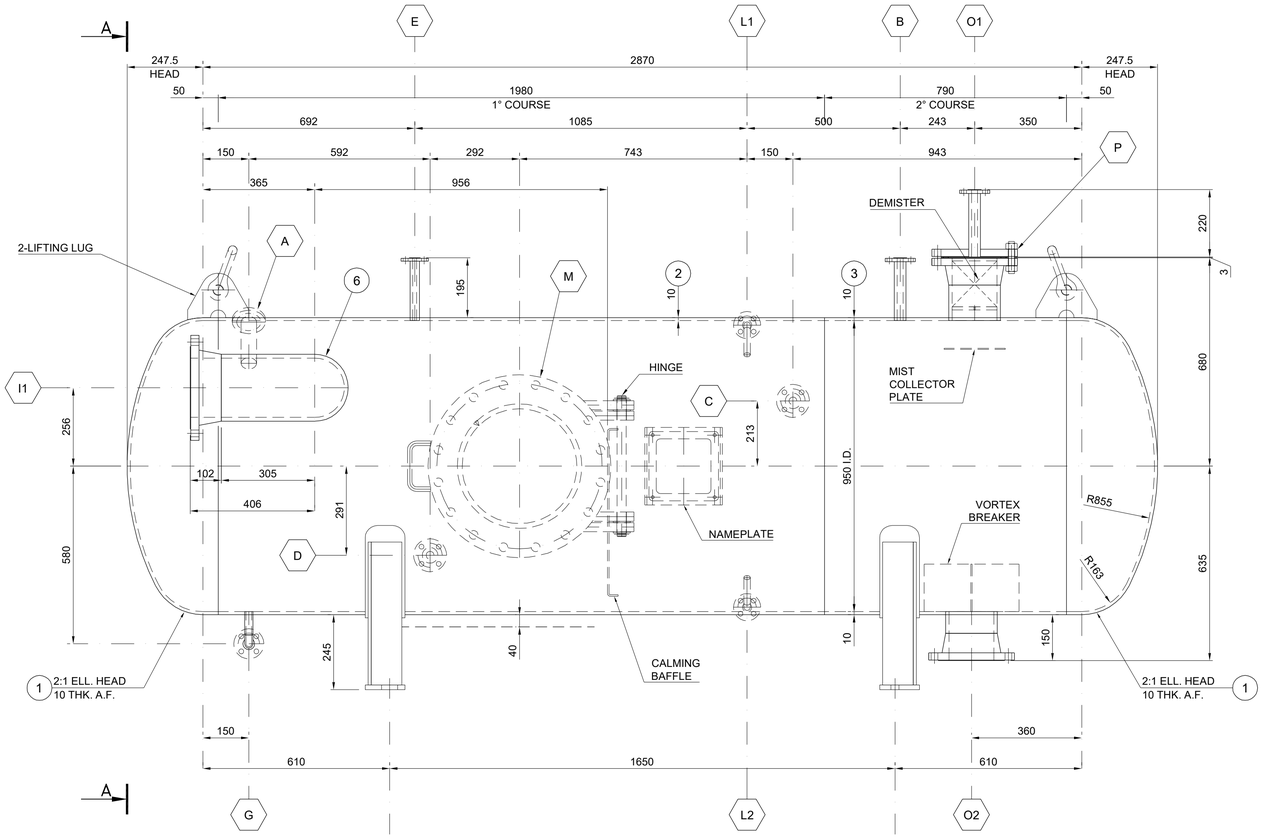
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

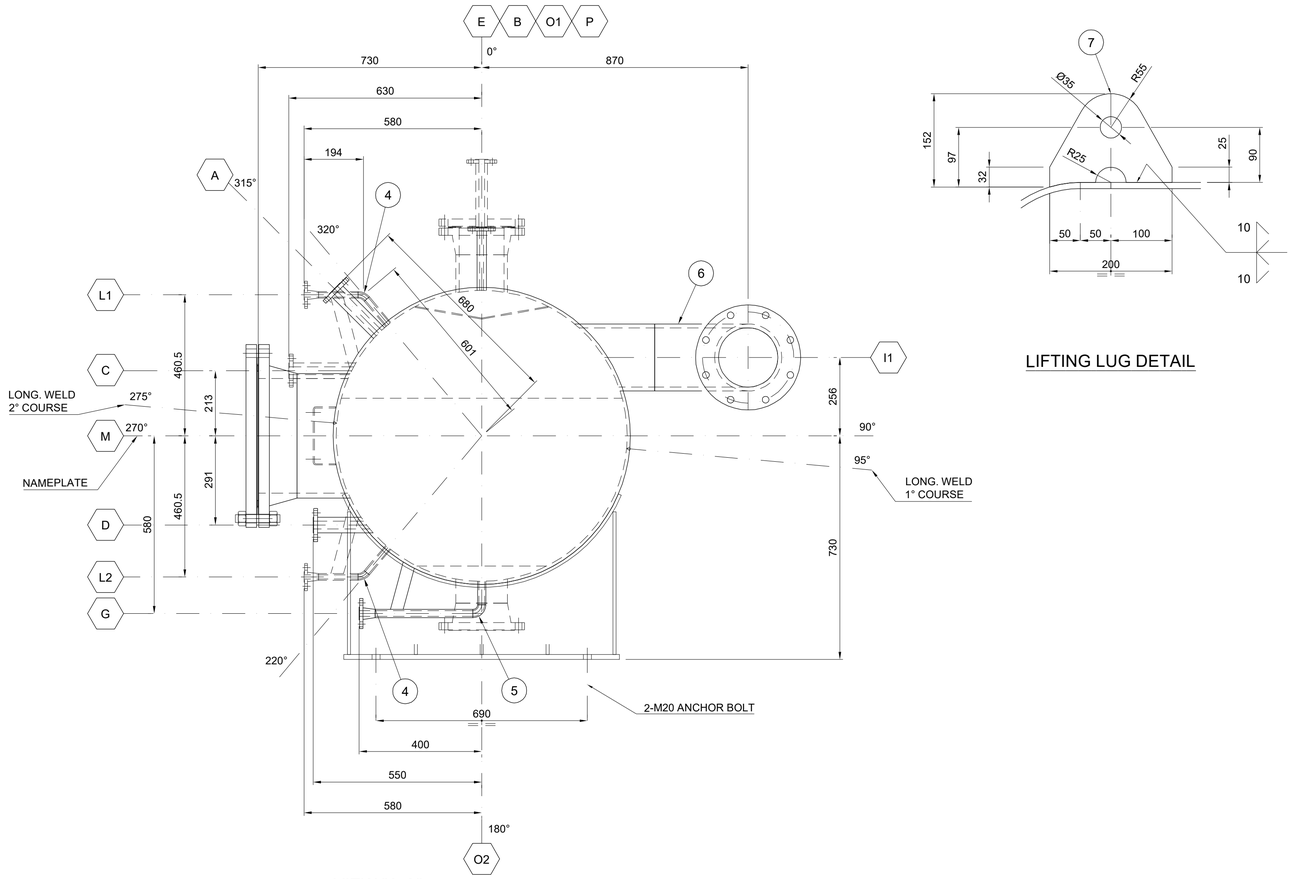
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ST-600

O_2 Separator Tank

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VIEW "A-A"

LIFTING LUG DETAIL

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
A	NITROGEN CONN. FOR IN.	680	1	1"	LWN 150# RF L=206	12.7	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		4
B	CIP SPRAY NOZZ. ACC. / PSV	680	1	3/4"	LWN 150# RF L=205	9.5	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		3
C	CONNECTION FOR LSH-600	SEE DWG.	1	1"	LWN 150# RF L=219	12.7	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		4
D	CONNECTION FOR LSL-600	SEE DWG.	1	1"	LWN 150# RF L=196	12.7	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		4
E	ANALYSIS COLUMN	680	1	1/2"	LWN 150# RF L=205	8.75	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		2
G	DRAIN	SEE DWG.	1	3/4"	WN 150# RF	3.91	SA182 F316/316L	◑	1+1	3/4"	3.91	319+77	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		2
I1	INLET FROM STACKS' COLL.	SEE DWG.	1	8"	WN 150# RF	12.7	SA182 F316/316L	◑	1	8"	12.7	262	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		36
L1	LEVEL TRASMITTER UPPER	SEE DWG.	1	1/2"	WN 150# RF	3.73	SA182 F316/316L	◑	1+1	1/2"	3.73	128+108	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		1
L2	LEVEL TRASMITTER LOWER	SEE DWG.	1	1/2"	WN 150# RF	3.73	SA182 F316/316L	◑	1+1	1/2"	3.73	128+108	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		1
O1	OXYGEN PROD. OUTLET	SEE DWG.	1	3/4"	LWN 150# RF L=220	9.5	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		3
O2	OUTLET TO CIRC. PUMP	635	1	6"	WN 150# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	79	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		15
P	DEMISTER + BORED BLIND	680	1	6"	WN 150# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	124	SA312 TP316/316L	◑	-	-	-	-	-		8	3/4"x105	B8 Cl.1 / Gr.8 Cl.1	◑	1	6" 150# RF	3	○	31
M	MANHOLE + BLIND	730	1	16"	WN 150# RF	16	SA182 F316/316L	◑	1	16"	16	174	SA240 316/316L	◑	-	-	-	-	-		16	1"x145	B8 Cl.1 / Gr.8 Cl.1	◑	1	16" 150# RF	3	○	181

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ○ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN PASSO D'UOMO AVENTE UN DIAMETRO INTERNO DI 374 mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A MANHOLE HAVING AN INTERNAL DIA. OF 374 mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 16 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 16 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE: (FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm, DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING) LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°, LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	2	2:1 ELL. HEAD 950 I.D. 10 Thk. (A.F.)	SA240 316/316L	◑	125	250	-
2	1	10 Thk. PLATE 1980x3015	SA240 316/316L	◑	-	478	-
3	1	10 Thk. PLATE 790x3015	SA240 316/316L	◑	-	191	-
4	2	1/2" ELBOW 50° LR 3.73 Thk.	SA403 WP316/316L	◑	-	-	-
5	1	3/4" ELBOW 90° LR 3.91 Thk.	SA403 WP316/316L	◑	-	-	-
6	1	8" ELBOW 90° LR 12.7 Thk.	SA403 WP316/316L	◑	-	30	-
7	2	16 Thk. PLATE 152x200	SA240 316/316L	◑	4	8	-

NOZZLE LOADS

NOZZLE	DIA.	FA (N)	FC (N)	FL (N)	FR (N)	MC (Nm)	ML (Nm)	MT (Nm)	MR (Nm)
I1	8"	4400	3300	4400	-	1760	2290	2640	-
O2	6"	3300	2475	3300	-	990	1285	1485	-

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE
PRESSIONE PRESSURE	DI PROGETTO INTERNA INTERNAL DESIGN	16 bar
	DI PROGETTO ESTERNA (VUOTO) EXTERNAL DESIGN (VACUUM)	0.58 bar(a)
	DI ESERCIZIO NORMAL OPERATING	11 bar
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	22.88 bar
	PROVA IDR. (IN ORIZ.) HYDROSTATIC TEST (HOR)	-
TEMPERATURA TEMPERATURE	DI PROGETTO DESIGN	80 °C (8)
	DI ESERCIZIO NORMAL OPERATING	65 °C
SOVRASPESSORE DI CORROS. CORROSION ALLOWANCE	MANTELLO SHELL	0
	FONDI HEADS	0
EFFICIENZA DEI GIUNTI JOINTS EFFICIENCY	MANTELLO SHELL	1
	FONDI HEADS	1
TRASPORTO TRANSPORT		ah=0.7g - av=0.5g
PRESS. DEL VENTO WIND PRESSURE		N.A.
COEFFICENTE SISMICO SEISMIC COEFFICIENT		N.A.
TRATTAMENTO TERMICO DOPO SALDATURA POSTWELD HEAT TREATMENT		NO
CONTROLLI N.D. N.D.E.		FULL (12)
TRATTAMENTO SUPERFICIALE SURFACE TREATMENT		PICKLING AND PASSIVATION
ISOLAMENTO INSULATION		40 Thk. MINERAL WOOL + METALLIC COVER
PROTEZIONE FUOCO FIREPROOFING		NO
POSIZIONE DEL RECIPIENTE ORIENTATION OF VESSEL		HORIZONTAL
CAPACITA' CAPACITY		2259 Lt.
FLUIDO CONTENUTO CONTAINED FLUID	NATURA TYPE	PURE WATER + OXYGEN
	STATO STATE	LIQUID + GAS
	DENSITA' DENSITY	980 Kg/dm3
PESI WEIGHTS	VUOTO EMPTY	1500 Kg
	PIENO D 'ACQUA WATER FULL	3759 Kg
ENTE COLLAUDATORE INSPECTION BY		ICIM
TALLONI DI PRODUZIONE PRODUCTION SAMPLES		NO
OVALIZZAZIONE OVALIZATION		1% MAX.
N° DI FABBRICA SERIAL No.	24J033-NF04	ANNO DI COSTRUZ. YEAR BUILT 2024
CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION		
CATEGORIA FLUIDO FLUID GROUP		1
CATEGORIA PED PED CATEGORY		IV
MODULO PED PED MODULE		G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME MATERIALS ACCORDING TO CODE			ASME SECT. II PART "A" 2023 ED.
MANTELLO SHELL			SA240 316/316L
FONDI HEADS			SA240 316/316L
CONN FLANGIATE FLANGED CONN.	FLANGE FLANGES		SA182 F316/316L
	TRONCH. NOZZLE		SA312 TP316/316L
PASSI D 'UOMO MANHOLES	FLANGE FLANGES		SA182 F316/316L
	TRONCH. P.U. MANHOLES NOZZLE		SA240 316/316L
TIRANTI STUD BOLTS	SA193 B8 Cl.1	DADI NUTS	SA194 Gr.8 C.l.1
GUARNIZIONI GASKETS			KEMPCHEN - RUBBER-STEEL GASKET
SUPPORTI SUPPORTS			SA240 316/316L
ACCESSORI INTERNI INTERNAL FITTINGS			
LAMIERA PLATE	SA240 316/316L	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	SS 316
ACCESSORI ESTERNI EXTERNAL FITTINGS			
LAMIERA PLATE	-	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	-

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO DRAWING N°	DESCRIZIONE DESCRIPTION
24J033-031-Sh.2	NAME PLATE AND SUPP.
24J033-031-Sh.3	LIFTING ARRANGEMENT
24J033-031-Sh.4	SADDLE DETAIL
24J033-031-Sh.5	HINGE MANHOLE
24J033-031-Sh.6	INTERNAL DETAIL

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO DOCUMENT N°	DESCRIZIONE DESCRIPTION
C63-MDS-007	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

ST-600 O2 SEPARATOR TANK

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1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
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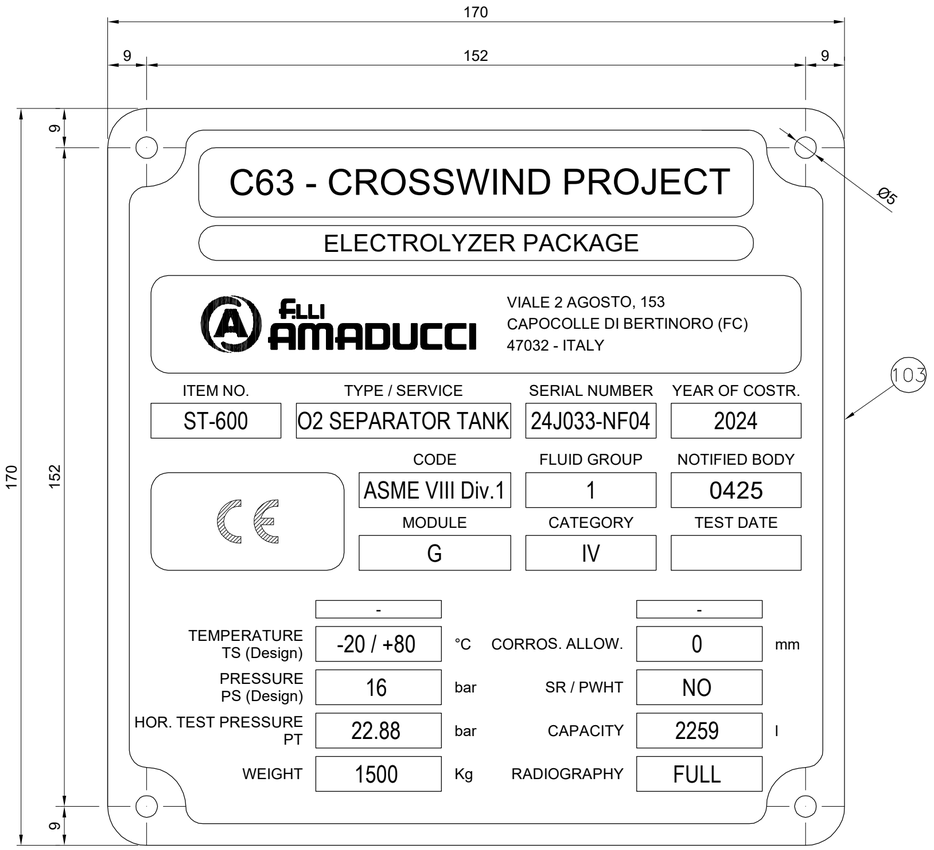
FLLI AMADUCCI
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JOB Nr. 24J033
DWG. Nr. 24J033-031
SH. OF 1 / 6

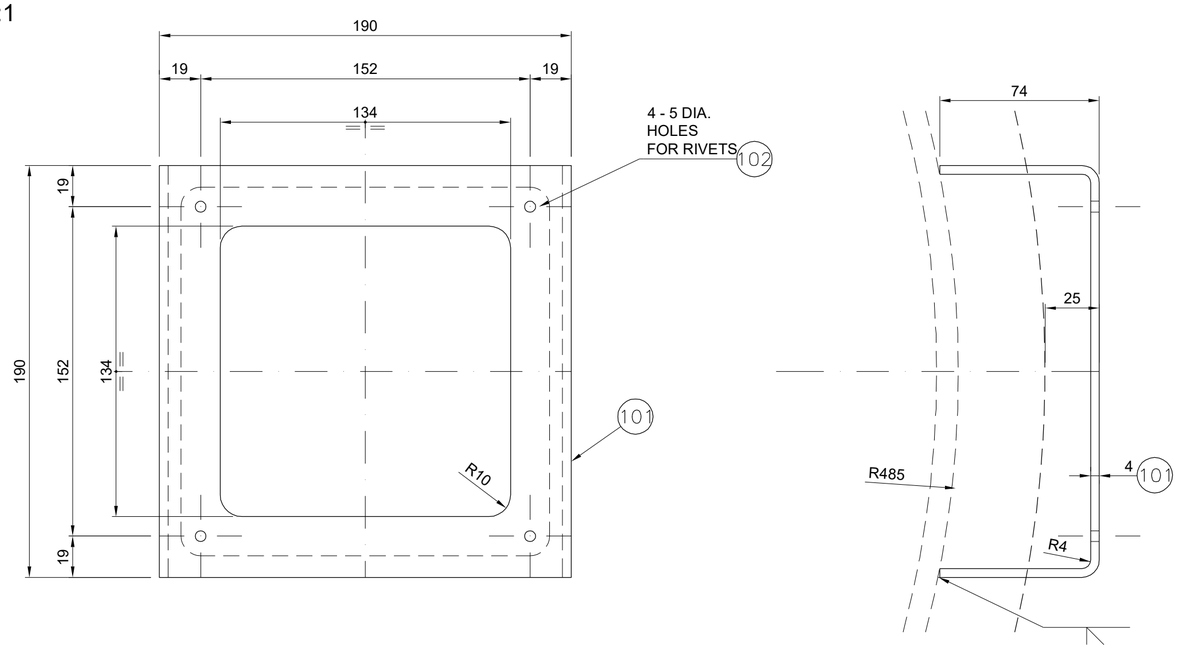
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1



NAMEPLATE SUPPORT
1:2

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
101	1	4 Thk. PLATE	SA240 316/316L	◑	-	2	-
102	4	4 DIA. RIVET	SS 316	◑	-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L	◑	-	0.5	-

NAMEPLATE NOTES

1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.

ST-600 O2 SEPARATOR TANK

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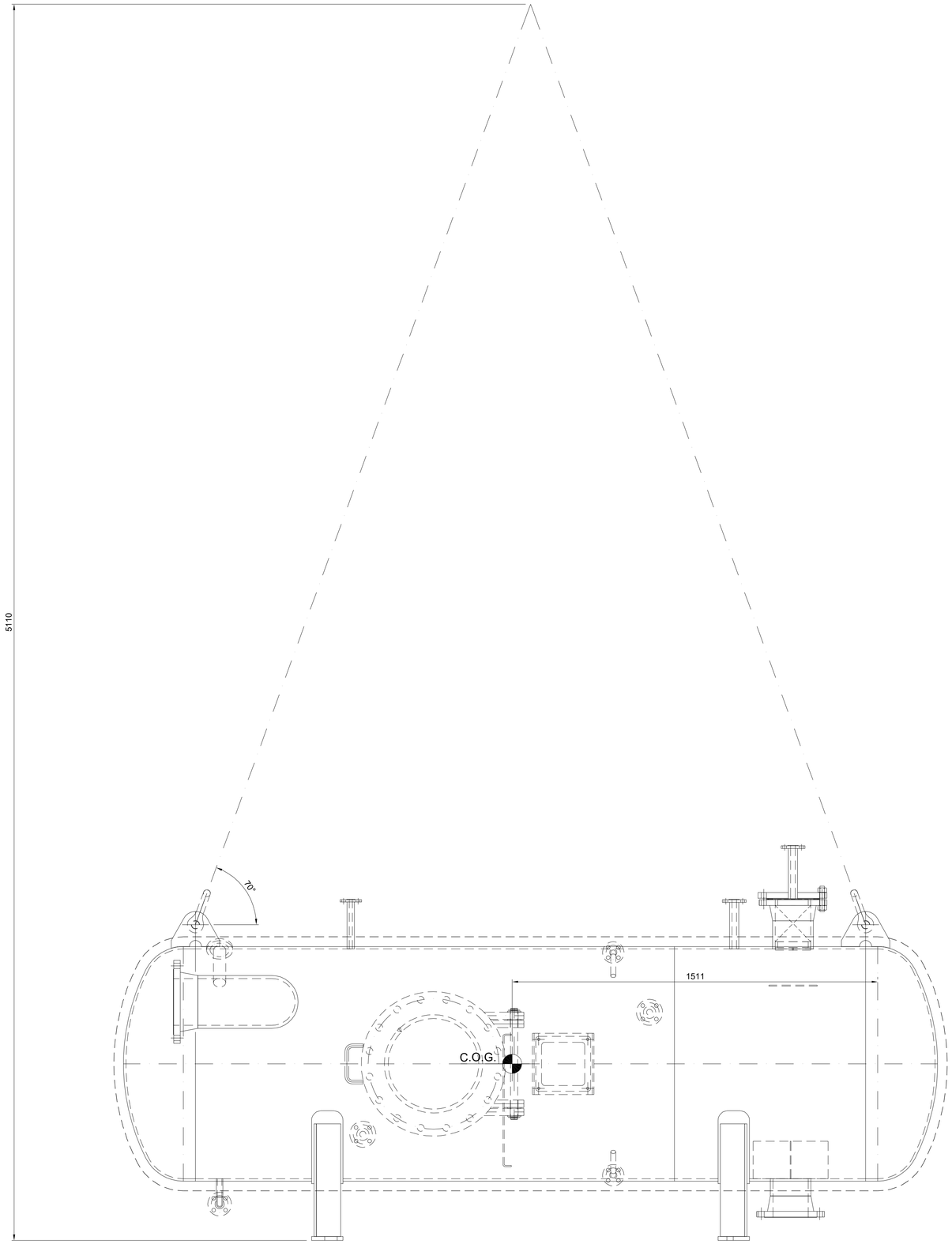
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CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-031
SH. OF 2 / 5

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 1500 kg

ST-600 O2 SEPARATOR TANK

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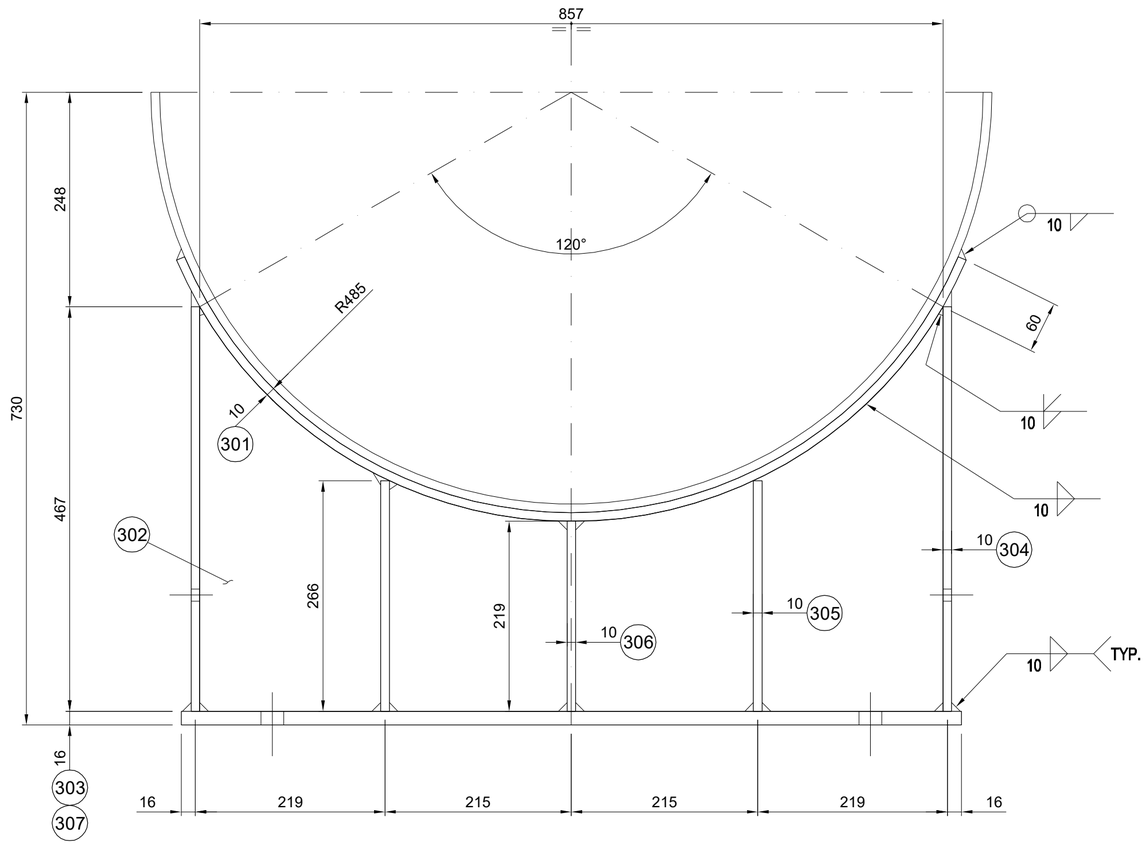
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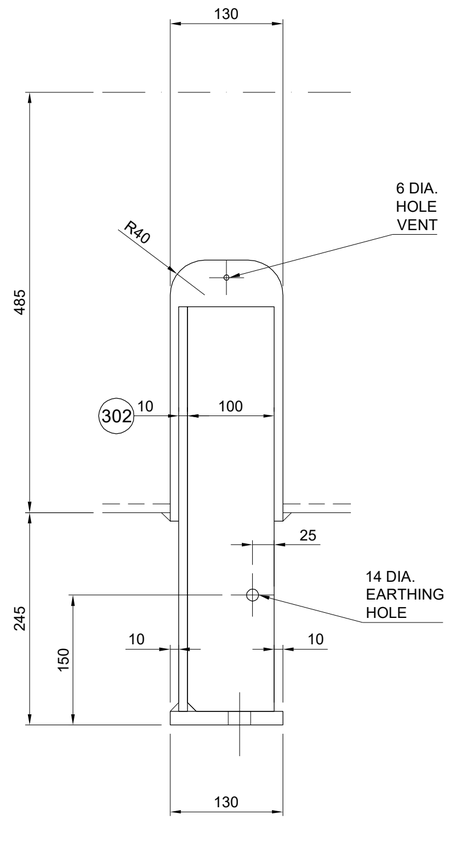
JOB Nr. 24J033
DWG. Nr. 24J033-031
SH. OF 3 / 6

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
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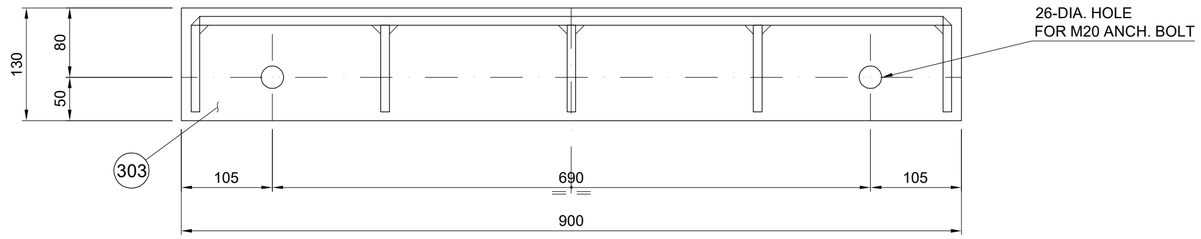
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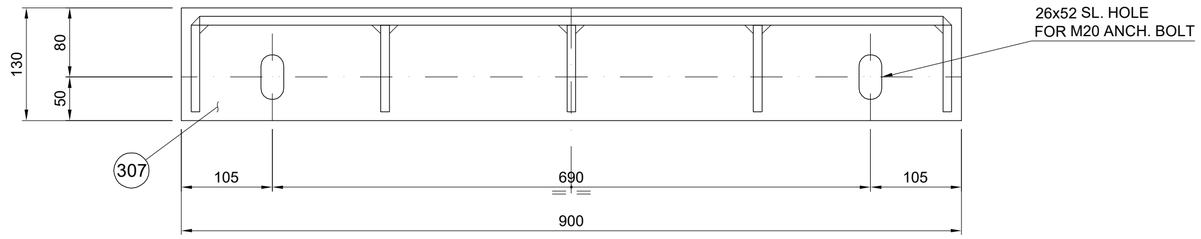


ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
301	2	10 Thk. PLATE 130x1145	SA240 316/316L	◑	11.9	24	-
302	2	10 Thk. PLATE 467x857	SA240 316/316L	◑	23.8	48	-
303	1	16 Thk. PLATE 130x900	SA240 316/316L	◑	-	15	-
304	4	10 Thk. PLATE 100x467	SA240 316/316L	◑	4.2	17	-
305	4	10 Thk. PLATE 100x266	SA240 316/316L	◑	2.6	10	-
306	2	10 Thk. PLATE 100x219	SA240 316/316L	◑	2.2	4	-
307	1	16 Thk. PLATE 130x900	SA240 316/316L	◑	-	15	-



FIXED SADDLE



SLIDING SADDLE

ST-600 O2 SEPARATOR TANK

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.	-

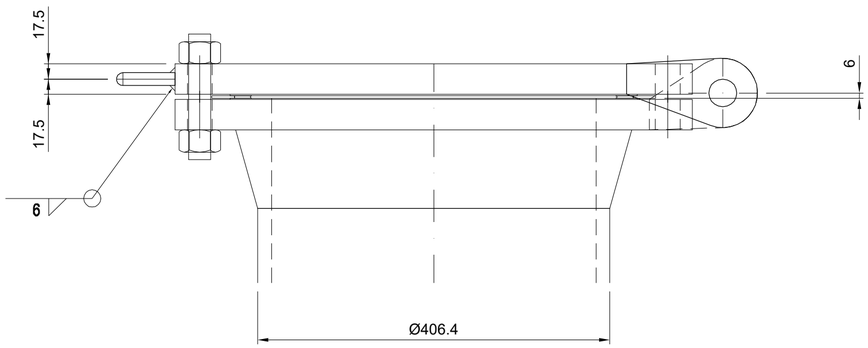
F.LLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

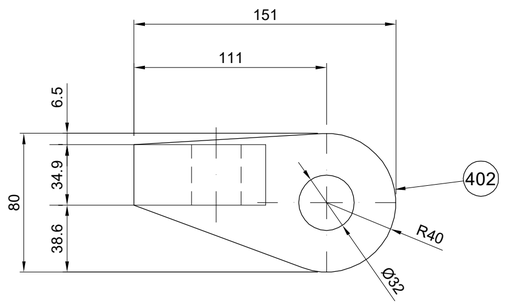
JOB Nr. 24J033
DWG. Nr. 24J033-031
SH. OF 4 / 6

elogen

PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

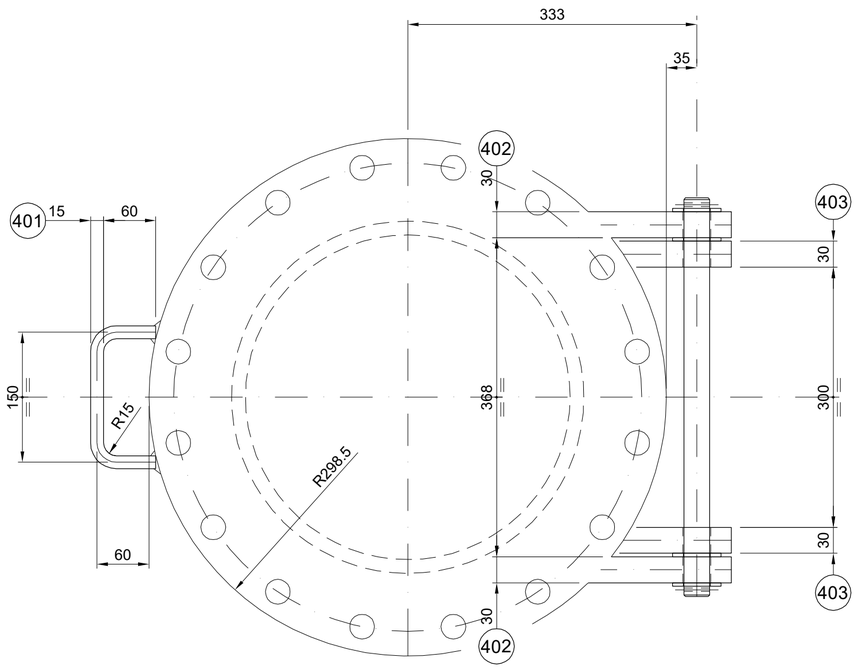
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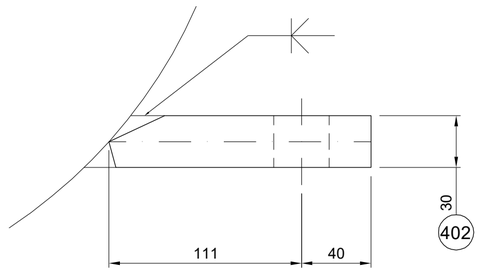


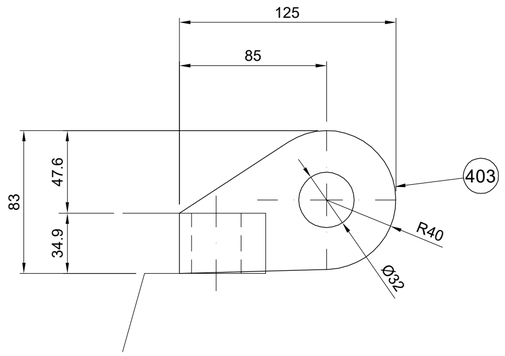


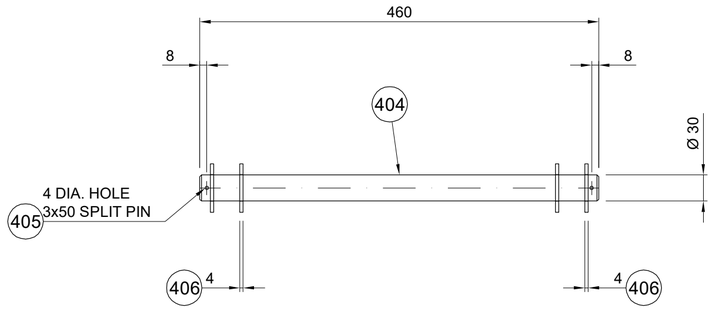
ELENCO MATERIALI / MATERIAL LIST

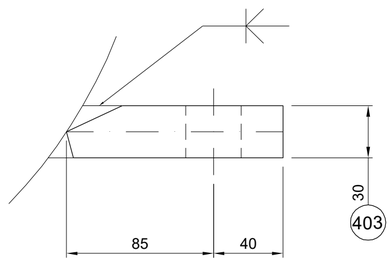
POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
401	1	15 DIA. ROD L=266	SA240 316/316L	◑	-	0.4	-
402	2	30 Thk. SKETH PLATE	SA240 316/316L	◑	2.1	4.2	-
403	2	30 Thk. SKETH PLATE	SA240 316/316L	◑	1.8	3.6	-
404	1	30 DIA. ROD L=460	SS 316	◑	-	3.0	-
405	2	3x50 SPLIT PIN	SS 316	◑	-	-	-
406	4	4 Thk. WASHER 31 I.D. 56 O.D.	BRASS	○	-	-	ISO 7089











ST-600 O2 SEPARATOR TANK

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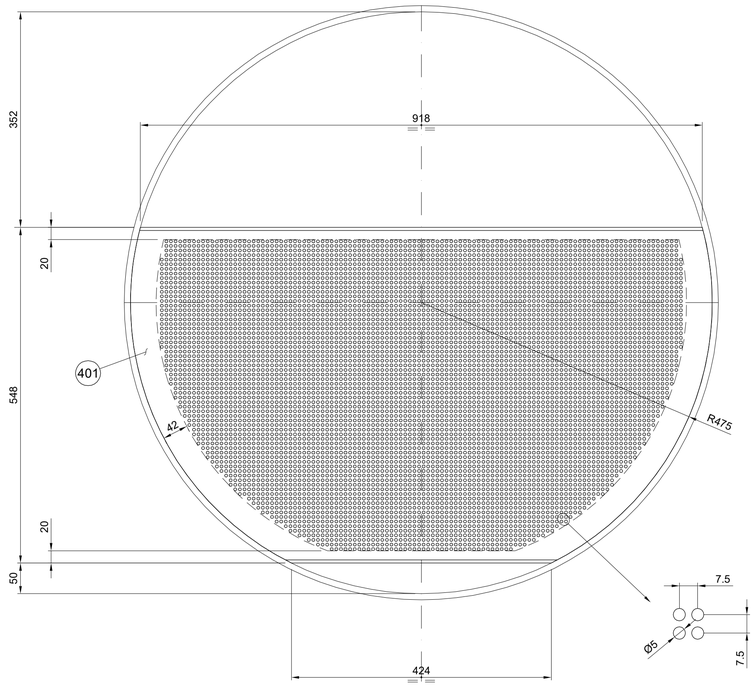
F.LLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

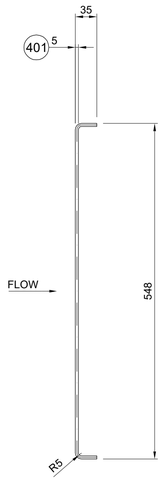
JOB Nr. 24J033
DWG. Nr. 24J033-031
SH. OF 5 / 6

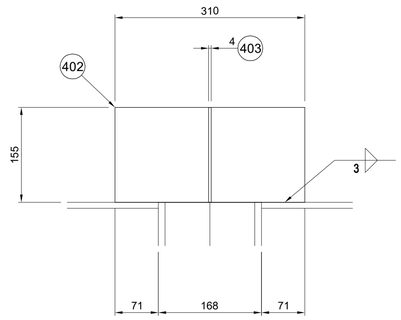
elogen

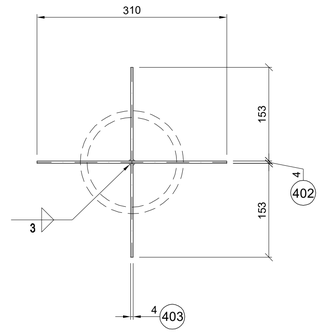
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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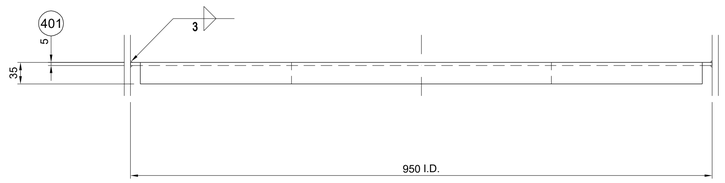




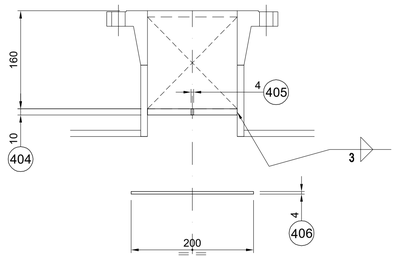


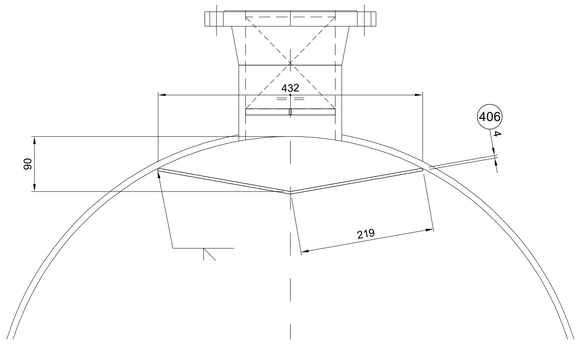


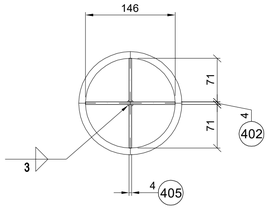
VORTEX BREAKER



CALMING BAFFLE







DEMISTER SUPPORT AND MIST COLLECTOR PLATE

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
401	1	5 Thk. BORED PLATE	SA240 316/316L	◑	-	19.8	-
402	1	4 Thk. PLATE 155x310	SA240 316/316L	◑	-	1.6	-
403	2	4 Thk. PLATE 155x153	SA240 316/316L	◑	0.8	1.6	-
404	1	4 Thk. PLATE 10x146	SA240 316/316L	◑	-	-	-
405	2	4 Thk. PLATE 10x71	SA240 316/316L	◑	-	-	-
406	1	4 Thk. PLATE 200x438	SA240 316/316L	◑	-	2.8	-

ST-600 O2 SEPARATOR TANK

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
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FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-031
SH. OF 6 / 6

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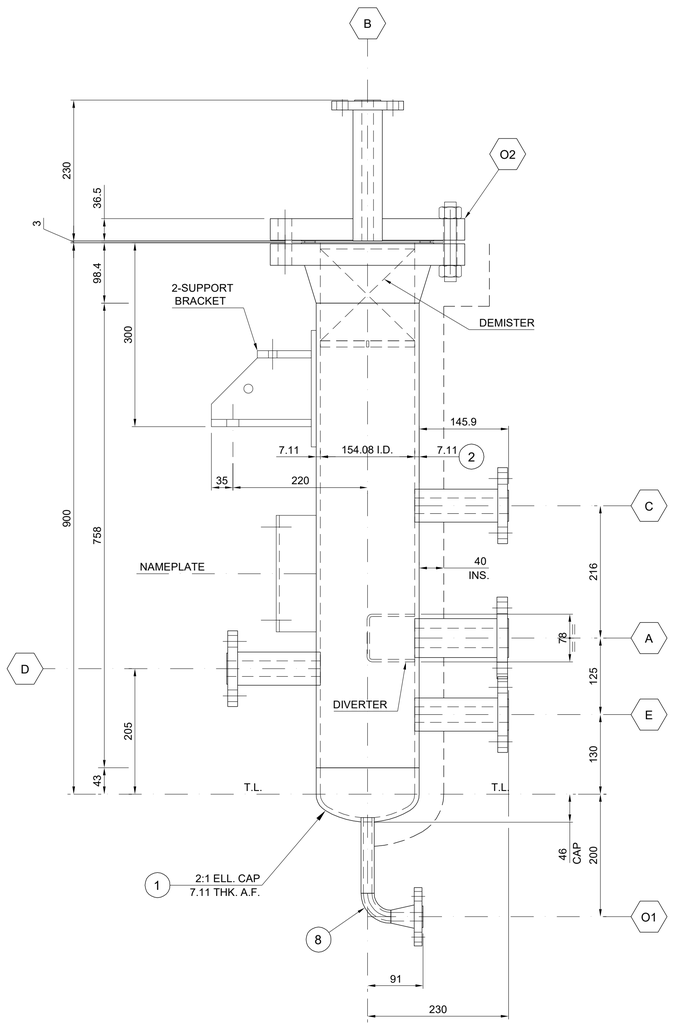
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
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CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

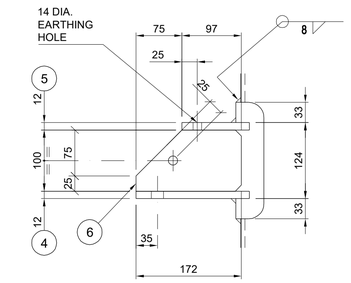
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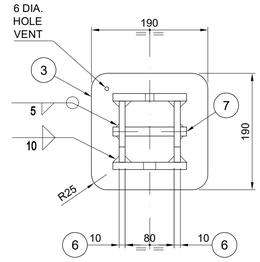
CS-630

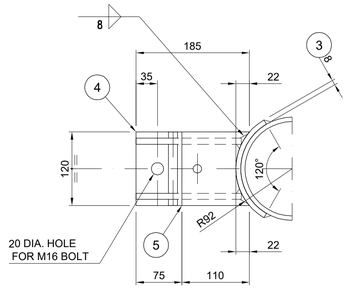
H_2 Condensate Separator

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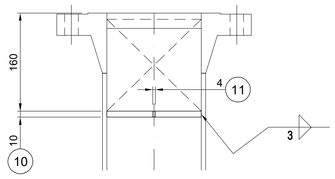


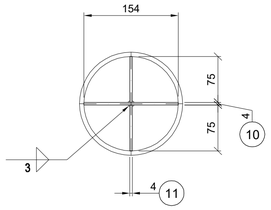




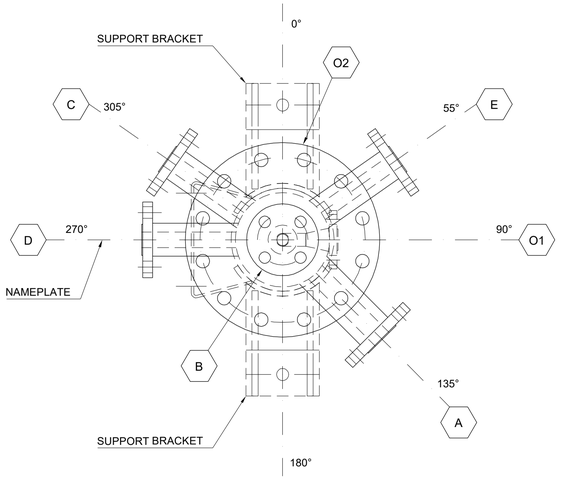


SUPPORT BRACKET DETAIL

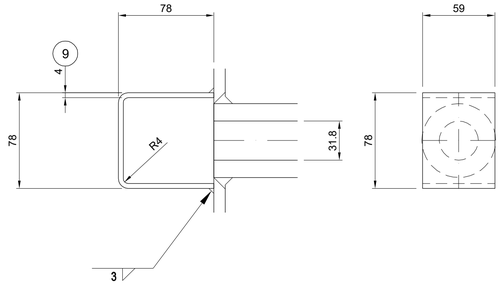




DEMISTER SUPPORT DETAIL



ORIENTATION



DIVERTER DETAIL

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
A	LIQUID INLET	230	1	1.1/4"	LWN 300# RF L=160	15.85	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		7
B	HYDROGEN GAS OUTLET	SEE DWG	1	3/4"	LWN 300# RF L=230	14.25	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		3
C	HHLS CONN. / ISPECTION	230	1	1"	LWN 300# RF L=158	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
D	HLS CONN. / ISPECTION	230	1	1"	LWN 300# RF L=158	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
E	LLS CONN. / ISPECTION	230	1	1"	LWN 300# RF L=158	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
O1	CONDENSATE OUTLET	SEE DWG.	1	1/2"	WN 300# RF	3.73	SA182 F316/316L	◑	1	1/2"	3.73	124	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		1
O2	SHELL FLG. + BORED BLIND	SEE DWG.	1	6"	WN 300# RF	7.11	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		12	3/4"x130	B8 Cl.1 / Gr.8 Cl.1	◑	1	6" 300# RF	3	◯	47

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ◯ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN BOCCHELLO AVENTE UN DIAMETRO INTERNO DI 154 mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A NOZZLE HAVING AN INTERNAL DIA. OF 154 mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 40 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 40 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE: (FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm, DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING) LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°, LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	1	2:1 ELL. CAP 6" 7.11 Thk. (A.F.)	SA403 WP316/316L	◑	-	4	B16.9
2	1	6" PIPE 7.11 Thk. L=758	SA312 TP316/316L	◑	-	22	-
3	2	8 Thk. PLATE 190x190	SA240 316/316L	◑	2.5	5	-
4	2	12 Thk. PLATE 120x185	SA240 316/316L	◑	2	4	-
5	2	12 Thk. PLATE 120x110	SA240 316/316L	◑	1.5	3	-
6	4	10 Thk. PLATE 100x172	SA240 316/316L	◑	1.5	6	-
7	2	15 DIA. ROD L=120	SS 316	◑	-	-	-
8	1	1/2" ELBOW 90° LR 3.73 Thk.	SA403 WP316/316L	◑	-	-	-
9	1	4 Thk. PLATE 59x220	SA240 316/316L	◑	-	1	-
10	1	4 Thk. PLATE 10x154	SA240 316/316L	◑	-	-	-
11	2	4 Thk. PLATE 10x75	SA240 316/316L	◑	-	-	-

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE
PRESSIONE PRESSURE	DI PROGETTO INTERNA INTERNAL DESIGN	40 bar
	DI PROGETTO ESTERNA (VUOTO) EXTERNAL DESIGN (VACUUM)	0.58 bar(a)
	DI ESERCIZIO NORMAL OPERATING	31 bar
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	57.2 bar
	PROVA IDR. (IN ORIZ.) HYDROSTATIC TEST (HOR)	-
TEMPERATURA TEMPERATURE	DI PROGETTO DESIGN	80 °C (8)
	DI ESERCIZIO NORMAL OPERATING	7 °C
SOVRASPESSORE DI CORROS. CORROSION ALLOWANCE	MANTELLO SHELL	0
	FONDI HEADS	0
EFFICIENZA DEI GIUNTI JOINTS EFFICIENCY	MANTELLO SHELL	1
	FONDI HEADS	1
TRASPORTO TRANSPORT		ah=0.7g - av=0.5g
PRESS. DEL VENTO WIND PRESSURE		N.A.
COEFFICENTE SISMICO SEISMIC COEFFICIENT		N.A.
TRATTAMENTO TERMICO DOPO SALDATURA POSTWELD HEAT TREATMENT		NO
CONTROLLI N.D. N.D.E.		FULL (12)
TRATTAMENTO SUPERFICIALE SURFACE TREATMENT		PICKLING AND PASSIVATION
ISOLAMENTO INSULATION		40 Thk. ROCKWOOL/GLASSWOOL + METALLIC COVER
PROTEZIONE FUOCO FIREPROOFING		NO
POSIZIONE DEL RECIPIENTE ORIENTATION OF VESSEL		VERTICAL
CAPACITA' CAPACITY		17 Lt.
FLUIDO CONTENUTO CONTAINED FLUID	NATURA TYPE	PURE WATER + HYDROGEN
	STATO STATE	LIQUID + GAS
	DENSITA' DENSITY	1000 Kg/dm3
PESI WEIGHTS	VUOTO EMPTY	130 Kg
	PIENO D 'ACQUA WATER FULL	147 Kg
ENTE COLLAUDATORE INSPECTION BY		ICIM
TALLONI DI PRODUZIONE PRODUCTION SAMPLES		NO
OVALIZZAZIONE OVALIZATION		1% MAX.
N° DI FABBRICA SERIAL No.	24J033-NF05	ANNO DI COSTRUZ. YEAR BUILT 2024

CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION

CATEGORIA FLUIDO FLUID GROUP	1
CATEGORIA PED PED CATEGORY	III
MODULO PED PED MODULE	G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME MATERIALS ACCORDING TO CODE		ASME SECT. II PART "A" 2023 ED.	
MANTELLO SHELL		SA312 TP316/316L	
FONDI HEADS		SA403 WP316/316L	
CONN FLANGIATE FLANGED CONN.	FLANGE FLANGES	SA182 F316/316L	
	TRONCH. NOZZLE	SA312 TP316/316L	
PASSI D 'UOMO MANHOLES	FLANGE FLANGES	-	
	TRONCH. P.U. MANHOLES NOZZLE	-	
TIRANTI STUD BOLTS	SA193 B8 Cl.1	DADI NUTS	SA194 Gr.8 C.l.1
GUARNIZIONI GASKETS	KEMPCHEN - RUBBER-STEEL GASKET		
SUPPORTI SUPPORTS	SA240 316/316L		
ACCESSORI INTERNI INTERNAL FITTINGS			
LAMIERA PLATE	SA240 316/316L	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	SS 316L
ACCESSORI ESTERNI EXTERNAL FITTINGS			
LAMIERA PLATE	-	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	-

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO DRAWING N°	DESCRIZIONE DESCRIPTION
24J033-041-Sh.2	NAME PLATE AND SUPP.
24J033-041-Sh.3	LIFTING ARRANGEMENT

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO DOCUMENT N°	DESCRIZIONE DESCRIPTION
C63-MDS-008	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

CS-630 H2 CONDENSATE SEPARATOR

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.	-

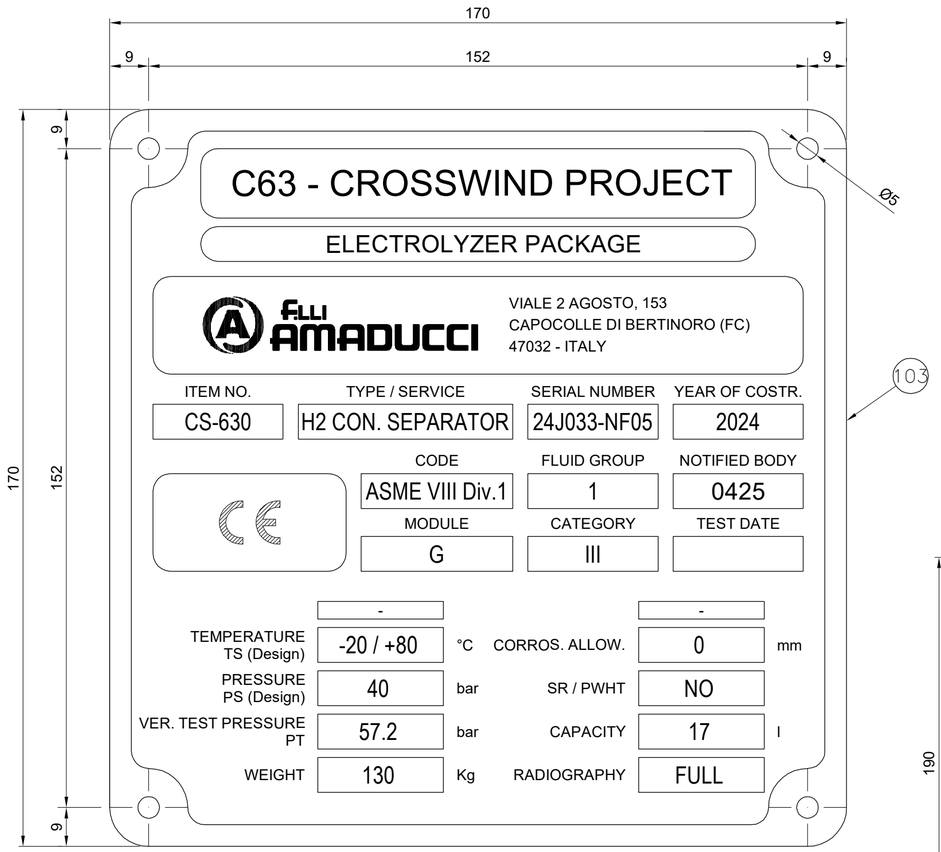
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VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-041
SH. OF 1 / 3

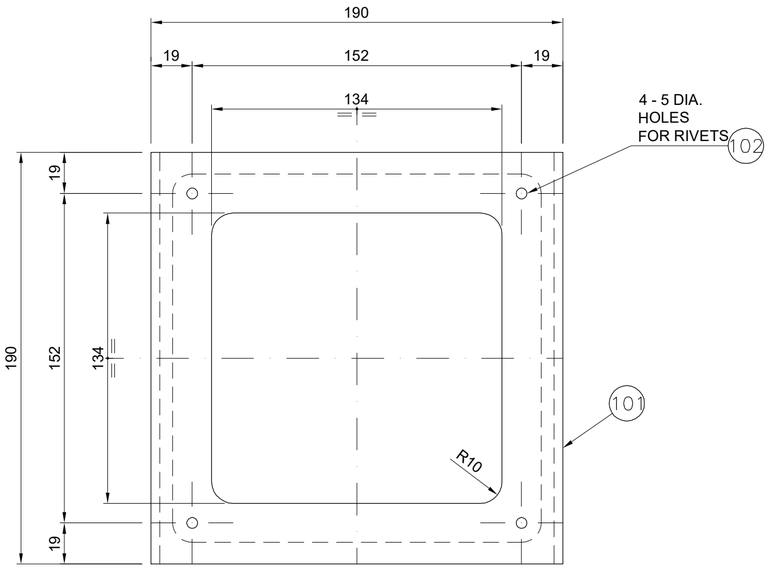
elogen

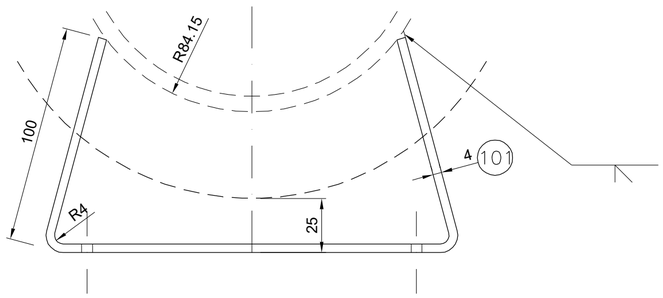
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1





NAMEPLATE SUPPORT
1:2

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
101	1	4 Thk. PLATE	SA240 316/316L	◑	-	2	-
102	4	4 DIA. RIVET	SS 316	◑	-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L	◑	-	0.5	-

NAMEPLATE NOTES

1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.

CS-630 H2 CONDENSATE SEPARATOR

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

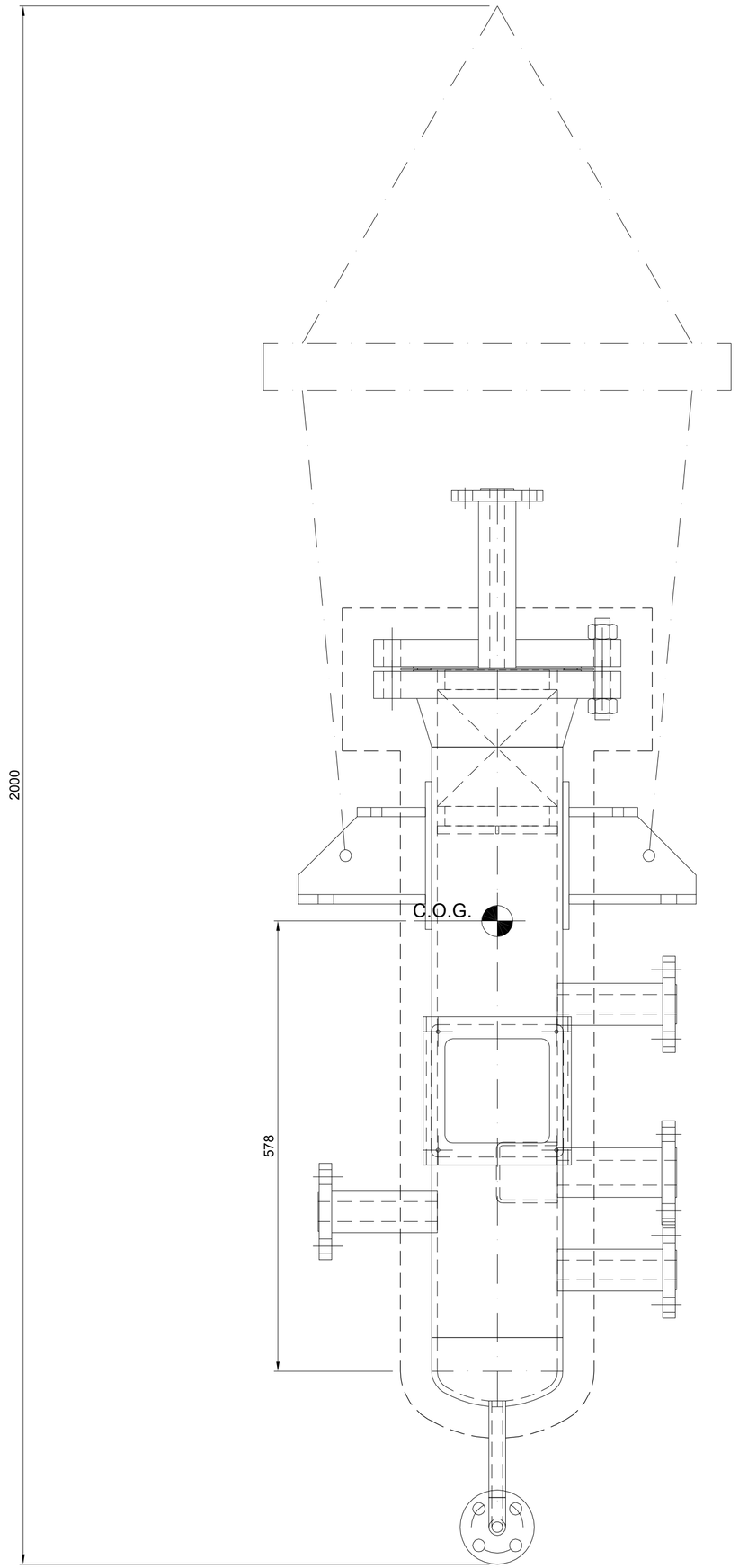
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-041
SH. OF 2 / 3

elogen

PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 130 kg

CS-630 H2 CONDENSATE SEPARATOR

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0	06/06/2024	ISSUE FOR APPROVAL	V.R.	L.Z.	C.A.	-

F.LLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-041
SH. OF 3 / 3

elogen

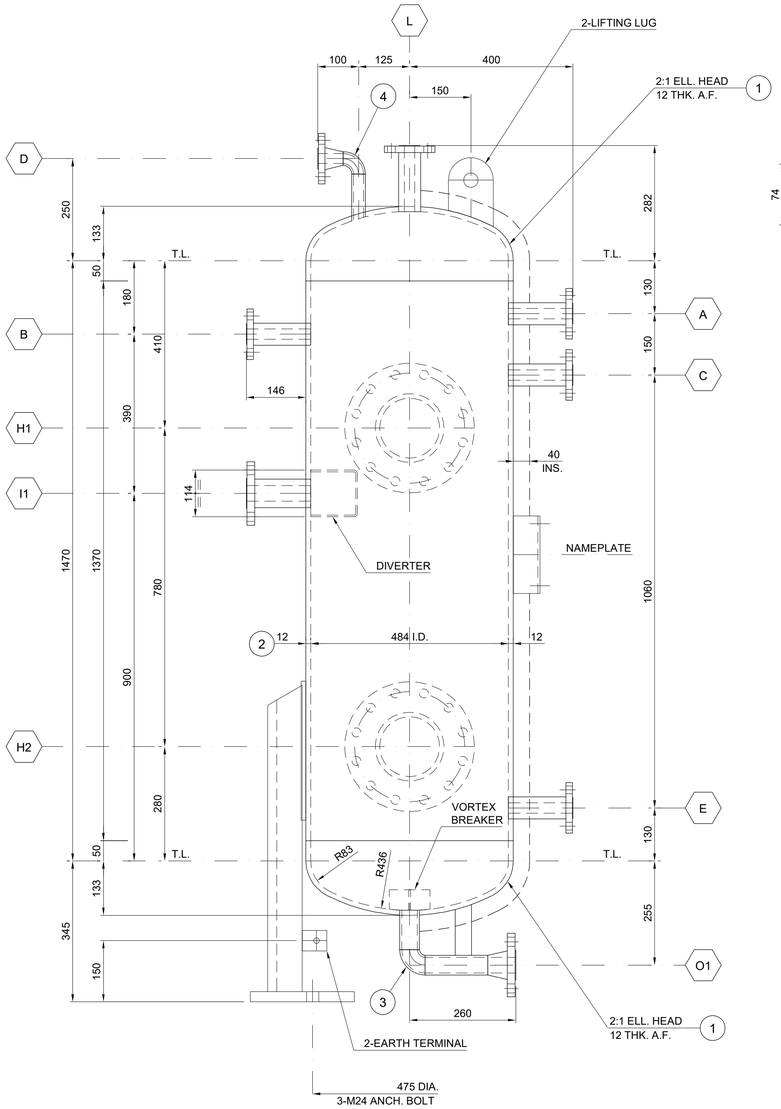
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

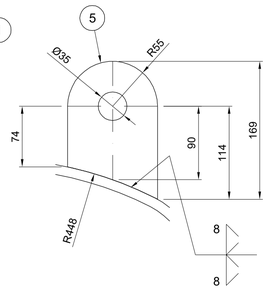
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DG-640

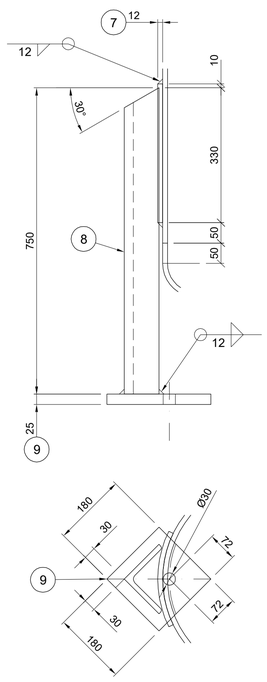
H_2 High Pressure Degasser

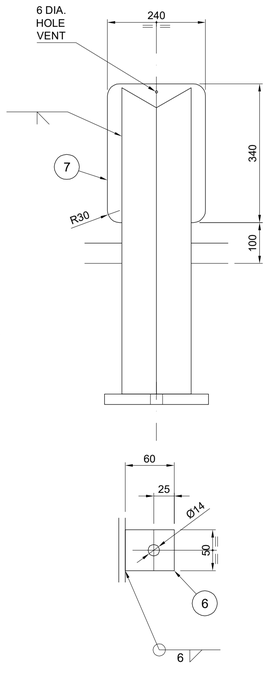
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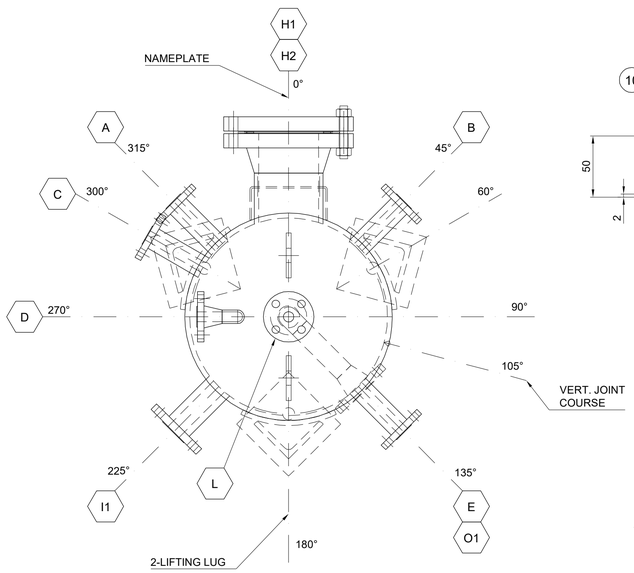
LIFTING LUG DETAIL



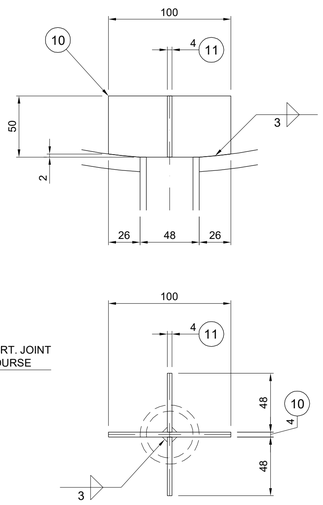


SUPPORT LEG DETAIL

EARTHING LUG DETAIL



ORIENTATION



VORTEX BREAKER DETAIL

DIVERTER DETAIL

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
A	LIQUID INLET	400	1	1"	LWN 300# RF L=160	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
B	LEVEL SWITCH HIGH	400	1	1"	LWN 300# RF L=160	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
C	LEVEL SWITCH LOW	400	1	1"	LWN 300# RF L=160	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
D	INERTING	SEE DWG.	1	1"	WN 300# RF	4.55	SA182 F316/316L	◑	1	1"	4.55	115	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		5
E	LEVEL SWITCH LOW LOW	400	1	1"	LWN 300# RF L=160	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
I1	WATER INLET	400	1	1.1/2"	LWN 300# RF L=161	15.85	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		8
L	VENT	282	1	1"	LWN 300# RF L=162	14.3	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
O1	WATER OULET	SEE DWG.	1	1.1/2"	WN 300# RF	5.08	SA182 F316/316L	◑	1+1	1.1/2"	5.08	154+97	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		3
H1	HANDHOLE + BLIND	450	1	6"	WN 300# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	125	SA312 TP316/316L	◑	-	-	-	-	-		12	3/4"x130	B8 Cl.1 / Gr.8 Cl.1	◑	1	6" 300# RF	3	○	53
H2	HANDHOLE + BLIND	450	1	6"	WN 300# RF	10.97	SA182 F316/316L	◑	1	6"	10.97	125	SA312 TP316/316L	◑	-	-	-	-	-		12	3/4"x130	B8 Cl.1 / Gr.8 Cl.1	◑	1	6" 300# RF	3	○	53

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ○ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN PASSO DI MANO AVENTE UN DIAMETRO INTERNO DI 146 mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A HANDHOLE HAVING AN INTERNAL DIA. OF 146 mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 40 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 40 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE:
(FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm,
DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING)
LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°,
LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	2	2:1 ELL. HEAD 508 O.D. 12 Thk. (A.F.)	SA240 316/316L	◑	45	90	-
2	1	12 Thk. PLATE 1370x1557	SA240 316/316L	◑	-	205	-
3	1	1.1/2" ELBOW 90° SR 5.08 Thk.	SA403 WP316/316L	◑	-	-	-
4	1	1" ELBOW 90° LR 4.55 Thk.	SA403 WP316/316L	◑	-	-	-
5	2	12 Thk. PLATE 110x169	SA240 316/316L	◑	2	4	-
6	2	8 Thk. PLATE 50x60	SA240 316/316L	◑	-	-	-
7	3	12 Thk. PLATE 240x340	SA240 316/316L	◑	8	24	-
8	3	L120x120x12 L=750	SA240 316/316L	◑	17	51	-
9	3	25 Thk. PLATE 180x180	SA240 316/316L	◑	7	21	-
10	1	4 Thk. PLATE 50x100	SA240 316/316L	◑	-	-	-
11	2	4 Thk. PLATE 50x48	SA240 316/316L	◑	-	-	-
12	1	4 Thk. PLATE 86x320	SA240 316/316L	◑	-	1	-

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE
PRESSIONE PRESSURE	DI PROGETTO INTERNA INTERNAL DESIGN	40 bar
	DI PROGETTO ESTERNA (VUOTO) EXTERNAL DESIGN (VACUUM)	0.58 bar(a)
	DI ESERCIZIO NORMAL OPERATING	13 bar
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	57.2 bar
	PROVA IDR. (IN ORIZ.) HYDROSTATIC TEST (HOR)	-
TEMPERATURA TEMPERATURE	DI PROGETTO DESIGN	80 °C (8)
	DI ESERCIZIO NORMAL OPERATING	65 °C
SOVRASPESSORE DI CORROS. CORROSION ALLOWANCE	MANTELLO SHELL	0
	FONDI HEADS	0
EFFICIENZA DEI GIUNTI JOINTS EFFICIENCY	MANTELLO SHELL	1
	FONDI HEADS	1
TRASPORTO TRANSPORT		ah=0.7g - av=0.5g
PRESS. DEL VENTO WIND PRESSURE		N.A.
COEFFICENTE SISMICO SEISMIC COEFFICIENT		N.A.
TRATTAMENTO TERMICO DOPO SALDATURA POSTWELD HEAT TREATMENT		NO
CONTROLLI N.D. N.D.E.		FULL (12)
TRATTAMENTO SUPERFICIALE SURFACE TREATMENT		PICKLING AND PASSIVATION
ISOLAMENTO INSULATION		40 Thk. ROCKWOOL/GLASSWOOL + METALLIC COVER
PROTEZIONE FUOCO FIREPROOFING		NO
POSIZIONE DEL RECIPIENTE ORIENTATION OF VESSEL		VERTICAL
CAPACITA' CAPACITY		300 Lt.
FLUIDO CONTENUTO CONTAINED FLUID	NATURA TYPE	PURE WATER + HYDROGEN
	STATO STATE	LIQUID + GAS
	DENSITA' DENSITY	980 Kg/dm3
PESI WEIGHTS	VUOTO EMPTY	600 Kg
	PIENO D 'ACQUA WATER FULL	900 Kg
ENTE COLLAUDATORE INSPECTION BY		ICIM
TALLONI DI PRODUZIONE PRODUCTION SAMPLES		NO
OVALIZZAZIONE OVALIZATION		1% MAX.
N° DI FABBRICA SERIAL No.	24J033-NF06	ANNO DI COSTRUZ. YEAR BUILT 2024

CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION

CATEGORIA FLUIDO FLUID GROUP	1
CATEGORIA PED PED CATEGORY	IV
MODULO PED PED MODULE	G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME MATERIALS ACCORDING TO CODE			ASME SECT. II PART "A" 2023 ED.
MANTELLO SHELL			SA240 316/316L
FONDI HEADS			SA240 316/316L
CONN FLANGIATE FLANGED CONN.	FLANGE FLANGES		SA182 F316/316L
	TRONCH. NOZZLE		SA312 TP316/316L
PASSI D 'UOMO MANHOLES	FLANGE FLANGES		-
	TRONCH. P.U. MANHOLES NOZZLE		-
TIRANTI STUD BOLTS	SA193 B8 Cl.1	DADI NUTS	SA194 Gr.8 C.l.1
GUARNIZIONI GASKETS			KEMPCHEN - RUBBER-STEEL GASKET
SUPPORTI SUPPORTS			SA240 316/316L
ACCESSORI INTERNI INTERNAL FITTINGS			
LAMIERA PLATE	SA240 316/316L	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	SS 316L
ACCESSORI ESTERNI EXTERNAL FITTINGS			
LAMIERA PLATE	-	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	-

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO DRAWING N°	DESCRIZIONE DESCRIPTION
24J033-051-Sh.2	NAME PLATE AND SUPP.
24J033-051-Sh.3	LIFTING ARRANGEMENT

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO DOCUMENT N°	DESCRIZIONE DESCRIPTION
C63-MDS-009	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

DG-640 H2 HIGH PRESSURE DEGASSER

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

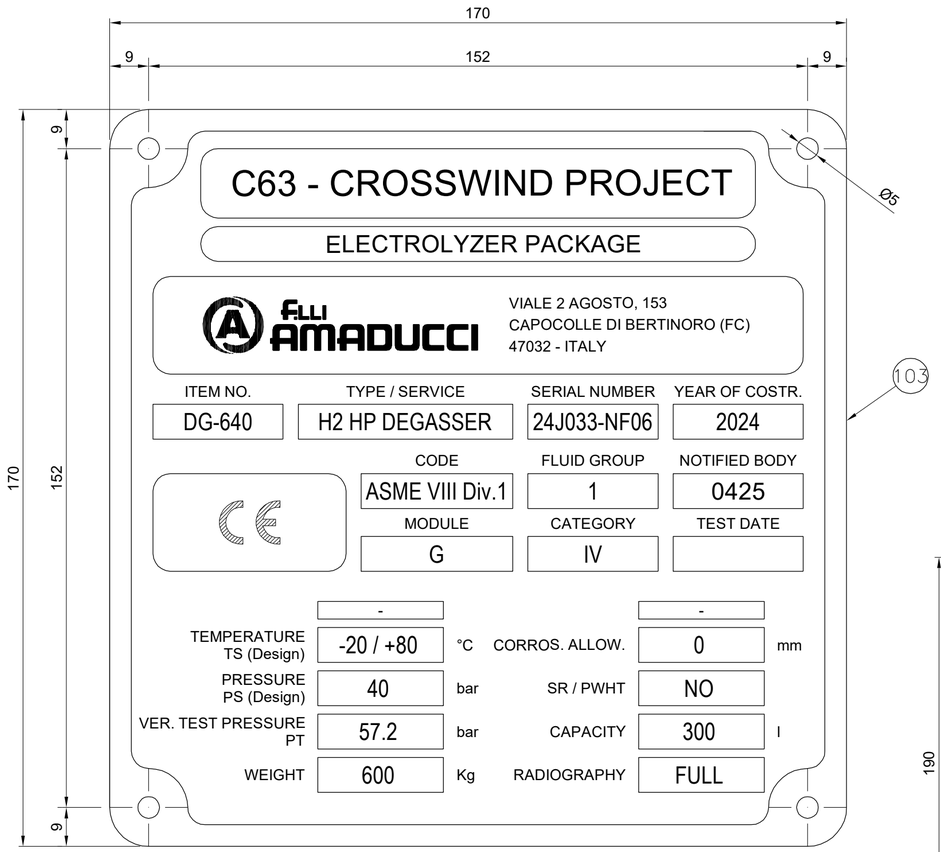
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-051
SH. OF 1 / 3

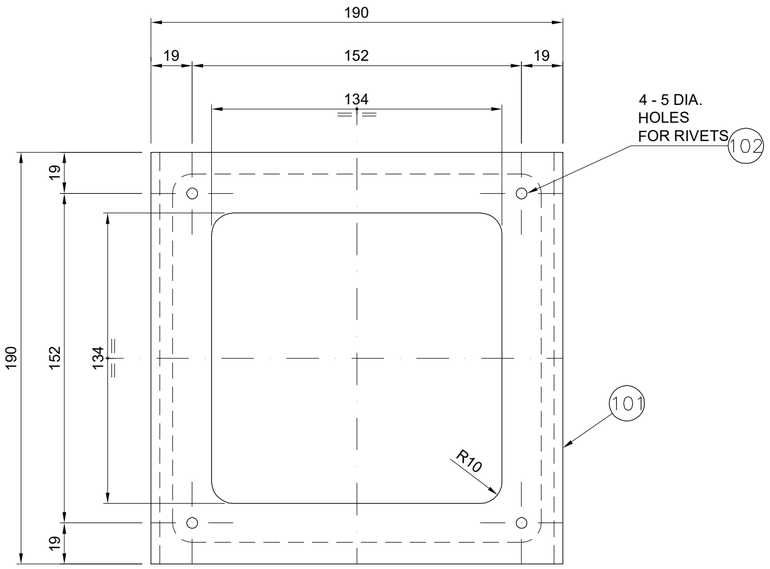
elogen

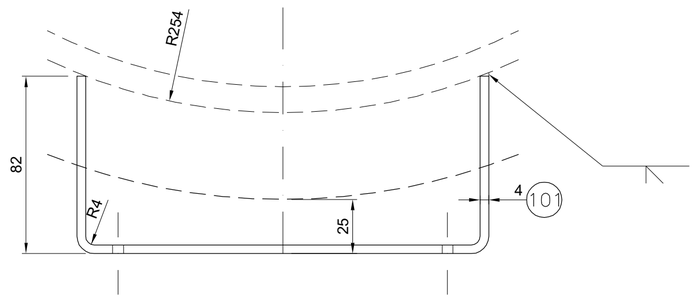
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1





NAMEPLATE SUPPORT
1:2

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
101	1	4 Thk. PLATE	SA240 316/316L	◑	-	2	-
102	4	4 DIA. RIVET	SS 316	◑	-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L	◑	-	0.5	-

NAMEPLATE NOTES

1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.

DG-640 H2 HIGH PRESSURE DEGASSER

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
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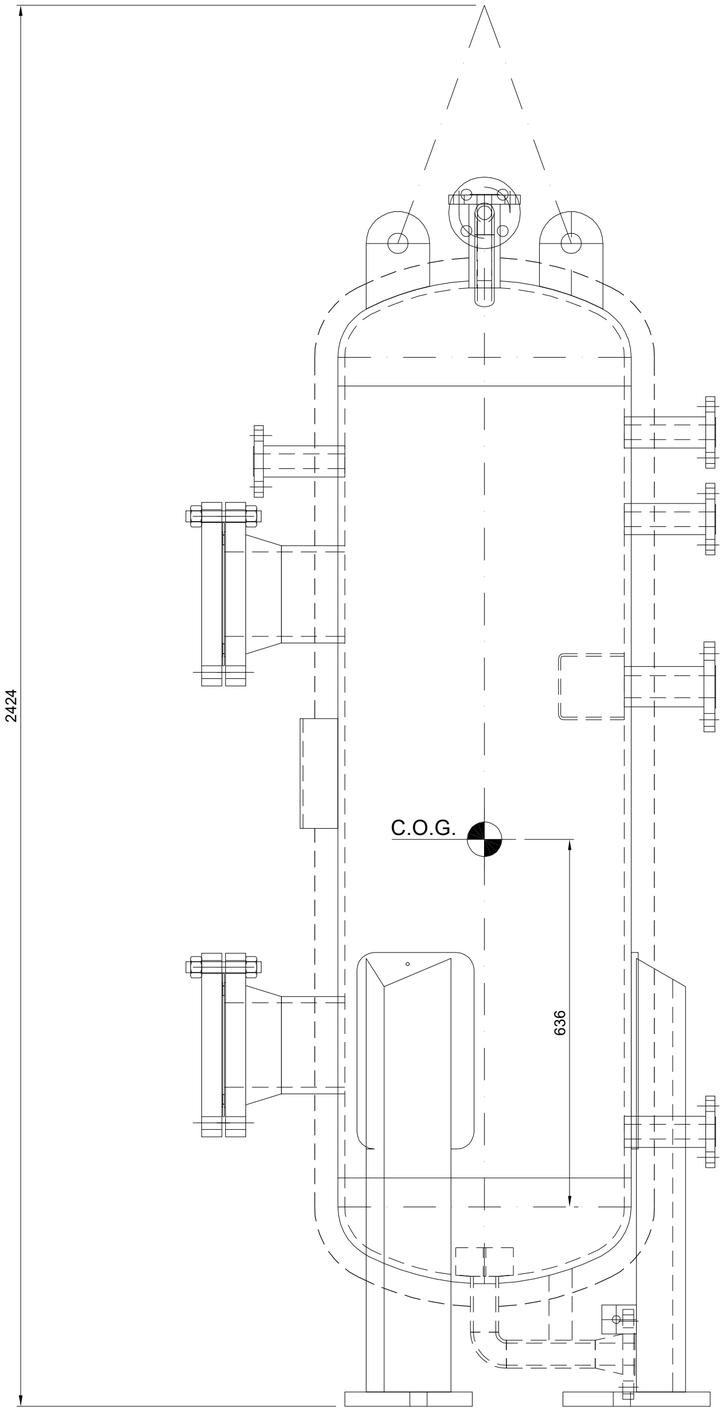
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-051
SH. OF 2 / 3

elogen

PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 600 kg

DG-640 H2 HIGH PRESSURE DEGASSER

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VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-051
SH. OF 3 / 3

elogen

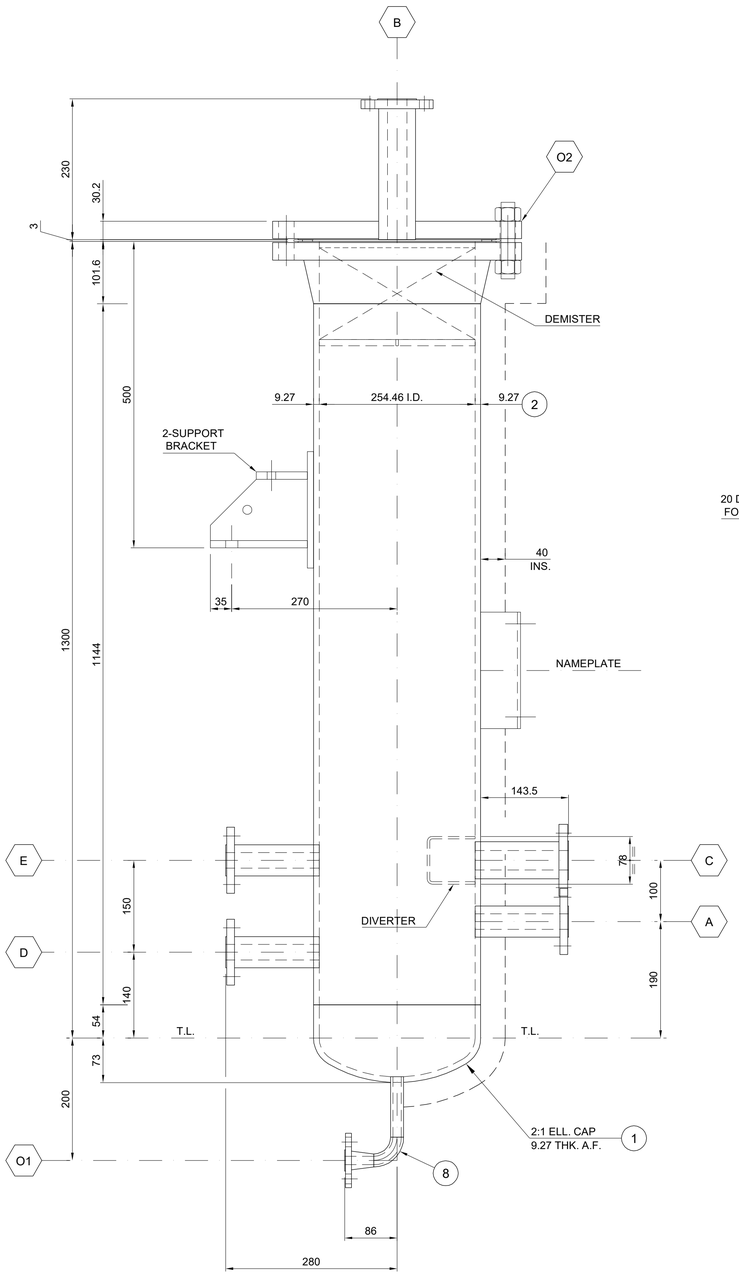
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ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

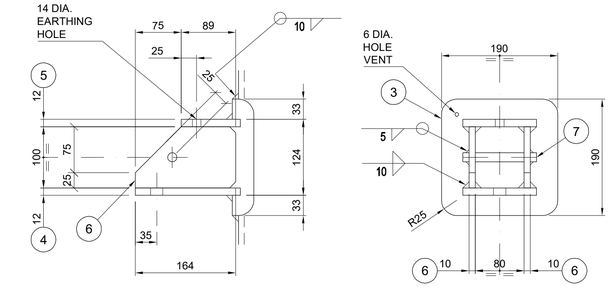
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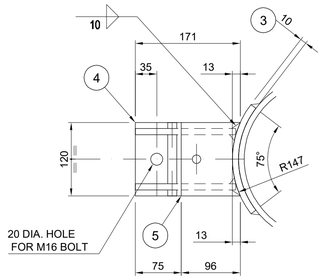
CS-610

O_2 Condensate Separator

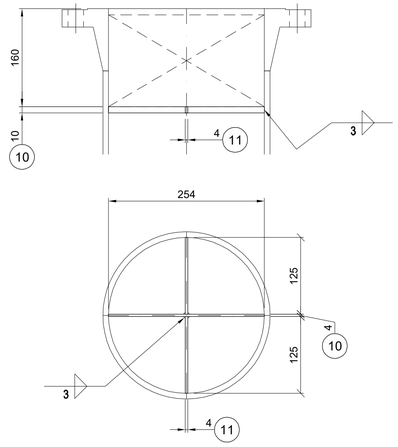
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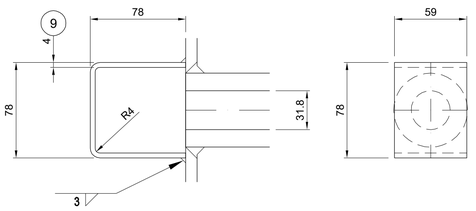




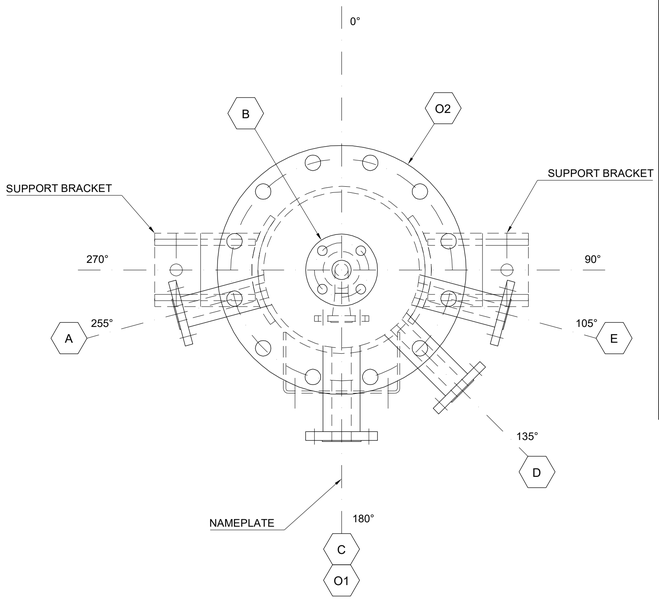
SUPPORT BRACKET DETAIL



DEMISTER SUPPORT DETAIL



DIVERTER DETAIL



ORIENTATION

ELENCO CONNESSIONI / LIST OF CONNECTIONS

SIGLA MARK	DESCRIZIONE DESCRIPTION	DIST. ASSE/L.T. AXIS DIST/T.L.	FLANGE / FLANGES N°	SIZE	TIPO / TYPE	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TUBI / PIPE N°	SIZE	Sp./Thk.	L (6)	MATERIALE/MATERIAL	CERT.	PIASTRE DI RINFORZO / REINFORCING PLATE N°	Øe / O.D.	Øi / I.D.	Sp./Thk.	MATERIALE/MATERIAL	CERT.	TIRANTI-DADI / STUD BOLT-NUTS N°	TIPO / TYPE	MATERIALE/MATERIAL	CERT.	GUARNIZIONI / GASKET N°	TIPO / TYPE	Sp./Thk.	CERT.	PESO WEIGHT (Kg)
A	LOW LEVEL SWITCH	280	1	1"	LWN 150# RF L=155	12.7	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		4
B	OXYGEN GAS OUTLET	SEE DWG.	1	1.1/4"	LWN 150# RF L=230	14.25	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
C	LIQUID INLET	280	1	1.1/4"	LWN 150# RF L=157	14.25	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		5
D	LOW LEVEL SWITCH	280	1	1"	LWN 150# RF L=155	12.7	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		4
E	HIGH LEVEL SWITCH	280	1	1"	LWN 150# RF L=155	12.7	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		-	-	-		-	-	-		4
O1	CONDESATE OUTLET	SEE DWG.	1	1/2"	WN 150# RF	3.73	SA182 F316/316L	◑	1	1/2"	3.73	99	SA312 TP316/316L	◑	-	-	-	-	-		-	-	-		-	-	-		1
O2	SHELL FLG. + BORED BLIND	SEE DWG.	1	10"	WN 150# RF	9.27	SA182 F316/316L	◑	-	-	-	-	-		-	-	-	-	-		12	7/8"X125	B8 Cl.1 / Gr.8 Cl.1	◑	1	10" 150# RF	3	○	62

● CERTIFICATO EN10204 - 3.2 ◑ CERTIFICATO EN10204 - 3.1 ○ CERTIFICATO EN10204 - 2.2

NOTE GENERALI / GENERAL NOTES

1 -TUTTE LE FLANGE DOVRANNO AVERE LA FACCIA DI ACCOPPIAMENTO CON FINITURA LISCIA 125 ÷ 250 AARH E ALTEZZA ONDULAZIONE MAX.0.05 MM.
ALL FLANGES SHALL HAVE SMOOTH FINISH FACING ROUGHNESS WITH 125 ÷ 250 AARH AND WAVINESS HEIGHT 0.05 MAX.

2 -SALVO DIVERSA INDICAZIONE, LE FLANGE DOVRANNO AVERE I FORI SFALSATI RISPETTO GLI ASSI PRINCIPALI DEL RECIPIENTE
UNLESS OTHERWISE INDICATED, ALL FLANGES HOLES SHALL BE STAGGERED TO MAIN AXES OF VESSEL

3 -TUTTI GLI INTERNI SMONTABILI DEVONO PASSARE ATTRAVERSO UN PASSO DI MANO AVENTE UN DIAMETRO INTERNO DI 254 mm.
ALL REMOVABLE INTERNAL SHALL PASS THROUGH A HANDHOLE HAVING AN INTERNAL DIA. OF 254 mm.

4 -LE FLANGE SARANNO IN ACCORDO AD ASME B16.5 (EDIZIONE 2020).
I TRONCHETTI DA TUBO SENZA SALDATURA SARANNO IN ACCORDO AD ASME B36.10M (EDIZIONE 2018).
I TIRANTI E I DADI AVRANNO FILETTATURA IN ACCORDO AD ASME B1.1 (EDIZIONE 2019).
LE CURVE SARANNO IN ACCORDO AD ASME B16.9 (EDIZIONE 2018).
NOZZLE FLANGES MUST BE IN ACCORDANCE WITH ASME B16.5 (2020 ED.).
NOZZLE NECK FROM SEAMLESS PIPE MUST BE IN ACCORDANCE WITH ASME B36.10M (2018 ED.).
BOLTS AND NUTS THREADS MUST BE IN ACCORDANCE WITH ASME B1.1 (2019 ED.).
ELBOWS MUST BE IN ACCORDANCE WITH ASME B16.9 (2018 ED.).

5 -GLI SPESSORI INDICATI SUL DISEGNO SONO QUELLI MINIMI DOPO FORMATURA
ALL THICKNESS SHOWN ON THE DRAWING MUST BE CONSIDERED AS MINIMUM AFTER FORMING

6 -L= LUNGHEZZA NETTA DEL TUBO
L= NET PIPE LENGHT

7 -TOLLERANZE MATERIALI: TUBI ±12.5%, LAMIERE -0.3 mm, FORGIATI -0/+2mm
MATERIAL TOLERANCES: PIPES ±12.5%, PLATES -0.3 mm, FORGING -0/+2 mm

8 -TEMPERATURA MINIMA DI PROGETTO -20 °C A 16 Bar g
MINIMUM DESIGN METAL TEMPERATURE -20 °C AT 16 Bar g

9 -SALVO DIVERSAMENTE INDICATO, LE TOLLERANZE DIMENSIONALI SARANNO IN ACCORDO A QUANTO SEGUE:
(FATTA ECCEZIONE PER SALDATURE) DIM. LINEARI ±3mm, DIM. LINEARI PASSI D'UOMO ±6 mm,
DIM. LINEARI COMPLESSIVE ±15 mm, DIMENSIONI ANGOLARI ±0.5°, INTERASSI LIVELLI ± 2mm
UNLESS OTHERWISE INDICATED, THE TOLERANCES SHALL BE AS FOLLOW: (EXCEPT FOR WELDING)
LINEAR DIM. ±3mm, MANHOLE LINEAR DIM. ±6mm, LINEAR DIM. GLOBAL ±15mm, ANGULAR ±0.5°,
LEVEL ±2mm

10-PER DETTAGLI SALDATURA VEDI "WELDING MAP"
FOR JOINT DETAILS SEE "WELDING MAP"

11-TUTTI I MATERIALI AVRANNO "DOPPIA CERTIFICAZIONE" 316 E 316L, SARANNO UTILIZZATE LE PROPRIETA' MECCANICHE DEL 316 E SARANNO SODDISFATTE LE PROPRIETA' CHIMICHE DEL 316L
ALL MATERIALS SHALL BE "DUAL CERTIFIED" 316 AND 316L, MECHANICAL PROPERTIES OF 316 SHALL BE USED AND CHEMICAL PROPERTIES OF 316L SHALL BE SATISFIED.

12-VEDI DOC. N. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"
SEE DOC. No. C0063-FOR-ITP-QA-001 "INSPECTION AND TEST PLAN ITP"

ELENCO MATERIALI / MATERIAL LIST

POSIZ. POS.	QUANT. Q.TY	DESCRIZIONE DESCRIPTION	MATERIALE MATERIAL	CERT.	PESO UNIT. UNIT WEIGHT	PESO TOT. TOTAL WEIGHT	NOTE REMARKS
1	1	2:1 ELL. CAP 10" 9.27 Thk. (A.F.)	SA403 WP316/316L	◑	-	10	B16.9
2	1	10" PIPE 9.27 Thk. L=1144	SA312 TP316/316L	◑	-	69	-
3	2	10 Thk. PLATE 190x190	SA240 316/316L	◑	3	6	-
4	2	12 Thk. PLATE 120x171	SA240 316/316L	◑	2	4	-
5	2	12 Thk. PLATE 120x96	SA240 316/316L	◑	1	2	-
6	4	10 Thk. PLATE 100x164	SA240 316/316L	◑	1.5	6	-
7	2	15 DIA. ROD L=120	SS 316	◑	-	-	-
8	1	1/2" ELBOW 90° LR 3.73 Thk.	SA403 WP316/316L	◑	-	-	-
9	1	4 Thk. PLATE 59x220	SA240 316/316L	◑	-	1	-
10	1	4 Thk. PLATE 10x254	SA240 316/316L	◑	-	-	-
11	2	4 Thk. PLATE 10x125	SA240 316/316L	◑	-	-	-

CARATTERISTICHE APPARECCHIO / VESSEL FEATURES

NORME DI PROGETTO CODE		ASME VIII Div.1 2023 Ed. + 2014/68/UE
PRESSIONE PRESSURE	DI PROGETTO INTERNA INTERNAL DESIGN	16 bar
	DI PROGETTO ESTERNA (VUOTO) EXTERNAL DESIGN (VACUUM)	0.58 bar(a)
	DI ESERCIZIO NORMAL OPERATING	11 bar
	PROVA IDR. (IN VERT.) MIS. ALLA SOMMITA HYDROSTATIC TEST (VERT.) MEAS.D TO TOP	22.88 bar
	PROVA IDR. (IN ORIZ.) HYDROSTATIC TEST (HOR)	-
TEMPERATURA TEMPERATURE	DI PROGETTO DESIGN	80 °C (8)
	DI ESERCIZIO NORMAL OPERATING	8.5 °C
SOVRASPESSORE DI CORROS. CORROSION ALLOWANCE	MANTELLO SHELL	0
	FONDI HEADS	0
EFFICIENZA DEI GIUNTI JOINTS EFFICIENCY	MANTELLO SHELL	1
	FONDI HEADS	1
TRASPORTO TRANSPORT		ah=0.7g - av=0.5g
PRESS. DEL VENTO WIND PRESSURE		N.A.
COEFFICENTE SISMICO SEISMIC COEFFICIENT		N.A.
TRATTAMENTO TERMICO DOPO SALDATURA POSTWELD HEAT TREATMENT		NO
CONTROLLI N.D. N.D.E.		FULL (12)
TRATTAMENTO SUPERFICIALE SURFACE TREATMENT		PICKLING AND PASSIVATION
ISOLAMENTO INSULATION		40 Thk. MINERAL WOOL + METALLIC COVER
PROTEZIONE FUOCO FIREPROOFING		NO
POSIZIONE DEL RECIPIENTE ORIENTATION OF VESSEL		VERTICAL
CAPACITA' CAPACITY		68 Lt.
FLUIDO CONTENUTO CONTAINED FLUID	NATURA TYPE	PURE WATER + OXYGEN
	STATO STATE	LIQUID + GAS
	DENSITA' DENSITY	1000 Kg/dm3
PESI WEIGHTS	VUOTO EMPTY	200 Kg
	PIENO D'ACQUA WATER FULL	268 Kg
ENTE COLLAUDATORE INSPECTION BY		ICIM
TALLONI DI PRODUZIONE PRODUCTION SAMPLES		NO
OVALIZZAZIONE OVALIZATION		1% MAX.
N° DI FABBRICA SERIAL No.	24J033-NF07	ANNO DI COSTRUZ. YEAR BUILT 2024

CLASSIFICAZIONE 2014/68/UE / 2014/68/UE CLASSIFICATION

CATEGORIA FLUIDO FLUID GROUP	1
CATEGORIA PED PED CATEGORY	IV
MODULO PED PED MODULE	G

MATERIALI / MATERIALS

MATERIALI IN ACC. CON LE NORME MATERIALS ACCORDING TO CODE		ASME SECT. II PART "A" 2023 ED.	
MANTELLO SHELL		SA312 TP316/316L	
FONDI HEADS		SA403 WP316/316L	
CONN FLANGIATE FLANGED CONN.	FLANGE FLANGES	SA182 F316/316L	
	TRONCH. NOZZLE	SA312 TP316/316L	
PASSI D'UOMO MANHOLES	FLANGE FLANGES	-	
	TRONCH. P.U. MANHOLES NOZZLE	-	
TIRANTI STUD BOLTS	SA193 B8 Cl.1	DADI NUTS	SA194 Gr.8 C.l.1
GUARNIZIONI GASKETS	KEMPCHEN - RUBBER-STEEL GASKET		
SUPPORTI SUPPORTS	SA240 316/316L		
ACCESSORI INTERNI INTERNAL FITTINGS			
LAMIERA PLATE	SA240 316/316L	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	SS 316
ACCESSORI ESTERNI EXTERNAL FITTINGS			
LAMIERA PLATE	-	PROFILATI IRON SECTIONS	-
TUBO PIPE	-	BULLONERIA BOLTING	-

DISEGNI ALLEGATI / ATTACHED DWGS.

N° DISEGNO DRAWING N°	DESCRIZIONE DESCRIPTION
24J033-061-Sh.2	NAME PLATE AND SUPP.
24J033-061-Sh.3	LIFTING ARRANGEMENT

DOCUMENTI RIF. / REF. DOCUMENT

N° DOCUMENTO DOCUMENT N°	DESCRIZIONE DESCRIPTION
C63-MDS-010	MECH. DATA SHEET
C0063-FOR-CAL-MP-002	P.V. CALCULATION NOTES

CS-610 O2 CONDENSATE SEPARATOR

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
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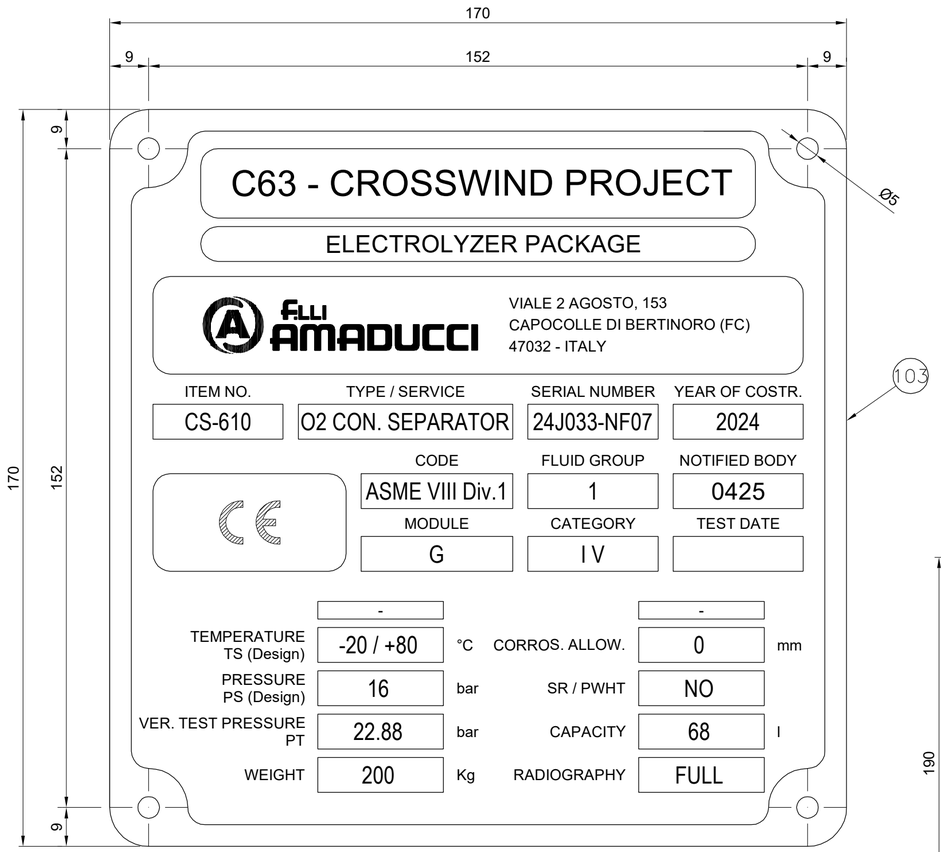
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47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-061
SH. OF 1 / 3

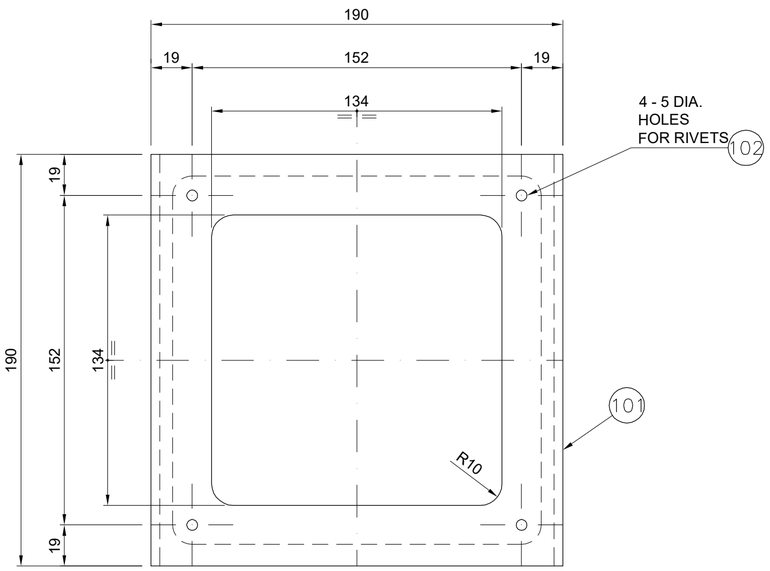
elogen

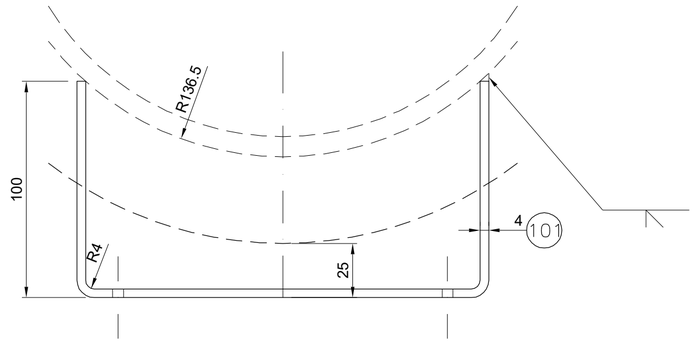
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FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NAMEPLATE
1:1





NAMEPLATE SUPPORT
1:2

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102	4	4 DIA. RIVET	SS 316		-	-	-
103	1	2 Thk. NAME PLATE	SA240 316/316L		-	0.5	-

NAMEPLATE NOTES

1)- LETTERS AND RECTANGLES MUST BE CHEMICALLY ENGRAVED AND FILLED IN BLACK.

2)- DIMENSIONS: MIN. NAMEPLATE THICKNESS 2 mm MIN.

3)- LETTERING TO BE 4 mm HIGH.

CS-610 O2 CONDENSATE SEPARATOR

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	
1	27/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-
0	06/06/2024	ISSUE FOR APPROVAL	V. R.	L. Z.	C. A.	-

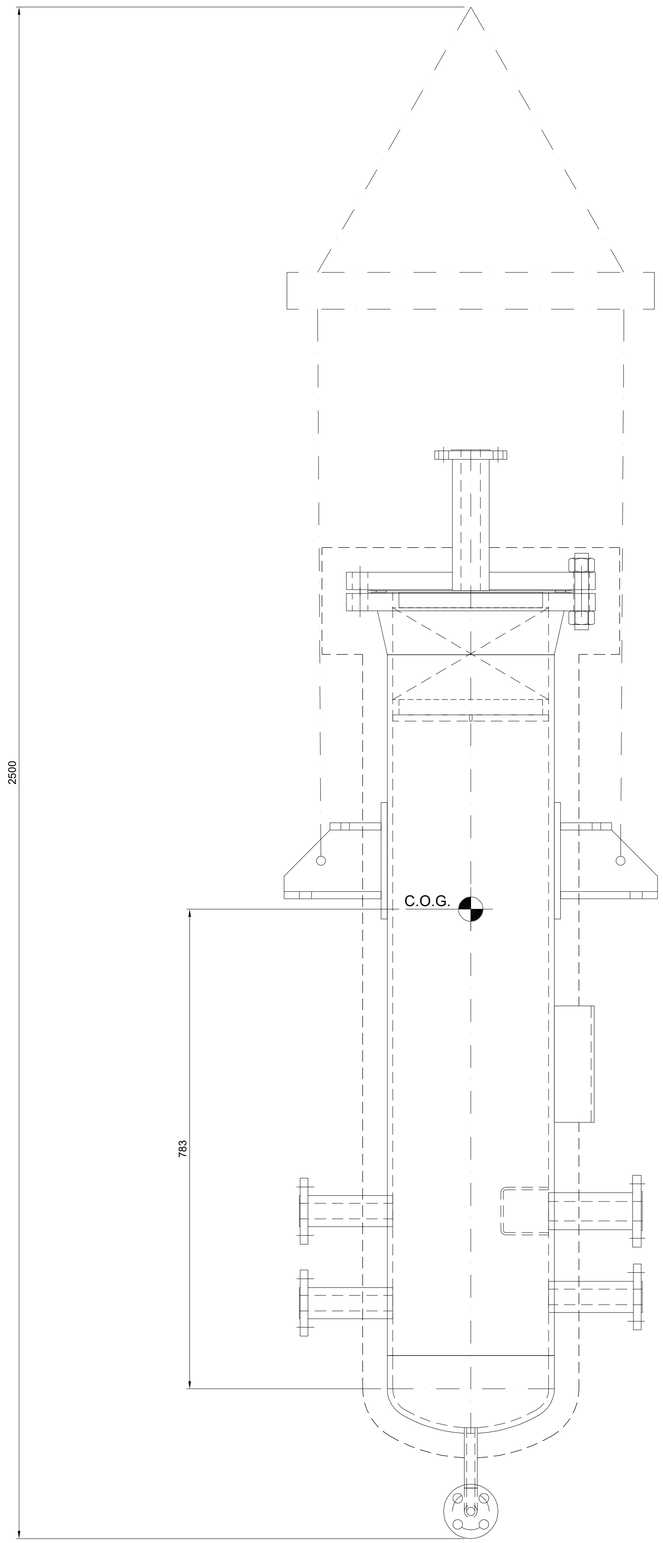
FLLI AMADUCCI
VIALE 2 AGOSTO, 153
CAPOCOLLE DI BERTINORO (FC)
47032 - ITALY

JOB Nr. 24J033
DWG. Nr. 24J033-061
SH. OF 2 / 3

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-001
ELOGEN PROJECT DOCUMENT TITLE	PRESSURE VESSELS DETAILED DRAWINGS
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00015
FORES DOCUMENT NUMBER	224J10-DDL-VS-DD-00001

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NET WEIGHT: 200 kg

CS-610 O2 CONDENSATE SEPARATOR

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No.	Qty.	Modified from	Date	Intr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

N7 Φ6mm Instrument air or Nitrogen

TO CP 64-V17 | TO CP 64-V8 | TO CP 64-V3 | TO CP 64-V2 | TO CP 64-V1 | TO CP 64-V12

TSA HH 64.4 / TS 64.4 ≤60°C

PI 64.1 / 64-V9

AQUAGAS | Customer

Flange 1", 300Lbs ASME B16.5, 316L

N2 Hydrogen

N10 Vent

Flange 1", 300Lbs ASME B16.5, A105

66 Particle filter 5µm

N8 PSV 64.1 36bar

N9 PSV 64.2 36bar

64-V4.1 | 64-V4.2 | 64-V4.3 | 64-V4.4

GSA LL/HH 64.1.1 / GS 64.1.1 Open=I

GSA LL/HH 64.1.2 / GS 64.1.2 Open=I

GSA LL/HH 64.1.3 / GS 64.1.3 Open=I

GSA LL/HH 64.1.4 / GS 64.1.4 Open=I

TSA HH 64.6 L/H / TA 64.6 / TC 64.6 / TI 64.6 / TT 64.6

TT 64.8 / TI 64.8 / TC 64.8 / TA 64.8 L/H / TSA 64.8 HH

TS 64.3 / TSA HH 64.3 ≤200°C

TSA HH 64.2 / TS 64.2

Heater HE64.1

TS(TC) 64.1

64-V14 | 64-V14.1

64-V5

64-V7

GSA LL/HH 64.3 / GS 64.3 Open=I

FC 64.1 4-20mA

64-T4

FO 64-V6

TSA HH 64.5 L/H / TA 64.5 / TC 64.5 / TI 64.5 / TT 64.5

GSA LL/HH 64.2 / GS 64.2 Open=I

64A Dryer

64B Dryer

TT 64.7 / TI 64.7 / TC 64.7 / TA 64.7 L/H / TSA 64.7 HH

64-V15 | 64-V10

64-T1

64-V16 | 64-V11

G 3/4" PSV-64.3 6bar

Discharge N4

TSA LL/HH 60.2 L/H / TA 60.2 / TC 60.2 / TI 60.2 / TT 60.2

TSA LL/HH 60.1 L/H / TA 60.1 / TC 60.1 / TI 60.1 / TT 60.1

TSA HH 61.1 H / TA 61.1 / TC 61.1 / TI 61.1 / TT 61.1

*Note 1

61 Deoxidizer

Trace heater cable HE61.1

Hydrogen N1

Flange 1", 300Lbs ASME B16.5 A105

61-V2 | 61-V1

CW N6 | CW N5

Flange 1", 150Lbs ASME B16.5 A105

Customer | AQUAGAS

61-F1.1 | 61-F1.2 | 61-V3

64-F1.1 1mm | 64-F1.2 0,5mm

64-V13 OA OB

64-F2.2 0,5mm | 64-F2.1 1mm | 64-V33

O-Deoxo | O-Dryer

64-V31 (R-Φ1,0mm)

64-V32

64-T2

PSA LL/HH 64.1 / PA L/H 64.1 / PT 64.1

GS 64-T2 Closed=I / GSA LL/HH 64-T2

(R-Φ1,2mm) AQUAGAS

Pipe coupling Φ8mm Hy-Loc N3 Customer

*Note 1: Flange to fill/drain desiccant/catalyst.

– – – – = Customer scope of supply

Pos. No.	Qty.	Designation	Material	Dimension	Remark
Design. RE	Drawn RE	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of

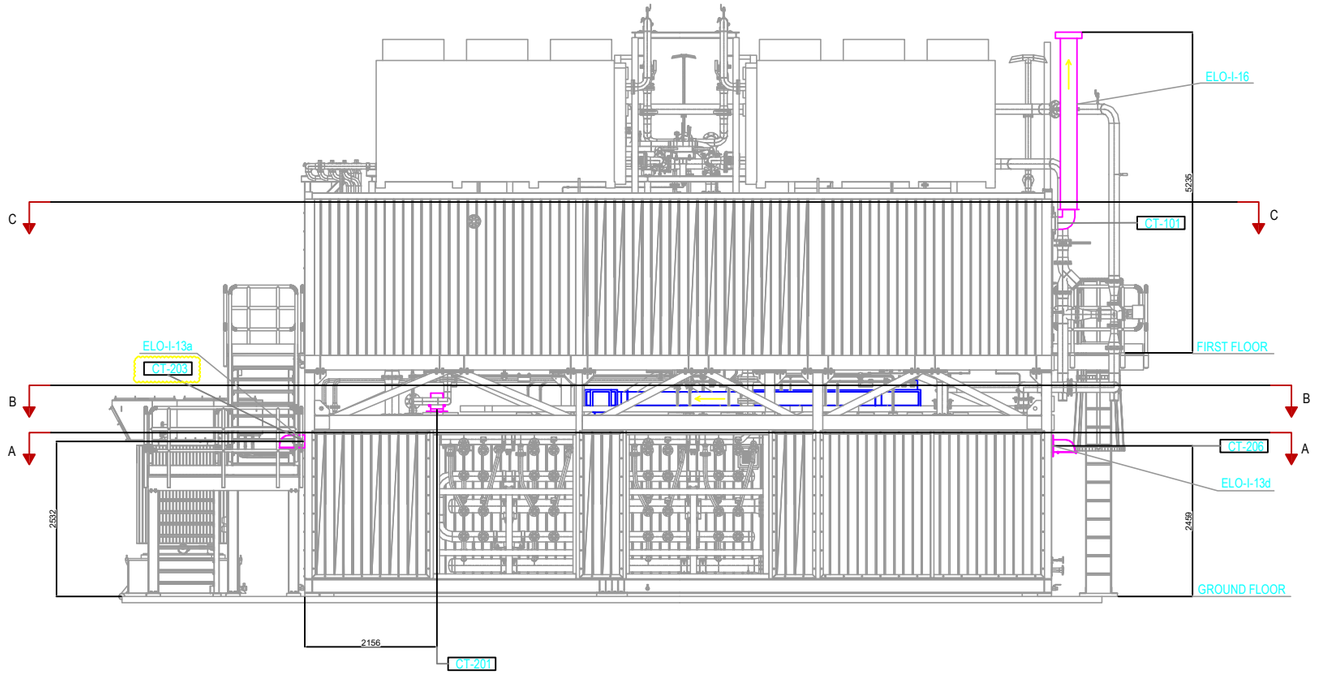
AQUAGAS SWEDEN AB
www.aquagas.se
Tel. +46 (0) 8 554 204 70

DEDR-500/36 OffShore
P&I Diagram

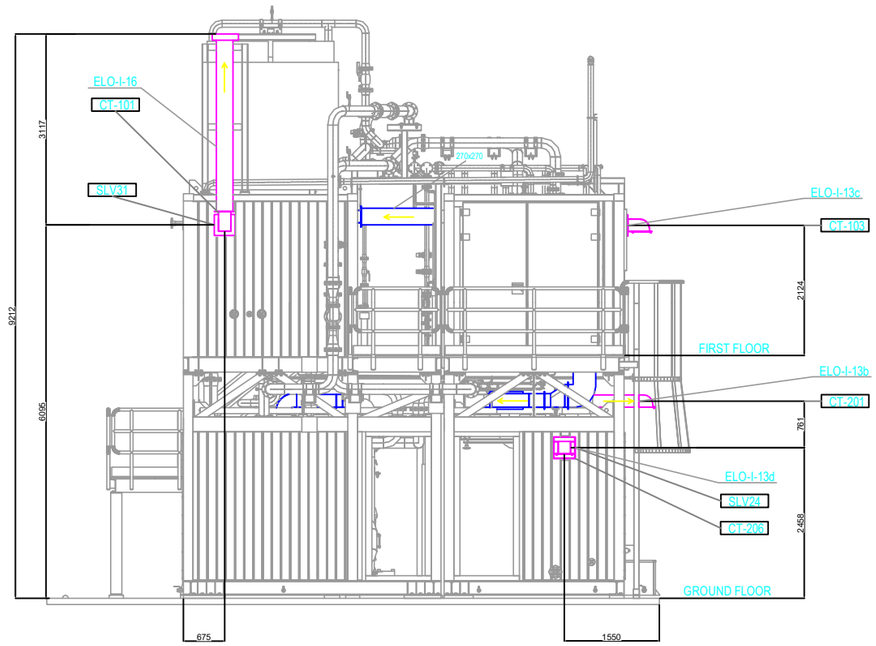
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Drawing no. 20230440

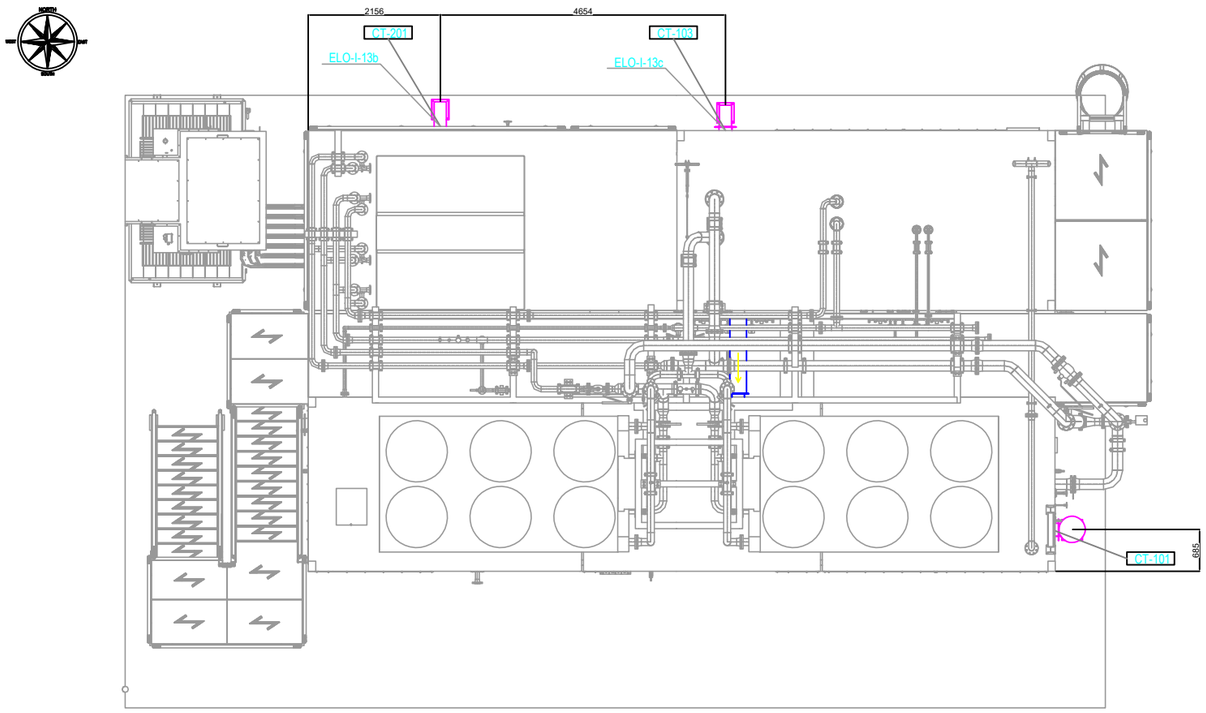
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SOUTH VIEW



EAST VIEW



PLAN VIEW

TYPE	TAG-NUMBER	DIMENSIONS(W x L)	SLEEVE	POSITION
REGULATING DAMPER	CT-102	200mm x 210mm	n.a	WP4
	CT-104	200mm x 210mm	n.a	WP4
	CT-202	200mm x 210mm	n.a	WP2
	CT-204	200mm x 210mm	n.a	WP1
	CT-207	200mm x 210mm	n.a	WP2
	CT-208	200mm x 210mm	n.a	WP1
OVERPRESSURE DAMPER	CT-101	204mm x 204mm	SLV31	WP3
	CT-103	204mm x 204mm	SLV42	WP4
	CT-201	204mm x 204mm	SLV23	WP2
	CT-203	204mm x 204mm	SLV13	WP1
	CT-205	204mm x 204mm	SLV14	WP1
	CT-206	204mm x 204mm	SLV24	WP2
FRESH AIR INTAKE	CT-102	530mm x 1000mm	n.a	WP4
SUPPLY GRILL	n.a	200mm x 150mm	n.a	WP1
	n.a	200mm x 150mm	n.a	WP1
	n.a	200mm x 150mm	n.a	WP2
	n.a	200mm x 150mm	n.a	WP2
	n.a	200mm x 150mm	n.a	WP4
	n.a	200mm x 150mm	n.a	WP4
NON RETURN DAMPER	CV-101	200mm x 210mm	n.a	WP3

LEGEND

SYMBOL	DESCRIPTION
	FRESH AIR INTAKE
	INTERNAL SUPPLY AIR
	EXPULSION AIR
	EXTERNAL SUPPLY AIR

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

NOTE:
- Galvanized duct part of fresh air intake is adjustable.
- Duct size is given with insulation included.
- For details regarding material and insulation please refer to the doc. number P.0608871.L.02.212

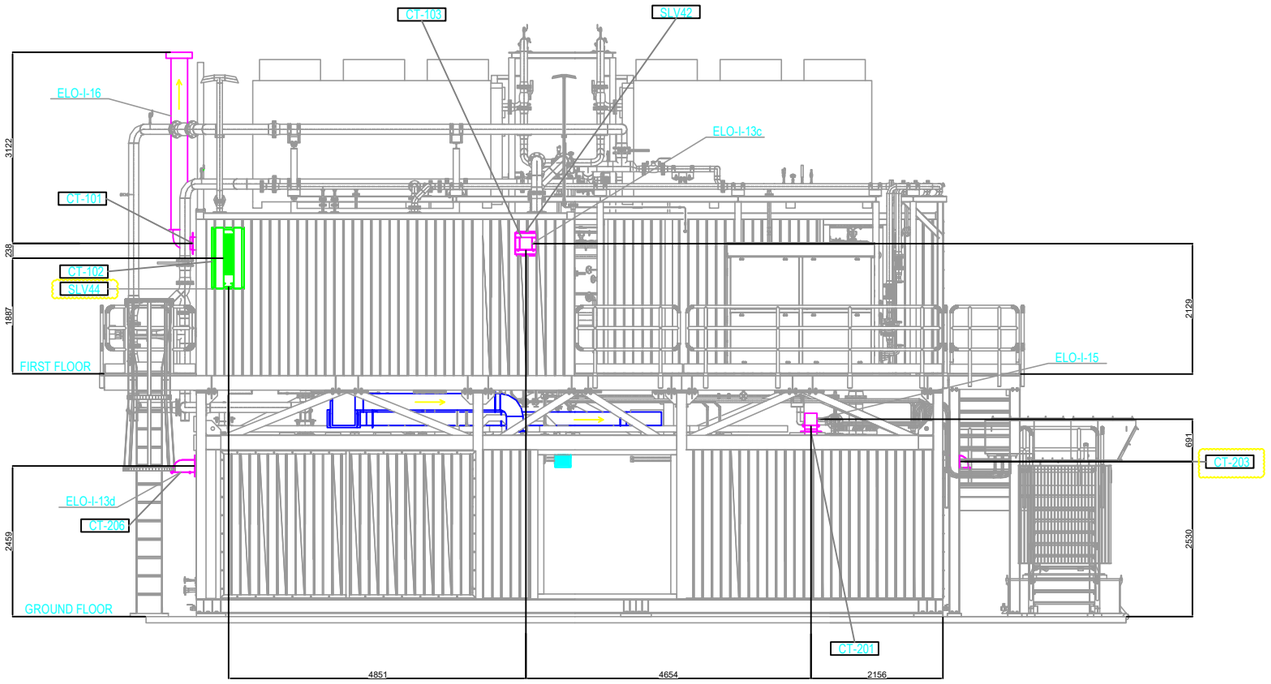
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			D. Crescimbeni	M. Chiarucci	L. Maioli	
01	28/11/2024	ISSUED FOR REVIEW	By	Checked	Approved	
			D. Crescimbeni	M. Chiarucci	L. Maioli	
00	26/08/2024	ISSUED FOR REVIEW	By	Checked	Approved	

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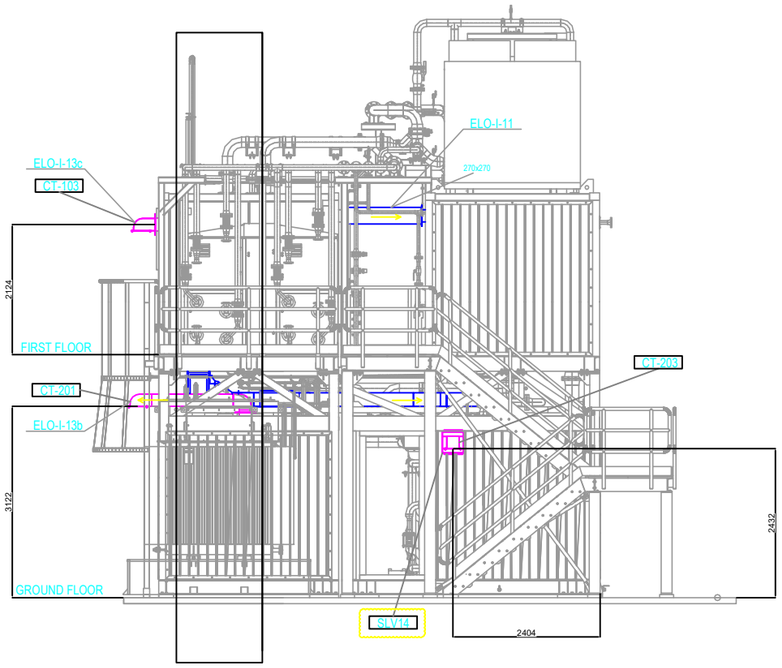
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-003			
ELOGEN PROJECT DOCUMENT TITLE	Ducting General Arrangement drawing			
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00027			
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-HV-00001			
	FORMAT	A1	SHEET	01 of 04

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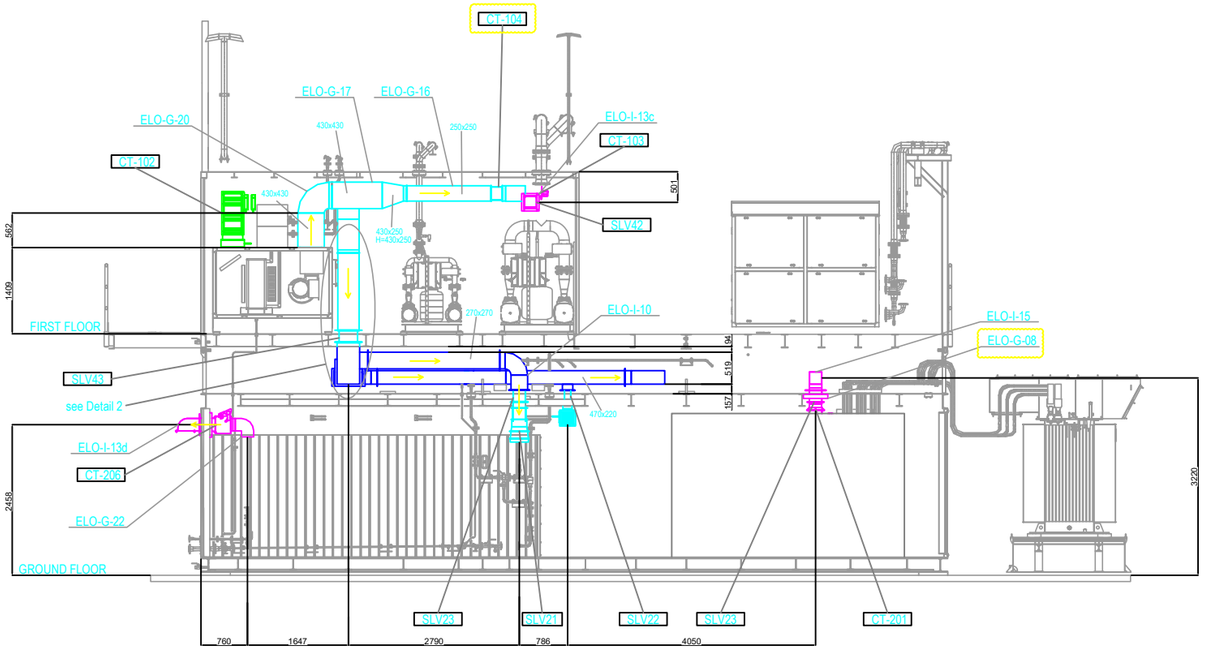


NORTH VIEW

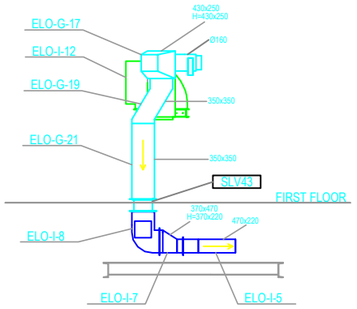


see Detail 1

WEST VIEW



Detail 1



Detail 2

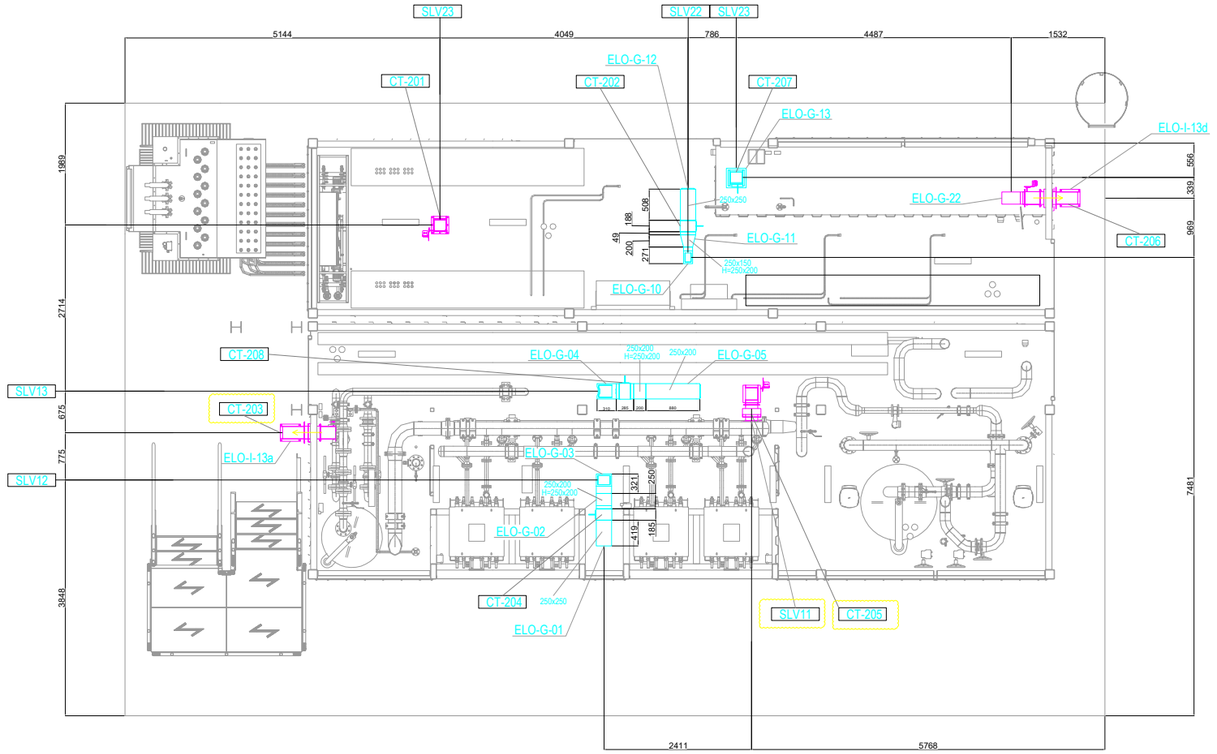
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01	28/11/2024	ISSUED FOR REVIEW	D. Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	
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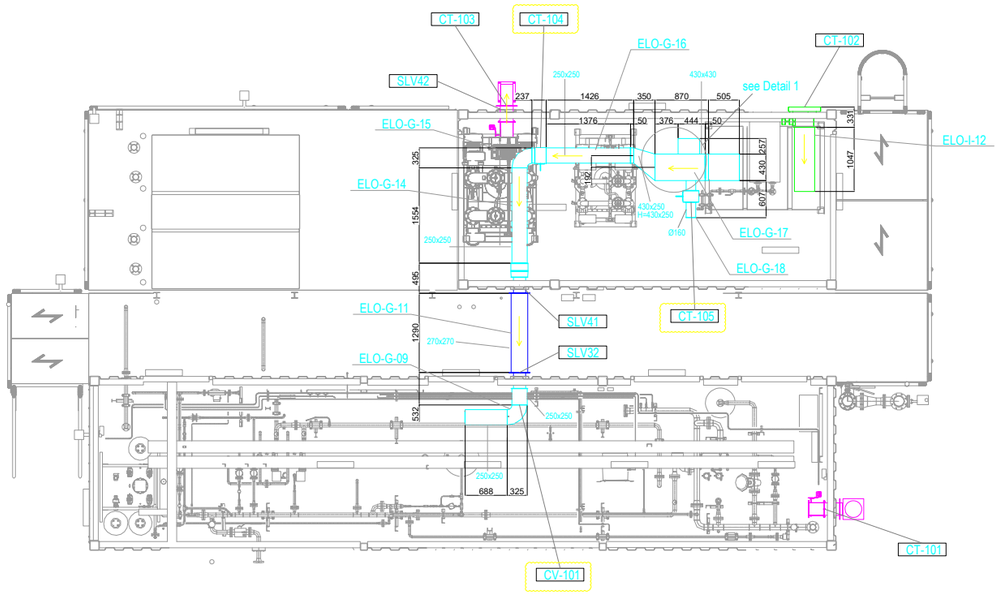
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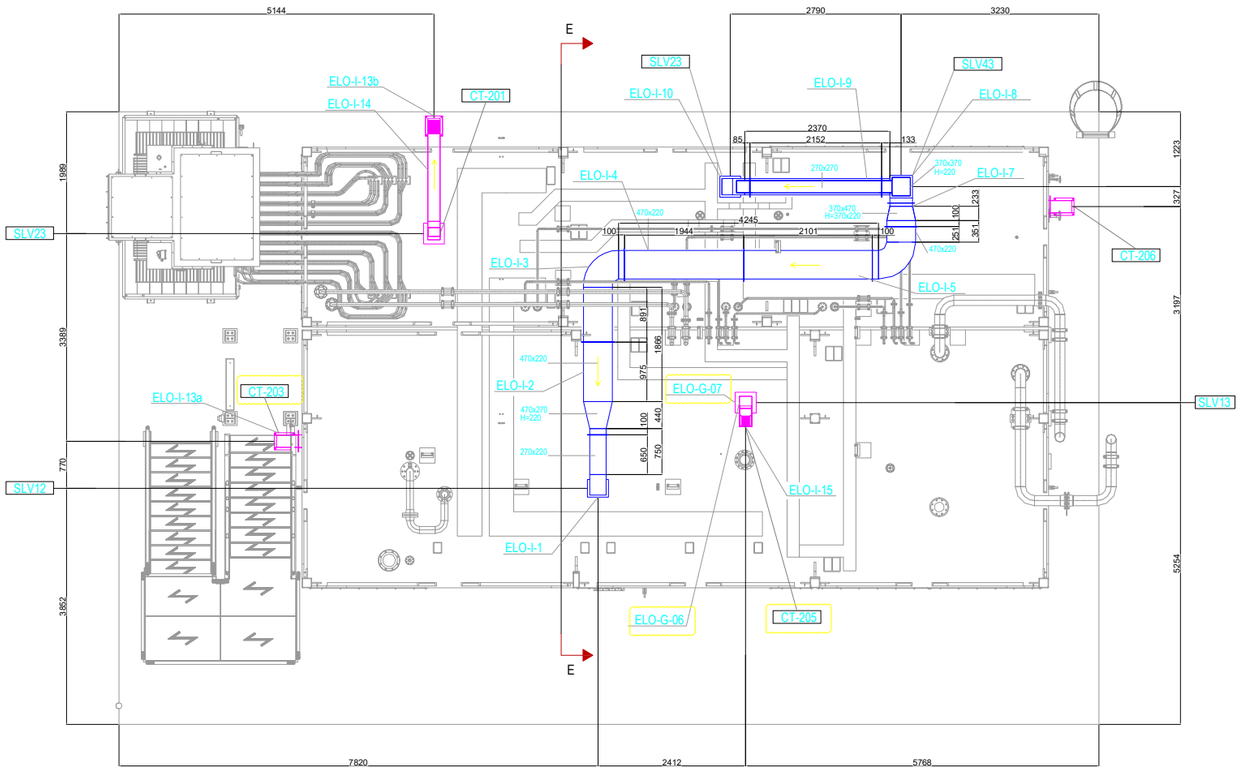
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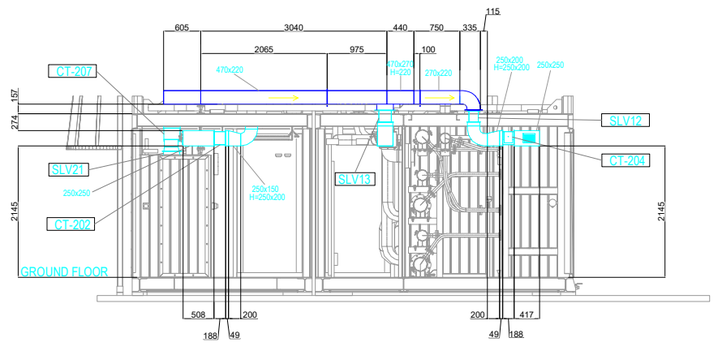
Section A-A



Section C-C



Section B-B



Section E-E

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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00	26/08/2024	ISSUED FOR REVIEW	D. Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	

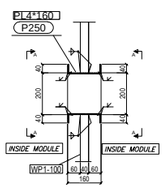
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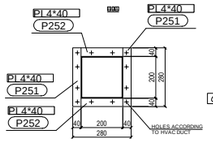
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-003
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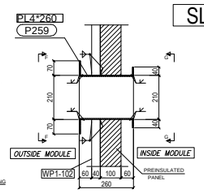
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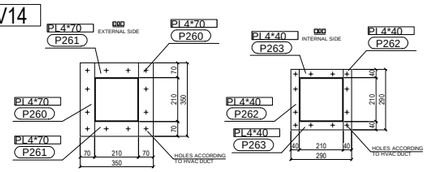
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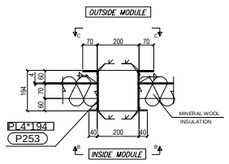


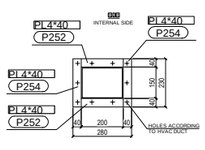
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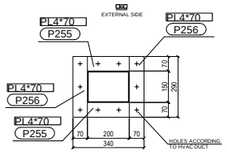


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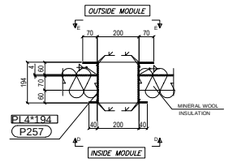
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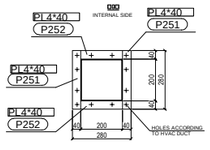


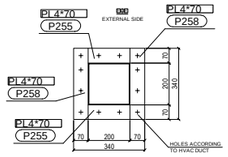




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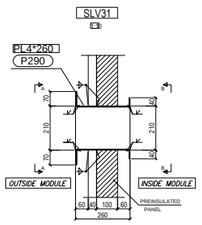


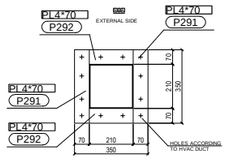
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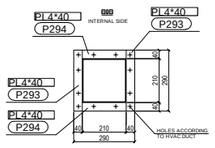
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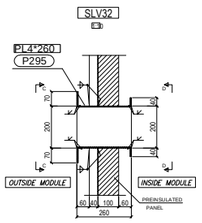
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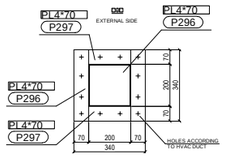


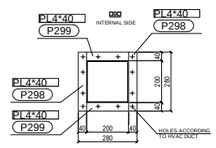




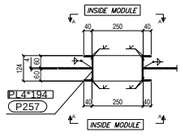
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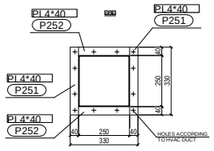




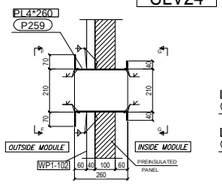


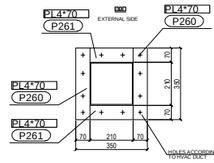
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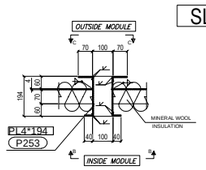


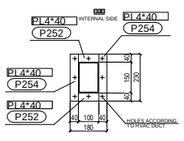
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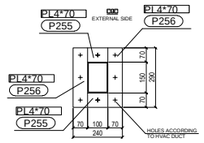




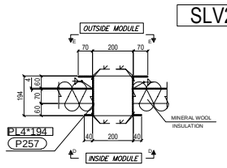
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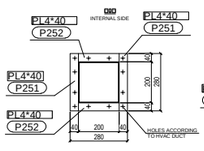


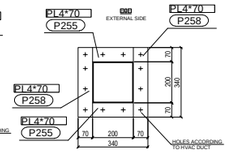




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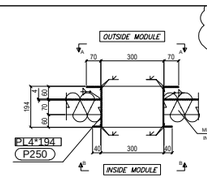


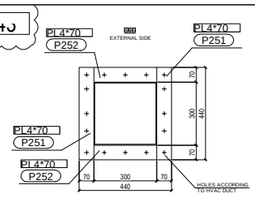


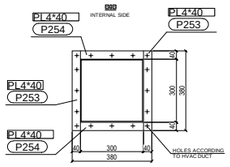
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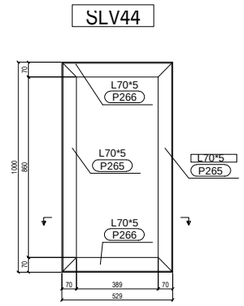
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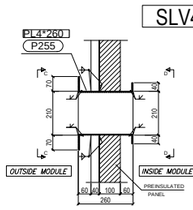


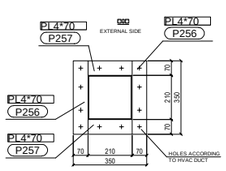


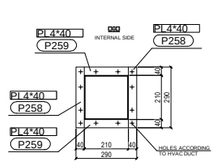
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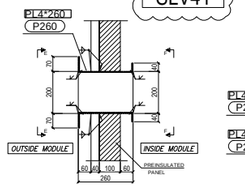
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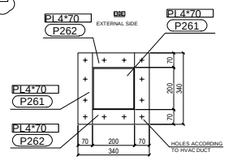


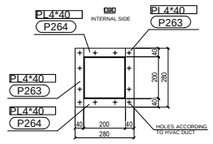




SLV41







WP4

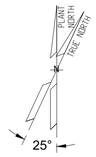
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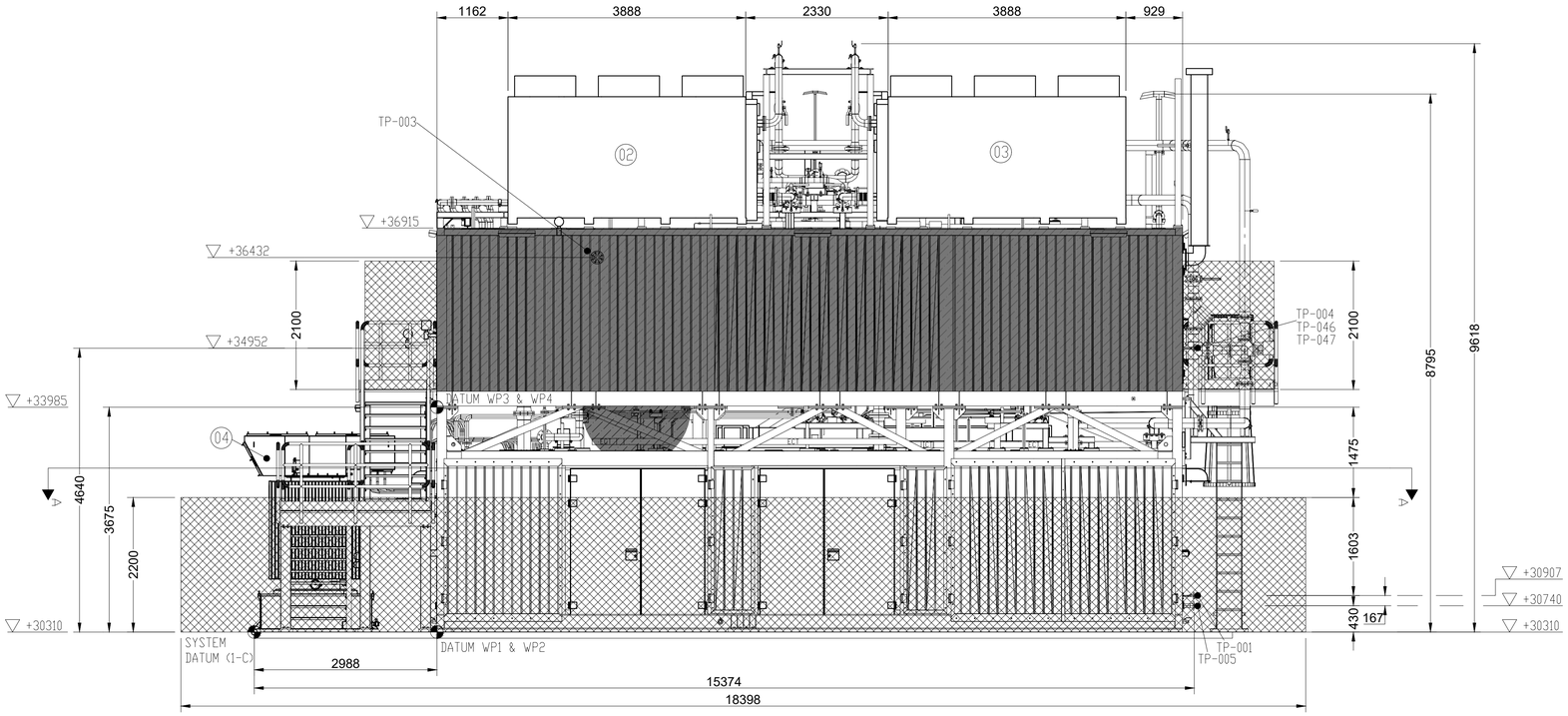
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	28/11/2024	ISSUED FOR REVIEW	D. Crescimbeni	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
00	26/08/2024	ISSUED FOR REVIEW	D. Crescimbeni	M. Chiarucci	L. Maioli	
			By	Checked	Approved	

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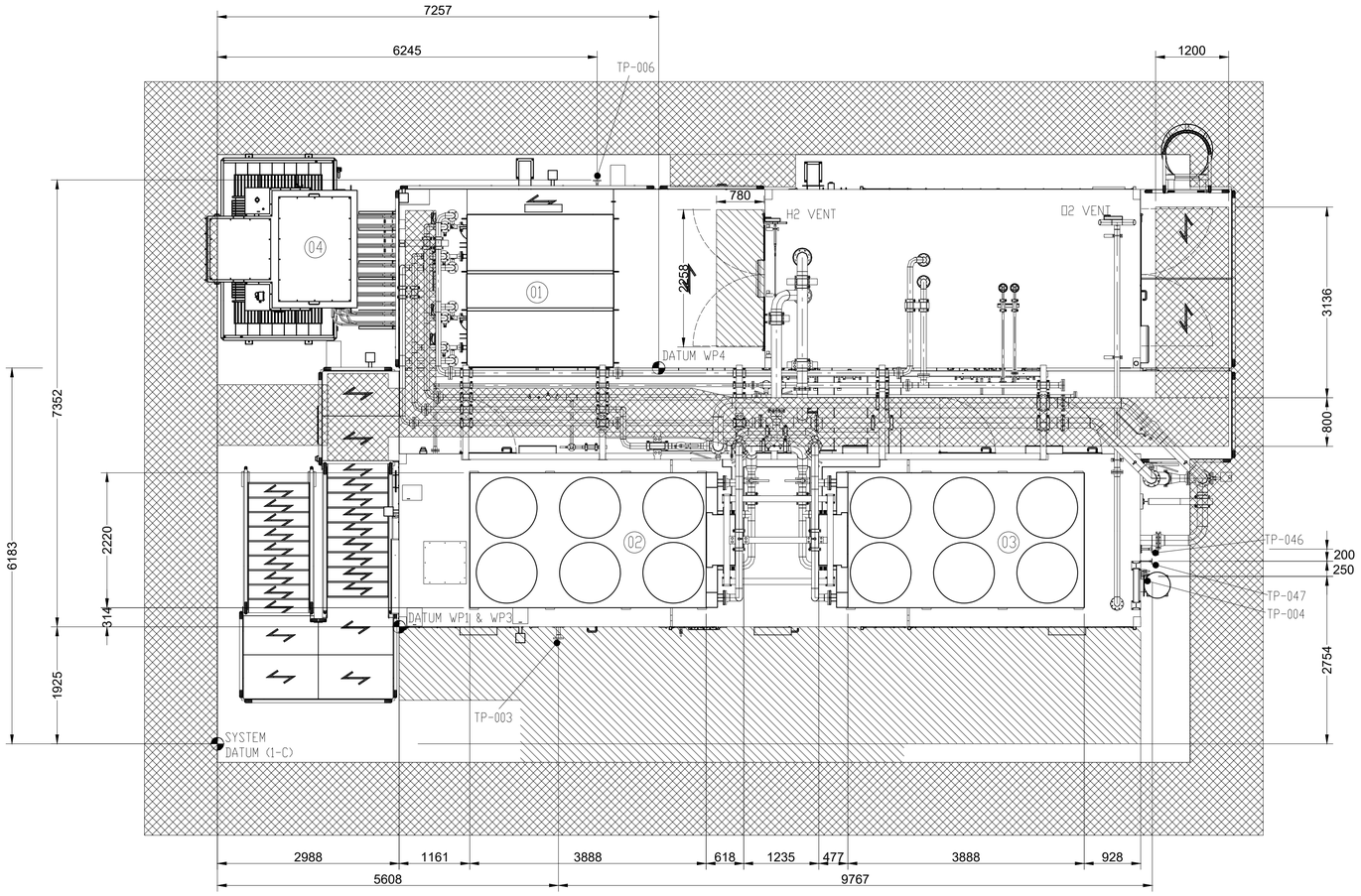
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-DWG-MP-003
ELOGEN PROJECT DOCUMENT TITLE	Ducting General Arrangement drawing
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00027
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-HV-00001
FORMAT	A1
SHEET	04 of 04

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SOUTH VIEW



PLAN VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_Interconnection	C0063-FOR-DTB-MP-007
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General structure Drawings Stair,Ladder & Handrail	C0063-FOR-DWG-CS-005
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	WATER CHILLER	WC-400/401
02	DRY COOLER	DC-200
03	DRY COOLER	DC-201
04	TRANSFORMER	TR-01

ZONES DEFINITION		
ITEM	DESCRIPTION	TAG
05	PROCESS CONTAINER - LOWER LEVEL	WP1
06	WATER PURIFICATION/ELECTRICAL PANEL & CONTROL ROOM - LOWER LEVEL	WP2
07	PROCESS CONTAINER - UPPER LEVEL	WP3
08	HVAC CONTAINER - UPPER LEVEL	WP4

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
A	TP001	Water supply	1"Fl. ASME B16.5	150 lb	15374	8590	+597
B	TP006	H2 Production	1"Fl. ASME B16.5	300 lb	6245	9276	+3601
C	TP003	H2 Vent	2"Fl. ASME B16.5	300 lb	5608	1724	+6122
D	TP046	Nitrogen supply	1"Fl. ASME B16.5	150 lb	15375	3204	+4640
E	TP005	Pure Water drainage	2"Fl. ASME B16.5	150 lb	15374	7999	+430
F	TP004	Water drainage	3/4"Fl. ASME B16.5	150 lb	15375	2754	+4640
I	TP047	IA supply	1/2"Fl. ASME B16.5	150 lb	15375	3004	+4640

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY
- ATEX ZONE 2

AS-BUILT

DATE 21/03/2025 | SIGNATURE MANUELE CHIARUCCI

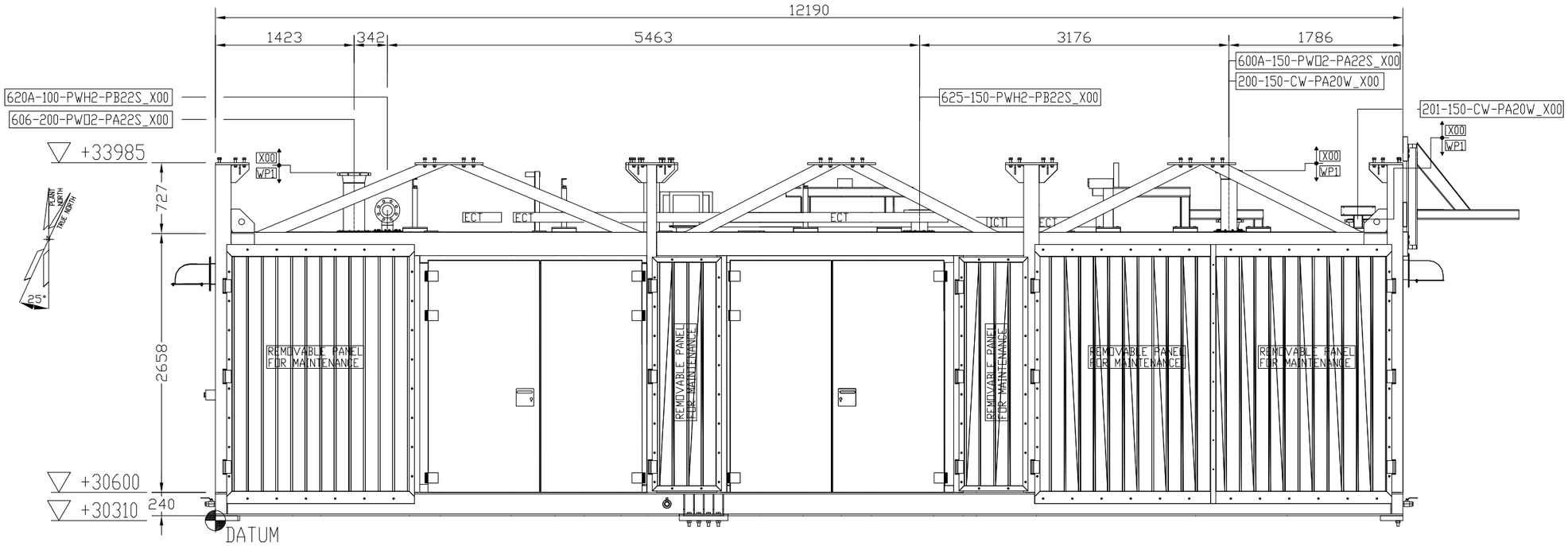
FORES ENGINEERING

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01-A	17/12/2024	DIMENSIONS FOR DRYCOOLER POSITION	F.Brunori	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
01	28/11/2024	ISSUE FOR REVIEW	D.Crescimbeni	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
0	09/08/2024	ISSUE FOR REVIEW	STONENG	M. Chiarucci	L. Maioli	
			By	Checked	Approved	

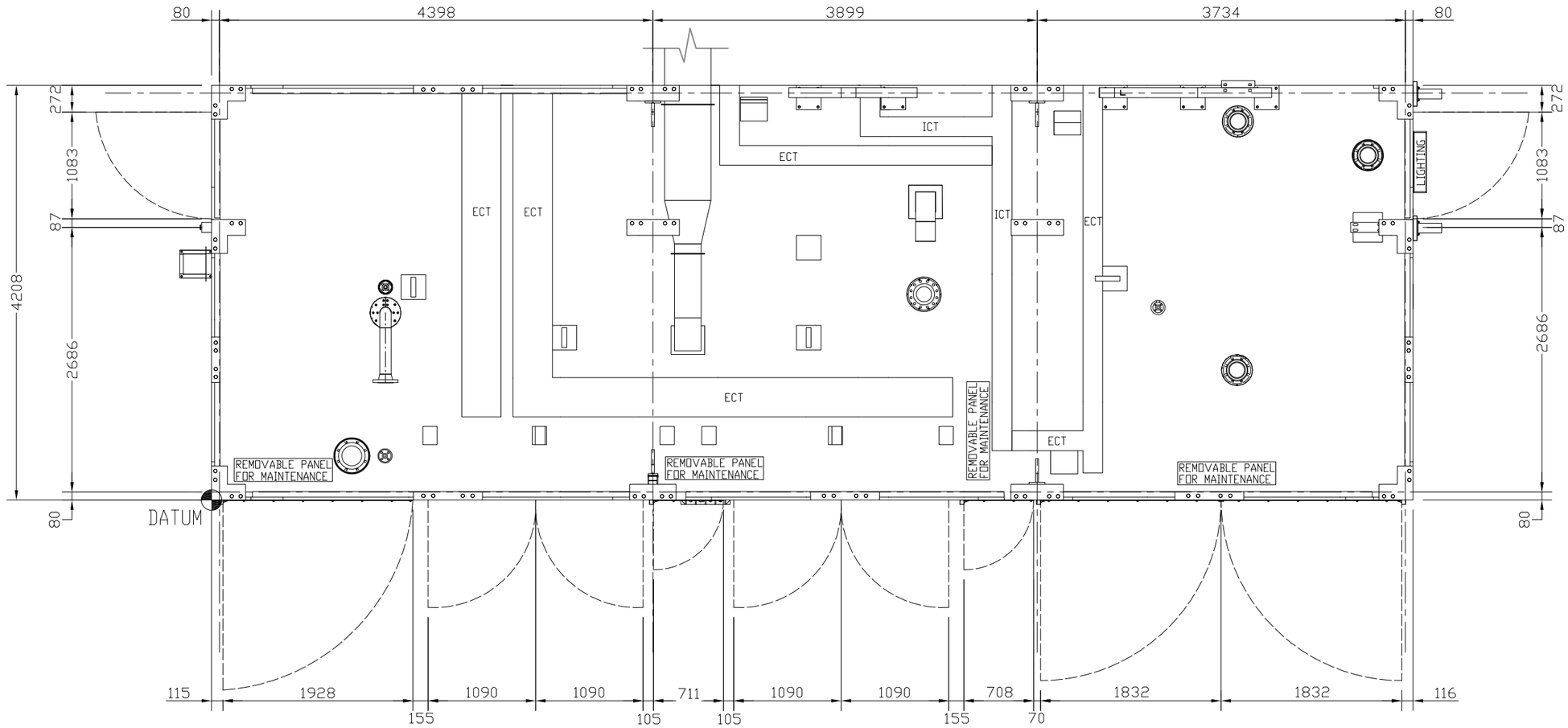
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-001
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_OVERALL
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00016
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00001
FORMAT	A1
SHEET	01 of 04
	1:50

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SOUTH VIEW



PLAN VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP1	C0063-FOR-DTB-MP-003
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP1	C0063-FOR-DWG-CS-001
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	ELECTROLYSIS STACKS	001-008
02	H2 LOOP PUMPS	CP-620A/B
03	O2 LOOP RESIN FILTERS HOUSING	FH-600
04	H2 LOOP RESIN FILTER HOUSING	FH-620
05	O2 LOOP PUMPS	CP-600A/B
06	O2 LOOP HEAT EXCHANGER	HE-600

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

LEGEND:

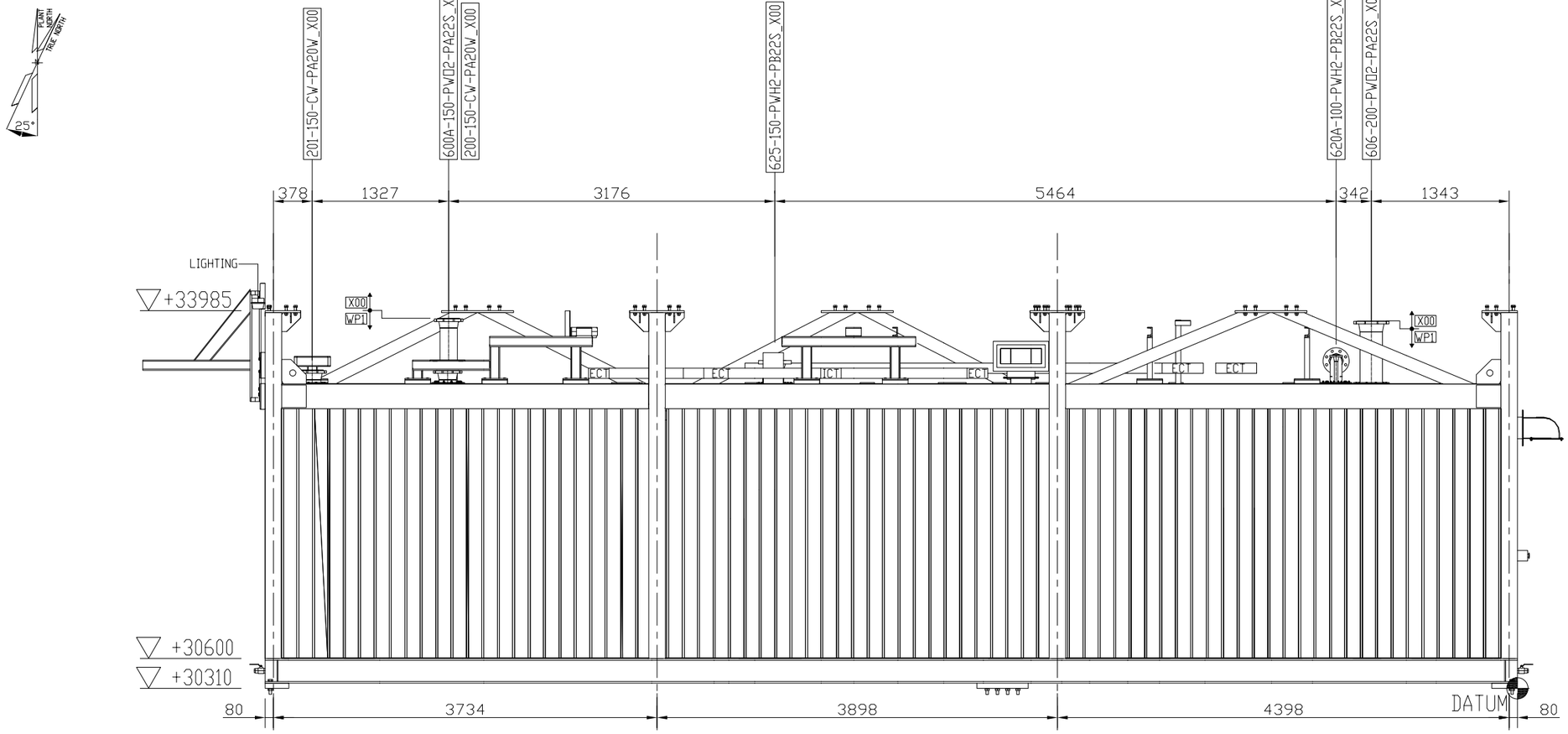
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	19/11/2024	ISSUE FOR REVIEW	D.Crescimbeni	M. Chiarucci	L. Maioli	
			By	Checked	Approved	
0	08/08/2024	ISSUE FOR REVIEW	STONENG	M. Chiarucci	L. Maioli	
			By	Checked	Approved	

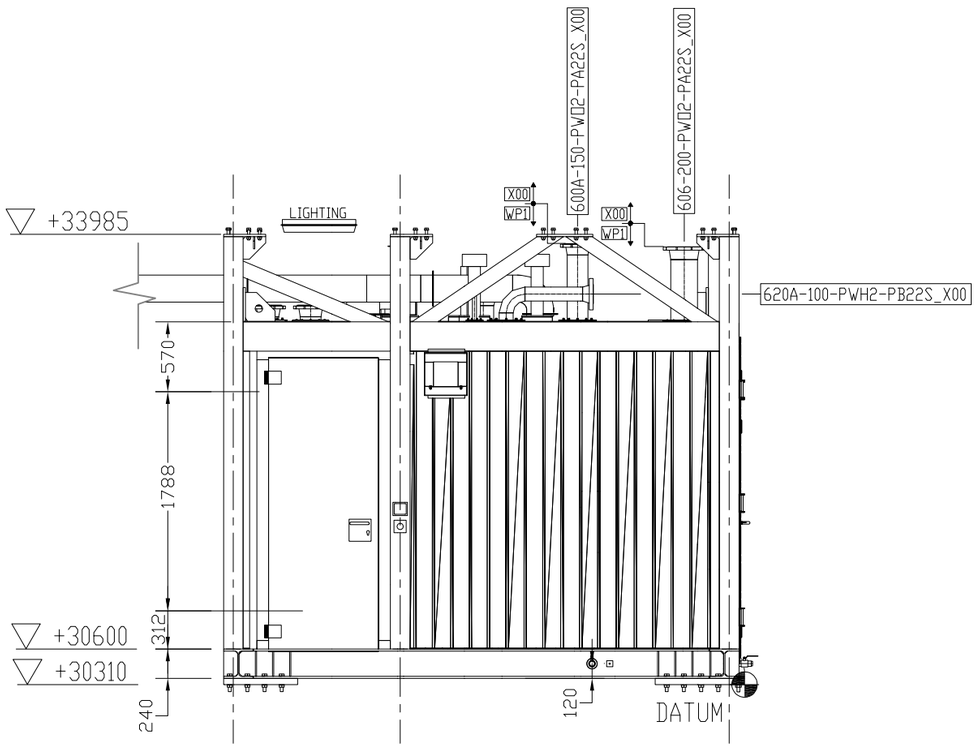
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-002
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP1 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00017
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00002
FORMAT	A1
SHEET	01 of 05
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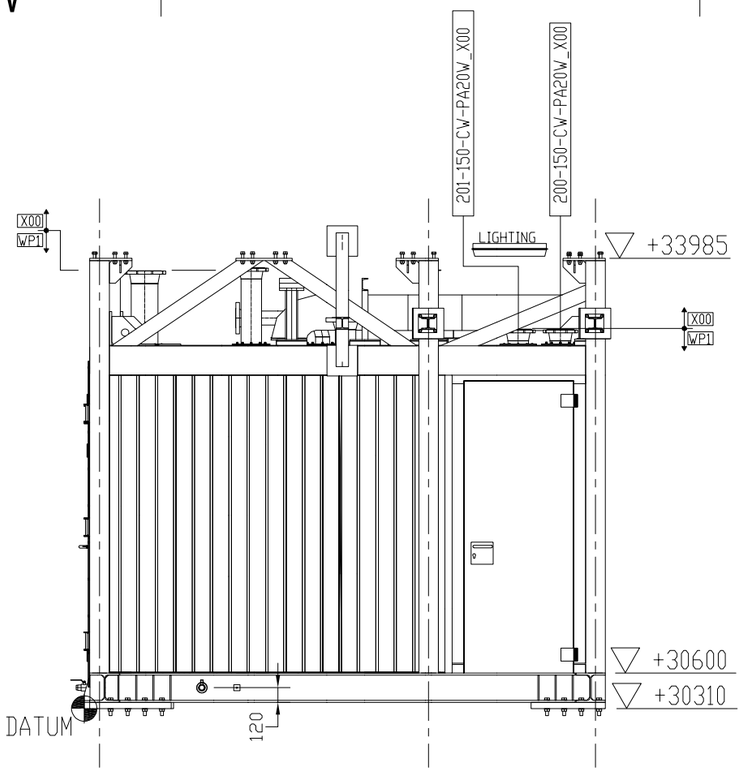
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NORTH VIEW



WEST VIEW



EAST VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP1	C0063-FOR-DTB-MP-003
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP1	C0063-FOR-DWG-CS-001
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	ELECTROLYSIS STACKS	001-008
02	H2 LOOP PUMPS	CP-620A/B
03	O2 LOOP RESIN FILTERS HOUSING	FH-600
04	H2 LOOP RESIN FILTER HOUSING	FH-620
05	O2 LOOP PUMPS	CP-600A/B
06	O2 LOOP HEAT EXCHANGER	HE-600

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

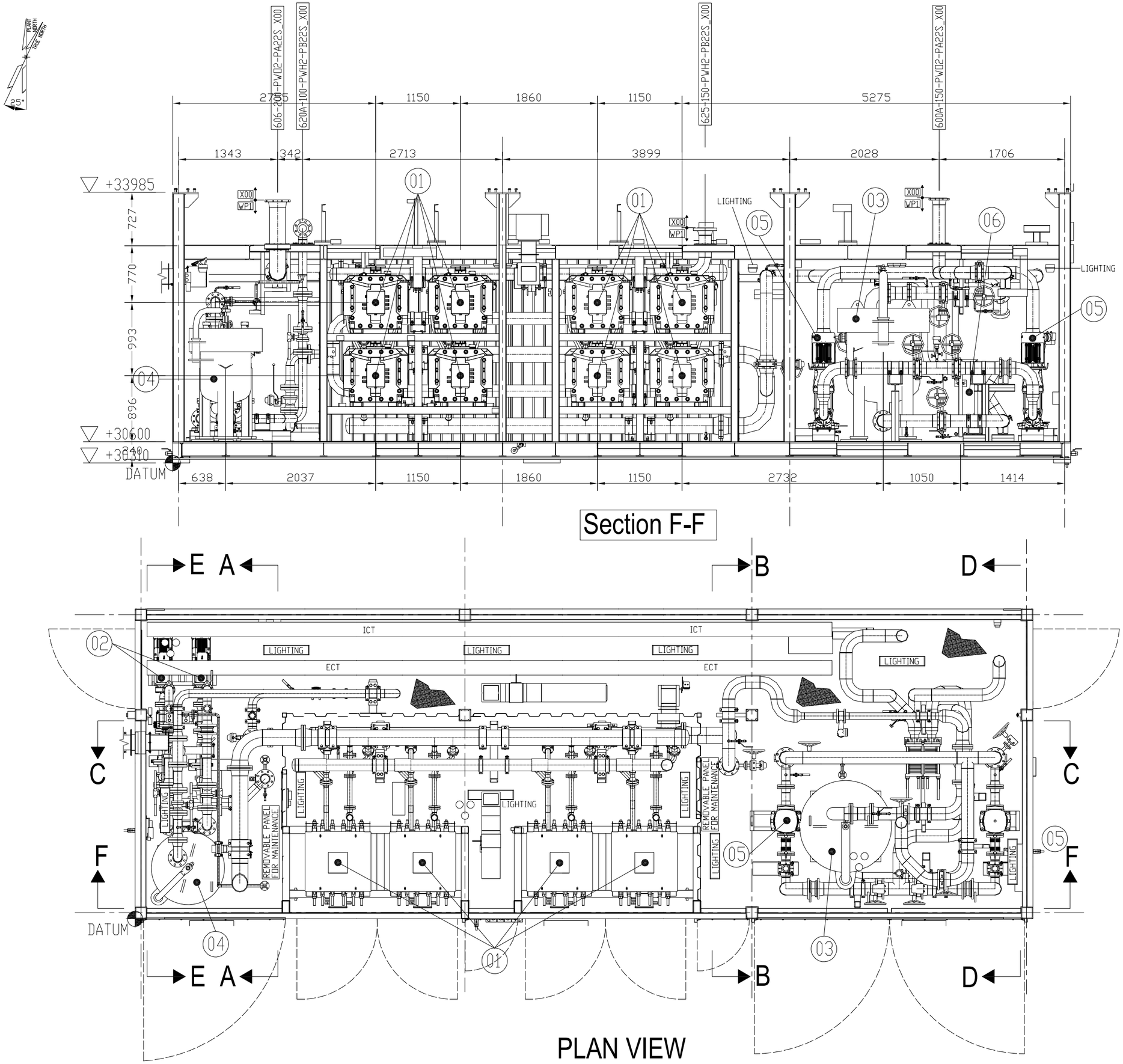
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	19/11/2024	ISSUE FOR REVIEW	D.Crescimbeni (By)	M. Chiarucci (Checked)	L. Maioli (Approved)	
0	08/08/2024	ISSUE FOR REVIEW	STONENG (By)	M. Chiarucci (Checked)	L. Maioli (Approved)	

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-002
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP1 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00017
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00002

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FORMAT	A1	SHEET	02 of 05	1:25



REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP1	C0063-FOR-DTB-MP-003
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP1	C0063-FOR-DWG-CS-001
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

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EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	ELECTROLYSIS STACKS	001-008
02	H2 LOOP PUMPS	CP-620A/B
03	O2 LOOP RESIN FILTERS HOUSING	FH-600
04	H2 LOOP RESIN FILTER HOUSING	FH-620
05	O2 LOOP PUMPS	CP-600A/B
06	O2 LOOP HEAT EXCHANGER	HE-600

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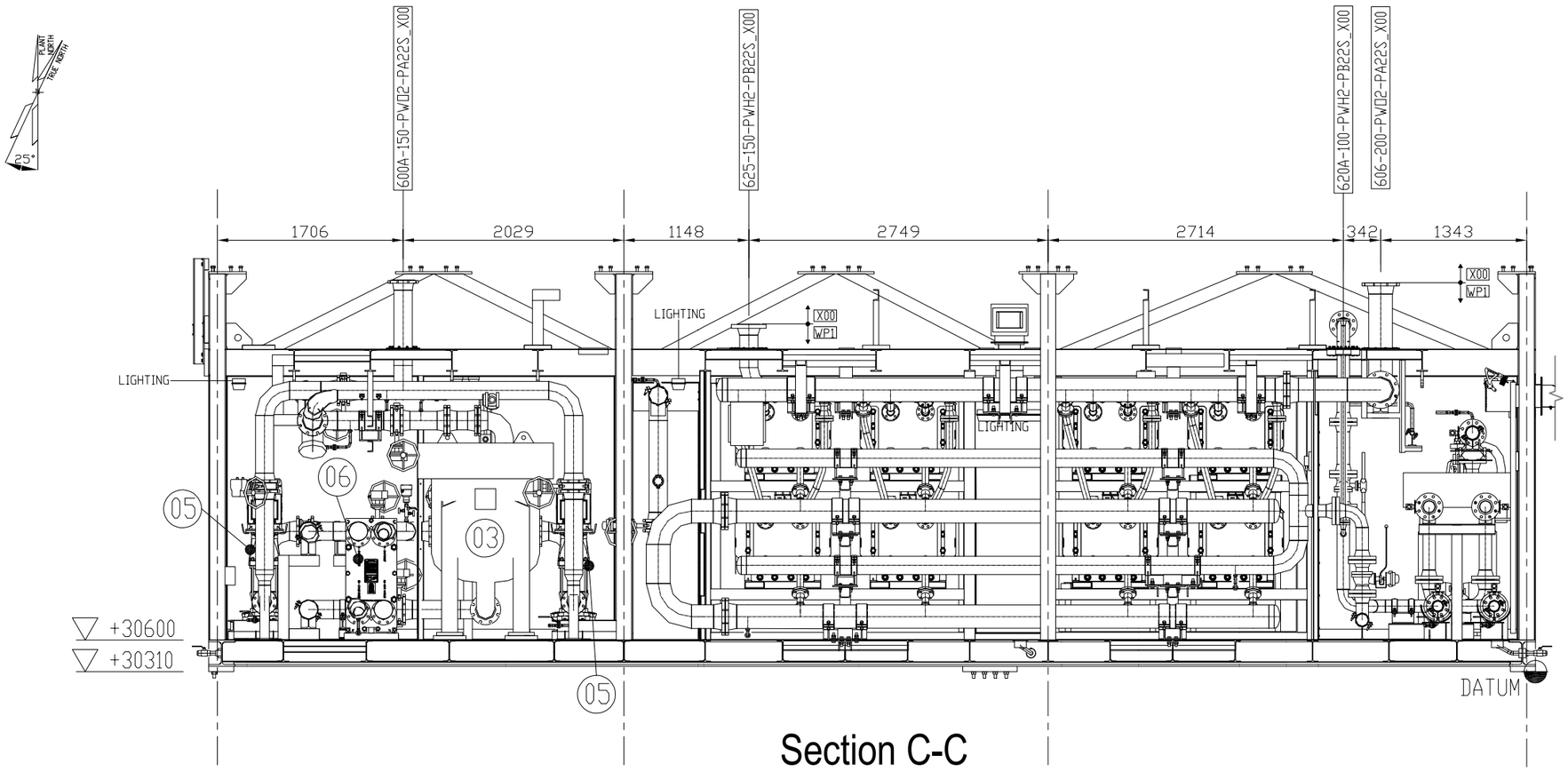
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	19/11/2024	ISSUE FOR REVIEW	D.Crescimbeni / By	M. Chiarucci / Checked	L. Maioli / Approved	
0	08/08/2024	ISSUE FOR REVIEW	STONENG / By	M. Chiarucci / Checked	L. Maioli / Approved	

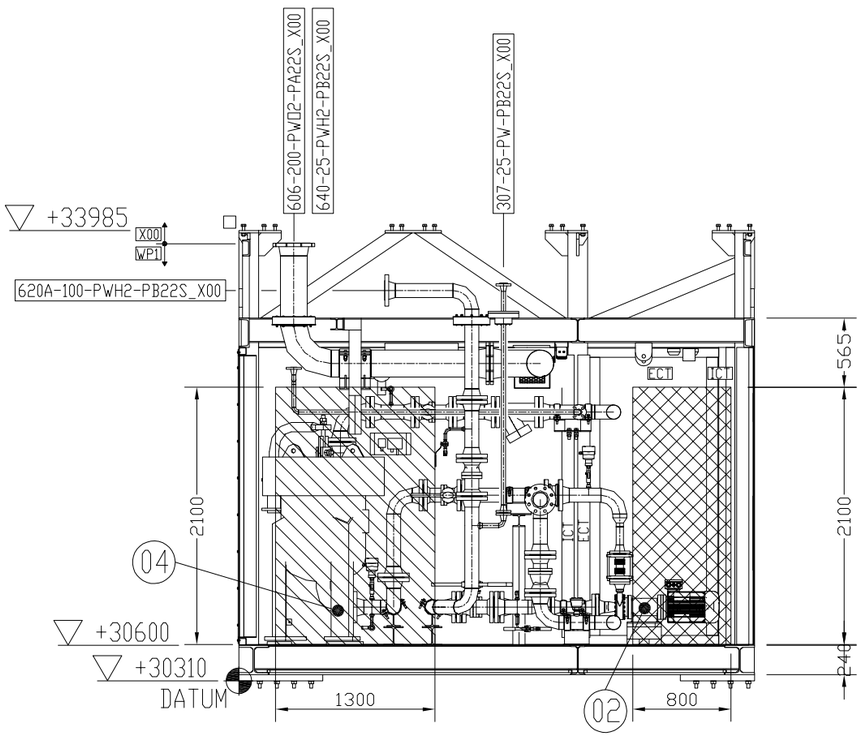
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-002
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP1 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00017
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00002
FORMAT	A1
SHEET	03 of 05
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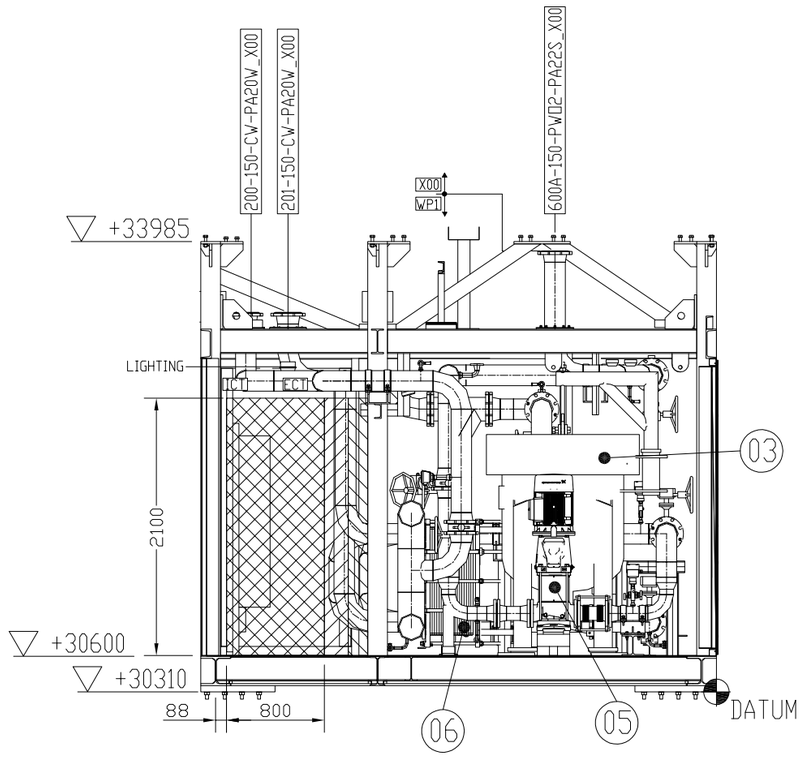
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Section C-C



Section A-A



Section B-B

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP1	C0063-FOR-DTB-MP-003
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP1	C0063-FOR-DWG-CS-001
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	ELECTROLYSIS STACKS	001-008
02	H2 LOOP PUMPS	CP-620A/B
03	O2 LOOP RESIN FILTERS HOUSING	FH-600
04	H2 LOOP RESIN FILTER HOUSING	FH-620
05	O2 LOOP PUMPS	CP-600A/B
06	O2 LOOP HEAT EXCHANGER	HE-600

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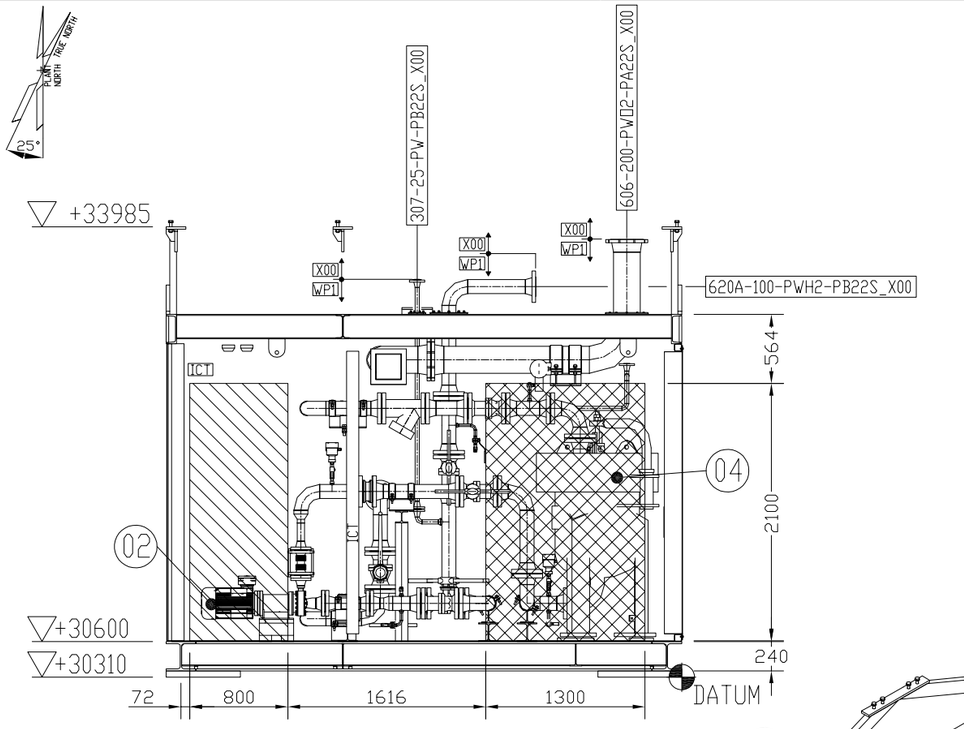
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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0	08/08/2024	ISSUE FOR REVIEW	STONENG By	M. Chiarucci Checked	L. Maioli Approved	

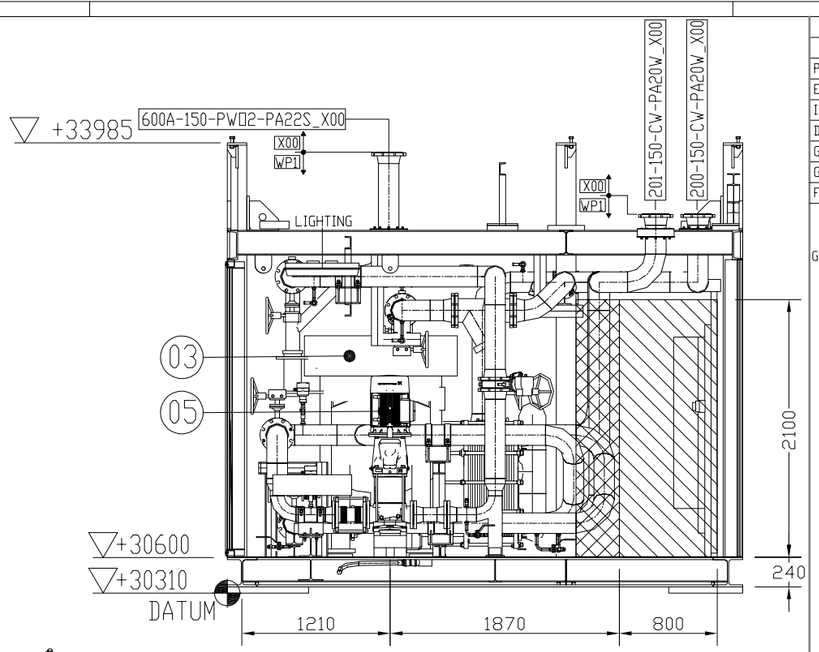
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-002
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP1 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00017
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00002
FORMAT	A1
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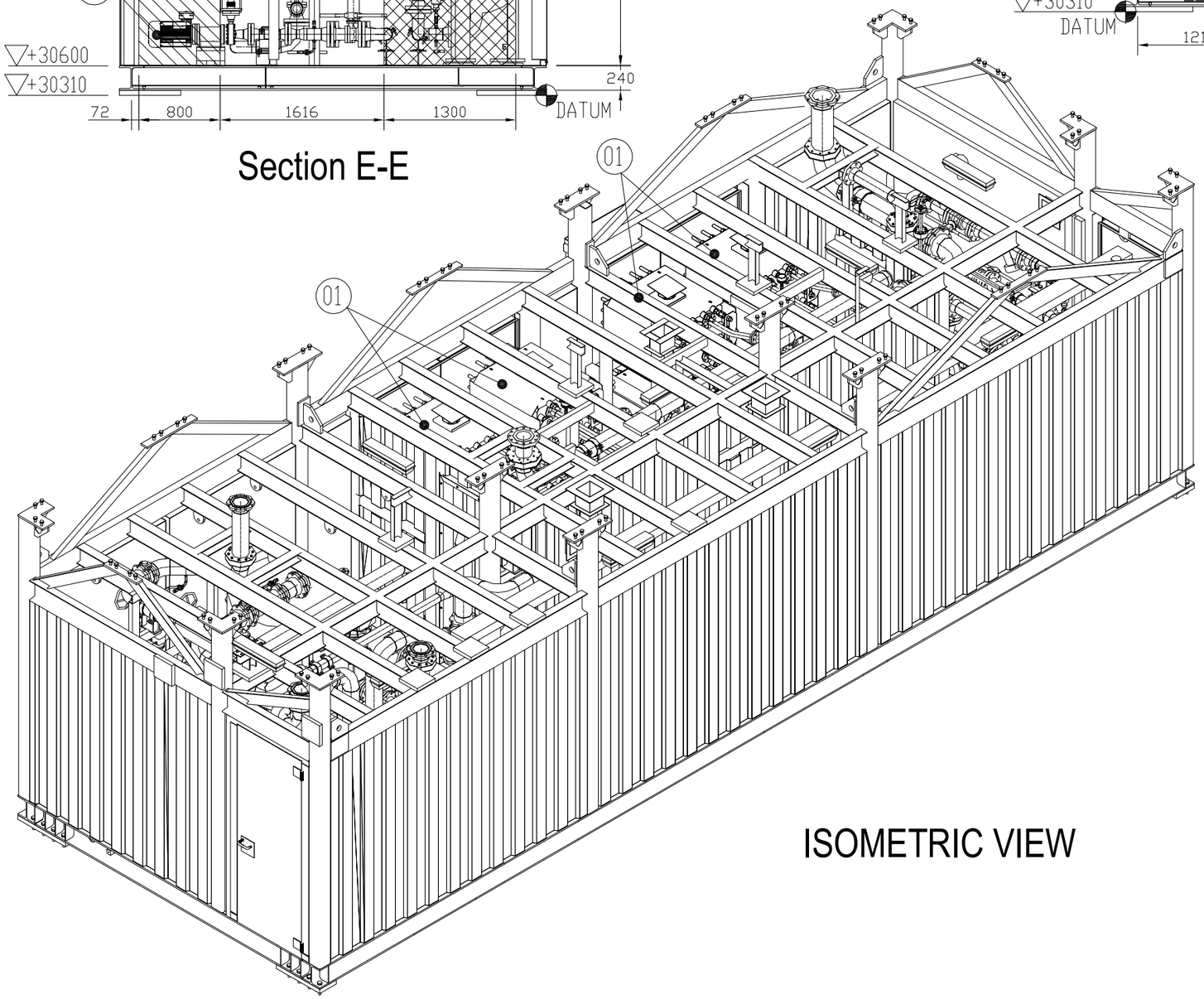
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Section E-E



Section D-D



ISOMETRIC VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP1	C0063-FOR-DTB-MP-003
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP1	C0063-FOR-DWG-CS-001
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	ELECTROLYSIS STACKS	001-008
02	H2 LOOP PUMPS	CP-620A/B
03	O2 LOOP RESIN FILTERS HOUSING	FH-600
04	H2 LOOP RESIN FILTER HOUSING	FH-620
05	O2 LOOP PUMPS	CP-600A/B
06	O2 LOOP HEAT EXCHANGER	HE-600

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

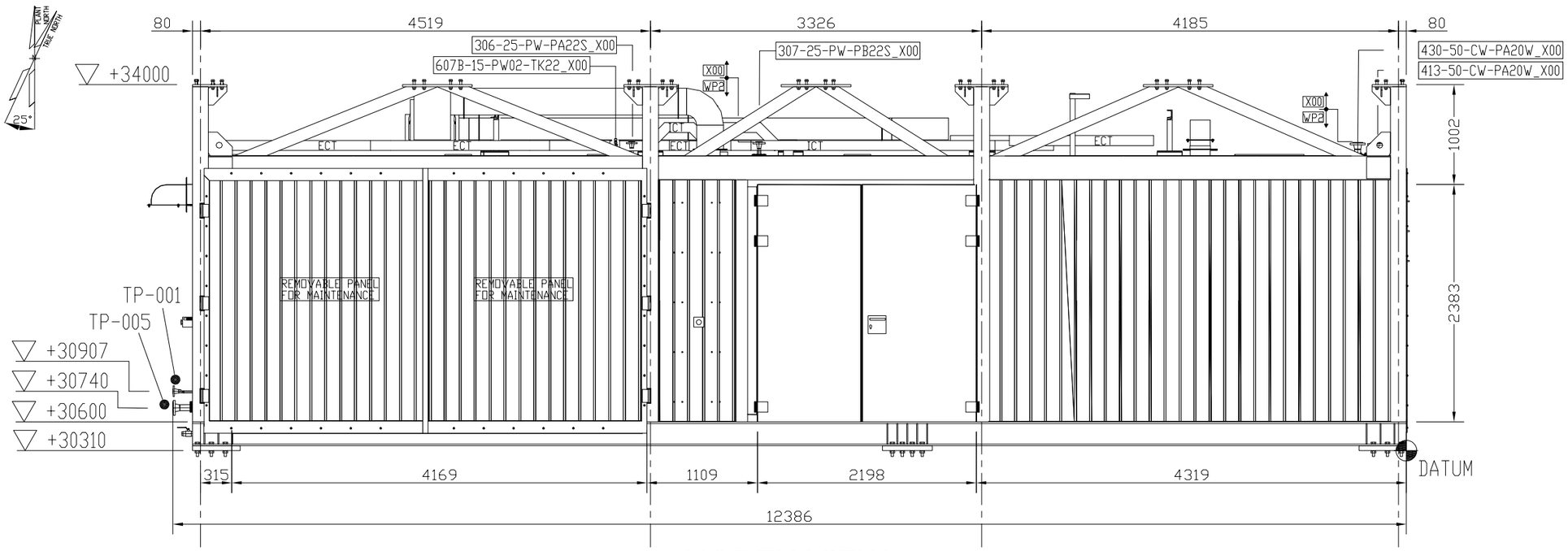
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
			D.Crescimbeni	M. Chiarucci	L. Maioli	
01	19/11/2024	ISSUE FOR REVIEW	By	Checked	Approved	
			STONENG	M. Chiarucci	L. Maioli	
0	08/08/2024	ISSUE FOR REVIEW	By	Checked	Approved	

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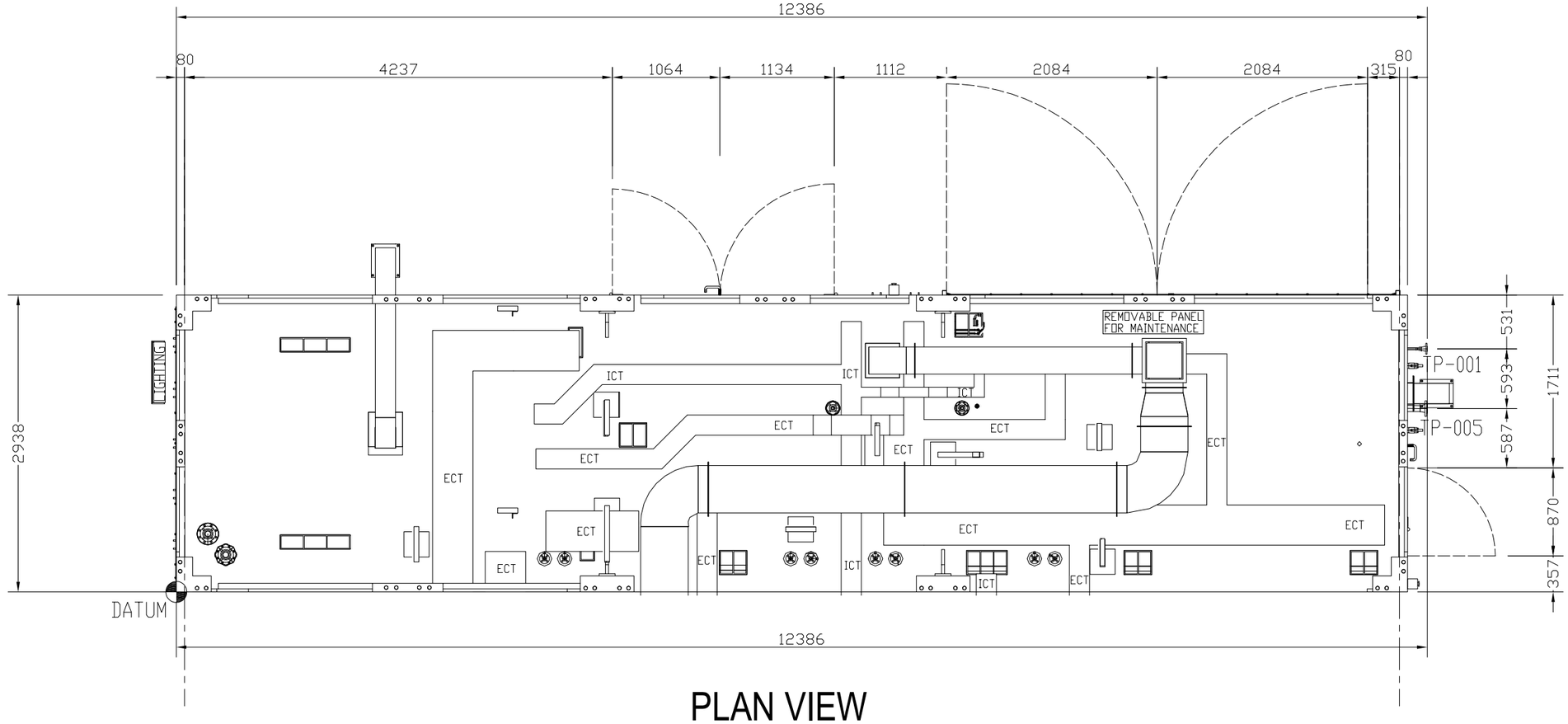
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE			
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-002			
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP1 (incl. interfaces)			
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00017			
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00002			
	FORMAT	A1	SHEET	05 of 05

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NORTH VIEW



PLAN VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP2	C0063-FOR-DTB-MP-004
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP2	C0063-FOR-DWG-CS-002
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	FANCOIL UNIT TYPE H8	FCU-400
02	FANCOIL UNIT TYPE H8	FCU-401
03	FANCOIL UNIT TYPE H8	FCU-402
04	FANCOIL UNIT TYPE H8	FCU-403
05	WATER TREATMENT PACKAGE	WTP-300
06	PW LOOP PUMPS	LP-300A e LP-300B
07	RECTIFIER	REC-001
08	HYDRAULIC COOLING UNIT	HCU-400
09	CONTROL CABINET	A-20000
10	CONTROL CABINET HVAC	-
11	RECTIFIER	REC-002

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
A	TP001	Water supply	1"Fl. ASME B16.5	150 lb	15374	8590	+597
E	TP005	Pure Water drainage	2"Fl. ASME B16.5	150 lb	15374	7999	+430

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

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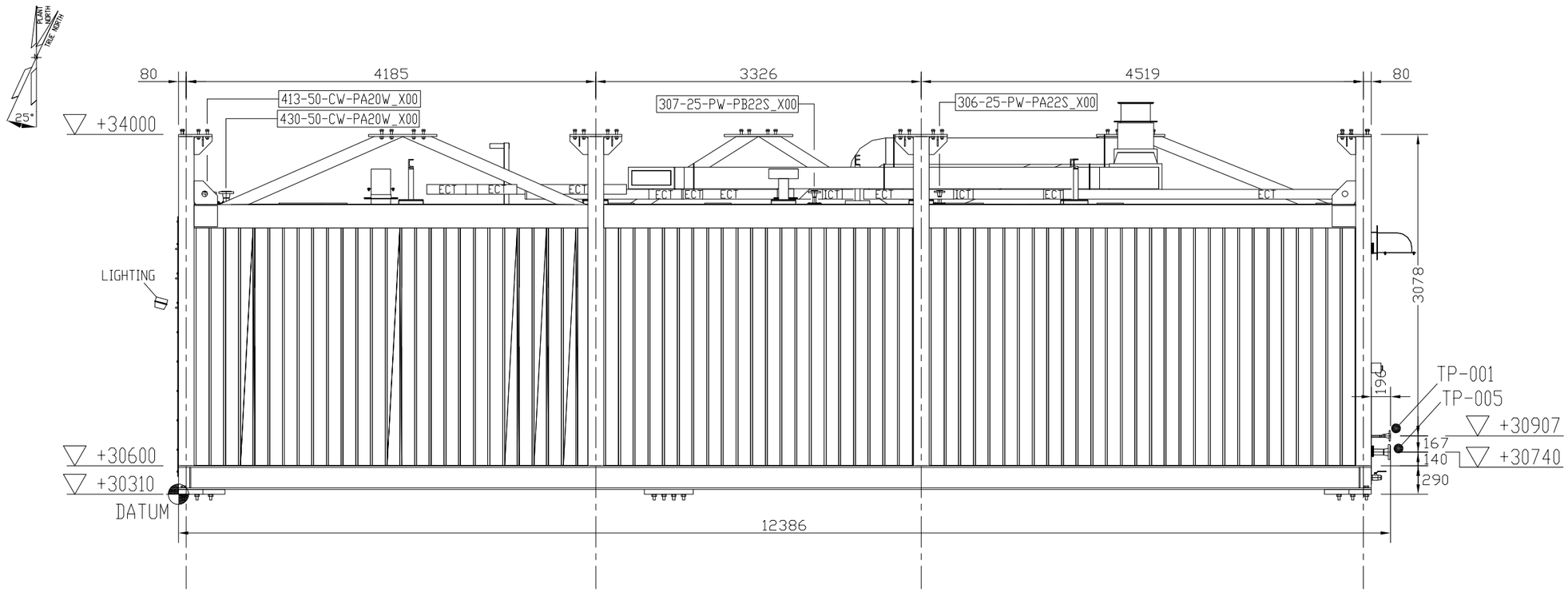
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT ELECTRICAL CABLE TRAY
- ICT INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	22/11/2024	ISSUE FOR REVIEW	D.Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	
0	08/08/2024	ISSUE FOR REVIEW	STONENG By	M. Chiarucci Checked	L. Maioli Approved	

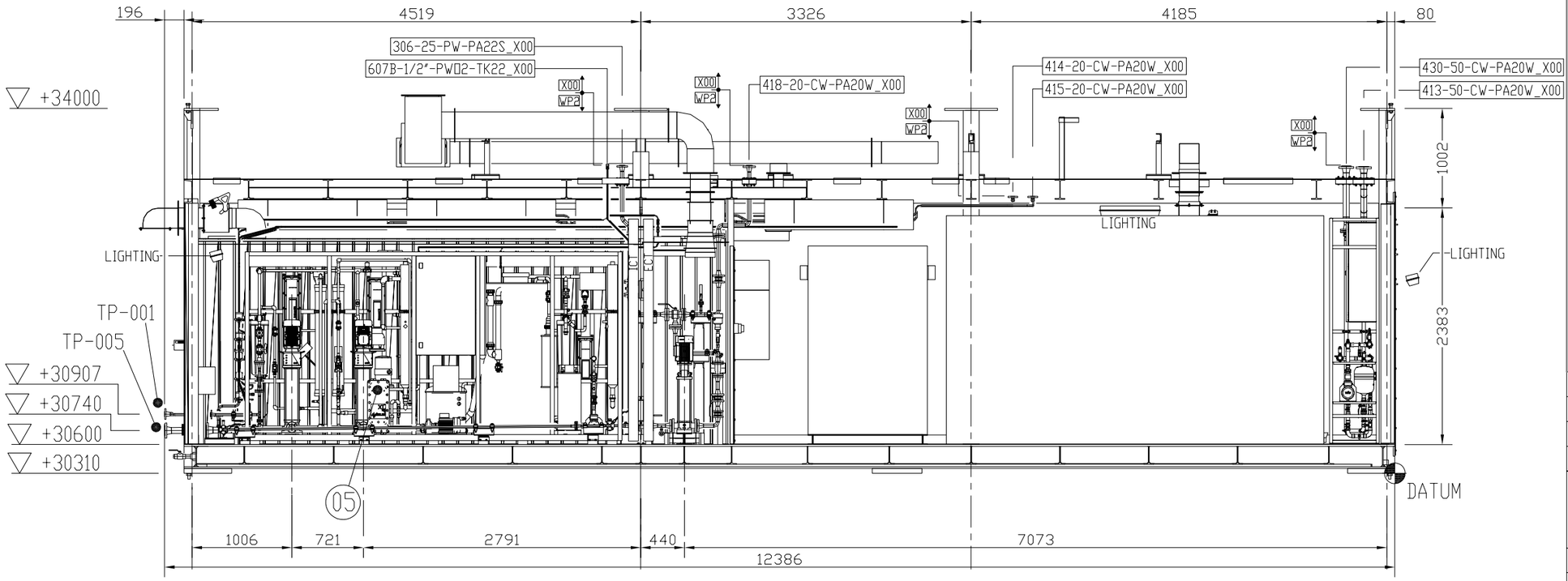
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-003
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP2 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00018
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00003
FORMAT	A1
SHEET	01 of 05
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SOUTH VIEW



Section A-A

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP2	C0063-FOR-DTB-MP-004
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP2	C0063-FOR-DWG-CS-002
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	FANCOIL UNIT TYPE H8	FCU-400
02	FANCOIL UNIT TYPE H8	FCU-401
03	FANCOIL UNIT TYPE H8	FCU-402
04	FANCOIL UNIT TYPE H8	FCU-403
05	WATER TREATMENT PACKAGE	WTP-300
06	PW LOOP PUMPS	LP-300A e LP-300B
07	RECTIFIER	REC-001
08	HYDRAULIC COOLING UNIT	HCU-400
09	CONTROL CABINET	A-20000
10	CONTROL CABINET HVAC	-
11	RECTIFIER	REC-002

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
A	TP001	Water supply	1"Fl. ASME B16.5	150 lb	15374	8590	+597
E	TP005	Pure Water drainage	2"Fl. ASME B16.5	150 lb	15374	7999	+430

LEGEND:

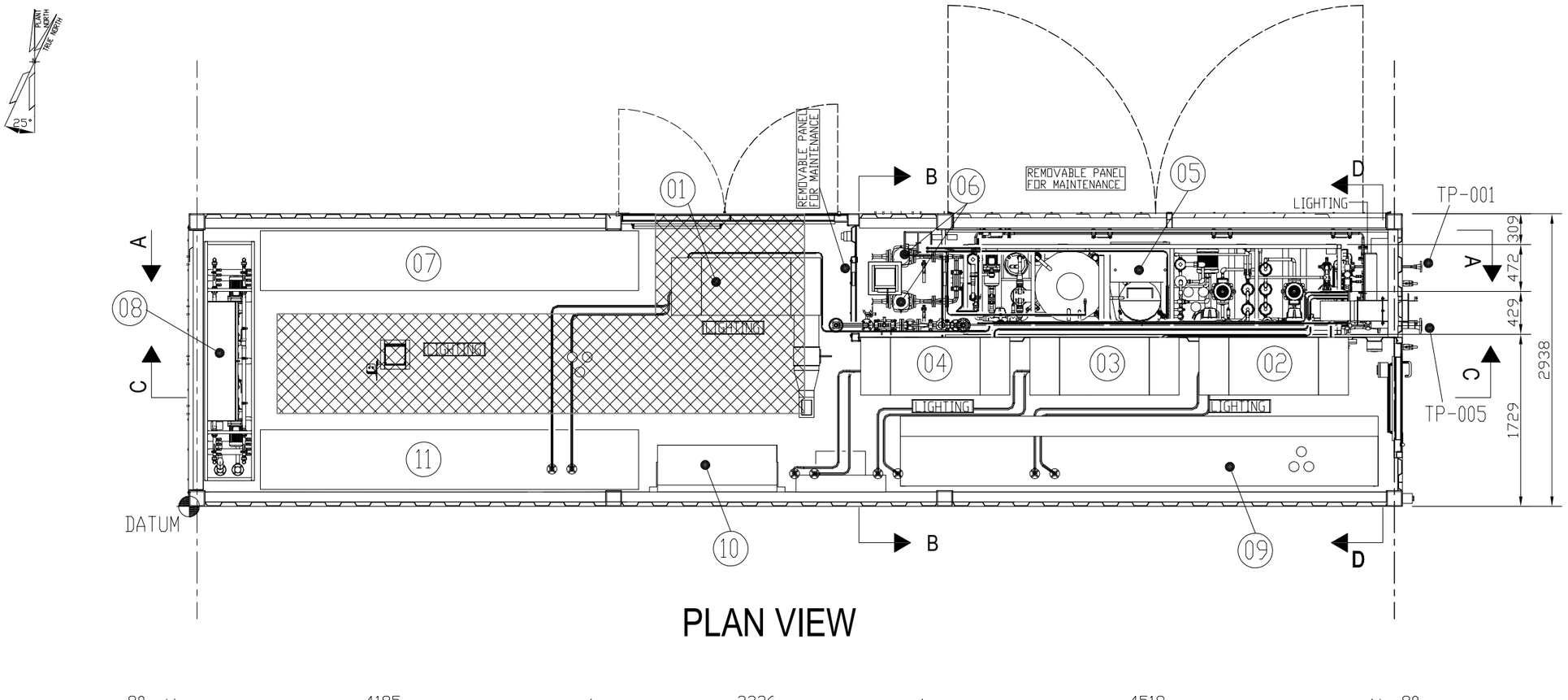
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	22/11/2024	ISSUE FOR REVIEW	D.Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	
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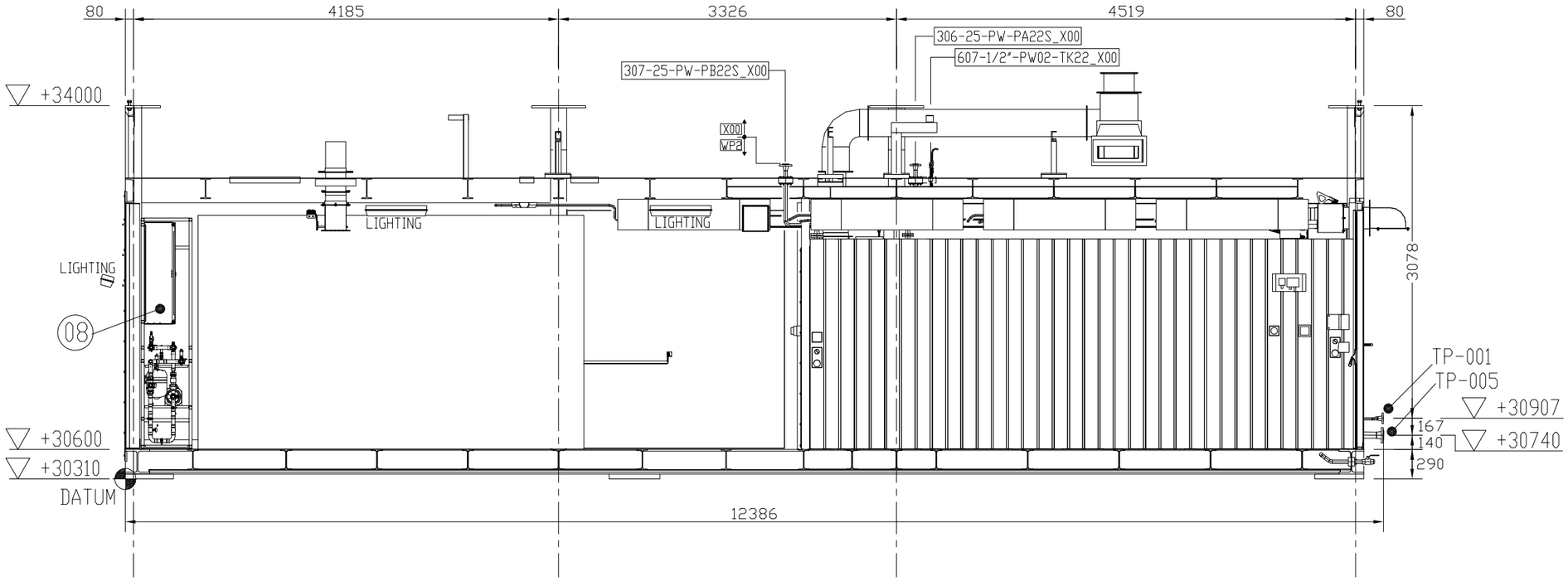
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-003
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP2 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00018
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00003
FORMAT	A1
SHEET	02 of 05
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PLAN VIEW



Section C-C

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP2	C0063-FOR-DTB-MP-004
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP2	C0063-FOR-DWG-CS-002
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	FANCOIL UNIT TYPE H8	FCU-400
02	FANCOIL UNIT TYPE H8	FCU-401
03	FANCOIL UNIT TYPE H8	FCU-402
04	FANCOIL UNIT TYPE H8	FCU-403
05	WATER TREATMENT PACKAGE	WTP-300
06	PW LOOP PUMPS	LP-300A e LP-300B
07	RECTIFIER	REC-001
08	HYDRAULIC COOLING UNIT	HCU-400
09	CONTROL CABINET	A-20000
10	CONTROL CABINET HVAC	-
11	RECTIFIER	REC-002

TIE-IN POINT LIST (NOTE2)							
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E	TP005	Pure Water drainage	2"Fl. ASME B16.5	150 lb	15374	7999	+430

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

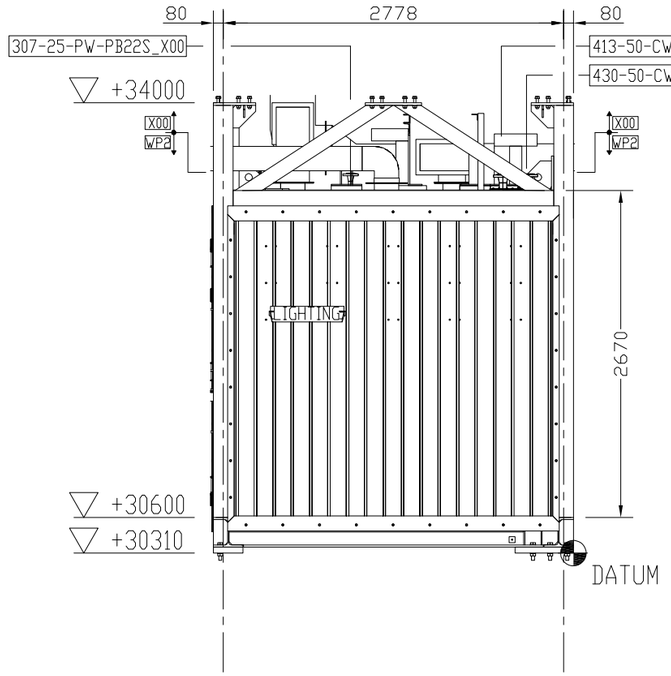
REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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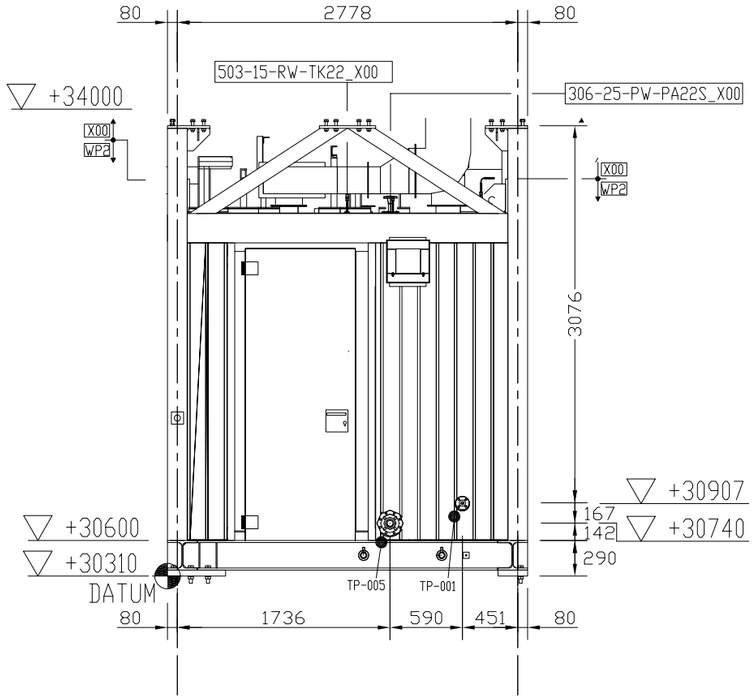
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-003				
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP2 (incl. interfaces)				
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00018				
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00003				
	FORMAT	A1	SHEET	03 of 05	1:25

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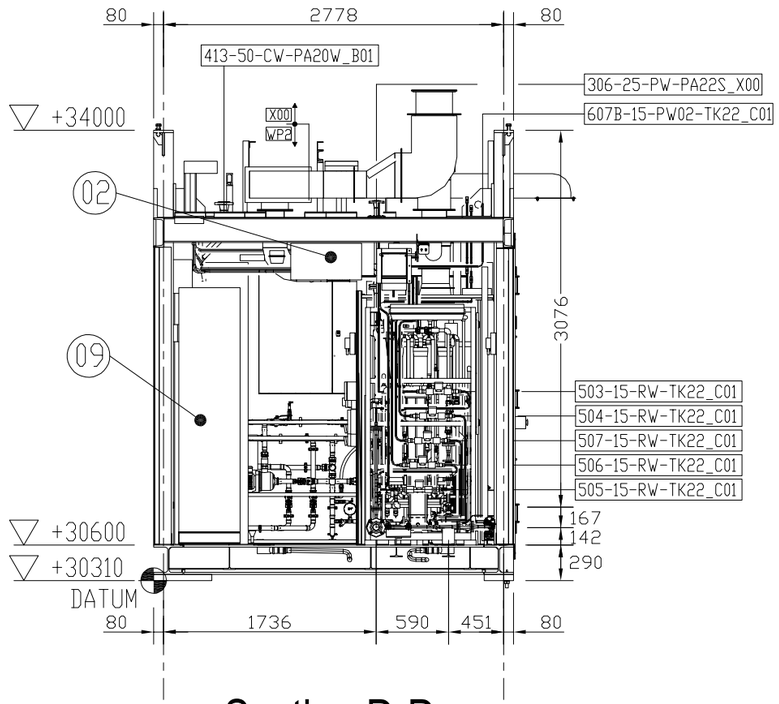




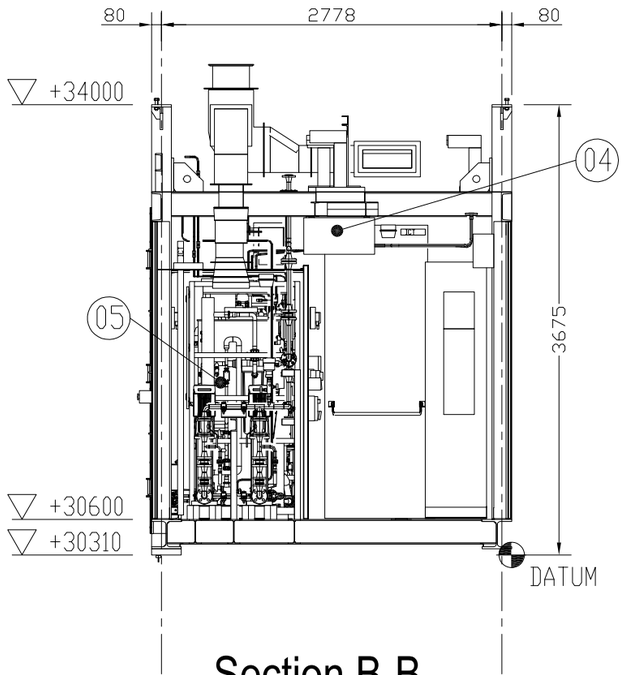
WEST VIEW



EAST VIEW



Section D-D



Section B-B

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP2	C0063-FOR-DTB-MP-004
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP2	C0063-FOR-DWG-CS-002
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
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02	FANCOIL UNIT TYPE H8	FCU-401
03	FANCOIL UNIT TYPE H8	FCU-402
04	FANCOIL UNIT TYPE H8	FCU-403
05	WATER TREATMENT PACKAGE	WTP-300
06	PW LOOP PUMPS	LP-300A e LP-300B
07	RECTIFIER	REC-001
08	HYDRAULIC COOLING UNIT	HCU-400
09	CONTROL CABINET	A-20000
10	CONTROL CABINET HVAC	-
11	RECTIFIER	REC-002

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
A	TP001	Water supply	1"Fl. ASME B16.5	150 lb	15374	8590	+597
E	TP005	Pure Water drainage	2"Fl. ASME B16.5	150 lb	15374	7999	+430

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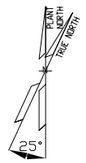
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- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

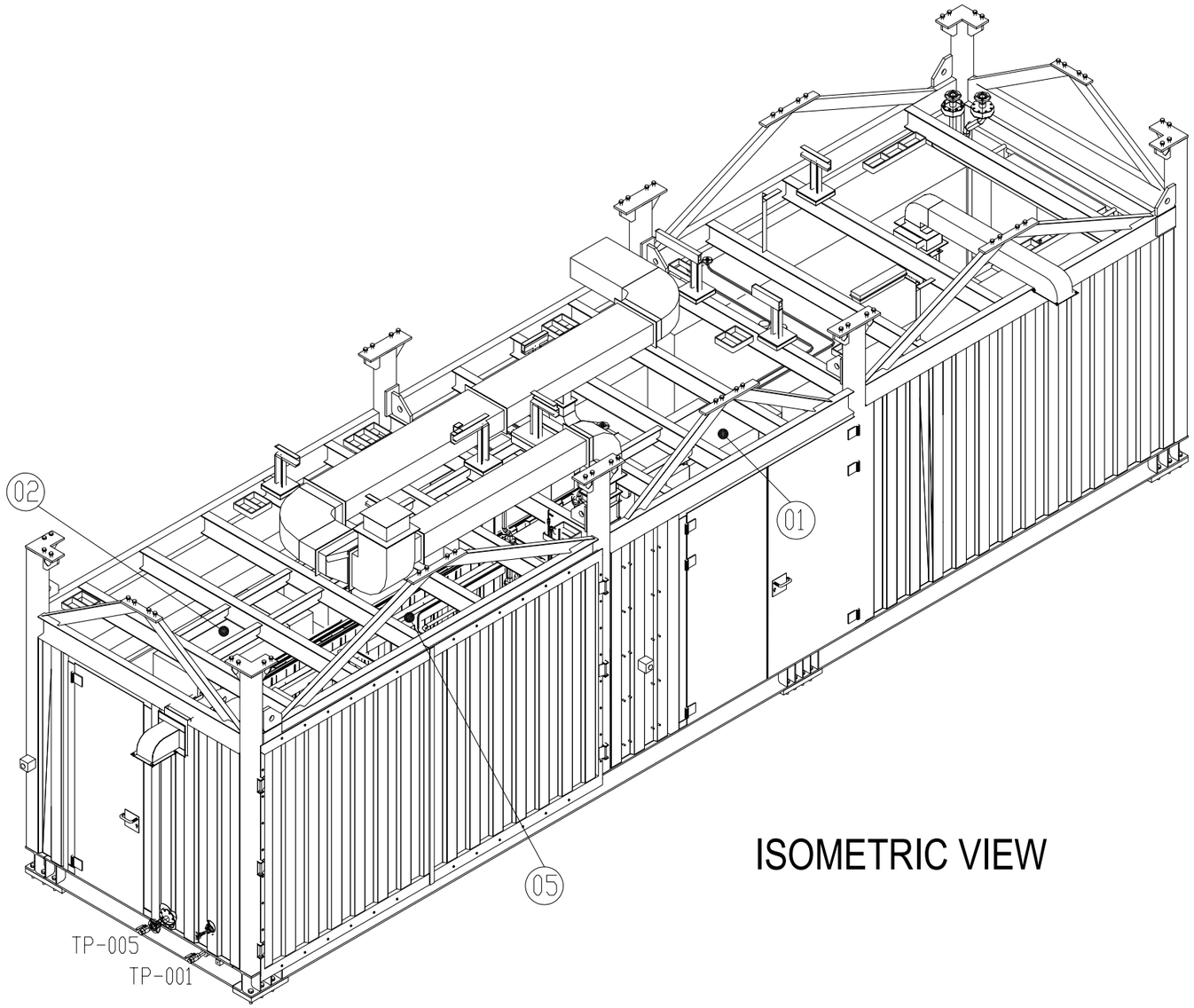
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01	22/11/2024	ISSUE FOR REVIEW	D.Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	
0	08/08/2024	ISSUE FOR REVIEW	STONENG By	M. Chiarucci Checked	L. Maioli Approved	

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE				
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-003				
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP2 (incl. interfaces)				
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00018				
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00003				
	FORMAT	A1	SHEET	04 of 05	1:25

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ISOMETRIC VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP2	C0063-FOR-DTB-MP-004
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP2	C0063-FOR-DWG-CS-002
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	FANCOIL UNIT TYPE H8	FCU-400
02	FANCOIL UNIT TYPE H8	FCU-401
03	FANCOIL UNIT TYPE H8	FCU-402
04	FANCOIL UNIT TYPE H8	FCU-403
05	WATER TREATMENT PACKAGE	WTP-300
06	PW LOOP PUMPS	LP-300A e LP-300B
07	RECTIFIER	REC-001
08	HYDRAULIC COOLING UNIT	HCU-400
09	CONTROL CABINET	A-20000
10	CONTROL CABINET HVAC	-
11	RECTIFIER	REC-002

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
A	TP001	Water supply	1"Fl. ASME B16.5	150 lb	15374	8590	+597
E	TP005	Pure Water drainage	2"Fl. ASME B16.5	150 lb	15374	7999	+430

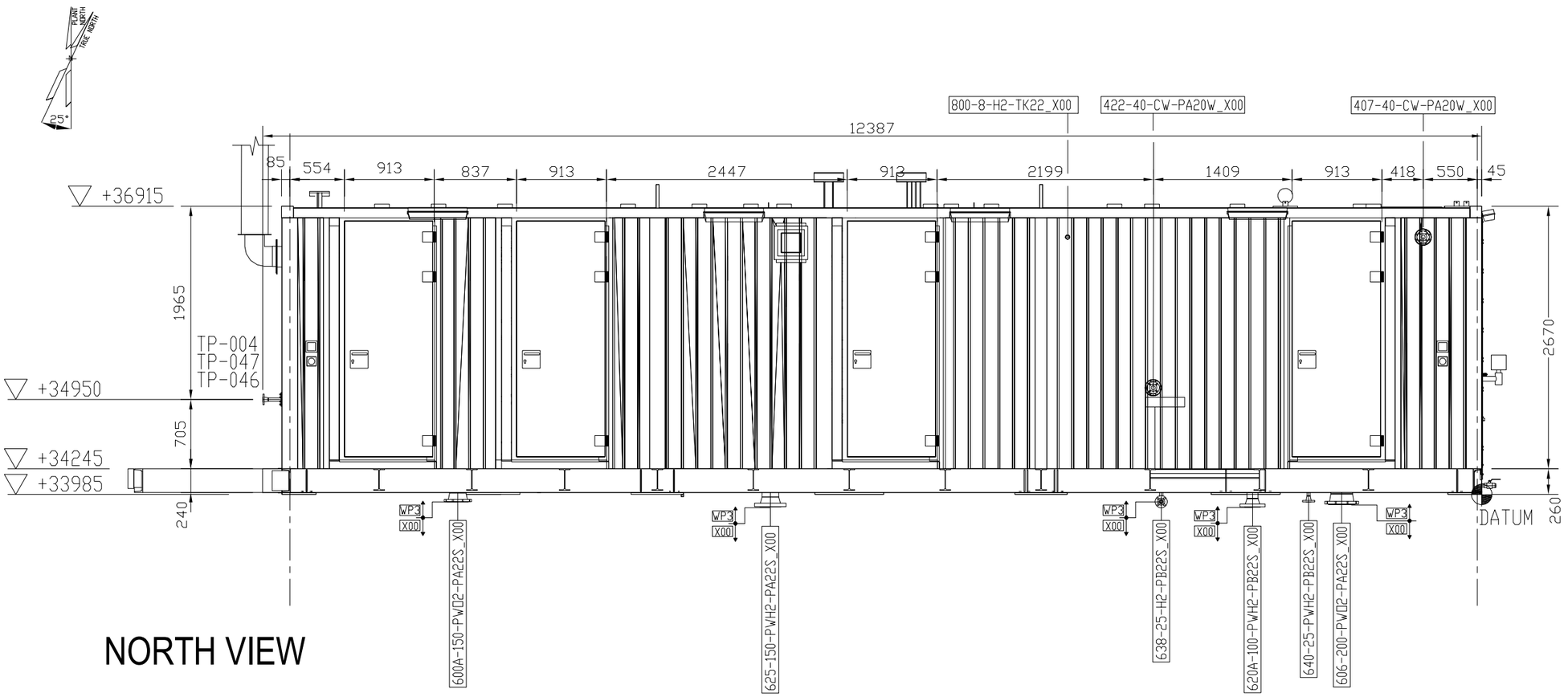
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- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

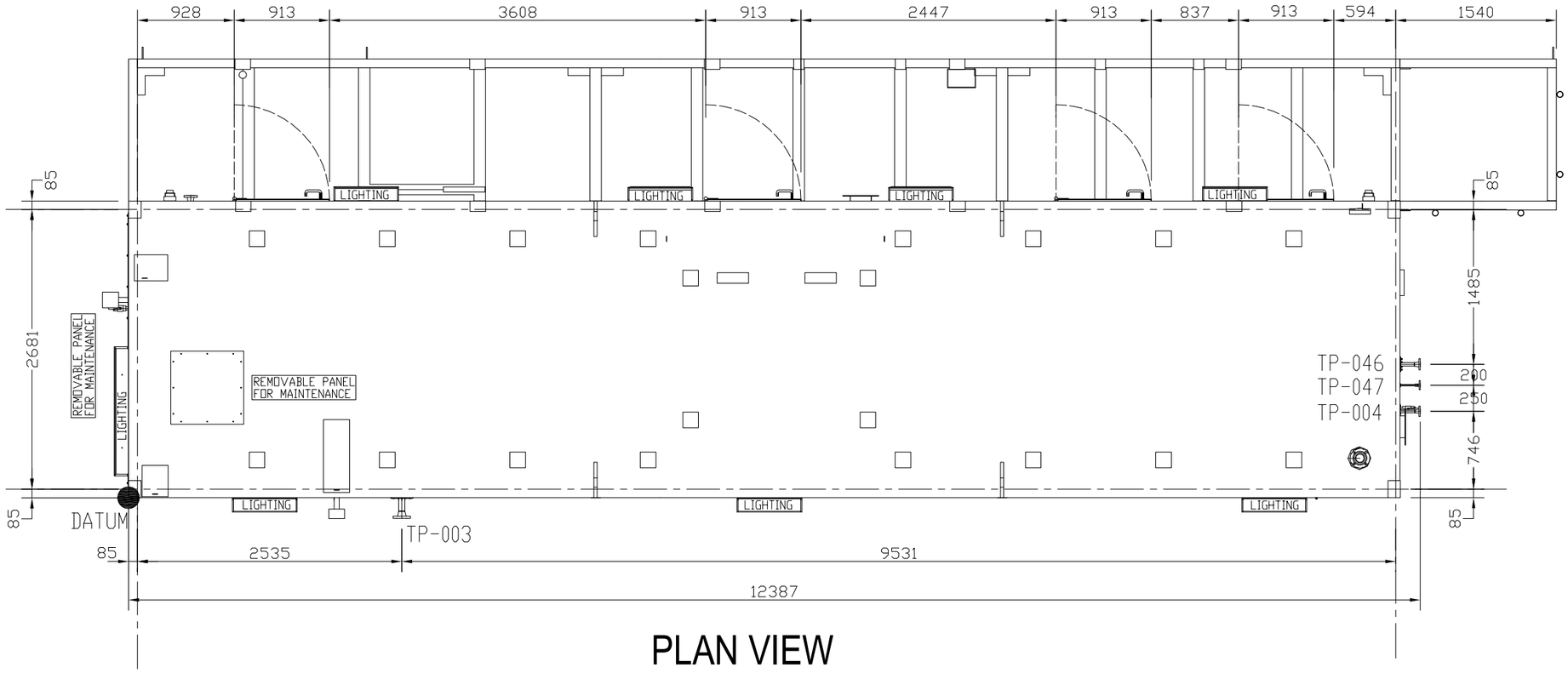
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-003
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP2 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00018
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00003
FORMAT A1 SHEET	05 of 05 1:25

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NORTH VIEW



PLAN VIEW

TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP3	C0063-FOR-DTB-MP-005
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall	C0063-FOR-GAD-MP-001
General structure Drawings	C0063-FOR-DWG-CS-003
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	HYDROGEN PURIFICATION PACKAGE	HPP-700
02	HYDROGEN SEPARATOR TANK	ST-620
03	H2 GAS HEAT EXCHANGER	HE-630
04	H2 GAS HEAT EXCHANGER	HE-631
05	H2 CONDENSATE SEPARATOR	CS-630
06	H2 HIGH PRESSURE DEGASSER	DG-640
07	OXYGEN SEPARATOR TANK	ST-600
08	O2 GAS HEAT EXCHANGER	HE-610
09	O2 CONDENSATE SEPARATOR	CS-610
10	COMPRESSED AIR BUFFER TANK	BTK-980

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
C	TP003	H2 Vent	2"Fl. ASME B16.5	300 lb	5608	1724	+6122
D	TP046	Nitrogen supply	1"Fl. ASME B16.5	150 lb	15375	3204	+4640
F	TP004	Water drainage	3/4"Fl. ASME B16.5	150 lb	15375	2754	+4640
I	TP047	IA supply	1/2"Fl. ASME B16.5	150 lb	15375	3004	+4640

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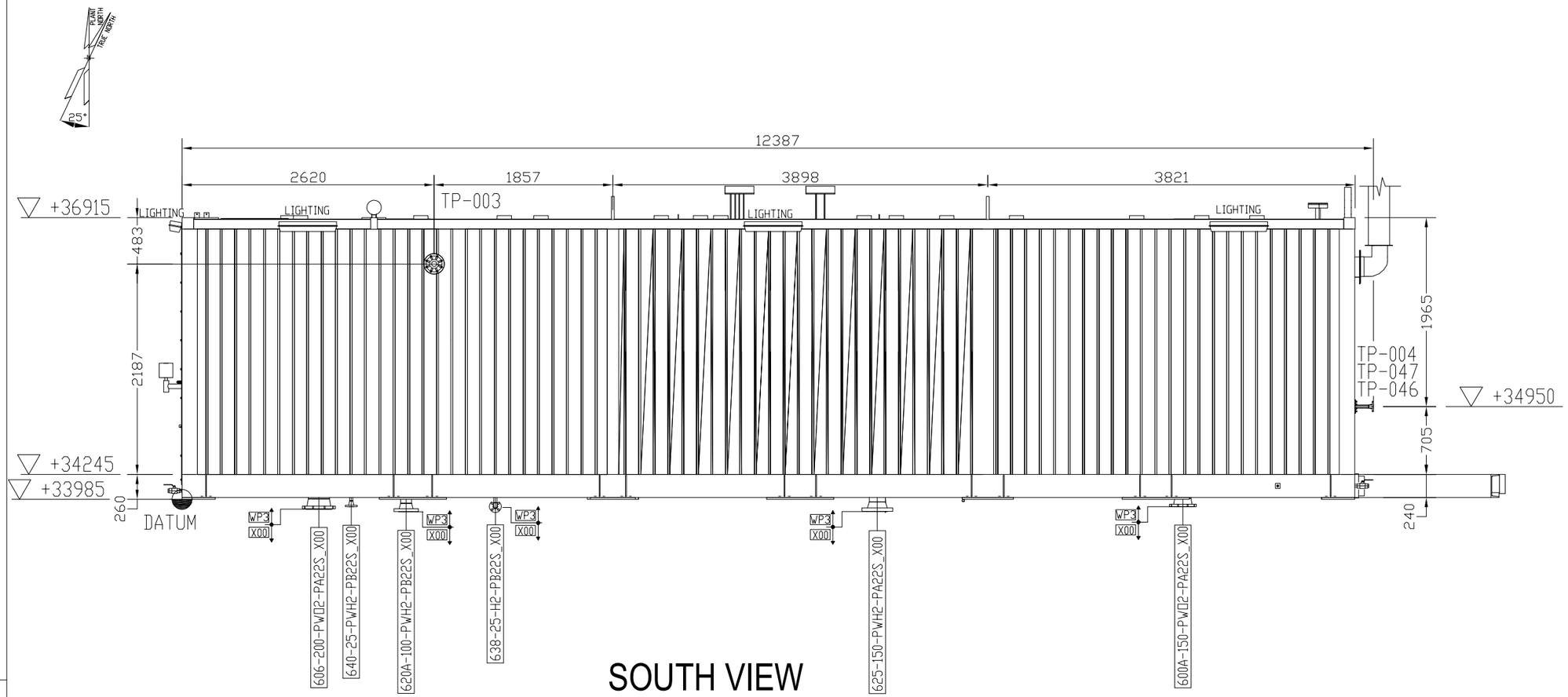
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

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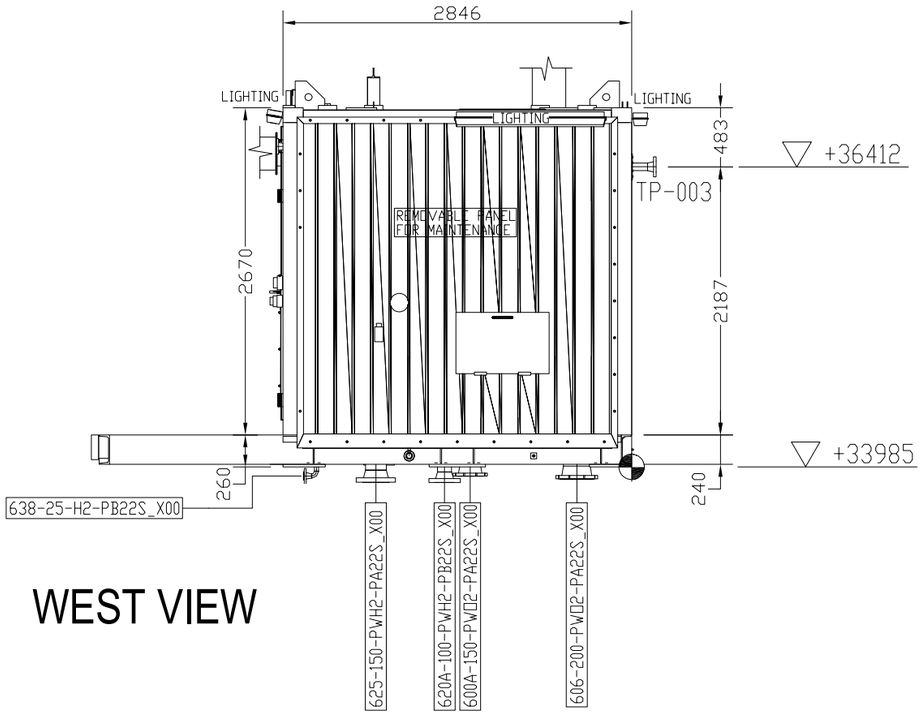
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-004
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP3 (incl interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00019
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00004
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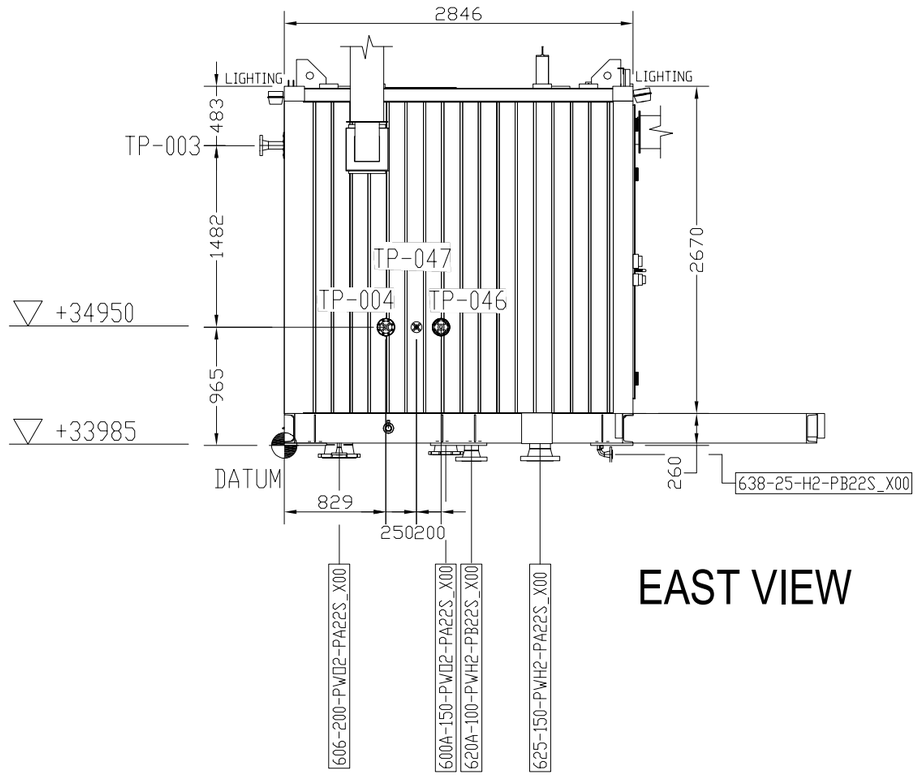
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SOUTH VIEW



WEST VIEW



EAST VIEW

TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP3	C0063-FOR-DTB-MP-005
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall	C0063-FOR-GAD-MP-001
General structure Drawings	C0063-FOR-DWG-CS-003
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	HYDROGEN PURIFICATION PACKAGE	HPP-700
02	HYDROGEN SEPARATOR TANK	ST-620
03	H2 GAS HEAT EXCHANGER	HE-630
04	H2 GAS HEAT EXCHANGER	HE-631
05	H2 CONDENSATE SEPARATOR	CS-630
06	H2 HIGH PRESSURE DEGASSER	DG-640
07	OXYGEN SEPARATOR TANK	ST-600
08	O2 GAS HEAT EXCHANGER	HE-610
09	O2 CONDENSATE SEPARATOR	CS-610
10	COMPRESSED AIR BUFFER TANK	BTK-980

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
C	TP003	H2 Vent	2"Fl. ASME B16.5	300 lb	5608	1724	+6122
D	TP046	Nitrogen supply	1"Fl. ASME B16.5	150 lb	15375	3204	+4640
F	TP004	Water drainage	3/4"Fl. ASME B16.5	150 lb	15375	2754	+4640
I	TP047	IA supply	1/2"Fl. ASME B16.5	150 lb	15375	3004	+4640

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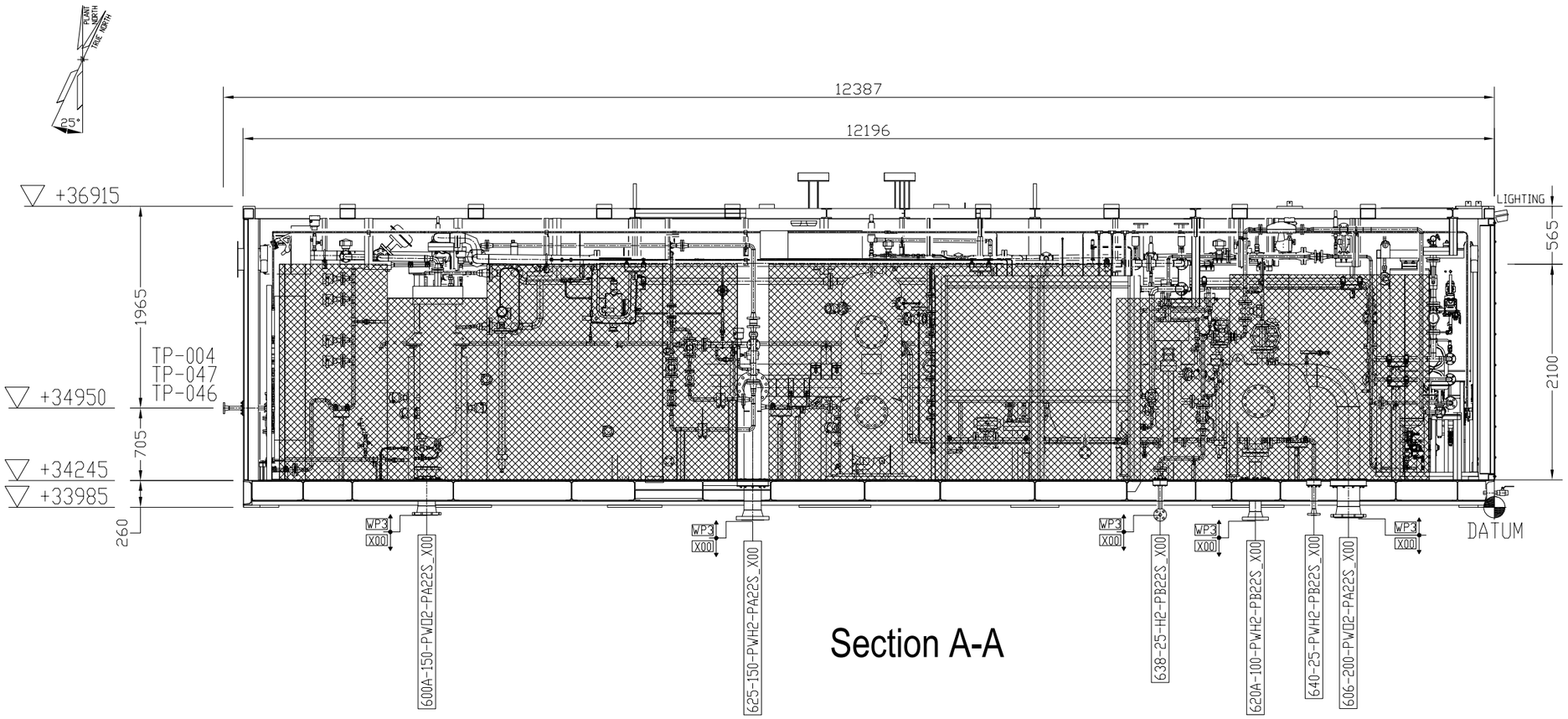
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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0	09/08/2024	ISSUE FOR REVIEW	STONENG By	M. Chiarucci Checked	L. Maioli Approved	

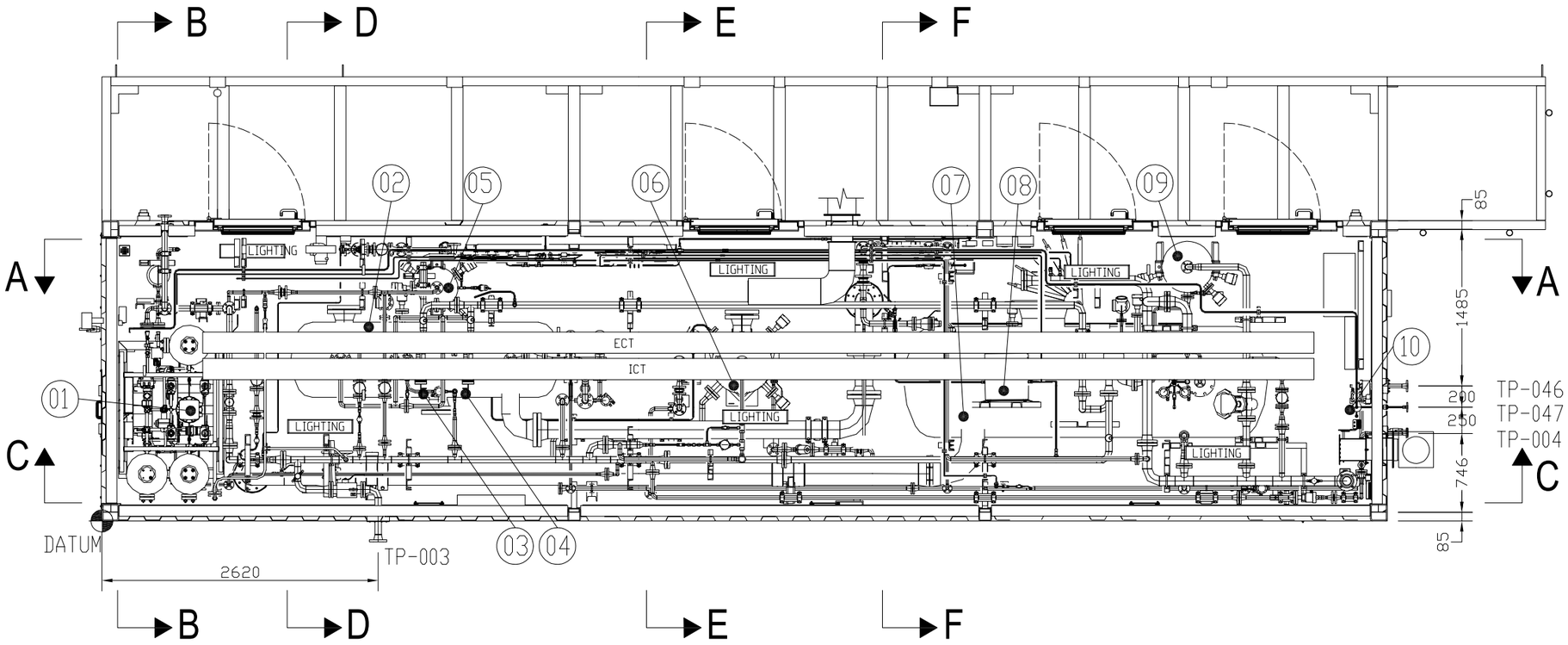
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE		
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-004		
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP3 (incl interfaces)		
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00019		
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00004		
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Section A-A



PLAN VIEW

TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP3	C0063-FOR-DTB-MP-005
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall	C0063-FOR-GAD-MP-001
General structure Drawings	C0063-FOR-DWG-CS-003
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	HYDROGEN PURIFICATION PACKAGE	HPP-700
02	HYDROGEN SEPARATOR TANK	ST-620
03	H2 GAS HEAT EXCHANGER	HE-630
04	H2 GAS HEAT EXCHANGER	HE-631
05	H2 CONDENSATE SEPARATOR	CS-630
06	H2 HIGH PRESSURE DEGASSER	DG-640
07	OXYGEN SEPARATOR TANK	ST-600
08	O2 GAS HEAT EXCHANGER	HE-610
09	O2 CONDENSATE SEPARATOR	CS-610
10	COMPRESSED AIR BUFFER TANK	BTK-980

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
C	TP003	H2 Vent	2"Fl. ASME B16.5	300 lb	5608	1724	+6122
D	TP046	Nitrogen supply	1"Fl. ASME B16.5	150 lb	15375	3204	+4640
F	TP004	Water drainage	3/4"Fl. ASME B16.5	150 lb	15375	2754	+4640
I	TP047	IA supply	1/2"Fl. ASME B16.5	150 lb	15375	3004	+4640

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

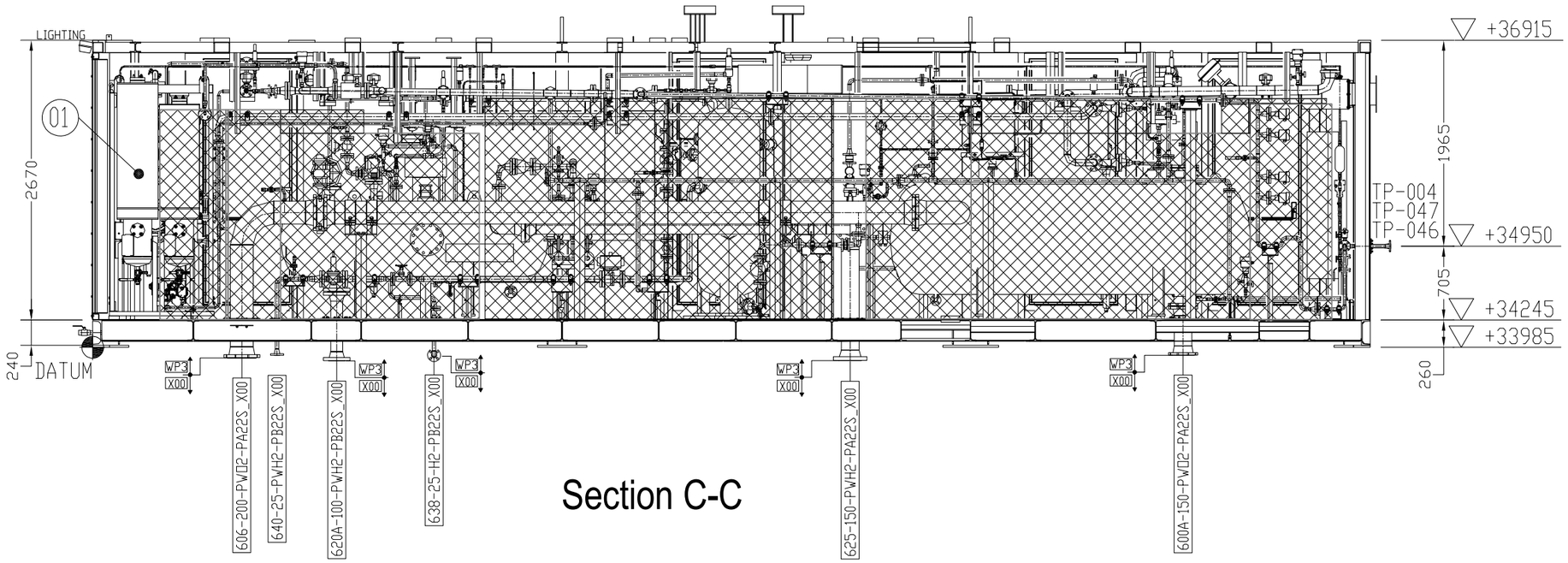
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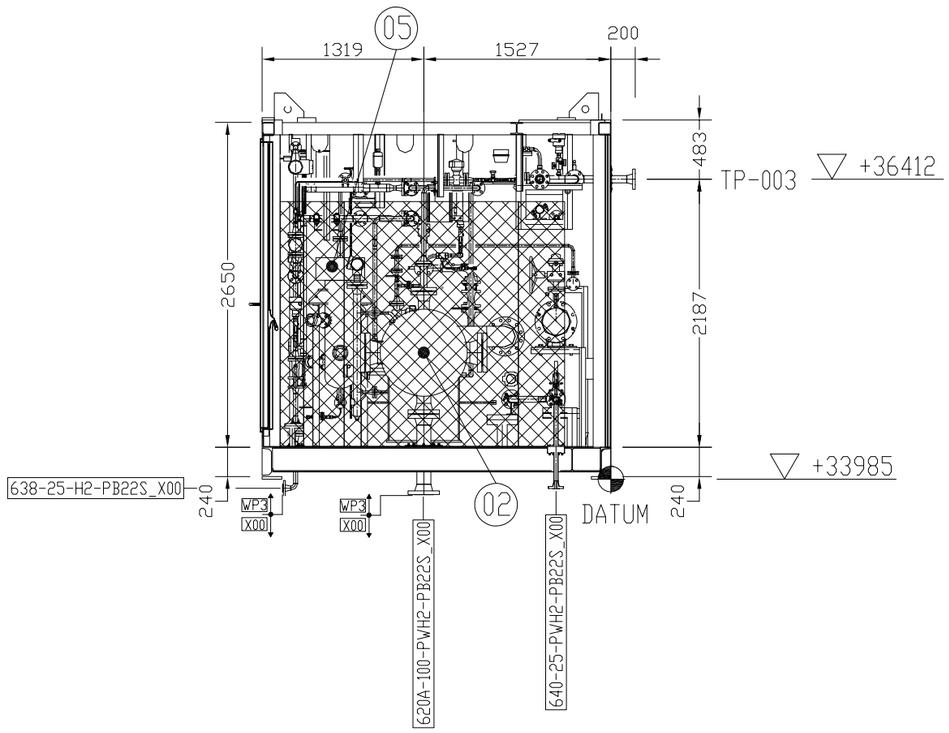
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ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-004
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP3 (incl interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00019
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00004
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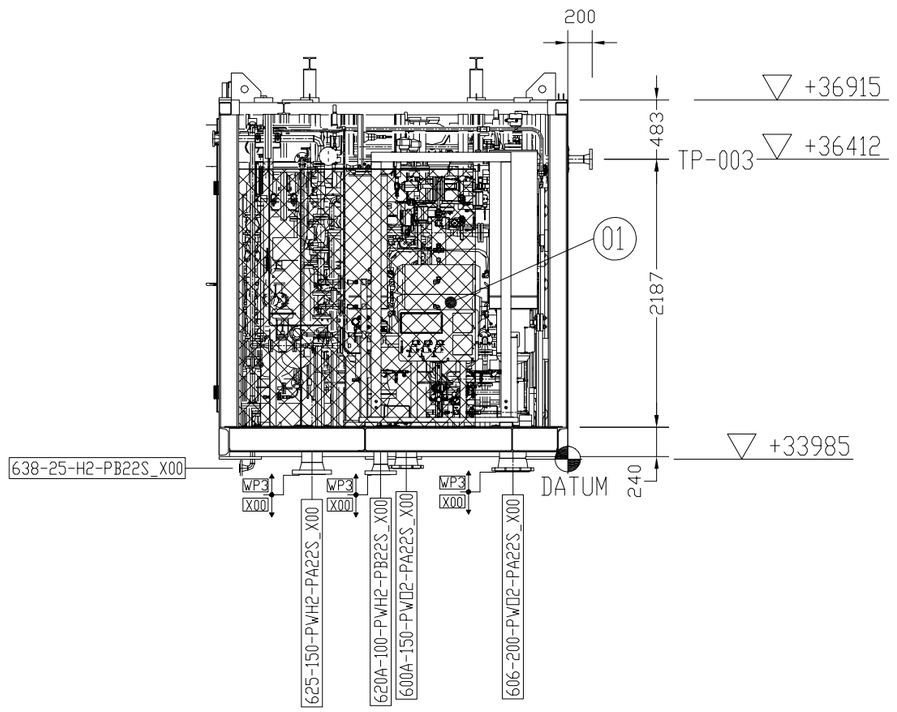




Section C-C



Section D-D



Section B-B

TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP3	C0063-FOR-DTB-MP-005
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall	C0063-FOR-GAD-MP-001
General structure Drawings	C0063-FOR-DWG-CS-003
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	HYDROGEN PURIFICATION PACKAGE	HPP-700
02	HYDROGEN SEPARATOR TANK	ST-620
03	H2 GAS HEAT EXCHANGER	HE-630
04	H2 GAS HEAT EXCHANGER	HE-631
05	H2 CONDENSATE SEPARATOR	CS-630
06	H2 HIGH PRESSURE DEGASSER	DG-640
07	OXYGEN SEPARATOR TANK	ST-600
08	O2 GAS HEAT EXCHANGER	HE-610
09	O2 CONDENSATE SEPARATOR	CS-610
10	COMPRESSED AIR BUFFER TANK	BTK-980

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
C	TP003	H2 Vent	2"Fl. ASME B16.5	300 lb	5608	1724	+6122
D	TP046	Nitrogen supply	1"Fl. ASME B16.5	150 lb	15375	3204	+4640
F	TP004	Water drainage	3/4"Fl. ASME B16.5	150 lb	15375	2754	+4640
I	TP047	IA supply	1/2"Fl. ASME B16.5	150 lb	15375	3004	+4640

AS-BUILT

DATE 19/03/2025 | SIGNATURE MANUELE CHIARUCCI

FORES ENGINEERING

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

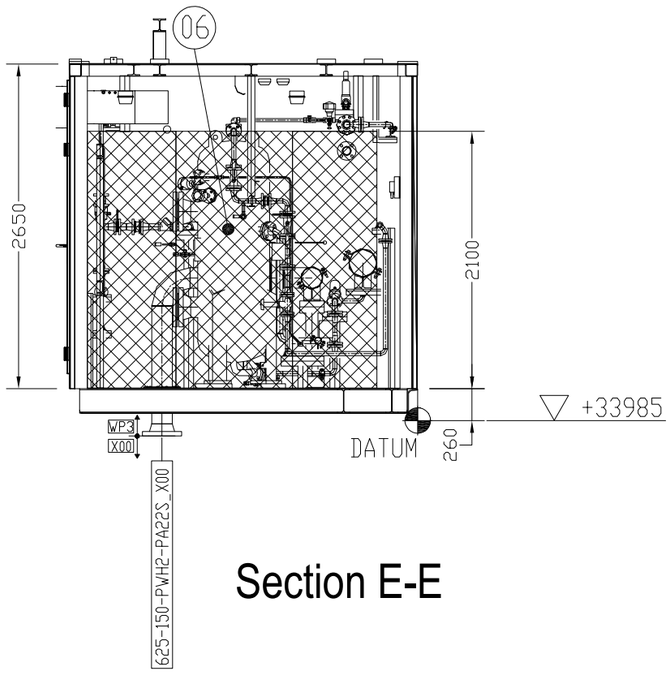
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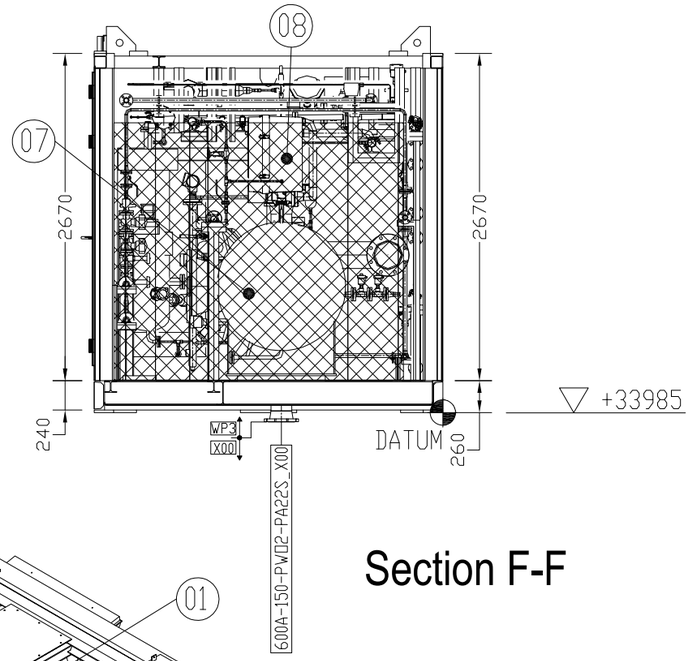
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CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00019
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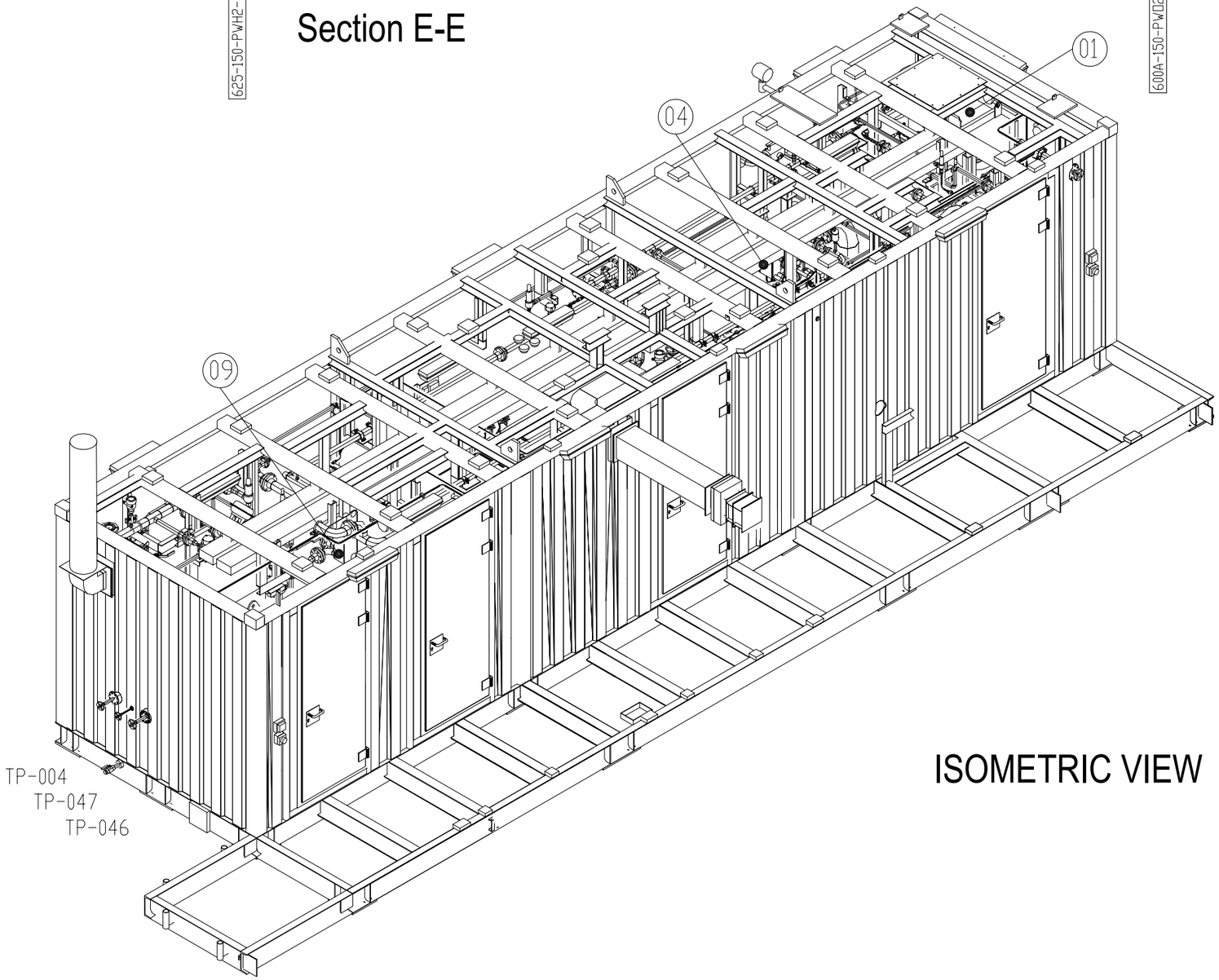




Section E-E



Section F-F



ISOMETRIC VIEW

TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP3	C0063-FOR-DTB-MP-005
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall	C0063-FOR-GAD-MP-001
General structure Drawings	C0063-FOR-DWG-CS-003
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	HYDROGEN PURIFICATION PACKAGE	HPP-700
02	HYDROGEN SEPARATOR TANK	ST-620
03	H2 GAS HEAT EXCHANGER	HE-630
04	H2 GAS HEAT EXCHANGER	HE-631
05	H2 CONDENSATE SEPARATOR	CS-630
06	H2 HIGH PRESSURE DEGASSER	DG-640
07	OXYGEN SEPARATOR TANK	ST-600
08	O2 GAS HEAT EXCHANGER	HE-610
09	O2 CONDENSATE SEPARATOR	CS-610
10	COMPRESSED AIR BUFFER TANK	BTK-980

TIE-IN POINT LIST (NOTE2)							
OLD NAME	NEW NAME	DESCRIPTION	DIAMETER	RATING	E	N	EL.
C	TP003	H2 Vent	2"Fl. ASME B16.5	300 lb	5608	1724	+6122
D	TP046	Nitrogen supply	1"Fl. ASME B16.5	150 lb	15375	3204	+4640
F	TP004	Water drainage	3/4"Fl. ASME B16.5	150 lb	15375	2754	+4640
I	TP047	IA supply	1/2"Fl. ASME B16.5	150 lb	15375	3004	+4640

LEGEND:

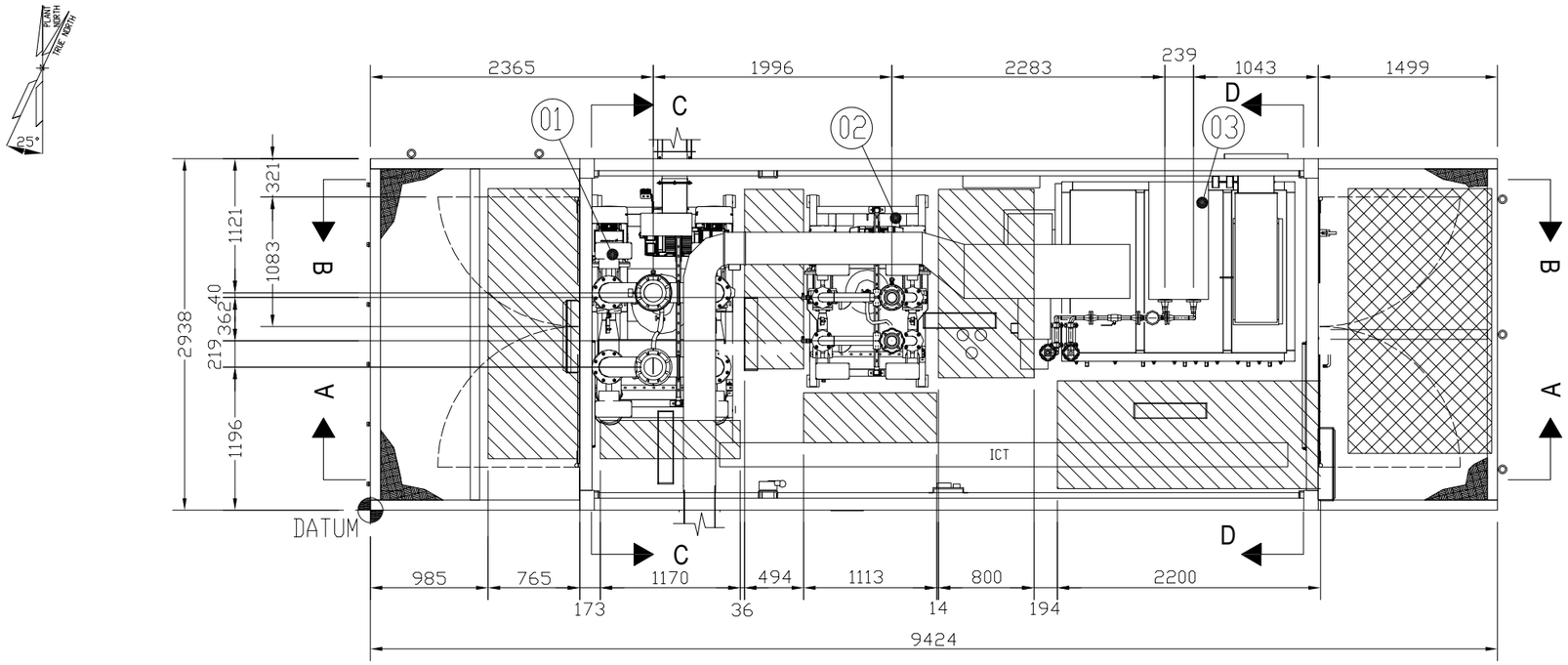
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	26/11/2024	ISSUE FOR REVIEW	D. Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	
0	09/08/2024	ISSUE FOR REVIEW	STONENG By	M. Chiarucci Checked	L. Maioli Approved	

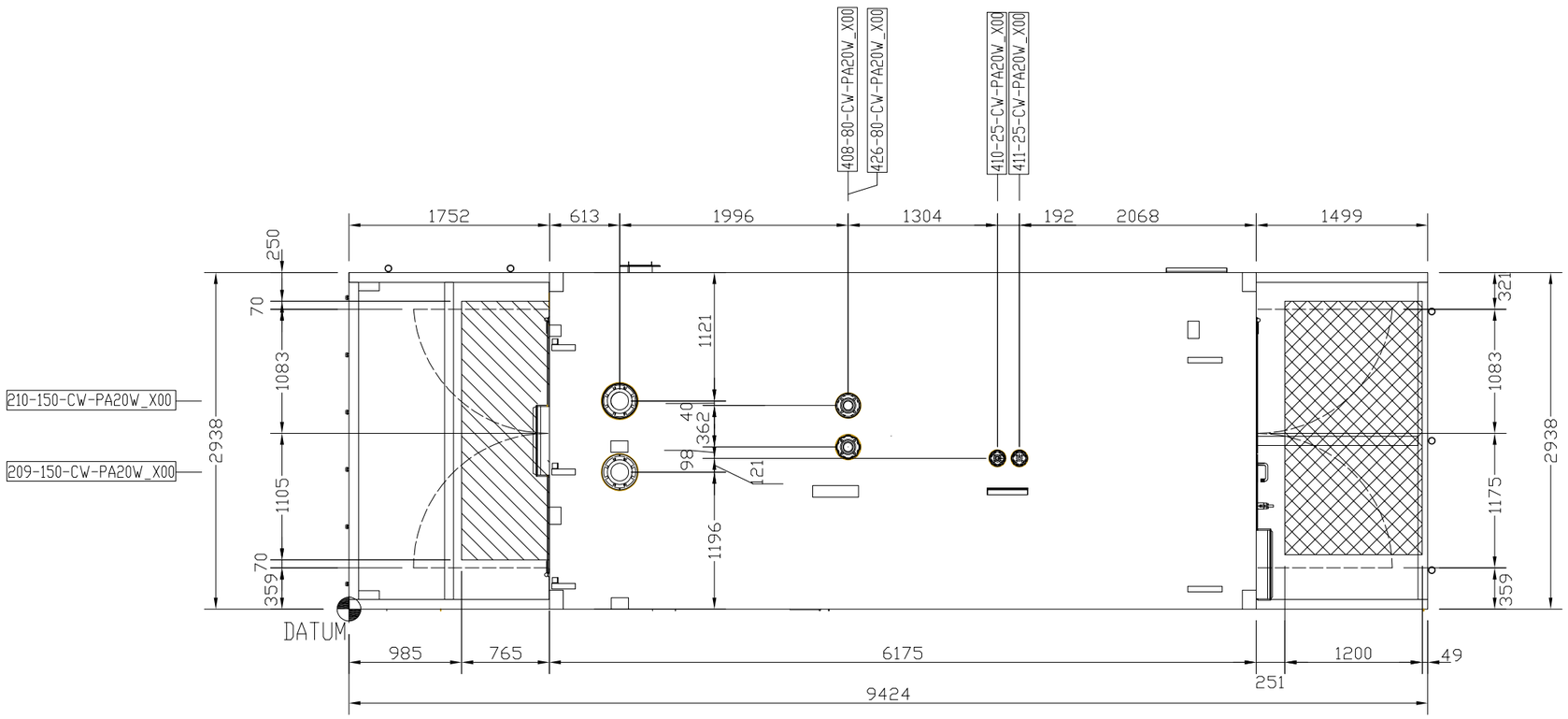
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-004
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP3 (incl interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00019
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00004
	FORMAT A1 SHEET 05 of 05 1:25

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PLAN VIEW



PLAN VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
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E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP4	C0063-FOR-DTB-MP-006
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP4	C0063-FOR-DWG-CS-004
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	CONDENSATION WATER SKID	THS-200
02	CHILLER WATER SKID	THS-400
03	AIR HANDLING UNIT	AHU-400

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

AS-BUILT

DATE 19/03/2025 SIGNATURE MANUELE CHIARUCCI

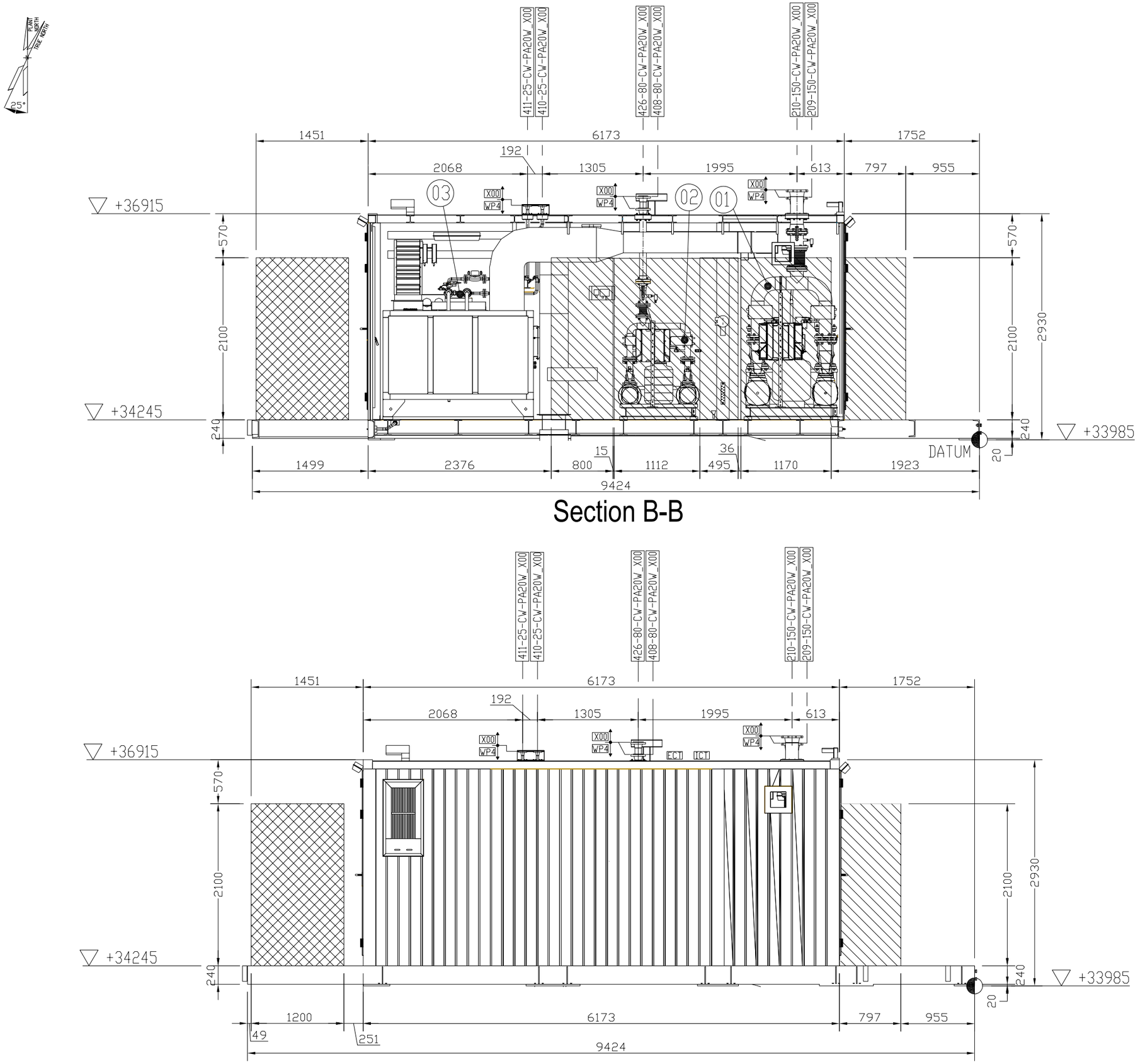
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REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	08/11/2024	ISSUE FOR REVIEW	D.Crescimbeni By	M. Chiarucci Checked	L. Maioli Approved	
0	08/08/2024	ISSUE FOR REVIEW	Stoneng By	M. Chiarucci Checked	L. Maioli Approved	

elogen

PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-005
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP4 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00020
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00005
FORMAT A1	SHEET 01 of 05 — 1:25

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Section B-B

NORTH VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP4	C0063-FOR-DTB-MP-006
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP4	C0063-FOR-DWG-CS-004
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	CONDENSATION WATER SKID	THS-200
02	CHILLER WATER SKID	THS-400
03	AIR HANDLING UNIT	AHU-400

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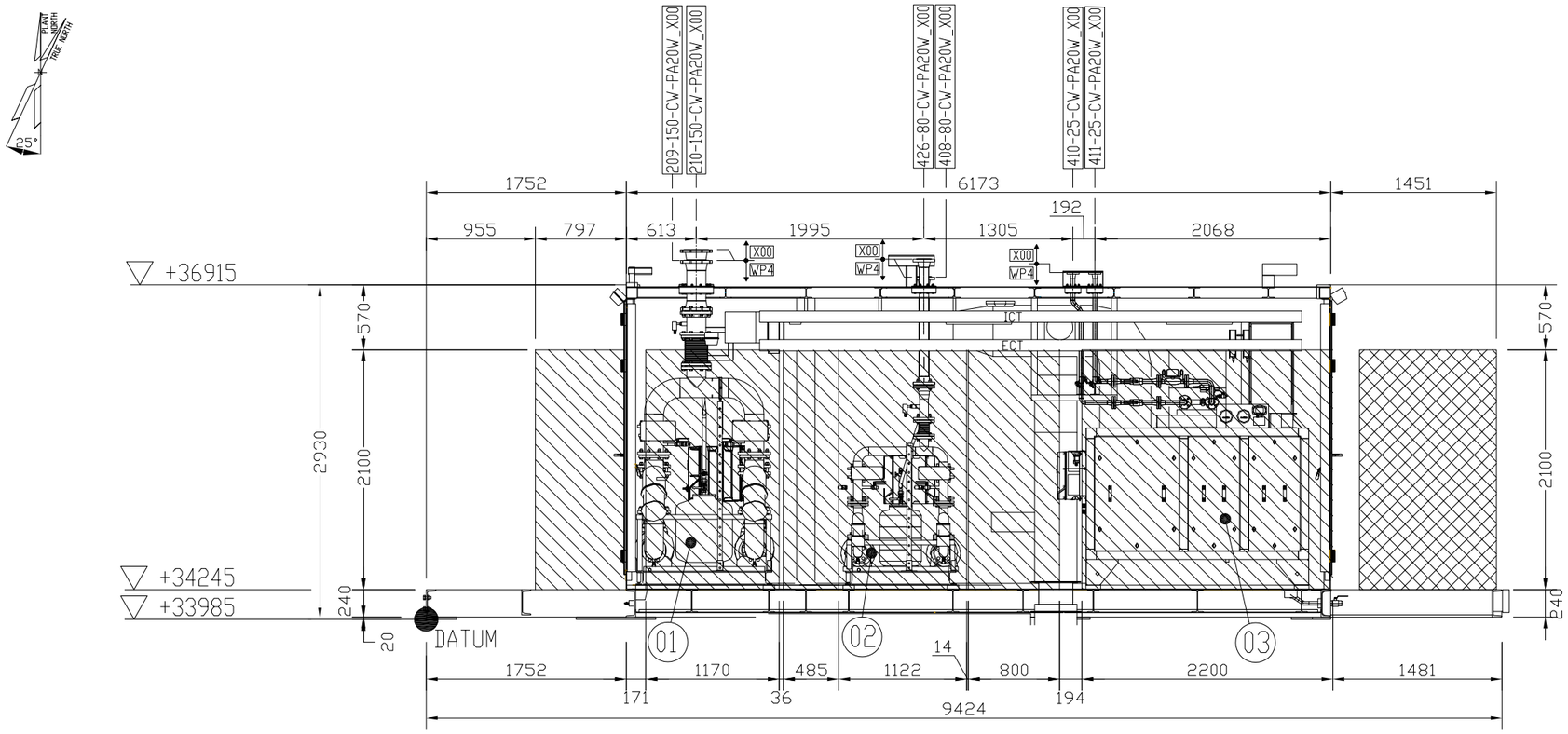
- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
01	08/11/2024	ISSUE FOR REVIEW	D.Crescimbeni (By)	M. Chiarucci (Checked)	L. Maioli (Approved)	
0	08/08/2024	ISSUE FOR REVIEW	Stoneng (By)	M. Chiarucci (Checked)	L. Maioli (Approved)	

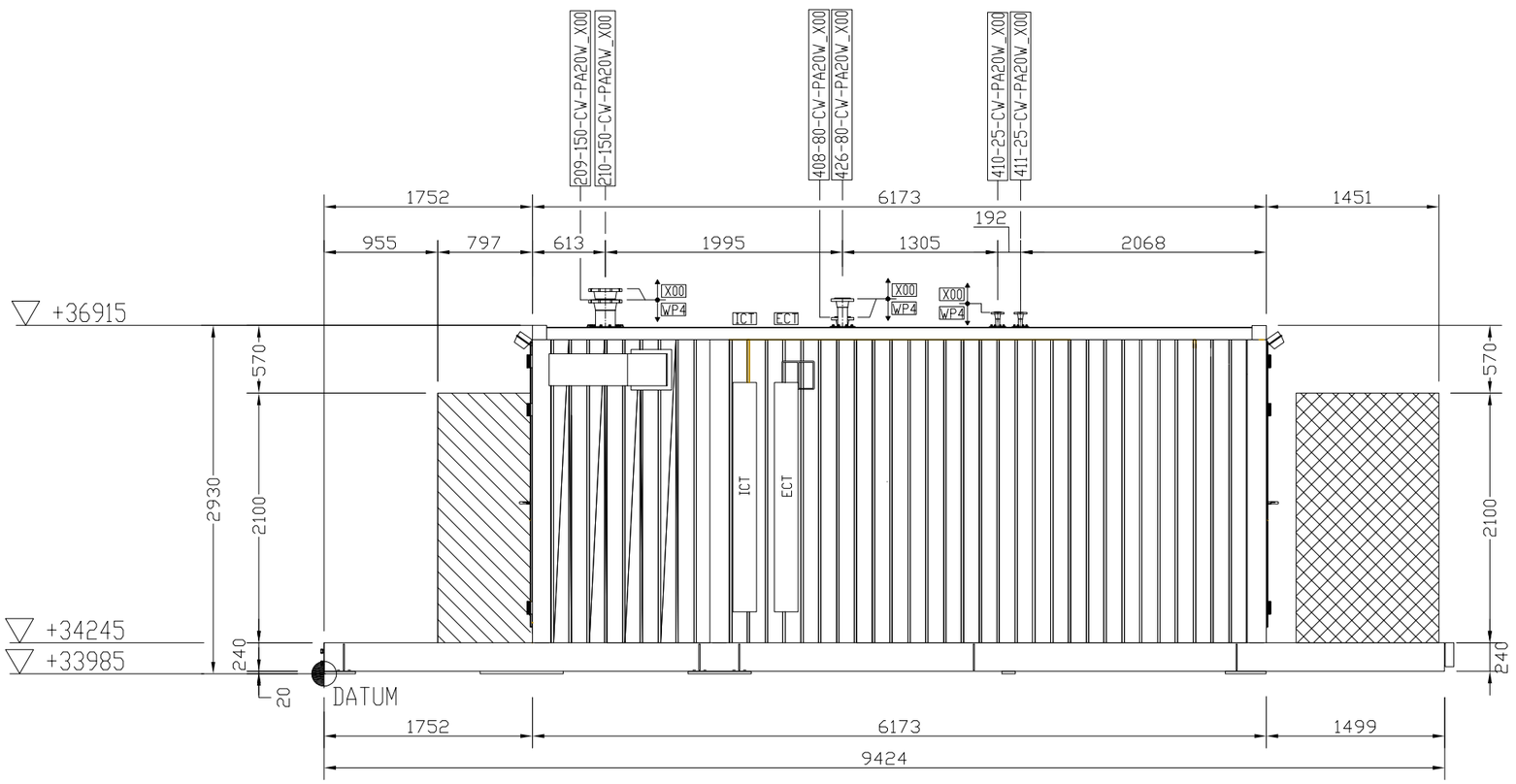
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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-005
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP4 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00020
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00005

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Section A-A



SOUTH VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP4	C0063-FOR-DTB-MP-006
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP4	C0063-FOR-DWG-CS-004
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE COORDINATES OF THE TIE-IN POINT ARE REFERRED TO THE SYSTEM DATUM POINT (1-C)
3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	CONDENSATION WATER SKID	THS-200
02	CHILLER WATER SKID	THS-400
03	AIR HANDLING UNIT	AHU-400

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

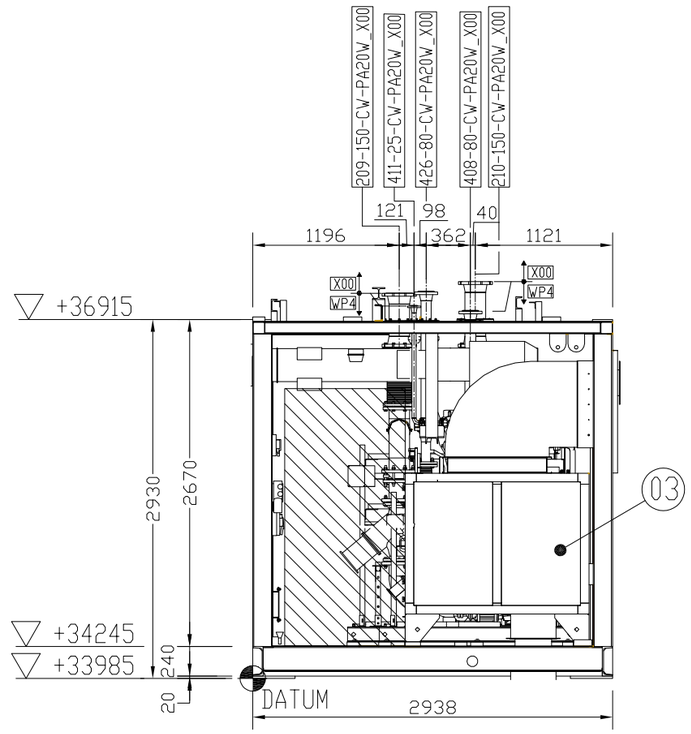
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0	08/08/2024	ISSUE FOR REVIEW	Stoneng (By)	M. Chiarucci (Checked)	L. Maioli (Approved)	

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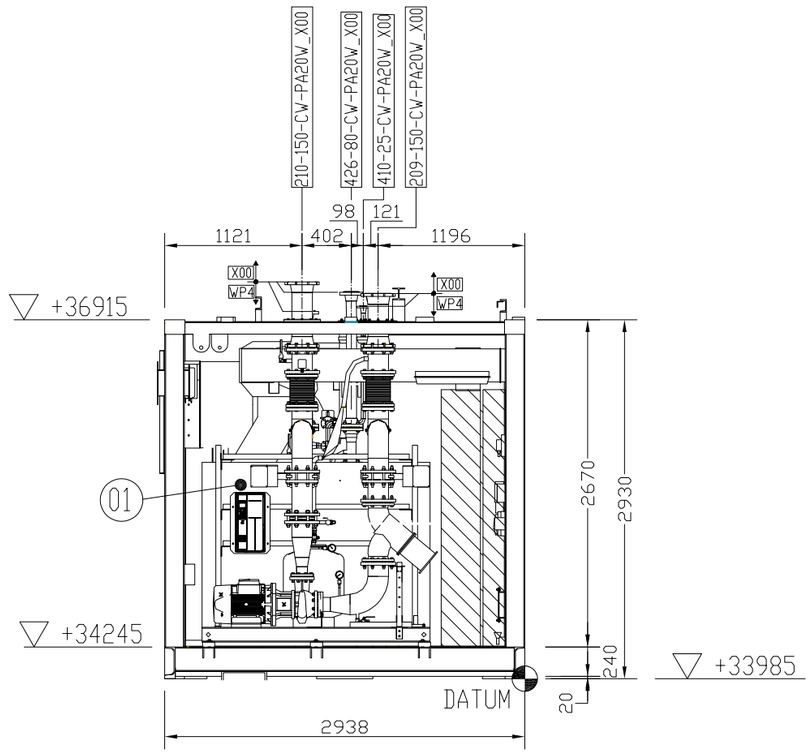
PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-005
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP4 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00020
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00005
FORMAT	A1
SHEET	03 of 05
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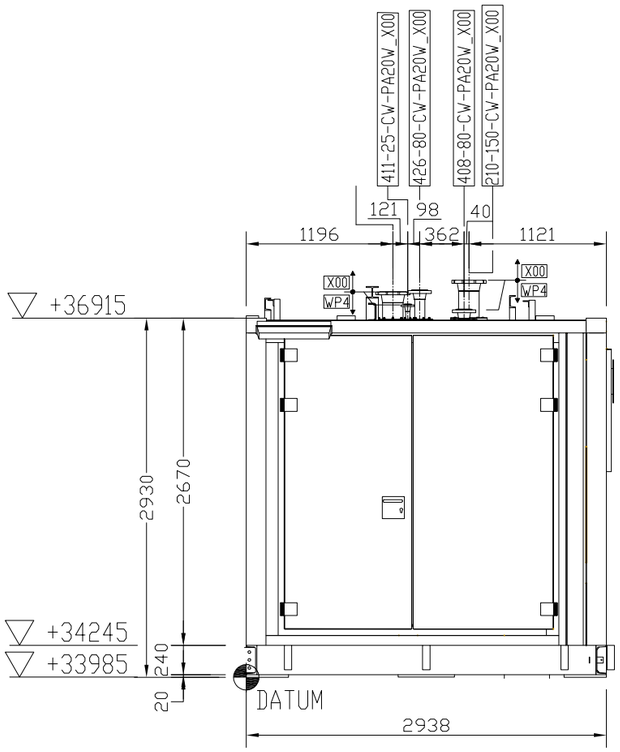




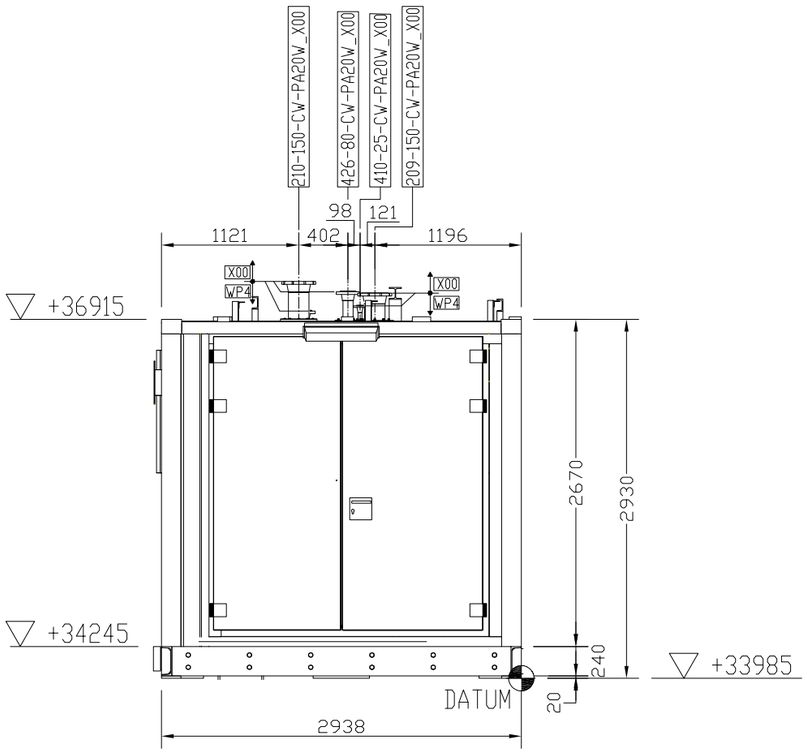
Section D-D



Section C-C



EAST VIEW



WEST VIEW

REFERENCE DRAWINGS	
TITLE	DOCUMENT NUMBER
Process and Instrumentation Diagrams	C63-PID-001
E&I Layout and Cable Trays Routing	C0063-FOR-DWG-EL-003
Isometrics Booklet (incl. heat tracing)_WP4	C0063-FOR-DTB-MP-006
Ducting General Arrangement Drawing	C0063-FOR-DWG-MP-003
General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP4	C0063-FOR-DWG-CS-004
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

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3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	CONDENSATION WATER SKID	THS-200
02	CHILLER WATER SKID	THS-400
03	AIR HANDLING UNIT	AHU-400

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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0	08/08/2024	ISSUE FOR REVIEW	Stoneng By	M. Chiarucci Checked	L. Maioli Approved	

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-005
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP4 (incl. interfaces)
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00020
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00005
FORMAT	A1
SHEET	04 of 05
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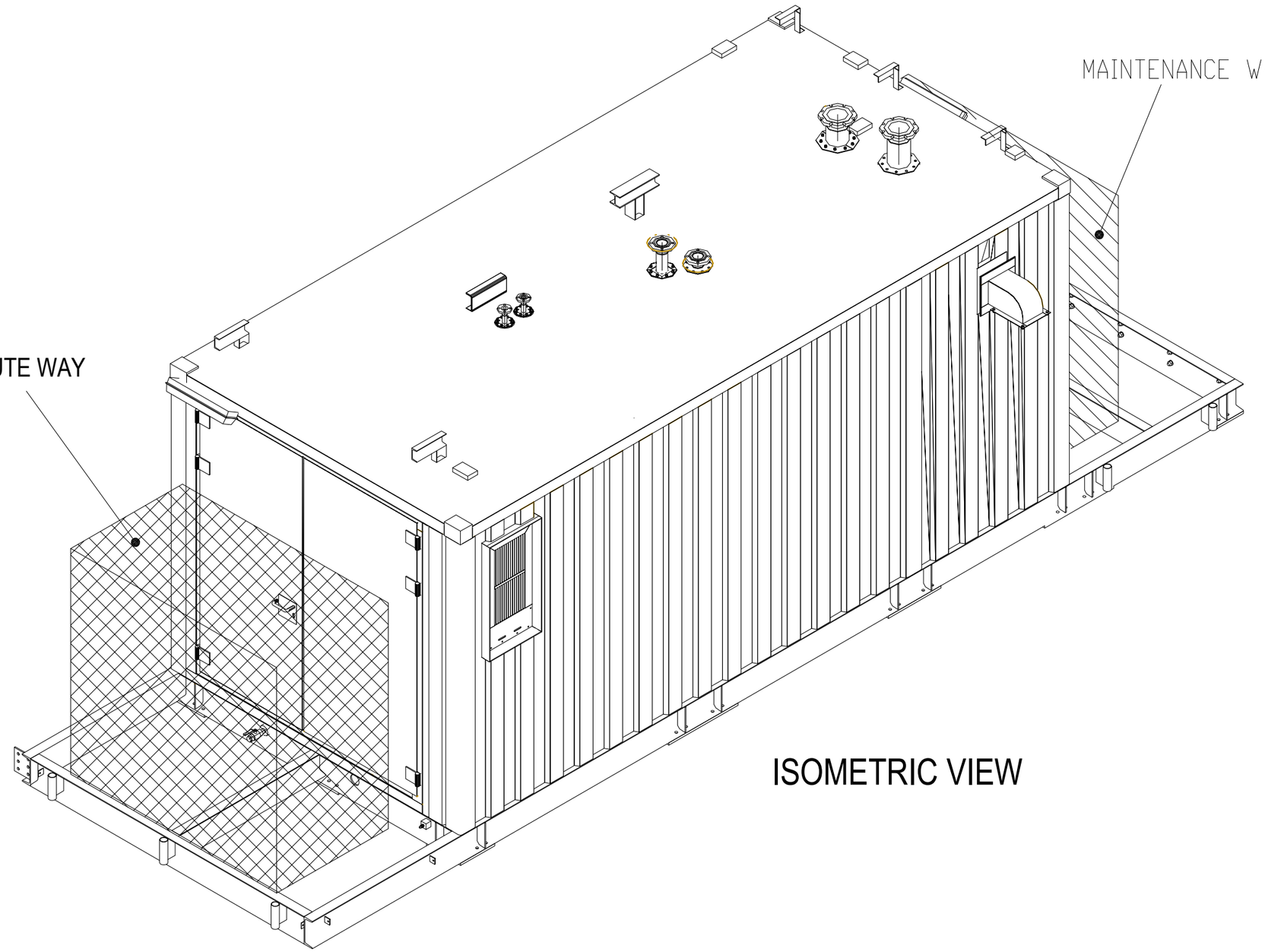
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REFERENCE DRAWINGS	
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Isometrics Booklet (incl. heat tracing)_WP4	C0063-FOR-DTB-MP-006
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General Arrangements Overall (incl. interfaces)	C0063-FOR-GAD-MP-001
General structure Drawings_WP4	C0063-FOR-DWG-CS-004
Foundation loading diagram	C0063-FOR-DWG-CS-006

GENERAL NOTES:

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3. FOR WEIGHT DETAILS REFER TO DOC. Nr. C0063-FOR-REG-MP-001 (WEIGHT REGISTER)



ISOMETRIC VIEW

EQUIPMENT LIST		
ITEM	DESCRIPTION	TAG
01	CONDENSATION WATER SKID	THS-200
02	CHILLER WATER SKID	THS-400
03	AIR HANDLING UNIT	AHU-400

LEGEND:

- MAINTENANCE WAY
- ESCAPE ROUTE WAY
- ECT — ELECTRICAL CABLE TRAY
- ICT — INSTRUMENT CABLE TRAY

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED	A.I.
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			By	Checked	Approved	
0	08/08/2024	ISSUE FOR REVIEW	Stoneng	M. Chiarucci	L. Maioli	
			By	Checked	Approved	

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PROJECT	C63 - CROSSWIND PROJECT - ELECTROLYZER PACKAGE			
ELOGEN PROJECT DOCUMENT NUMBER	C0063-FOR-GAD-MP-005			
ELOGEN PROJECT DOCUMENT TITLE	General Arrangement_WP4 (incl. interfaces)			
CROSSWIND PROJECT DOCUMENT NUMBER	FORES-INN-BPH-DWG-00020			
FORES DOCUMENT NUMBER AND REVISION	224J10-DDL-PP-DA-00005			
	FORMAT	A1	SHEET	05 of 05

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Section 6.2 Leak Test / Drying / Inerting Test Sheets Index

NOT APPLICABLE

Section 6.3 Chemical Loading & First Fill records Index

NOT APPLICABLE

Section 6.4 Chemical Cleaning Reports and Records Index

NOT APPLICABLE

Section 6.5 Lubrication Schedule

NOT APPLICABLE

Section 7 VENDOR

Section 7.1 Vendor Package Summary Index

NOT APPLICABLE

Section 7.2 SAT Procedure with associated punch list and reference (Front Page)

NOT APPLICABLE

Section 7.3 Vendor Spares & Special Tools lists references

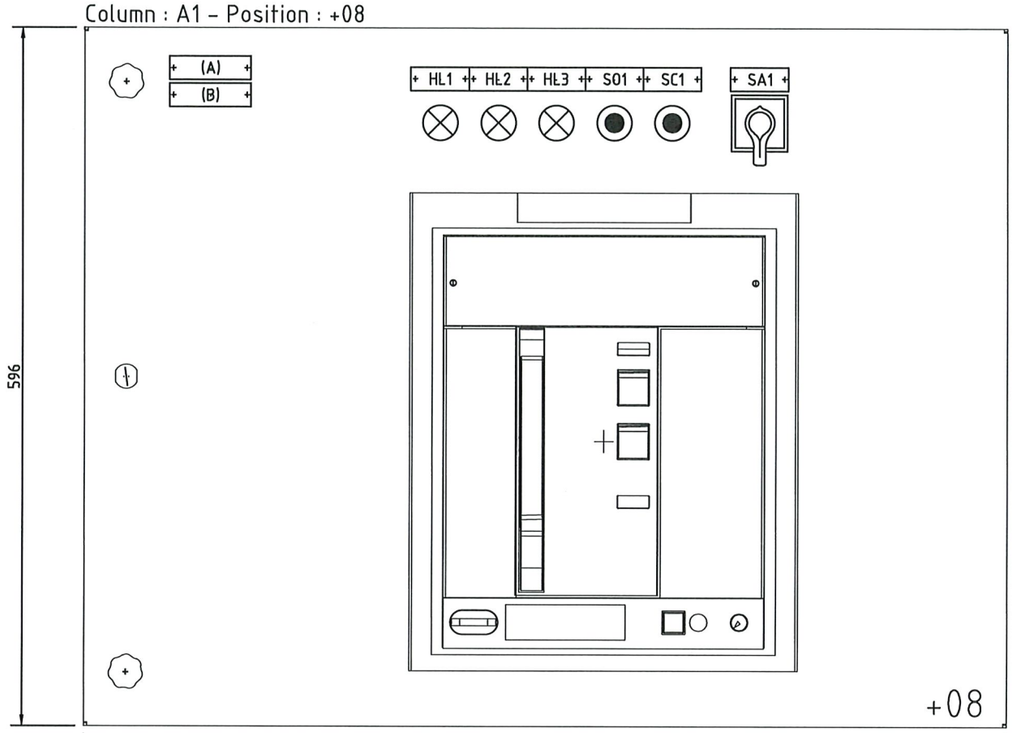
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Section 7.4 Vendor Data / Operations / Maintenance Manuals References

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

AS-COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025

Column : A1 - Position : +08



SCALE 1/5

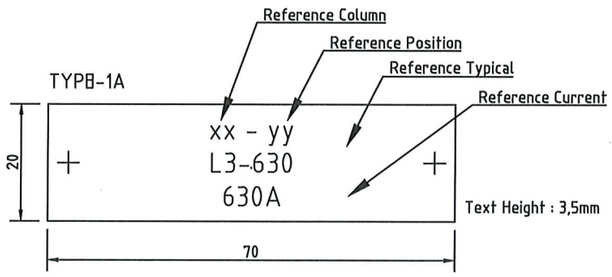
NOTE :

A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

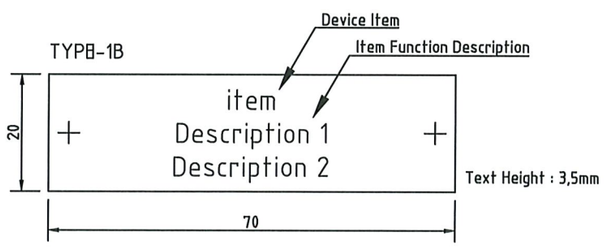
B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate				
ITEM	COMPONENT	DESCRIPTION 1	DESCRIPTION 2	NOTE
HL1	PILOT LIGHT	CIRCUIT BREAKER	CLOSED	TYPE-2A
HL2	PILOT LIGHT	CIRCUIT BREAKER	OPENED	TYPE-2A
HL3	PILOT LIGHT	CIRCUIT BREAKER	TRIPPED	TYPE-2A
SO1	PUSH BUTTON	CIRCUIT BREAKER	OPENING COMMAND	TYPE-2A
SC1	PUSH BUTTON	CIRCUIT BREAKER	CLOSING COMMAND	TYPE-2A
SA1	PUSH BUTTON	SELECTOR	LOCAL / REMOTE	TYPE-2A

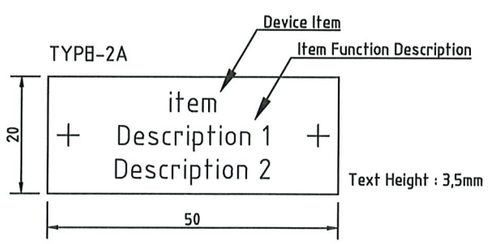
TYPE-1A



TYPE-1B



TYPE-2A



=	SG-200N1
+	A1/+08
DWG n° :	231298/SD/30
Item n° :	PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 036

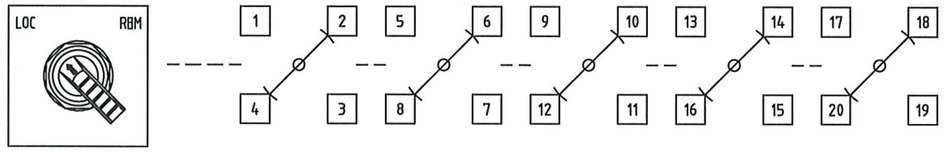
REV. 02

File Name : 1723002197-EL-DG-00030 Rev.02

F.to UNI A3: 420mmx297mm

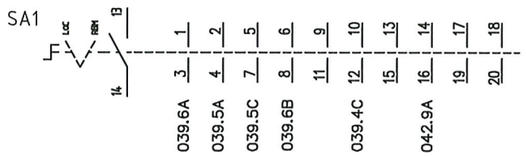
FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025



Control Mode Switch

NOTES:
1. Square plate
2. Fixed position



=	SG-200N1						
+	A1/+08						
DWG n°:	231298/SD/30						
Item n°:	PF1002983/30						
		2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
		1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 037

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.02

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

AS-COMMISSIONED
GIROTTI MATTIA
NO MARK UP
26/03/2025

MAIN BUS BARS
400V - 50Hz - 2500A - 50kA

018.10D L1-AA
018.10D L2-AA
018.10E L3-AA
018.10E N-AA

BUS-1
(Command/Signal Circuit)

P
L03-bus1
048.6A

230V-50Hz

SUPPLY MOTOR SPRING CHARGER C.B.

COMMAND CIRCUITS

Emax E1

			INSERTED	TEST	ISOLATED
S75E	101-102 / 101-104	111-112 / 111-114	X	X	X
S75T	121-122 / 121-124	131-132 / 131-134	X	X	X
S75I	141-142 / 141-144	151-152 / 151-154	X	X	X

S75E/1 S75E/2 S75T/1 S75T/2 S75I/1 S75I/2

040.5A 039.5B 039.6C 040.6A

QF1
630A

(1)

K51 Ekip Hi-Touch

(2)

Q/1 Q/2 Q/3 Q/4 S33M RTC S51

040.2A 043.2B 042.4A 038.8C 040.4A 039.5C 039.3C K2

QA1
4A

042.6A

202 1x1.5 BK
203 1x1.5 BK

QA2
4A

042.6B

204 1x1.5 BK
205 1x1.5 BK

230V-50Hz

039.1A 039.1B

BGS1

MAS M

038.2B

QF1

A-20000
ELECTROLYSER AUXILIARY LOAD

(1) KEY LOCK FOR OPEN POSITION (CIRCUIT-BREAKER)

(2) RACKING-IN/RACKING-OUT PREVENTION LOCK WITH KEY (CIRCUIT-BREAKER)

=	SG-200N1
+	A1/+08
DWG n° :	231298/SD/30
Item n° :	PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

IMESA ELECTRICAL ENGINEERING

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 038

REV. 02

File Name : 1723002197-EL-DG-00030 Rev.02

F.to UNI A3: 420mmx297mm

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

038.9C 204 230VAC

AVAILABLE 9 X1

AVAILABLE 11 X1

EXT 10 X1

EXT 12 X1

LOCAL OPENING COMMAND

SO1 13 RD OPEN 14

206 1x1.5 BK

OPENING COMMAND BY BMCS

LOCAL COMMAND

SA1 LOC REM 037.3B 2 4 close on "LOC"

207 1x1.5 BK

SC1 13 GR CLOSE 14

CLOSING COMMAND BY BMCS

REMOTE COMMANDS

SA1 LOC REM 037.3B 1 3 close on "REM"

213 1x1.5 BK

CONSENT TO CLOSE FROM EXT

204 040.1A

QF1 038.2B 132 134 S75T 131

SA1 LOC REM 037.3B 6 8 close on "LOC"

SA1 LOC REM 037.3B 10 12 close on "REM"

208 1x1.5 BK

SA1 LOC REM 037.3B 5 7 close on "REM"

209 1x1.5 BK

210 1x1.5 BK

13 X1

EXT 14 X1

211 1x1.5 BK

212 1x1.5 BK

QF1 038.2B 144 142 S75I 141

JUMPER TO BE REMOVED IF EXTERNAL CONSENT TO BE USED

QF1 C11 C13 Bkip Con - Actuator K51 YO Y0 038.2B C12

QF1 C1 C3 Bkip Con - Actuator K51 YC YC 038.2B C2

038.9C 205

205 040.1D

AS-COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

= SG-200N1
+ A1/+08
DWG n° : 231298/SD/30
Item n° : PF1002983/30

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

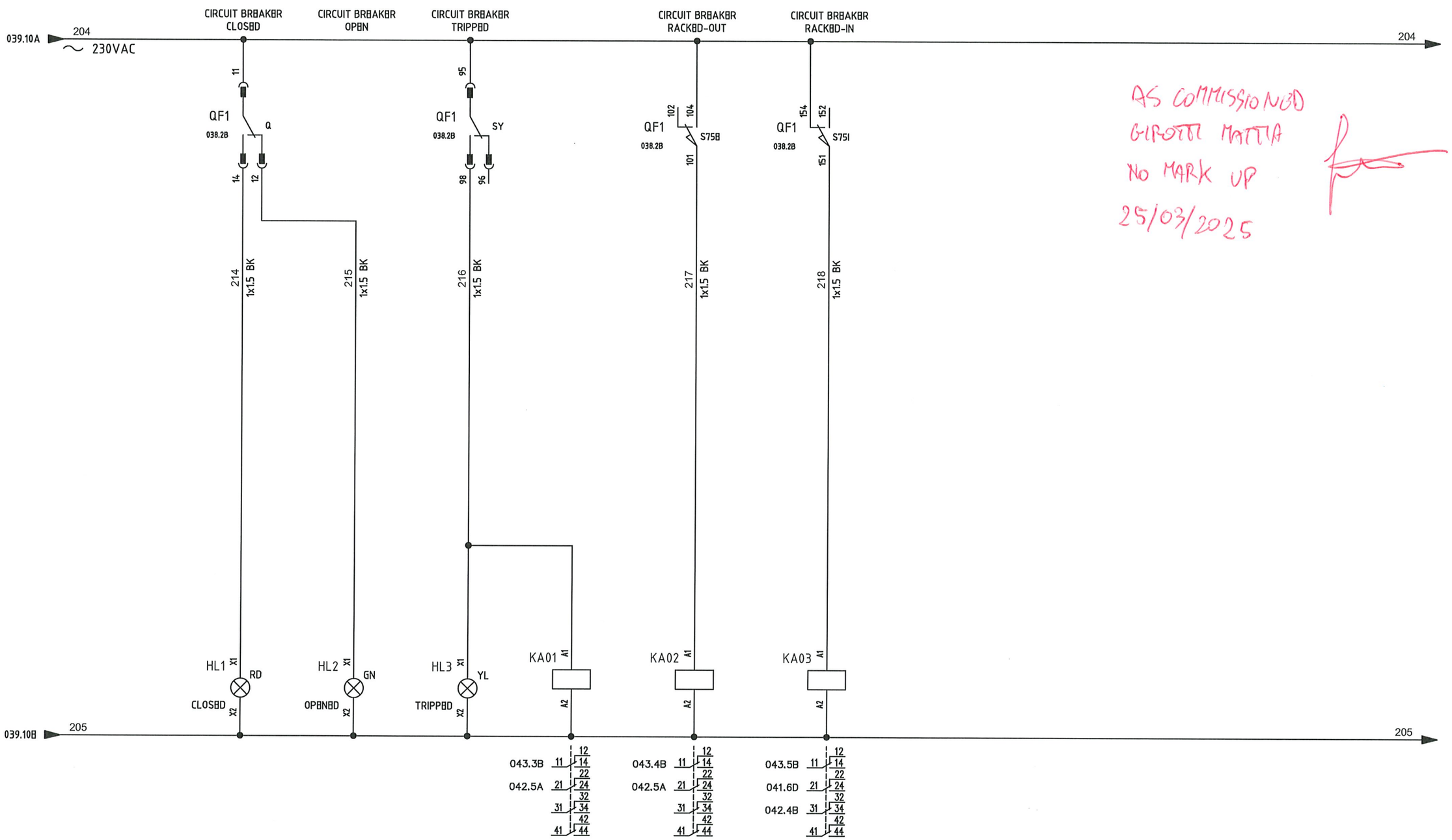
SHEET 039

REV. 02

File Name : 1723002197-EL-DG-00030 Rev.02

F.to UNI A3: 420mmx297mm

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]



AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025

=	SG-200N1
+	A1/+08
DWG n° :	231298/SD/30
Item n° :	PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliary Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 040

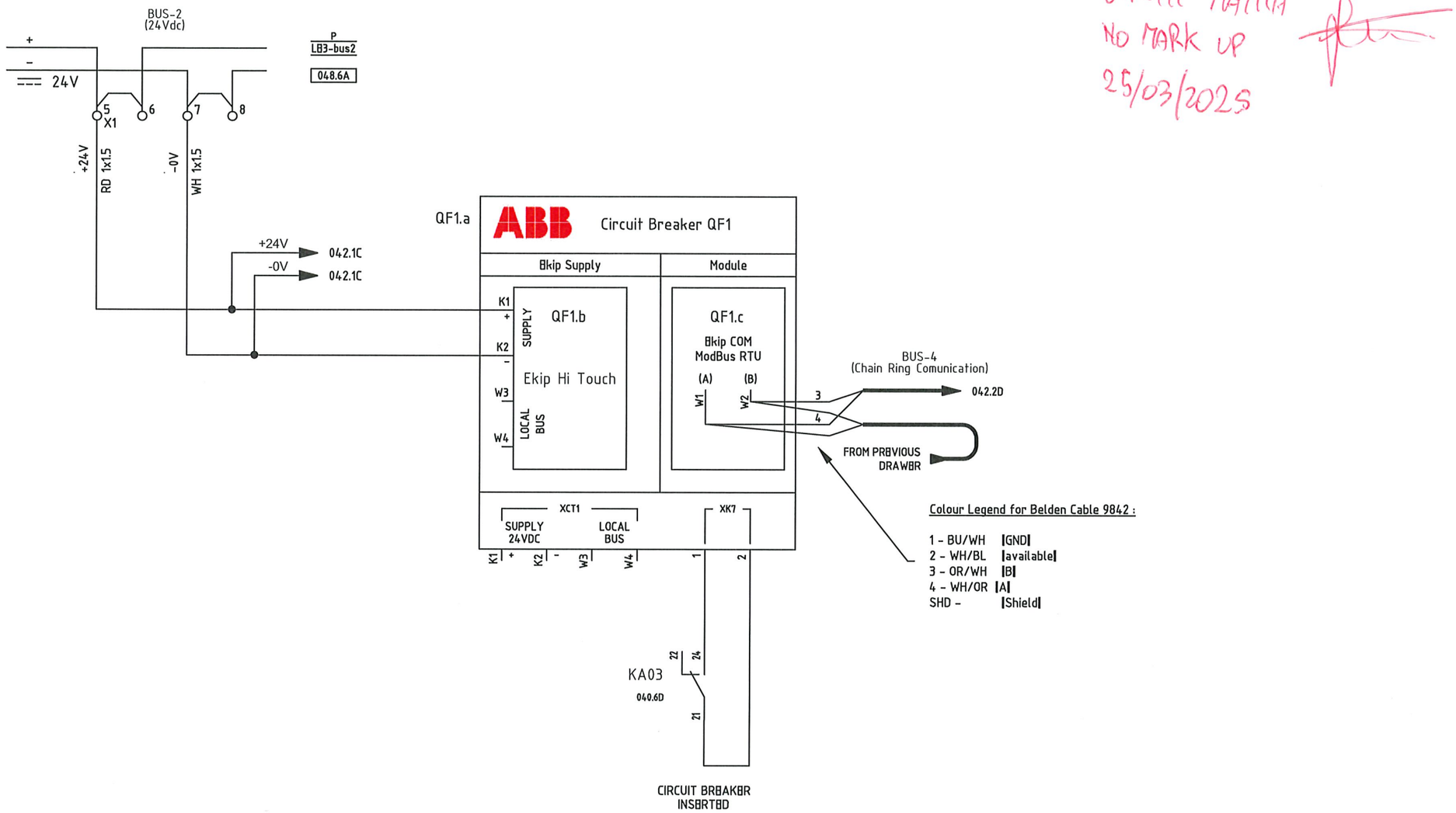
REV. 02

File Name : 1723002197-EL-DG-00030 Rev.02

F.to UNI A3: 420mmx297mm

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025



Colour Legend for Belden Cable 9842 :

1 - BU/WH [GND]
2 - WH/BL [available]
3 - OR/WH [B]
4 - WH/OR [A]
SHD - [Shield]

= SG-200N1							
+ A1/+08							
DWG n° : 231298/SD/30							
Item n° : PF1002983/30	2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)	
	1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)	
	0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)	
	REV.	DATE	DRN	CHKD	APPD	DESCRIPTION	

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 041

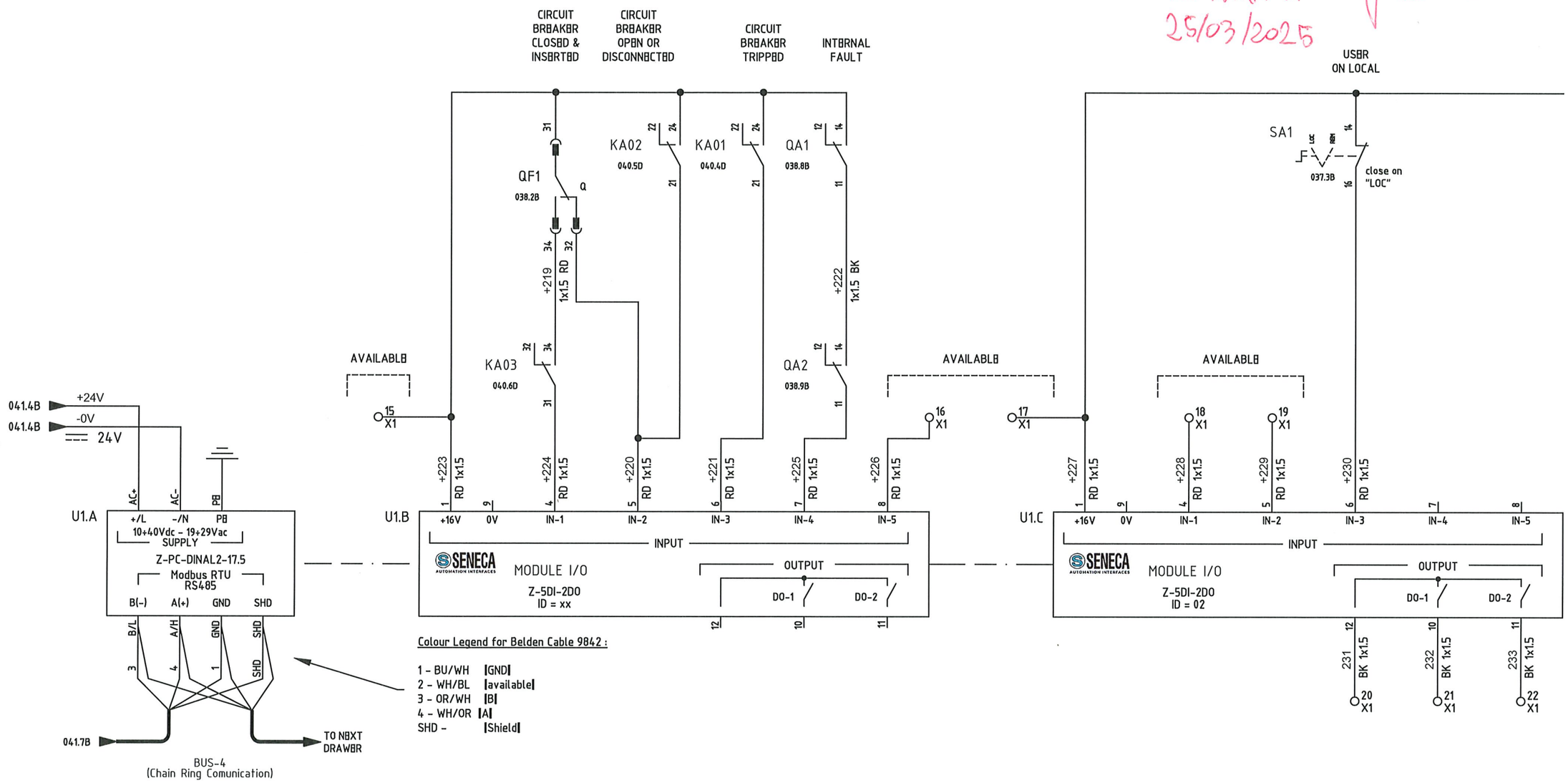
REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.02

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025



Colour Legend for Belden Cable 9842 :

1 - BU/WH [GND]
2 - WH/BL [available]
3 - OR/WH [B]
4 - WH/OR [A]
SHD - [Shield]

=	SG-200N1						
+	A1/+08						
DWG n° :	231298/SD/30						
Item n° :	PF1002983/30						
		2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
		1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxialiry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 042

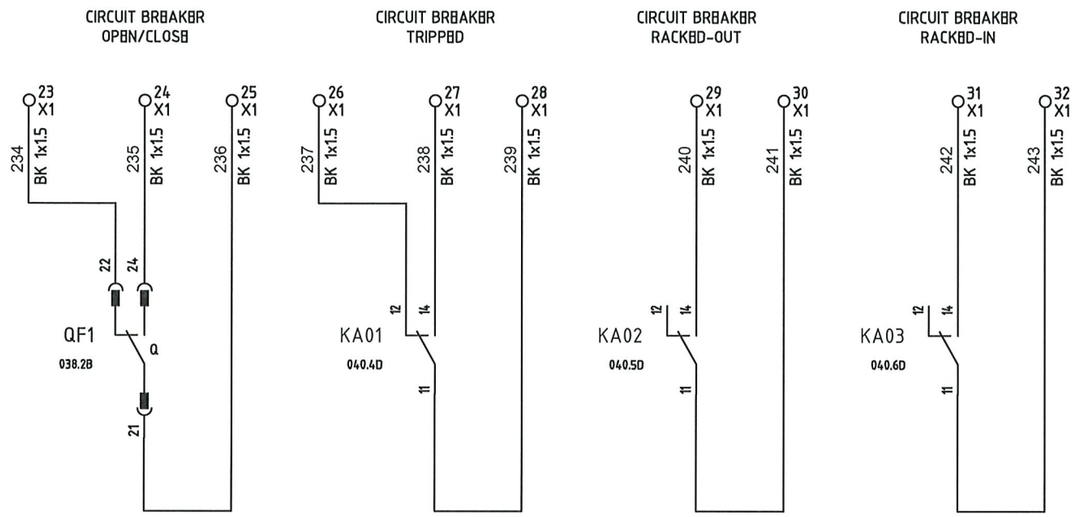
REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.02

FUNCTIONAL DIAGRAM - "A-20000 ELECTROLYSER AUXILIARY LOAD" [L3-630]

AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025



=	SG-200N1						
+	A1/+08						
DWG n° :	231298/SD/30						
Item n° :	PF1002983/30	2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
		1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 043

REV. 02

File Name : 1723002197-EL-DG-00030 Rev.02

F.to UNI A3: 420mmx297mm

AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025

SG-200N1 - A1/+08
X1

NumM	Sheet	Sec.	Type	Terminal Description	Manufacturer
			BT003	BT/3 End bracket	Cabur
1	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
2	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD101GR	HMD/PT/GR End section - Grey	Cabur
3	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
4	038.7A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
5	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
6	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
7	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
8	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
9	039.2A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
10	039.2B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
11	039.3A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
12	039.2B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
13	039.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
14	039.7C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
15	042.3C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
16	042.6C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
17	042.7C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
18	042.8C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
19	042.8C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
20	042.9D	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
21	042.9D	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
22	042.10D	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
23	043.1A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
24	043.2A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
25	043.2A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
26	043.3A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
27	043.3A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
28	043.4A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
29	043.4A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
30	043.5A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
31	043.5A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
32	043.6A	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD201GR	HMD.1/PT/GR End section - Grey	Cabur
			BT003	BT/3 End bracket	Cabur

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

DWG n°: 231298/SD/30
Item n°: PF1002983/30

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 044

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.02

Nome/Item	Fg/Sh	Tipo/Type	Q.tà	Descrizione/Description	Costruttore/Manufacturer	Ubicazione (descrizione)	Quadro (descrizione)
HL1	040	BO 562 2	1	ML1-100R RBD LAMP	ABB	SG-200N1	A1/+08
		BO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	SG-200N1	A1/+08
		KV 035 7	1	MLBL-07R RBD LBD BLOCK INTBGRATBD 230VAC	ABB	SG-200N1	A1/+08
HL2	040	BO 563 0	1	ML1-100G GRBBN LAMP	ABB	SG-200N1	A1/+08
		BO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	SG-200N1	A1/+08
		KV 036 5	1	MLBL-07G GRBBN LBD BLOCK INTBGRATBD 230VAC	ABB	SG-200N1	A1/+08
HL3	040	BO 564 8	1	ML1-100Y YBLLOW LAMP	ABB	SG-200N1	A1/+08
		BO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	SG-200N1	A1/+08
		KV 037 3	1	MLBL-07Y YBLLOW LBD BLOCK INTBGRATBD 230VAC	ABB	SG-200N1	A1/+08
KA01	040	BR 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LBD	ABB	SG-200N1	A1/+08
		BR 686 6	1	CR-M4SS SOCKBT STANDARD X 2/4 C/O(CR-M)	ABB	SG-200N1	A1/+08
		BR 609 8	1	CR-MH HOLDBR FOR CR-M RBLAY	ABB	SG-200N1	A1/+08
KA02	040	BR 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LBD	ABB	SG-200N1	A1/+08
		BR 686 6	1	CR-M4SS SOCKBT STANDARD X 2/4 C/O(CR-M)	ABB	SG-200N1	A1/+08
		BR 609 8	1	CR-MH HOLDBR FOR CR-M RBLAY	ABB	SG-200N1	A1/+08
KA03	040	BR 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LBD	ABB	SG-200N1	A1/+08
		BR 686 6	1	CR-M4SS SOCKBT STANDARD X 2/4 C/O(CR-M)	ABB	SG-200N1	A1/+08
		BR 609 8	1	CR-MH HOLDBR FOR CR-M RBLAY	ABB	SG-200N1	A1/+08
QA1	038	S550253	1	S202M C 4 AUTOMATIC CIRCUIT-BRBAKBR 10KA 2P	ABB	SG-200N1	A1/+08
		A563819	1	S2-CS/H6R AUXILIARY STATB CONTACT 1CO	ABB	SG-200N1	A1/+08
QA2	038	S550253	1	S202M C 4 AUTOMATIC CIRCUIT-BRBAKBR 10KA 2P	ABB	SG-200N1	A1/+08
		A563819	1	S2-CS/H6R AUXILIARY STATB CONTACT 1CO	ABB	SG-200N1	A1/+08
QF1	038	1SDA072819R1	1	B1.2C 1250 Bkip Hi-Touch LSIG In=1000A 4p MP	ABB	SG-200N1	A1/+08
		1SDA073908R1	1	B1.2 W FP 250÷1600A 4P FIXBD PART HR-HR	ABB	SG-200N1	A1/+08
		1SDA073762R1	1	AUP 6 CONTACT AUX INS/TBST/BST TO B1.2	ABB	SG-200N1	A1/+08
		1SDA073687R1	1	CLOSING COIL YC 220÷240VAC/DC TO B1.2÷B6.2	ABB	SG-200N1	A1/+08
		1SDA073711R1	1	MOTOR SPRING CHARGBR 220÷250Vac/dc TO B1.2	ABB	SG-200N1	A1/+08
		1SDA073770R1	1	RTC 250V B1.2	ABB	SG-200N1	A1/+08
		1SDA074166R1	2	Module Bkip Actuator Bmax B1.2÷B6.2÷XT7÷XT7M	ABB	SG-200N1	A1/+08
		1SDA073782R1	1	KLC-D BLOCK KBY ON OPBN POSITION TO B1.2	ABB	SG-200N1	A1/+08
		1SDA073822R1	1	KLP-D INSBRTBD/ISOLATBD KBY BLOCK TO B1.2	ABB	SG-200N1	A1/+08
		1SDA073854R1	1	PBC PUSHBOTTOM COVBR OP/CL FOR B1.2	ABB	SG-200N1	A1/+08
		1SDA074173R1	1	MODUL BKIP SUPPLY 24÷48VDC	ABB	SG-200N1	A1/+08
		1SDA074150R1	1	Module Bkip Com Modbus RTU Bmax B1.2÷B6.2	ABB	SG-200N1	A1/+08
		1SDA112845R1	1	RATING PLUG In=630A B1.2÷-B6.2	ABB	SG-200N1	A1/+08
SA1	037	R601-205__02-W002	1	SWITCH R16 2/5 - 2 STAY POSITION	Comeletric	SG-200N1	A1/+08
		Q4820030	1	Frontplate 48x48mm (LOC-RBM)	Comeletric	SG-200N1	A1/+08
SC1	039	KW 076 0	1	MP1-10G PUSH BUTTON GRBBN WITH BLACK RING	ABB	SG-200N1	A1/+08
		BO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	SG-200N1	A1/+08
		BO 570 5	1	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	SG-200N1	A1/+08
SO1	039	KW 075 2	1	MP1-10R PUSH BUTTON RBD WITH BLACK RING	ABB	SG-200N1	A1/+08
		BO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	SG-200N1	A1/+08
		BO 570 5	1	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	SG-200N1	A1/+08
U1.A	042	Z-PC-DINAL2-17.5	1	DIN RAIL 2SLOT WITH HBAD FOR "Z-5DI-2DO"	SBNBCA	SG-200N1	A1/+08

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

DWG n°: 231298/SD/30
Item n°: PF1002983/30

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load (L3-630)

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00030 | SHEET 045 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00030 Rev.02

AS COMMISSIONED GIROTTI MATTIA NO MARK UP 25/03/2025

Nome/Item	Fg/Sh	Tipo/Type	Q.tà	Descrizione/Description	Costruttore/Manufacturer	Ubicazione (descrizione)	Quadro (descrizione)
U1.B	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	SG-200N1	A1/+08
U1.C	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	SG-200N1	A1/+08
X1		HD400GR__	24	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	SG-200N1	A1/+08
		HD100GR__	8	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	SG-200N1	A1/+08
		BT003	2	BT/3 End bracket	Cabur	SG-200N1	A1/+08
		HD101GR	1	HMD/PT/GR End section - Grey	Cabur	SG-200N1	A1/+08
		HD201GR	1	HMD.1/PT/GR End section - Grey	Cabur	SG-200N1	A1/+08

AS COMMISSIONED
GIROTTI MATTIA
NO MARK UP
25/03/2025

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
2	28/08/2024	Giulietti	Flamminio	Sigismondi	As Built (ASB)
1	08/07/2024	Giulietti	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	10/06/2024	Giulietti	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

DWG n°: 231298/SD/30
Item n°: PF1002983/30

TITLE : SG-200N1
FUNCTIONAL DIAGRAM
A-2000 / Electrolyser Auxiliry Load [L3-630]

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00030

SHEET 046

REV. 02

File Name : 1723002197-EL-DG-00030 Rev.02

F.to UNI A3: 420mmx297mm

CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

CH8 VENDOR SoW

FACTORY ACCEPTANCE TEST

Inspected object	
Pressure vessel No.	
Customer Order No./Part No.	
Aquagas Serial No.	
Manufacturer	AQUAGAS Sweden AB
P&ID nr. (Appendix A)	
GA drawing nr. (Appendix B)	
Electrical drawing nr. (Appendix C)	

Check points	**Result**	**Remark / Setpoint**
Build and dimensions		
With P&ID nr. acc. to above, check build and tags		Dryer must correspond to P&ID.
With dimensional drawing nr. acc. to above, check all dimensions.		Dryer must correspond to dimensional drawing.
With Electrical drawing verify amount/size of cable glands and number of terminals installed.		Dryer must correspond to electrical drawing.
All bottom drain points have plugs; Tower A, B, DE, heater pipe and condensate.		
Check all instruments for ATEX or IECEX approval according to spec.		
Cleaning inspections		
Visual inspection of vessels, piping and nozzles. Internal and external		
Cleaning of all surfaces with air		
		B
Electrical test		
Insulation test trace heater HE 61.1 HE 61.2 HE 61.3	Ω Ω Ω	Min 1 M Ω Max: ∞ M Ω
Insulation test regen. heater HE 64.1	…….. Ω	Min: 1 M Ω Max: ∞ M Ω
Resistance over trace heater HE 61.1 HE 61.2 HE 61.3	…….. Ω …….. Ω Ω	L1-0

Resistance over regen. heater HE 64.1	…….. Ω	L1-0
Continuity over temperature switch, TS(TC) 64.1		On/Off at 20°C, test with continuity (pin 3 & 4).
Set point for TS(TC) 64.1 is acc. to spec.		Set value 280°C
Maximum temp. of reg heater, TS 64.2		Maximum T1: 450°C
Note down type of heater		DHG81B03GG-12-T1, 400V, 12kW
Set point for TS 64.3 is according to spec.		Set value 200°C
Continuity over temperature switch, TS 64.3		Test continuity (pin “Common” & “NC”). Should give signal
Set point for TS 64.4 is according to spec.		Set value 60°C
Continuity over temperature switch, TS 64.4		Test continuity (pin “Common” & “NC”). Should give signal
Grounding cables attached on all solenoid valves, ~~level switch~~, pressure sensor, heater, ~~dew point sensor~~ and positioner		Ground cable present on all EX-d/e devices.
All Ex-i cables have blue markings		Check both ends.
Functional test		**Use reference list where applicable**
Solenoid valves acc. to electrical drawing.		On/off electrical with test instrument. Check corresponding valve movement.
Function of all pneumatic valves, check P&ID for reference		Checked open/close with pilot air. Valve axle location should correspond to actuator indicator.
Function of all manually operated valves, check P&ID for reference		Checked open/close. Manually, no resistance should be felt.
Function of all electrical limit switches, check P&ID for reference		On/off electrical with test instrument. Signal acc. to P&ID
Function of flow control by positioner		4mA=Closed 12mA=25% Open 20mA=80% Open Use loop calibrator
Function of all temperature sensors PT100, check P&ID for reference	… to …. mA at °C	Programmed at supplier 0-300°C. Max deviation between all readings is 0,7 mA. Note down min/max mA or Ω @ RT Use loop calibrator
Pressure transmitter PT 64.1	mA	Check signal at pressure. Analog 4-20mA. Use loop calibrator.
Dew point transmitter	N/A	Check signal at pressure. Analog 4-20mA. Use loop calibrator.
Note down type of dew point sensor	N/A	~~Easidew PRO XP~~ Serial No.
Note down type of pressure transmitter		WIKA IS-3 Sr-Nr.

Condensate System test		
Condensate 3-way valves 64-V13 and 64-V31 have seals		Check that 8 mm connections have bonded seals (tredo) installed.
Test condensate trap valves 64-V31 (controlled by 64-V17), 64-V13 (controlled by 64-V2). Open valve 64-T2 (controlled by 64-V12).		Open/close with air, Change tower with 3-way valve and repeat. Change to tower DE with the other 3-way valve and repeat. Isolate units not in use in all steps.
Level Switch LS-64-1	N/A	Check signal with and without water. Digital 1/0. (No water = No signal)
Level sensor LIT-64-1	N/A	Check signal with and without water. Analog 4-20mA.
Condensate valves 61-V2, 64-V15 and 64-V16 in open position.		Locked in open position
Test condensate trap 64-T2		Open with water/close when empty.
Safety valve(s)		
Check correct opening pressure PSV 64.1 and PSV 64.2		36 bar, check opening pressure marking on valve or manufacturer specification.
Check correct opening pressure PSV 64.3		6 bar, check opening pressure marking on valve or manufacturer specification.
Leak test		
Pneumatic test: pressurised and isolated unit to atmosphere and detect leaks at nozzles, fittings, and valves.		23 bar (g) for 1 hour with air. Detect leaks with leak detecting spray. Note: If applicable, open condensate valve and block outlet.
Helium leak test.		Gas mix with ~10% helium + ~90% compressed air at 25 bar (g) for 1 hour. Detect leaks with Helium leak detector.
Pressurised and isolated HEX water side to atmosphere and detect leaks at nozzles, fittings, and valves.		Pressurised and isolated unit to atmosphere and detect leaks at nozzles, fittings, and valves.
Check all fittings with wrench and gap-inspection tool (Hylok).		When approved, draw a line with dedicated green marker to indicate position of the nut on the coupling.
Visual		
Ground sticker attached on grounding point on skid		
Logo, tower designation stickers, warning stickers (all towers and heater) and trace heating warning label		Precaution Heat Dryer A & B, DE, Heater Pipe. Trace Heating cable warning.
Photos taken of all components		Machine type plate, pressure vessel plates and all 4 sides.

Machine and vessel nameplates attached. Vessel nameplates should be stamped.		All pressure vessels and machine type plate attached.
Filling		
Tower A&B filled with drying agent acc. to specification		~ 60 kg/each (BASF WS)
Tower DE filled with deoxo agent acc. to specification		~ 100 kg DSL2
Other		
Bypass valve 64-V14.1 pre-set		Set to approx. 3 turns, ~50%
Thermowell coupling tightened for all temperature transmitters		Approx. 1/8 turn, check by pulling on sensor. Make sure transmitter is seated before tightening.
Cover for position sensor puck screw attached.		Mount after all tests have passed.
Confirm that T-filters have the correct insert		Mesh screen 0,5 mm, not 50µm filter. See marking on filter housing
Note down all serial numbers in below list		

Temporary checks		
Check Habonim actuators for IIC marking		If IIB then take photo of serial number and send to Project manager. Replace nameplate or actuator with IIC.

Serial number list

Equipment tag	Serial number	Manufacturer	Description
Pressure vessels			
Deoxo vessel			Deoxo vessel
Dryer vessel A			Dryer vessel A
Dryer vessel B			Dryer vessel B
Housing for HE 64.1			Heater pipe
64-T1A			HEX Cooler
64-T1B			HEX Cooler
Other components			
HE 61.1			Trace heater DE vessel
HE 61.2			Trace heater DE vessel
HE 61.3			Trace heater condens.
HE 64.1			Regeneration heater
TS 64.3			Temp. switch 200°C
TS 64.4			Temp. switch 60°C
PT 64.1			Pressure transmitter
FC 64.1			Flow Control
66			Particle filter
PSV 64.1			Safety valve on H2
PSV 64.2			Safety valve on H2

Reference list for instrumentation values

Instrument	Analogue mA	Resistance Ω	Physical value
TT (min/max @ RT*)	5,00-5,17	107-109	RT is usually around 19-22 °C
PT (min/max @ pressure)	11,54-11.97	N/A	26-27,5 bar (g)
HX/HE (min/max @ RT) 12kW	N/A	24 – 24.5	*RT is usually around 19-22 °C

Punch list

Tag nr. or explain location/equipment	**Notes/Remarks/Missing component**	**Corrected or accepted**

Södertälje:
Technician:
Approved by:

Approved by customer:

Signatures

REVU
11:08, 09/08/24

elogen

VENDOR DOCUMENT REVIEW

Reviewed by	**Position**
Hassan HAMMAMI	Quality Engineer

Accepted/Reviewed without Comments. No further revision. Work may proceed.	**CODE 1**	☑
Accepted/Reviewed with Comments. Revise and resubmit. Work may proceed.	**CODE 2**	☐
Rejected. Revise and resubmit. Work may not proceed.	**CODE 3**	☐
Received but not reviewed.	**CODE 4**	☐

ELOGEN acceptance in no way relieves the duty of the supplier to meet the Purchase Order requirements.

APPROUVÉ
Par Hassan HAMMAMI , 11:04, 09/08/2024

elogen

VENDOR DOCUMENT REVIEW

Reviewed by	Position
Hassan HAMMAMI	Quality Engineer

Accepted/Reviewed without Comments. No further revision. Work may proceed.	CODE 1 ☑
Accepted/Reviewed with Comments. Revise and resubmit. Work may proceed.	CODE 2 ☐
Rejected. Revise and resubmit. Work may not proceed.	CODE 3 ☐
Received but not reviewed.	CODE 4 ☐

ELOGEN acceptance in no way relieves the duty of the supplier to meet the Purchase Order requirements.

AQUAGAS SWEDEN AB

INSPECTON & TEST PLAN (ITP)

Inspection, test plan & certificate list
Document No: ITP A-23/24 140
Customer: ELOGEN
Customer order No. / Project No.: BC0006223 / C63
This I&T plan is valid for: hydrogen dryer DEDR 500/36 Offshore
Design code Vessels: PED 2014/68/EU (Module G), EN 13445

No	Quality Control Stage check	Control Document	Report or Document	Inspected By					
				Sub-contractor	Aquagas	Customer	End-user	Notified Body	
1.0	**Pre-manufacturing**			GYP					
1.1	Verification of sub-contracted design drawings		Manufacturing drawings		R1, AP				Sub-contracted manufactured parts: - DE and DR pressure vessels, - Heater pipe
1.2	Verification of design drawing and calculation	EN 13445:2014	Design statement		R1	R1		AP	Pressure vessels
2.0	**Approval**								
2.1	Welding procedure specification (WPS)	EN 15614-1	WPS		R1	R1		R1	Subcontractor and/or Aquagas WPS
2.2	Welding procedure qualification test (WPQR)	EN 15614-1	WPQR		R1	R1		AP	Subcontractor and/or Aquagas WPQR
2.3	Welder's qualification (WPQ)	EN 9606-1	WPQ		R1	R1		AP	Subcontractor and/or Aquagas WPQ
2.4	Radiographic procedure specification	EN 17636-1 class B	Procedure		R1			R1	Applicable 10% welds
2.5	NDT operator's qualification	EN 9712, level II	Certificate		R1			R1	
2.6	Hydrostatic pressure test:	EN 13445:2014	COC	R1	R1	R1		AP	
2.7	Welding and test plan vessels		Test Plan	R1	R1	R1		R1	
2.8	Pressure leak test air	A-10-13	Procedure	R1	R1	R1,			Final test complete units at FAT
2.9	Helium Leak Test		Procedure		R1	R2			Included

Inspection code:
A1=100% inspection
A2=Sample inspection
W1=Witnessed inspection-No hold point
W2= Optional witness-No hold point
H=Hold point

R1=100% review of documentation
R2=Sample review
AP=Approval of document
S=Surveillance

AQUAGAS SWEDEN AB

INSPECTON & TEST PLAN (ITP)

Inspection, test plan & certificate list
Document No: ITP A-23/24 140
Date: 2024-01-22
Customer: ELOGEN
Customer order No. / Project No.: BC0006223 / C63
This I&T plan is valid for: hydrogen dryer DEDR 500/36 Offshore
Design code Vessels: PED 2014/68/EU (Module G), EN 13445

No	Quality Control Stage check	Control Document	Report or Document	Inspected By					Clarifications
				Sub-contractor	Aquagas	Customer	End-user	Notified Body	
3.0	**Fabrication**								
3.1	Inspection of incoming material, identification and transfer identity markings material certificates for pressure parts	EN 10204/3.1 B	Material list/material certificate	A1	R1			R1	Critical items procured by Aquagas: Fittings, internals, valves, instruments
3.2	Examine cut edges of shell, pipes and heads		COC	A1	A2, A1			R1	
3.3	Dimension &visually inspection press. vessels and piping		Shop insp. Cert.	A1	R1, AP			A1	Pressure vessels
3.4	Radiographic examination of vessel & piping	EN 17636-1 class B	X-ray certificate	A1	R1	R1		R1	Standard 10% of welds
3.5	Verification of pressure gauge calibration				R1			R1	
3.6	Verification of pressure safety valve calibration				R1			R1	
3.7	Hydrostatic pressure test	PED 2014/68/EU	P.T. Cert	A1	A1, R1	W2		A1	
3.8	Examination of NDT-reports		Shop insp. Cert	A1	A1, R1	R1		R1	
3.9	Surface treatment / painting	ISO-12944 , C3	COC	A1	A1, R1	R2			
3.10	Leak test with air		COC	A1	A1, R1	R1			
3.11	Issue as built drawing	Dimension report	As built drawing		A1	R2			
3.12	Functional test	Function report	COC		A1	W2	W2		
3.13	Factory Acceptance Test	FAT report	Check list		R1	W2, R1, H	W2		
3.14	Issue of manufacturing record books	I/T plan	MRB		R1	R1			Final Documentation
4.0	**Expediting**								
4.1	Shipping release note issued by customer		Release note		H	H			
4.2	Packing and Labelling inspection				A1	R2			

Inspection code:
A1=100% inspection
A2=Sample inspection
W1=Witnessed inspection-No hold point
W2= Optional witness-No hold point
H=Hold point
R1=100% review of documentation
R2=Sample review
AP=Approval of document
S=Surveillance

C63-AQU-QIX-002

END OF MANUFACTURING REPORT

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
01	*1st Issue*	*14-NOV-2024*	*AQU*	*IDI*	*LDG*

Client Document Number	**ELO-INN-BPH-RPT-00021**

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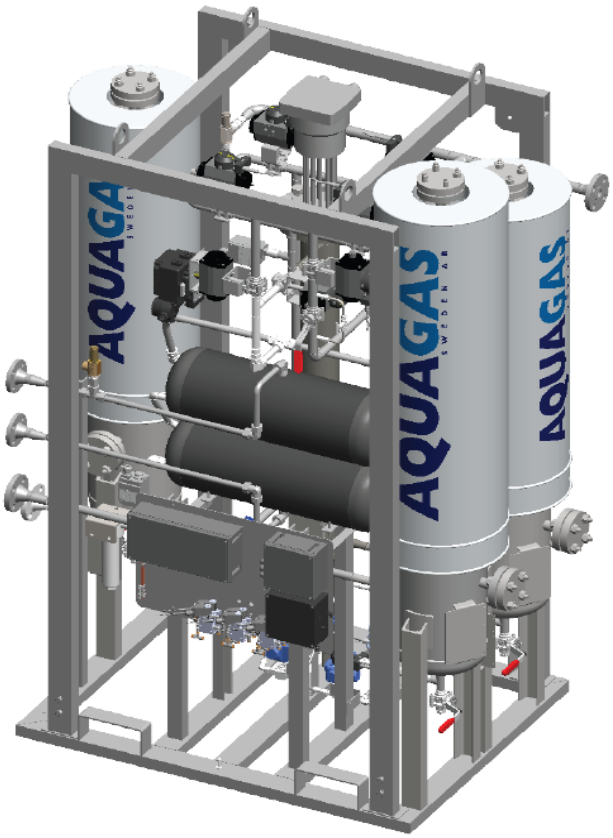
Issued: 2024-10-01

MANUFACTURING RECORD BOOK for AQUAGAS deoxo-dryer DEDR 500/36

Customer order No: BC0006223
Country of installation: Netherlands - Offshore
AQUAGAS order No: A-23/24 140
AQUAGAS serial No: A-23/24 140

BILL OF MATERIAL

	Chapter
AQUAGAS deoxo-dryer DEDR 500/36 serial No: A-23/24 140 acc. General arrangement drawing 21231800 Rev. 4 consisting of:	06
* 1 pcs DEOXO Vessel: Serial No: GYP-2430131	01
* 2 pcs DRYER Vessels: Serial No: GYP-2430132, GYP-2430133	01
* 1pc Heater pipe: Serial No: GYP-2430134	01
* Set of instruments and valves acc. P&ID 20230440 Rev. 3	05



AQUAGAS SWEDEN AB

Issued: 2024-10-01

01 PRESSURE VESSEL DOCUMENTATION

02 VALVE AND MECHANICAL PARTS DATA SHEETS

03 INSTRUMENTS AND ELECTICAL EQUIPMENT DATA SHEETS & CERTIFICATES

04 HANDLING OPERATING MAINTENANCE INSTRUCTIONS

05 INSTRUMENT AND VALVE LISTS

06 GENERAL ARRANGEMENT DRAWING

07 P&I DIAGRAM

08 ELECTRICAL CONTROL WIRING DIAGRAM

09 CONTROL LOGIC INSTRUCTION FOR PROGAMMING PLC

10 FAT AND FUNCTIONAL TESTS

11 CE-MARKING WITH DECLARATION OF CONFORMITY

12 ALARM AND TROUBLE SHOOTING LIST

13 SPARE PARTS LIST

14 HELIUM LEAK TEST

15 RISK ANALYSIS & HAZOP

16 PICTURES PUNCH LIST AFTER FAT

17 INSPECTION AND TEST PLAN

01 -PRESSURE VESSEL DOCUMENTATION

01.1 - DE DR Vessels

GYÉMÁNT-PIRAZOL KFT.

Műszaki átadási dokumentáció

Technical documentation

Megnevezés / *Product name:*

DE-250/40; DR-250/40 A; DR-250/40 B vessels

Gyári szám / Serial No.:

GYP-2430131; GYP-2430132; GYP-2430133

Megrendelő / *Customer:*

AQUAGAS SWEDEN AB.

Megrendelés száma / *Order No.:*

IK-23/24 140-14

GYÉMÁNT-PIRAZOL KFT.

Tartalomjegyzék
Contents

Megnevezés: *Product name*	**DE-250/40; DR-250/40 A; DR-250/40 B vessels**
Gyári szám: *Serial No.*	**GYP-2430131; GYP-2430132; GYP-2430133**

Sorszám *No.*	Fejezet / Dokumentum azonosító *Chapter / Document ID.*		Oldalak száma *Number of pages*
01	**EU Megfelelőségi nyilatkozat** *EU Declaration of Conformity*	**EU- 013-ST-2024-1**	1
02	**Megfelelőségi tanúsítvány (NoBo)** *Certificate of Conformity*	**HU05/62993/24; HU05/62994/24; HU05/62995/24**	3
03	**Átvételi jegyzőkönyv, megvalósulási rajz (NoBo)** *Acceptance protocol, as built drawing*	**HU05/62993/24; HU05/62994/24; HU05/62995/24**	15
04	**Tervellenőrzési jegyzőkönyv (NoBo)** *Design review report*	**HU04/62978/24**	3
05	**Jóváhagyott tervdokumentáció (NoBo)** *Approved plans*		5
06	**Beépített anyagok jegyzéke** *List of built-in materials*		1
07	**Alapanyag bizonylatok** *Material certificates*		32
08	**Hegesztési és varratvizsgálati** *Welding and examination plan*		1
09	**WPS lapok** *WPS sheets*		4
10	**Hegesztő minősítések** *Welder certificates*		3
11	**Hegesztőanyag bizonylatok** *Filler metal certificates*		2
12	**Roncsolásmentes vizsgálati jegyzőkönyvek** *NDT test reports*	**VT- 013-ST-2024-1** **PT- 013-ST-2024-1** **RT- 013-ST-2024-1**	1 1 1
13	**Méretellenőrzési jegyzőkönyv** *Dimension check report*		6
14	**Nyomáspróba, Tömörségi próba jegyzőkönyv** *Pressure test, Tightness test record*	**NY- 013-ST-2024-1**	3
15	**Veszélyelemzés** *Hazard analysis*		5
16	**Üzemeltetési utasítás** *Operating instructions*		4
17	**Gyártói tanúsítványok** *Manufacturer certificates*		3

GYÉMÁNT-PIRAZOL KFT.	**EU-MEGFELELŐSÉGI NYILATKOZAT** **2014/68/EU direktíva szerint** *Declaration of Conformity* *according to EU Directive 2014/68/EU*	**Sorszám** / *N* o.: EU- 013-ST-2024-1

Gyártó: *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**

nyilatkozik, hogy az alábbi nyomástartó berendezés

herewith declares that the following pressure equipment

Megnevezés: *Product name*	**DE-250/40; DR-250/40 A; DR-250/40 B vessels**
Gyári szám: *Serial No.*	**GYP-2430131; GYP-2430132; GYP-2430133**
Gyártási Év *Year of manufacturing*	**2024**

Tér: *Space*	**Shell side**	-	-
Min / max megengedett nyomás [bar]: *Min / max allowable pressure*	**-1/+39**	-	-
Min / max megengedett hőmérséklet [°C] *Min / max allowable temperature*	**-20 / +270**	-	-
Térfogat [l] *Volume*	**DE:86; DR:76**	-	-
Próbanyomás [bar]: *Test pressure*	**68,8**	-	-
Alkalmazott közeg: *Used fluid*	**water**	-	-

megfelel a 2014/68/EU irányelv követelményeinek

compliant the Pressure Equipment Directive 2014/68/EU

PED kategória / modul *PED kategorie / modul*	IV/G	**Megfelelőségi értékelési eljárás:** *Applied standards and technical specifications*	MSZ EN 13445

Engedélyezést, ellenőrzést végző szervezet: *Notified body*	**0090 - TÜV Thüringen e.V.** **Konrad-Zuse-Straße 21 D-99099 Erfurt**
Tervellenőrzési jegyzőkönyv: *Design review report*	**HU04/62978/24**
Átvételi jegyzőkönyv: *Acceptance protocol*	**HU05/62993/24; HU05/62994/24; HU05/62995/24**
Megfelelőségi tanúsítvány: *Certificate of Conformity*	**HU05/62993/24; HU05/62994/24; HU05/62995/24**

Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9. 2024.04.08	GYÉMÁNT-PIRAZOL KFT. 4031 Debrecen, Nívó u. 11. Adószám: 32071814-2-09 Cégjegyzékszám: 09-09-034339 1. Lantos Zsolt
Hely, dátum / *Place, date*	**Név, aláírás, pecsét** / *Name, signature, stamp*

CERTIFICATE

CONFORMITY BASED ON UNIT VERIFICATION (Module G) according to Directive 2014/68/EU

Certificate No.: HU05/62993/24

Name and address of manufacturer:

GYÉMÁNT-PIRAZOL Kft.
H-4031 Debrecen
Nívó utca 11.

This is to certify, that the results of examination for the pressure equipment listed below meet the requirements of the Pressure Equipment Directive 2014/68/EU. The pressure equipment complies to the submitted documents and is marked with the following stamp:

CE 0090

Examination Report – Design	HU04/62978/24
Examination Report – Manufacture	HU05/62993/24
Description of pressure equipment	DE-250/40 Vessel
Category	IV
Drawing No.	DG-GYP-243013-01-00 Rev.0
Manufacturers Serial No.	GYP-2430131
Order No.	TTHU-ÁTV-24-4020
Remarks	Design Code applied: EN 13445:2021

Budapest, 05.04.2024

TÜV THÜRINGEN

K. Wiegand
Certification Body
for Pressure Equipment
TÜV Thüringen e.V.
Notified Body 0090

TÜV Thüringen e.V. Notified Body ÜTV 15 0090

TÜV Thüringen e.V., Konrad-Zuse-Straße 21, D-99099 Erfurt
Tel: +49-361-4283-0, Fax: +49-361-4283-242, E-Mail: ped@tuev-thueringen.de

CERTIFICATE

CONFORMITY BASED ON UNIT VERIFICATION (Module G) according to Directive 2014/68/EU

Certificate No.: HU05/62994/24

Name and address of manufacturer:

GYÉMÁNT-PIRAZOL Kft.
H-4031 Debrecen
Nívó utca 11.

This is to certify, that the results of examination for the pressure equipment listed below meet the requirements of the Pressure Equipment Directive 2014/68/EU. The pressure equipment complies to the submitted documents and is marked with the following stamp:

CE 0090

Examination Report – Design	HU04/62978/24
Examination Report – Manufacture	HU05/62994/24
Description of pressure equipment	DR 250/40 A Vessel
Category	IV
Drawing No.	DG-GYP-243013-01-00 Rev.0
Manufacturers Serial No.	GYP-2430132
Order No.	TTHU-ÁTV-24-4020
Remarks	Design Code applied: EN 13445:2021

Budapest, 08.04.2024

TÜV THÜRINGEN

TÜV Thüringen e.V. Notified Body ÜTV 15 0090

K. Wiegand
Certification Body
for Pressure Equipment
TÜV Thüringen e.V.
Notified Body 0090

TÜV Thüringen e.V., Konrad-Zuse-Straße 21, D-99099 Erfurt
Tel: +49-361-4283-0, Fax: +49-361-4283-242, E-Mail: ped@tuev-thueringen.de

CERTIFICATE

CONFORMITY BASED ON UNIT VERIFICATION (Module G) according to Directive 2014/68/EU

Certificate No.: HU05/62995/24

Name and address of manufacturer:

GYÉMÁNT-PIRAZOL Kft.
H-4031 Debrecen
Nívó utca 11.

This is to certify, that the results of examination for the pressure equipment listed below meet the requirements of the Pressure Equipment Directive 2014/68/EU. The pressure equipment complies to the submitted documents and is marked with the following stamp:

CE 0090

Examination Report – Design	HU04/62978/24
Examination Report – Manufacture	HU05/62995/24
Description of pressure equipment	DR 250/40 B Vessel
Category	IV
Drawing No.	DG-GYP-243013-01-00 Rev.0
Manufacturers Serial No.	GYP-2430133
Order No.	TTHU-ÁTV-24-4020
Remarks	Design Code applied: EN 13445:2021

Budapest, 08.04.2024

TÜV THÜRINGEN

K. Wiegand
Certification Body
for Pressure Equipment
TÜV Thüringen e.V.
Notified Body 0090

TÜV Thüringen e.V. Notified Body ÜTV 15 0090

TÜV Thüringen e.V., Konrad-Zuse-Straße 21, D-99099 Erfurt
Tel: +49-361-4283-0, Fax: +49-361-4283-242, E-Mail: ped@tuev-thueringen.de

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

1	General information for Certification Body / Testing Laboratory		Insp. No.	HU05/62993/24
1.1	Applicant	GYÉMÁNT-PIRAZOL Kft.		
1.2	Manufacturer, address	GYÉMÁNT-PIRAZOL Kft., H-4031 Debrecen, Nívó u. 11.		
1.3	Order No. / Serial No.	TTHU-ÁTV-24-4020/GYP-2430131		
1.4	Equipment designation	DE-250/40 Vessel		
1.5	Drawing No.	DG-GYP-243013-01-00	Revision	0
2	**Inspection according to**	**2014/68/EU, EN 13445:2021**	Module	G
2.1	Type of pressure equipment	pressure vessel		
2.2	Remarks	---		

3	Operational limits	Chamber 1	Chamber 2	Chamber 3	Chamber 4
3.1	Designation of chamber	workchamber			---
3.2	PS [bar]	+39,0/-1,0			---
3.3	TS [°C]	+270/-20			---
3.4	PT [bar]	68,8			---
3.5	Test fluid	water	---	---	---
3.6	Corrosion allowance [mm]	1,0			---
3.7	Number of allowable load cycles	20 000*			---
3.8	Allowable load cycle range [bar]	0/+38,0			---
3.9	Volume [L] / DN	86,0			---
3.10	Fluid group	1	---	---	---
3.11	Category acc. to Annex II	IV	---	---	---

4	Additional loads	---
4.1	Vessel position first pressure test	**vertical**
4.2	Seismic	
4.3	Wind	
4.4	Nozzles	
4.5	Others	

5	Technical documents examined	
5.1	Notified Body	TÜV Thüringen e.V.
5.2	Approved drawing, parts list, other documents	DG/PL-GYP-243013-01-00 Rev.0
5.3	Design examination report by Notified Body	HU04/62978/24
5.4	Formal subcontracting	---

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

5.5	Module B[B1]: Certificate by Notified Body	---
5.6	The documents are suitable for the evaluation of the pressure equipment.	
6	**Intermediate inspections [Annex I para. 3]**	
6.1	Preparation of materials for joining [Annex I, 3.1.1.]	not applicable
6.2	Internal visual inspection	acceptable, see section 11
7	**Final examination [Annex I para. 3]**	
7.1	Visual inspection and dimensional check	considered, acceptable
7.2	Material test reports and traceability	considered, acceptable
7.3	Approvals for procedures (permanent joining, forming)	considered, acceptable
7.4	Approvals for personnel (permanent joining)	considered, acceptable
7.5	Approvals for NDE-personnel	considered, acceptable
7.6	NDE-personnel - Approval according to PED, Annex I, 3.1.3	considered, acceptable
7.7	Heat treatment	not applicable
7.8	Marking [Annex I, 3.3]	considered, acceptable
8	**Calibration of measuring tools & test resources**	
8.1	Manometer / pressure probe [33866; 33867]	considered, acceptable
8.2	Heat treatment devices [---]	not applicable
8.3	Others [---]	not applicable
9	**Pressure test [Annex I para. 3]**	
9.1	Test pressure, test fluid	considered, acceptable
10	**Examination of fundamental documentary requirements**	
10.1	Declaration of conformity of manufacturer	considered, acceptable
10.2	Reference of declaration to pressure equipment	considered, acceptable
10.3	Operating instructions of manufacturer	considered, acceptable
10.4	Examination of instruction regarding technical parameters	considered, acceptable

11 Remarks

(1) to 1.3: Serial number has been specified on the as-built drawing according to the realized state.
(2) to 3.7: Simplified fatique analysis acc. to EN 13445-3 point 17
(3) to 6.2: only nozzles circumferential welding seams randomly during manufacturing on 13.03.2024 and on 26.03.2024 at final examination.
(4) to 9.1: executed on 26.03.2024 at final examination, result acceptable.
(5) Name plate rivet, detachable parts (blind flanges, nozzles N1, N4) and flange N1 (Item No. 8.) stamped with: T Ü V 15

12 Result of inspection

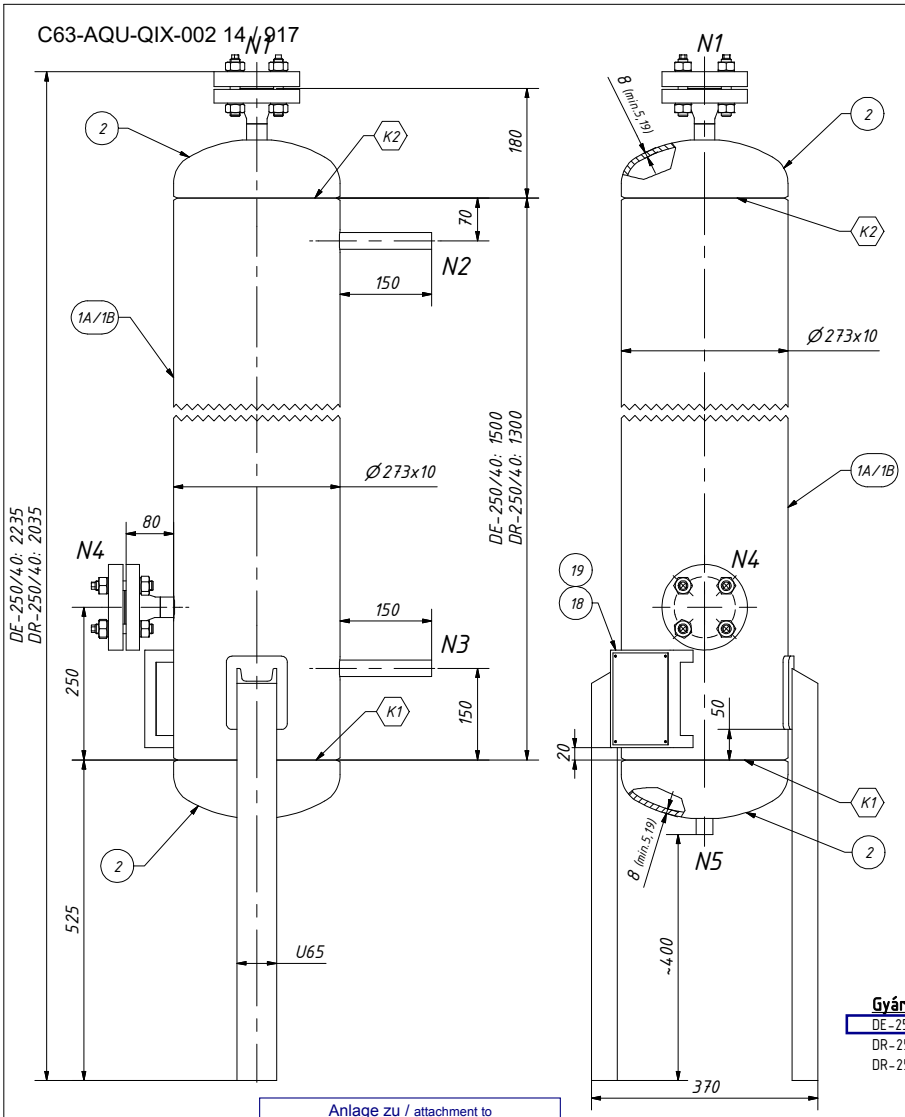
Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

	The inspection of pressure equipment is finished.

Testing Laboratory for Pressure Equipment Notified Body 0090 TÜV Thüringen e.V. Konrad-Zuse-Straße 21 D-99099 Erfurt ped@tuev-thueringen.de	Date	26.03.2024	Place	Salgótarján	Stamp
	Fülöp Kerekes Name / Signature				

	Annex
13	Drawing with approval Listing of material test certificates, traceability checked at premesis of manufacturer on NDE test reports, procedure-/control tests operating instructions, declaration of conformity

C63-AQU-QIX-002 14/917

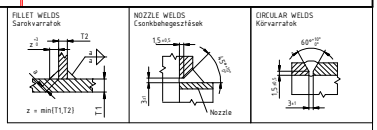


MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 (Druckgerät PED Art.1) [Pressure equipment PED Art. 1]		DE-250/40 // DR-250/40
	Terek neve (Name der Räume) [Name of spaces]		Munkatér / Shellside
	Közeg [Medium] [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Füllgutes) [Allowed density]	[kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nenninhalt / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13. cikk. (Flüssigkeitskl.-PED, Art. 13) [Fluidgroups acc. to Art. 13]		1
	Hőátadó felület (Wärmeaustauscher areal) [Heat exchanger area]	[m²]	-
	Közeg állapot PED. 13. cikk. (Medumzustand-PED, Art. 13) [Condition of fluid acc. To PED, Art. 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]	[barg]	-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) [Category-PED, Art. 14]		IV. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) [Module-PED, Art. 14]		G modul
	Min./max üzemi hőmérséklet (min./max. zul. Betriebstemperatur) [min./max. operating Temperature]	[°C]	-20 / +270
	Próbanyomás (PT) (Prüfüberdruck (PT)) [Test pressure (PT)]	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgáló közeg (Prüfmedium) [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (PS) (Berechnungsüberdruck (PS)) [Design over pressure] (PS)	[barg]	-1 / +39
	Tervezési hőmérsékletet (TS) (Berechnungstemperatur (TS)) [Design temperature (TS)]	[°C]	-20 / +270
	Terhelés AD-W10 (Beanspruchungsfall AD-W10) [Load case AD-W10]		-
	Korróziós pótlék (Abnutzungszuschlag) [Corrosion allowance]	[mm]	1
	Ciklus szám (Lastspielzahl) [Load cycles]		20.000
	Nyomásváltozás (Druckschwankungsbreite) [Pressure difference]		0-38 bar (-20°C - +50°C)
	Biztonsági tényező, Üzemi (Sicherheitsbeiwert, Betrieb) [Safety factor, Operation]		1,5
	Üres tömeg (Gewicht leer) [Weight empty]	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) [Weight with water filling]	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben (Gewicht während des Betriebs) [Operating weight]	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési előírás (Auslegung, Herstellung, Prüfung) [Design code]		MSZ EN 13445-3:2021
	Tervellenőrzés (Entwurfsprüfung) [Design-examination]		MSZ EN 13445-3:2021
	Végátvétel, nyomáspróba (Schluß- und Druckprüfung) [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]		GYP-2430131 - GYP-2430133
	Gyártási év (Herstellungsjahr) [Year of manufacture]		2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT
Non-destructive test

VIZSGÁLATI ELJÁRÁS Testing procedure		VIZSGÁLTI TERJEDELEM Test quantity					
Hegesztési tényező: Joint efficiency:	0,85	Csomópont (Welding junction)	Hosszvarrat (Longitudinal seam)	Kipany (Shell) Körvarrat (Circular seam)	Csonk / Karima (Nozzle / Flange) Körvarrat (Circular seam)	Behegesztés (Set-in)	Sarokvarrat (Fillet weld)
Szemrevételezési vizsgálat: Visual test:	VT	100%					
Folyadékbehatolásos / Mágnesporos vizsgálat: Dye Penetrat / Magnetic particel test:	PT / MT	-	-	100%	100%	100%	-
Radiográfiai / Ultrahangos vizsgálat: Radiography / Ultrasonic test:	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok: Other tests:				-			



Gyári számok / Serial No.: *

DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Anlage zu / attachment to	
Prüfbericht / report N°	HU05/62993/24
Datum / date:	26.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nivó u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu
CE 0090

Tervezési kód: Design code:	Gyártási szám: Serial Nr.: *
MSZ EN 13445: 2021	Gyártási év: Year of built: 2024
Megnevezés: Designation:	DE-250/40 // DR-250/40
Űrtartalom (bruttó): Volume:	Munkatér / Workspace [Liter] DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg] -1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C] -20 / +270
PED kategória/modul: PED category/module:	IV./G
Próbanyomás: Test pressure:	[barg] +68,8
Próbanyomás dátuma: Date of test pressure:	2024.__.
Tömeg üresen: Empty weight:	[kg] DE: ~135; DR:~125

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

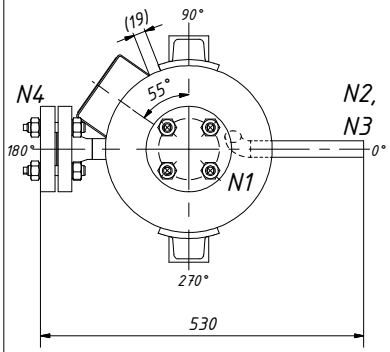
MEGJEGYZÉSEK:

- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- A 21, 22-es tételeket a megrendelő (AQUAGAS) biztosítja!
- A 21, 22-es tételeket a fenék behegesztése előtt beszerelni!
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 3 db. (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

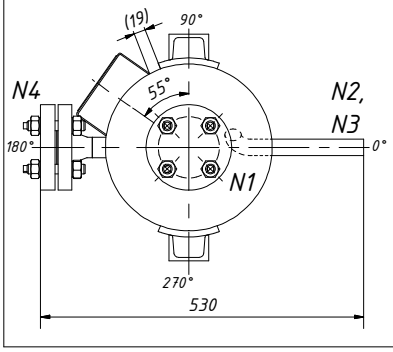
Note:

- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

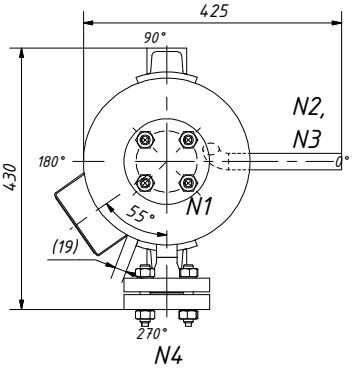
Felülnézet
Top view
DE-250/40: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 A: 1 pc.
M1:6



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeitet Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprueft Checked by	2024. 01. 31.				

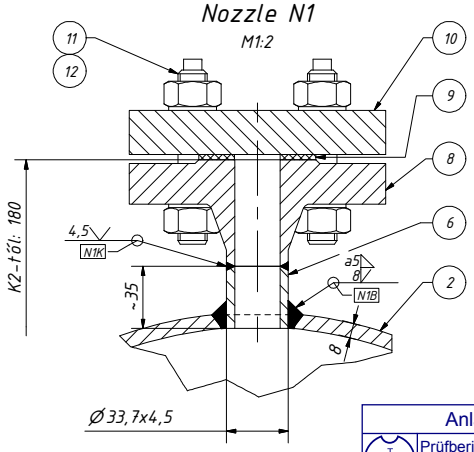
Megnevezés Benennung Title

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

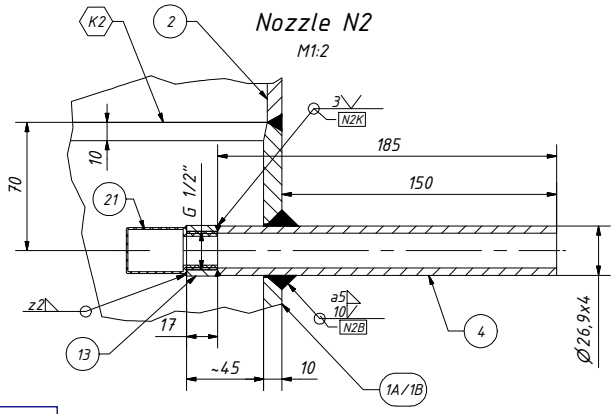
Munkaszám Arbeit Nr. Work No.	013-ST-2024
Méretarány Masstab Scale	M 1:6
Anyagminőség Werkstoff Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Spicherdatum / Saved on	2024. 01. 31.
Rajzszám: Zeichn.Nr. Drwg.No.	DG-GYP-243013-01-00
Módosítás: Aenderung Revision	0
Lapok száma: Blatt Sheet	1 von of 1
Rajzlap:	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

N1 csonk
Nozzle N1
M1:2



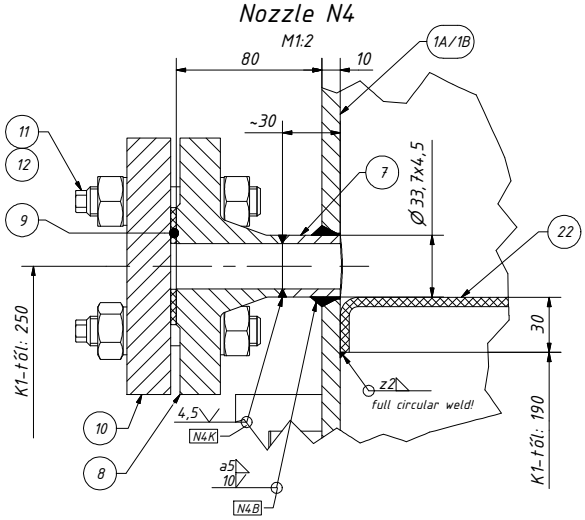
N2 csonk
Nozzle N2
M1:2



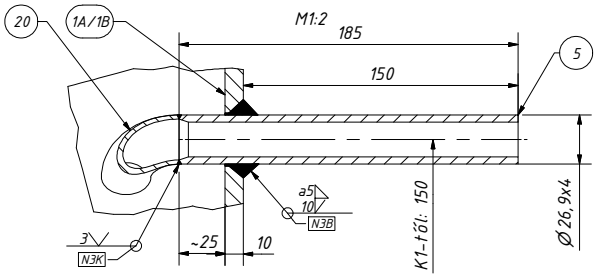
Anlage zu / attachment to

Prüfbericht / report N°	HU05/62993/24
Datum / date:	26.03.2024

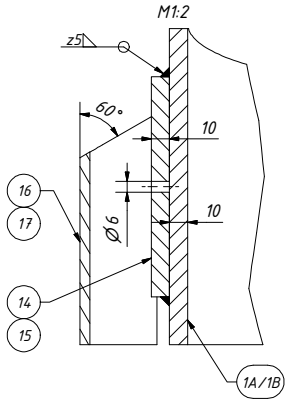
N4 csonk
Nozzle N4
M1:2



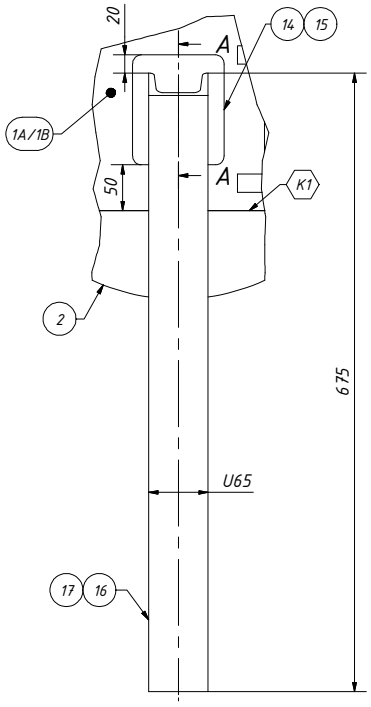
N3 csonk
Nozzle N3
M1:2



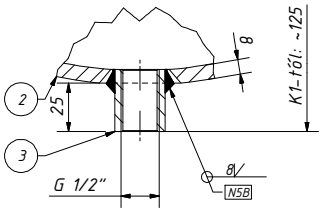
A-A metszet
A-A section
M1:2



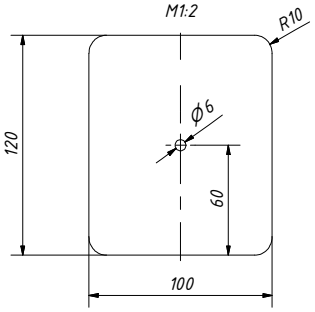
Láb
Leg
M1:4



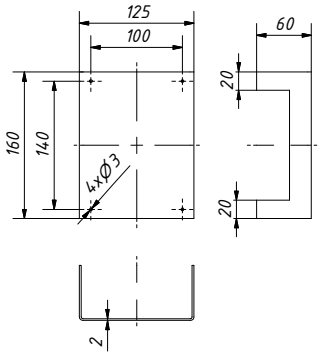
N5 csonk
Nozzle N5
M1:2



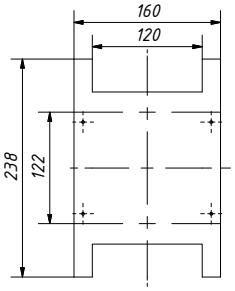
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

	Datum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette / Bearbeitet / Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Geprueft / Checked by	2024. 01. 31.				

Megnevezés / Benennung / Title

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Részletek

Munkaszám / Arbeit Nr. / Work No.	013-ST-2024
Méretarány / Massstab / Scale	M 1:10
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Spicherdatum / Saved on	2024. 01. 31.
Rajzszám: / Zeichn.Nr. / Drwg.No.	DG-GYP-243013-01-01
Módosítás: / Aenderung / Revision	0
Lapok száma: / Blatt / Sheet	1 von / of 1
Rajzlap:	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

1	General information for Certification Body / Testing Laboratory		Insp. No.	HU05/62994/24
1.1	Applicant	GYÉMÁNT-PIRAZOL Kft.		
1.2	Manufacturer, address	GYÉMÁNT-PIRAZOL Kft., H-4031 Debrecen, Nívó u. 11.		
1.3	Order No. / Serial No.	TTHU-ÁTV-24-4020/GYP-2430132		
1.4	Equipment designation	DR 250/40 A Vessel		
1.5	Drawing No.	DG-GYP-243013-01-00	Revision	0
2	**Inspection according to**	**2014/68/EU, EN 13445:2021**	Module	G
2.1	Type of pressure equipment	pressure vessel		
2.2	Remarks	---		

3	Operational limits	Chamber 1	Chamber 2	Chamber 3	Chamber 4
3.1	Designation of chamber	workchamber			---
3.2	PS [bar]	+39,0/-1,0			---
3.3	TS [°C]	+270/-20			---
3.4	PT [bar]	68,8			---
3.5	Test fluid	water	---	---	---
3.6	Corrosion allowance [mm]	1,0			---
3.7	Number of allowable load cycles	20 000*			---
3.8	Allowable load cycle range [bar]	0/+38,0			---
3.9	Volume [L] / DN	76,0			---
3.10	Fluid group	1	---	---	---
3.11	Category acc. to Annex II	IV	---	---	---

4	Additional loads	---
4.1	Vessel position first pressure test	**vertical**
4.2	Seismic	
4.3	Wind	
4.4	Nozzles	
4.5	Others	

5	Technical documents examined	
5.1	Notified Body	TÜV Thüringen e.V.
5.2	Approved drawing, parts list, other documents	DG/PL-GYP-243013-01-00 Rev.0
5.3	Design examination report by Notified Body	HU04/62978/24
5.4	Formal subcontracting	---

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

5.5	Module B[B1]: Certificate by Notified Body	---
5.6	The documents are suitable for the evaluation of the pressure equipment.	
6	**Intermediate inspections [Annex I para. 3]**	
6.1	Preparation of materials for joining [Annex I, 3.1.1.]	not applicable
6.2	Internal visual inspection	acceptable, see section 11
7	**Final examination [Annex I para. 3]**	
7.1	Visual inspection and dimensional check	considered, acceptable
7.2	Material test reports and traceability	considered, acceptable
7.3	Approvals for procedures (permanent joining, forming)	considered, acceptable
7.4	Approvals for personnel (permanent joining)	considered, acceptable
7.5	Approvals for NDE-personnel	considered, acceptable
7.6	NDE-personnel - Approval according to PED, Annex I, 3.1.3	considered, acceptable
7.7	Heat treatment	not applicable
7.8	Marking [Annex I, 3.3]	considered, acceptable
8	**Calibration of measuring tools & test resources**	
8.1	Manometer / pressure probe [33866; 33867]	considered, acceptable
8.2	Heat treatment devices [---]	not applicable
8.3	Others [---]	not applicable
9	**Pressure test [Annex I para. 3]**	
9.1	Test pressure, test fluid	considered, acceptable
10	**Examination of fundamental documentary requirements**	
10.1	Declaration of conformity of manufacturer	considered, acceptable
10.2	Reference of declaration to pressure equipment	considered, acceptable
10.3	Operating instructions of manufacturer	considered, acceptable
10.4	Examination of instruction regarding technical parameters	considered, acceptable

11 Remarks

(1) to 1.3: Serial numbers have been specified on the as-built drawing according to the realized state.
(2) to 3.7: Simplified fatique analysis acc. to EN 13445-3 point 17
(3) to 6.2: Internal visual inspection: only nozzles circumferential welding seams randomly during manufacturing on 13.03.2024 and on 26.03.2024 at final examination.
(4) to 9.1: executed on 26.03.2024 at final examination, result acceptable.
(5) Name plate rivet, detachable parts (blind flanges, nozzles N1, N4) and flange N1 (Item No. 8.) stamped with:



Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

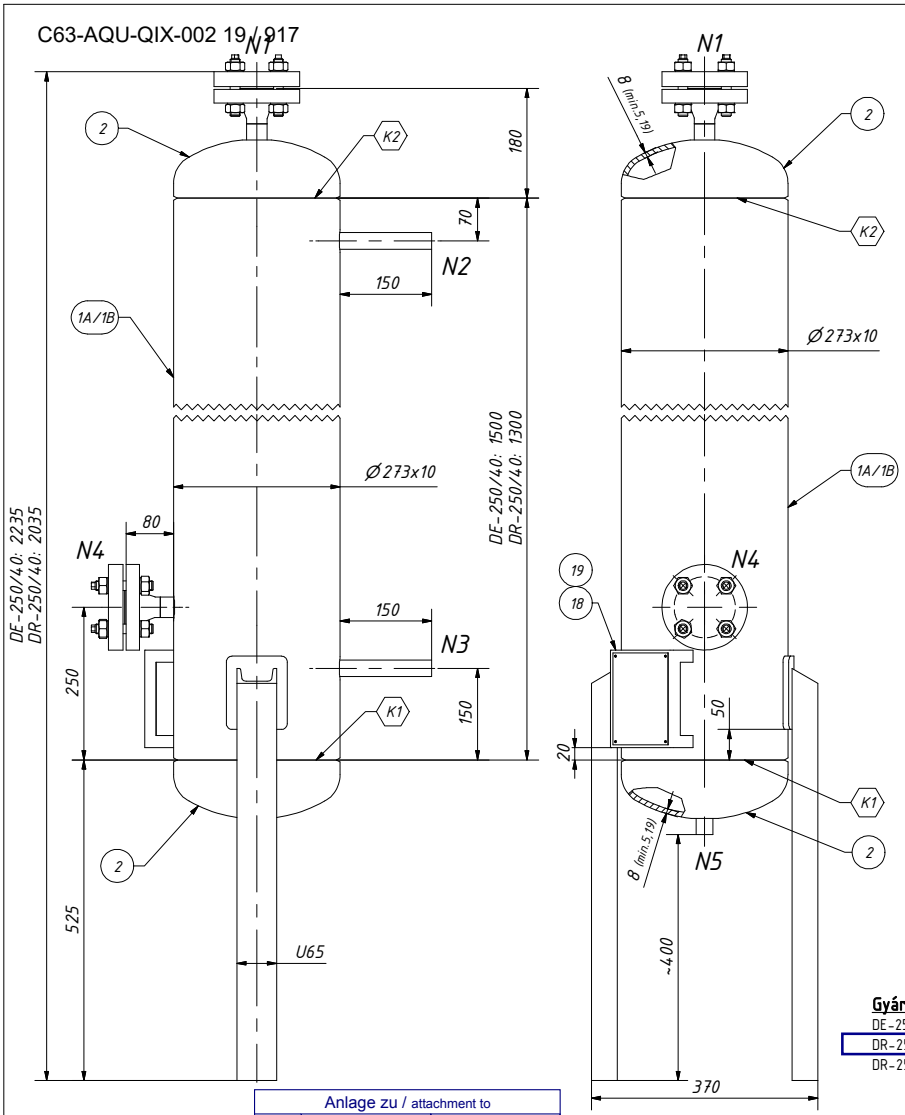
TÜV THÜRINGEN

12	**Result of inspection**
	The inspection of pressure equipment is finished.

Testing Laboratory for Pressure Equipment Notified Body 0090 TÜV Thüringen e.V. Konrad-Zuse-Straße 21 D-99099 Erfurt ped@tuev-thueringen.de	Date	26.03.2024	Place	Salgótarján	Technischer Überwachungs-Verein TÜV 694 Thüringen e.V.
	Fülöp Kerekes Name / Signature				Stamp

13	**Annex**
	Drawing with approval Listing of material test certificates, traceability checked at premesis of manufacturer on NDE test reports, procedure-/control tests operating instructions, declaration of conformity

C63-AQU-QIX-002 19/917

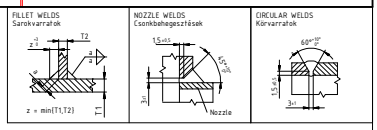


MŰSZAKI ADATOK
(TECHNISCHE DATEN) (TECHNICAL DATA)

Üzemeltetés (Betrieb) (Working)	Nyomástartó edény PED Art. 1 (Druckgerät PED Art.1) (Pressure equipment PED Art. 1)		DE-250/40 // DR-250/40
	Terek neve (Name der Räume) (Name of spaces)		Munkatér / Shellside
	Közeg (Medium) (Fluid)		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Füllgutes) (Allowed density)	[kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nenninhalt / geom. Inhalt) (Nominal volume / Geometrical volume)	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13. cikk. (Flüssigkeitskl.-PED, Art. 13) (Fluidgroups acc. to Art. 13)		1
	Hőátadó felület (Wärmeaustauscher areal) (Heat exchanger area)	[m²]	-
	Közeg állapot PED. 13. cikk. (Medumzustand-PED, Art. 13) (Condition of fluid acc. To PED, Art. 13)		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) (Operating pressure)	[barg]	-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) (Category-PED, Art. 14)		IV. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) (Module-PED, Art. 14)		G modul
	Min./max üzemi hőmérséklet (min./max. zul. Betriebstemperatur) (min./max. operating Temperature)	[°C]	-20 / +270
	Próbanyomás (PT) (Prüfüberdruck (PT)) (Test pressure (PT))	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) (Test temperature)	[°C]	+10 / +25
	Vizsgáló közeg (Prüfmedium) (Test fluid)		Víz / Water
Tervezés (Auslegung) (Design)	Tervezési nyomás (PS) (Berechnungsüberdruck (PS)) (Design over pressure) (PS)	[barg]	-1 / +39
	Tervezési hőmérséklet (TS) (Berechnungstemperatur (TS)) (Design temperature (TS))	[°C]	-20 / +270
	Terhelés AD-W10 (Beanspruchungsfall AD-W10) (Load case AD-W10)		-
	Korróziós pótlék (Abnutzungszuschlag) (Corrosion allowance)	[mm]	1
	Ciklus szám (Lastspielzahl) (Load cycles)		20.000
	Nyomásváltozás (Druckschwankungsbreite) (Pressure difference)		0-38 bar (-20°C - +50°C)
	Biztonsági tényező, Üzemi (Sicherheitsbeiwert, Betrieb) (Safety factor, Operation)		1,5
	Üres tömeg (Gewicht leer) (Weight empty)	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) (Weight with water filling)	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben (Gewicht während des Betriebs) (Operating weight)	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési előírás (Auslegung, Herstellung, Prüfung) (Design code)		MSZ EN 13445-3:2021
	Tervellenőrzés (Entwurfsprüfung) (Design-examination)		MSZ EN 13445-3:2021
	Végátvérel, nyomáspróba (Schluß- und Druckprüfung) (Final inspection and pressure test)		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) (Serial No.)		GYP-2430131 - GYP-2430133
	Gyártási év (Herstellungsjahr) (Year of manufacture)		2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT
Non-destructive test

VIZSGÁLATI ELJÁRÁS Testing procedure		VIZSGÁLTI TERJEDELEM Test quantity					
Hegesztési tényező: Joint efficiency:	0,85	Csomópont (Welding junction)	Hosszvarrat (Longitudinal seam)	Kipárg (Shell) Körvarrat (Circular seam)	Csonk / Karima (Nozzle / Flange) Körvarrat (Circular seam)	Behegesztés (Set-in)	Sarokvarrat (Fillet weld)
Szemrevételezési vizsgálat: Visual test:	VT	100%					
Folyadékbehatolásos / Mágnesporos vizsgálat: Dye Penetrat / Magnetic particel test:	PT / MT	-	-	100%	100%	100%	-
Radiográfiai / Ultrahangos vizsgálat: Radiography / Ultrasonic test:	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok: Other tests:				-			



Gyári számok / Serial No.:

DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Anlage zu / attachment to	
Prüfbericht / report N°	HU05/62994/24
Datum / date:	26.03.2024

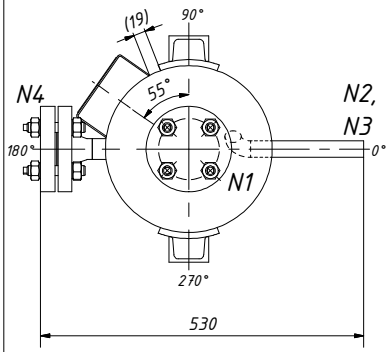
Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu

CE 0090

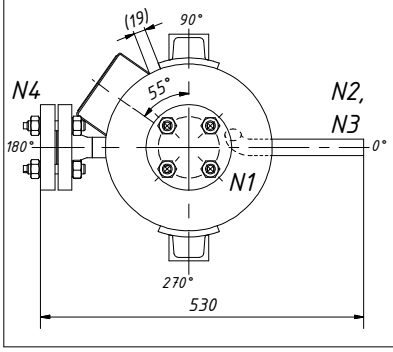
Tervezési kód: Design code:	Gyártási szám: Serial Nr.: *
MSZ EN 13445: 2021	Gyártási év: Year of built: 2024
Megnevezés: Designation:	DE-250/40 // DR-250/40
Űrtartalom (bruttó): Volume:	[Liter] Munkatér / Workspace DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg] -1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C] -20 / +270
PED kategória/modul: PED category/module:	IV./G
Próbanyomás: Test pressure:	[barg] +68,8
Próbanyomás dátuma: Date of test pressure:	2024.__.
Tömeg üresen: Empty weight:	[kg] DE: ~135; DR:~125

AQUAGAS
www.aquagas.se **SWEDEN AB**
Phone: +46 (0)8 554 204 70

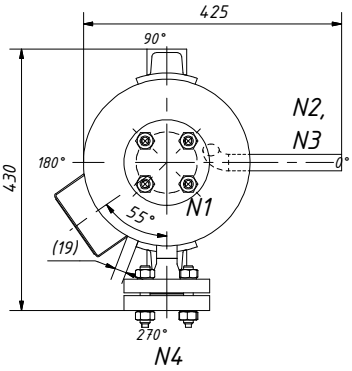
Felülnézet
Top view
DE-250/40: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 A: 1 pc.
M1:6



MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- A 21, 22-es tételeket a megrendelő (AQUAGAS) biztosítja!
- A 21, 22-es tételeket a fenék behegesztése előtt beszerelni!
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 3 db.
  (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeitet Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprueft Checked by	2024. 01. 31.				

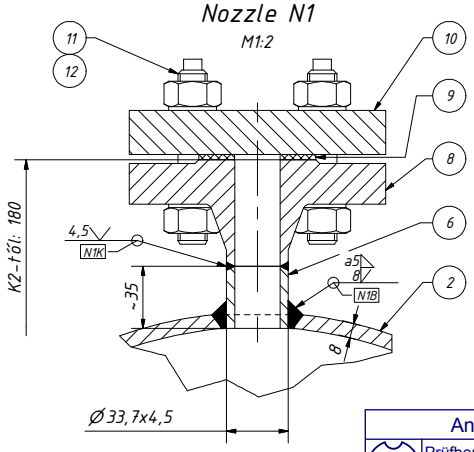
Megnevezés Benennung Title

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

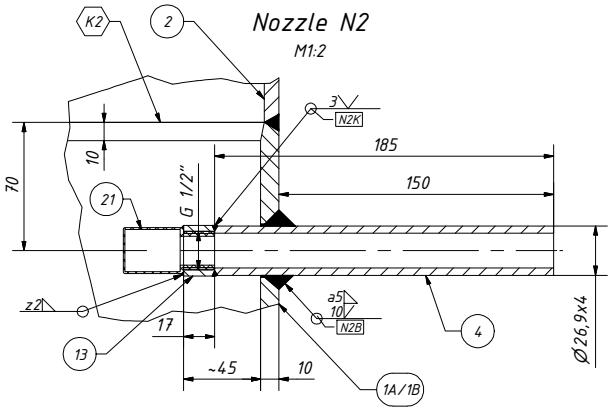
Munkaszám Arbeit Nr. Work No.	013-ST-2024
Méretarány Masstab Scale	M 1:6
Anyagminőség Werkstoff Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Speicherdatum / Saved on	2024. 01. 31.
Rajzszám: Zeichn.Nr. Drwg.No.	DG-GYP-243013-01-00
Módosítás: Aenderung Revision	0
Lapok száma: Blatt Sheet	1 von of 1
Rajzlap:	A2

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N1 csonk
Nozzle N1
M1:2



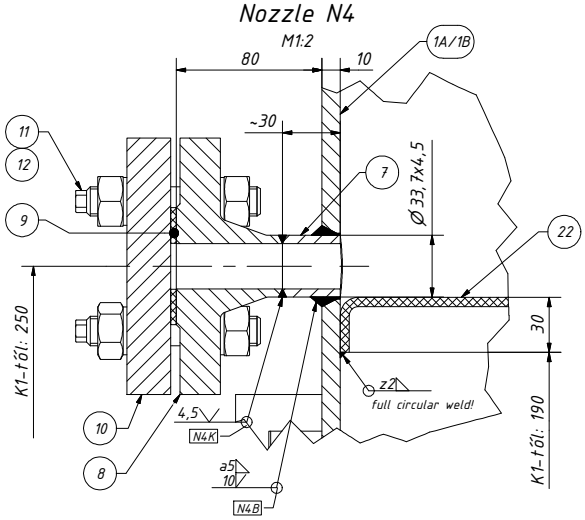
N2 csonk
Nozzle N2
M1:2



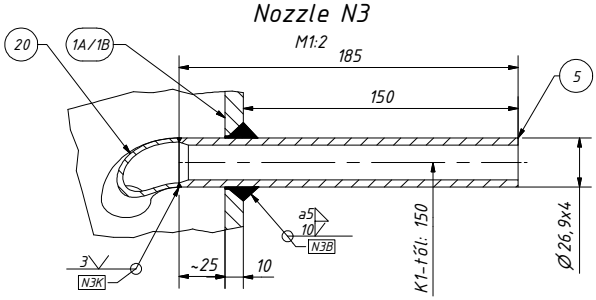
Anlage zu / attachment to

Prüfbericht / report N°	HU05/62994/24
Datum / date:	26.03.2024

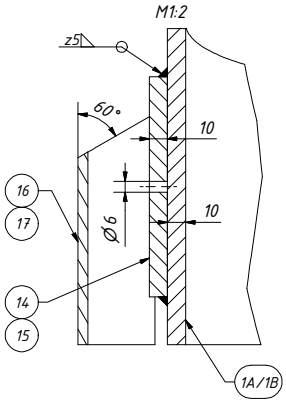
N4 csonk
Nozzle N4
M1:2



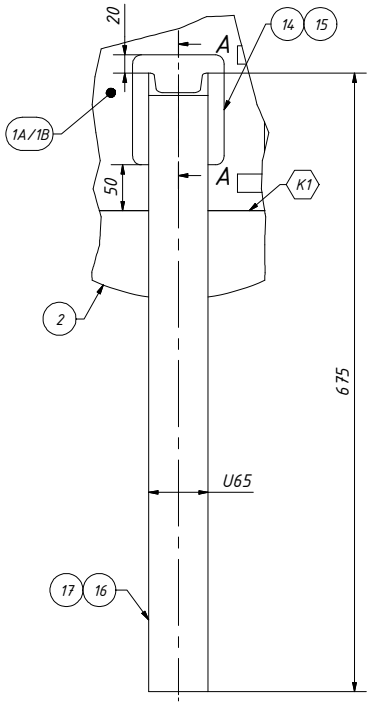
N3 csonk
Nozzle N3
M1:2



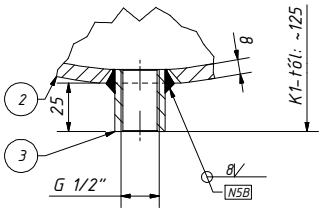
A-A metszet
A-A section
M1:2



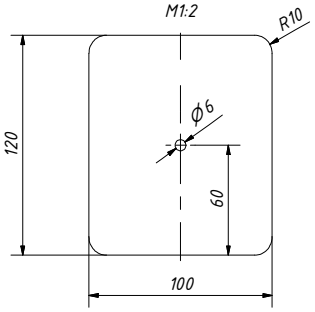
Láb
Leg
M1:4



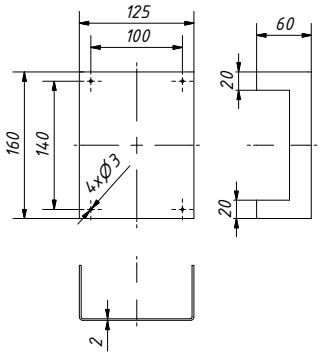
N5 csonk
Nozzle N5
M1:2



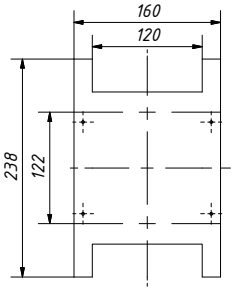
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

	Datum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette / Bearbeitet / Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Geprueft / Checked by	2024. 01. 31.				

Megnevezés / Benennung / Title	Aquagas Sweden AB. DE-250/40 // DR-250/40 Részletek
Munkaszám / Arbeit Nr. / Work No.	013-ST-2024
Méretarány / Massstab / Scale	M 1:10
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Speicherdatum / Saved on	2024. 01. 31.
Rajzszám / Zeichn.Nr. / Drwg.No.	DG-GYP-243013-01-01
Módosítás / Aenderung / Revision	0
Lapok száma / Blatt / Sheet	1 von / of 1
Rajzlap:	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

1	General information for Certification Body / Testing Laboratory		Insp. No.	HU05/62995/24
1.1	Applicant	GYÉMÁNT-PIRAZOL Kft.		
1.2	Manufacturer, address	GYÉMÁNT-PIRAZOL Kft., H-4031 Debrecen, Nívó u. 11.		
1.3	Order No. / Serial No.	TTHU-ÁTV-24-4020/GYP-2430133		
1.4	Equipment designation	DR 250/40 B Vessel		
1.5	Drawing No.	DG-GYP-243013-01-00	Revision	0
2	**Inspection according to**	**2014/68/EU, EN 13445:2021**	Module	G
2.1	Type of pressure equipment	pressure vessel		
2.2	Remarks	---		

3	Operational limits	Chamber 1	Chamber 2	Chamber 3	Chamber 4
3.1	Designation of chamber	workchamber			---
3.2	PS [bar]	+39,0/-1,0			---
3.3	TS [°C]	+270/-20			---
3.4	PT [bar]	68,8			---
3.5	Test fluid	water	---	---	---
3.6	Corrosion allowance [mm]	1,0			---
3.7	Number of allowable load cycles	20 000*			---
3.8	Allowable load cycle range [bar]	0/+38,0			---
3.9	Volume [L] / DN	76,0			---
3.10	Fluid group	1	---	---	---
3.11	Category acc. to Annex II	IV	---	---	---

4	Additional loads	---
4.1	Vessel position first pressure test	**vertical**
4.2	Seismic	
4.3	Wind	
4.4	Nozzles	
4.5	Others	

5	Technical documents examined	
5.1	Notified Body	TÜV Thüringen e.V.
5.2	Approved drawing, parts list, other documents	DG/PL-GYP-243013-01-00 Rev.0
5.3	Design examination report by Notified Body	HU04/62978/24
5.4	Formal subcontracting	---

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

5.5	Module B[B1]: Certificate by Notified Body	---
5.6	The documents are suitable for the evaluation of the pressure equipment.	
6	**Intermediate inspections [Annex I para. 3]**	
6.1	Preparation of materials for joining [Annex I, 3.1.1.]	not applicable
6.2	Internal visual inspection	acceptable, see section 11
7	**Final examination [Annex I para. 3]**	
7.1	Visual inspection and dimensional check	considered, acceptable
7.2	Material test reports and traceability	considered, acceptable
7.3	Approvals for procedures (permanent joining, forming)	considered, acceptable
7.4	Approvals for personnel (permanent joining)	considered, acceptable
7.5	Approvals for NDE-personnel	considered, acceptable
7.6	NDE-personnel - Approval according to PED, Annex I, 3.1.3	considered, acceptable
7.7	Heat treatment	not applicable
7.8	Marking [Annex I, 3.3]	considered, acceptable
8	**Calibration of measuring tools & test resources**	
8.1	Manometer / pressure probe [33866; 33867]	considered, acceptable
8.2	Heat treatment devices [---]	not applicable
8.3	Others [---]	not applicable
9	**Pressure test [Annex I para. 3]**	
9.1	Test pressure, test fluid	considered, acceptable
10	**Examination of fundamental documentary requirements**	
10.1	Declaration of conformity of manufacturer	considered, acceptable
10.2	Reference of declaration to pressure equipment	considered, acceptable
10.3	Operating instructions of manufacturer	considered, acceptable
10.4	Examination of instruction regarding technical parameters	considered, acceptable

11 Remarks

(1) to 1.3: Serial numbers have been specified on the as-built drawing according to the realized state.
(2) to 3.7: Simplified fatique analysis acc. to EN 13445-3 point 17
(3) to 6.2: Internal visual inspection: only nozzles circumferential welding seams randomly during manufacturing on 13.03.2024 and on 26.03.2024 at final examination.
(4) to 9.1: executed on 26.03.2024 at final examination, result acceptable.
(5) Name plate rivet, detachable parts (blind flanges, nozzles N1, N4) and flange N1 (Item No. 8.) stamped with: 

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

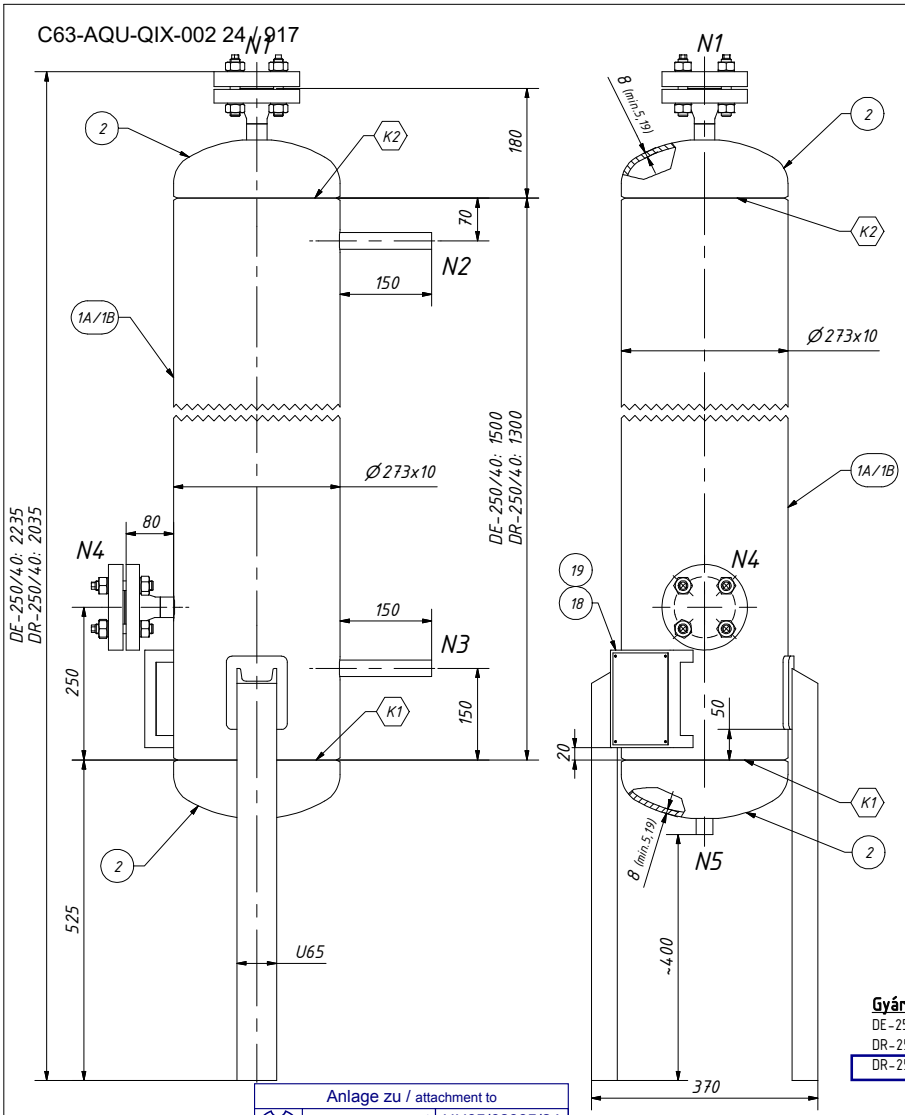
TÜV THÜRINGEN

12	**Result of inspection**
	The inspection of pressure equipment is finished.

Testing Laboratory for Pressure Equipment Notified Body 0090 TÜV Thüringen e.V. Konrad-Zuse-Straße 21 D-99099 Erfurt ped@tuev-thueringen.de	Date	26.03.2024	Place	Salgótarján	Technischer Überwachungs-Verein TÜV 694 Thüringen e.V. Stamp
	Fülöp Kerekes Name / Signature				

13	**Annex**
	Drawing with approval Listing of material test certificates, traceability checked at premesis of manufacturer on NDE test reports, procedure-/control tests operating instructions, declaration of conformity

C63-AQU-QIX-002 24 / 917

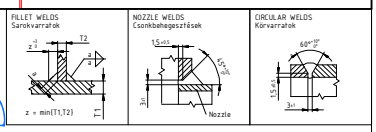


MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 (Druckgerät PED Art.1) [Pressure equipment PED Art. 1]		DE-250/40 // DR-250/40
	Terek neve (Name der Räume) [Name of spaces]		Munkatér / Shellside
	Közeg [Medium] [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Füllgutes) [Allowed density]	[kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nenninhalt / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13. cikk. (Flüssigkeitskl.-PED, Art. 13) [Fluidgroups acc. to Art. 13]		1
	Hőátadó felület (Wärmeaustauscher areal) [Heat exchanger area]	[m²]	-
	Közeg állapot PED. 13. cikk. (Medumzustand-PED, Art. 13) [Condition of fluid acc. To PED, Art. 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]	[barg]	-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) [Category-PED, Art. 14]		IV. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) [Module-PED, Art. 14]		G modul
	Min./max üzemi hőmérséklet (min./max. zul. Betriebstemperatur) [min./max. operating Temperature]	[°C]	-20 / +270
	Próbanyomás (PT) (Prüfüberdruck (PT)) [Test pressure (PT)]	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgáló közeg (Prüfmedium) [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (PS) (Berechnungsüberdruck (PS)) [Design over pressure] (PS)	[barg]	-1 / +39
	Tervezési hőmérsékletet (TS) (Berechnungstemperatur (TS)) [Design temperature (TS)]	[°C]	-20 / +270
	Terhelés AD-W10 (Beanspruchungsfall AD-W10) [Load case AD-W10]		-
	Korróziós pótlék (Abnutzungszuschlag) [Corrosion allowance]	[mm]	1
	Ciklus szám (Lastspielzahl) [Load cycles]		20.000
	Nyomásváltozás (Druckschwankungsbreite) [Pressure difference]		0-38 bar (-20°C - +50°C)
	Biztonsági tényező, Üzemi (Sicherheitsbeiwert, Betrieb) [Safety factor, Operation]		1,5
	Üres tömeg (Gewicht leer) [Weight empty]	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) [Weight with water filling]	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben (Gewicht während des Betriebs) [Operating weight]	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési előírás (Auslegung, Herstellung, Prüfung) [Design code]		MSZ EN 13445-3:2021
	Tervellenőrzés (Entwurfsprüfung) [Design-examination]		MSZ EN 13445-3:2021
	Végátvétel, nyomáspróba (Schluß- und Druckprüfung) [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]		GYP-2430131 - GYP-2430133
	Gyártási év (Herstellungsjahr) [Year of manufacture]		2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT
Non-destructive test

VIZSGÁLATI ELJÁRÁS Testing procedure		VIZSGÁLT TERJEDELEM Test quantity					
Hegesztési tényező: Joint efficiency:	0,85	Csomópont (Welding junction)	Hosszvarrat (Longitudinal seam)	Kipany (Shell) Körvarrat (Circular seam)	Csonk / Karima (Nozzle / Flange) Körvarrat (Circular seam)	Behegesztés (Set-in)	Sarokvarrat (Fillet weld)
Szemrevételezési vizsgálat: Visual test:	VT	100%					
Folyadékbehatolásos / Mágnesporos vizsgálat: Dye Penetrat / Magnetic particel test:	PT / MT	-	-	100%	100%	100%	-
Radiográfiai / Ultrahangos vizsgálat: Radiography / Ultrasonic test:	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok: Other tests:				-			



Gyári számok / Serial No.:

DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Anlage zu / attachment to	
Prüfbericht / report N°	HU05/62995/24
Datum / date:	26.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu
CE 0090

Tervezési kód: Design code:	Gyártási szám: Serial Nr.:	*
MSZ EN 13445: 2021	Gyártási év: Year of built	2024
Megnevezés: Designation:	DE-250/40 // DR-250/40	
Űrtartalom (bruttó): Volume:	[Liter]	Munkatér / Workspace DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg]	-1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C]	-20 / +270
PED kategória/modul: PED category/module:		IV./G
Próbanyomás: Test pressure:	[barg]	+68,8
Próbanyomás dátuma: Date of test pressure:		2024.__.
Tömeg üresen: Empty weight:	[kg]	DE: ~135; DR:~125

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

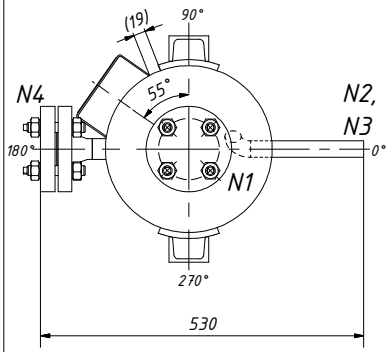
MEGJEGYZÉSEK:

- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- A 21, 22-es tételeket a megrendelő (AQUAGAS) biztosítja!
- A 21, 22-es tételeket a fenék behegesztése előtt beszerelni!
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 3 db.
  (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

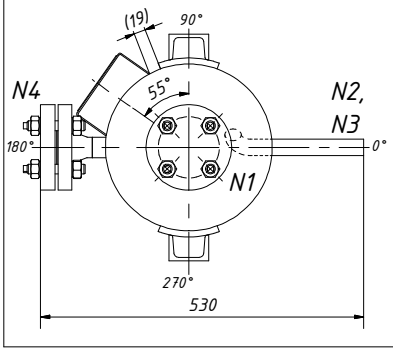
Note:

- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

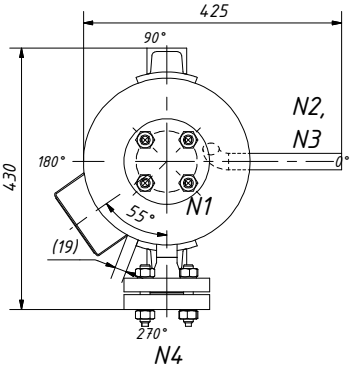
Felülnézet
Top view
DE-250/40: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 A: 1 pc.
M1:6



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeitet Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprueft Checked by	2024. 01. 31.				

Megnevezés Benennung Title

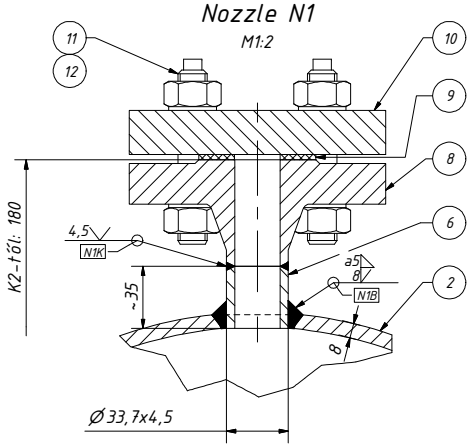
Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

Munkaszám Arbeit Nr. Work No.	013-ST-2024
Méretarány Masstab Scale	M 1:6
Anyagminőség Werkstoff Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Speicherdatum / Saved on	2024. 01. 31.
Rajzszám: Zeichn.Nr. Drwg.No.	DG-GYP-243013-01-00
Módosítás: Aenderung Revision	0
Lapok száma: Blatt Sheet	1 von of 1
Rajzlap:	A2

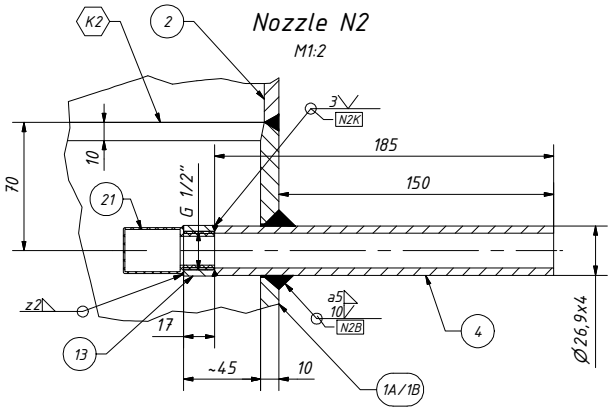
A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

C63-AQU-QIX-002 25 / 917

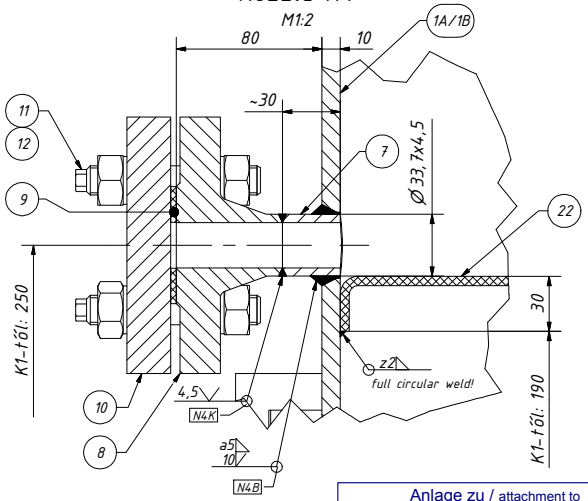
N1 csonk
Nozzle N1
M1:2



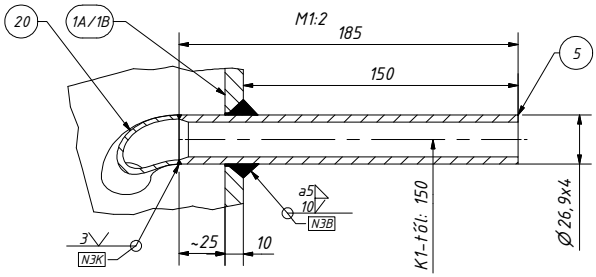
N2 csonk
Nozzle N2
M1:2



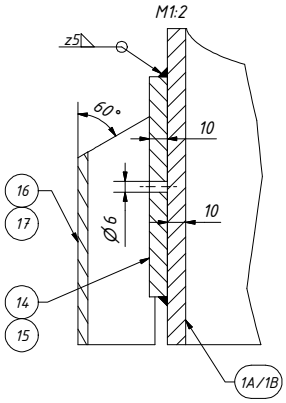
N4 csonk
Nozzle N4
M1:2



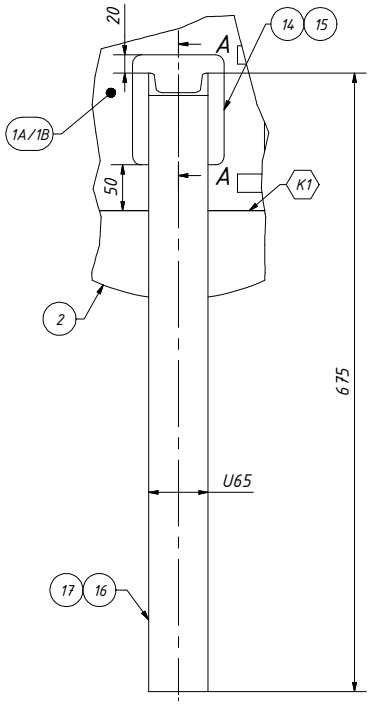
N3 csonk
Nozzle N3
M1:2



A-A metszet
A-A section
M1:2

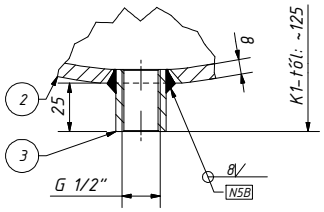


Láb
Leg
M1:4

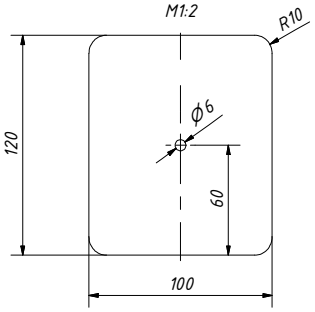


Anlage zu / attachment to	
Prüfbericht / report N°	HU05/62995/24
Datum / date:	26.03.2024

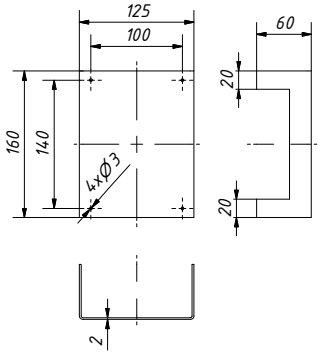
N5 csonk
Nozzle N5
M1:2



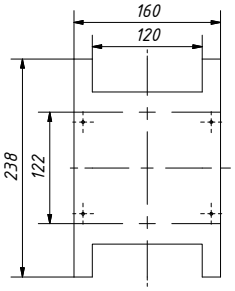
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeitet Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprueft Checked by	2024. 01. 31.				

Megnevezés Benennung Title

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Részletek

Munkaszám Arbeit Nr. Work No.	013-ST-2024
Méretarány Massstab Scale	M 1:10
Anyagminőség Werkstoff Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Spicherdatum / Saved on	2024. 01. 31.
Rajzszám: Zeichn.Nr. Drwg.No.	DG-GYP-243013-01-01
Módosítás: Aenderung Revision	0
Lapok száma: Blatt Sheet	1 von of 1
Rajzlap:	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

Report
for the examination of a pressure equipment design according to Directive 2014/68/EU Modules B / G / H1

TÜV THÜRINGEN

1	General Information for Certification Body / Testing Laboratory		Insp. No.	HU04/62978/24
1.1	Applicant, address	Gyémánt-Pirazol Kft.		
1.2	Manufacturer, address	Gyémánt-Pirazol Kft.; 4031 Debrecen, Nívó u.11.		
1.3	Order no. / Com. no.	TTHU-TE-24-3019		
1.4	Equipment designation	DE-250/40; DR-250/40 vessel		
1.5	Drawing no.	DG-GYP-243013-01-00	Revision	0

2	Design code	2014/68/EU, EN 13445:2021	Module	G
2.1	Type of equipment	pressure vessel		
2.2	Remarks	---		

3	Operational limits	Chamber 1	Chamber 2	Chamber 3	Chamber 4
3.1	Designation of pressure chamber	workchamber	---	---	---
3.2	PS [bar]	+39,0/-1,0	---	---	---
3.3	TS [°C]	+270/-20	---	---	---
3.4	PT [bar]	68,8	---	---	---
3.5	Test fluid	water	---	---	---
3.6	Corrosion allowance [mm]	1,0	---	---	---
3.7	Number of allowable load cycles	20 000*	---	---	---
3.8	Allowable load cycle range [bar]	0/+38,0	---	---	---
3.9	Volume [L] / DN	86,0 / 76,0*	---	---	---
3.10	Fluid group	1	---	---	---
3.11	Category according to Annex II	IV	---	---	---

4	Additional loads	---
4.1	Position first pressure test	vertical
4.2	Seismic	---
4.3	Wind	---
4.4	Nozzles	---
4.5	Others	---

5	Completeness and adequacy of technical documents	
5.1	Exclusive statement of manufacturer	considered, acceptable
5.2	Equipment description / functional description	considered, acceptable
5.3	Description of type range (for type approvals only)	not applicable
5.4	Drawing(s)	considered, acceptable

Report
for the examination of a pressure equipment design
according to Directive 2014/68/EU Modules B / G / H1

TÜV THÜRINGEN

5.5	Part list(s): Instructions to applied standards and design codes	considered, acceptable
5.6	Part list(s): Instructions to manufact.& delivery terms, measure tolerances	not applicable
5.7	Design calculation(s): traditional design by formula	considered, acceptable
5.8	Design calculation(s): design by analysis (FEA, FDA, BEA)	not applicable
5.9	Test results of experimental design	not applicable
5.10	Approvals for procedures for permanent joining	acceptable, see section 11
5.11	Approvals for personnel for permanent joining	acceptable, see section 11
5.12	Approvals for NDE-personnel	acceptable, see section 11
5.13	Risk analysis	considered, acceptable
5.14	Operating instructions	considered, acceptable
5.15	The submitted documents are --- for the design evaluation.	
6	**Examination of documents concerning materials [Annex I 4]**	
6.1	Materials according to harmonized standards	considered, acceptable
6.2	European approval of materials (EAM)	not applicable
6.3	Particular material appraisal (PMA)	not applicable
7	**Examination of documents concerning design [Annex I 2]**	
7.1	Strength - internal pressure / add. loads	considered, acceptable
7.2	Strength - external pressure / support	acceptable, see section 11
7.3	Strength - fatigue, cyclic loading(s)	acceptable, see section 11
7.4	Strength - time depending behaviour, creep	not applicable
7.5	Experimental design method (test programme)	not applicable
7.6	Inspection, vent and drain openings	considered, acceptable
7.7	Corrosion, chemical attack	Resistance acc. to user specificatior
7.8	Wear (also other measures)	not applicable
7.9	External fire	not applicable
7.10	Additional requirements for piping	not applicable
7.11	Additional requirements for equipment with risk of overheating	not applicable
7.12	Deep cold service with the risk of brittle fraction	acceptable, see section 11
8	**Examination of documents concerning manufacturing [Annex I 3]**	
8.1	Forming operations	not applicable
8.2	Heat treatment (caused by forming: normalization / sol. annealing)	not applicable
8.3	Permanent joining	considered, acceptable
8.4	Nondestructive examinations: scope and location	considered, acceptable

Report
for the examination of a pressure equipment design
according to Directive 2014/68/EU Modules B / G / H1

TÜV THÜRINGEN

8.5	Heat treatment (before / after welding)	not applicable
9	**Examination of documents concerning safety equipment [Annex I 3]**	
9.1	Examination of safety accessories	not applicable
10	**Examination of documents concerning final examination [Annex I 3]**	
10.1	Test pressure [Annex I, Para. 3.2.2, 7.4]	considered, acceptable
10.2	Marking [Annex I, Para. 3.3]	considered, acceptable

11 Remarks

(1) to 3.7; 7.3 : Simplified fatigue analysis acc. to EN13445-3 point 17.
(2) to 3.9 : DE vessel type has shell L=1500 and V=86,0 lit; DR vessel type has shell L=1300 and V=76,0 lit.
(3) to 5.10 : During final inspection the relevant WPQR's will be checked by our expert.
(4) to 5.11 : During final inspection welders' certificates will be checked by our expert.
(5) to 5.12 : During final inspection the qualification of the NDT-personnel will be checked by our expert.
(6) to 6.1 : Materials for pressurized items shall be certified 3.1/EN10204+PED.
(7) to 7.2 : The vessel will be connected to steel structure, so that the stability is ensured.
(8) to 7.12: Minimum allowable temperature is -20 C° , so that the requirements acc.to EN13445-2 appendix B shall be taken into account.
(9) to 8.3 : Welding details shall be made acc. to EN1708-1.
(10) to 8.4 : All NDT have to be carried out according to the requirements of EN 13445 part 5.
(11) to 10.2: The pressure equipment must be marked in accordance with PED Annex I. point 3.3 and EN13445-5 point 11.
(12) Installed fittings and pressure accessories shall be designed for the intended use (pressure, temperature, fluid).

12 Result of examination

The design is considered as finally approved.

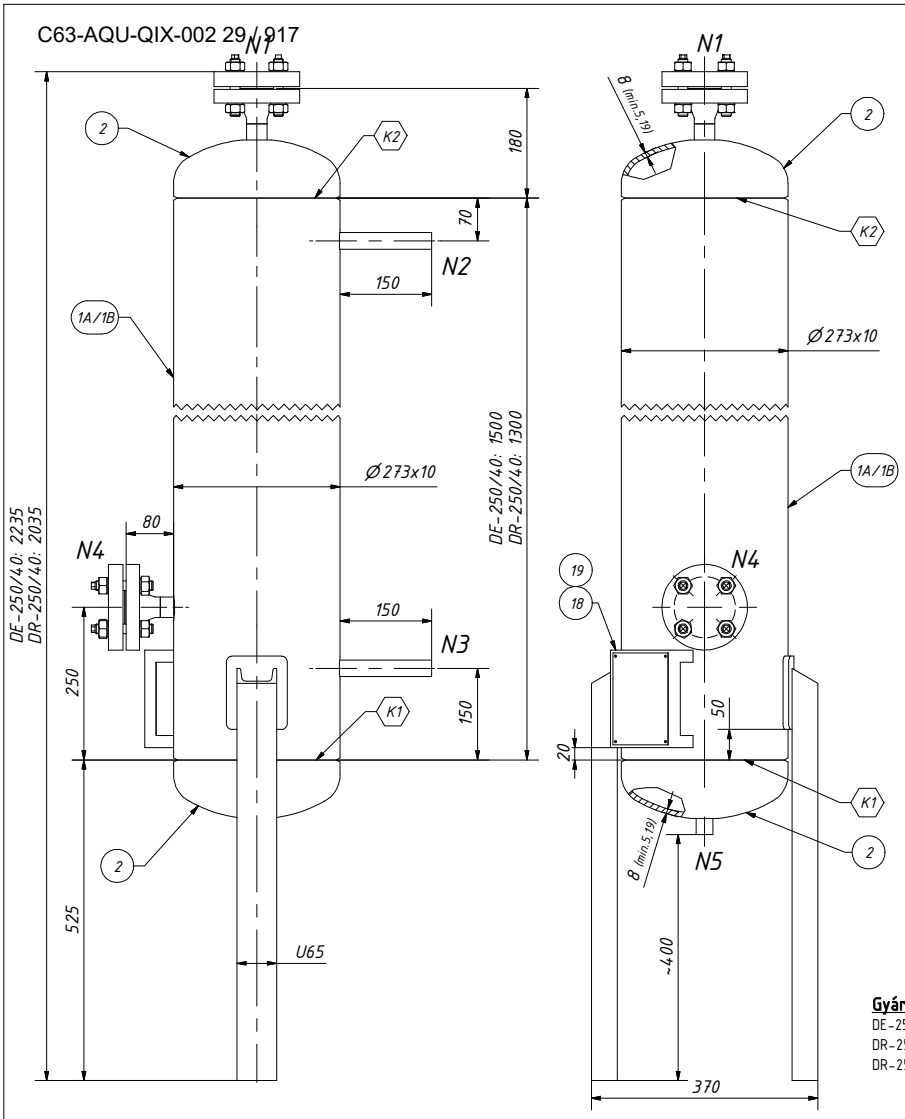
Testing Laboratory	Date	25-03-2024	Place	Budapest
for Pressure Equipment **Notified Body 0090** **TÜV Thüringen e.V.** **Konrad-Zuse-Straße 21** **D-99099 Erfurt** **ped@tuev-thueringen.de**	Ilona Gál Name / Signature			Stamp

Validity note for modules G and H1: Two years, for Modules B Ten years (monitored) from the day of issue.

13 Annex

Drawing, parts list, other related documents / documents with test note
drawings:DG-GYP-243013-01-00 Rev.0; DG-GYP-243013-01-01 Rev.0
part list: PL-GYP-243013-01 Rev.0

C63-AQU-QIX-002 29/917

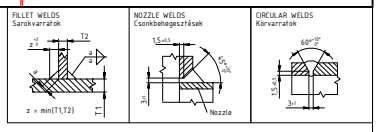


MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 (Druckgerät PED Art.1) [Pressure equipment PED Art. 1]		DE-250/40 // DR-250/40
	Terek neve (Name der Räume) [Name of spaces]		Munkatér / Shellside
	Közeg [Medium] [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Füllgutes) [Allowed density]	[kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nenninhalt / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13. cikk. (Flüssigkeitskl.-PED, Art. 13) [Fluidgroups acc. to Art. 13]		1
	Hőátadó felület (Wärmeaustauscher areal) [Heat exchanger area]	[m²]	-
	Közeg állapot PED. 13. cikk. (Medumzustand-PED, Art. 13) [Condition of fluid acc. To PED, Art. 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]	[barg]	-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) [Category-PED, Art. 14]		IV. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) [Module-PED, Art. 14]		G modul
	Min./max üzemi hőmérséklet (min./max. zul. Betriebstemperatur) [min./max. operating Temperature]	[°C]	-20 / +270
	Próbanyomás (PT) (Prüfüberdruck (PT)) [Test pressure (PT)]	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgáló közeg (Prüfmedium) [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (PS) (Berechnungsüberdruck (PS)) [Design over pressure] (PS)	[barg]	-1 / +39
	Tervezési hőmérsékletet (TS) (Berechnungstemperatur (TS)) [Design temperature (TS)]	[°C]	-20 / +270
	Terhelés AD-W10 (Beanspruchungsfall AD-W10) [Load case AD-W10]		-
	Korróziós pótlék (Abnutzungszuschlag) [Corrosion allowance]	[mm]	1
	Ciklus szám (Lastspielzahl) [Load cycles]		20.000
	Nyomásváltozás (Druckschwankungsbreite) [Pressure difference]		0-38 bar (-20°C - +50°C)
	Biztonsági tényező, Üzemi (Sicherheitsbeiwert, Betrieb) [Safety factor, Operation]		1,5
	Üres tömeg (Gewicht leer) [Weight empty]	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) [Weight with water filling]	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben (Gewicht während des Betriebs) [Operating weight]	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési előírás (Auslegung, Herstellung, Prüfung) [Design code]		MSZ EN 13445-3:2021
	Tervellenőrzés (Entwurfsprüfung) [Design-examination]		MSZ EN 13445-3:2021
	Végátvétel, nyomáspróba (Schluß- und Druckprüfung) [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]		GYP-2430131 - GYP-2430133
	Gyártási év (Herstellungsjahr) [Year of manufacture]		2024

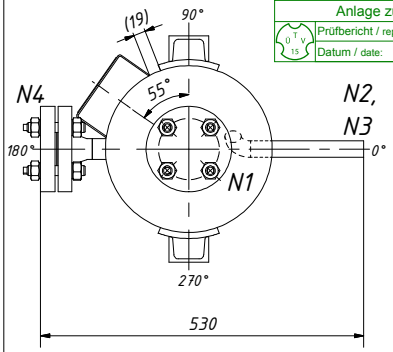
RONCSOLÁSMENTES ANYAGVIZSGÁLAT
Non-destructive test

VIZSGÁLATI ELJÁRÁS Testing procedure		VIZSGÁLTI TERJEDELEM Test quantity					
Hegesztési tényező: Joint efficiency:	0,85	Csomópont (Welding junction)	Hosszvarrat (Longitudinal seam)	Körvarrat (Circular seam)	Csonk / Karima (Stutzen / Flange) Körvarrat (Circular seam)	Behegesztés (Set-in)	Sarokvarrat (Fillet weld)
Szemrevételezési vizsgálat: Visual test:	VT	100%					
Folyadékbehatolásos / Mágnesporos vizsgálat: Dye Penetrat / Magnetic particel test:	PT / MT	-	-	100%	100%	100%	-
Radiográfiai / Ultrahangos vizsgálat: Radiography / Ultrasonic test:	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok: Other tests:				-			



Gyári számok / Serial No.:
DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Felülnézet
Top view
DE-250/40: 1 pc.
M1:6



Anlage zu / attachment to

Prüfbericht / report N°	HU04/62978/24
Datum / date:	25.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nivó u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu
CE 0090

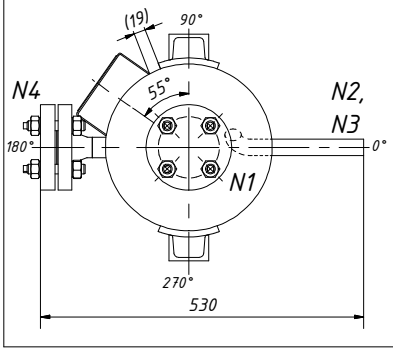
Tervezési kód: Design code:	Gyártási szám: Serial Nr.	*
MSZ EN 13445: 2021	Gyártási év: Year of built	2024
Megnevezés: Designation:	DE-250/40 // DR-250/40	
Űrtartalom (bruttó): Volume:	[Liter]	Munkatér / Workspace DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg]	-1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C]	-20 / +270
PED kategória/modul: PED category/module:		IV./G
Próbanyomás: Test pressure:	[barg]	+68,8
Próbanyomás dátuma: Date of test pressure:		2024.__.
Tömeg üresen: Empty weight:	[kg]	DE: ~135; DR:~125

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

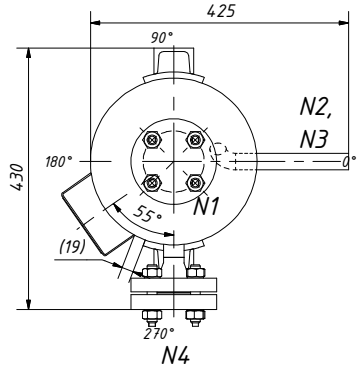
MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- A 21, 22-es tételeket a megrendelő (AQUAGAS) biztosítja!
- A 21, 22-es tételeket a fenék behegesztése előtt beszerelni!
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 3 db.
  (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

Felülnézet
Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 A: 1 pc.
M1:6



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeitet Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprueft Checked by	2024. 01. 31.				

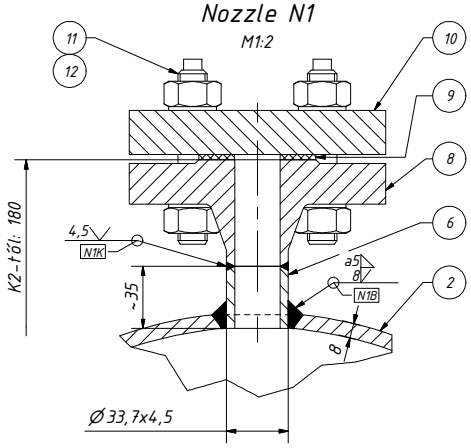
Megnevezés Benennung Title

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

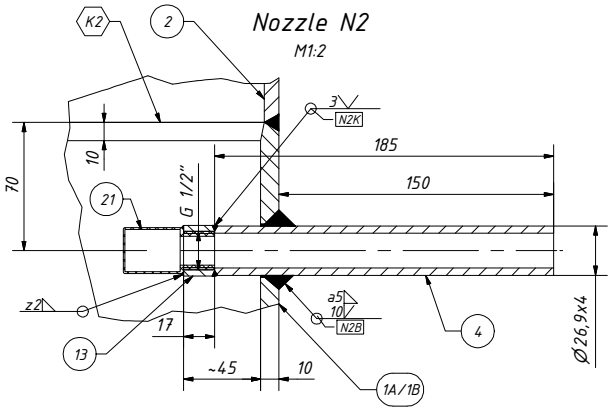
Munkaszám Arbeit Nr. Work No.	013-ST-2024
Méretarány Masstab Scale	M 1:6
Anyagminőség Werkstoff Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Spicherdatum / Saved on	2024. 01. 31.
Rajzszám: Zeichn.Nr. Drwg.No.	DG-GYP-243013-01-00
Módosítás: Aenderung Revision	0
Lapok száma: Blatt Sheet	1 von of 1
Rajzlap:	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

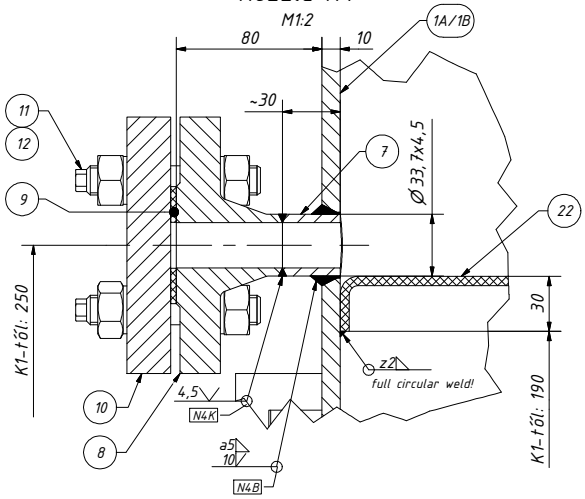
N1 csonk
Nozzle N1
M1:2



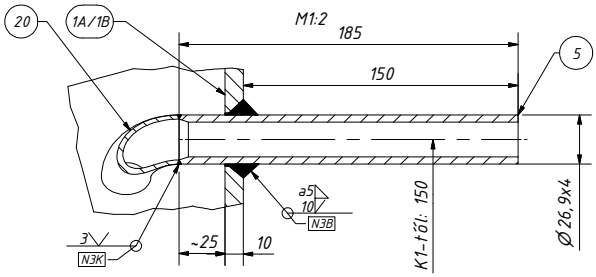
N2 csonk
Nozzle N2
M1:2



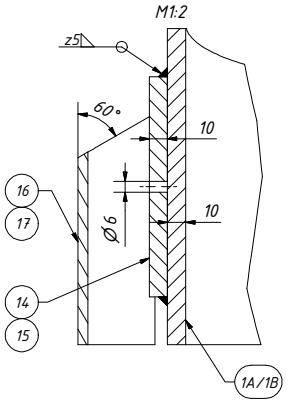
N4 csonk
Nozzle N4
M1:2



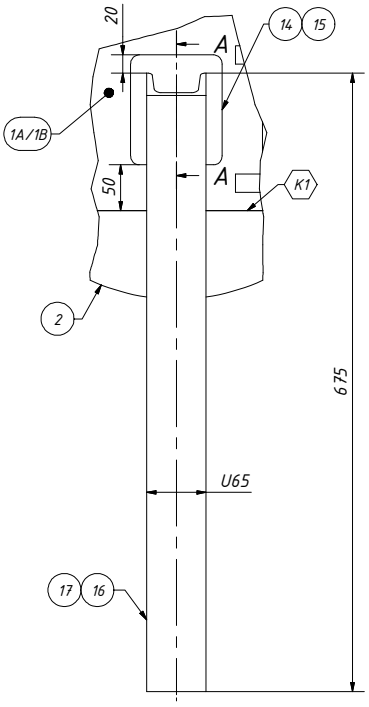
N3 csonk
Nozzle N3
M1:2



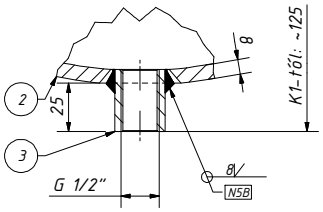
A-A metszet
A-A section
M1:2



Láb
Leg
M1:4

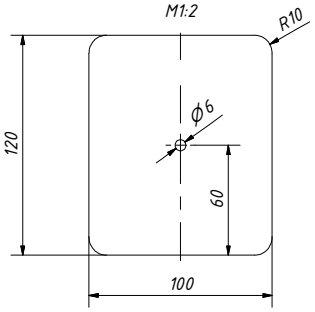


N5 csonk
Nozzle N5
M1:2

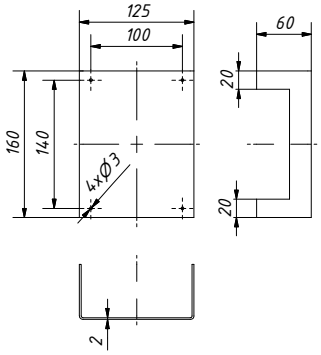


Anlage zu / attachment to	
Prüfbericht / report N°	HU04/62978/24
Datum / date:	25.03.2024

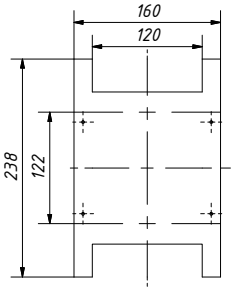
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette / Bearbeitet / Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Geprueft / Checked by	2024. 01. 31.				

Megnevezés / Benennung / Title

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Részletek

Munkaszám / Arbeit Nr. / Work No.	013-ST-2024
Méretarány / Massstab / Scale	M 1:10
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Plotdatum / Plotted on	2024. 01. 31.
Spicherdatum / Saved on	2024. 01. 31.
Rajzszám / Zeichn.Nr. / Drwg.No.	DG-GYP-243013-01-01
Módosítás / Aenderung / Revision	0
Lapok száma / Blatt / Sheet	1 von / of 1
Rajzlap:	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

GYÉMÁNT-PIRAZOL KFT.

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó utca 11.
www.gyemantpirazol.hu

Doc.No./Szám:	PL-GYP-243013-01	Rev.:	0

Aquagas Sweden AB.

Anlage zu / attachment to		
TÜV 15	Prüfbericht / report N°	HU04/62978/24
	Datum / date:	25.03.2024

DE-250/40, DR-250/40

Tételjegyzék

Dwg. No. / Rajzszám:
DG-GYP-243013-00

Task No.: / Munkaszám:
013-ST-2024

0	2024.01.31		Pásku P.	Kristóf G.
Rev:	Date/Dátum:	Remark/Megjegyzés:	Designer/Tervező:	Checked/Ellenőr:

Prepared/Készítette: Pásku P.	Doc. No. / Dok szám:	**PL-GYP-243013-01**	Rev.:	GYÉMÁNT-PIRAZOL KFT
Date/Dátum: 2024.01.31	Dwg. No. / Rajzsz.:	**DG-GYP-243013-00**	**0**	
Checked/Ellenőrízte: Kristóf G.	Equipment / Gyártmány:	**DE-250/40, DR-250/40**		
Date/Dátum: 2024.01.31				

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]
1A	Hengeres palást Cylindrical shell	1	P355NH	Ø273x10 - 1500	3.1+PED	EN 10216-~~2~~ -3	For DE-250/40	96,8	96,8
1B	Hengeres palást Cylindrical shell	1	P355NH	Ø273x10 - 1300	3.1+PED	EN 10216-~~2~~ -3	For DR-250/40	83,9	83,9
2	Mélydomború edényfenék Torispherical head	2	P265GH	OD 273x8 (min.5,19)	3.1+PED	DIN 28013	-	6,1	12,2
3	Karmantyú Socket	1	P235GH	G 1/2"	3.1+PED	EN 10216-2	-	0,1	0,1
4	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø26,9x4-185	3.1+PED	EN 10216-2	-	0,4	0,4
5	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø26,9x4-185	3.1+PED	EN 10216-2	-	0,4	0,4
6	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø33,7x4,5-35	3.1+PED	EN 10216-2	-	0,1	0,1
7	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø33,7x4,5~30	3.1+PED	EN 10216-2	-	0,1	0,1
8	Hegtoldatos karima Weld neck flange	2	P245GH	DN25 PN63	3.1+PED	EN 1092-1 Type11/B EN 10222-2	-	2,7	5,4
9	Lapos tömítés Flat gasget	2	Novaphit SSTC	DN25 PN63, t=3	2.1	EN 1514-1	-	0,0	0,0
10	Vakkarima Blind flange	2	P245GH	DN25 PN63	3.1+PED	EN 1092-1 Type05/A EN 10222-2	-	2,8	5,5
11	Szegcsavar Stud bolt	8	25CrMo4+horg	M16x95	3.1+PED	DIN 2510-3	-	0,2	1,2
12	Szegcsavar anya Stud bolt hex nut	16	25CrMo4+horg	M16	3.1+PED	DIN 2510-3/NF	-	0,1	0,9
13	Karmantyú fél Half socket	1	P235GH	G 1/2"	3.1	EN 10216-2	-	0,0	0,0
14	Párnalemez Reinforcement plate	1	P265GH	Lv10x120x100	3.1+PED	EN 10028-2	Vágat	0,9	0,9
15	Párnalemez Reinforcement plate	1	P265GH	Lv10x120x100	3.1+PED	EN 10028-2	Vágat	0,9	0,9

Prepared/Készítette: Pásku P.	Doc. No. / Dok szám:	**PL-GYP-243013-01**	Rev.:	GYÉMÁNT-PIRAZOL KFT
Date/Dátum: 2024.01.31	Dwg. No. / Rajzsz.:	**DG-GYP-243013-00**	**0**	
Checked/Ellenőrízte: Kristóf G.	Equipment / Gyártmány:	**DE-250/40, DR-250/40**		
Date/Dátum: 2024.01.31				

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]
16	U-acél U-profil	1	S235JRG2	U 65 L=675	2.2	DIN 1026-1	-	4,7	4,7
17	U-acél U-profil	1	S235JRG2	U 65 L=675	2.2	DIN 1026-1	-	4,7	4,7
18	Adattábla tartó Nameplate holder	1	1.4301	t=3 mm	3.1	EN 10028-7	Vágat	0,5	0,5
19	Gyártói adattábla Nameplate of manufacturer	1	1.4301	Lv1x110x150	3.1	EN 10028-7	-	0,1	0,1
20	Patentív Elbow	1	P235GH-TC1	Ø26,9x2,3 R29	3.1	DIN 2605	-	0,1	0,1
21	Szűrő Strainer	1	SS	G 1/2"			AQUAGAS	0,0	0,0
22	Szűrő Strainer	1	SS				AQUAGAS	0,4	0,4
							DE-250/40 - Total / Összesen:		**136kg**
							DR-250/40 - Total / Összesen:		**123kg**

Notes / Megjegyzések:

1) Az alapanyagok bizonylatolása az EN10204 szerint. / Raw material certificates according to EN 10204 standard.

Prepared/Készítette:	Pásku P.	Doc. No. / Dok szám:	**PL-GYP-243013-01**	Rev.:	
Date/Dátum:	2024.01.31	Dwg. No. / Rajzsz.:	**DG-GYP-243013-00**	**0**	
Checked/Ellenőrízte:	Kristóf G.	Equipment / Gyártmány:	**DE-250/40, DR-250/40**		
Date/Dátum:	2024.01.31				

GYÉMÁNT-PIRAZOL KFT.

Munkaszám / Job no.:	013-ST-2024
Gyártási szám / Serial no.:	GYP-2430131-3

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]	Material deviation Eltérő anyag	Heat no. Adagszám
1A	Hengeres palást Cylindrical shell	1	P355NH	Ø273x10 - 1500	3.1+PED	EN 10216-3	For DE-250/40	96,8	96,8		221224
1B	Hengeres palást Cylindrical shell	1	P355NH	Ø273x10 - 1300	3.1+PED	EN 10216-3	For DR-250/40	83,9	83,9		221224
2	Mélydomború edényfenék Torispherical head	2	P265GH	OD 273x8 (min.5,19)	3.1+PED	DIN 28013	-	6,1	12,2		930723
3	Karmantyú Socket	1	P235GH	G 1/2"	3.1+PED	EN 10216-2	-	0,1	0,1	P355NH	16216
4	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø26,9x4-185	3.1+PED	EN 10216-3	-	0,4	0,4	P355NH	4285
5	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø26,9x4-185	3.1+PED	EN 10216-3	-	0,4	0,4	P355NH	4285
6	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø33,7x4,5-35	3.1+PED	EN 10216-3	-	0,1	0,1	P355NH	17047
7	Vn. acélcső Seamless pipe	1	P235GH-TC1	Ø33,7x4,5~30	3.1+PED	EN 10216-3	-	0,1	0,1	P355NH	17047
8	Hegtoldatos karima Weld neck flange	2	P245GH	DN25 PN63	3.1+PED	EN 1092-1 Type11/B EN 10222-2	-	2,7	5,4	P355QH1	A12465
9	Lapos tömítés Flat gasget	2	Novaphit SSTC	DN25 PN63, t=3	2.1	EN 1514-1	-	0,0	0,0		-
10	Vakkarima Blind flange	2	P245GH	DN25 PN63	3.1+PED	EN 1092-1 Type05/A EN 10222-2	-	2,8	5,5	P250GH	1497; 9527
11	Szegcsavar Stud bolt	8	25CrMo4+horg	M16x95	3.1+PED	DIN 2510-3	-	0,2	1,2		6948770002
12	Szegcsavar anya Stud bolt hex nut	16	25CrMo4+horg	M16	3.1+PED	DIN 2510-3/NF	-	0,1	0,9		597260; 604284
13	Karmantyú fél Half socket	1	P235GH	G 1/2"	3.1	EN 10216-2	-	0,0	0,0		-
14	Párnalemez Reinforcement plate	1	P265GH	Lv10x120x100	3.1+PED	EN 10028-2	Vágat	0,9	0,9		43348
15	Párnalemez Reinforcement plate	1	P265GH	Lv10x120x100	3.1+PED	EN 10028-2	Vágat	0,9	0,9		43348

Prepared/Készítette:	Pásku P.	Doc. No. / Dok szám:	PL-GYP-243013-01		Rev.:	GYÉMÁNT-PIRAZOL KFT.			Munkaszám / Job no.:	013-ST-2024	
Date/Dátum:	2024.01.31	Dwg. No. / Rajzsz.:	DG-GYP-243013-00		0				Gyártási szám / Serial no.:	GYP-2430131-3	
Checked/Ellenőrízte:	Kristóf G.	Equipment / Gyártmány:	DE-250/40, DR-250/40								
Date/Dátum:	2024.01.31										

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]	Material deviation Eltérő anyag	Heat no. Adagszám
16	U-acél U-profil	1	S235JRG2	U 65 L=675	2.2	DIN 1026-1	-	4,7	4,7		-
17	U-acél U-profil	1	S235JRG2	U 65 L=675	2.2	DIN 1026-1	-	4,7	4,7		-
18	Adattábla tartó Nameplate holder	1	1.4301	t=3 mm	3.1	EN 10028-7	Vágat	0,5	0,5		-
19	Gyártói adattábla Nameplate of manufacturer	1	1.4301	Lv1x110x150	3.1	EN 10028-7	-	0,1	0,1		-
20	Patentív Elbow	1	P235GH-TC1	Ø26,9x2,3 R29	3.1	DIN 2605	-	0,1	0,1		E1720
21	Szűrő Strainer	1	SS	G 1/2"			AQUAGAS	0,0	0,0		-
22	Szűrő Strainer	1	SS				AQUAGAS	0,4	0,4		-
							DE-250/40 - Total / Összesen:		**136kg**		
							DR-250/40 - Total / Összesen:		**6 950 288 872kg**		

Notes / Megjegyzések:

1) Az alapanyagok bizonylatolása az EN10204 szerint. / Raw material certificates according to EN 10204 standard.

Anlage zu / attachment to
Prüfbericht / report N° HU05/62993 – 62995/24
Datum / date: 26.03.2024

Technischer Überwachungs-Verein TÜV 694 Thüringen e.V.

Tanúsítva a 2014/68/EU nyomástartó berendezések-irányelv I függelék, 4.3 fejezet szerint, a TÜV Anlagentechnik GmbH által. Azonosító száma 0035.
Zertifiziert nach Druckgeräte-Richtlinie 2014/68/EU, Anhang I, Abschnitt 4.3 durch TÜV Anlagentechnik GmbH (Benannte Stelle Kenn-Nr. 0035)
Certified by TÜV Anlagentechnik GmbH (notified body No. 0035) acc. to PED (Pressure Equipment Directive) 2014/68/EU Appendix I, Chapter 4.3.

Technokov Kft.
Telephely, Location : H-1089 Budapest, Golgota u. 4.
Telephone : +36 1 303-9184,+36 1 313-1774
Fax: +36 1 333-7549
E-mail: meo@technokov.hu

Gyémánt-Pirazol Kft.
Debrecen
Nívó utca 11
4031
Hungary

Szakértõi minõségi bizonyítvány: EN 10204 3.1

Abnahmeprüfzeugnis
Material Test Report Certificate Of Compliance
Dátum / Datum / Date : 28.02.2024
Bizonylat száma
Zeugnisnummer
Registration No. : MB24-00234/1
Munkaszámunk :
Unsere Arbeitsnummer :
Our Work number. :MK24154-0292

Szállító lev. szám KI24-00182
Lieferscheinsnummer KI24-00182
Delivery No. KI24-00182

Rendelés száma VR24-00104
Bestellungsnummer VR24-00104
Order number VR24-00104

Hivatkozási szám 013-ST-2024
Referenz nummer 013-ST-2024
Reference number 013-ST-2024

Mélydomború edényfenék DIN 28013 / Korbbogenboden / Semi-ellipsoidal head

Darabszám Stück Quantity	Méret Größe Dimensions	Anyagminőség Materialgüte Material	Adagszám Schmelznummer Heat No.	Próbaszám Probenummer Test No.
9	D 273x8 mm	P265GH EN 10028-2	930723	5820

Technológiai műveletek / Technologische Arbeitsgänge / Technological procedures

Az edényfenék kivitele / Ausführung der Boden / Vessel Head construction :	
A tartályfenekek hidegalakítással készültek./Die Böden wurden kaltbearbeitet./Vessel heads were made by cold pressing.	
A tartályfenekek melegsajtolással, a szabványnak megfelelően, 920-780 °C között készültek. Die Böden wurden warmgepresst und nach dem Standard zwischen 920-780 °C hergestellt. Vessel heads were made by hot pressing, according to the standards, between 920-780 °C.	X
A hőkezelés megfelel az előírásoknak. Die Wärmebehandlung entspricht den Vorschriften. Heat treatment is in accordance with the stipulations.	
Hegesztett / Welded / Geschweißte	

Csatolt bizonylatok / Anlage, Zeugnisse / Enclosed Certificates

Nr	Bizonylat száma Zeugnisnummer Number of Document	Megnevezés, leírás Benennung Designation, Description
1	20716731	Liberty Galati S.A.
2	240223/01	Mechanikai Vizsg.\ Mechanical Test

Legyártott termék ellenőrzése : Szemrevételezés és méretellenőrzés alapján: MEGFELELT
Endkontrolle: Sicht- und Maßkontrolle binnen Tolerenzen.
Examination of the Products: According to the inspection and the checking of dimensions, the product is within the tolerances stipulated in
A termékbe beütött gyártóműjel:
Das Produkt ist geprägt mit Werksstempel:
Products have been marked with:

TANÚSÍTJUK, HOGY A LEGYÁRTOTT TERMÉK(EK) A RENDELÉSIGAZOLÁSBAN RÖGZÍTETT MÛSZAKI KÖVETELMÉNYEKNEK MEGFELEL(NEK)
WIR BESTÄTIGEN, DAS DIE HERGESTELLTEN PRODUKT(E) DEN TECHNISCHEN FORDERUNGEN DER AUFTRAGSBESTÄTIGUNG ENTSPRECHEN.
WE HEREBY CERTIFY THAT THE PRODUCTS COMPLY WITH THE TECHNICAL DESCRIPTIONS DETERMINED IN THE CONFIRMATION OF THE ORDER.

Ezen mûbizonylat számítógépes úton, zárt rendszerben készült, így aláírás nélkül is hiteles.
This certification was made by a closed computer program hence authoritative without subscription.
Dieses Zertifikat wurde mit einem geschlossenen PC-System gemacht, deshalb braucht keine Untrschrift.

TECHNOKOV KFT
SZAKÉRTŐI MINŐSÉGI ÁTVÉTEL
Turán Mihály

C63-AQU-QIX-002 37 / 917

LIBERTY
No.1 Calea Smirdan
Galati, Postcode 800698
Romania
libertysteelgroup.com/ro/

Prüf-Nr.7001681050
Inspection No:20716731

Blatt(Sheet) 1 von 00001

ABNAHMEPRÜFZEUGNIS 3.1.
(NACH./ACCORDING TO. EN 10204/2004)
INSPECTION CERTIFICATE 3.1.

BESTELLER: Salzgitter Mannesmann
CUSTOMER

BESTELL-NR: 901538/50085066
ORDER NO.
WERK-NR 7001681050
WORKS NO.

PRÜFGEGENSTAND BLECH (HOT ROLLED HEAVY PLATS)
ARTICLE
ANFORDERUNGE "AD-2000 MERKBLATT W 1 AUSGABE 2004" "PED 2014/68/EU"
TECHNICAL REQUIREMENTS
WERKSTOFF (NORMBEZEICHUNG) P265GH-1.0425
MATERIAL
KENNZEICHNUNG: SCHMELZEN-NR.; PROBEN-NR.
MARKING: HEAT-NO.; TEST NO.
ERSCHMELZUNGSART: Y
ELABORATION
MARKENBEZEICHNUNG (MARK) P265GH-1.0425
STEMPEL DES WERKSSACVERSTÄNDIGEN
MARK OF THE WORKS INSPECTOR

ENTSPRECHEND. EN 10028-2:2017 EN 10160-1999, S1E1
ACCORDING TO. EN 10029/2010,tab,1 class B,tab.2,tab.3
EN 10029/2010,class N, tab.4
EN 10163/2-2004,class B,subclass 3

ZEICHEN DES LIEFERWERKES
MARK OF THE MANUFACTURER

POS. NR. ITEM NO.	ABMESSUNGEN DIMENSIONS MMxMMxMM	GEWICHT WEIGHT KG	SCHMELZE NR. HEAT NO.	PROBE NR. TEST NO.	STEMPEL NR. DES WERKSSACH-VERSTÄNDIGEN MARK NO. OF THE WORKS INSPECTOR CTC	UT
577323/0722/1/3	8,00x2000x6000	754	930723	5821	26	OK
577323/0722/1/6	8,00x2000x6000	754	930723	5821	01	OK
577323/0722/1/5	8,00x2000x6000	754	930723	5821	01	OK
577323/0722/1/4	8,00x2000x6000	754	930723	5821	26	OK
578139/0722/1/4	8,00x2000x6000	754	929536	5721	26	OK
577322/0722/1/5	8,00x2000x6000	754	930723	5820	26	OK
577322/0722/1/4	8,00x2000x6000	754	930723	5820	26	OK
577322/0722/1/3	8,00x2000x6000	754	930723	5820	26	OK
577322/0722/1/2	8,00x2000x6000	754	930723	5820	26	OK

TEST RESULTS: SEE ANNEX 1
DIE GESTELLTEN ANFORDERUNGEN SIND LAUT ANLAGE ERFÜLLT.
THE REQUIREMENTS ARE FULFILLED AS PER ANNEX
GALATI, DEN. 16.09.2022
DATE

BUJOREANU OLIVIA
DER WERKSSACHVERSTÄNDIGE (WORKS INSPECTOR)

"IM EINVERNEHMEN MIT DEM TÜV BAYERN (NOV. 77) "
"IN ACCORDING WITH TÜV REQUIREMENTS (NOV. 77) "
"AUF EINE GEGENZEICHNUNG WURDE MIT SCHREIBEN DES TÜV SÜD INDUSTRIE SERVICE GMBH VOM 09. JUNI. 2020 VERZICHTET"
"THE CHANGEOVER TO AN INSPECTION CERTIFICATE 3.1 IS CONFIRMED IN LETTER OF THE TÜV SÜD INDUSTRIE SERVICE GMBH JUNE 09TH, 2020"

C63-AQU-QIX-002 38 / 917

Anlage 1 zum Zeugnis Annex 1
Prüf-Nr.7001681050
Inspection No:0020716731

LIBERTY
No.1 Calea Smirdan
Galati, Postcode 800698, Romania
libertysteelgroup.com/ro/

ERGEBNIS DER PRÜFUNGEN
TEST RESULTS

1. BESICHTIGUNG UND AUSMESSUNG: OHNE BEANSTANDUNG (WITHOUT FAILURES)
   VISUAL INSPECTION AND DIMENSIONAL CHECK
2. ZUGVERSUCH (TENSILE TEST): nach EN ISO 6892-1:2009:quer (trans.)
3. KERBSCHLAGBIEGEVERSUCH NACH EN ISO 148-1:2010, Probenform ISO-V quer. (Trans.)
   ENERGY OF IMPACT TEST SPECIMEN TYPE
   PRÜFTEMPERATUR -20°C
   TEST TEMPERATURE
4. FALTVERSUCH:NACH ENISO7438-2005 DORNDURCHMESSER:.....-.....FALTWINKEL:-
   BEND TEST DIAMETER OF FORMER BENDING ANGLE
5. LIEFERZUSTAND: N-Normalgeglüht
   STATE OF DELIVERY N-Normalized
6. KOHLENSTOFFAQUIVALENT: CEQ = C + Mn / 6 + (Cr+Mo+V) / 5 + (Ni+Cu) / 15
   CARBON EQUIVALENT

TOTAL NUMBER OF PIECES: 9 / TOTAL WEIGHT: 6.786,00 KG

PROBE NR. TEST NO.	ABMESSUNGEN DES PROBESTABES DIM. OF SPECIMEN BREITE&DICKE WIDTH THICKNESS MMxMM	STRECK- GRENZE YIELD POINT MPa	ZUGFES- TIG/KEIT TENSILE STRENGHT MPa	BRUCH- DEHNUNG ELON- GATION L0-5D0 %	STRECKRENZE YELD POINT 300°C J	PROBENFORM SPECIMEN TYPE ISO-V7,5 SCHLAGARBEIT ENERGY OF IMPACT J	PROBENFORM SPECIMEN TYPE ISO-V5 SCHLAGARBEIT ENERGY OF IMPACT J
P265GH							
5821	25,3x8,50	349	498	28	245	54 - 60 - 59	
5821	25,3x8,50	349	498	28	245	54 - 60 - 59	
5821	25,3x8,50	349	498	28	245	54 - 60 - 59	
5821	25,3x8,50	349	498	28	245	54 - 60 - 59	
5721	25,4x8,10	365	496	30	286	33 - 51 - 56	
5820	25,3x8,50	344	493	40	245	59 - 61 - 59	
5820	25,3x8,50	344	493	40	245	59 - 61 - 59	
5820	25,3x8,50	344	493	40	245	59 - 61 - 59	
5820	25,3x8,50	344	493	40	245	59 - 61 - 59	

SCHMELZENANALYSE in Gew.-% Chem. Composition of Heat

SCHMELZE NR. HEAT NO.	C	Si	Mn	P	S	Al	Ti	V	Cu	Ni	Cr	Mo	Nb	B	N2	CEV
L 929536	0,16	0,19	1,12	0,013	0,005	0,037	0,001	0,004	0,06	0,05	0,03	0,009	0,002	0,0002	0,0067	0,36
L 930723	0,16	0,18	1,09	0,014	0,006	0,032	0,002	0,004	0,06	0,05	0,03	0,008	0,002	0,0002	0,0067	0,36

GALATI, DEN. 16.09.2022
DATE

BUJOREANU OLIVIA
DER WERKSSACHVERSTÄNDIGE
WORKS INSPECTOR

TECHNOKOV GmbH.
H-1089 Budapest, Golgota Str. 4.
Telefon : (36-1) 324-8355 Fax : (36-1) 333-7549

Zeugnis der Festigkeitsprobe / Mechanical test report

Arbeits nr.\Job number:		Nennung\ Name of product:							Zeichnungsnr.oder Größe\ Dimension:					Materialgüte\Quality:			Zeugnisnr\Voucher number:				
MK24154-0292		DIN 28013							D273x8mm					P265GH			240223/01				
			Zugprobe\ Tearing test											Warmstreck-prüfung\ Yield			Kerbschlagprobe\ Impact strength test				
Schmelze Nr.\ Charge number	Probe Nr.\ Test number	Zeichen\ Sign	Maß vor dem Bruch\ Dimension before tearing					Belastung an der Streckgrenze\ Loading at yield point	max. Belastung\ Max.loading	Schtreckgrenze\ Yieldpoint	Zugfestigkeit \Tension strength	Dehnung\ Extension	Kontraktion\Contraction	Biegefestigkeit\ Bending stregth	Streckgrenze\ Yieldpoint	Prüftemperatur\ Temperature	ISO-V / 300				
			d	a	b	S_0	L_0	F	Fm	ReH	Rm	A	Z	δBh	ReH		Prüf-temp.\ Temp	Einzel-werte\ Values			Mittel-wert\ Avg.
			mm			mm^2	mm	kN	kN	N/mm^2	N/mm^2	%	%	N/mm^2	N/mm^2	°C	°C	J			
										265	410-530	21					-20				19
930723	5820	243		9,2	11,2	103,0	57,05	35,3	50,1	342,6	486,2	26,0					-20	34	38	54	42

TECHNOKOV KFT
SZAKÉRTŐI MINŐSÉGI ÁTVÉTEL
Turán Mihály

Budapest, 2024.03.07

Der Werksachverständige\ Factory expert

TÜVRheinland CERTIFIED
Management System ISO 9001:2008 valid until: 2016.08.22
www.tuv.com ID 9105012937

TECHNOKOV Kovácsoló és Lemezsajtoló Kft.
Gesenk- und Blechpress G.m.b.H - Forging and Sheet Metal Pressing Co. Ltd.

Gyémánt-Pirazol Kft.

Debrecen
Nívó utca 11
4031

Hungary

Telephely : H-1089 Budapest, Golgota u. 4.
Telefon : +36 1 303-9184, +36 1 313-1774
+36 1 324-8355, +36 1 324-8356
Telefax : +36 1 333-7549
E-mail : meo@technokov.hu
Web : www.technokov.hu

Budapest, 07.03.2024

Authorization of stamping
Bestätigung über Verstempelung

MB24-00234-1
MK24154-0292 Nr.:240307/01

Dimensions Grösse	Current number Gestempelte Material	Current number Gestempelte		Correct number Richtige, im Attest stehende	
		Schmelze-Nr.	Probe-Nr.	Schmelze-Nr.	Probe-Nr.
D 273x8 mm	P265GH EN 10028-2	630723	5820	**930723**	5820

We certify that the disc was manufactured by Technokov Kft and we give permission to **Gyémánt-Pirazol Kft** to change the numbering.

Hiermit bestätigen wir, dass Technokov Kft. die Ronden der Böden geschnitten und gestempelt hat. Wir erteilen **Gyémánt-Pirazol Kft** die Erlaubnis, die Stempelung zu ändern.

TECHNOKOV KFT
SZAKÉRTŐI MINŐSÉGI ÁTVÉTEL
Turán Mihály

Mihaly Turan
Qualitätsabteilung

C63-AQU-QIX-002 41 / 917

CS-423

ŽELEZIARNE PODBREZOVA

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **2691/1/2022**

Č ext obj - External order No - Externauftragsnummer
E4990

Číslo položky - Item number - Positionsnummer
5

Číslo zakazky vyrobcu - Manufacturer's works order number - Werksauftragsnummer
243475/1/2 2143A06

Číslo dopravneho prostriedku - Transport No - Waggon Nr
BL815FP BL417YO

Číslo ložneho listu - *Loading Bill No* - *Ladebrief Nr*
3018627

Číslo avíza - *Dispatch note* - *Lieferanzeige*
3220306

Zakaznik/Prijemca - Customer/Consignee - Besteller/Empfänger

Bepelog Kft.
3043 Egyházasdengeleg,
Rákóczi út 40.
HU

0222646504

Vyrobok - *Product* - *Erzeugnis*

Rúry oceľové bezošvé, valcované za tepla - rúry pre tlakové účely
Seamless hot finished steel tubes - Tubes for pressure purposes
Nahtlose warmgewalzte Stahlrohre - Rohre fur Druckbeanspruchungen

Vonkajší priemer - Outside diameter - Aussendurchmesser	**26.900** mm
Hrubka steny - Wall thickness - Wanddicke	**4.500** mm
Dĺžka - Length - Lange	min **6000** mm max **6500** mm
Počet kusov - Number of pieces - Stuckzahl	**171**
Celkova dĺžka - Total length - Gesamtlange	**1037.00** m
Celkova hmotnosť - Total mass - Gesamtmasse	**2590.00** kg

Značka vyrobcu - *Symbol of the manufacturer's work* - *Herstellerzeichen*

Pečiatka závodneho znalca - *Works inspector's stamp* - *Stempel des Werks Sachverstandingen*

Material - *Material* - *Material*

E355+N EN 10297-1 :2003, P355NH TC1 EN 10216-3 :2013, S355J2H EN 10210-1 :2006

Stav dodania - *Products as delivered condition* - *Lieferzustand*

Normalizačné tvárnenie - *Normalizing forming* - *Normalisierendes Umformen*

Technicke predpisy - *Technical requirements/Demand* - *Prufgrundlagen/ Anforderungen*

AD 2000-Merkblatt W4,VdTUV-Werkstoffblatt 354/2, EN 10210-1 :2006, EN 10216-3 :2013, EN 10297-1 :2003, EN 10025-2 Option 5, Category B, EN 10210-2 Tabelle 2, EN 10216-3 Tabelle 9, EN 10297-1 Tabelle 15, PED 2014/68/EU

Číslo tavby *Cast number* *Schmelze Nr*	Počet kusov *Number of pieces* *Stuckzahl*	Dĺžka *Length* *Lange* [m]	Hmotnost *Mass* *Masse* [kg]	Druh tavenia *Steelmaking process* *Erschmelzungsart*
16216	**171**	**1037**	**2590**	**E**

E = elektricka oblukova pec - *electric arc furnace* - *elektrolichtbogenofen*

Druh ocele - *Steel grade* - *Stahlsorte*

úplne uklúdnená oceľ - *fully killed steel* - *vollberuhigter Stahl*

Miesto / *Location* / *Ort* **v Podbrezovej** **koll**

Datum / *Date* / *Datum* **15.01.2022**

Zavodny znalec / *Works Inspector* / *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a.s. Kolkareň 35, 976 81 Podbrezova, Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www.steeltube.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenska sporitelňa a.s. IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banska Bystrica Section Sa Entry No 69 S

ŽELEZIARNE PODBREZOVA akciová spoločnosť 976 81 Podbrezová
Oddelenie kontroly a zabezpečovania kvality -1-

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CS-4231

ŽELEZIARNE PODBREZOVA

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo *Number* *Nummer* **2691/1/2022**

Uprava povrchu - *Surface protection* - *Oberflachenschutz*

Bez úpravy povrchu (neolejované) - *Without surface treatment (without oil) - Ohne Oberflächenbehandlung (ungeölt)*

Chemicke zloženie - *Chemical composition - Chemische Zusammensetzung*

Číslo tavby *Cast number* *Schmelze Nr*		C [%]	Mn [%]	Si [%]	P [%]	S [%]	Cu [%]	Cr [%]	Ni [%]	Al [%]	Mo [%]	Ti [%]	V [%]	Nb [%]
	Predpis *Requirements* *Vorschrift*													
	min		0 90	0 14						0 020				
	max	0 20	1 60	0 25	0 035	0 010	0 30	0 30	0 50		0 08	0 040	0 100	0 050
16216		**0.18**	**1.23**	**0.23**	**0.021**	**0.007**	**0.25**	**0.07**	**0.07**	**0.025**	**0.02**	**0.001**	**0.005**	**0.000**

Číslo tavby *Cast number* *Schmelze Nr*		N [%]	Exp.1 [%]
	min		
	max	0 0200	
16216		**0.0080**	**0.43**

Exp 1 = Ceq = C + Mn/6 + (V+Mo+Cr)/5 + (Ni+Cu)/15

Skuška ťahom - *Tensile test* - *Zugversuch* **20** °C

	Číslo tavby *Cast number* *Schmelze Nr*	Vzorka č *Test sample No* *Probe Nr*	Rozmery *Dimensions* *Masse* [mm]	Smer odberu/typ vzorky *Direction/Type of the test piece* *Probenrichtung/ Probenform*	Medza kĺzu *Yield point Proof stress* *Streck Dehngrenze* ReH [MPa]	Pevnost v tahu *Tensile strength* *Zugfestigkeit* Rm [MPa]	Ťažnost *Elongation* *Bruchdehnung* A5,65 [%]
C Nr	Predpis Requirements Vorschrift			min / max	355 ---	490 630	22 0 ---
1	**16216**	D001703/21	13 15x4 56	L / V	**396**	**543**	**32.7**

L = Pozdĺžny - *Longitudinal* - *Langsrichtung*

V = Vyrez - *Strip test* - *Streifen*

Skuška razom v ohybe Charpy - *Charpy impact test* - *Kerbschlagbiegeversuch nach Charpy* **EN ISO 148-1**

C Nr	Číslo tavby *Cast number* *Schmelze Nr*	Vzorka č *Test sample No* *Probe Nr*	Predpis *Requirements* *Vorschrift* min max [J]	Jednotlive hodnoty *Individual values* *Einzelwerte* [J]	Priemerna hodnota *Mean value* *Mittelwerte* [J]	Teplota skušania *Test temperature* *Pruftemperatur* [°C]
1	**16216**	D001703/21	KV 40 - ---	**120, 124, 128**	**124**	**-20**

C Nr	Vzorka č *Test sample No* *Probe Nr*	Rozmery *Dimensions* *Masse* [mm]	Smer odberu vzorky *Direction of the test piece* *Probenrichtung*
1	D001703/21	10 00x2 50	L

Skuška rozširovaním vyhovela
Flaring test without objections
Aufweitversuch ohne Beanstandung

Miesto **v Podbrezovej** *Location* *Ort* **koll**

Datum **15.01.2022** *Date* *Datum*

Zavodny znalec *Works Inspector* *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a s Kolkáreň 35 976 81 Podbrezova Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www steeltube sk
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Registered in Register of Business Names in the District Court Banska Bystrica Section Sa Entry No 69 S

ŽELEZIARNE PODBREZOVA akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

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CS-4231

ŽELEZIARNE PODBREZOVÁ

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **2691/1/2022**

List č. - *Sheet No* - *Blatt Nr* **3 / 4**

Skuška vírivými prúdmi vyhovela
Eddy current test without objections
Wirbelstromprufung ohne Beanstandung **EN ISO 10893 -1 100 %**

Material nie je kontaminovany ortut'ou
Material has no contamination by mercury
Material ist nicht kontaminiert mit Quecksilber

System kvality vyrobcu je certifikovany fy SGS podl'a ISO 9001, číslo certifikatu HU95/4628 platnost' certifikatu je do 15 6 2023
Producer s Quality Assurance Sytem is certified according to ISO 9001 by SGS certificate no HU95/4628 validity 15 6 2023
Das Qualitatssystem des Herstellers ist nach ISO 9001 von SGS zertifiziert Zertifikatsnummer HU95/4628 Gultigkeit bis 15 6 2023

Rury su normalizačne valcovane podl'a EN 10210-1-6 4
Tubes are normalized rolled under EN 10210-1-6 4
Rohren sind normalisierend gewalzt nach EN 10210-1-6 4

Radioizotopicka aktivita je max 100 Bq/kg
Radioisotopic activity is max 100 Bq/kg
Radioisotopische Aktivitat ist max 100 Bq/kg

Skušky t'ahom za tepla podl'a AD 2000-Merkblatt W4, časť 3 3 neboli vykonane so suhlasom TUV NORD Systems, TUV-file 18B03/012
With the approval of TUV NORD Systems TUV-file 18B03/012 hot tensile tests according to AD 2000-Merkblatt W4 section 3 3 have not been carried out
Verzicht auf Warmzugversuche gemass AD 2000-Merkblatt W4 Abschnitt 3 3 mit Zustimmung der TUV NORD Systems TUV-Az 18B03/012

Inšpekčny certifikat EN 10204 3 1 podl'a AD 2000 W4 , časť 5 1, vydany na zaklade pisomneho suhlasu TUV NORD System, TUV–dokument 1326W133360
Inspection certificate EN 10204-3 1 acc to AD 2000-Guideline W4 sec 5 1 letter of agreement by TUV NORD Systems TUV-file 1326W133360
Abnahmeprufzeugnis EN 10204-3 1 gemaß AD 2000-Merkblatt W4 Abs 5 1 Zustimmungsschreiben der TUV NORD Systems TUV-Az 1326W133360

System kvality vyrobcu bol podrobeny špecifickemu hodnoteniu pre materialy (Článok 4 3 a 7 5 Priloha I Smernice PED 2014/68/EU) Certifikat 07/202/9150/WZ/0915/20 vydalo notifikovane miesto 0045 TUV NORD Systems GmbH s platnost'ou do 02/2023 Rozsah platnosti certifikatu zahrňa predmetne vyrobky
The producer has a specific reviewed quality system for materials according to the Article 4 3 and 7 5 Annex I of the Directive PED 2014/68/EU
The certificate 07/202/9150/WZ/0915/20 with the validity till 02/2023 was issued by the Notified Body TUV NORD Systems GmbH Code 0045
The mentioned products belong to the certificate validity range
Der Hersteller hat ein spezifisch beurteiltes Qualitatssystem fur die Werkstoffe nach dem Artikel 4 3 und 7 5 Anhang I der Direktive DGRL 2014/68/EU Das Zertifikat 07/202/9150/WZ/0915/20 gultig bis 02/2023 wurde von der Benannten Stelle TUV NORD Systems GmbH Kennummer 0045 erstellt Die aufgeführten Produkte sind im Geltungsbereich des Zertifikates eingeschlossen

Miesto / *Location* / *Ort* **v Podbrezovej** **koll**

Datum / *Date* / *Datum* **15.01.2022**

Zavodny znalec / *Works Inspector* / *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a s Kolkareň 35 976 81 Podbrezová Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www steeltube sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenska sporitelňa a s IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banska Bystrica Section Sa Entry No 69 S

ŽELEZIARNE PODBREZOVÁ akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

C63-AQU-QIX-002 44 / 917

CS-4231

ŽELEZIARNE PODBREZOVÁ

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **2691/1/2022**

List č - *Sheet No* - *Blatt Nr* **4 / 4**

Všetky výrobky vyhovujú vyššie uvedeným normám a požiadavkám v objednávke.
All products meet requirements of above mentioned standards and requirements specified in the order.
Alle Produkte entsprechen den o.a. Normen und Forderungen in der Bestellung.

Vizuálna kontrola a rozmery vyhoveli (100 %).
Visual inspection and dimensional check without objections (100 %).
Visuelle Kontrolle und Abmessungskontrolle sind in Ordnung (100 %).

CE 07 0045-CPR-0915	Železiarne Podbrezová a.s. Kolkáreň 35 976 81 Podbrezová Slovenská republika S355J2H EN 10210-1 2006 Hot finished structural hollow sections of non alloy and fine grain steels Declaration of performance DP 003
Declaration of performance DP see	http://www.steeltube.sk/Product_certificates1

Overenie základných parametrov dokumentu kontroly v informačnom systéme výrobcu ŽP a. s.
Verification of basic parameters of inspection document in the ZP information system (Manufacturers information system)
Die Verizifierung der Grundparameters der Prufbescheinigung im ZP Informationssystem (Herstellers Informationssystem)
https://check.zelpo.sk/certchk.php?ID=524338845

Miesto / *Location* / *Ort* **v Podbrezovej** **koll**

Dátum / *Date* / *Datum* **15.01.2022**

Závodný znalec / *Works Inspector* / *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a.s. Kolkareň 35 976 81 Podbrezová Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www.steeltube.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenská sporitelňa a.s., IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banska Bystrica Section Sa Entry No 69 S

ŽELEZIARNE PODBREZOVÁ akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -I-

CS-3905

ŽELEZIARNE PODBREZOVA

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo *Number* *Nummer* **57186/1/2020**

List č. - *Sheet No.* - *Blatt Nr* . 1 / 4

Č.ext.obj. - External order No. - Externauftragsnummer:
E3383

Číslo položky - Item number - Positionsnummer:
1

Číslo zákazky výrobcu - Manufacturer's works order number - Werksauftragsnummer:
229088/1/1 2043562

Číslo dopravného prostriedku - Transport No. - Waggon Nr.:
BR720CT BR127YF

Číslo ložného listu - *Loading Bill No* - *Ladebrief Nr* :
3010805

Číslo avíza - *Dispatch note* - *Lieferanzeige*:
3027669

Zákazník/Príjemca. - Customer/Consignee - Besteller/Empfanger:

Bepelog Kft
3043 Egyházasdengeleg
Rákóczi út 40
HU

0221789804

Výrobok - *Product* - *Erzeugnis*:

Rúry oceľové bezošvé, valcované za tepla - rúry pre tlakové účely
Seamless hot finished steel tubes - Tubes for pressure purposes
Nahtlose warmgewalzte Stahlrohre - Rohre fur Druckbeanspruchungen

Vonkajší priemer - Outside diameter - Aussendurchmesser:	**26.900** mm
Hrúbka steny - Wall thickness - Wanddicke:	**4.000** mm
Dĺžka - Length - Länge:	min.**6000** mm max.**6500** mm
Počet kusov - Number of pieces - Stuckzahl:	**362**
Celková dĺžka - Total length - Gesamtlänge:	**2200.00** m
Celková hmotnosť - Total mass - Gesamtmasse:	**5012.00** kg

Značka výrobcu - *Symbol of the manufacturer's work* - *Herstellerzeichen*

Pečiatka závodného znalca - *Works inspector's stamp* - *Stempel des Werks Sachverstandigen*

Materiál - *Material* - *Material*.

E355+N EN 10297-1 :2003, P355NH TC1 EN 10216-3 :2013, S355J2H EN 10210-1 :2006

Stav dodania - *Products as delivered condition* - *Lieferzustand*:

Normalizačné tvárnenie - *Normalizing forming* - *Normalisierendes Umformen*

Technické predpisy - *Technical requirements/Demand* - *Prufgrundlagen/ Anforderungen*:

VdTUV-Werkstoffblatt 354/2,AD 2000-Merkblatt W4, EN 10210-1 :2006, EN 10216-3 :2013, EN 10297-1 :2003, EN 10025-2 Tabelle 1 Classe 3, EN 10210-2 Tabelle 2, EN 10216-3 Tabelle 9, EN 10297-1 Tabelle 15, PED 2014/68/EU

Číslo tavby *Cast number* *Schmelze Nr*	Počet kusov *Number of pieces* *Stuckzahl*	Dĺžka *Length* *Lange* [m]	Hmotnosť *Mass* *Masse* [kg]	Druh tavenia *Steelmaking process* *Erschmelzungsart*
4285	362	2200	5012	E

E = elektrická oblúková pec - *electric arc furnace* - *elektrolichtbogenofen*

Druh ocele - *Steel grade* - *Stahlsorte*:

úplne ukludnená oceľ - *fully killed steel* - *vollberuhigter Stahl*

Miesto *Location* *Ort* **v Podbrezovej koli**

Dátum *Date* *Datum* **11.12.2020**

Závodný znalec *Works Inspector* *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a.s., Kolkárska 35, 976 81 Podbrezová, Slovak Republic
Phone +421 48 645 1011, Fax +421 48 645 3032 www.steelnube.sk
CIN 31 562 141, VAT No SK2020458704
Bank account Slovenská sporiteľňa, a.s., IBAN SK69 0900 0000 0000 7990 0086, SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banská Bystrica, Section Sa, Entry No 69/S

ŽELEZIARNE PODBREZOVA akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

Auftr: 202111427/LANG/ Datum 20210322 Dim: 26.9/4/S355J2H/E355+N/P355NH-TC1 Bestell: Proj: Meter: 24.00

04-05-CS-3905 26,9x4 P355NH

CS-3905

ŽELEZIARNE PODBREZOVA

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo *Number* *Nummer* **57186/1/2020**

Uprava povrchu - *Surface protection* - *Oberflachenschutz*

Bez úpravy povrchu (neolejované) - *Without surface treatment (without oil)* - *Ohne Oberflächenbehandlung (ungeölt)*

Chemické zloženie - *Chemical composition* - *Chemische Zusammensetzung*

Číslo tavby *Cast number* *Schmelze Nr*		C [%]	Mn [%]	Si [%]	P [%]	S [%]	Cu [%]	Cr [%]	Ni [%]	Al [%]	Mo [%]	Ti [%]	V [%]	Nb [%]
	Predpis *Requirements* *Vorschrift*													
	min		0 90	0 14						0 020				
	max	0 20	1 60	0 25	0 035	0 010	0 30	0 30	0 50		0 08	0 040	0 100	0 050
4285		**0.19**	**1.24**	**0.22**	**0.013**	**0.007**	**0.19**	**0.07**	**0.06**	**0.024**	**0.02**	**0.001**	**0.005**	**0.001**

Číslo tavby *Cast number* *Schmelze Nr*		N [%]	Exp.1 [%]
	min		
	max	0 0200	
4285		**0.0090**	**0.43**

Exp 1 = Ceq = C + Mn/6 + (V+Mo+Cr)/5 + (Ni+Cu)/15

Skuška ťahom - *Tensile test* - *Zugversuch* 20 °C

C Nr	Číslo tavby *Cast number* *Schmelze Nr*	Vzorka č *Test sample No* *Probe Nr*	Rozmery *Dimensions* *Masse* [mm]	Smer odberu vzorky *Direction of the test piece* *Probenrichtung*	Medza kĺzu *Yield point Proof stress* *Streck Dehngrenze* ReH [MPa]	Pevnosť v ťahu *Tensile strength* *Zugfestigkeit* Rm [MPa]	Ťažnosť *Elongation* *Bruchdehnung* A5,65 [%]
	Predpis Requirements Vorschrift			min	355	490	22 0
				max	---	630	---
1	**4285**	**A053088/20**	**13 05x4 15**	**L**	**410**	**574**	**29.1**
2	**4285**	**A053089/20**	**13 06x4 16**	**L**	**406**	**570**	**28.9**

Skuška razom v ohybe Charpy - *Charpy impact test* - *Kerbschlagbiegeversuch nach Charpy* EN ISO 148-1

C Nr	Číslo tavby *Cast number* *Schmelze Nr*	Vzorka č *Test sample No* *Probe Nr*	Predpis *Requirement* *Vorschrift* min max [J]	Jednotlivé hodnoty *Individual values* *Einzelwerte* [J]	Priemerna hodnota *Mean value* *Mittelwerte* [J]	Teplota skušania *Test temperature* *Prüftemperatur* [°C]
1	**4285**	**A053088/20**	**KV 40 - ---**	**128, 132, 136**	**132**	**-20**

C Nr	Vzorka č *Test sample No* *Probe Nr*	Rozmery *Dimensions* *Masse* [mm]	Smer odberu vzorky *Direction of the test piece* *Probenrichtung*
1	A053088/20	10 00x2 50	L

Skuška stlačením vyhovela
Flattening test without objections
Faltversuch ohne Beanstandung

Skuška rozširovaním vyhovela
Flaring test without objections
Aufweitversuch ohne Beanstandung

Miesto v Podbrezovej *Location* *Ort* koll

Datum 11.12.2020 *Date* *Datum*

Zavodny znalec *Works Inspector* *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a s Kolkáren 35 976 81 Podbrezová Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www.steelbbc.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenská sporiteľňa a s IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banská Bystrica Section Sa Entry No 695

ŽELEZIARNE PODBREZOVA akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

04-05-CS-3905 26,9x4 P355NH

CS-3905

ŽELEZIARNE PODBREZOVÁ

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **57186/1/2020**

Skuška vírivými prúdmi vyhovela
Eddy current test without objections
Wirbelstromprüfung ohne Beanstandung
EN ISO 10893 -1 100 %

Material nie je kontaminovany ortut'ou
Material has no contamination by mercury
Material ist nicht kontaminiert mit Quecksilber

System kvality vyrobcu je certifikovany fy SGS podľa ISO 9001, číslo certifikatu HU95/4628 platnosť certifikatu je do 15 6 2023
Producer s Quality Assurance Sytem is certified according to ISO 9001 by SGS certificate no HU95/4628 validity 15 6 2023
Das Qualitatssystem des Herstellers ist nach ISO 9001 von SGS zertifiziert Zertifikatsnummer HU95/4628 Gultigkeit bis 15 6 2023

Rury su normalizačne valcovane podľa EN 10210-1-6 4
Tubes are normalized rolled under EN 10210-1-6 4
Rohren sind normalisierend gewalzt nach EN 10210-1-6 4

Radioizotopicka aktivita je max 100 Bq/kg
Radioisotopic activity is max 100 Bq/kg
Radioisotopische Aktivitat ist max 100 Bq/kg

Skušky ťahom za tepla podľa AD 2000-Merkblatt W4, časť 3 3 neboli vykonane so suhlasom TUV NORD Systems, TUV-file 18B03/012
With the approval of TUV NORD Systems TUV-file 18B03/012 hot tensile tests according to AD 2000-Merkblatt W4 section 3 3 have not been carried out
Verzicht auf Warmzugversuche gemass AD 2000-Merkblatt W4 Abschnitt 3 3 mit Zustimmung der TUV NORD Systems TUV-Az 18B03/012

Inšpekčny certifikat EN 10204 3 1 podľa AD 2000 W4 , časť 5 1, vydany na zaklade pisomneho suhlasu TUV NORD System, TUV–dokument 1326W133360
Inspection certificate EN 10204-3 1 acc to AD 2000-Guideline W4 sec 5 1 letter of agreement by TUV NORD Systems TUV-file 1326W133360
Abnahmeprüfzeugnis EN 10204-3 1 gemaß AD 2000-Merkblatt W4 Abs 5 1 Zustimmungsschreiben der TUV NORD Systems TUV-Az 1326W133360

System kvality vyrobcu bol podrobeny špecifickemu hodnoteniu pre materialy (Článok 4 3 a 7 5, Priloha I Smernice PED 2014/68/EU) Certifikat 07/202/9150/WZ/0915/20 vydalo notifikovane miesto 0045 TUV NORD Systems GmbH s platnosťou do 02/2023 Rozsah platnosti certifikatu zahŕňa predmetne vyrobky
The producer has a specific reviewed quality system for materials according to the Article 4 3 and 7 5 Annex I of the Directive PED 2014/68/EU
The certificate 07/202/9150/WZ/0915/20 with the validity till 02/2023 was issued by the Notified Body TUV NORD Systems GmbH Code 0045
The mentioned products belong to the certificate validity range
Der Hersteller hat ein spezifisch beurteiltes Qualitatssystem für die Werkstoffe nach dem Artikel 4 3 und 7 5 Anhang I der Direktive DGRL 2014/68/EU Das Zertifikat 07/202/9150/WZ/0915/20 gultig bis 02/2023 wurde von der Benannten Stelle TUV NORD Systems GmbH Kennummer 0045 erstellt Die aufgeführten Produkte sind im Geltungsbereich des Zertifikates eingeschlossen

Rury su vhodne na žiarovu galvanizaciu v zmysle EN 10025-2, tabuľka 1, trieda 3
Tubes are suitable for hot dip galvanizing acc to EN 10025 Table No 1 Class 3
Die Rohren sind für das Feuerverzinken nach EN 10025-2 die Tabelle Nr 1 die Klasse 3 geeignet

Miesto / *Location* / *Ort* v Podbrezovej koli

Datum / *Date* / *Datum* 11.12.2020

Zavodny znalec / *Works Inspector* / *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a s Kolkáreň 35 976 81 Podbrezová Slovak Republic
Phone +421 48 645 3011 Fax +421 48 645 3032 www.zeabbe.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenská sporitelňa a s IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banská Bystrica Section Sa Entry No 69/S

ŽELEZIARNE PODBREZOVÁ akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

04-05-CS-3905 26,9x4 P355NH
Page 3 of 4

04-05-CS-3905 26,9x4 P355NH

CS-3905

ŽELEZIARNE PODBREZOVÁ

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **57186/1/2020**

Všetky výrobky vyhovujú vyššie uvedeným normám a požiadavkám v objednávke.
All products meet requirements of above mentioned standards and requirements specified in the order.
Alle Produkte entsprechen den o.a. Normen und Forderungen in der Bestellung.

Vizuálna kontrola a rozmery vyhoveli (100 %).
Visual inspection and dimensional check without objections (100 %).
Visuelle Kontrolle und Abmessungskontrolle sind in Ordnung (100 %).

CE 07 0045-CPR-0915	Železarne Podbrezová a.s. Kolkárek 35 976 81 Podbrezová Slovenská republika S355J2H EN 10210-1 2006 Hot finished structural hollow sections of non alloy and fine grain steels Declaration of performance DP 003
Declaration of performance DP xxx	http://www.steeltube.sk/Product_certificates/

Overenie základných parametrov dokumentu kontroly v informačnom systeme vyrobcu ŽP a. s.
Verification of basic parameters of inspection document in the ZP information system (Manufacturers information system)
Die Verifizierung der Grundparameters der Prufbescheinigung im ZP Informationssystem (Herstellers Informationssystem)
https://check.zelpo.sk/certchk.php?ID=1527799068

Miesto v Podbrezovej *Location* *Ort*	Datum 11.12.2020 *Date* *Datum*	Zavodny znalec *Works Inspector* *Der Werks Sachverstandige*	Ing. Čižmárik Miroslav

Železarne Podbrezová a.s. Kolkárek 35 976 81 Podbrezova Slovak Republic
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Registered in Register of Business Names in the District Court Banska Bystrica Section Sa Entry No 6905

ŽELEZIARNE PODBREZOVÁ akciová spoločnosť 976 81 Podbrezová
Oddelenie kontroly a zabezpečovania kvality -1-

C63-AQU-QIX-002 49 / 917
COD QC-3.1-Ed.2 REV 6/2017

TMK-ARTROM S.A.
Draganesti Str. 30, Slatina, jud. OLT, Romania 230119
Tel: +40 (249) 436862, 434640, 434641
Fax: +40 (249) 434330, 437288
E-mail: office.slatina@tmk-artrom.eu www.tmk-artrom.eu
EUID: ROONRC.J28/9/1991; J28/9/31.01.1991
VAT No. RO 1510210/1992
Subscribed and Paid Share Capital: 291.587.538,34 lei

INSPECTION CERTIFICATE - EN 10204: 2004 / 3.1

No/Nr : E14721 **Date/Datum: 31.07.2019**	**Manufacturer's mark :** **Herstellerzeichen :**	**Customer Order No. / Vertrags Nr. K19/0738-BR03800**	**PL: 14387**

CUSTOMER - KUNDE: ARGENTO TRADING LTD

Specification / Spezifikation: PED 2014/68/EU+ VdTÜV 354/2+AD 2000W4/ EN 10216-3: 13/DIN 1629: 84 ASTM A333-18	**Dimensions-Abmessungen: 33.7 x 4.5 x 6 000+100/-0 mm** **Steel-Stahlsorte: P355NL1 TC1/P355NH TC1/St 52.0 N/ Gr. 6**

Description: Hot rolled seamless steel pipes; marking at one end: manufacturer's mark, standard, steel grade, dimensions, 3.24Kg/m, L(m), 17.0 MPa, HF, S, 1", LT-45, heat no., LOT, mill inspector no. 5, technical control sign,
Beschreibung: Warmgewalzte Nahtlose Stahlrohre; Markierung an einen Ende: Herstellerzeichen, Norm, Stahl Qualität, Abmessungen, 3.24Kg/m, L(m), 17.0 MPa, HF, S, 1", LT-45, Chargen nr., LOT, Werkssachverständiger nr. 5, tehnisches – Kontrollzeichen,

Heat No. - Schmelze Nr.: 17047

Quantity delivered Gesamtgewicht	Pcs. – Stückzahl	Length –Gesamtlänge – m	Weight – Gesamtgewicht – Kg
	162	972.0	3138

Ladle Chemical Analysis-Schmelzenanalyse (%)

Heat no.	C	Mn	S	P	Si	Ni	Cr	Mo	Cu	Al	Nb	Ti	N	V
17047	0.18	1.21	0.004	0.013	0.21	0.06	0.06	0.01	0.20	0.021	0.001	0.001	0.009	0.002

Cr+Cu+Mo: 0.27 **Nb+Ti+V: 0.004**

Mechanical Properties- Mechanische Eigenschaften

TENSILE TEST (1. ASTM A370 / 2. EN ISO 6892-1) – at room temperature- Test Specimen / Strip–longitudinal	**Rp0.2** N/mm²	**Rt0.5** N/mm²	**Rm** N/mm²	**A** %
Dimension –Proben-Abmessungen (mm): 1.1. 12.8 x 4.6 / 1.2. 12.65 x 4.65 / 2. 15.2 x 4.7	1.1. -	407	571	29
Section – Proben-Durchschnitt (mm²): 1.1. 60.83 / 1.2. 60.73 / 2. 74.8	1.2. -	406	566	30
Length –Proben-Länge - (Lo) (mm): 1.1. 50.8 / 1.2. 50.8 / 2. 50	2. 406	-	575	30

Ring expanding test Ringaufdornversuch (EN ISO 8495)	Flattening test Ring faltversuch (EN ISO 8492)	Charpy V – Notch / Kerbschlagbiegeversuch		
		(EN ISO 148 -1) KV / Longitudinal 2.5 x 10 [mm]	(EN ISO 148 -1) KVc / Longitudinal 10 x 10 [mm]	(ASTM A370)
OK	OK	25 (26; 23; 27) J (-40^{0}C)	101(104; 92; 108) J (-40^{0}C)	KV / Longitudinal 2.5 x 10 [mm] 19 (20; 16; 21) J (-59^{0}C) KVc / Longitudinal 10 x 10 [mm] 76 (80; 64; 84) J (-59^{0}C)

Heat Treatment – thermische Behandlung: normalised - Normalisierung Hydraulic test pressure (ASTM A530): 17.0 MPa for 5 sec: OK Hot yield at 300°C: Rp0.2=289 MPa (strip longitudinal 6.25 x 4.55=28.66 mm²	Melting process: electric arc furnace, fully killed Hardness HRB: 86 - 87–86 – 87 Hardness HRC max 22 (acc to NACE MR01.75/ISO 15156) Flattening test (ASTM A999): OK

Visual inspection and dimensional check: OK; Besichtigung und Ausmessung: OK
" NO WELD REPAIR ON HEREBY CERTIFIED TUBES "
The manufacturer of pipes is certified in acc. with ISO 9001: 2015, ISO 14001:2015 and ISO 45001:2018

QC & LABORATORIES CHIEF
CHEF DER WERKSZEUGNISABTEILUNG
Dipl. Eng. Silviu Barbulescu

MILL INSPECTOR
UNTERSCHRIFT DES WERKSSACHVERSTÄNDIGEN
Eng. Constantin Lupu

"Issued in agreement with TÜV SÜD Industrie Service GmbH (02/98)"
"QS approved acc. to PED, Annex I, Para. 4.3 by Notified Body 0036"
"(Certification no. DGR-0036-QS-W 62/2002/MUC)"

The changeover to an inspection certificate 3.1 is confirmed in letter of TÜV SÜD Industrie Service GmbH August 12th, 2013
This inspection certificate is electronic.
The forgery of this certificate concludes to responsibility mentioned on Romanian Penal Code (art. 290-292).
THIS IS FOR CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED WITH THE ORDERED SPECIFICATION AND THAT INFORMATION IS CORRECT, THEY MEET THE SPECIFICATION'S REQUIREMENTS AND ARE RECORDS IN OUR COMPANY DOCUMENTS.

C63-AQU-QIX-002 50 / 917

Abnahmeprüfzeugnis nach EN10204:01.2005 – 3.1

Inspection Certificate according to EN10204:01.2005 – 3.1



MANFRED GELDBACH
Flansch und Fitting GmbH

Eschfeldstraße 11a
45894 Gelsenkirchen
Tel.: +49 (0) 209 389 88-0
Fax: +49 (0) 209 389 88-11
info@manfred-geldbach.de
www.manfred-geldbach.de

Zeichen des Herstellers Manufacturer's mark		Zeichen des Abnahmebeauftragten Inspector's stamp	
Customer:		Date: 18.09.2023	Test cert №: PO.23-0109B.7
Auftragsnr. Your order - №	PO-23-0109/ZD/0026/05/2023/GEPO-B	Lieferschein-Nr. PO-23-0109 Delivery - №	Lieferdatum 09.11.2023 Delivery date

Bezeichnung Designation of article	Werkstoff Material	Prüfgrundlagen Requirements (last Edd.)
Flanges acc. EN1092-1: 2018	P355QH1 QT	EN10222-4

Pos. Nr. Item №	Menge Quantity	Abmessung Dimension	Schmelze Nr. Heat - №	Prüflos Nr. Lot №	Test-No	Lief.-zust. Del. Cond.	Erschm. Melting proc.
610	50	DN80/88.9 PN63 EN1092-1/11 RFWN Form B2 S=11.25,UNBEV.	A12465	Y61	196	QT	E
630	50	DN100/114.3 PN63 EN1092-1/11 RFWN Form B2 S=11.25,UNBEV.	A12465	Y61	196	QT	E
660	10	DN300/323.9 PN63 EN1092-1/11 RFWN Form B2 S=16,UNBEV.	2A12649	Y58	196	QT	E
130	200	DN25/33.7 PN100 EN1092-1/11 RFWN Form B2 SOLID,UNBEV.	A12465	Y61	196	QT	E
140	40	DN40/48.3 PN100 EN1092-1/11 RFWN Form B2 S=6.5,UNBEV.	A12465	Y61	196	QT	E
150	40	DN50/60.3 PN100 EN1092-1/11 RFWN Form B2 S=7.3,UNBEV.	A12465	Y61	196	QT	E
160	6	DN65/76.1 PN100 EN1092-1/11 RFWN Form B2 S=7.3,UNBEV.	A12465	Y61	196	QT	E

Delivery condition: QT = quenched and tempered 900°C Water/600°C Air

Schmelzanalyse/ Heat analysis

Pos. Nr.	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Cu %	V %	Nb %	Al %	Ti %	N %	1)%	Nb+V %	CEV %
Min.			0,9000									0,0200					
Max.	0,1800	0,4000	1,5000	0,0250	0,0100	0,3000	0,2500	0,5000	0,3000	0,1000	0,0500			0,0150	<0,45	0,1200	0,4700
610	0,1700	0,2800	1,2500	0,0170	0,0040	0,0240	0,0004	0,0050	0,0070	0,0050	0,0020	0,0240		0,0060	0,0314	0,0070	0,3850
630	0,1700	0,2800	1,2500	0,0170	0,0040	0,0240	0,0004	0,0050	0,0070	0,0050	0,0020	0,0240		0,0060	0,0314	0,0070	0,3850
660	0,1800	0,2400	1,3100	0,0140	0,0060	0,0200	0,0030	0,0050	0,0060	0,0020	0,0020	0,0300		0,0060	0,0290	0,0040	0,4041
130	0,1700	0,2800	1,2500	0,0170	0,0040	0,0240	0,0004	0,0050	0,0070	0,0050	0,0020	0,0240		0,0060	0,0314	0,0070	0,3850
140	0,1700	0,2800	1,2500	0,0170	0,0040	0,0240	0,0004	0,0050	0,0070	0,0050	0,0020	0,0240		0,0060	0,0314	0,0070	0,3850
150	0,1700	0,2800	1,2500	0,0170	0,0040	0,0240	0,0004	0,0050	0,0070	0,0050	0,0020	0,0240		0,0060	0,0314	0,0070	0,3850
160	0,1700	0,2800	1,2500	0,0170	0,0040	0,0240	0,0004	0,0050	0,0070	0,0050	0,0020	0,0240		0,0060	0,0314	0,0070	0,3850

Mechanische Prüfungen/ Mechanical tests

Zugversuch (tensile test) DIN EN ISO 6892-1/

Kerbschlagversuch (impact test) DIN EN ISO 148-1; ISO – V – Probe/

Härteprüfung nach Brinell (Brinell hardness test) DIN EN ISO 6506-1; HBW 2.5/187,5 /

CEV=C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15

1) Cr+Cu+Mo

Probenr. Test №	Probenlage Direction	Streckgrenze Yield strength $R_{p0,2\,min}$ N/mm²		Zugfestigkeit Tensile strength R_m N/mm²		Dehnung Elongation A % (Lo=5do)		Einschnürung Reduction of area Z %		Kerbschlagbiegeversuch Energie of impact J				Härteprüfung Hardness HB
Test temperature:		RT		RT		RT				-46°C				
Min.		355		490		21				27				
Max.				630										
Y61-196										1	2	3	S/n	
	tr	480,00		609,00		38,00				96,00	107,00	112,00	105,00	165
	tr	492,00		610,00		38,40				110,00	114,00	116,00	113,33	167
	tr	504,00		604,00		39,10				120,00	124,00	126,00	123,33	168
	tr	506,00		606,00		39,60				127,00	130,00	134,00	130,33	169
Y58-196														
	tr	479,00		612,00		36,00				98,00	105,00	110,00	104,33	167
	tr	485,00		620,00		36,40				100,00	104,00	106,00	103,33	170
	tr	504,00		614,00		37,40				110,00	114,00	116,00	113,33	171
	tr	510,00		604,00		37,60				115,00	120,00	124,00	119,67	172

Weitere Prüfungen/ Additional tests

Maß- und Sichtprüfung / dimensional and visual inspection	OK
IK Test gem. DIN 50914 / testing the resistance of stainless steels to interganular corrosion	-
Prüfung auf Werkstoffverwechselung / testing for material discrepancies	-
UStest for flanges ≥ PN63 acc. EN10228-3, QK3	100% ok

Die gestellten Anforderungen sind erfüllt.
The requirements are fulfilled.

Der Abnahmebeauftrage Carsten Neuhäuser

Zugelassener Hersteller nach AD2000-W0 und HP0, sowie Druckgeräte-Richtlinie 2014/68/EU gemäß Zertifikat des TÜV Nord Deutschland.
Approved manufacturer acc. to AD2000-W0, HP0 and PED 2014/68/EU corresponding to certificate of TÜV NordDeutschland.

Dieses Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.
This certificateis issued by data system and is valid without signature.

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SHANXI BAOFAN HEAVY INDUSTRY GROUP CO., LTD

Test Certificate/Abnahmeprüfzeugnis

EN 10204/3.1(2005)

certified in accordance to AD2000-W0 and Pressure Equipment Directive 2014/68/EU, Annex 1, Paragraph 4.3 by TÜV NORD Systems GmbH & Co. KG with renounce of countersignment

Zertifiziert nach AD2000-W0/W9/W10/W13 Druckgeräte-Richtlinie 2014/68/EU, Anhang 1, Abschnitt 4.3 durch TÜV NORD Systems GmbH & Co. KG mit Verzicht auf Gegenzeichnung

contact:info@baofanheavyindustrygroup.com

page:4/6

Certificate No./Prüf-Nr 2023-07-15 BF23-111

Customer /Besteller:

Order No./ Bestell Nr.:	date / vom	Works No. / Werks Nr.
400881HH	26.05.2023	2023BF23-111

Article / Gegenstand: Hot Forged Flanges / geschmiedete Flansche / 800-1250℃

Specification / Anforderung: **VdTüV-WB350/3 AD2000-W9 W13 TRB100 TRD107**

Requirement: **According to EN1092-1-2018**

Material / Werkstoff: **P250GH (1.0460)**

according to / entsprechend: **EN-10222-2 2017+A1:2021**

State of delivery t / Lieferzustand: **Heat treatment Normalized 890-950℃**

Melting process / Erschmelzungsart: **E**

Marking / Kennzeichnung: Material, Size, PN, DN, Heat-No.

Werkstoff, Grösse, PN, DN, Schmelze-Nr.

Stamp of Manufacturer:

Herstellerzeichen:

Work Inspectors stamp:

Prüfstempel:

Content of the Delivery / Lieferumfang:

Pieces/Stückzahl	Description/Bezeichnung	HeatNo./Schmelze-Nr	Test No. / Probe Nr.
40	EN1092-1 T:05 A PN6 DN40 Blind flange	1497	00-0641048/1
20	EN1092-1 T:05 B2 PN63-100 DN15 Blind flange	1497	000647021/1
70	EN1092-1 T:05 B2 PN63-100 DN25 Blind flange	1497	000647034/1
20	EN1092-1 T:05 B2 PN100 DN80 Blind flange	1828	000647089/8
60	EN1092-1 T:05 B2 PN160 DN25 Blind flange	1497	000648034/1

Mechanical tests / mechanische Prüfungen: Position of specimen / Probenlage: Tangential

Test No. / Probe Nr.	Thickness Dicke	Width, ∅ Breite, ∅	Tensile test / Zugversuch (ISO 6892-1)				Charpy-impact Test, ISO-V Specimen Kerbschlagversuch, ISO-V Probe (ISO 148-1)				Hardness / Härte (ISO 6506-1)
1. 8			R m N /mm²	Rp0,2 N/mm²	Rp0,2 N/mm²	A - %	Joule 20°C	∑/N	Joule 0°C	∑/N	
Requirement											HB
1	12.5*100		473	292	139	32	73 81 85	80	37 41 45	41	143
8			465	287	150	30	72 80 84	79	36 40 44	40	143

Chemical analysis / chemische Analyse:

$$Cev = C + \frac{Mn}{6} + \frac{V+Mo+Cr}{5} + \frac{Ni+Cu}{15}$$

HeatNo./Schmelze Nr.	% C	%Si	%Mn	% P	% S	%Cr	% Al	% Nb	% Ni	% Ti	% V	% Cu	%Mo	%N	Cr+Cu+ Mo+Ni	CEV
Requirement min./max. Heat number	0.18-0.23	≤ 0.40	0.30-0.90	≤ 0.025	≤ 0.015	≤ 0.30	≥ 0.020	≤ 0.01	≤ 0.30	≤ 0.03	≤ 0.02	≤ 0.30	≤ 0.08	≤ 0.012	≤ 0.70	≤ 0.43
1497	0.20	0.21	0.80	0.013	0.006	0.05	0.033	0.002	0.007	0.003	0.002	0.017	0.003	0.005	0.08	0.35
1828	0.19	0.22	0.79	0.016	0.005	0.06	0.031	0.003	0.006	0.002	0.003	0.015	0.002	0.006	0.08	0.34

Inspection and dimensional control / Besichtigung und Maßnachprüfung: without objection / ohne Beanstandung

Herewith we confirm that the goods are in accordance with the order requirements under indication of specific examinations

Hiermit bestaetigen wir, dass die Produkte mit den Anforderungen der Bestellung uebereinstimmen unter Angabe der Ergebnisse spezifischer Prucfungen.

Place / Ort DINGXIANG **Date / Datum** 15-07-2023

Work's Inspector / Werkssachverständiger

SHANXI BAOFAN HEAVY INDUSTRY GROUP CO.,LTD INSPECTION DEPT 山西宝帆重工集团有限公司

山西宝帆重工集团有限公司 SHANXI BAOFAN HEAVY INDUSTRY GROUP CO.,LTD

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SHANXI BAOFAN HEAVY INDUSTRY GROUP CO., LTD

Test Certificate/Abnahmeprüfzeugnis

EN 10204/3.1(2005)

certified in accordance to **AD2000-W0**
and Pressure
Equipment Directive 2014/68/EU, Annex 1, Paragraph 4.3 by
TÜV NORD Systems GmbH & Co. KG
with renounce of countersignment

Zertifiziert nach **AD2000-W0/W9/W10/W13**
Druckgeräte-Richtlinie
2014/68/EU, Anhang 1, Abschnitt 4.3 durch
TÜV NORD Systems GmbH & Co. KG
mit Verzicht auf Gegenzeichnung
contact:info@baofanheavyindustrygroup.com
page:5/8

Certificate No./Prüf-Nr 2023-10-01 BF23-204
Customer /Besteller:

Order No./ Bestell Nr.:	date / vom	Works No. / Werks Nr.
414996HH	**23.08.2023**	**2023BF23-204**

Article / Gegenstand: Hot Forged Flanges / geschmiedete Flansche / 800-1250℃
Specification / Anforderung: **VdTüV-WB350/3 AD2000-W9 W13 TRB100 TRD107**
Requirement: **According to EN1092-1-2018**
Material / Werkstoff: **P250GH (1.0460)**
State of delivery t / Lieferzustand: **Heat treatment Normalized 890-950℃**
Marking / Kennzeichnung: Material, Size, PN, DN, Heat-No.
Stamp of Manufacturer:
Herstellerzeichen:

according to / entsprechend: **EN-10222-2 2017+A1:2021**
Melting process / Erschmelzungsart: **E**
Werkstoff, Grösse, PN, DN, Schmelze-Nr.
Work Inspectors stamp:
Prüfstempel:

Content of the Delivery / Lieferumfang:

Pieces/Stückzahl	Description/Bezeichnung	HeatNo./Schmelze-Nr.	Test No. / Probe Nr.
10	**EN1092-1 T:05 B2 PN63 DN65 Blind flange**	**9527**	**000646076/8**
10	**EN1092-1 T:05 B2 PN63 DN100 Blind flange**	**0172**	**000646114/4**
5	**EN1092-1 T:05 B2 PN63 DN125 Blind flange**	**0172**	**000646140/4**
30	**EN1092-1 T:05 B2 PN63-100 DN25 Blind flange**	**9527**	**000647034/8**
10	**EN1092-1 T:05 B2 PN63-100 DN32 Blind flange**	**9527**	**000647042/8**

Mechanical tests / mechanische Prüfungen: Position of specimen / Probenlage: Tangential

Test No. / Probe Nr.	Thickness Dicke	Width, ∅ Breite, ∅	Tensile test / Zugversuch (ISO 6892-1)				Charpy-impact Test, ISO-V Specimen Kerbschlagversuch, ISO-V Probe (ISO 148-1)				Hardness / Härte (ISO 6506-1)
4.8			R.m N /mm²	Rp0,2 N/mm²	Rp0,2 N/mm²	A - %	Joule 20°C	∑/N	Joule0°C	∑/N	
Requirement			410-540	≥250	400°C ≥110	≥25	≥44				HB
4	12.5*100		477	288	147	32	70 80 85	78	35 40 45	40	143
8			465	285	136	30	72 81 87	80	36 41 47	41	139

Chemical analysis / chemische Analyse:

$$Cev = C + \frac{Mn}{6} + \frac{V+Mo+Cr}{5} + \frac{Ni+Cu}{15}$$

HeatNo./Schmelze Nr.	% C	%Si	%Mn	% P	% S	%Cr	% Al	% Nb	% Ni	% Ti	% V	% Cu	%Mo	%N	Cr+Cu+ Mo+Ni	CEV
Requirement min./max. **Heat number**	0.18-0.23	≤ 0.40	0.30-0.90	≤ 0.025	≤ 0.015	≤ 0.30	≥ 0.020	≤ 0.01	≤ 0.30	≤ 0.03	≤ 0.02	≤ 0.30	≤ 0.08	≤ 0.012	≤ 0.70	≤ 0.43
0172	**0.20**	**0.22**	**0.81**	**0.016**	**0.005**	**0.04**	**0.031**	**0.003**	**0.006**	**0.002**	**0.001**	**0.014**	**0.002**	**0.005**	**0.06**	**0.34**
9527	**0.19**	**0.21**	**0.80**	**0.015**	**0.006**	**0.05**	**0.032**	**0.002**	**0.007**	**0.003**	**0.002**	**0.013**	**0.003**	**0.006**	**0.07**	**0.34**

Inspection and dimensional control / Besichtigung und Maßnachprüfung: without objection / ohne Beanstandung

Herewith we confirm that the goods are in accordance with the order requirements under indication of specific examinations

Hiermit bestaetigen wir, dass die Produkte mit den Anforderungen der Bestellung uebereinstimmen unter Angabe der Ergebnisse spezifischer Pruefungen.

Place / Ort DINGXIANG **Date / Datum 01-10-2023**
Work's Inspector / Werkssachverständiger

SHANXI BAOFAN HEAVY INDUSTRY GROUP CO.,LTD INSPECTION DEPT 山西宝帆重工集团有限公司

山西宝帆重工集团有限公司 SHANXI BAOFAN HEAVY INDUSTRY GROUP CO.,LTD

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Abnahmeprüfzeugnis

(DIN EN 10 204:2005 - 3.2)

Inspection Certificate
Certificat de Réception
Certificato Collaudo Materiali

Prüf-Nr. - Inspection No. - Certificat No. - No. di collaudo: **71 201 22 WA 00700**

Teil - Part - Partie - Parte: **-**

Besteller - Customer - Acheteur - Committente:

GeisslerWista Stahlhandel Witten GmbH
Bebbelsdorf 105, 58454 Witten

Bestell-Nr. - Order No. – No. delacommande - No. dell'ordine: 2500306137

vom - dated - date - in data: 07.01.2022

Hersteller - Manufacturer - Fabricant – Produttore

Saar Blankstahl GmbH
Postfach 1554, 66406 Homburg

Werks-Nr. - Works No. – No. usine - Commessa No.: **409036635**

Prüfgegenstand - Article - Produit-Prodotto:
Stabstahl gezogen/steel bars, drawn/acier en barre, étieré

Prüfgrundlagen/Anforderungen - Technical requirements/Demand - Spécification techniques/Exigences - Norma di controllo/Requisiti:
DGRL 2014/68/EU, Anhang I, Abschnitt 4.3, AD 2000 – W0 / W 7 / W 10, Vorschrift des Bestellers/Customer's requirements

Werkstoff - Material - Matière - Materiale:	**entsprechend** - according to – suivant - secondo:	**Ausgabe** - Edition - Edizione:
25CrMo4	**DIN EN 10269**	**02.2014**

Lieferzustand - State of delivery - Etat de livraison - Stato di fornitura: **vergütet/quenched+tempered/trempe et revenu**

Erschmelzungsart - Melting process - Procédé d'élaboration - Procedimento di elaborazione: Y

Kennzeichnung - Marking - Marquage - Punzonature:
auf Etikett/on label/sur etiquette:
25CrMo4
Schm.Nr./heat-no./No. de Coulée

Zeichen des Herstellers - Brand of the manufacturer - Marque du fabricant- Marchio del produttore: **SBG**

Stempel der Prüfstelle – stamp of inspecting authority - Poinçon de l'organisme de contrôle – Punzone dal l'erite di controllo: STS

Umfang der Lieferung - Extent of material delivery - Liste descriptive - Descrizione della fornitura:

Pos.-Nr. Item-No. Poste-No. No. pos	Stückzahl No. of Qte Numero pezzi	Gegenstand Article Désignation du produit Tipo di prodotto	Schmelze-Nr. Heat No. No. Coulée No. Colata	Probe-Nr. Test No. No. d'éprouvette No. di prova
--	2 Bunde/ Bundles/ Paquet	Rundstäbe/round bars/barre ronde ∅ 14,60 Gewicht/weight/masse: 1941 kg Toleranzen/Tolerances/Tolerances: +0/-0,043 mm	6948770002	32, 33

Die Prüfergebnisse entsprechen auch dem Werkstoff 1.7258(24 CrMo 5) nach DIN 17240-07/76 und Werkstoff 1.7219/26 CrMo 4) nach DIN 17280-07/85
The obtained results are also in accordance with material 1.7258(24 CrMo 5) acc. DIN 17240-07/76 and material 1.7219(26 CrMo 4) acc. DIN 17280-07/85
Les résultats obtenue correspondent aussi avec le matiere 1.7258(24 CrMo 5) selon DIN 17240-07/76 et le matiere 1.7219(26 CrMo 4) selon DIN 17280-07/85

Zusätzliche Angaben - Additional remarks - Autres remarques - Osservazione: --

Die gestellten Anforderungen sind erfüllt - The requirements are fulfilled. - Les conditions imposées sont satisfaites. - I risultati sono conformi al requisiti richiesti.

Homburg
Ort - Location - Lieu - Localita:

Tag 28.09.2022
Datum - Date – Data:

SGS-TÜV Saar GmbH

Norbert Zender
Der Abnahmebeauftragte / inspector/L'inspecteur

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Abnahmeprüfzeugnis

(DIN EN 10 204:2005 - 3.2)

Inspection Certificate
Certificat de Réception
Certificato Collaudo Materiali

SGS TÜV SAAR

Ergebnisse der Prüfungen – Test Results – Résultats des Essais – Risultati delle Prove

Prüf-Nr. - Inspection No. - Certificat No. - No. di collaudo: **71 201 22 WA 00700** **Teil** - Part - Partie - Parte: **-**

Prüfungen - tests - Essais - Prove

Prüfart-Test - Test type - Type d'essai - Tipo di prove: Probenart - Specimen type - Type de l'éprouvette - Tipo di provette: Probenzustand - Specimen condition - Traitement de l'éprouvette - Stato delle provette:	**Zugversuch** – Tensile test – Essai de traction **Rundprobe** – Round specimen – éprouvette cylindrique **vergütet**/quenched+tempered – trempe et revenu	**Kerbschlagbiegevers.** – Impact test – Essai de résilience ISO-V **vergütet**/quenched+tempered – trempe et revenu

Probe Nr. Test No. No. d'éprouvet. No. di prova	**Probenabmessung** Dim. of specimen Dim. de l'éprouvette Dim. della provetta	**Probenentnahme** Specimen Prélèvement Prelevamento	**Prüf-temperatur** Test temperature Température d'essai Temperatura di prova	**Streck-grenze** Limit of elasticity Limité d'élasticité Lim. di snervamento	**Zug-festigkeit** Tensile strength Résistance à la tractio Carico di rottura	**Bruch-dehnung** Elong-ation Allong-ement Allung-amento	**Bruch-einschn.** Reduction of area Stric-tion Striz-ione	1 = (J) 2 = (J/cm²) 3 = (%) 4 = (mm) 5 = (%) 6 = HB	**Schlagarbeit** - Energy of impact - Energie de rupture - Energia di rottura **Kerbschlagzähigkeit** - Impact strength - Résilience - Resilienza **Krist. Bruchanteil** - Cryst.proportion **Breitung** - Expansion Elargissement - Espansione **Härte (Einheiten)** - Hardness - Dureté - Durezza

Schmelze Nr. Heat No. No. Coulée Colata No.	Dicke Thickness Epaisseur Spessore mm	Breite ∅ Width ∅ Largeur ∅ Largh. ∅ mm	Ort Loc. Lieu Zone	Richtung Direc. Senso	Lage Pos.	T C°	$R_{p0,2}$ MPa	Rm MPa	A Lo= %	Z %		Werte - Values - Valeurs - Valori 1	2	3	Σ/N	Bemerk. Remarks Remarques Osservaz
Anforderungen - Requirements - Exigences - Richiesti:																
			-	l	-	20	450	600-740	18	60	1				118	
			-	l	-	-60	-	-	-	-	1				40	

Mechanisch-technologische Prüfungen durchgeführt im Beisein der SGS-TÜV GmbH
Mechanical-technological tests in presence of SGS-TÜV Saar GmbH
Essais mécaniques – technologiques en presence de SGS-TÜV Saar GmbH

- Zugversuch/tensile test/Essai de traction
- Kerbschlagbiegeversuch/impact test/Essai de résilience

Prüfergebnisse, siehe Abnahmeprüfprotokoll 3.2 des Herstellers - Anlage 1
Test results, see inspection certificate 3.2 from manufacturer - annex 1
Résultats des essais, voir certificate de reception 3.2 de fabricant - annexe 1

Aussagen zu weiteren Prüfungen/Declarations to further tests/Déclarations sur les vèrifications
Besichtigung und Maßkontrolle : ohne Beanstandung
visual inspection and dimension check : no objection
contrôle visual et dimensionnel : sans remarques

Schmelzanalyse, siehe Abnahmeprüfzeugnis 3.2 Nr. 69/22 Anlage 1
Heat analysis, see inspection certificate 3.2 no. 69/22 annex 1
Analyse sur coulee, voir certificate de reception 3.2 no. 69/22 annexe 1

Härteprüfung, siehe Abnahmeprüfzeugnis 3.2 Nr. 69/22 Anlage 1
Hardness test, see inspection certificate 3.2 no. 69/22 annex 1
Essai de dureté à la bille, voir certificate de reception 3.2 no. 69/22 annexe 1

Homburg
Ort - Location - Lieu - Localita:

Tag 28.09.2022
Datum - Date - Data:

SGS-TÜV Saar GmbH

Norbert Zender
Der Abnahmebeauftragte / inspector/L'inspecteur

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Abnahmeprüfzeugnis 3.2
Certificat de reception 3.2 / Inspection Certificate 3.2
Gemäß/Selon/According DIN EN 10204 Januar 2005

SAAR BLANKSTAHL GmbH
Postfach 1554
D-66406 Homburg

Seite 1/2

GeisslerWista Stahlhandel GmbH

Bebbelsdorf 105

D-58454 Witten

Nr./No.: 69/22
Ort/ Datum: Homburg, 28.09.2022

Besteller/Client/Customer: GeisslerWista
Bestell-Nr./No. de commande/order No.: s. Bemerkungen
Werksauftrag/Commande Usine/Mill Order: 409036635

POSITION ITEM No	GÜTE UND LIEFERZUSTAND NUANCE ET ETAT DE LIVRAISON GRADE AND STATE OF DELIVERY	ABMESSUNG DIMENSION mm	LIEFERVORSCHRIFT PRESCRIPTIONS SPECIFICATIONS	LÄNGE LONGUEUR LENGTH mm	GEWICHT MASSE WEIGHT kg
	Stabstahl 25CrMo4 vergütet gezogen entspannt	rd. 14,60 +0 / -0,043	DGRL 2014/68/EU, Anhang 1, Abschn. 4.3, AD 2000 W0/W7/W10, DIN EN 10269	4000 - 4100	1941 2 Bunde

TÜV-Abnahme vom: 28.09.2022

Bemerkungen/remarque/remarks: Kundenbest. 2500306137 v. 07.01.2022

	SCHMELZANALYSE-ANALYSE SUR COULEE - HEAT ANALYSIS in Gewichts-%								
SCHMELZEN Nr. No. DE COULEE HEAT No.	% C	% Si	% Mn	% P	% S	% Cr	% Mo		ERSCHMELZUNGSART MODE D'ELABORATIN PROCESS
SOLLWERTE VALEURS IMPOSEES SPECIFICATION	0,22 – 0,29 0,20 – 0,28 0,22 – 0,29	max. 0,40 0,15– 0,35 max. 0,35	0,60 - 0,90 0,50 – 0,80 0,50 – 0,80	max. 0,025 max. 0,030 max. 0,030	max. 0,035 max. 0,035 max. 0,025	0,90 – 1,20 0,90 – 1,20 0,90 – 1,20	0,15 – 0,30 0,20 – 0,35 0,15 – 0,30	EN 10269 DIN 17240 DIN 17280	
6948770002	0,278	0,331	0,749	0,011	0,023	1,150	0,205		Y

HÄRTETEMPERATUR/ TEMPERATURE DE TREMPE/HARDENING TEMPERATURE: **870°C** ÖL/HUILE/OIL
ANLASSTEMPERATUR+ZEIT/TEMPERATURE DE REVENU+TEMPS/TEMPERING TEMPERATURE+TIME : **710°C/ ≥ 2,5** Stunden/Heures/Hours

KENNZEICHNUNG / MARQUAGE / MARKING :
< 25: AUF ETIKETT / SUR ETIQUETTE/ON LABEL : **SBG 25CrMo4 6948770002 STS KG**
≥ 25: STABWEISE STEMPELUNG/ 100% SUR BARRES/ ALL BARS :

100% VERWECHSLUNGSPRÜFUNG / 100 % CONTRÔLE ANTI-MÉLANGE / 100% TEST FOR MIXUP: OHNE BEANSTANDUNG / SANS REMARQUES / WITHOUT OBJECTIONS

MAß- u. BESICHTIGUNGSKONTROLLE/CONTRÔLE DIMENSIONNEL-CONTROLE VISUEL/DIMENSIONAL CHECK-VISUAL INSPECTION : OHNE BEANSTANDUNG / SANS REMARQUES / WITHOUT OBJECTIONS

100 % WIRBELSTROMRISSPRÜFUNG / 100 % CONTROLE COURANT FOUCAULT / 100 % EDDY CURRENT TEST
OHNE BEANSTANDUNG / SANS REMARQUES / WITHOUT OBJECTIONS

SGS-TÜV Saar GmbH
Anlage/Annex/Annexe Nr 71 20122 WA 00700

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Abnahmeprüfzeugnis 3.2 SAAR BLANKSTAHL GmbH

Nr./No.: 69/22
Auftr./Pos./Los: 409036635

Ergebnisse der Prüfungen
Test results / Résultat de essai

Mechanische Prüfungen – Mechanical Tests – Essais Mécaniques

Prüfart-Test - Test type - Type d'essai: **Zugversuch** - Tensile Test –Essai de traction | **Kerbschlagbiegevers.** - Impact Test Essai de résilience

Probenart - Specimen type - Type de l'éprouvette - Tipo di provette: **Rundprobe** – Round specimen-éprouvette cylindrique; **Sechskantprobe** – hexagon specimen-éprouvette hexagonal | **ISO-V / ISO-U**

Probenzustand - Specimen condition - Traitement de l'éprouvette : **Vergütet** - quenched+tempered – trempe et revenu | **Vergütet** - quenched+tempered – trempe et revenu

Probe-Nr. Test No. No d'éprouvet	Proben-abmess. Dim. of specimen Dim. de l'éprouvette	Probenentnahme Specimen Prélèvement A= Anfang/beginning/Debut l = längs/longitudinal/longitudinale D = Durchmess./diameter/diamètre			Prüf-temp. Test temp. Temp. d'éssai	Streck-grenze Limit of elasticity Limité d'élasticité	Zugfestig-keit Tensile strength Résistance à la tractio	Bruch-dehnung Elongation Allong-ement	Bruch-einschn. Reductio n of ares Striction	Schlagarbeit Enery of impact Energie de rupture				Bemerk. Remark Remar-ques
		Ort Loc. Lieu	Richtung Directi. Senso	Lage Position	T	Rp0,2	Rm	A	Z	1	2	3	Σ/N	ISO-V
	mm				°C	MPa	MPa	%	%	J	J	J	J	
Anforderungen – Requirements – Exigences														
					RT	>450	600 - 740	>18	>60				118 >40	RT -60°
Ergebnisse – Results – Résultats														
32	14,58	A	I	D/2		584	681	27,4	72,8	178 166	189 170	187 176	185 171	RT -60°
33	14,58	A	I	D/2		591	691	26,8	72,8	194 178	180 182	186 170	187 177	RT -60°

Härteprüfung am Stab / Durete Sur Barres / Hardness an bars : **215 - 219 HB**

Zusätzliche Angaben – Additional remarks – Autres remarques

Die gestellten Anforderungen sind erfüllt – The requirements are fullfilled – Les conditions imposées sont satisfaites

Die Prüfergebnisse entsprechen auch dem Werkstoff 1.7258(24CrMo5) nach DIN 17240–07/76 und Werkstoff 1.7219(26CrMo4) nach DIN 17280–07/85
Les résultats obtenue correspondent aussi avec le matiere 1.7258(24CrMo5) selon DIN 17240–07/76 et le matiere 1.7219(26CrMo4) selon DIN 17280–07/85
The obtained results are also in accordance with material 1.7258(24CrMo5) acc. DIN 17240–07/76 and material 1.7219(26CrMo4) acc. DIN 17280–07/85

Das Zeugnis entspricht einem Zeugnis 3.1 C nach DIN EN 10204, Ausgabe August 1995

Hersteller – Manufacturer – Fabricant

Homburg — Ort – Location – Lieu
28.09.2022 — Datum – Date – Data

Dr. Christoph Peter
Abnahmebeauftragter des Herstellers

Saar-Blankstahl GmbH, Mainzer-Str. 38, D-66404 Homburg
Tel.: 06841/693-303, Fax: 06841-693-5303
E-Mail: christoph.peter@saar-blankstahl.de

Benannte Stelle – Kenn-Nr. 1637

Homburg — Ort – Location – Lieu
28.09.2022 — Datum – Date – Data

Norbert Zender
Prüflabor der SGS-TÜV GmbH, der Abnahmebeauftragte

Technischer Überwachungs-Verein Saarland e.V., Am TÜV 1, D-66280 Sulzbach
Tel.: 06897/506-111 -/210, Fax: 06897/506224

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LIPPISCHE EISENINDUSTRIE GMBH

Lippische Eisenindustrie GmbH
Alter Weg 57
32760 Detmold
Tel. 05231 / 564..0
Fax. 05231 / 564 ..147
email : Info@Lippische-Eisen.de
web : www.lippische-eisen.de

☐ **Werkszeugnis EN 10204** 2.2 **WZ-Nr.: 144919**
Test report

☒ **Abnahmeprüfzeugnis EN 10204** 3. 1
Inspection certificate

Besteller : 101304
Purchaser :

Importőr:
NITECH 2004. Kft
Kazincbarcika, Hadak útja 2/a
H-3700
www.nitech2004.eu

I. Bestellnr. :
Y. Order No.: BE-002449

Lieferdatum :
Shipping date : 17.01.2023

Rechnung Nr. :
Invoice No. :

Herstellung : Warmumformung
Manufacturing process : Hot forging

Erschmelzungsart des Stahles :
Melting method of steel : E

Prüfbedingung :
Conditions of test : EN 10269 / DIN 267-13 / AD-2000-W7/1-W10

QM System zertifiziert nach DIN EN ISO 9001-2015
Zertifikat Nr.:
08 100 959 170

QM System zertifiziert nach Richtlinie 2014/68/EU
EN 764-5 Abschnitt 4.2
TÜV Rheinland
01 202 641 / Q-12 0002

Stück Pieces	Artikelbezeichnung Description	Kennzeichnung Marking					Werkstoff Material	Schmelze Heat No.:	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
	6 Kt. - Muttern		1*	2*	3*	4*										
1 39630	DIN 2510/NF M 16	LE-KG-	126000	i.O.	221-231	710	25CrMo4	597260	.24	.21	.74	.012	.013	.97	.16	
		260					Wärmebehandlungszustand /Heat treatment:	QT	AL %	B %	Cu %	Ti %	As %	Sn %	V %	N %
	Kerbschlagprobe ISO-V															
	bei -60°C															
	130 / 108 / 120 Joule		1*	2*	3*	4*	Werkstoff Material	Schmelze Heat No.:	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
2																
									AL %	B %	Cu %	Ti %	As %	Sn %	V %	N %

1* = Prüfkraftversuch N — 4 Stck.
Proof load test

2* = Aufweitversuch 6 % — 4 Stck.
Widening test

3* = Vickershärte HV 30 — 20 Stck.
Vickers hardness HV 30

4* = Anlasstemperatur °C
Annealing temperature

Besondere Anforderungen :
Special demands :
Materialverwechslungsprüfung wurde durchgeführt.
Ergebnis: i.O.

Die Prüfungsergebnisse erfüllen die Anforderungen aus der Bestellung.
The test results are in compliance with the requirements of the order.

Datum : 17.01.2023
Date :

Lippische Eisenindustrie GmbH
Martin Mallok
Abnahmebeauftragter
Manufacturer authorised inspection representative

Das Zeugnis wurde per EDV erstellt und ist auch ohne Unterschrift gültig.
This certificate was generated by data system and must not be signed for validity.

C63-AQU-QIX-002 58 / 917

LIPPISCHE EISENINDUSTRIE GMBH

Lippische Eisenindustrie GmbH
Alter Weg 57
32760 Detmold
Tel. 05231 / 564..0
Fax. 05231 / 564 ..147
email : Info@Lippische-Eisen.de
web : www.lippische-eisen.de

☐ Werkszeugnis EN 10204 2.2 WZ-Nr.: 146979
Test report

☒ Abnahmeprüfzeugnis EN 10204 3. 1
Inspection certificate

Besteller : 101304
Purchaser :

Importőr:
NITECH 2004. Kft
Kazincbarcika, Hadak útja 2/a
H-3700
www.nitech2004.eu

I. Bestellnr. :
Y. Order No.: BE-003356

Lieferdatum :
Shipping date : 09.05.2023

Rechnung Nr. :
Invoice No. :

Herstellung : Warmumformung
Manufacturing process : Hot forging

Erschmelzungsart des Stahles :
Melting method of steel : E

Prüfbedingung :
Conditions of test : EN 10269 / DIN 267-13 / AD-2000-W7/1-W10

QM System zertifiziert nach DIN EN ISO 9001-2015
Zertifikat Nr.:
08 100 959 170

QM System zertifiziert nach Richtlinie 2014/68/EU
EN 764-5 Abschnitt 4.2
TÜV Rheinland
01 202 641 / Q-12 0002

Stück Pieces	Artikelbezeichnung Description	Kennzeichnung Marking					Werkstoff Material	Schmelze Heat No.:	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
	6 Kt. - Muttern		1*	2*	3*	4*										
1 45547	DIN 2510/NF M 16	LE-KG-	126000	i.O.	214-228	730	25CrMo4	604284	.26	.20	.86	.014	.007	.97	.16	
		284					Wärmebehandlungszustand /Heat treatment:	QT	AL %	B %	Cu %	Ti %	As %	Sn %	V %	N %
	Kerbschlagprobe ISO-V															
	bei -60°C															
	62 / 74 / 88 Joule		1*	2*	3*	4*	Werkstoff Material	Schmelze Heat No.:	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
2								,								
									AL %	B %	Cu %	Ti %	As %	Sn %	V %	N %

1* = Prüfkraftversuch N — 4 Stck.
Proof load test

2* = Aufweitversuch 6 % — 4 Stck.
Widening test

3* = Vickershärte HV 30 — 20 Stck.
Vickers hardness HV 30

4* = Anlasstemperatur °C
Annealing temperature

Besondere Anforderungen :
Special demands :
Materialverwechslungsprüfung wurde durchgeführt.
Ergebnis: i.O.

Die Prüfungsergebnisse erfüllen die Anforderungen aus der Bestellung.
The test results are in compliance with the requirements of the order.

Datum : 09.05.2023
Date :

Lippische Eisenindustrie GmbH
Martin Mallok
Abnahmebeauftragter
Manufacturer authorised inspection representative

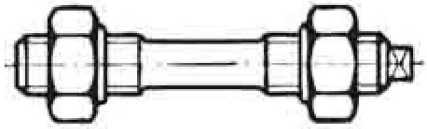
Das Zeugnis wurde per EDV erstellt und ist auch ohne Unterschrift gültig.
This certificate was generated by data system and must not be signed for validity.

C63-AQU-QIX-002 59 / 917

Minőségi Bizonyítvány EN 10204 3.1 / Inspection Certificate

Sorszám / No.: NMB057/2024

Szállító / Supplier
Gyártó/Manufacturer
NITECH 2004. Kft.
3700 Kazincbarcika, Hadak útja 2/a.
Weboldal / Website: www.nitech2004.eu



Vevő / Customer
Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó utca 11.

Kelte / Issued date	Iktatószám / Registrar number
2024.02.20.	013-ST-2024

Forrás bizonylat(ok) / Source documents:
Számla / Invoice: SZA00058/2024, Iktatószám / Registrar number: 013-ST-2024

Szabvány hivatkozások/according to:
- Termék / Produkt : MSZ 5189/7
- Anyag / Material : EN 10269 - PED 2014/68/EU - AD 2000 W7-W10
- Horganyozás / Galvanizing : EN ISO 4042

Megmunkálás műveletei/Operations of processing: a szabvány előírásai szerint gyártva/Manufactured according to the standard
Csavarok / Bolts - Darabolás, forgácsolás, jelölés, menethengerlés, felületkezelés horganyozás/Cutting, chipping, marking, thread rolling, surface treatment galvanizing.
Anyák / Nuts - felületkezelés horganyozás/ surface treatment galvanizing.

Ellenőrzési műveletek/Sequnce of operations:
- Méretellenőrzés szabvány szerint, és szemrevételezés/Size control according to standard and visual inspection.
- Vegyi összetétel: lásd a vonatkozó alapanyag bizonylatot/Chemical composition:see relevant basic material certificate
- Mechanikai tulajdonságok: lásd a vonatkozó alapanyag bizonylatot/Mechanical properties:see relevant basic material certificate

Gyártói jelölés/Brand of the manufacturer: N+
Minősítés/Qualification:
- A követelmények teljesülnek/The requirements are fulfilled

Csomagolás módja/Mode of packaging
- papir kartondoboz/paper cardboard box

Sor. / No.	Termék / Description	Menny. / Quantity	Mee / Unit
	Megjegyzés / Note		
1.	Szegcsavar MSZ5189/7-"E" 25CrMo4 M16x 95 horganyzott	25	db / pcs
	Alapanyag bizonylat száma/Certificate No:71 201 22 WA 00700, Adagszám/Heat No:6948770002, Anyag jelölése/Marking of material:KG		
2.	Szegcsavar anya M16 DIN 2510 NF 25CrMo4 horg.	50	db / pcs
	Az anyák csak horganyozás, gyártói bizonylat csatolva.		

Az átbélyegzés új jelölése/New marking of the re-stamping:

TÜV tanúsítvány száma/TÜV certificate number:01 202 HU/U-16 3040

Felelős vezető/Responsible leader

Nagy István
NITECH 2004. Kft.

C63-AQU-QIX-002 60 / 917

L-7291

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
Certificat de reception 3.1
DIN EN 10204
(A02)

Nr./No./N° (A03) **2020456**
Seite/Page/Page 1/5
Datum/Date/Date 22.06.2022

Nr. (A07) G22-0321 15.02.2022
Besteller UnionStahl GmbH
Purchaser 47229 Duisburg
Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werksauftrags-Nr. 0001446323
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090206418
Dispatch note No. 15.06.2022
Avis d'expédition N°

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Abnahme WS
Inspection
Reception
(A05)

Kennzeichnung des Materials / Marking of the product / Marquage du produit (B06)
Herstellerzeichen/Stahlsorte/Schmelzen-Nr/Erzeugnis-Nr/
Sachverständigenstempel
Trademark/Steelgrade/Heat-No/Product-No/Inspector´s stamp
Sigle de l´usine/Nuance de l´acier/N° coulée/N° produit/
Poinçon de l´expert

Materialdaten / Material data / Données des matériaux (B01-B99)

Pos. Item Poste	Anzahl Quantity Nombre (B08)	Erzeugnis-Nr. Product No. N° produit (B07)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Lieferzustand Cond. of delivery Etat de livraison (B04)	Dicke x Breite x Länge Thickness x Width x Length Epaisseur x Largeur x Longueur (B09-B11) mm x mm x mm
08	33	1982222	43348	N	10,00 x 2000,0 x 4000
Σ	33	Gewicht Weight Poids (B12) 20.930 kg kgs kgs		N: normalisiert / normalized / normalisé	

Maßprüfung und Sichtkontrolle auf äußere Beschaffenheit: ohne Beanstandung
Dimensional check and visual examination of the surface condition:
without objection
Contrôle dimensionnel et examen visuel de l'état de surface: satisfaisants

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

AS Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

Diese durch ein geeignetes Datenverarbeitungssystem erstellte Bescheinigung ist gemäß EN 10 204, Abschnitt 5, ohne Unterschrift gültig.
This certificate was prepared by a suitable data processing system and is valid without signature according to EN 10 204, section 5.
Ce certificat a été établi par un système adéquat de traitement de données, il est valable sans signature selon EN 10 204, section 5.

C63-AQU-QIX-002 61 / 917

L-7291

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
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(A02)

Nr./No./N° (A03) **2020456**
Seite/Page/Page 2/5
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Besteller UnionStahl GmbH
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Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werksauftrags-Nr. 0001446323
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090206418
Dispatch note No. 15.06.2022
Avis d'expédition N°

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Abnahme WS
Inspection
Reception
(A05)

Schmelzenanalyse / Ladle analysis / Analyse de coulée (C70-C99)

Schmelzen-Nr. Heat No. N° Coulée (B07)	C % ≤ 0,20	Si % ≤ 0,40	Mn % 0,80 - 1,40	P % ≤ 0,025	S % ≤ 0,010	N % ≤ 0,012	Al % ≥ 0,020	Cu % ≤ 0,30	Cr % ≤ 0,30	Ni % ≤ 0,30
43348	0,14	0,17	0,88	0,012	0,004	0,004	0,037	0,01	0,03	0,03

Schmelzen-Nr. Heat No. N° Coulée (B07)	Mo % ≤ 0,08	Nb % ≤ 0,020	Ti % ≤ 0,03	V % ≤ 0,02	EV1 1) % ≤ 0,70	Al/N	EV2 2) %			
43348	0,004	0,001	0,001	0,001	0,07	9,250	0,30			

1) EV1 : Cr+Cu+Mo+Ni

2) EV2 : CEV=C+Mn/6+Mo/5+Ni/15+Cr/5+V/5+Cu/15

Stahlherstellung: Sauerstoffaufblasverfahren
Steel making: Basic oxygen process
Fabrication d´acier: Procédé au convertisseur à l´oxygène
(C70)

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

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L-7291

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
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Nr./No./N° (A03) **2020456**
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Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werksauftrags-Nr. 0001446323
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090206418
Dispatch note No. 15.06.2022
Avis d'expédition N°

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Abnahme WS
Inspection
Reception
(A05)

Zugversuch / Tensile test / Essai de traction (C10-C29)

Proben-Nr. Specimen No. N° éprouvette (C00)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Ort Location Lieu (C01) 1) 2) 3)	Richt. Direct. Orient. (C02) 4)	Zustand Cond. Cond. (B05) 5)	Form Type Type (C10) 6)	Streckgrenze Yield point Limite d'élasticité (C11) ReH MPa ≥ 265	Zugfestigkeit Tensile strength Résistance (C12) Rm MPa 410 - 530	Bruchdehnung Elongation Allongement (C13) A5 7) % ≥ 22		
1982222	43348	M4G	Q	N	P	335	464	33		

1) M: 1/2 Länge / 1/2 Length / 1/2 Longueur
2) 4: 1/4 Breite / 1/4 Width / 1/4 Largeur
3) G: Erzeugnisdicke / Thickness of product / Epaisseur du produit
4) Q: quer / transversal / transversal
5) N: normalisiert / normalized / normalisé
6) P: prismatisch / prismatic / prismatique
7) A5: Lo=5,65 √So

Warmzugversuch / Hot tensile test / Essai de traction à chaud (C10-C29)

Proben-Nr. Specimen No. N° éprouvette (C00)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Ort Location Lieu (C01) 1) 2) 3)	Richt. Direct. Orient. (C02) 4)	Zustand Cond. Cond. (B05) 5)	Form Type Type (C10) 6)	Temperatur Temperature Température (C03) °C	Dehngrenze Yield strength Limite d'élasticité (C11) Rp0,2 MPa ≥ 155			
1982222	43348	M4G	Q	N	P	+300	242			

1) M: 1/2 Länge / 1/2 Length / 1/2 Longueur
2) 4: 1/4 Breite / 1/4 Width / 1/4 Largeur
3) G: Erzeugnisdicke / Thickness of product / Epaisseur du produit
4) Q: quer / transversal / transversal
5) N: normalisiert / normalized / normalisé
6) P: prismatisch / prismatic / prismatique

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

AS Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

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L-7291

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
Certificat de reception 3.1
DIN EN 10204
(A02)

Nr./No./N° (A03) **2020456**
Seite/Page/Page 4/5
Datum/Date/Date 22.06.2022

Nr. (A07) G22-0321 15.02.2022
Besteller UnionStahl GmbH
Purchaser 47229 Duisburg
Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werksauftrags-Nr. 0001446323
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090206418
Dispatch note No. 15.06.2022
Avis d'expédition N°

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Abnahme WS
Inspection
Reception
(A05)

Kerbschlagbiegeversuch / Impact test / Essai de résilience (C40-C49)

Proben-Nr. Specimen No. N° éprouvette (C00)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Ort Location Lieu (C01) 1) 2) 3)	Richt. Direct. Orient. (C02) 4)	Zustand Cond. Cond. (B05) 5)	Probenform Type of specimen Type d'éprouvette (C40-C41)	Temperatur Temperature Température (C03) °C	Schlagarbeit Impact energy Energie de rupture (C42-C43) 1 2 3 MW 6) J ≥ 14 J ≥ 20			
1982222	43348	M4O	Q	N	KV750/7,5	-020	98	101	109	103

1) M: 1/2 Länge / 1/2 Length / 1/2 Longueur
2) 4: 1/4 Breite / 1/4 Width / 1/4 Largeur
3) O: oberflächennah / near surface / près de la peau
4) Q: quer / transversal / transversal
5) N: normalisiert / normalized / normalisé
6) MW: Mittelwert / Average / Moyenne

Unsere Produkte sind frei von radioaktiven Stoffen. Der Freigabegrenzwert von 100 Bq/kg, der die Einhaltung der Grenzwerte der Strahlenschutzverordnung(StrlSchV) für die uneingeschränkte Freigabe von festen oder flüssigen Stoffen(StrlSchV Anlage 4, Spalte 3) für eisenverwandte Nuklide gewährleistet, wird nicht überschritten.

Our products are free of radioactive substances and do not exceed the clearing limit value of 100 Bq/kg, which guarantees the compliance with limit values given in the Radiation Protection Ordinance(StrlSchV) for the unrestricted clearance of solid material(StrlSchV Annex III, Section 5) for ferrous nuclides.

Nos produits ne contiennent aucun élément radioactif. La limite de 100 Bq/kg fixée par le décret concernant la protection contre la radioactivité (Strl SchV annexe III, colonne 5) pour les produits sidérurgiques n´est pas dépassée.

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

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C63-AQU-QIX-002 64 / 917

L-7291

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
Certificat de reception 3.1
DIN EN 10204
(A02)

Nr./No./N° (A03) **2020456**
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Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werksauftrags-Nr. 0001446323
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Lieferschein-Nr. 0090206418
Dispatch note No. 15.06.2022
Avis d'expédition N°

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Abnahme WS
Inspection
Reception
(A05)

Zertifiziert nach
Druckgeräte-Richtlinie 2014/68/EU durch die
TÜV CERT-Zertifizierungsstelle für Druckgeräte der
TÜV NORD GRUPPE; benannte Stelle, Kennnr. 0045
Zertifikats-Nr.: 07-202-1044-WP-0679/15

Certified acc. to
2014/68/EU TÜV CERT-Certification bodypressure equipment of the
TÜV NORD GRUPPE; notified body, Reg.No.: 0045
Certificate-No.: 07-202-1044-WP-0679/15

Certifié selon
Directive 2014/68/EU sur les équipements sous pression par la
Organisme de certification TÜV CERT pour les équipements sous pression
de la
TÜV NORD GROUP ; organisme notifié, numéro d'identification 0045
Zertifikats-Nr.: 07-202-1044-WP-0679/15

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

Diese durch ein geeignetes Datenverarbeitungssystem erstellte Bescheinigung ist gemäß EN 10 204, Abschnitt 5, ohne Unterschrift gültig.
This certificate was prepared by a suitable data processing system and is valid without signature according to EN 10 204, section 5.
Ce certificat a été établi par un système adéquat de traitement de données, il est valable sans signature selon EN 10 204, section 5.

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CS-4277

alchemia

A01/Nazwa wytwórcy/ Manufacturer's Works/ Herstellerwerk:
ALCHEMIA S.A. ul. Aleje Jerozolimskie 92, 00-807 Warszawa
Oddział Rurexpol ul. Trochimowskiego 27, 42-207 Częstochowa
www.alchemiasa.pl

Z02/Data/date/Datum: **14.06.2022**

A03/Nr. dokumentu/Document numer/Bescheinigungsnummer: **Nr: RXP/1039/E/22**

A02/Rodzaj dokumentu kontroli/Type of Inspection document/ Art der Prüfbescheinigung:

ŚWIADECTWO ODBIORU

Atest/Inspection Certificate/Abnahmeprüfzeugnis nach PN EN 10204 : 2006–3.1/EN 10204 : 2004 –3.1
ISO 9001 :2015 , Certificate No: 04 100 950250-002

A07/Kontrakt / Contract / Vertrag: **R2200226/5/1**
K22/0785-BR07586

A06/Odbiorca/Addressee/Abnehmer
ARGENTO KFT TÓPARK UT 9. 2045 - TOROKBALINT HUNGARY

B09-B11/Wymiary/ Dimensions/Abmessungen
273 mm x 10 mm
długość/lenght/Länge : **5,00 m - 7,00 m**

A08/Specyfikacja /Specification/Spezifikation: Nr: 32674

A08/ Dokumenty dostawy /Delivery note/Liefer scheim : 38205

Nr. auta/Car no./Auto nr: MYC 985 / XYH133

B03/Warunki techniczne odbioru/Testrequirements/Prüfbedinungen:
EN-10216-3:2013
AD2000 W4 / PED 2014/68/EU

B01/Wyrób / Product / Erzeugnis:
Rury stalowe bez szwu/Seamless steel pipes/Nahtlose Stahlrohre

B02/Gatunek / Material designation / Werkstoff:
P355NHTC1

B04 / Stan dostawy / State of Delivery / Lieferzustand:
Normalizowane/Normalization/ Normalisierung: 880°C – 940°C
Rury walcowane na gorąco/Hot formed pipes/Warmgeformte Rohre

Z05/Dopuszczenie/ Admittance/Zulassung: Producent materiałów posiada oceniony system jakości w odniesieniu do materiałów według zał. 1 pkt. 4.3 Dyrektywy PED2014/68/EU oraz, AD2000-Merkblatt W0 przez TÜV Thüringen Industrie Service GmbH. Jednostka notyfikowana nr 0090, nr. certyfikatu 0090-154-871/The Producer has a reviewed quality system in reference to materials acc 1,sec 4.3 Directive PED 2014/68/EU and AD2000-Merkblatt W0 by Notivied Body TÜV Thüringen Industrie Service GmbH, reg.-no 0090, certificate no. 0090-154-0871/Der Hersteller hat ein beurteiltes Qualitätssystemin Bezug auf die Werkstoffe nach dem Anh. 1 , Kap. 4.3 Direktive PED 2014/68/EU und AD2000-Merkblatt W0 durch In TÜV Thüringen Industrie Service GmbH,notifizierte Stelle,Kenn-Nr.0090, Zertifikat Nr. 0090-154-0871 .

Z04:Cechowanie znakiem CE/CE marking/ce Zeichen:Certyfikat Zgodności zakladowej komtroli produkcji nr.certyfikatu 0090-CPR-0863/Certificate of conformity of the factory production control, certivicate no.0090-CPR-0863/Zertifikat der Konformität der werkseigenen Produktionskontrolle, Zertifikat No. 0090-CPR-0863

Własności mechaniczne/Mechaninical properties/Mechanische eigenschaften EN ISO 6892-1 | Próba udarności / Impact test / Kerbschlagversuch EN ISO 148-1

C71-C90 Numer wytopu Heat No. Schmelze Nr	C02 Kierunek Próby Direction of test pieces Probenrichtung	C00/ Nr. próby Sample No. Probe Nr	C11 Granica plastyczności Yield or Proof strength Streck-order Dehngrenze	C12 Wytrzymałość Tensile strength Zugfestig-keit	C13 Wydłużenie Elongation after Fracture Bruchdeh-nung	C02 Kierunek Próby Direction of test pieces Probenrichtung	C40/C41 Typ próby Szerokość próby Type of test Piece.Width of test piece Probenform Probenbreite	C03 Temperatura Temperature Temperatur °C	C42 Wartości pojedyncze Individual values Einzelwerte 1.	2.	3.	C43 Wartość średnia Mean value Mitte-lwert	C30 Pomiar Twardości Hardeness test Härtepr-ufung Wartość średnia Mean value Mittelwert
Wymagania / Requiements / Anforderungen. Korpus rury/Pipe body/Rohrkörper			R_{eH} MPa	R_m MPa	A_5 %								
			min. 355	490 650	min. 22.0		KV_2		-20 deg min 27J -40 deg min 40J				
221224	L	5103	373	511	26,1	T	10 x 5	-20	76	78	82	79	-
						L	10 x 7,5	-40	135	148	119	134	
			R_{p02} MPa min.-216										
Ret-300 deg C		5103	247										

C70/Sposób wytopu stali. / Way of casting./ Ehrschmelzungsverfahren. : EAF – Oxygen Electric Are Furnace//Stal uspokojona/Fully killed/Beruhigter Stahl
Huta/Steelworks/Stahlwerk: ArcelorMittal Poland S.A.

Dopuszczalne wartości analizy wytopowej dla gatunków / Permitted values of Chemical Composition for Material designation / Zulässige Werte der Chemische Zusammensetzung für die Werkstoff		C	Mn	Si	P	S	Cr	Mo	Ni	Al	Cu	N	Nb	V	Ti	C_E
	P355NH	max. 0.20	0.90 – 1.70	max. 0.50	max. 0.025	max. 0.010	max. 0.30	max. 0.08	max. 0.50	max. 0.020	max. 0.30	max. 0.020	max. 0.05	max. 0.10	max. 0.04	-

Numer wytopu Heat No Schmelze Nr	Sztuki Number of piece Stückzahl	Długość Length Länge	Waga Weight Gewicht [kg]	C71-C90/ Analiza chemiczna [%] / Chemical Composition [%] / Chemische Zusammensetzung [%] C	Mn	Si	P	S	Cr	Mo	Ni	Al	Cu	N	Nb	V	Ti	C_E
221224	39	238,690	10106	0,18	1,30	0,23	0,014	0,001	0,030	0,002	0,024	0,036	0,070	0,007	0,001	0,053	0,002	0,42

Oddział Rurexpol w Częstochowie

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Nr: RXP/1039/E/22

Numery rur zgodnie ze specyfikacją na liście przewozowej nr/ Pipe no according to pipe specification on Packing List no/Rohrnummern gemäß Angabe auf Frachtbrief Nr.: 32674

Kontrola wizualna i wymiarowa/Visual inspection and checking of dimensions/Besichtigung und Massprüfung	- Wynik pozytywny/Positive results/Pozytives Ergebnis
Próba szczelności/Hydraulic test at pressure/ Dichtigkeitstest 7,0 MPa	- Wynik pozytywny/Positive results/Pozytives Ergebnis
Próba splaszczania/Flattening test/Ringfaltversuch	- Wynik pozytywny/Positive results/Pozytives Ergebnis

Niniejszym potwierdza się, że dostawa została skontrolowana i odpowiada warunkom zamówienia. / We hereby certify, that the material described above has been tested and complies with terms of the order contract./Es wird bestätigt, das die Lieferung geprüft wurde und den Vereinbarungen bei der Bestellung entspricht.

Badany material nie wykazal radioaktywnosci. Pomiar zostal wykonany przy użyciu systemu GENIE 2000, produkcja Canberra-Packard.The tested material did not show any signs of radioactivity. The measurement was performed with the application of GENIE 2000 system, manufactured by Canberra-Packard.In dem untersuchten Material wurde keine Radioaktivität gefunden. Die Messung wurde mit dem GENIE-2000-System gemacht, Hersteller: Canberra-Packard.

D01/Rury oznakowano / Pipes Markings / Kennzeichnu	Kontrola Jakości/Control of Manufacture Fabrikationskontrolle	Z02/Z03Specjalista Kontroli/Works Inspector Der Werksachverständigen	
Acc. to EN10216	ALCHEMIA S.A. Oddział Rurexpol Dział Kontroli Jakości Rurexpol Branch Quality Control Department	Specjalista kontroli jakości odbioru rur - Kierownik Zespołu Sebastian Kałka	

T- Poprzeczna/ Transverse/ Quer L- Wzdłużna/ Longitudinal/ Längs

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A01 **TASTA ARMATURA Sp. z o.o.**

A02 **Inspection certificate 3.1+PED PN-EN 10204** 1 / 1

A03 Document No **2022/05/10562** Z02 Date **2022-05-13**

A04 Manufacturer's mark A05 Quality Assurance Department

NIP: 865-00-13-543
Władysława Grabskiego 38
37-450 Stalowa Wola
POLAND
PN-EN ISO 9001:2015/Certyfikat nr CSJ/115/2019
UDT-CERT:2014/68/UE/Cert.CSJ/115/WM/PED/2019
AD 2000 Merkblatt W0//Cer.01 2627 PL/M-200005.00

A06.1 Customer: **EUROMIX NK Muszaki, Kereskedelmi Kft.** Papirgyari ut 49, H-2400 Dunaujvaros

A06.2 Consignee: **EUROMIX NK Muszaki, Kereskedelmi Kft.** Papirgyari ut 49, H-2400 Dunaujvaros

A06.3 Receiver of the document: **EUROMIX NK Muszaki, Kereskedelmi Kft.** Papirgyari ut 49, H-2400 Dunaujvaros

A07 Purchaser's order number: **13.05.2022**

A08 Manufakturer's works order num: **1051**

B01 / B09 - B11 Product description: **Elbow - PN-EN 10253-2 TYP A : 2010 - 90° - 3 - 26.9x2.3 - S**

B08 Quantity in psc: **200**

B02 Steel and standard: PN-EN 10253-2 TYP A : 2010 ; Opc.9 ,AD 2000 W4 ; P235GHTC1 / PN-EN 10216-2 ;

B07 Heat No: **E1720**

B04 Delivery Condition/forming metod: Hot formed 750-950°C/Cooling medium: air

B12 Theoretical mass

B06 Marking: **P235GH EN2 E1720**

B07 / C71-C92 **Chemical composition %**

Heat No	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Al	V							CEV
E1720	0,16	0,54	0,26	0,017	0,012	0,01	0,01	0,01	0,01		0,01							0,2573

C02 Direction of taking sample — C33-C39 Diameter of the ball/weighting force

C00 Test No	C03 Temp. °C	C11 Yield point /MPa/		C12 Tensile strength /MPa/	C13 Elongation %	C14 Narrowing Z %	C30-C32 Hardness test on fitting HB
Result obtained							
E1720		Re	300	490	A5	28,5	155

Impact test PN-EN ISO 148-1

C02 Direction of taking sample — C41 Size

C00 Test No	C03 Temp. °C	C40 Type of specime	Unit	Mesaured value C42 1	C42 2	C42 3	C43 average	C44 value counted to standard measurements of Required	1	2	3	average

D02-D99 Non-destructive and additional tests	Standard	Criterion

Z06 Suplementary confirmation

D01 Marking, surface and dimension checked - no objections.

Z03 Work's Inspector stamp

Z01 Hereby we confirm that above-mentioned products became examined and realize requirements of given norms and order.

Z03 Work's Inspector

Z up. PREZESA ZARZĄDU
TASTA Armatura Sp. z o.o.
Referent ds. Kontroli Jakości
Tomasz Michalak

Z05 TASTA ARMATURA has implemented and applies the quality system in production of materials intended to be used in pressure equipment verified for conformity with Annex I Clause 4.3 of the Directive 2014/68/EU.

HEGESZTÉSI ÉS VARRATVIZSGÁLATI TERV

WEP_013-ST-2024-DEDR_rev0

Welding-seam examimination plan / Schweiß-Prüfplan

Munkaszám / *Work no. / Arbeitsn:*	**Megnevezés** / *Designation / Benennung:*	**Széria szám** / *Serial No / Seria N* **:**
013-ST-2024	**DE-DR-250/40 vessels**	**GYP-2430131; GYP-2430132; GYP-2430133**

Készítette / *Prepared / Hersteller:*	**Dátum** / *Date / Datum:*	**Ellenőrizte** / *Controller / Kontrolleur:*	**Dátum** / *Date / Datum:*
Filius Balázs	2024.02.12		

Varratszám *Welding No* *Schweißnaht nummer*	**Varrat típusa** *Type of weld* *Nahtart*	**Alapanyagok** *Parent metal* *Werkstoff gruppe*	**WPS No.:** **WPQR No.:**	**Hegesztési eljárás** *Welding process* *Schweißverfahren*	**Hozaganyag** *Filler metal* *Zusatzwerkstoff*	**Roncsolásmentes vizsgálatok** *Non-destructive testing* *Zerstörungsfreiprüfung*				**Hegesztő neve / Beütő** *Welder name / Punch* *Schweißer / Einsschlag*
						VT	RT	UT	PT	
K1, K2	V	P265GH	WPS-GYP-0016_rev0	141	ESAB OK Tigrod 12.64					Danó Péter LO27
	6		1417 ÉMI-TÜV 18.081-V105			100%	10%	-	100%	
						VT	RT	UT	PT	
N1K, N4K	V	P235GH	WPS-GYP-0011_rev0	141	ESAB OK Tigrod 12.64					Danó Péter LO27
	4,5	P245GH	1417 ÉMI-TÜV 18.081-V105			100%	-	-	100%	
						VT	RT	UT	PT	
N1B, N2B, N3B, N4B, N5B	V	P235GH	WPS-GYP-0017_rev0	141	ESAB OK Tigrod 12.64					Pancsovai Tamás VZ79
	6-8,8	P265GH	1417 ÉMI-TÜV 18.081-V105			100%	-	-	100%	
						VT	RT	UT	PT	
Párnalemez-Köpeny ***Rainforcement plate-shell***	◿	P265GH	WPS-GYP-0084_rev0	141	ESAB OK Tigrod 12.64					Pancsovai Tamás VZ79
	z5		1417 ÉMI-TÜV 22.085-V107			100%	-	-	-	

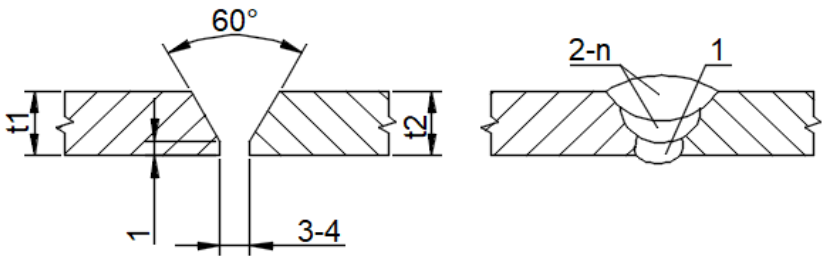
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0011_rev0	*Hegesztő gép Welding machine*	-
WPQR száma *WPQR No.*	1417 ÉMI-TÜV 18.081-V105	Hegesztési helyzet (ISO 6947) *Welding position*	PA / PC / PH

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	BW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*



	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 P235-P355	S235-S355 P235-P355
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	1.1 / 1.2 (TR/ISO 15608)
Vastagság / Thickness t (mm)	3-5	3-5
Átmérő / Diameter ØD (mm)	>=25	>=25

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	ESAB OK Tigrod 12.64	EN ISO 636-A: W 46 4 4Si1	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	2,0	85 - 95	11 - 12	DC -	-	60 - 70	0,48 - 0,68
2-n	141	2,4	90 - 120	12 - 13	DC -	-	60 - 80	0,49 - 0,94

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munkadarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	*200*	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét Stamp	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.10.10		

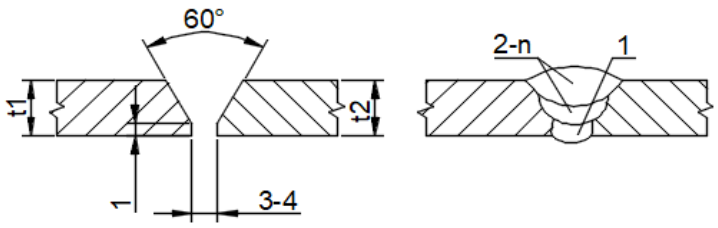
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0016_rev0	*Hegesztő gép Welding machine*	-
WPQR száma *WPQR No.*	1417 ÉMI-TÜV 18.081-V105	Hegesztési helyzet (ISO 6947) *Welding position*	PA / PC / PH

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	BW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*



	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 P235-P355	S235-S355 P235-P355
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	1.1 / 1.2 (TR/ISO 15608)
Vastagság / Thickness t (mm)	5-24	5-24
Átmérő / Diameter ØD (mm)	>=25	>=25

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	ESAB OK Tigrod 12.64	EN ISO 636-A: W 46 4 4Si1	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	2,0	100 - 120	12 - 13	DC -	-	60 - 70	0,62 - 0,94
2-n	141	2,4	130 - 160	13 - 14	DC -	-	60 - 80	0,76 - 1,34

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munkadarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	*200*	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét Stamp	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.10.17		

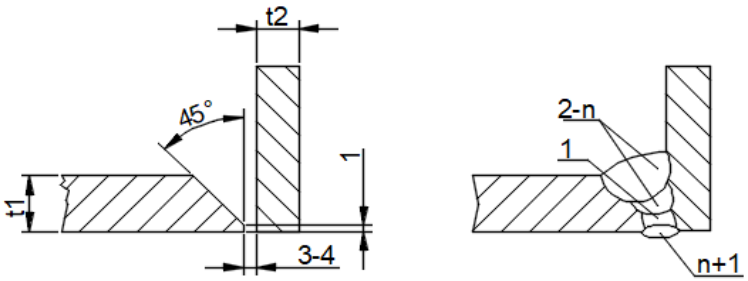
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0017_rev0	*Hegesztő gép Welding machine*	-
WPQR száma *WPQR No.*	1417 ÉMI-TÜV 18.081-V105	Hegesztési helyzet (ISO 6947) *Welding position*	PA / PC / PF

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	BW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*



	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 P235-P355	S235-S355 P235-P355
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	1.1 / 1.2 (TR/ISO 15608)
Vastagság / Thickness t (mm)	3-24	2-16
Átmérő / Diameter ØD (mm)	>=25	>=25

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	ESAB OK Tigrod 12.64	EN ISO 636-A: W 46 4 4Si1	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	2,0	100 - 120	12 - 13	DC -	-	60 - 80	0,54 - 0,94
2-n	141	2,4	130 - 160	13 - 14	DC -	-	60 - 80	0,76 - 1,34
n+1	141	2,4	130 - 160	13 - 14	DC -	-	60 - 80	0,76 - 1,34

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munkadarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	*200*	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét *Stamp*	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.10.17		

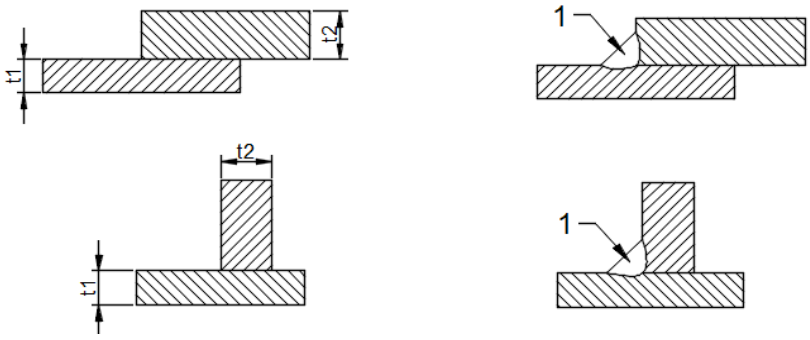
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0084_rev0	*Hegesztő gép Welding machine*	-
WPQR száma *WPQR No.*	1417 ÉMI-TÜV 22.085-V107	Hegesztési helyzet (ISO 6947) *Welding position*	PB / PD / PF / PH

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	FW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*



	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 P235-P355	S235-S355 P235-P355
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	1.1 / 1.2 (TR/ISO 15608)
Vastagság / Thickness t (mm)	3-16	3-16
Átmérő / Diameter ØD (mm)	>=25	>=25

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	ESAB OK Tigrod 12.64	EN ISO 636-A: W 46 4 4Si1	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	2,4	140 - 150	13 - 15	DC -	-	60 - 80	0,82 - 1,35

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munakdarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	-	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét Stamp	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.10.17		

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

ÉMI-TÜV

HEGESZTŐ MINŐSÍTÉSI BIZONYÍTVÁNY

2	Megnevezés(ek)	**EN ISO 9606-1 141 T BW FM1 S s12 D49 H-L045 ss nb**
3	Gyártói heg. ut. (WPS):	4 Tanúsító szervezet - Vizsg. szám.: 1417 ÉMI-TÜV 22.157.0809
5	Hiv. szám (ha van):	LO27
6	A hegesztő neve:	**Danó, Péter** **LO 27**
7	A hegesztő azonosítója:	Ellenőrizve
8	Az azonosítás módja:	Személyi igazolvány
9	Születési idő és hely:	1968. 10. 09., Fehérgyarmat
10	Munkáltató:	PIRAZOL Kft.
11	Előírás/vizsg. szabvány:	MSZ EN ISO 9606-1:2017
	Megjegyzés: AD2000-HP3	
12	Szakmai ismeretek: megfelelt	

Fénykép (ha szükséges)

13		Vizsgálati adatok	Érvényességi tartomány
14	Hegesztési eljárás(ok)	**141**	141, 142, 143 és 145
15	Az anyagátmenet típusa		
16	Lemez vagy cső	**T (cső)**	T, P
17	Kötéstípus	**BW (Tompavarrat)**	BW (csőelágazás, szög >= 60°)
18	Alapanyagcsoport(ok)/-alcsoport(ok)	**1.1**	
19	Hozaganyagcsoport(ok)	**FM1**	FM1, FM2
20	Hozaganyag (megjelölés)	**S**	Gyök: S, nm; Többi: S, M, nm
21	Védőgáz		----------
22	Segédanyagok		----------
23	Áramnem típusa és polaritás	**DC(-)**	----------
24	Anyagvastagság t (mm)		
25	Varratvastagság s (mm)	**12**	s >= 3 mm
26	Cső külső átmérője D (mm)	**49**	D >= 25 mm
27	Hegesztési helyzet	**H-L045**	PA,PC,PE,PF,PH,H-L045
28	Hegfürdő megtámasztás	**ss nb**	ss nb, ss mb, bs, ss gb, ss fb
29	Több réteg/egy réteg		

30 Kiegészítő sarokvarratos vizsgálat (tompavarrattal együtt hegesztett): **nincs**

31 Egyéb információk: Kielégíti a 2014/68/EU irányelv (PED) (44/2016 (XI.28.) NGM rendelet) követelményeit

32 33	A vizsgálat megnevezése	Elvégezve és megfelelt	Nem szükséges
34	Szemrevételezés	**igen**	-
35	Radiográfiai / ultrahangos vizsgálat	**igen**	-
36	Törésvizsgálat	-	X
37	Hajlítóvizsgálat	-	X
38	Bemetszéses szakítóvizsgálat	-	X
39	Makroszkópos vizsgálat	-	X
40	Kiegészítő vizsglatok *)	-	X

*) ha szükséges, adatok kiegészítő lapon

Tanúsító személy és/vagy szervezet:
ÉMI-TÜV SÜD Kft.

ÉMI-TÜV SÜD Kft. Notified Body 1417 TÜV SÜD Group

Szentendre, 2022. 05. 16., Juhász Gergely
Név, dátum, aláírás
Tanúsító személy vagy szervezet

Hegesztés dátuma: 2022. 03. 31.
Érvényesség: **2025. 03. 30.**

42 Az érvényesség igazolása a szabvány **9.3 a)** fejezete szerint
Újraminősítés 3 év múlva

41 **6 havonkénti érvényesítés a hegesztési felelős/ minősítő, vagy tanúsító szervezet által (a 9.2 szakasz szerint)**

43

Dátum	Aláírás	Beosztás v. megszólítás
2022.09.30		IWE B. Filius HU 00550 Issue date: 17/12/2015
2023.03.30		
2023. 09. 30		

44

45

Dátum	Aláírás	Beosztás v. megszólítás

TÜV®

Notified body for pressure equipment
of TÜV Thüringen e.V.
Konrad-Zuse-Straße 21, 99099 Erfurt, Tel. +49 361 42 83 0
Email: info@tuev-thueringen.de

TÜV THÜRINGEN

Welder's Qualification Test Certificate

Certificate No. 23-282585-HU

3 Designation(s): **ISO 9606-1 141 T BW FM1 S s12 D49 PH-L045 ss nb**

4	**WPS-Reference:**	WPS_GYPmin-002	**Examining body:** TÜV Thüringen e. V.
5			**Examiner:** F. Kerekes
6	**Welder's name:**	**Tamás Pancsovai (VZ79)**	
7	**Method of identification:**	Identity card	**Photograph (if required)**
8	**Date and place of birth:**	1989-10-10, Salgótarján	
9	**Employer:**	Gyémánt-Pirazol Kft.	
10	**Code / testing standard:**	ISO 9606-1, AD-Merkblatt HP 3	
11	**Supplementary fillet weld test:**	No (completed in conjunction with a butt weld qualification)	
12	**Job knowledge:**	Acceptable	

13		Test piece	Range of qualification
14	**Welding process(es);**	141 TIG (GTAW)	141, 142, 143, 145
15	**Transfer mode**	-	----------
16	**Product type (plate or pipe)**	T Pipe/Tube	P, T, Pipe branch ≥60°
17	**Type of weld**	BW Butt weld	BW
18	**Parent material group(s)**	1.1	1 to 11; 142 only 1.1
19	**Filler material group(s)**	FM1	FM1, FM2, nm
20	**Filler material typ(s)**	S	S, M, nm
21	**Shielding gas / flux**	EN ISO 14175-I1	----------
22	**Auxiliaries**	-	----------
23	**Type of current and polarity**	DC- (= -)	----------
24	**Material thickness t (mm)**	-	----------
25	**Deposited thickness s (mm)**	12.00 (≥ 3 Layers)	≥ 3.00
26	**Outside pipe diameter (mm)**	49.00	≥ 25.00
27	**Welding position(s)**	PH-L045 (6G)	All except PG (Vd)
28	**Weld details**	ss nb	ss (nb, mb, gb, fb), bs
29	**Multi layer / single layer**	-	----------

30 **Additional information:** ----------

The requirements of the Pressure Equipment Directive 2014/68/EU approval of personnel Annex I, 3.1.2 are fulfilled.

31/32	Type of tests	Performed and accepted	Not tested
33	Visual testing	X	-
34	Radiographic testing	X	-
35	Fracture test	-	X
36	Bend test	-	X
37	Notch tensile test	-	X
38	Macroscopic examination	-	X
39	Additional tests	-	X

K. Wiegand
Notified Body 0090 for Pressure Equipment

TÜV Thüringen e.V. Notified Body 0090

Place, date: Budapest, 2023-10-19
Revalidation method: 9.3 a
Date of welding: 2023-10-10
Validity until: **2026-10-09**

40 **Revalidation for qualification by examiner or examining body for the following 2 years**

41

Date	Signature	Position or title
N/A		

Confirmation of the validity by welding coordinator / examiner or examining body for the following 6 months

Date	Signature	Position or title
2024-04-		
2024-10-		
2025-04-		
2025-10-		
2026-04-		

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04.23 Created with WelderCert-13.2.30

Notified body for pressure equipment
of TÜV Thüringen e.V.
Konrad-Zuse-Straße 21, 99099 Erfurt, Tel. +49 361 42 83 0
Email: info@tuev-thueringen.de

TÜV THÜRINGEN

Welder's Qualification Test Certificate

Certificate No. 23-282586-HU

3 **Designation(s):** **ISO 9606-1 141 T FW FM1 S t4 D48.3 PH ml**

4 **WPS-Reference:** WPS_GYPmin-003

Examining body: TÜV Thüringen e. V.

5 **Examiner:** F. Kerekes

6 **Welder's name:** **Tamás Pancsovai (VZ79)**

7 **Method of identification:** Identity card

8 **Date and place of birth:** 1989-10-10, Salgótarján

Photograph (if required)

9 **Employer:** Gyémánt-Pirazol Kft.

10 **Code / testing standard:** ISO 9606-1, AD-Merkblatt HP 3

11 **Supplementary fillet weld test:** No (completed in conjunction with a butt weld qualification)

12 **Job knowledge:** Acceptable

13	Test piece	Range of qualification
14 Welding process(es);	141 TIG (GTAW)	141, 142, 143, 145
15 Transfer mode	-	----------
16 Product type (plate or pipe)	T Pipe/Tube	P, T
17 Type of weld	FW Fillet weld	FW
18 Parent material group(s)	1.1	1 to 11; 142 only 1.1
19 Filler material group(s)	FM1	FM1, FM2, nm
20 Filler material typ(s)	S	S, M, nm
21 Shielding gas / flux	EN ISO 14175-I1	----------
22 Auxiliaries	-	----------
23 Type of current and polarity	DC- (= -)	----------
24 Material thickness t (mm)	4.00	≥ 3.00
25 Deposited thickness s (mm)	-	----------
26 Outside pipe diameter (mm)	48.30	≥ 25.00
27 Welding position(s)	PH (5F up)	All except PG; (Vd)
28 Weld details	-	----------
29 Multi layer / single layer	ml	sl, ml

30 **Additional information:** ----------

The requirements of the Pressure Equipment Directive 2014/68/EU approval of personnel Annex I, 3.1.2 are fulfilled.

31 32 Type of tests	Performed and accepted	Not tested
33 Visual testing	X	-
34 Radiographic testing	-	X
35 Fracture test	-	X
36 Bend test	-	X
37 Notch tensile test	-	X
38 Macroscopic examination	X	-
39 Additional tests	-	X

K. Wiegand
Notified Body 0090 for Pressure Equipment

TÜV Thüringen e.V. Notified Body T Ü V 15 0090

Place, date: Budapest, 2023-10-19
Revalidation method: 9.3 a
Date of welding: 2023-10-10
Validity until: **2026-10-09**

40 **Revalidation for qualification by examiner or examining body for the following 2 years**

41

Date	Signature	Position or title
N/A		

Confirmation of the validity by welding coordinator / examiner or examining body for the following 6 months

Date	Signature	Position or title
2024-04-		
2024-10-		
2025-04-		
2025-10-		
2026-04-		

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ISO 9606-1 de	ISO 9606-1 en	ISO 9606-1 hu
1 ZERTIFIKAT SCHWEISSERPRÜFUNG	1 CERTIFICATE WELDER'S QUALIFICATION TEST	1 A HEGESZTŐ MINŐSÍTÉSI BIZONYÍTVÁNYA
2 Zertifikat Nr.	2 Certificate No.	2 A bizonyítvány száma
3 Bezeichnung(en)	3 Designation(s)	3 Megnevezés(ek)
4 WPS-Bezug/Prüfstelle	4 WPS-Reference / Examining body	4 WPS hivatkozási száma / Minősítő vagy Tanúsító szervezet
5 Prüfer	5 Examiner	5 Minősítő személy
6 Name des Schweißers	6 Welder's Name	6 A hegesztő neve
7 Art der Legitimation / Fotografie	7 Method of identification / Photograph	7 Azonosítás módja, személyi igazolvány / Fénykép
8 Geburtsdatum und -ort / (falls nötig)	8 Date and place of birth / (if required)	8 Születési idő és hely / (ha szükséges)
9 Arbeitgeber	9 Employer	9 Munkáltató
10 Vorschrift / Prüfnorm	10 Code / Testing Standard	10 Szabályzat / vizsgálati szabvány
11 Ergänzende Kehlnahtprüfung Ja / Nein	11 Supplementary fillet weld test Yes / No	11 Kiegészítő sarokvarratos vizsga Igen / Nem (tompavarratos vizsgával együtt tett)
12 Fachkunde: Bestanden / Nicht geprüft	12 Job knowledge: Acceptable / Not tested	12 Szakmai ismeretek: Megfelelt / Nem vizsgálták
13 Prüfstück / Geltungsbereich	13 Test piece / Range of qualification	13 Vizsgadarab / Érvényességi tartomány
14 Schweißprozess(e)	14 Welding process(es)	14 Hegesztési eljárás(ok)
15 Art des Werkstoffüberganges	15 Transfer mode	15 Az anyagátmenet típusa
16 Produktform (Blech oder Rohr)	16 Product type (plate or pipe)	16 Terméktípus (lemez vagy cső)
17 Nahtart	17 Joint type	17 Varrattípus
18 Werkstoffgruppe(n)	18 Material group(s)	18 Alapanyagcsoport(ok)
19 Werkstoffgruppen des Schweißzusatzes	19 Filler material group(s)	19 Hozaganyagcsoport(ok)
20 Schweißzusatzart	20 Filler material typ(s)	20 Hozaganyag (megjelölés)
21 Schutzgas / Pulver	21 Gas / flux	21 Védőgáz / Fedőpor
22 Hilfsstoffe (z. B. Formiergas)	22 Auxiliaries (e. g. backing gas)	22 Segédanyagok (pl. gyökvédő gáz)
23 Stromart und Polung	23 Type of current and polarity	23 Áramnem típusa és polaritás
24 Werkstoffdicke t (mm)	24 Material thickness t (mm)	24 Anyagvastagság t (mm)
25 Schweißgutdicke s (mm)	25 Deposited thickness s (mm)	25 Varratvastagság s (mm)
26 Rohraußendurchmesser (mm)	26 Outside pipe diameter (mm)	26 Cső külső átmérője (mm)
27 Schweißposition W = Wannenlage H = Horizontal Ü = Überkopf S = Steigend F = Fallend Alle Schweißpositionen außer..	27 Welding position F = Flat H = Horizontal O = Overhead Vu = Vertikal up Vd = Vertical down All position expect...	27 Hegesztési helyzet PA = vízszintes PC = haránt PE = fej feletti PF = függőlegesen felfelé PG = függőlegesen lefelé Minden helyzet, kivéve...
28 Schweißnahteinzelheiten	28 Weld details	28 Hegesztéstechnikai adatok
29 Mehrlagig / einlagig	29 Multi layer / single layer	29 Több réteg / egy réteg
30 Zusätzliche Hinweise Werkstoff Zusatz Die Anforderungen der Druckgeräterichtlinie 2014/68/EU Zulassung von Personal Anhang I, 3.1.2 sind erfüllt.	30 Additional information Parent metal Filler The requirements of the Pressure Equipment Directive 2014/68/EU approval of personnel Annex I, 3.1.2 are fulfilled	30 Kiegészítő információk Alapanyag Hozaganyag A 2014/68/EU nyomástartó berendezések direktíva követelményeinek megfelelően a személyzet jóváhagyása az I. melléklet 3.1.2 pontja szerint teljesült.
31 Art der Prüfung / Sachverständiger oder Notifizierte Stelle für Druckgeräte	31 Type of test / The Authorized Expert or Notified Body for Pressure Equipment	31 A vizsgálat megnevezése / A minősítő személy vagy tanúsító szervezet neve
32 Ausgeführt und bestanden / Nicht geprüft	32 Performed and accepted / Not tested	32 Vizsgálták és megfelelt / Nem vizsgálták
33 Sichtprüfung	33 Visual testing	33 Szemrevételezés
34 Durchstrahlungsprüfung	34 Radiographic testing	34 Radiográfiai vizsgálat
35 Bruchprüfung	35 Fracture test	35 Törésvizsgálat
36 Biegeprüfung	36 Bend test	36 Hajlítóvizsgálat
37 Kerbzugprüfung / Ort, Datum	37 Notch tensile test / Place, Date	37 Bemetszett szakítóvizsgálat / Hely, Idő
38 Makroskopische Untersuchungen / Datum des Schweißens	38 Macroscopic examination / Date of welding	38 Makroszkópos vizsgálatok / Hegesztés ideje
39 Zusätzliche Prüfungen / Gültigkeitsdauer bis	39 Additional tests / Validity until	39 Kiegészítő vizsgálatok / Érvényes
40 Verlängerung der Qualifizierung durch den Prüfer oder die Prüfstelle für die nächsten 2 Jahre (unter Bezug auf 9.3 b) / Bestätigung der Gültigkeit durch die Schweißaufsichtsperson oder der Prüfstelle für die folgenden 6 Monate (Bezug auf 9.2)	40 Prolongation for qualification by examiner or examining body for the following 2 years (refer to 9.3 b) / Confirmation of the validity by welding coordinator/examiner or examining for the following 6 months (refer to 9.2) /	40 A minősítés megújítása a minősítő vagy tanúsító szervezet által további 2 évre (a 9.3. szakasz b) bekezdése szerint) / Az érvényesség igazolása a munkaadó/hegesztési felelős/minősítő vagy tanúsító szervezet által további 6 hónapra (a 9.2. szakasz szerint)
41 Datum, Unterschrift, Dienststellung oder Titel	41 Date, signature, position or title	41 Dátum, Aláírás, Beosztás vagy cím

C6 LABOLOGX-002 77® / 917

Ellenőrzési bizonyítvány (3.1) – Kémiai elemzés
Tesztjelentés (2.2) – Mechanikai tulajdonságok
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Kelt/Date: 2023-08-18

Bizonylat száma/Cert no: EC27247226 rev. 0

Rendelésünk/Our order: 0100833590
Hivatkozásunk/Our ref: HYBRIS PRD account
Vevõ száma/Cust no: HUB00075
Vevõ rendelési dátuma/Your date: 20230807

Vevõ rendelési száma/Your 1430-233314
Vevõ hivatkozása/Your ref:
Vevõ fax száma/Your fax:
Vevõ e-mail címe/Your e-mail:

Számla címe/Invoice address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

A bizonylat címzettje/Cert receiver

Szállítási cím/Delivery address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

KISZÁLLÍTÁS/DELIVERY Adagszám/Lot no: PVX2810438 Mennyiség/Quantity: 75 KGM

TERMÉK/PRODUCT

Márkanév/Brand: ESAB
Megnevezés/Desc: OK Tigrod 12.64 2.0x1000mm 5kg
Cikkszám/Item no: 126420R150
Adagszám/Heat number: 330968
Mennyiség/Quantity: 75 KGM

BESOROLÁSOK/CLASSIFICATIONS

EN ISO 636-A: W 4Si1
EN ISO 636-A: W 46 5 4Si1
SFA/AWS A5.18: ER70S-6

VEGYELEMZÉS/CHEMICAL ANALYSIS

Actual results: acc to EN 10204 - 3.1

Wire/strip	
C	0.06%
Si	0.99%
Mn	1.65%
P	0.009%
S	0.009%
Cr	0.02%
Ni	0.01%
Mo	0.01%
Cu	0.05%
V	< 0.01%
Al	< 0.01%
Ti+Zr	< 0.01%

MECHANIKAI TULAJDONSÁGOK/MECHANICAL PROPS

Typical data: acc to 10204 - 2.2

Tensile

Standard	Shielding Gas	ReL [MPa/ksi]	Rm [MPa/ksi]	A5 [%]
EN	I1	525/76	595/86	26

Impact

Standard	Shielding Gas	Temp [°C/°F]	KV[J/ft-lb]
EN	I1	-40/-40	150/111
EN	I1	-50/-58	90/66

A4, A5 = Elongation
ReH = Upper Yield Point
ReL = Lower Yield Point
Rm = Ultimate Tensile Strength (UTS)
Rp0.2 = Yield Strength 0.2 offset
Rp1.0 = Yield Strength 1.0 offset

MEGJEGYZÉSEK/COMMENTS

A terméket az EN ISO 9001 szabványnak megfelelõ minõségbiztosítási rendszerrel összhangban szállítottuk.
A bizonylat elektronikusan készült.
Legyen szíves érdeklõdésével keresse:
ESAB Kft. 1083 Budapest, Bókay János u. 44-46., C6 épület, 7. emelet +36 1 382-12-00
Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically.
Please refer any queries to: (see above)

Érvényesség/Validation

Josef Moravek Quality Manager Helene Rasmuson Product Manager

C6 LAQ LOX-002 78® / 917

Ellenőrzési bizonyítvány (3.1) – Kémiai elemzés
Tesztjelentés (2.2) – Mechanikai tulajdonságok
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Kelt/Date: 2024-01-11

Bizonylat száma/Cert no: EC27391041 rev. 0

Rendelésünk/Our order: 0100933039
Hivatkozásunk/Our ref: HYBRIS PRD account
Vevõ száma/Cust no: HUB00075
Vevõ rendelési dátuma/Your date: 20240109

Vevõ rendelési száma/Your 1481-240209
Vevõ hivatkozása/Your ref:
Vevõ fax száma/Your fax:
Vevõ e-mail címe/Your e-mail:

Számla címe/Invoice address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

A bizonylat címzettje/Cert receiver

Szállítási cím/Delivery address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

KISZÁLLÍTÁS/DELIVERY Adagszám/Lot no: PVX5011426 Mennyiség/Quantity: 300 KGM

TERMÉK/PRODUCT

Márkanév/Brand: ESAB
Megnevezés/Desc: OK Tigrod 12.64 2.4x1000mm 5kg
Cikkszám/Item no: 126424R150
Adagszám/Heat number: 34330
Mennyiség/Quantity: 300 KGM

BESOROLÁSOK/CLASSIFICATIONS

EN ISO 636-A: W 4Si1
EN ISO 636-A: W 46 5 4Si1
SFA/AWS A5.18: ER70S-6

VEGYELEMZÉS/CHEMICAL ANALYSIS

Actual results: acc to EN 10204 - 3.1

Wire/strip	
C	0.06%
Si	0.92%
Mn	1.68%
P	0.012%
S	0.014%
Cr	0.03%
Ni	0.01%
Mo	0.01%
Cu	0.05%
V	< 0.01%
Al	< 0.01%
Ti+Zr	0.01%

MECHANIKAI TULAJDONSÁGOK/MECHANICAL PROPS

Typical data: acc to 10204 - 2.2

Tensile

Standard	Shielding Gas	ReL [MPa/ksi]	Rm [MPa/ksi]	A5 [%]
EN	I1	525/76	595/86	26

Impact

Standard	Shielding Gas	Temp [°C/°F]	KV[J/ft-lb]
EN	I1	-40/-40	150/111
EN	I1	-50/-58	90/66

A4, A5 = Elongation
ReH = Upper Yield Point
ReL = Lower Yield Point
Rm = Ultimate Tensile Strength (UTS)
Rp0.2 = Yield Strength 0.2 offset
Rp1.0 = Yield Strength 1.0 offset

MEGJEGYZÉSEK/COMMENTS

A terméket az EN ISO 9001 szabványnak megfelelõ minõségbiztosítási rendszerrel összhangban szállítottuk.
A bizonylat elektronikusan készült.
Legyen szíves érdeklõdésével keresse:
ESAB Kft. 1083 Budapest, Bókay János u. 44-46., C6 épület, 7. emelet +36 1 382-12-00
Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically.
Please refer any queries to: (see above)

Érvényesség/Validation

Josef Moravek Quality Manager Helene Rasmuson Product Manager

GYÉMÁNT-PIRAZOL KFT.	**Szemrevételezéses vizsgálati jegyzőkönyv** *Visual test record*	**Sorszám** / *No.*: VT- 013-ST-2024-1

Megnevezés: *Product name*	**DE-250/40; DR-250/40 A; DR-250/40 B vessels**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430131; GYP-2430132; GYP-2430133**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-01-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH, P355NH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Vizsgálati adatok / *Test data*

Vizsgálati előírás: *Regulation*	**MSZ EN ISO 17637**	**Átvételi követelmény:** *Requirement*	**EN ISO 5817-B**
Vizsgálati terjedelem: *Test scope*	**100%**	**Felület állapota:** *Surface condition*	**Tisztított** *Cleaned*
Eszközök: *Tools*	**Mérőszalag, varratmérő, elemlámpa** *Tape measure, seam gauge, flashlight*		

Vizsgálat eredménye / *Result of examination*

A szemrevételezéses vizsgálat során a nyomáshatároló és a teherviselő hegesztési varratokon, valamint a varratok környezetében a hőhatás övezetben nemmegfelelőség nem észlelhető.

During the visual inspection, non-conformance on pressure-limiting and load-bearing seams or in the heat-affected zone is not detected.

Megjegyzés / *Remark*:

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.22

Vizsgálatot végezte *Examined by:*		**Vizsgálatot jóváhagyta** *Approved by:*	
Név: *Name*	**Lázár Krisztián**	**Név:** *Name*	**Bakos Gyula**
Tanúsítvány száma: *Cert. No.*	**VT20102090504Ú**	**Tanúsítvány száma:** *Cert. No.*	**VT20101050201 Ú**
Aláírás: *Signature*		**Aláírás:** *Signature*	

GYÉMÁNT-PIRAZOL KFT.	**Folyadékbehatolásos vizsgálati jegyzőkönyv** *Penetration test record*	**Sorszám** / *No.*: PT- 013-ST-2024-1

Megnevezés: *Product name*	**DE-250/40; DR-250/40 A; DR-250/40 B vessels**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430131; GYP-2430132; GYP-2430133**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-01-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH, P355NH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Vizsgálati adatok / *Test data*

Vizsgálati terjedelem: *Test scope*	**A WEP_013-ST-2024-DEDR_rev0 hegesztési és vizsgálati terv szerint.** **Acc. to the WEP_013-ST-2024-DEDR_rev0 welding-seams examination plan**		
Vizsgálati előírás: *Regulation*	**MSZ EN ISO 3452**	**Átvételi követelmény:** *Requirement*	**MSZ EN ISO 23277 2X**
Behatolási idő: *Penetration time*	**15 min**	**Előhívási idő:** *Development time*	**15 min**
Felület állapota: *Surface condition*	**Tisztított / Cleaned**	**Tisztító folyadék:** *Washing fluid*	**MR-85**
Behatoló folyadék: *Penetrating fluid*	**MR-311-R**	**Előhívó folyadék:** *Developing fluid*	**MR-70**

Vizsgálat eredménye / *Result of examination*

A folyadékbehatolásos vizsgálat során a vizsgált hegesztési varratokon, valamint a varratok környezetében a hőhatás övezetben jegyzőkönyvezendő hibajelzés nem észlelhető.

During the liquid penetration test, no fault indication is recorded on the welding seams and heat-affected zones.

Megjegyzés / *Remark*:

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.19

Vizsgálatot végezte *Examined by:*		**Vizsgálatot jóváhagyta** *Approved by:*	
Név: *Name*	**Bakos Gyula**	**Név:** *Name*	**Tari Szilárd**
Tanúsítvány száma: *Cert. No.*	**PT2202020012**	**Tanúsítvány száma:** *Cert. No.*	**PT2201614704**
Aláírás: *Signature*		**Aláírás:** *Signature*	

GYÉMÁNT-PIRAZOL KFT.	**Radiográfiai vizsgálati jegyzőkönyv** *Radiographic test record*	**Sorszám** / *No.*: RT- 013-ST-2024-1

Megnevezés: *Product name*	**DE-250/40; DR-250/40 A; DR-250/40 B vessels**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430131; GYP-2430132; GYP-2430133**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-01-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH, P355NH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Vizsgálati adatok / *Test data*

Készülék: *Machine*	**TELEDYNE ICM CP300D**	**Film típusa és mérete:** *Film type and size*	**FUJI IX80 10x16cm**
Erősítő fólia: *Screens*	**Pb**	**Huzaletalon:** *Image quality indicator*	**10 FE EN**
Csőfeszültség: *Tube voltage*	**160 kV**	**Csőáram:** *Tube amperage:*	**3 mA**
Expozíció ideje: *Exposure time*	**20 sec**	**Film-fókusz távolság:** *Film-focus distance*	**500 mm**
Feketedés: *Density*	**>=2,3**	**Megjegyzés:** *Remarks*	**10 %**
Vizsgálati előírás: *Regulation*	**MSZ EN ISO 17636-1 „B" 7.1.8**	**Átvételi követelmény:** *Requirement*	**MSZ EN ISO 10675-1 Level 1** **MSZ EN ISO 5817 B**

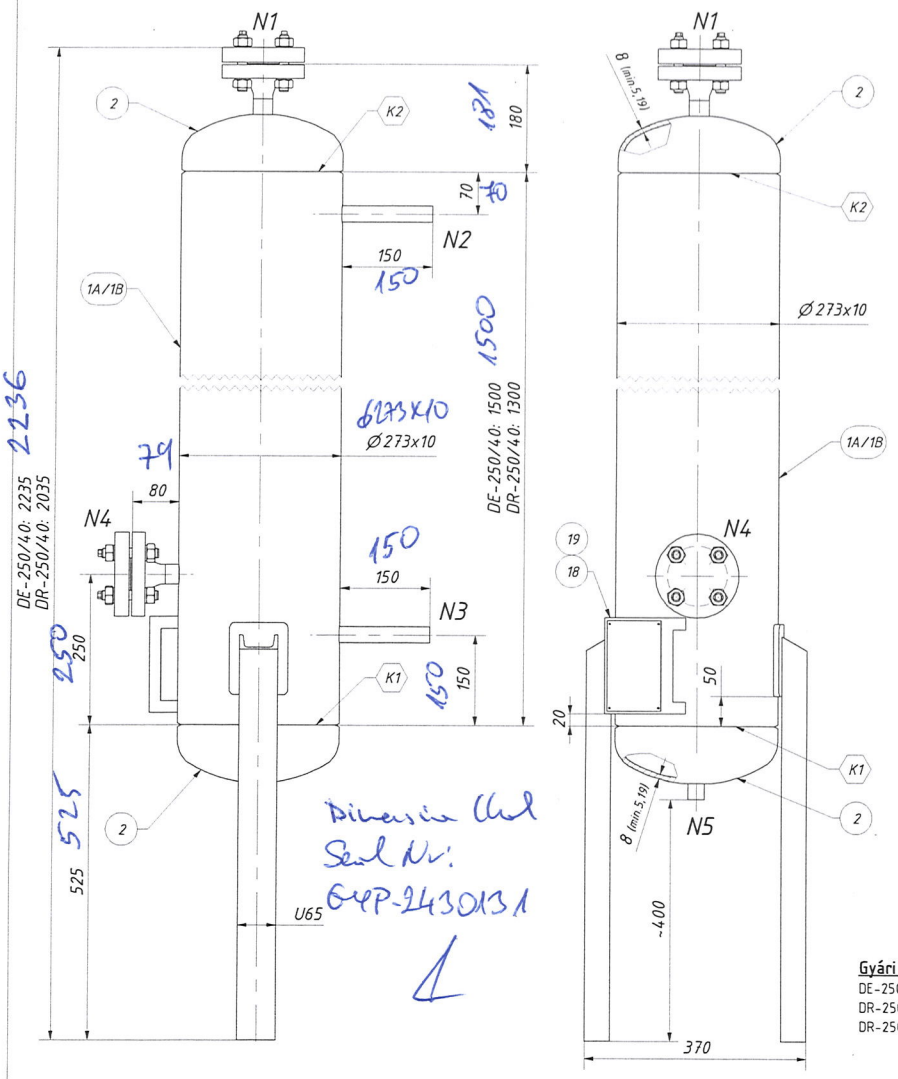
Vizsgálat eredménye / *Result of examination*

Film azonosító *Film Id.*	**Varrat azonosító** *Weld seam Id.*	**Hegesztő** *Welder*	**Méret** *Dimension*	**Képminőség** *IQI*	**Értékelt szakasz** *Evaluated section*	**Eltérés** *Deviation*	**Értékelés** *Evaluation*	
							e	*ne*
3013 1	GYP-2430133 K2	LO27	Ø273x8	W14F	-7 - +7		x	
3013 2	GYP-2430133 K1	LO27	Ø273x8	W14F	-7 - +7		x	
3013 3	GYP-2430132 K1	LO27	Ø273x8	W14F	-7 - +7		x	
3013 4	GYP-2430132 K2	LO27	Ø273x8	W14F	-7 - +7		x	
3013 5	GYP-2430131 K2	LO27	Ø273x8	W14F	-7 - +7		x	
3013 6	GYP-2430131 K1	LO27	Ø273x8	W14F	-7 - +7		x	

2024.03.26.

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.19

Vizsgálatot végezte *Examined by:*		**Vizsgálatot jóváhagyta** *Approved by:*	
Név: *Name*	**Lázár Krisztián**	**Név:** *Name*	**Bakos Gyula**
Tanúsítvány száma: *Cert. No.*	**RT20108140107**	**Tanúsítvány száma:** *Cert. No.*	**RT20101050201**
Aláírás: *Signature*		**Aláírás:** *Signature*	

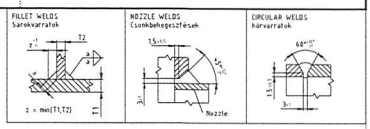


MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 (Druckgerät PED Art. 1) [Pressure equipment PED Art. 1]		DE-250/40 // DR-250/40
	Terek neve (Name der Räume) [Name of spaces]		Munkatér / Shellside
	Közeg (Medium) [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Fluides) [Allowed density]	[kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nennvolum. / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13 cikk. (Druckgeräte-PED Art 13) [Fluid group acc. to Art. 13]		1
	Hőátadó felület (Wärmeaustauscher Fläche) [Heat exchanger area]	[m²]	-
	Közeg állapot PED, 13 cikk. (Mechanische-PED Art 13) [Condition of fluid acc. to PED, Art 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Working pressure]	[barg]	-1 / +39
	Kategória PED 4. cikk. (Kategorie-PED, Art 4) [Kategory-PED, Art 4]		IV. kategória
	Modul-PED 4. cikk. (Modul-PED, Art 4) [Module-PED, Art 4]		G modul
	Max./min. üzemi hőmérséklet (max./min. zul. Betriebstemperatur) [Max./min. operating temperature]	[°C]	-20 / +270
	Próbanyomás (P.P.) [Test pressure (P.P.)]	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgáló közeg [Prüfmedium] [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (PS) [Berechnungsdruck (PS)] [Design pressure (PS)]	[barg]	-1 / +39
	Tervezési hőmérséklet (TS) [Berechnungstemperatur (TS)] [Design temperature (TS)]	[°C]	-20 / +270
	Technikai AD-W/D [Verfahrensprüfung AD-W/D] [Used type AD-W/D]		-
	Korrózió pótlék [Korrosionszuschlag] [Corrosion allowance]	[mm]	1
	Életút szám [Lebenszahl] [Load cycles]		20.000
	Nyomásbíróság [Druckverwaltungsgeräte] [Pressure determiner]		0-38 bar (-20°C - +50°C)
	Biztonsági tényező [Zahl der Sicherheit, Beiwert] [Safety factor, Symbol]		1,5
	Üres tömeg [Gewicht leer] [Weight empty]	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel [Gewicht mit Wasserfüllung] [Weight with water filling]	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben [Gewicht während des Betriebs] [Operating weight]	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési eljárás [Auslegung, Herstellung, Prüfung] [Design code]		MSZ EN 13445-3:2021
	Tervezésellenőrzés [Konstruktionsprüfung] [Design calculation]		MSZ EN 13445-3:2021
	Végső vizsgálat, nyomáspróba [Abschlussprüfung] [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám [Fabrik-Nr.] [Serial No.]		GYP-2430131 - GYP-2430133
	Gyártási év [Herstellungsjahr] [Year of manufacture]		2024

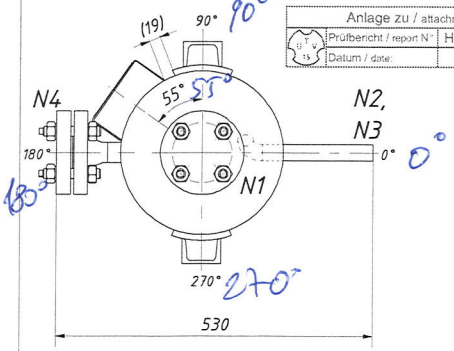
RONCSOLÁSMENTES ANYAGVIZSGÁLAT

Hegesztési tervezési tényező [Nahtfaktor]	0,85						
Szemrevételezés [Sichtprüfung]	VT	100%					
Folyadékbehatolásos vizsgálat [Eindringprüfung]	PT / MT	-	-	100%	100%	100%	-
Radiográfiai / ultrahangos vizsgálat [Durchstrahlungsprüfung]	RT / UT	-	-	20%			



Gyári számok / Serial No.:
DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Felülnézet / Top view
DE-250/40: 1 pc.
M1:6



Anlage zu / attachment to
Prüfbericht / report N°: HU04/62978/24
Datum / date: 25.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nive u. 11.
gyemantpirazol@gyem.antpirazol.hu
www.gyem.antpirazol.hu
CE 0090

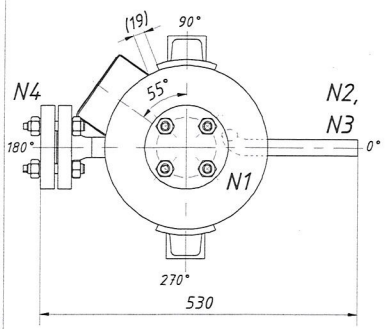
Tervezési kód: Design code:	Gyártási szám: Serial Nr. *
MSZ EN 13445: 2021	Gyártási év: Year of built 2024
Megnevezés: Designation: DE-250/40 // DR-250/40	Munkatér / Workspace
Űrtartalom (brutto): Volume:	[Liter] DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg] -1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C] -20 / +270
PED kategóriamodul: PED categorymodule:	IV./G
Próbanyomás: Test pressure:	[barg] +68,8
Próbanyomás dátuma: Date of test pressure:	2024.__.
Tömeg üresen: Empty weight:	[kg] DE: ~135; DR:~125

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

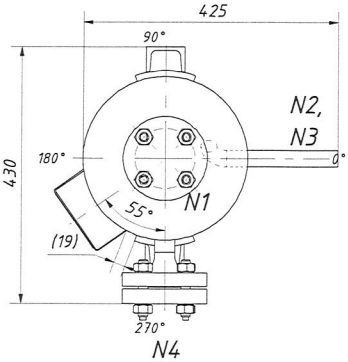
MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- A 21, 22-es tételeket a megrendelő (AQUAGAS) biztosítja!
- A 21, 22-es tételeket a fenék behegesztése előtt beszerelni!
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 3 db.
  (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

Felülnézet / Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet / Top view
DR-250/40 A: 1 pc.
M1:6



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:
	Dátum / Date	Név / Name	
Készítette / Bearbeitet / Prepared by	2024. 01. 31.	Pásku P.	
Ellenőrizte / Geprüft / Checked by	2024. 01. 31.		

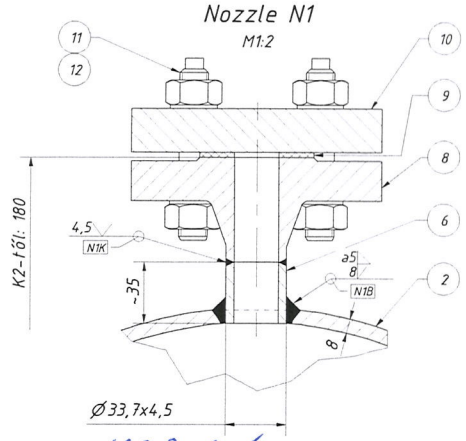
Tervezőiroda / Konstruktionsbüro / Design: GYÉMÁNT-PIRAZOL KFT.
Gyártó / Hersteller / Manufacturer: GYÉMÁNT-PIRAZOL KFT.
Tervezőjogosult / Konstrukteur / Certificate: TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28

Tárgy / Benennung / Title:
Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

Munkaszám / Auftrag-Nr. / Order No.	013-ST-2024
Méretarány / Maßstab / Scale	M 1:6
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Készítette / Erstellt am / Prepared on	2024. 01. 31.
Jóváhagyta / Geprüft am / Checked on	2024. 01. 31.
Rajzszám / Zeichn.-Nr. / Drawing No.	DG-GYP-243013-01-00
Módosítás / Änderung / Revision	0
Lapok száma / Blatt / Sheet	1 von / of 1
Rajzlap / Zeichnungsformat / Drawing sheet	A2

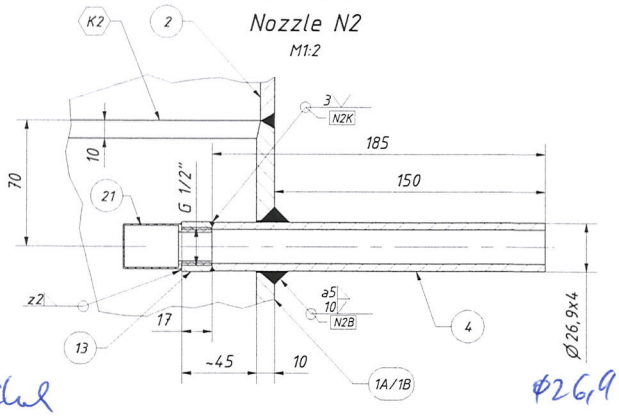
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N1 csonk
Nozzle N1
M1:2



ϕ33,7x4,5

N2 csonk
Nozzle N2
M1:2

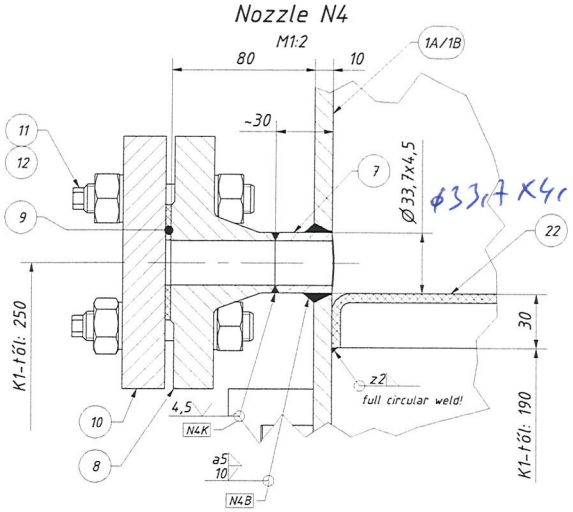


ϕ26,9x4

Diversia Kft
Szám: DGYP-243013-1

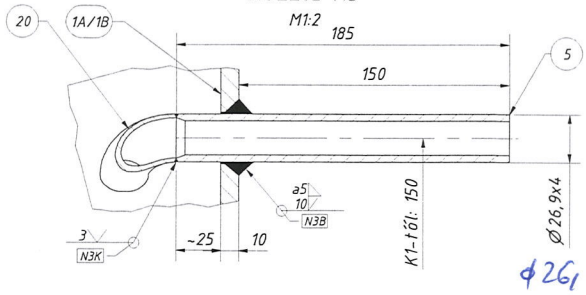
4

N4 csonk
Nozzle N4
M1:2



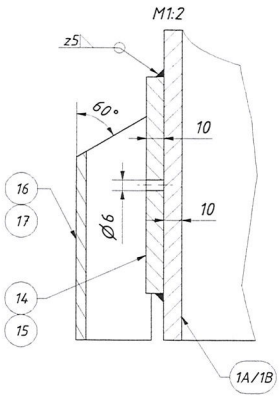
ϕ33,7x4,5

N3 csonk
Nozzle N3
M1:2

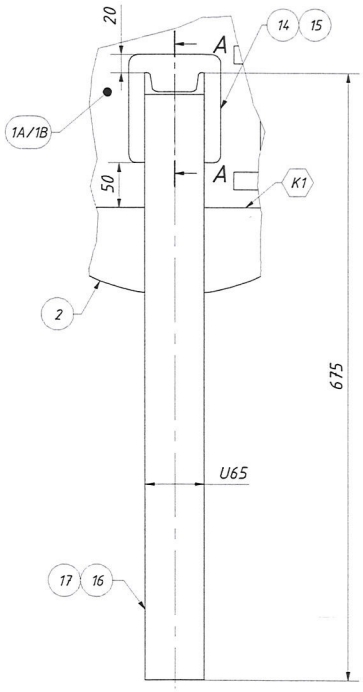


ϕ26,9x4

A-A metszet
A-A section
M1:2

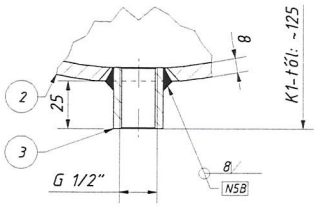


Láb
Leg
M1:4

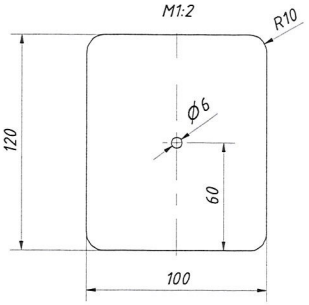


Anlage zu / attachment to	
Prüfbericht / report N.°	HU04/62978/24
Datum / date:	25.03.2024

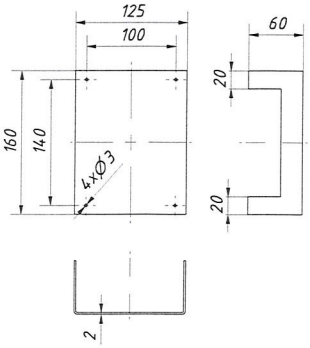
N5 csonk
Nozzle N5
M1:2



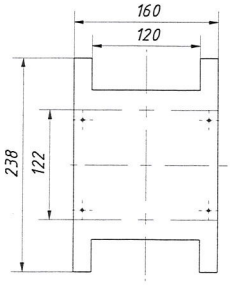
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

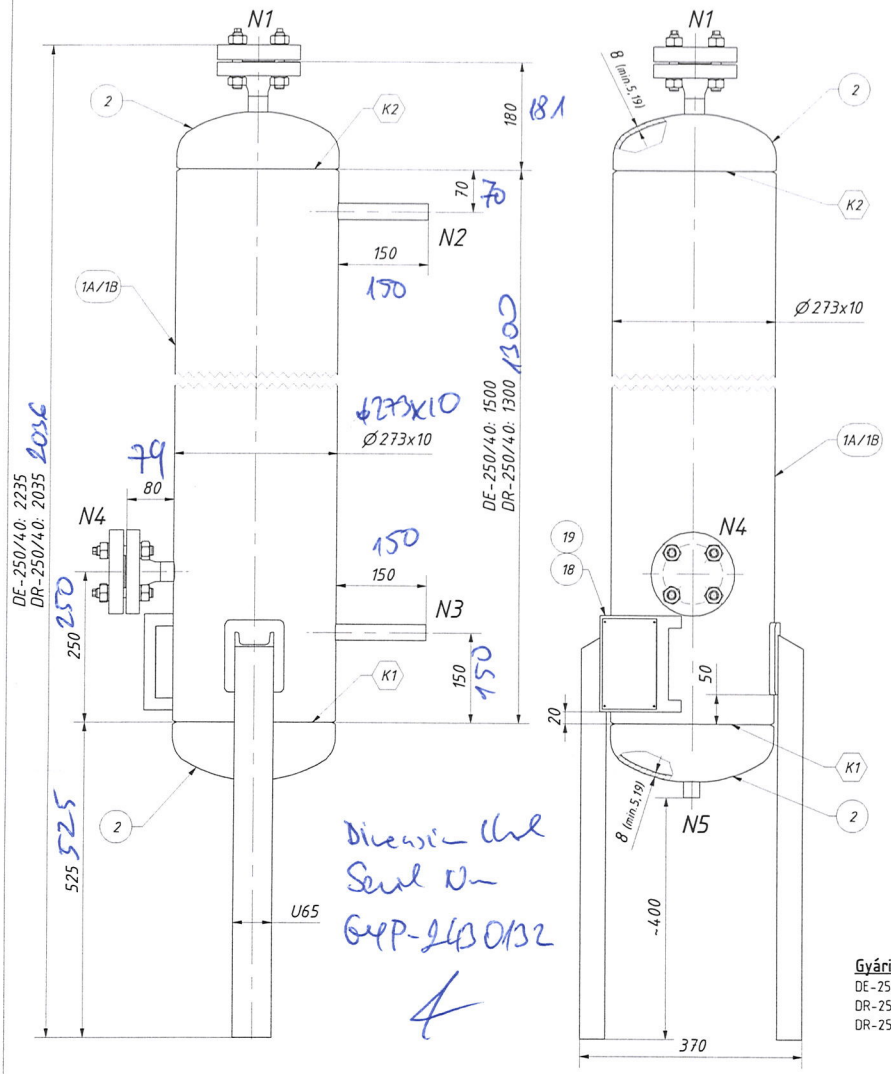
	Dátum / Date	Név / Name	Készítette / Prepared by	Ellenőrizte / Checked by	Felülvizsgálta / Approved by	Felügyelte / Supervised by
Készítette / Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.		TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Checked by	2024. 01. 31.					
Jóváhagyta / Approved by						

Megjegyzés / Remarks

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Részletek

Rajzszám / Drawing No.	DG-GYP-243013-01-01
Megrendelés / Purchase order No.	013-ST-2024
Méretarány / Scale	M 1:10
Anyagminőség / Material	P265GH, P235GH
Készítette / Prepared on	2024. 01. 31.
Jóváhagyta / Approved on	2024. 01. 31.
Módosítás / Revision	0
Lapok száma / Sheet	1 of 1
Rajzlap	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

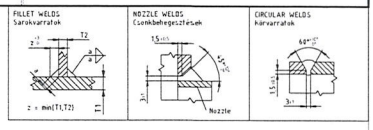


MŰSZAKI ADATOK
(TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 (Druckgerät PED Art. 1) [Pressure equipment PED Art. 1]		DE-250/40 // DR-250/40
	Tartó henger (Mantel der Behälter) [Inside of vessel]		Munkatér / Shellside
	Közeg (Medium) [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zulässige Gas Fullgutes) [Allowed mass]	[kg/m³]	~0,071
	Névleges térfogat / Geometrai térfogat (Nennvolumen / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13 cikk (Flüssigkeitsart - PED Art. 13) [Fluid group acc. to Art. 13]		1
	Hőátadó felület (Wärmeaustauscher Fläche) [Heat exchanger area]	[m²]	-
	Közeg állapot PED 13 cikk (Medienzustand - PED Art. 13) [Condition of fluid acc. to PED Art. 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]	[barg]	-1 / +39
	Kategória PED 14. cikk (Kategorie - PED, Art. 14) [Category - PED, Art. 14]		IV. kategória
	Modul - PED 14. cikk (Modul - PED, Art. 14) [Module - PED, Art. 14]		G modul
	Maximális üzemi hőmérséklet (min.-max. tzw. Betriebstemperatur) [max./min. operating temperature]	[°C]	-20 / +270
	Próbanyomás (PT) [Test pressure (PT)]	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgálati közeg (Prüfmedium) [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (MOP) (Nennbetriebsdruck) [Design test pressure (MOP)]	[barg]	-1 / +39
	Tervezési hőmérséklet (TS) (Berechnungstemperatur) [Design temperature (TS)]	[°C]	-20 / +270
	Terhelés AD-W10 (Belastungsumfang AD-W10) [Load case AD-W10]		-
	Korrózió pótlék (Korrosionszuschlag) [Corrosion allowance]	[mm]	1
	Ciklus szám (Lastwechsel) [Load cycles]		20.000
	Névnyomástartás (Druckstufe) [Pressure reference]		0-38 bar (-20°C - +50°C)
	Biztonsági tényező (Sicherheitsbeiwert, Bereich) [Safety factor, diameter]		1,5
	Üres tömeg (Gewicht leer) [Weight empty]	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) [Weight with water filling]	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben (Gewicht während des Betriebs) [Operating weight]	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési, elvi írás (Auslegung, Herstellung, Prüfung) [Design code]		MSZ EN 13445-3:2021
	Tervezésvezető (Entwurfsprüfung) [Design engineer]		MSZ EN 13445-3:2021
	Végátvizsgálat, nyomáspróba (Schluß-, visk Druckprüfung) [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]		GYP-2430131 - GYP-2430133
	Gyártási év (Herstellungsjahr) [Year of manufacture]		2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT

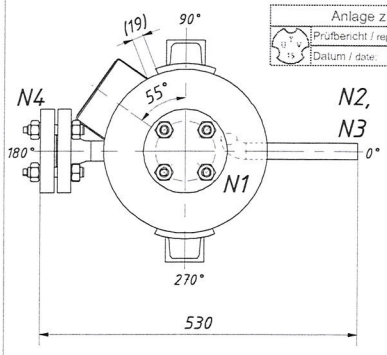
VIZSGÁLAT JELÖLÉSE		VIZSGÁLAT TERJEDELME					
Tervezési tényező	0,85	Lemezben	Hegesztésben	Tompa varrat		Sarok-, Csonk-, Fülvarrat	
				Kézi ultrahangos vizsgálat	Gépi ultrahangos vizsgálat	Kézi ultrahangos vizsgálat	Gépi ultrahangos vizsgálat
Szemrevételezés	VT	100%					
Folyadékbehatolásos / Mágneses repedésvizsgálat	PT / MT	-	-	10%	10%	10%	-
Radiográfiai / Ultrahangos vizsgálat	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok							



Gyári számok / Serial No.:

DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Felülnézet
Top view
DE-250/40: 1 pc.
M1:6



Anlage zu / attachment to

Prüfbericht / report N°	HU04/62978/24
Datum / date:	25.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nyúl u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu

CE 0090

Tervezési kód: Design code:	Gyártási szám: Serial Nr.	*
MSZ EN 13445: 2021	Gyártási év: Year of built	2024
Megnevezés: Designation:	DE-250/40 // DR-250/40	
Űrtartalom (brutto): Volume:		Munkatér / Workspace
	[Liter]	DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg]	-1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C]	-20 / +270
PED kategória/modul: PED category/module:		IV./G
Próbanyomás: Test pressure:	[barg]	+68,8
Próbanyomás dátuma: Date of test pressure:		2024.__.
Tömeg üresen: Empty weight:	[kg]	DE: ~135; DR:~125

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

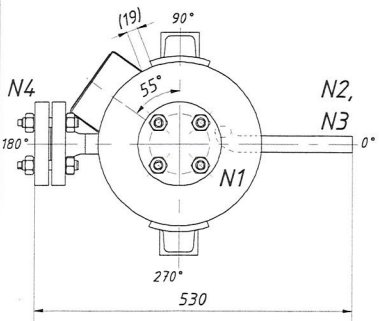
MEGJEGYZÉSEK:

- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
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- Készül: 3 db.
  (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

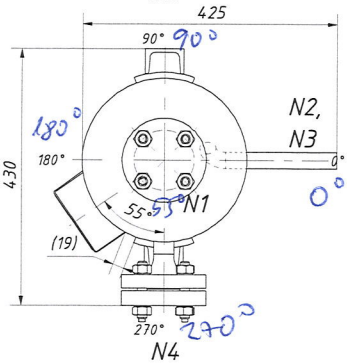
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- Nozzles welding seams according to MSZ EN 13445-3:2021.
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- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

Felülnézet
Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet
Top view
DR-250/40 A: 1 pc.
M1:6



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:

	Datum / Date	Name / Name	Tervezővezető / Kovetkeztető / Designer	Jóváhagyta / Kibocsátotta / Approved	Felülvizsgálta / Kontrolliert / Controller
Készítette / Erstellt von / Prepared by:	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Geprüft / Checked by:	2024. 01. 31.				

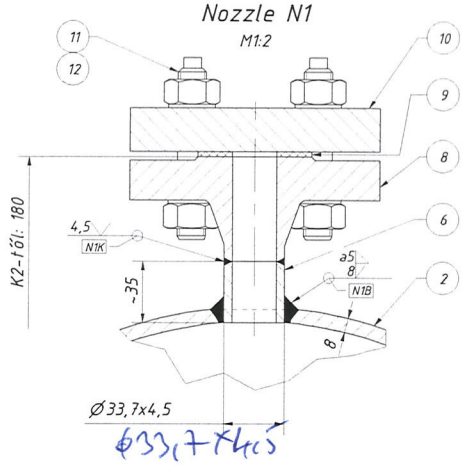
Tárgy / Titel / Title:

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

Rajzszám / Zeichnungs-Nr. / Drawing No.	013-ST-2024
Méretarány / Maßstab / Scale	M 1:6
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Készítette / Erstellt am / Prepared on	2024. 01. 31.
Jóváhagyta / Geprüft am / Checked on	2024. 01. 31.
Rajzszám / Zeichnungs-Nr. / Drawing No.	DG-GYP-243013-01-00
Módosítás / Änderung / Revision	0
Lapok száma / Blatt / Sheet	1 von / of 1
Rajzlap / Zeichnungsblatt / Drawing sheet	A2

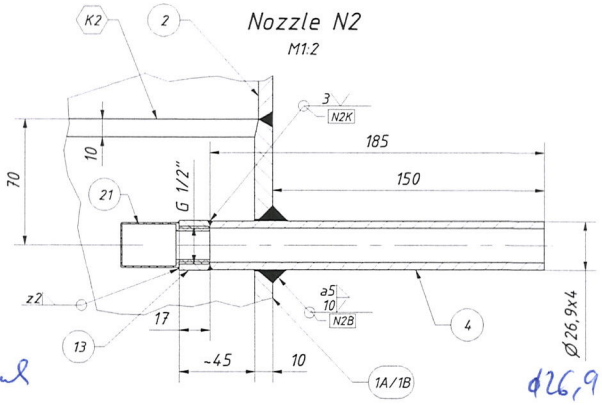
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N1 csonk
Nozzle N1
M1:2



Ø33,7x4,5

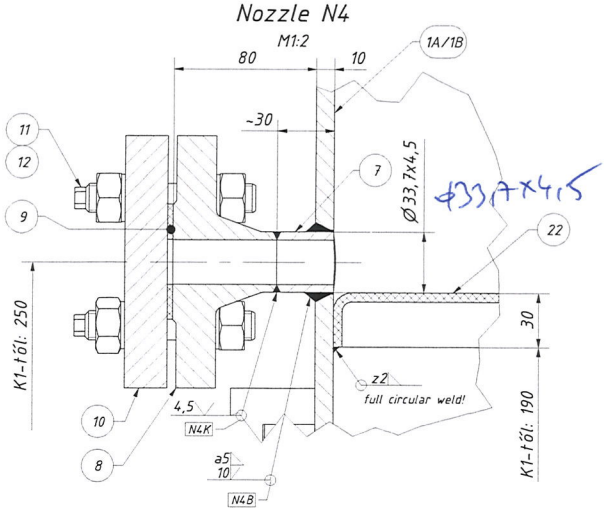
N2 csonk
Nozzle N2
M1:2



Ø26,9x4

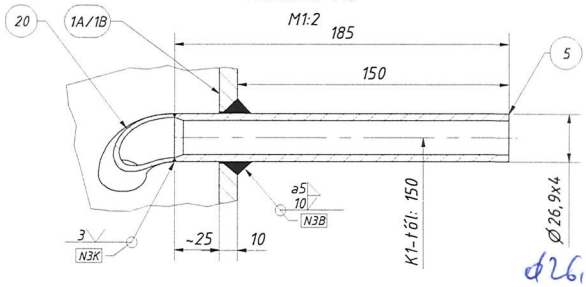
Diesen Clip
Seal Nr:
GYP-243013-2

N4 csonk
Nozzle N4
M1:2



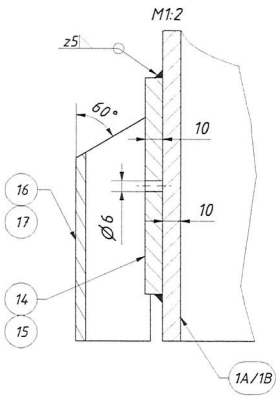
Ø33,7x4,5

N3 csonk
Nozzle N3
M1:2

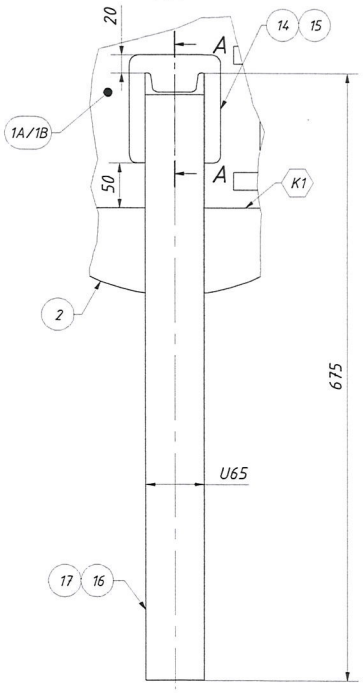


Ø26,9x4

A-A metszet
A-A section
M1:2

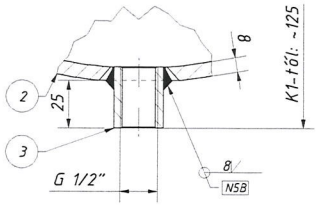


Láb
Leg
M1:4

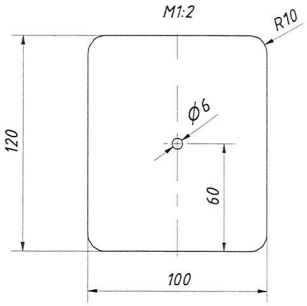


Anlage zu / attachment to	
Prüfbericht / report N°	HU04/62978/24
Datum / date:	25.03.2024

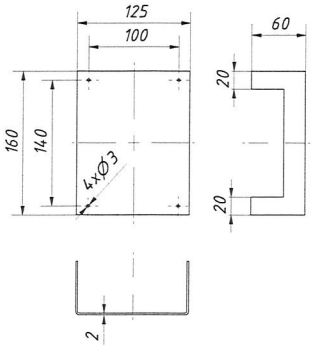
N5 csonk
Nozzle N5
M1:2



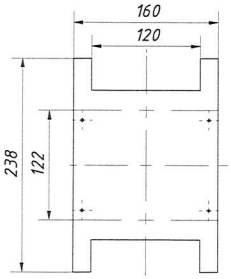
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

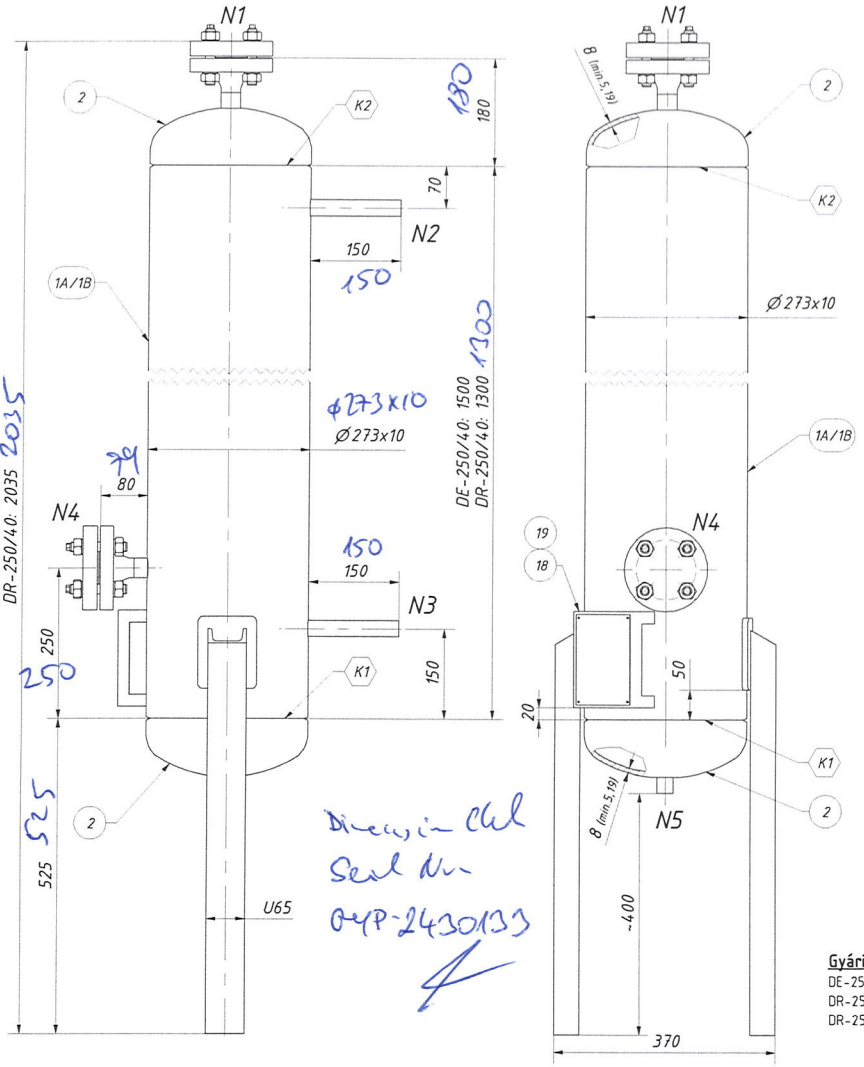
	Dátum / Date	Név / Name	Tervezővezető / Konstrukteur / Designer	Szerkesztő / Bearbeiter / Draftsman	Felülvizsgálta / Kontrolliert / Controlled
Készítette / Bearbeitet / Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Geprüft / Checked by	2024. 01. 31.				
Jóváhagyó / Freigabe / Approved by					

Megjegyzés / Bemerkung / Note

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Részletek

Megrendelő / Besteller / Client	013-ST-2024
Méretarány / Maßstab / Scale	M 1:10
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Készítette / Erstellt am / Created on	2024. 01. 31.
Jóváhagyta / Genehmigt am / Approved on	2024. 01. 31.
Rajzszám / Zeichnungs-Nr. / Drawing No.	DG-GYP-243013-01-01
Módosítás / Änderung / Revision	0
Lapok száma / Blatt / Sheet	1 von / of 1
Rajzlap / Zeichnungsblatt / Drawing sheet	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

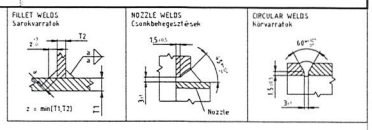


MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 (Druckgerät PED Art. 1) [Pressure equipment PED Art. 1]		DE-250/40 // DR-250/40
	Tartó hely (Halter für Rahmen) [Holder of support]		Munkatér / Shellside
	Közeg (Medium) [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Fluides) [Allowed density]	[kg/m³]	<0,071
	Névleges térfogat / Geometrai térfogat (Nennvolum / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	DE: 86; DR: 76
	Közeg csoport PED 13 cikk. (Fluidgruppe-PED Art. 13) [Fluid group acc. to art. 13]		1
	Hőátadó felület (Wärmeaustauscher Fläche) [Heat exchanger area]	[m²]	-
	Közeg állapot PED 13 cikk. (Medienzustand-PED Art. 13) [Condition of fluid acc. to PED Art. 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]	[barg]	-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) [Category-PED, Art. 14]		IV. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) [Module-PED Art. 14]		G modul
	Működési üzemi hőmérséklet (Betriebstemperatur) [Maximum operating temperature]	[°C]	-20 / +270
	Próbanyomás (Prüfdruck) [Test pressure]	[barg]	+68,8
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgáló közeg (Prüfmedium) [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (MPa) (Berechnungsdruck (MPa)) [Design pressure (MPa)]	[barg]	-1 / +39
	Tervezési hőmérséklet (°C) (Berechnungstemperatur (°C)) [Design temperature (°C)]	[°C]	-20 / +270
	Tervezés AD-W10 (Berechnungsauslegung AD-W10) [Load case AD-W10]		-
	Korrózió pótlék (Abtragszugabe) [Corrosion allowance]	[mm]	1
	Ciklus száma [Lifecycles]		20.000
	Nyomásváltozás (Druckschwankungsbereite) [Pressure difference]		0-38 bar (-20°C - +50°C)
	Biztonsági tényező, Üzem, Tűzbiztonsági tényező, Betörési tényező [Safety factor, Operating, Fire safety factor, Burst factor]		1,5
	Üres tömeg (Gewicht leer) [Weight empty]	[kg]	DE: ~135; DR: ~125
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) [Weight with water filling]	[kg]	DE: ~220; DR: ~200
	Tömeg üzem közben (Gewicht während des Betriebs) [Operating weight]	[kg]	max. DE: ~6,1; DR: ~5,4
	Tervezési előírás (Auslegung, Herstellung, Prüfung) [Design code]		MSZ EN 13445-3:2021
	Tervezőiroda (Konstruktionsbüro) [Design organization]		MSZ EN 13445-3:2021
	Végátvizsgálat, nyomáspróba (Schluß- und Druckprüfung) [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]		GYP-2430131 - GYP-2430133
	Gyártási év (Herstellungsjahr) [Year of manufacture]		2024

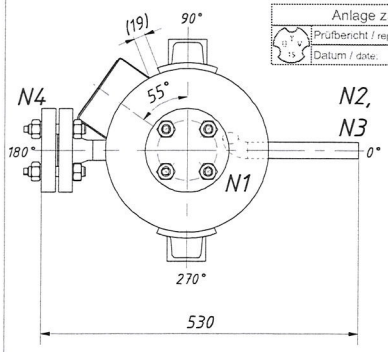
RONCSOLÁSMENTES ANYAGVIZSGÁLAT

Vizsgálat típusának jele (Prüfart)		Vizsgálat terjedelme (Prüfumfang)					
Hegesztett varratok (Naht-Prüfung)	0,85	Lemezanyag (Prüfung Blech)	Tömítőanyag (Prüfung Dichtung)	Csatlakozó csonkok (Stutzen)	Lemez / Karima (Blech / Flansch)		
					Körvarratok (Umfangnaht)	Kis méretű varratok (Kleine Naht)	Hegesztett csonkok (Stutzen)	Szúrópróbaszerű (Stich)
Szemrevételezés (Sichtprüfung)	VT				max			
Folyadékbehatolásos / Mágneses eljárással (PT-Prüfung / MT-Prüfung)	PT / MT	-	-		10%	10%	max	-
Radiográfiai / Ultrahangos vizsgálat (Durchstrahlungsprüfung / Ultraschallprüfung)	RT / UT	-	-		20%	-	-	-
Egyéb vizsgálatok (Andere Prüfung)								



Gyári számok / Serial No.:
DE-250/40: GYP-2430131
DR-250/40 A: GYP-2430132
DR-250/40 B: GYP-2430133

Felülnézet / Top view
DE-250/40: 1 pc.
M1:6



Anlage zu / attachment to	
Prüfbericht / report N°	HU04/62978/24
Datum / date:	25.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nyúl u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu
CE 0090

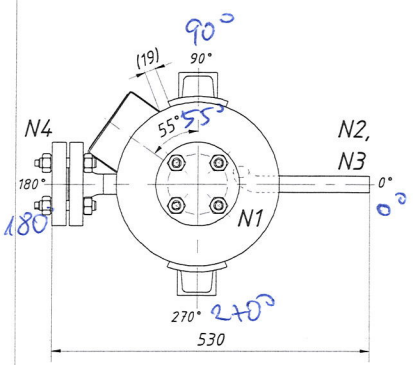
Tervezési kód: Design code:	Gyártási szám Serial Nr.	-
MSZ EN 13445: 2021	Gyártási év Year of built	2024
Megnevezés: Designation:	DE-250/40 // DR-250/40	
Űrtartalom (brutto): Volume:		Munkatér / Workspace
	[Liter]	DE: 86; DR: 76
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg]	-1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C]	-20 / +270
PED kategória/modul: PED category/module:		IV./G
Próbanyomás: Test pressure:	[barg]	+68,8
Próbanyomás dátuma: Date of test pressure:		2024.__.
Tömeg üresen: Empty weight:	[kg]	DE: ~135; DR:~125

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

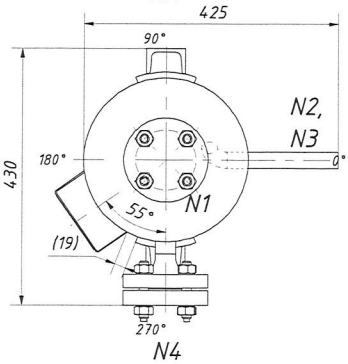
MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem esnek.
- Felületkikészítés: -
- A 21, 22-es tételeket a megrendelő (AQUAGAS) biztosítja!
- A 21, 22-es tételeket a fenék behegesztése előtt beszerelni!
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 3 db. (típusonként 1)
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-01

Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Items 21, 22 supplied by AQUAGAS
- Items 21, 22 shall be installed before welding the vessel ends
- The vessel is manufactured without thermal insulation.
- 3 pcs to be made (1 of each)
- Parts list no. associated with the plan: PL-GYP-243013-01

Felülnézet / Top view
DR-250/40 B: 1 pc.
M1:6



Felülnézet / Top view
DR-250/40 A: 1 pc.
M1:6



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N2	Hydrogen outlet / Hidrogén kilépő	DN20	-	EN 10216-2
N3	Hydrogen inlet / Hidrogén belépő	DN20	-	EN 10216-2
N4	Inspection opening / Vizsgáló nyílás	DN25	PN63	EN 1092-1 Typ.11 / B + Typ.05
N5	Drain / Leeresztő nyílás	G 1/2"	-	-

Rev.	Dátum:	Módosítás oka:	Módosította:
	2024. 01. 31.	Pásku P.	
	2024. 01. 31.		

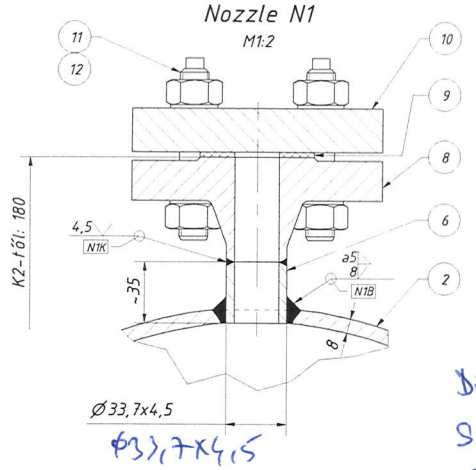
Tervezőiroda / Konstruktionsbüro / Designer: GYÉMÁNT-PIRAZOL KFT.
Gyártó / Hersteller / Manufacturer: GYÉMÁNT-PIRAZOL KFT.
Felügyelő / Kontrolleur / Controller: TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.

Aquagas Sweden AB.
DE-250/40 // DR-250/40
Összeállítási rajz

Munkaszám / Arbeits-Nr. / Work No.	013-ST-2024
Méretarány / Maßstab / Scale	M 1:6
Anyagminőség / Werkstoff / Material	P265GH, P235GH
Készítette / Erstellt am / Prepared on	2024. 01. 31.
Jóváhagyta / Geprüft am / Approved on	2024. 01. 31.
Rajzszám / Zeichn.-Nr. / Drawing No.	DG-GYP-243013-01-00
Módosítási sorszám / Änderung / Revision	0
Lapok száma / Blatt / Sheet	1 von / of 1
Rajzlap / Zeichnungsformat / Sheet size	A2

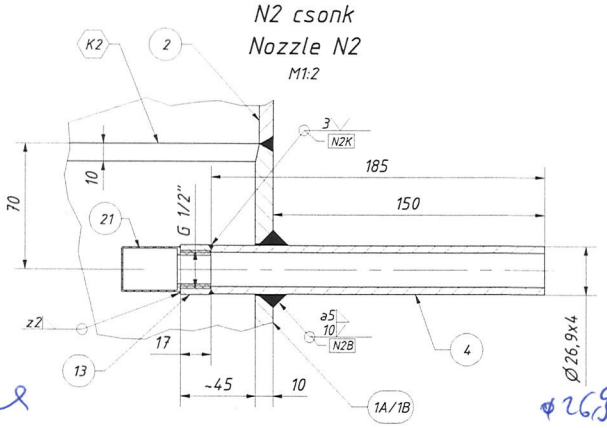
A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

N1 csonk
Nozzle N1
M1:2



Ø33,7X4,5

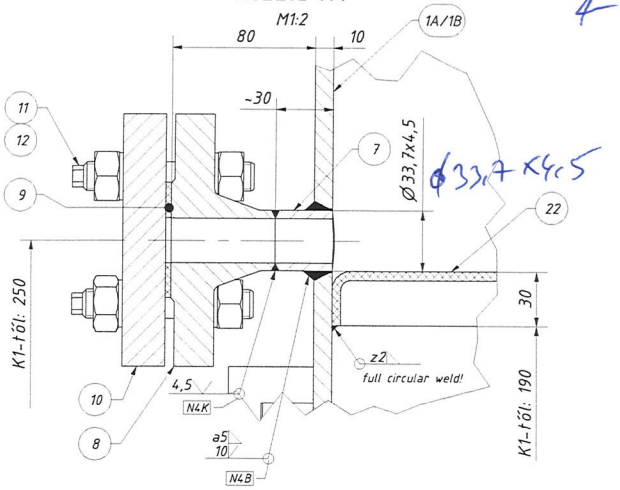
N2 csonk
Nozzle N2
M1:2



Ø26,9X4

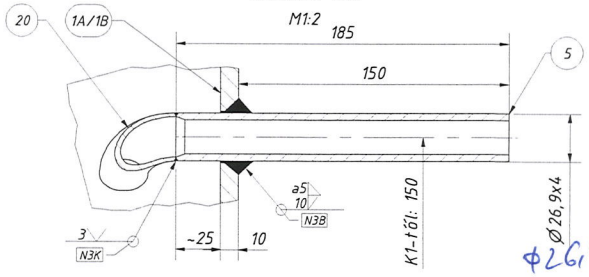
Diversa Cloud
Seal No.:
04P-243013
4

N4 csonk
Nozzle N4
M1:2



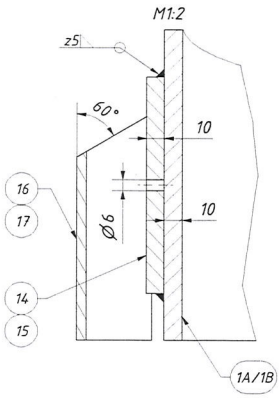
Ø33,7X4,5

N3 csonk
Nozzle N3
M1:2

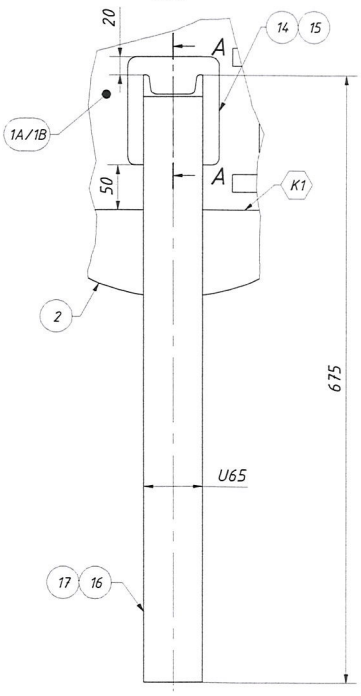


Ø26,9X4

A-A metszet
A-A section
M1:2

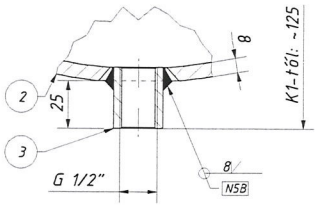


Láb
Leg
M1:4

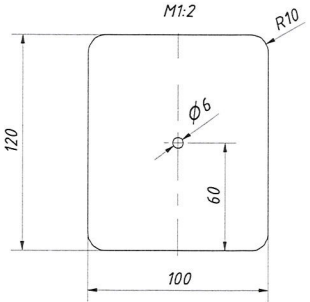


Anlage zu / attachment to	
Prüfbericht / report N°	HU04/62978/24
Datum / date:	25.03.2024

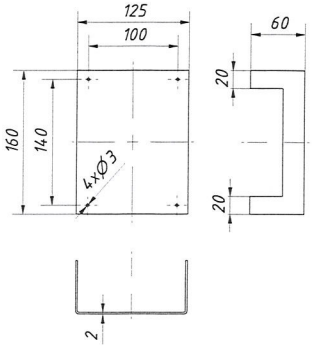
N5 csonk
Nozzle N5
M1:2



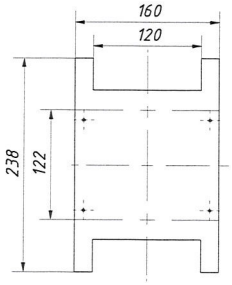
Pos.14, 15
M1:2



Pos.18
M1 : 4



Pos.18
Flat pattern
M1 : 4



Megjegyzés:
Az N2 és N3 csonkok Pos.4 és Pos.5 csöveit a gyártás során hosszabra kell hagyni! A sikeres nyomáspróbát követően a csonkokat a rajzon megadott méretekre kell visszavágni!

Note:
Pos.4 & 5 shall be installed with allowance for closure during pressure test. After passing the pressure test, nozzle pipes shall be cut back to the protrusion length indicated in the drawing.

	Dátum / Date	Név / Name	Tervezőiroda / Kivitelező / Designer	Gyártó / Fabricator / Manufacturer	Felülvizsgálta / Approved / Controller
Készítette / Created by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte / Approved by	2024. 01. 31.				

Megnevezés / Title: **Aquagas Sweden AB. DE-250/40 // DR-250/40 Részletek**

Munkaszám / Job No.	013-ST-2024
Méretarány / Scale	M 1:10
Anyagminőség / Material	P265GH, P235GH
Rajzolta / Drawn	2024. 01. 31.
Jóváhagyta / Approved	2024. 01. 31.
Rajzszám / Drawing No.	DG-GYP-243013-01-01
Módosítás / Revision	0
Lapok száma / Sheet	1 of 1
Rajzlap	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

GYÉMÁNT-PIRAZOL KFT.	**Nyomáspróba, tömörségi próba jegyzőkönyv** *Pressure test, tightness test record*	**Sorszám** / *No.:* NY- 013-ST-2024-1

Megnevezés: *Product name*	**DE-250/40; DR-250/40 A; DR-250/40 B vessels**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430131; GYP-2430132; GYP-2430133**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-01-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH, P355NH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Tér: *Space*	**Shell side**	-	-
Térfogat [l] *Volume*	**DE:86; DR:76**	-	-
Min / max megengedett nyomás [bar]: *Min / max allowed pressure*	**-1/+39**	-	-
Próbanyomás [bar]: *Test pressure*	**68,8**	-	-
Alkalmazott közeg: *Used fluid*	**water**	-	-
Közeg hőmérséklet [°C] *Fluid temperature*	**16**	-	-
Időtartam [min.] *Holding time*	**30**	-	-
Nyomásmérők azonosító száma: *Pressure Gauges ID No.*	**33866; 33867**	-	-
Nyomásmérők mérési tartománya (bar): *Measuring range of pressure gauges*	**0 - 160**	-	-
Pontossági osztály: *Accuracy class:*	**1,6 %**	-	-
Kalibráció érvényessége: *Calibration validity:*	**2025.02.02**	-	-
Értékelés (OK / nOK): *Evaluation*	**OK**	-	-

Megjegyzés / *Remark* :

A vizsgálat során a készüléken folyás, szivárgás, alakváltozás nem észlelhető.
During the test, no water leakage or deformation is found.

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.26

Vizsgálat résztvevői / *Participants of the pressure test*

Gyártó *Manufacturer*	**Független szervezet** *Notified body*	**Megrendelő** *Customer*
Bakos Gyula	2024.03.26. Kerekes Fülöp	

Név, aláírás / ***Name, signature***

PANNONMŰSZER LTD
Calibration laboratory

NAH-2-0297/2021
KALIBRÁLÓLABORATÓRIUM

Location: 6750 Algyő, Külterület Hrsz.: 01884/17. Mailing address: 6750 Algyő, Pf. 16
Tel./Fax: (62) 267-424 e-mail: info@pannonmuszer.hu http://www.pannonmuszer.hu

Certificate number: **MM-84202/24**

CERTIFICATE OF CALIBRATION

PM job number: PM-24-125 **Customer job number:** 999-ST-2024

Customer name: Gyémánt-Pirazol Kft. (admin: László Fekete)
Customer address: 3100 Salgótarján, Fülemüle út 9.
Calibration place, date: PANNONMŰSZER LTD Calibration laboratory, 2024. february 2.
Method of calibration: calibration was performed using direct comparison according to **KE-MM-01/2020** calibration process of manometers operating on indirect principle with ethalons selected properly to prescribed accuracy tolerances.

Calibrated measuring instrument: **Manometer**

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Accuracy class:	Measuring medium:	Condition:
Suku	*4451*	*33866*	*0...160 bar*	*5 bar*	*1,6*	*oil*	*appropriate*

Standard used for calibration: **Dead Weight Tester**

Manufacturer:	Type:	Serial number:	Measuring range:	Certificate number:	Validity:
OMIKSZ	*M8*	*7942*	*25.....250 bar*	*81796*	*11/20/2026*

Other measuring instrument: **Temperature and humidity sensor**

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Measurement uncertainty:	Certificate number:
DOSTMAN	*KVDLOG220*	*22019070006*	*-10...+60 °C*	*0,1*	*0,1 °C*	*H108003 R017007 N034044*

The measurements could be originate to the national ethalons based on calibration certifications of in-use ethalons and gauges.

Ambient temperature: 22,2 – 22,1 °C
Measurement results: (during preloading, the calibrated measuring instrument conformed):

Reference value [bar]	Measured value [bar]				Error (of measurement) [bar]				Expanded measurement uncertainty [bar]
	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	
0	0,0	0,0	0,0	0,0	0	0	0	0	0,6
30	30,0	30,0	30,0	30,0	0	0	0	0	0,6
60	60,0	60,0	60,0	60,0	0	0	0	0	0,6
90	90,0	90,0	90,0	90,0	0	0	0	0	0,6
120	120,0	120,0	120,0	120,0	0	0	0	0	0,6
160	160,0	160,0	160,0	160,0	0	0	0	0	0,6

Maximum permissible absolute error; $|h_{op}|$: 2,56 bar
Maximum measured absolute error; $|h_i|$: 0 bar

The reported expanded measurement uncertainty is the value of standard uncertainty multiplied by k=2 factor that means 95% reliability probability in case of normal distribution. The standard uncertainty of measurement has been determined in accordance to Publication EA-4/02 (Expression of the Uncertainty of Measuremen in Calibration).

Certification: according to ILAC G8:09/2019 using safety lanes.
Based on the metrological characteristics found, the measuring instrument:

Accepted: ☒ Not accepted: ☐ - the requirements of the specification (accuracy class).

The measurement results and the determination of compliance with the specification apply only to the calibrated measuring instrument.

Note: Please pay attention to the fact, that identifying and supervising a re-calibration date is basically the task of the owner of the measuring instrument.
The reported data refer to the metrological specifications of the calibrated measuring instrument.
Certificate can be issued.

P.H.

Gábor Molnár
examiner

Zsolt Balázs
calibration laboratory manager

Place and date of issue of the certificate: Algyő, 2024. february 2.

This certificate is valid and copyable to third parties only in its entirety and in full. A copy may be made only with the consent of the body issuing the certificate and the customer.

PANNONMŰSZER LTD
Calibration laboratory

Location: 6750 Algyő, Külterület Hrsz.: 01884/17.
Tel./Fax: (62) 267-424 e-mail: info@pannonmuszer.hu
Mailing address: 6750 Algyő, Pf. 16
http://www.pannonmuszer.hu

NAH-2-0297/2021
KALIBRÁLÓLABORATÓRIUM

Certificate number: **MM-84203/24**

CERTIFICATE OF CALIBRATION

PM job number: PM-24-125
Customer job number: 999-ST-2024
Customer name: Gyémánt-Pirazol Kft. (admin: László Fekete)
Customer address: 3100 Salgótarján, Fülemüle út 9.
Calibration place, date: PANNONMŰSZER LTD Calibration laboratory, 2024. february 2.
Method of calibration: calibration was performed using direct comparison according to **KE-MM-01/2020** calibration process of manometers operating on indirect principle with ethalons selected properly to prescribed accuracy tolerances.

Calibrated measuring instrument: **Manometer**

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Accuracy class:	Measuring medium:	Condition:
Suku	*4451*	*33867*	*0...160 bar*	*5 bar*	*1,6*	*oil*	*appropriate*

Standard used for calibration: **Dead Weight Tester**

Manufacturer:	Type:	Serial number:	Measuring range:	Certificate number:	Validity:
OMIKSZ	*M8*	*7942*	*25.....250 bar*	*81796*	*11/20/2026*

Other measuring instrument: **Temperature and humidity sensor**

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Measurement uncertainty:	Certificate number:
DOSTMAN	*KVDLOG220*	*22019070006*	*-10...+60 °C*	*0,1*	*0,1 °C*	*H108003 R017007 N034044*

The measurements could be originate to the national ethalons based on calibration certifications of in-use ethalons and gauges.

Ambient temperature: 22,2 – 22,1 °C
Measurement results: (during preloading, the calibrated measuring instrument conformed):

Reference value [bar]	Measured value [bar]				Error (of measurement) [bar]				Expanded measurement uncertainty [bar]
	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	
0	0,0	0,0	0,0	0,0	0	0	0	0	0,6
30	29,0	30,0	29,0	30,0	-1	0	-1	0	0,6
60	59,0	60,0	60,0	60,0	-1	0	0	0	0,6
90	89,0	89,0	89,0	90,0	-1	-1	-1	0	0,6
120	120,0	120,0	120,0	120,0	0	0	0	0	0,6
160	160,0	160,0	160,0	160,0	0	0	0	0	0,6

Maximum permissible absolute error; $|h_{op}|$: 2,56 bar
Maximum measured absolute error; $|h_i|$: 1 bar

The reported expanded measurement uncertainty is the value of standard uncertainty multiplied by k=2 factor that means 95% reliability probability in case of normal distribution. The standard uncertainty of measurement has been determined in accordance to Publication EA-4/02 (Expression of the Uncertainty of Measuremen in Calibration).

Certification: according to ILAC G8:09/2019 using safety lanes.
Based on the metrological characteristics found, the measuring instrument:

Accepted: ☒ Not accepted: ☐ - the requirements of the specification (accuracy class).

The measurement results and the determination of compliance with the specification apply only to the calibrated measuring instrument.

Note: Please pay attention to the fact, that identifying and supervising a re-calibration date is basically the task of the owner of the measuring instrument.
The reported data refer to the metrological specifications of the calibrated measuring instrument.
Certificate can be issued.

.....
Gábor Molnár
examiner

PANNONMŰSZER KFT
Kalibrálólaboratórium
P.H.

.....
Zsolt Balázs
calibration laboratory manager

Place and date of issue of the certificate: Algyő, 2024. february 2.

This certificate is valid and copyable to third parties only in its entirety and in full. A copy may be made only with the consent of the body issuing the certificate and the customer.

GYÉMÁNT-PIRAZOL KFT.

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó utca 11.
www.gyemantpirazol.hu

Doc.No./Szám:	HA-GYP-243013-01	Rev.:	0

Aquagas Sweden AB.

Veszélyelemzés

Hazard analysis

Dwg. No. / Rajzszám:
DG-GYP-243013-01

Task No.: / Munkaszám:
013-ST-2024

0	2024.01.31		Pásku P.	Kristóf G.
Rev:	Date/Dátum:	Remark/Megjegyzés:	Designer/Tervező:	Checked/Ellenőr:

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-01**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-01**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**IV./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430131 - GYP-2430133**

Veszélyek és forrásaik összegzése
SUMMARY OF HAZARDS & THEIR SOURCES

I.	**Nyomástartó héj műszaki hibájából adódó veszély** ***Hazard from mechanical failure of pressure retaining shell***				
	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
1	Hibás számítás *Incorrect calculation*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 5-10. sor *see Page 3, Line 5 to 10*	□ igen/*yes* ■ nem/*no*	
2	Konstrukciós hiba *Incorrect construction*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 12-15. sor *see Page 3, Line 12 to 15*	□ igen/*yes* ■ nem/*no*	
3	Helytelen anyagmegválasztás *Incorrect material selection*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 17-23. sor *see Page 3, Line 17 to 23*	□ igen/*yes* ■ nem/*no*	
4	Korrózió helytelen megítélése *Incorrect rating of corrosion anticipated*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 19. és 20. sor *See Page 3, Line 19 and 20*	□ igen/*yes* ■ nem/*no*	
5	Hibás gyártás *Defective fabrication*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 25-27. sor *see Page 3, Line 25 to 27*	□ igen/*yes* ■ nem/*no*	
6	Elégtelen vizsgálat és a vizsgálat helytelen megválasztása	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 28-32. sor *see Page 3, Line 28 to 32*	□ igen/*yes* ■ nem/*no*	
7	Megengedett terhelések túllépése *Exceeding of the allowable loads*	■ igen/*yes* □ nem/*no*	lásd 4. oldal, 5-18. sor *see Page 4, Line 5 to 18*	■ igen/*yes* □ nem/*no*	lásd 5. oldal see Page 5.
II.	**Végátvétel utáni helytelen kezelésből adódó veszély** **Hazard from incorrect Handling after Final Inspection**				
	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
8	Hibás csomagolás *False packing*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 5. sor *see Page 5, Line 5*	□ igen/*yes* ■ nem/*no*	
9	Hibás szállítás, rakodás, tárolás *False transport, loading, storage*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 6. és 7. sor *see Page 5, Line 6 and 7*	□ igen/*yes* ■ nem/*no*	
10	Hibás összeszerelés és felállítás *False assembly and erection*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 8-11. sor *see Page 5, Line 8 to 11*	□ igen/*yes* ■ nem/*no*	
III.	**Tömítetlenségből adódó veszély** ***Hazard by loss of Technical Tightness***				
	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
11	Szivárgás eltávolítható és nem eltávolítható csatlakozásoknál	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 21-28. sor *see Page 5, Line 21 to 28*	□ igen/*yes* ■ nem/*no*	
12	Szivárgás mozgó alkatrészeknél *Leakage at moving parts*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 30. sor *see Page 5, Line 30*	□ igen/*yes* ■ nem/*no*	
IV.	**Üzemelés közbeni helytelen tevékenységekből adódó veszély** ***Hazard from incorrect Activities during Operation***				
	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
13	Nyomástartó edény normál üzemelése *Normal operation of pressure vessel*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 13. és 14. sor *see Page 5, Line 13 and 14*	□ igen/*yes* ■ nem/*no*	
14	Edény kinyitása hozzáférés céljából *Opening of vessel for entering*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 15-19. sor *see Page 5, Line 15 to 19*	■ igen/*yes* □ nem/*no*	lásd 5. oldal see Page 5.
15	Edény kinyitása üzemelés közben *Opening of vessel during operation*	□ igen/*yes* ■ nem/*no*		□ igen/*yes* ■ nem/*no*	

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-01**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-01**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**IV./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430131 - GYP-2430133**

Veszélykontrol vagy -csökkentés
HAZARD CONTROL OR REDUCTION

V. **Nyomástartó héj műszaki hibája**
Mechnical failure of pressure retaining shell

	Veszélykontrolra és -csökkentésre tett intézkedések **Measures for Hazard Control / Reduction**	**V**	**U**	**Alkalmazott módszer** **Applied Method**	**P**	**Megmaradó veszély** **Remain Hazard**
1	Igazolt számítási módszerek és programok használata	M	M	EN13445	TP	nincs / none
2	Minden üzemelési feltétel figyelembevétele az elvárt folyamathoz	O	M	Adatlap, Igénybevétel, specifikáció *Data sheet, Requisition, Spec.*	TP	nincs / none
3	Helyi külső terhelések figyelembevétele *Consideration of local external loadings*	O	M	Adatlap, specifikáció *Data sheet, Specifications*	TP	nincs / none
4	Különféle általános és helyi belső terhelések figyelembevétele	O	N/A	Adatlap *Data sheet*	N/A	nincs / none
5	A létesítményi helyszínre vonatkozó további terhelések figyelembevétele	O	N/A	Adatlap, specifikáció *Data sheet, Specifications*	N/A	nincs / none
6	Ciklikus terhelések figyelembevétele *Consideration of cyclic loadings*	O	N/A		N/A	nincs / none
7	Elfogadott konstrukciós gyakorlatok és igazolt konstrukciók használata	O	M	Tervezési kód, műszaki specifikáció Design code, techn. Specification	TP	nincs / none
8	Minősített személyzet és megbízható programok használata	M	M	Minőségbiztosítási rendszer QM-System	M	nincs / none
9	Jó minőségű műszaki dokumentáció biztosítása	M	M	Minőségbiztosítási rendszer QM-System	O	nincs / none
10	Dokumentáció rendszeres frissítésének biztosítása	M	M	Minőségbiztosítási rendszer QM-System	M	nincs / none
11	Anyagmegválasztás a közeg figyelembevételével	O	M	Adatlap, specifikáció *Data sheet, Specification*	O	nincs / none
12	Anyagmegválasztás üzemi körülmények alapján	O	M	Adatlap, specifikáció *Data sheet, Specification*	O / M	nincs / none
13	A tervezésben figyelembevett korróziós követelmények elemzése	O	M	Adatlap, specifikáció *Data sheet, Specification*	O	nincs / none
14	Közeg és üzemelés miatti kopás figyelembevétele (pl. erózió)	O	M	Adatlap, specifikáció *Data sheet, Specification*	O	nincs / none
15	Megbízható anyagbeszállítók kiválasztása *Selection of reliable material suppliers*	M	M	PED szerinti minősítés *Qualification acc. to PED*	TP	nincs / none
16	A megrendelési dokumentumokban meghatározandó, anyagra vonatkozó speciális	O / M	M	Adatlap, specifikáció *Data sheet, Specification*	M / TP	nincs / none
17	Előírások betartásának ellenőrzése megrendeléskor	M	M	Minőségbiztosítási rendszer QM-System	M	nincs / none
18	Engedélyezett és igazolt gyártási módszerek használata	M	M	EN13445	TP	nincs / none
19	Engedélyezett és igazolt hegesztési kötések használata	M	M	EN13445	TP	nincs / none
20	Engedélyezett és igazolt hőkezelési eljárások használata	M	M	Adatlap, általános specifikáció *Data sheet, Gen. Spec.*	M	nincs / none
21	Gyártási és vizsgálati ütemterv szerinti vizsgálatok teljesítése	O	M	Vizsgálatokat jelenteni /visszaigazolni *Inspections inform. / confirm.*	TP / O	nincs / none
22	Engedélyezett vizsgálati eljárások és eszközök használata	M	M	Minőségbiztosítási rendszer QM-System	TP / M	nincs / none
23	Vizsgálatokat megfelelően minősített személyzetnek kell végeznie	M	M	Minőségbiztosítási rendszer QM-System	TP / M	nincs / none
24	Vizes nyomáspróbát megfelelő vizsgálati közeggel kell végezni	O	M	Adatlap, igénylés *Data sheet / requisition*	TP / M	nincs / none
25	Teljes gyártási és vizsgálati dokumentáció biztosítása	O	M	Dokumentáció ellenőrzés *Documentation check*	TP / M	nincs / none

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-01**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-01**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**IV./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430131 - GYP-2430133**

Veszélykontrol vagy -csökkentés
HAZARD CONTROL OR REDUCTION

V. Nyomástartó héj műszaki hibája / Mechnical failure of pressure retaining shell

	Veszélykontrolra és -csökkentésre tett intézkedések / Measures for Hazard Control / Reduction	V	U	Alkalmazott módszer / Applied Method	P	Megmaradó veszély / Remain Hazard
26	Túlzott mértékű túlnyomás elleni védelem normál üzemelés közben	O	O	A rendszer biztonsági szelep beállítása Pressure setting of safety valve in system	TP / O	nincs / none
27	Hőtágulás miatti, túlzott mértékű túlnyomás elleni védelem	O	O	A rendszer biztonsági szelep beállítása Pressure setting of safety valve in system	TP / O	nincs / none
28	Exotermikus reakció során fellépő túlzott mértékű túlnyomás elleni védelem	O	N/A		N/A	nincs / none
29	Túlzott külső nyomás elleni védelem *Protection against excessive external pressure*	O	M	Adatlap / Igazolt számítási módszer *Data sheet / Proven calculation method*	TP	nincs / none
30	Ciklikus nyomás miatti alakváltozás elleni védelem	O	N/A		N/A	nincs / none
31	Átmoszferikus körülményekből származó alakváltozás elleni védelem	O	O	Szigetelés, hőmérséklet szabályozás *Insulation, temperature contol*	N/A	nincs / none
32	Túlzott hőmérséklet miatti szilárdság csökkenés elleni védelem	O	B	Hőmérsékletszabályozás TI/TC *Temperature control TI/TC*	B	nincs / none
33	Korrózív közegek lecsapódásából adódó korrózió elleni védelem	O	B	Anyagmegválasztás *Material selection*	B	nincs / none
34	Vizes nyomáspróba után maradó vízből adódó korrózió elleni védelem	M	M	Anyagmegválasztás, szárítás *Material selection, drying*	M / B	nincs / none
35	Üzemszünet közbeni maradék közeg miatt fellépő korrózió elleni védelem.	O	B	Anyagmegválasztás *Material selection*	B	nincs / none
36	Helytelen konstrukció miatti korróziós sérülés elleni védelem	O	N/A		N/A	nincs / none
37	Külső tűzből adódó instabilitás elleni védelem *Protection against instability arising from an*	O	O		O	nincs / none
38	Alakváltozásból adódó plasztikus deformálódás elleni védelem	O	M	Számítás / anyagmegválasztás / Terv.kód Calculation / mat. select / Design code	TP	nincs / none
39	Dinamikus nyomáshullámok ellni védelem (nyomáslengés)	O	N/A		N/A	nincs / none

VI. Végátvétel utáni és üzemelés közbeni / tömítetlenség esetén nem megfelelő kezelés / Improper Handling after Final Inspection and during operation and loss of tightness

	Veszélykontrolra és -csökkentésre tett intézkedések / Measures for Hazard Control / Reduction	V	U	Alkalmazott módszer / Applied Method	P	Megmaradó veszély / Remain Hazard
1	Szállítóeszköznek és időnek megfelelő csomagolás	O	M	Az igénylésben meghatározott követelmények	M / O	nincs / none
2	Várható rakodáshoz megfelelő szállító támasztékok	M	M		O	nincs / none
3	Szállítási sérülések ellenőrzése átrakodásnál és a végső rendeltetési helyen	O	O		O	nincs / none
4	Alapozás és alapcsavarok kivitelezésének (minőség) ellenőrzése	O	*)		O	nincs / none
5	Felállítás felügyelete *Supervision of erection*	O	*)	Minősített összeszerelő cég *Qualified assembly corp.*	O	nincs / none
6	Helyszíni összeépítés jóváhagyott felállítási dokumentumok szerint	O	O	Minősített összeszerelő cég *Qualified assembly corp.*	O	nincs / none
7	Összeszerelések teljesítése és helyességük vizsgálata	O	O	Minősített összeszerelő cég *Qualified assembly corp.*	O	nincs / none
8	Közeg nem szabályozott kiengedése, (pl. lefújás)	O	O	A teljes rendszer tömítettségvizsgálata *Leaktest of complete system*	O	nincs / none
9	Statikus elektromos feltöltődés megelőzése, villámvédelem	O	M / O	Földelés *Earthing*	TP / O	nincs / none

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-01**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-01**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**IV./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430131 - GYP-2430133**

Veszélykontrol vagy -csökkentés
HAZARD CONTROL OR REDUCTION

VI. Végátvétel utáni és üzemelés közbeni / tömítetlenség esetén nem megfelelő kezelés
Improper Handling after Final Inspection and during operation and loss of tightness

	Veszélykontrolra és -csökkentésre tett intézkedések Measures for Hazard Control / Reduction	V	U	Alkalmazott módszer Applied Method	P	Megmaradó veszély Remain Hazard
10	Közegből és az üzemelés közbeni reakciókból adódó veszélyek megelőzése	O	O		B	nincs / none
11	Nyomásellenőrzés megnyitás előtt *Pressure check before opening*	O	B	Helyi nyomásjelző ellenőrzése *Check of local PI*	B	igen / yes
12	Ellenőrizni, hogy be lehet-e jutni a tartályba veszély nélkül (analízis)	O	B		B	nincs / none
13	Magas felületi hőmérséklet ellenőrzése *Check against elevated surface temperature*	O	B		B	nincs / none
14	Kiegészítő eszközök, pl. létrák, stb. a biztonságos bejutáshoz	O	M		B	nincs / none
15	Oldható csatlakozások funkcionális terve *Functional design of removeable connections*	O	M		M	nincs / none
16	Tömítés megválasztása és igazolt termékek megszerzése	O	M		O	nincs / none
17	Tömítőfelületek gondos kezelése és ellenőrzése összeszerelés előtt	M	M	Minősített összeszerelő cég *Qualified assembly corp.*	O / B	nincs / none
18	Szakszerű és dokumentált összeszerelés (csavarmeghúzó nyomaték)	O / M	O / M	Minősített összeszerelő cég *Qualified assembly corp.*	O / B	nincs / none
19	Minden oldható és nem oldható kötés nyomáspróbája és tömítettségvizsgálata	M	M	Vizes nyomáspróba *Hydrostatic Test*	TP / O	nincs / none
20	Cső / csőköteg kötések speciális tömítettségvizsgálata	M	M		TP / O	nincs / none
21	Kiegészítő roncs. mentes vizsg. vagy felülethiba vizsgálat	n/a	n/a		n/a	nincs / none
22	Próbaüzem, ideértve az üzemelés előtti tömítettségvizsgálatot is	O	O		B	nincs / none

VII. RÖVIDÍTÉSEK
ABBREVATIONS

1. **3-5. oldal, 4. sor:** Felelősség a specifikációért (**V**), megvalósításért, (**U**), vizsgálatért (**P**)
   Sheet 3 up to 5, line 4 *: Responsibility for the specification (**V**), realization (**U**), inspection (**P**)*
2. **Megrendelő (O**), Gyártó (**M**), Harmadik fél általi vizsgálat (**TP**), Felhasználó (**B**)
   Order (**O**), *Manufacturer (**M**), Third Party Inspection (**TP**), User (**B**),*
3. **n/a : nem** alkalmazandó, HST: Vizes nyomáspróba
   *n/a : **not** applicable, HST: Hydro Static Test*

VIII. Megmaradó veszélyek kiértékelése és üzemeltetőre vonatkozó utasítások
EVALUATION OF REMAINING HAZARD AND OPERATOR INSTRUCTIONS

	Megmaradó veszély megnevezése Description of remaining Hazard	Kockázat Risk	Intézkedés Action
1	Végátvétel utáni korrózió a vizes nyomáspróba utáni nem teljes víztelenítés miatt *Corrosion after final inspection due to incomplete drainage after hydro test*	nincs / none	
2	A rendszer leállása utáni korrózió nem teljes víztelenítés miatt *Corrosion after shut down of unit due to incomplete drainage*	nincs / none	
3	A rendszer átmeneti leállása utáni korrózió nem teljes víztelenítés miatt *Corrosion after temporary shut down of unit due to incomplete drainage*	nincs / none	
4	Nem teljes víztelenítés vagy tisztítás miatti folyadékokból származó veszély *Danger from fluids due to incomplete drainage or cleaning*	nincs / none	
5	Kinyitás előtt a készüléknek nyomásmentesnek kell lennie *Chamber to be pressureless before opening*	igen / yes	Oktatás Instruction
6	60°C-ot meghaladó felületi hőmérséklet miatti potenciális veszély a személyzetre *Potential danger for personnel by surface temperatures over 60°C*	igen / yes	Oktatás Instruction

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Doc.No./Szám:	OI-GYP-243013-01	Rev.:	0

Aquagas Sweden AB.

Üzemeltetési utasítás

Operating instructions

Dwg. No. / Rajzszám:
DG-GYP-243013-01

Task No.: / Munkaszám:
013-ST-2024

0	2024.01.31		Pásku P.	Kristóf G.
Rev:	Date/Dátum:	Remark/Megjegyzés:	Designer/Tervező:	Checked/Ellenőr:

GYÉMÁNT-PIRAZOL KFT.

Üzemeltetési utasítás
Operating instructions

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Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-01**
Dátum / Date:	2024.01.31	Task No.: / Munkaszám:	**013-ST-2024**
Tervezési kód / Design code:	PED-2014/68/EU + MSZ EN 13445-3:2021	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430131 - GYP-2430133**

I.	Üzemeltetési és tervezési adatok összegzése Summary of operating- and design date		*DE vessel* *DE VESSEL*	*DR vessel* DR VESSEL
1	Tér megnevezése Description of the chamber		*Munkatér* Shell side	*Munkatér* Shell side
2	Közeg, töltet Fluid		Sűrített hidrogén Compressed hydrogen	Sűrített hidrogén Compressed hydrogen
3	Közegcsoport Fluid group		1 - gáz / gas	1 - gáz / gas
4	Térfogat Capacity	[liter]	~86	~76
5	Tervezési nyomás Design pressure	[barg]	-1 / +39	-1 / +39
6	Tervezési hőmérséklet Design temperature	[°C]	-20/+270	-20/+270
7	PED II. mell. szerinti kategória Category in acc. to PED Att. II		IV.	IV.
8	Üzemi nyomás Operating pressure	[bara]	-1 / +39	-1 / +39
9	Üzemi hőmérséklet Operating temperature	[°C]	-20/+270	-20/+270
10	Próbanyomás Test pressure	[barg]	+68,8	+68,8
11	Biztonsági szelep beállítási nyomása Set pressure relief valve	[barg]	-	-
12	Hegesztési tényező Joint efficiency		0,85	0,85
13	Korróziós pótlék Corrosion allowance	[mm]	1	1
14	Hegesztés utáni hőkezelés Post weld heat treatment		-	-
15	Megengedett ciklusszám Number of allowable load cycles		20000	20000
16	Megengedett ciklikus terhelés Allowable load cycle range		0 - 38	0 - 38
II.	*Fő méretek és súlyok* Main dimensions and weights		*DE vessel* *DE VESSEL*	*DR vessel* DR VESSEL
1	Köpeny magasság Length of shell	[mm]	~1500	~1300
2	Átmérő (szélesség) Diameter (width)	[mm]	OD 273	OD 273
3	Teljes magasság Total Height	[mm]	~2235	~2035
4	Üres tömeg Empty weight	[kg]	~135	~115
5	Üzemi súly Operating weight	[kg]	~140	~120
6	Vizes nyomáspróba súly Hydro test weight	[kg]	~220	~190

GYÉMÁNT-PIRAZOL KFT.

Üzemeltetési utasítás
Operating instructions

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III.	Általános megjegyzések General remarks
1	*Az Üzemeltető a felelős azért, hogy a szerelést, üzemeltetést és karbantartást végző személyzet ismerje ezeket az utasításokat.* *The Operator is responsible that these instructions are known to the erection, operating and maintaince personnel.*
2	*A gyártó azokért a károkért nem vállal felelősséget, amelyek ezen utasítások be nem tartásából származnak.* The Manufacturer disavows any responsibility for damages resulting from inobservance of these instructions.
3	*Az utasítások a gyártó gyakorlati és elméleti tapasztalataiból származnak. Azonban nem mentesítik az üzemeltetőt az üzemeltetésre, a nyomástartó készülék biztonságára és a személyzet oktatására vonatkozó felelőssége alól.* The instructions derive from practical and theoretical experience of the manufacturer. They, however, do not relieve the operator of his responsibility for the operation, for the safety of the pressure apparatus and for personnel schooling.
4	*Az üzemeltetőnek kell biztosítania megfelelő és alkalmas biztonsági intézkedésekkel, hogy a megengedett üzemi feltételeket és/vagy terhelési ciklusokat ne lépjék túl.* The Operator is to ensure through suitable and functionable safety measures that the allowable operation conditions and/or load cycles are not exceeded.
5	*A meghatározott üzemi feltételektől, a gyártó jóváhagyása nélküli bármilyen eltérés vagy a jelen utasítások figyelembe nem vétele érvényteleníti a gyártó felelősségét.* Any deviation from the specified operation conditions without the manufacturer's approval or nonobservance of these instructions nullifies the manufacturer's responcibility.
IV.	Szállítási és beszerelési megjegyzések Remarks on shipment and installation
1	*A szállítást, tárolást és beszerelést úgy kell végezni, hogy sem a nyomástartó részek, sem a tartozékok ne sérüljenek, sem pedig a belső és külső felületek állagmegóvása ne károsodjon.* The transport, storage and installation shall be done so that neither the pressure parts and attachments are damaged nor that the inner or outer surfaces respective preservation impaired.
2	*Szállításnál és beszerelésnél a készülék emelését a szállítási utasítás szerint kell végezni. A beszerelést szakképzett személyzetnek kell végezni, megfelelő emelőgépekkel és -kötelekkel, eszközökkel, stb.* The lifting of apparatus for transport or installation shall be made according to the transport-instructions. Installation shall be done with suitable lifting machines and lines, tools etc and by trained personnel.
3	*Az alaphoz vagy konstrukcióhoz történő helyes rögzítést ellenőrizni kell .* The correct anchoring to the foundation or construction is to be checked.
4	*A csővezetékeket csak a hozzájuk meghatározott csonkokra lehet csatlakoztatni.* Piping is to be attached only to their designated nozzles.
5	*A karimák újra lezárása előtt a használt tömítéseket le kell cserélni. A tömítőfelületeket le kell tisztítani, és ellenőrizni kell, hogy van-e rajtuk sérülés, szükség esetén újra kell őket forgácsolni. Szerelés után tömörségvizsgálatot kell végezni.* Used gaskets are to be replaced before re-closing flanges. Gasket surfaces are to be cleaned and checked for damage and re-machined if necessary. New leek test shall be performed.
6	*A készülék belsejének állapotát ellenőrizni kell közvetlenül lezárás előtt.* The condition inside the apparatus is to be checked just before closing.
7	*A készülék nyomástartó részein tilos a hegesztés vagy a hőkezelés.* No welding or heat treating is allowed on the pressurized parts of the apparatus.
8	*Csak a pótalkatrészlistán és/vagy a darabjegyzékben meghatározott anyagokat lehet beépíteni vagy beszerelni a készülékbe.* Only material as specified in the spare parts list and / or parts lists may be installed or mounted in the apparatus.
9	*A sikeres felállítást, beszerelést, rögzítést, csőcsatlakoztatást, a készülék belsejének vizsgálatát és a készülék lezárását jegyzőkönyvezni kell, és felhatalmazott személyeknek kell az átvételt végezniük.* The satisfactory erection, alignment, attachment, piping attachment, inspection of the equipment interior and closing of the equipment are to be recorded and accepted by authorized persons.
10	*A pótalkatrészeket, különösen a tömítéseket, zárt helységben, gondosan, vízszintes pozícióban kell tárolni.* *Spare parts, particularly gaskets, are to be stored carefully in the horizontally position in a closed room.*

GYÉMÁNT-PIRAZOL KFT.

Üzemeltetési utasítás
Operating instructions

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V.	Üzemeltetési megjegyzések Remarks to operation
1	*Ügyelni kell az üzemeltetési paraméterekben történő hirtelen ingadozások elkerülésére.* *A következő értékeket nem szabad túllépni: Nyomás: 1 bar/min.* Care is to be taken to avoid surges in the operation parameters. The following values are not to be exceeded: Pressure: 1 bar/min.
2	*Ha üzemelés közben abnormális körülmények jelentkeznek, pl. nyomásnövekedés, akkor az üzemeltetőnek meg kell állapítani az okot, és ki kell javítania, szükség esetén pedig le kell állítania a készüléket.* Should abnormal conditions appear in operation, e.g. pressure increases, the operator is to determine the cause and correct or, if necessary, shut down the apparatus.
3	*A tervezett leállítások során is kerülni kell az üzemeltetési paraméterekben történő hirtelen ingadozásokat.* Also during planned shut downs, surges in the operation parameters are to be avoided.
4	*Tartós üzemszünet esetén javasolt a készülék nitrogénnel történő védelme. A tömítő felületeket állagmegóvó szerrel kell bevonni és óvni a mechanikai sérülésektől.* By extended shut downs, it is recommended to protect the apparatus with nitrogen. Gasket surfaces are to be coated with a preservation agent and protected from mechanical damage.
5	*Mielőtt újra üzembe helyeznék, a készüléken ellenőrizni kell a szivárgásokat, nyomáspróbával vagy tömörségvizsgálattal.* The apparatus is to be checked for leaks, e.g. hydrotest or leaktest, before placing in operation again.
VI.	Karbantartás Maintenance
1	*Amenyiben a készülék hosszabb ideig üzemen kívül van, pl. 6 hónapig, akkor a puha (soft) anyagból készült tömítéseket le kell cserélni.* If the apparatus has been out of operation for extended periods, e.g. 6 months, as can occur by delayed start-ups or longer shut down - renewed start-up interruptions, soft material gaskets should be replaced.
2	*A készülékben vagy a készüléken használandó tisztító anyagoknak a környezetet vagy a készüléket károsító vagy a személyzetre veszélyes anyogoktól mentesnek kell lenniük. Szükség esetén védőruhát és -felszerelést kell viselni.* Cleaning materials for use in or on the apparatus are to be free of substances damaging to the environment or the apparatus or injurious to personnel. If necessary, protective clothing and gear are to be worn.
3	*A készülék belsejét meg kell vizsgálni, hogy vannak-e rajta mechanikai, korróziós, vagy egyéb sérülések.* The interior of the apparatus is to be inspected for mechanical and corrosion damage etc.
4	*Lezárás előtt ellenőrizni kell a tömítő felületeket és a csavarkötéseket. Új tömítéseket kell használni.* Gasket surfaces and bolting are to be checked before closing. New gaskets are to be used.
5	*Próba utáni leürítés során biztosítani kell a rendszer vagy a készülék megfelelő mértékű légzését.* A sufficient venting of the system or apparatus is to be provided during draining after hydrotest.
6	*Keverős tartályok, készülékek esetében a hajtómű és a hozzá tartozó részek legalább negyedévente való karbantartása és ellenőrzése szükséges.* *A karbantartást és ellenőrzést a gyártó által készített kezelési, karbantartási utasításban megfogalmazottaknak megfelelően kell elvégezni, ellenkező esetben a készülék meghibásodásával, garanciavesztéssel járhat.* That vessels which have agitators, the mixer and its parts (gearbox, shafts, etc.) need to mantenance and inspection at least quarterly every year. Maintenance and inspection must be carried out in accordance with the instructions for use and maintenance prepared by the manufacturer, otherwise the device may malfunction and void the warranty.
7	*A karbantartási intézkedéseket jegyzőkönyvezni kell.* Maintaince measures are to be recorded.
VII.	Rendszeres vizsgálatok Regularity inspections
1	*Az illetékes hatóság határozza meg a rendszeres vizsgálatok közti időszakokat a veszélyanalízis és az alkalmazandó törvények alapján.* The responsible authority determines the intervals between regulatory inspections based on the hazard analysis and applicable laws.
2	*A gyártó 5 évente belső vizsgálatokat javasol, és 10 évente pedig nyomáspróbát.* Manufacturer recommends internal inspections every 5 years and every 10 years for pressure tests.

MultiCert Europe

CERTIFICATE

Hereby we certify that

GYÉMÁNT-PIRAZOL KFT.

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Locations: 4031 Debrecen, Nívó u. 10; 4032 Debrecen, Pallagi út 13; 4026 Debrecen, Péterfia utca 13-19. 5. em. 505; 2220 Vecsés, Dózsa György u. 86; 3100 Salgótarján, Fülemüle u. 9.

within the scope

design, manufacturing, installation, maintenance and repair activities of pressure equipment, storage tanks, facilities for storing dangerous liquids and molten material, equipment intended for use in potentially explosive environments (EX operating area), unique machines, metal structures, industrial technological systems and pipelines

has implemented and applied a quality management system, which meets the requirements of the standard

MSZ EN ISO 9001:2015

The certificate is valid until 23. 02. 2025.

The certificate remains valid subject to annual audit reports.

Certificate registration No.: 1 2004 22

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

NAH-4-0143/2020 MANAGEMENT SYSTEM CERTIFICATION BODY

Budapest, 30. 09. 2022

In the name of the certification body

CERTIFICATE

The Certification Body TÜV Thüringen Hungary Kft.
certifies that the company

GYÉMÁNT-PIRAZOL Kft.

H-4031 Debrecen,
Nívó u. 11.

Manufacturing plants: H-4031 Debrecen, Nívó u. 10-11.
H-2220 Vecsés, Dózsa György u. 86.
H-3100 Salgótarján, Fülemüle u. 9.

fulfils the requirements according to

MSZ EN ISO 3834-2:2021

Comprehensive quality requirements
in the specified scope of the report.

report no: **TTHU-3834-23-111J**

certificate no: **TTHU-3834-23-111T**

certificate expires: **2026-06-05.**

TÜV Thüringen Hungary Kft.

Budapest, 2023-06-08.

TÜV THÜRINGEN HUNGARY

(K.Wiegand.)
TÜV Thüringen Hungary Kft.

CERTIFICATE

The Certification Body TÜV Thüringen Hungary Kft.
certifies that the company

GYÉMÁNT-PIRAZOL Kft.

H-4031 Debrecen,
Nívó u. 11.

Manufacturing plants: H-4031 Debrecen, Nívó u. 10-11.
H-2220 Vecsés, Dózsa György u. 86.
H-3100 Salgótarján, Fülemüle u. 9.

fulfils the requirements of MSZ EN ISO 3834-2:2021 as well as the requirements for production of pressure equipment according to

Directive 2014/68/EU and to AD 2000 HP0

in the specified scope of the report.

report no: **TTHU-3834-23-111J**

certificate no: **TTHU-3834P-23-111T**

certificate expires: **2026-06-05.**

Budapest, 2023-06-08.

TÜV Thüringen Hungary Kft.

(Wiegand K.)
TÜV Thüringen Hungary Kft.

TÜV THÜRINGEN HUNGARY

01 PRESSURE VESSEL DOCUMENTATION

01.2 - Extra PT of Vessel

EN ISO 9712 / NORDTEST

NDT LEVEL 2 CERTIFICATE

Number: *10090-L2-P* Test method: *Penetrant testing* Sector(s): *IPI*

Expiry date: *2026-06-28* Date of initial examination: *2021-06-28*



This is to certify that

Nader Gerges

Employer's address: Råsundavägen 12, 170 07 Solna, SWEDEN

Date of birth: *1977-06-15*

(Signature holder of certificate)

[X] Fulfils all requirements of examination and certification according to EN ISO 9712:2012 and NORDTEST Doc Gen 010, edition 6.4, 2019:07 regarding training, experience, physical fitness and has successfully completed an

[X] Examination within: Industrial sector IPI - Pre- and inservice testing of equipment, plant and structure, (IPI: comprising sectors c, f, t, w, wp and IMA.)

[ ] Limitations:

Initial certification body: NDT Training Center AB

NDT Training Center AB

NDT TRAINING CENTER AB · nordtest · CERTIFICATION BODY SWEDEN

SWEDAC ACKREDITERING
Accred. no. 1356
Certification of Persons
ISO/IEC 17024

2021-09-01 (Date)

Signature independent certifying body (ICB)
Lennart Forsman, NDT Training Center AB

Issued by recognized third-party organization
NDT Training Center AB
Date 2021-09-01 Sign.
as required by AFS 2016:1/Directive 2014/68/EU

This certificate is valid from the date of certifier signature above and only with the operating authorization, which is based on visual acuity and proof of satisfying work with the actual NDT method, without significant interruption exceeding the requirements in EN ISO 9712:2012. The documentation file of the certificate holder shall also include complaints within the scope of the certification of competence. The operating authorization shall be renewed annually.

The operating authorization by employer, *Kiwa Inspecta AB* NTO No: *S-001*

2021-09-03	2022-07-29	2023-08-10
Jonas Hagström	*Jonas Hagström*	*Jonas Hagström*
Signature employer, first time issue	Signature employer, renewed 1st year	Signature employer, renewed 2nd year
(Date)	(Date)	(Date)
Signature employer, renewed 3rd year	Signature employer, renewed 4th year	Signature employer, renewed 5th year

info at: www.ndttraining.se

NDT Training Center AB CertOnline, file created 2024-06-25.

Accred. No. 1181
Testing
ISO/IEC 17025

EXAMINATION REPORT
LIQUID PENETRANT

Replaces certificateTQ089764-001/BD6EAE10

Customer

Aquagas Sweden AB
Box 1036
61923 TROSA

Our comm No
1027821-100

TQ089764-001/068CFDB7

Customer reference
Kasim Aytekin

Order No
IK-23/24 140-24

Test object

Manufacturer: Aquagas Sweden AB.		Test site: Aquagas Sweden AB.Södertälje.	
Object: PT testing av Cistern.		Registration No: --	Thickness: --
Base material: --	Filler metal: --	Drawing No: --	Heat treated: ☐ Yes ☒ No ☐ See notes
Welding process: --	Joint: --	Item No: --	Notes: --

Extent of examination

☒ 100%	☐ Non-conformity to procedure	Comments: PT after removal of welded support against both Cis. Proijectnr:AQUAGAS : A-23/24 140. Serienr:GYP-2430131/GYP-2430133.
☐ %		
☐ Spot check		
☐ According to		

Test data

Test according to	Standard: EN ISO 3452-1:2021	Acceptance	Standard, level: EN ISO 23277.2015 Level 2X		
	Procedure, rev: NDT-PT-01 Rev 8		Procedure, rev: NDT-PT-01 Rev 8		
Surface condition: ground	Lighting, Light meter ID No: Daylight,LUXP8	Method: ☒ Colour contrast penetrant ☐ Fluorescent penetrant			
Pre examination	Cleaning: N/A	Cleaner: C10.	Charge nr: 230402	Penetrant: RP20	Charge nr: 221107
	Drying method: Air.	Remover: C10+Rag	Charge nr: 230402	Developer: D30Plus.	Charge nr: 230509
	Drying time: 10 min	Penetrant used are removed with: ☐ Water ☒ Solvent ☐ Water + solvent			
Application of penetrant	Application method: Aerosol	Removing	Drying method: Luft.		
	Penetration time: 20 min		Drying time: 10		
	Temperature, °C: 20	Developing	Time: 0-30	Application method: Aerosol	Temperature, °C: 20

Examination result

According to requirements ☒ Yes ☐ No ☐ See remarks

Remarks

☒ No additional testing has been done. ☐ This testing has been complemented with:

Kiwa Sweden AB – Box 7178 170 07 Solna Sweden Phone: (+46) 10 479 3000 www.kiwa.se

Reviewed by (if applicable)	Responsible person: Nader Gerges	Date: 2024-06-24	
		Certified according to: EN ISO 9712	Level: II

This report refers to what is stated under the heading "Test object" and may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

EXAMINATION REPORT
LIQUID PENETRANT
Encl, No TQ089764-001/068CFDB7

Test object

Manufacturer		Test site	
Aquagas Sweden AB.		Aquagas Sweden AB.Södertälje.	
Object			Thickness
PT testing av Cistern.			--
Base material	Filler material	Drawing No	Heat treated
--	--	--	☐ Yes ☒ No ☐ See note
Welding process	Joint	Item No	Registration No
--	--	--	--

Supplementary data







01- PRESSURE VESSEL DOCUMENTATION

01.3 Heater pipe

GYÉMÁNT-PIRAZOL KFT.

Műszaki átadási dokumentáció

Technical documentation

Megnevezés / *Product name:*

HP-100/40 vessel

Gyári szám / Serial No.:

GYP-2430134

Megrendelő / *Customer:*

AQUAGAS SWEDEN AB.

Megrendelés száma / *Order No.:*

IK-23/24 140-14

GYÉMÁNT-PIRAZOL KFT.

Tartalomjegyzék
Contents

Megnevezés: *Product name*	**HP-100/40 vessel**
Gyári szám: *Serial No.*	**GYP-2430134**

Sorszám *No.*	Fejezet / Dokumentum azonosító *Chapter / Document ID.*		Oldalak száma *Number of pages*
01	**EU Megfelelőségi nyilatkozat** *EU Declaration of Conformity*	**EU- 013-ST-2024-2**	1
02	**Megfelelőségi tanúsítvány (NoBo)** *Certificate of Conformity*	**HU05/62996/24**	1
03	**Átvételi jegyzőkönyv, megvalósulási rajz (NoBo)** *Acceptance protocol, as built drawing*	**HU05/62996/24**	4
04	**Tervellenőrzési jegyzőkönyv (NoBo)** *Design review report*	**HU04/62979/24**	3
05	**Jóváhagyott tervdokumentáció (NoBo)** *Approved plans*		4
06	**Beépített anyagok jegyzéke** *List of built-in materials*		1
07	**Alapanyag bizonylatok** *Material certificates*		4
08	**Hegesztési és varratvizsgálati** *Welding and examination plan*		1
09	**WPS lapok** *WPS sheets*		3
10	**Hegesztő minősítések** *Welder certificates*		1
11	**Hegesztőanyag bizonylatok** *Filler metal certificates*		3
12	**Roncsolásmentes vizsgálati jegyzőkönyvek** *NDT test reports*	**VT- 013-ST-2024-2** **PT- 013-ST-2024-2** **RT- 013-ST-2024-2**	1 1 1
13	**Méretellenőrzési jegyzőkönyv** *Dimension check report*		1
14	**Nyomáspróba, Tömörségi próba jegyzőkönyv** *Pressure test, Tightness test record*	**NY- 013-ST-2024-2**	3
15	**Veszélyelemzés** *Hazard analysis*		5
16	**Üzemeltetési utasítás** *Operating instructions*		4
17	**Gyártói tanúsítványok** *Manufacturer certificates*		3

GYÉMÁNT-PIRAZOL KFT.	**EU-MEGFELELŐSÉGI NYILATKOZAT** **2014/68/EU direktíva szerint** *Declaration of Conformity* *according to EU Directive 2014/68/EU*	**Sorszám** / *N* o.: EU- 013-ST-2024-2

Gyártó: *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**

nyilatkozik, hogy az alábbi nyomástartó berendezés

herewith declares that the following pressure equipment

Megnevezés: *Product name*	**HP-100/40 vessel**
Gyári szám: *Serial No.*	**GYP-2430134**
Gyártási Év *Year of manufacturing*	**2024**

Tér: *Space*	**Shell side**	-	-
Min / max megengedett nyomás [bar]: *Min / max allowable pressure*	**-1/+39**	-	-
Min / max megengedett hőmérséklet [°C] *Min / max allowable temperature*	**-20 / +270**	-	-
Térfogat [l] *Volume*	**10**	-	-
Próbanyomás [bar]: *Test pressure*	**69,7**	-	-
Alkalmazott közeg: *Used fluid*	**water**	-	-

megfelel a 2014/68/EU irányelv követelményeinek

compliant the Pressure Equipment Directive 2014/68/EU

PED kategória / modul *PED kategorie / modul*	III/G	**Megfelelőségi értékelési eljárás:** *Applied standards and technical specifications*	MSZ EN 13445

Engedélyezést, ellenőrzést végző szervezet: *Notified body*	**0090 - TÜV Thüringen e.V.** **Konrad-Zuse-Straße 21 D-99099 Erfurt**
Tervellenőrzési jegyzőkönyv: *Design review report*	**HU04/62979/24**
Átvételi jegyzőkönyv: *Acceptance protocol*	**HU05/62996/24**
Megfelelőségi tanúsítvány: *Certificate of Conformity*	**HU05/62996/24**

Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9. 2024.04.09	GYÉMÁNT-PIRAZOL KFT. 4031 Debrecen, Nívó u. 11. Adószám: 32071814-2-09 Cégjegyzékszám: 09-09-034339 1. Lantos Zsolt
Hely, dátum / *Place, date*	**Név, aláírás, pecsét** / *Name, signature, stamp*

CERTIFICATE

CONFORMITY BASED ON UNIT VERIFICATION (Module G) according to Directive 2014/68/EU

Certificate No.: HU05/62996/24

Name and address of manufacturer:

GYÉMÁNT-PIRAZOL Kft.
H-4031 Debrecen
Nívó utca 11.

This is to certify, that the results of examination for the pressure equipment listed below meet the requirements of the Pressure Equipment Directive 2014/68/EU. The pressure equipment complies to the submitted documents and is marked with the following stamp:

CE 0090

Examination Report – Design	HU04/62979/24
Examination Report – Manufacture	HU05/62996/24
Description of pressure equipment	HP-100/40 Vessel
Category	III
Drawing No.	DG-GYP-243013-02-00 Rev.0
Manufacturers Serial No.	GYP-2430134
Order No.	TTHU-ÁTV-24-4020
Remarks	Design Code applied: EN 13445:2021

Budapest, 08.04.2024

TÜV THÜRINGEN

K. Wiegand
Certification Body
for Pressure Equipment
TÜV Thüringen e.V.
Notified Body 0090

TÜV Thüringen e.V. Notified Body ÜTV 15 0090

TÜV Thüringen e.V., Konrad-Zuse-Straße 21, D-99099 Erfurt
Tel: +49-361-4283-0, Fax: +49-361-4283-242, E-Mail: ped@tuev-thueringen.de

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

1	General information for Certification Body / Testing Laboratory		Insp. No.	HU05/62996/24
1.1	Applicant	GYÉMÁNT-PIRAZOL Kft.		
1.2	Manufacturer, address	GYÉMÁNT-PIRAZOL Kft., H-4031 Debrecen, Nívó u. 11.		
1.3	Order No. / Serial No.	TTHU-ÁTV-24-4020/GYP-2430134		
1.4	Equipment designation	HP-100/40 Vessel		
1.5	Drawing No.	DG-GYP-243013-02-00	Revision	0
2	**Inspection according to**	**2014/68/EU, EN 13445:2021**	Module	G
2.1	Type of pressure equipment	pressure vessel		
2.2	Remarks	---		

3	Operational limits	Chamber 1	Chamber 2	Chamber 3	Chamber 4
3.1	Designation of chamber	workchamber			---
3.2	PS [bar]	+39,0/-1,0			---
3.3	TS [°C]	+270/-20			---
3.4	PT [bar]	69,7			---
3.5	Test fluid	water	---	---	---
3.6	Corrosion allowance [mm]	1,0			---
3.7	Number of allowable load cycles	20 000*			---
3.8	Allowable load cycle range [bar]	0/+38,0			---
3.9	Volume [L] / DN	10,0			---
3.10	Fluid group	1	---	---	---
3.11	Category acc. to Annex II	III	---	---	---

4	Additional loads	---
4.1	Vessel position first pressure test	**vertical**
4.2	Seismic	
4.3	Wind	
4.4	Nozzles	
4.5	Others	

5	Technical documents examined	
5.1	Notified Body	TÜV Thüringen e.V.
5.2	Approved drawing, parts list, other documents	DG/PL-GYP-243013-02-00 Rev.0
5.3	Design examination report by Notified Body	HU04/62979/24
5.4	Formal subcontracting	---

Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

5.5	Module B[B1]: Certificate by Notified Body	---
5.6	The documents are suitable for the evaluation of the pressure equipment.	
6	**Intermediate inspections [Annex I para. 3]**	
6.1	Preparation of materials for joining [Annex I, 3.1.1.]	not applicable
6.2	Internal visual inspection	acceptable, see section 11
7	**Final examination [Annex I para. 3]**	
7.1	Visual inspection and dimensional check	considered, acceptable
7.2	Material test reports and traceability	considered, acceptable
7.3	Approvals for procedures (permanent joining, forming)	considered, acceptable
7.4	Approvals for personnel (permanent joining)	considered, acceptable
7.5	Approvals for NDE-personnel	considered, acceptable
7.6	NDE-personnel - Approval according to PED, Annex I, 3.1.3	considered, acceptable
7.7	Heat treatment	not applicable
7.8	Marking [Annex I, 3.3]	considered, acceptable
8	**Calibration of measuring tools & test resources**	
8.1	Manometer / pressure probe [33866; 33867]	considered, acceptable
8.2	Heat treatment devices [---]	not applicable
8.3	Others [---]	not applicable
9	**Pressure test [Annex I para. 3]**	
9.1	Test pressure, test fluid	considered, acceptable
10	**Examination of fundamental documentary requirements**	
10.1	Declaration of conformity of manufacturer	considered, acceptable
10.2	Reference of declaration to pressure equipment	considered, acceptable
10.3	Operating instructions of manufacturer	considered, acceptable
10.4	Examination of instruction regarding technical parameters	considered, acceptable

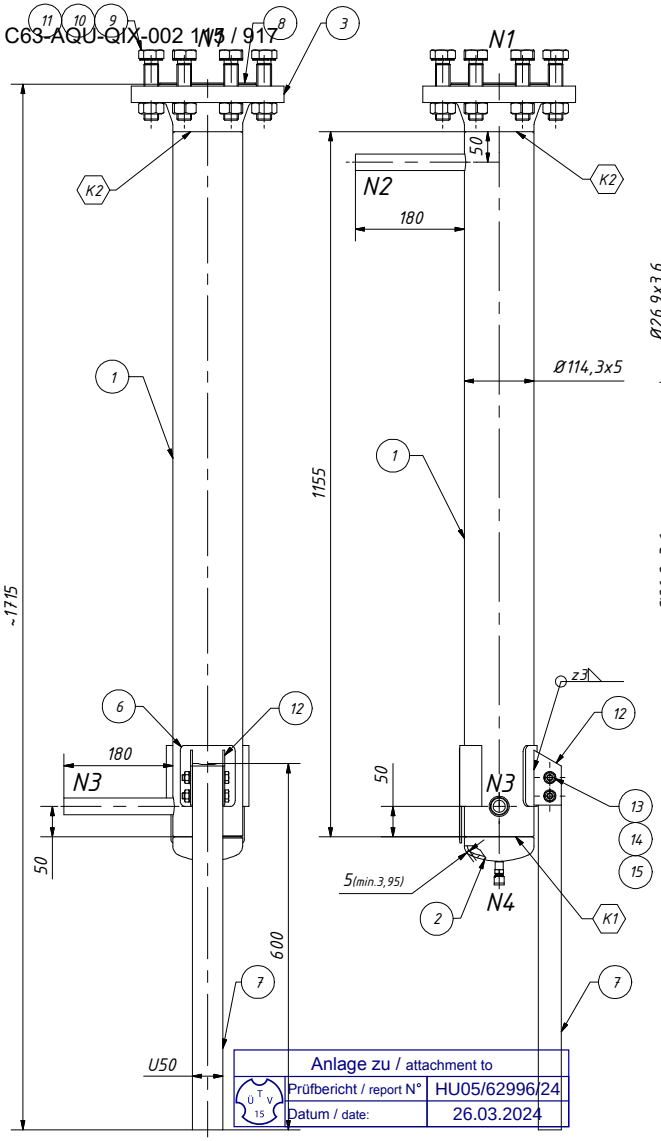
11	**Remarks**
	(1) to 1.3: Serial number has been specified on the as-built drawing according to the realized state. (2) to 3.7: Simplified fatique analysis acc. to EN 13445-3 point 17 (3) to 6.2: Internal visual inspection: only nozzle N1 circumferential welding seam on 26.03.2024 at final examination. (4) to 9.1: executed on 26.03.2024 at final examination, result acceptable. (5) Name plate rivet and nozzle N1 flange stamped with: 
12	**Result of inspection**
	The inspection of pressure equipment is finished.

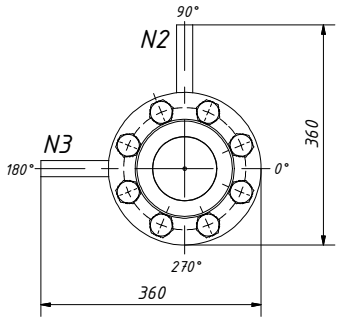
Report
on first inspection of pressure equipment
according to Directive 2014/68/EU Modules B / F / G

TÜV THÜRINGEN

Testing Laboratory for Pressure Equipment Notified Body 0090 TÜV Thüringen e.V. Konrad-Zuse-Straße 21 D-99099 Erfurt ped@tuev-thueringen.de	Date	26.03.2024	Place	Salgótarján	Stamp
	Fülöp Kerekes Name / Signature				

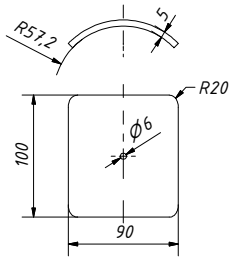
	Annex
13	Drawing with approval Listing of material test certificates, traceability checked at premesis of manufacturer on NDE test reports, procedure-/control tests operating instructions, declaration of conformity





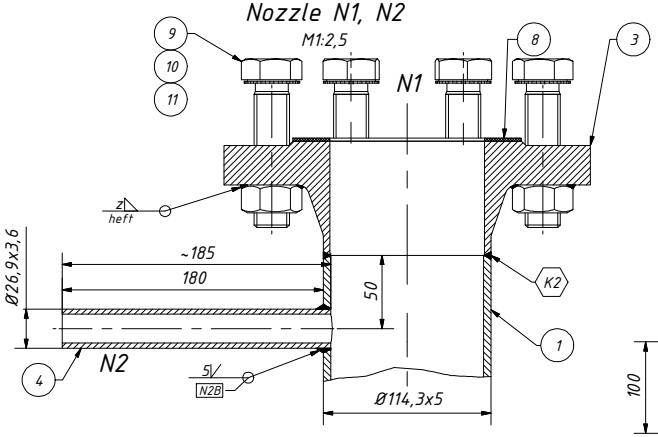
Pos.6

M1:3



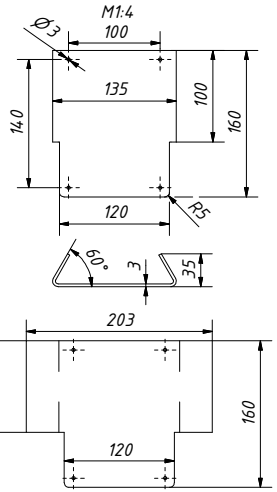
N1, N2 csonk
Nozzle N1, N2

M1:2,5



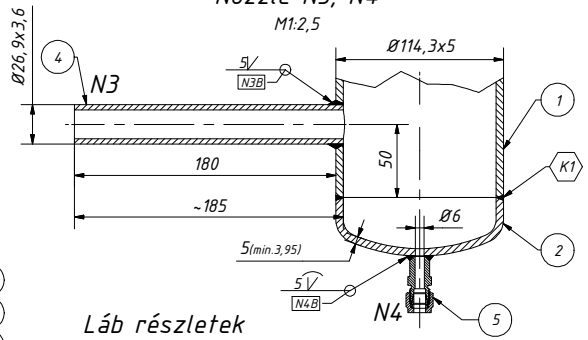
Pos.16

M1:4



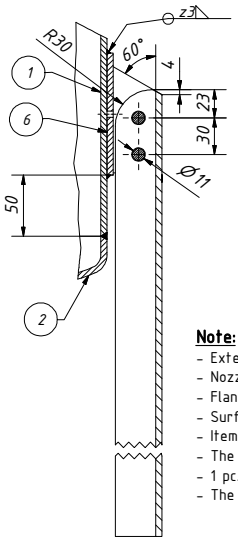
N3, N4 csonk
Nozzle N3, N4

M1:2,5



Láb részletek
Details of Leg

M1:3



Gyári számok / Serial No.:
HP-100/40: GYP-2430134

MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- Az 5-ös tételt a megrendelő (AQUAGAS) biztosítja.
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 1 db
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-02

Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Item 5 supplied by AQUAGAS
- The vessel is manufactured without thermal insulation.
- 1 pc. to be made
- The parts list number associated with the plan: PL-GYP-243013-02

Anlage zu / attachment to
Prüfbericht / report N° HU05/62996/24
Datum / date: 26.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu
CE 0090

Tervezési kód: Design code:		Gyártási szám: Serial Nr.	*
MSZ EN 13445: 2021		Gyártási év: Year of built	2024
Megnevezés: Designation:	HP-100/40		
Űrtartalom (bruttó): Volume:	[Liter]	Munkatér / Shellside	10
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg]		-1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C]		-20 / +270
PED kategória/modul: PED category/module:			III./G
Próbanyomás: Test pressure:	[barg]		+69,7
Próbanyomás dátuma: Date of test pressure:			2024.__.__.
Tömeg üresen: Empty weight:	[kg]		~35

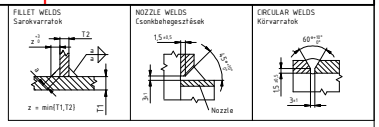
AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

MŰSZAKI ADATOK
(TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 [Druckgerät PED Art.1] [Pressure equipment PED Art. 1]		HP-100/40
	Terek neve (Name der Räume) [Name of spaces]		Munkatér / Shellside
	Közeg (Medium) [Fluid]		Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Füllgutes) [Allowed density]	[kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nenninhalt / geom. Inhalt) [Nominal volume / Geometrical volume]	[liter]	~10
	Közeg csoport PED 13. cikk. (Flüssigkeitsk. -PED, Art. 13) [Fluidgroups acc. to Art. 13]		1
	Hőátadó felület (Wärmeaustauscher areal) [Heat exchanger area]	[m²]	-
	Közeg állapot PED, 13 cikk. (Medumzustand-PED, Art. 13) [Condition of fluid acc. To PED, Art. 13]		Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]		-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) [Category-PED, Art. 14]		III. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) [Module-PED, Art. 14]		G modul
	Min./max üzemi hőmérséklet (min./max. zul. Betriebstemperatur) [min./max. operating Temperature]	[°C]	-20 / +270
	Próbanyomás (PT) (Prüfüberdruck (PT)) [Test pressure (PT)]	[barg]	+69,7
	Vizsgálati hőmérséklet (Prüftemperatur) [Test temperature]	[°C]	+10 / +25
	Vizsgáló közeg (Prüfmedium) [Test fluid]		Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (PS) (Berechnungsüberdruck (PS)) [Design over pressure] (PS)	[barg]	-1 / +39
	Tervezési hőmérséklet (TS) (Berechnungstemperatur (TS)) [Design temperature (TS)]	[°C]	-20 / +270
	Terhelés AD-W10 (Beanspruchungsfall AD-W10) [Load case AD-W10]		-
	Korróziós pótlék (Abnutzungszuschlag) [Corrosion allowance]	[mm]	1
	Ciklus szám (Lastspielzahl) [Load cycles]		20000
	Nyomásváltozás (Druckschwankungsbreite) [Pressure difference]		0-38 bar / -20°C - +50°C
	Biztonsági tényező, Üzemi (Sicherheitsbeiwert, Betrieb) [Safety factor, Operation]		1,5
	Üres tömeg (Gewicht leer) [Weight empty]	[kg]	~35
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) [Weight with water filling]	[kg]	~45
	Tömeg üzem közben (Gewicht während des Betriebs) [Operating weight]	[kg]	~36
	Tervezési előírás (Auslegung, Herstellung, Prüfung) [Design code]		MSZ EN 13445-3:2021
	Tervellenőrzés (Entwurfsprüfung) [Design-examination]		MSZ EN 13445-3:2021
	Végátvétel, nyomáspróba (Schluß- und Druckprüfung) [Final inspection and pressure test]		MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]		GYP-2430134
	Gyártási év (Herstellungsjahr) [Year of manufacture]		2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT
Non-destructive test

VIZSGÁLATI ELJÁRÁS Testing procedure		VIZSGÁLT TERJEDELEM Test quantity					
		Csomópont (welding junction)	Hosszvarrat (Longitudinal seam)	Körvarrat (Circular seam)	Csonk / Karima (Nozzle / Flange) Körvarrat (Circular seam)	Behegesztés (Set-in)	Sarokvarrat (Fillet weld)
Hegesztési tényező Joint efficiency	0,85						
Szemrevételezési vizsgálat Visual test	VT	100%					
Folyadékbehatolásos / Mágnesporos vizsgálat Dye Penetrat / Magnetic partical test	PT / MT	-	-	100%	-	100%	-
Radiográfiai / Ultrahangos vizsgálat Radiography / Ultrasonic test	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok Other test	-	-					



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Fűtőegység csatlakozó / Heating unit connection	DN100	PN63	EN 1092-1 Typ.11/B
N2	Hidrogén kilépő / Hydrogen outlet	DN20	-	EN 10217-2
N3	Hidrogén belépő / Hydrogen inlet	DN20	-	EN 10217-2
N4	Technológiai csonk	CWC-8M-4P-S316	-	Hy-Lok csatl.

Rev.	Dátum:	Módosítás oka:	Módosította:

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeiter Prepared By	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprüft Checked by	2024. 01. 31.				

Megnevezés Benennung Title

Aquagas Sweden AB.
HP-100/40
Összeállítási rajz

Munkaszám Arbeit Nr. Work No.	013-ST-2024
Méretarány Maßstab Scale	M 1:6
Anyagminőség Werkstoff Material	P265GH,P245GH,P235GH
Plotdátum / Plotted on	2024. 01. 31.
Speicherdatum / Saved on	2024. 01. 31.
Rajzszám Zeichn.Nr. Drwg.No.	DG-GYP-243013-02-00
Módosítás Aenderung Revision	0
Lapok száma Blatt Sheet	1 von of 1
Rajzlap	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

Report
for the examination of a pressure equipment design according to Directive 2014/68/EU Modules B / G / H1

TÜV THÜRINGEN

1	General Information for Certification Body / Testing Laboratory		Insp. No.	HU04/62979/24
1.1	Applicant, address	Gyémánt-Pirazol Kft.		
1.2	Manufacturer, address	Gyémánt-Pirazol Kft.; 4031 Debrecen, Nívó u.11.		
1.3	Order no. / Com. no.	TTHU-TE-24-3019		
1.4	Equipment designation	HP-100/40 vessel		
1.5	Drawing no.	DG-GYP-243013-02-00	Revision	0

2	Design code	2014/68/EU, EN 13445:2021	Module	G
2.1	Type of equipment	pressure vessel		
2.2	Remarks	---		

3	Operational limits	Chamber 1	Chamber 2	Chamber 3	Chamber 4
3.1	Designation of pressure chamber	workchamber	---	---	---
3.2	PS [bar]	+39,0/-1,0	---	---	---
3.3	TS [°C]	+270/-20	---	---	---
3.4	PT [bar]	69,7	---	---	---
3.5	Test fluid	water	---	---	---
3.6	Corrosion allowance [mm]	1,0	---	---	---
3.7	Number of allowable load cycles	20 000*	---	---	---
3.8	Allowable load cycle range [bar]	0/+38,0	---	---	---
3.9	Volume [L] / DN	10,0	---	---	---
3.10	Fluid group	1	---	---	---
3.11	Category according to Annex II	III	---	---	---

4	Additional loads	---
4.1	Position first pressure test	vertical
4.2	Seismic	---
4.3	Wind	---
4.4	Nozzles	---
4.5	Others	---

5	Completeness and adequacy of technical documents	
5.1	Exclusive statement of manufacturer	considered, acceptable
5.2	Equipment description / functional description	considered, acceptable
5.3	Description of type range (for type approvals only)	not applicable
5.4	Drawing(s)	considered, acceptable

Report
for the examination of a pressure equipment design
according to Directive 2014/68/EU Modules B / G / H1

TÜV THÜRINGEN

5.5	Part list(s): Instructions to applied standards and design codes	considered, acceptable
5.6	Part list(s): Instructions to manufact.& delivery terms, measure tolerances	not applicable
5.7	Design calculation(s): traditional design by formula	considered, acceptable
5.8	Design calculation(s): design by analysis (FEA, FDA, BEA)	not applicable
5.9	Test results of experimental design	not applicable
5.10	Approvals for procedures for permanent joining	acceptable, see section 11
5.11	Approvals for personnel for permanent joining	acceptable, see section 11
5.12	Approvals for NDE-personnel	acceptable, see section 11
5.13	Risk analysis	considered, acceptable
5.14	Operating instructions	considered, acceptable
5.15	The submitted documents are --- for the design evaluation.	
6	**Examination of documents concerning materials [Annex I 4]**	
6.1	Materials according to harmonized standards	considered, acceptable
6.2	European approval of materials (EAM)	not applicable
6.3	Particular material appraisal (PMA)	not applicable
7	**Examination of documents concerning design [Annex I 2]**	
7.1	Strength - internal pressure / add. loads	considered, acceptable
7.2	Strength - external pressure / support	acceptable, see section 11
7.3	Strength - fatigue, cyclic loading(s)	acceptable, see section 11
7.4	Strength - time depending behaviour, creep	not applicable
7.5	Experimental design method (test programme)	not applicable
7.6	Inspection, vent and drain openings	considered, acceptable
7.7	Corrosion, chemical attack	Resistance acc. to user specification
7.8	Wear (also other measures)	not applicable
7.9	External fire	not applicable
7.10	Additional requirements for piping	not applicable
7.11	Additional requirements for equipment with risk of overheating	not applicable
7.12	Deep cold service with the risk of brittle fraction	acceptable, see section 11
8	**Examination of documents concerning manufacturing [Annex I 3]**	
8.1	Forming operations	not applicable
8.2	Heat treatment (caused by forming: normalization / sol. annealing)	not applicable
8.3	Permanent joining	considered, acceptable
8.4	Nondestructive examinations: scope and location	considered, acceptable

Report
for the examination of a pressure equipment design
according to Directive 2014/68/EU Modules B / G / H1

TÜV THÜRINGEN

8.5	Heat treatment (before / after welding)	not applicable
9	**Examination of documents concerning safety equipment [Annex I 3]**	
9.1	Examination of safety accessories	not applicable
10	**Examination of documents concerning final examination [Annex I 3]**	
10.1	Test pressure [Annex I, Para. 3.2.2, 7.4]	considered, acceptable
10.2	Marking [Annex I, Para. 3.3]	considered, acceptable

11 Remarks

(1) to 3.7; 7.3 : Simplified fatigue analysis acc. to EN13445-3 point 17.
(2) to 5.10 : During final inspection the relevant WPQR's will be checked by our expert.
(3) to 5.11 : During final inspection welders' certificates will be checked by our expert.
(4) to 5.12 : During final inspection the qualification of the NDT-personnel will be checked by our expert.
(5) to 6.1 : Materials for pressurized items shall be certified 3.1/EN10204+PED.
(6) to 7.2 : The vessel will be connected to steel structure, so that the stability is ensured.
(7) to 7.12: Minimum allowable temperature is -20 C° , so that the requirements acc.to EN13445-2 appendix B shall be taken into account.
(8) to 8.3 : Welding details shall be made acc. to EN1708-1.
(9) to 8.4 : All NDT have to be carried out according to the requirements of EN 13445 part 5.
(10) to 10.2: The pressure equipment must be marked in accordance with PED Annex I. point 3.3 and EN13445-5 point 11.
(11) Installed fittings and pressure accessories shall be designed for the intended use (pressure, temperature, fluid).

12 Result of examination

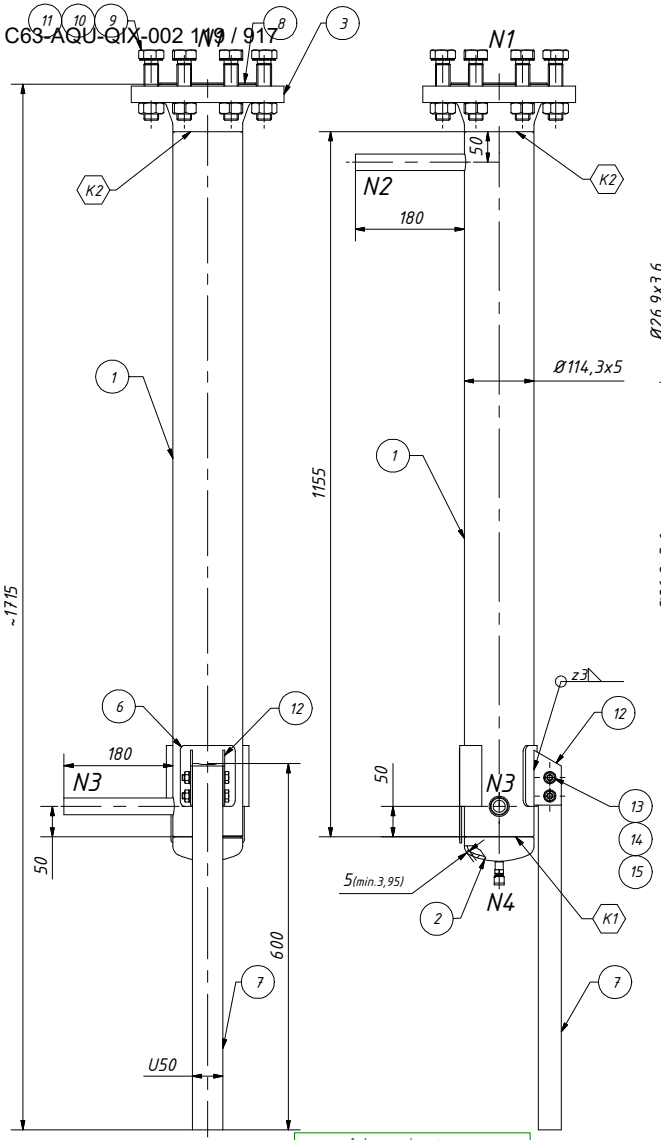
The design is considered as finally approved.

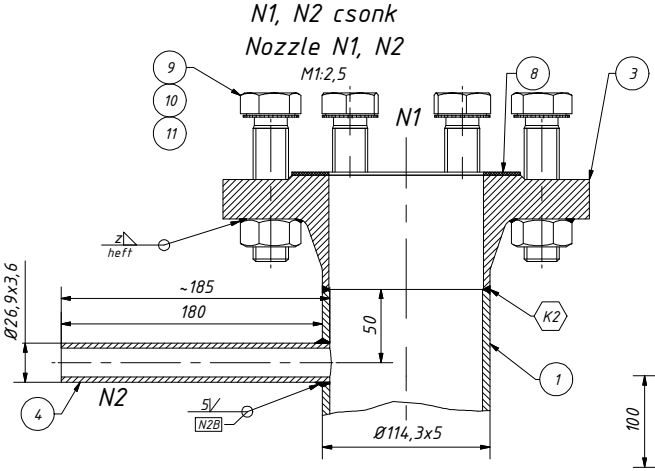
Testing Laboratory for Pressure Equipment Notified Body 0090 TÜV Thüringen e.V. Konrad-Zuse-Straße 21 D-99099 Erfurt ped@tuev-thueringen.de	Date	25-03-2024	Place	Budapest
	Ilona Gál Name / Signature			Stamp

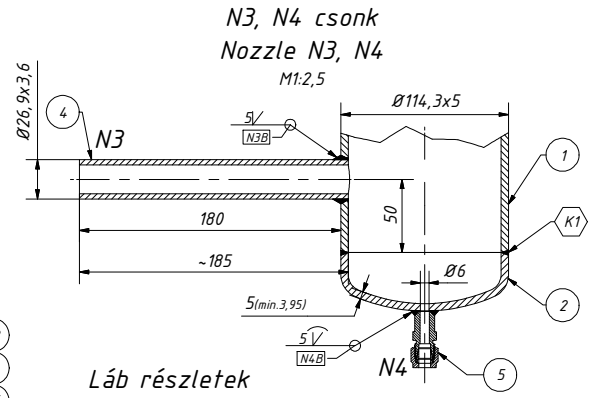
Validity note for modules G and H1: Two years, for Modules B Ten years (monitored) from the day of issue.

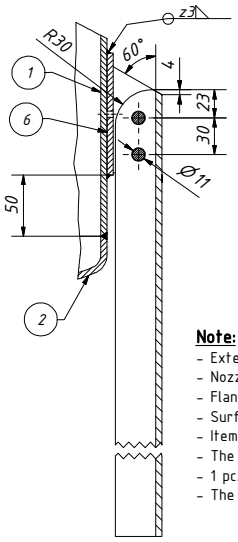
13 Annex

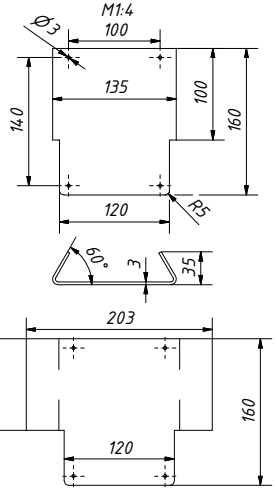
Drawing, parts list, other related documents / documents with test note
drawings:DG-GYP-243013-02-00 Rev.0;
part list: PL-GYP-243013-02 Rev.0

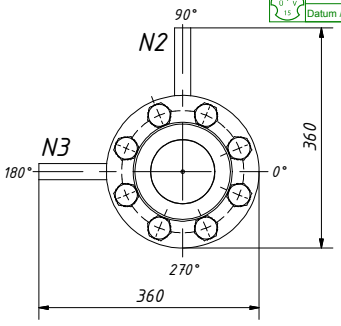


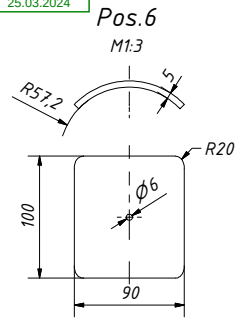












Anlage zu / attachment to

Prüfbericht / report N°	HU04/62979/24
Datum / date:	25.03.2024

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu

CE 0090

Tervezési kód: Design code:	
Gyártási szám: Serial Nr.	*
MSZ EN 13445: 2021	
Gyártási év: Year of built	2024
Megnevezés: Designation: HP-100/40	
	Munkatér / Shellside
Űrtartalom (bruttó): Volume:	[Liter] 10
Min./Max. megengedett nyomás: Min./Max. allowable pressure:	[barg] -1 / +39
Min./Max. megengedett hőmérséklet: Min./Max. allowable temperature:	[°C] -20 / +270
PED kategória/modul: PED category/module:	III./G
Próbanyomás: Test pressure:	[barg] +69,7
Próbanyomás dátuma: Date of test pressure:	2024. ___.
Tömeg üresen: Empty weight:	[kg] ~35

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

Gyári számok / Serial No.:
HP-100/40: GYP-2430134

MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- Az 5-ös tételt a megrendelő (AQUAGAS) biztosítja.
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 1 db
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-02

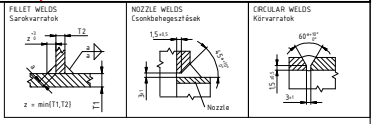
Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Item 5 supplied by AQUAGAS
- The vessel is manufactured without thermal insulation.
- 1 pc. to be made
- The parts list number associated with the plan: PL-GYP-243013-02

MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 1 [Druckgerät PED Art.1] [Pressure equipment PED Art. 1]	HP-100/40
	Terek neve (Name der Räume) [Name of spaces]	Munkatér / Shellside
	Közeg (Medium) [Fluid]	Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Zul. Dichte des Füllgutes) [Allowed density] [kg/m³]	<0,071
	Névleges térfogat / Geometriai térfogat (Nenninhalt / geom. Inhalt) [Nominal volume / Geometrical volume] [liter]	~10
	Közeg csoport PED 13. cikk. (Flüssigkeitsk. -PED, Art. 13) [Fluidgroups acc. to Art. 13]	1
	Hőátadó felület (Wärmeaustauscher areal) [Heat exchanger area] [m²]	-
	Közeg állapot PED, 13 cikk. (Medumzustand-PED, Art. 13) [Condition of fluid acc. To PED, Art. 13]	Gáz / Gas
	Üzemi nyomás (Betriebsdruck) [Operating pressure]	-1 / +39
	Kategória PED 14. cikk. (Kategorie-PED, Art. 14) [Category-PED, Art. 14]	III. kategória
	Modul-PED 14. cikk. (Modul-PED, Art. 14) [Module-PED, Art. 14]	G modul
	Min./max üzemi hőmérséklet (min./max. zul. Betriebstemperatur) [min./max. operating Temperature] [°C]	-20 / +270
	Próbanyomás (PT) (Prüfüberdruck (PT)) [Test pressure (PT)] [barg]	+69,7
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	Tervezési hőmérséklet (TS) (Berechnungstemperatur (TS)) [Design temperature (TS)] [°C]	-20 / +270
	Terhelés AD-W10 (Beanspruchungsfall AD-W10) [Load case AD-W10]	-
	Korróziós pótlék (Abnutzungszuschlag) [Corrosion allowance] [mm]	1
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	Nyomásváltozás (Druckschwankungsbreite) [Pressure difference]	0-38 bar / -20°C - +50°C
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	Tervellenőrzés (Entwurfsprüfung) [Design-examination]	MSZ EN 13445-3:2021
	Végátvétel, nyomáspróba (Schluß- und Druckprüfung) [Fillal inspection and pressure test]	MSZ EN 13445-5:2021
	Gyári szám (Fabrik-Nr.) [Serial No.]	GYP-2430134
	Gyártási év (Herstellungsjahr) [Year of manufacture]	2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT
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Hegesztési tényező: Joint efficiency	0,85						
Szemrevételezési vizsgálat: Visual test	VT	100%					
Folyadékbehatolásos / Mágnesporos vizsgálat: Dye Penetrat / Magnetic partical test	PT / MT	-	-	100%	-	100%	-
Radiográfiai / Ultrahangos vizsgálat: Radiography / Ultrasonic test	RT / UT	-	-	10%	-	-	-
Egyéb vizsgálatok: Other tests	-						



CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Fűtőegység csatlakozó / Heating unit connection	DN100	PN63	EN 1092-1 Typ.11/B
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N4	Technológiai csonk	CWC-8M-4P-S316	-	Hy-Lok csatl.

Rev.	Dátum:	Módosítás oka:	Módosította:

	Dátum / Date	Name / Name	Tervezőiroda / Konstruktionsbüro / Designer	Gyártó / Arbeiterfirma / Manufacturer	Felülvizsgáló / Kontrolleur / Controller
Készítette Bearbeiter Prepared By	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.	GYÉMÁNT-PIRAZOL KFT.	TÜV Thüringen Hungary Kft. H-1023 Budapest Árpád fejedelem útja 26-28.
Ellenőrizte Geprüft Checked by	2024. 01. 31.				

Megnevezés / Benennung / Title

Aquagas Sweden AB.
HP-100/40
Összeállítási rajz

Munkaszám / Arbeit Nr. / Work No.	013-ST-2024
Méretarány / Maßstab / Scale	M 1:6
Anyagminőség / Werkstoff / Material	P265GH,P245GH,P235GH
Plotdátum / Plotted on	2024. 01. 31.
Speicherdatum / Saved on	2024. 01. 31.
Rajzszám / Zeichn.Nr. / Drwg.No.	DG-GYP-243013-02-00
Módosítás / Aenderung / Revision	0
Lapok száma / Blatt / Sheet	1 von of 1
Rajzlap	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képző szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

GYÉMÁNT-PIRAZOL KFT.

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó utca 11.
www.gyemantpirazol.hu

Doc.No./Szám:	PL-GYP-243013-02	Rev.:	0

Aquagas Sweden AB.

Anlage zu / attachment to	
Prüfbericht / report N°	HU04/62979/24
Datum / date:	25.03.2024

HP-DN100 PN40

Tételjegyzék

Dwg. No. / Rajzszám:
DG-GYP-243013-00

Task No.: / Munkaszám:
013-ST-2024

0	2024.01.31		Pásku P.	Kristóf G.
Rev:	Date/Dátum:	Remark/Megjegyzés:	Designer/Tervező:	Checked/Ellenőr:

Prepared/Készítette: Pásku P.	Doc. No. / Dok szám:	**PL-GYP-243013-02**	Rev.:	GYÉMÁNT-PIRAZOL KFT.
Date/Dátum: 2024.01.31	Dwg. No. / Rajzsz.:	**DG-GYP-243013-00**	**0**	
Checked/Ellenőrízte: Kristóf G.	Equipment / Gyártmány:	**HP-DN100 PN40**		
Date/Dátum: 2024.01.31				

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]
1	Hengeres palást Cylindrical shell	1	P235GH-TC1	Ø114,3x5 - 1155	3.1+PED	EN 10217-2	-	15,5	15,5
2	Sekélydomború edényfenék Torispherical head	1	P265GH	Ø114,3x5 (min.3,95)	3.1+PED	DIN 28011	-	0,7	0,7
3	Hegtoldatos karima Weld neck flange	1	P245GH	DN100 PN63	3.1+PED	EN 1092-1 Typ.11/B EN 10222-2	-	9,3	9,3
4	Varratos acélcső Pipe	2	P235GH-TC1	Ø26,9x3,6 - 185	3.1+PED	EN 10217-2	-	0,4	0,8
5	Hy-Lok csatlakozó Hy-Lok connection	1	316	CWC-8M-4P-S316	3.1	-	AQUAGAS	0,0	0,0
6	Párnalemez Reinforcement plate	1	P235GH	Lv5x90x100	3.1	EN 10028-2	-	0,4	0,4
7	U-acél U-profile	1	S235JR	U50 - 600	3.1	DIN 1026-1	-	3,3	3,3
8	Tömítés Gasket	1	Grafit	DN100 PN63	2.1	EN 1514-1	-	0,0	0,0
9	Hlf. tm. csavar Hexagonal bolt	8	A2-70	M24x100	TÜV	DIN 933	-	0,5	3,8
10	Körmös alátét Lock washer	8	A2	A25	2.1	-	-	0,0	0,0
11	Hl. anya Hexagonal nut	8	A4	M24	TÜV	DIN 934	-	0,1	0,9
12	Bordalemez Rib	2	S235JR	Lv3x45x90	3.1	EN 10028-2	-	0,0	0,0
13	Hlf. tm. csavar Hexagonal bolt	2	A2-70	M10x70	-	DIN 933	-	0,6	1,1
14	Lapos alátét Washer	2	A2	A10,5	-	DIN 125	-	0,0	0,0
15	Hl. anya Hexagonal nut	2	A4	M10	-	DIN 934	-	0,0	0,0
16	Adattábla tartó Nameplate holder	1	1.4301	t=3 mm	3.1	EN 10028-7	-	0,7	0,7

Prepared/Készítette:	Pásku P.	Doc. No. / Dok szám:	**PL-GYP-243013-02**	Rev.:	GYÉMÁNT-PIRAZOL KFT.
Date/Dátum:	2024.01.31	Dwg. No. / Rajzsz.:	**DG-GYP-243013-00**	**0**	
Checked/Ellenőrízte:	Kristóf G.	Equipment / Gyártmány:	**HP-DN100 PN40**		
Date/Dátum:	2024.01.31				

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]
17	Gyártói adattábla Nameplate of manufacturer	1	1.4301	Lv1x110x150	3.1	EN 10028-7	-	0,1	0,1
							Total / Összesen:		**37kg**

Notes / Megjegyzések:

1) Az alapanyagok bizonylatolása az EN10204 szerint. / Raw material certificates according to EN 10204 standard.

Prepared/Készítette:	Pásku P.	Doc. No. / Dok szám:	PL-GYP-243013-02	Rev.:	GYÉMÁNT-PIRAZOL KFT.	Munkaszám / Job no.:	013-ST-2024
Date/Dátum:	2024.01.31	Dwg. No. / Rajzsz.:	DG-GYP-243013-00	0		Gyártási szám / Serial no.:	GYP-2430134
Checked/Ellenőrízte:	Kristóf G.	Equipment / Gyártmány:	HP-DN100 PN40				
Date/Dátum:	2024.01.31						

Item Tsz.	Denomination Megnevezés	Pcs. Db.	Material Anyagminőség	Dimension / Drw.No. Méret / Rajzszám	Certificate Bizonylat 1)	Standard Szabvány	Notes Megjegyzés	Weight [kg/db] Tömeg [kg/db]	Weight [kg] Tömeg [kg]	Material deviation Eltérő anyag	Heat no. Adagszám
1	Hengeres palást Cylindrical shell	1	P235GH-TC1	Ø114,3x5 - 1155	3.1+PED	EN 10217-2	-	15,5	15,5	P355NH EN10216-3	49978YU
2	Sekélydomború edényfenék Torispherical head	1	P265GH	Ø114,3x5 (min.3,95)	3.1+PED	DIN 28011	-	0,7	0,7		582093
3	Hegtoldatos karima Weld neck flange	1	P245GH	DN100 PN63	3.1+PED	EN 1092-1 Typ.11/B EN 10222-2	-	9,3	9,3	P355QH1	2A12649
4	Varratos acélcső Pipe	2	P235GH-TC1	Ø26,9x4 - 185	3.1+PED	EN 10217-2	-	0,4	0,8	P355NH EN10216-3	4285
5	Hy-Lok csatlakozó Hy-Lok connection	1	316	CWC-8M-4P-S316	3.1	-	AQUAGAS	0,0	0,0		DZN
6	Párnalemez Reinforcement plate	1	P235GH	Lv6x90x100	3.1	EN 10028-2	-	0,4	0,4	P265GH	41266
7	U-acél U-profile	1	S235JR	U50 - 600	3.1	DIN 1026-1	-	3,3	3,3		-
8	Tömítés Gasket	1	Grafit	DN100 PN63	2.1	EN 1514-1	-	0,0	0,0		-
9	Hlf. tm. csavar Hexagonal bolt	8	A2-70	M24x100	TÜV	DIN 933	-	0,5	3,8		VIRAJ
10	Körmös alátét Lock washer	8	A2	A25	2.1	-	-	0,0	0,0		-
11	Hl. anya Hexagonal nut	8	A4	M24	TÜV	DIN 934	-	0,1	0,9		TD
12	Bordalemez Rib	2	S235JR	Lv3x45x90	3.1	EN 10028-2	-	0,0	0,0		11989
13	Hlf. tm. csavar Hexagonal bolt	2	A2-70	M10x70	-	DIN 933	-	0,6	1,1		-
14	Lapos alátét Washer	2	A2	A10,5	-	DIN 125	-	0,0	0,0		-
15	Hl. anya Hexagonal nut	2	A4	M10	-	DIN 934	-	0,0	0,0		-
16	Adattábla tartó Nameplate holder	1	1.4301	t=3 mm	3.1	EN 10028-7	-	0,7	0,7		-
17	Gyártói adattábla Nameplate of manufacturer	1	1.4301	Lv1x110x150	3.1	EN 10028-7	-	0,1	0,1		-
							Total / Összesen:		**37kg**		

Anlage zu / attachment to
Prüfbericht / report N° HU05/62996/24
Datum / date: 26.03.2024

Technischer Überwachungs-Verein TÜV 694 Thüringen e.V.

C63-AQU-QIX-002 124 / 917

LIBERTY

A02 **Inspection certificate "3.1" (EN 10 204)**

A03 Document No.: **73571/22** Page: **1/1**

A07	Customer's Order (P.O.) No./Item No.: **10/6/22**	A08	Manufacturer's Works Order No.: **31041/0/22**
A11	Supplier's Order No.: **3151019382**	A10	Advice - Note No.: **8150091538**
B08, B12/13	Quantity delivered: B13 Actual mass	A06	Customer / Consignee:

pcs / bdls	mtrs / feet	kgs / lbs
20	**121,000**	**1674**

BEPELOG KFT.
RÁKÓSZI ÚT 40
3043 EGYHÁZASDENGELEG
HUNGARY

B09-11	Dimensions: **114,3 X 5,00 mm**
B02	Steel designation: **S355J2H P355NH**
B01,B03, B04	Product, conditions and terms of delivery: **Structural hollow sections / Seamless steel tubes, EN 10220/2002, EN 10210-1/06, 2/19 (CE), EN 10216-3/13 TC1 Normalized hot finished.**
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp **LIBERTY OSTRAVA** 1 CE 07 0045-CPR-0807-1 LO a.s. LO-007-CPR2020-01-06 EN 10210:2006 S355J2H/1.0576

C71-92 Heat chemical analysis (%) C70 Steel made by basic oxygen process, fully killed, strand cast.

B07 Heat No.:	C	MN	SI	P	S	CU	NI	CR	ALt	N	MO	V	TI	NB	CEQ
49978YU	0,16	1,34	0,207	0,019	0,007	0,09	0,09	0,05	0,031	0,0064	0,011	0,045	0,002	<0,003	0,42

Z99

B07 C04 Test results: Heat No. C00 Specimen No. / Requirements:	MPa C11 Yield Point	MPa C12 Tensile Strength	% (5d) C13 Elongation	C40-43 Impact test Ø	C40-43 Impact test min	C30-32 Hardness
Requirements: **P355NH**	**min. 355**	**490- 650**	**min. 22**			
Requirements: **S355J2H**	**min. 355**	**470- 630**	**min. 22**			
49978YU	**397**	**554**	**25,5**			

Z99

D01	Visual and dimensional inspection with satisfactory results	X	D51	Hydrostatic test - min. test pressure	
C50	Flattening test (EN ISO 8492) - satisfactory	X	D02	The pipes tested on tightness by NDT flux - leakage in acc. to EN ISO 10893-1/11	X
C51	Expanding test (EN ISO 8493) - satisfactory				
C52	Bending test (EN ISO 8491) - satisfactory				
C53	Ring expanding test (EN ISO 8495) - satisfactory	X	D03	Nondestructive Electromagnetic Testing	
C54	Ring tensile test (EN ISO 8496) - satisfactory				

The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, ISO 45001:2018.

Z01 All pipes conform to the above mentioned standards and ordering requirements and agreements.

Z02 Date of issue **29.9.2022/JN** Tel.:++420 595683644

A01 Liberty Ostrava a.s.
A05 QA Department
Vratimovská 689/117
719 00 Ostrava-Kunčice
Czech Republic

LIBERTY
Liberty Ostrava a.s.
Vratimovská 689/117, 719 00 Ostrava - Kunčice
QA - WORKS INSPECTOR
IDENTIFICATION No. 4

58

Bc. Petr Pastucha
Work's Inspector
Z02 Validation

E.z. 2574/16/15/P

01-114,3x 5 egyben

TÜV NORD

CERTIFICATE

Quality-Assurance System for material manufacturer according to Pressure Equipment Directive 2014/68/EU

Certificate no.: 07/202/9190/WZ/0807/21

Name and address of the manufacturer:	**Liberty Ostrava a.s.** **Plant 15 Tube plant** **Vratimovská 689/117, Kunčice** **719 00 OSTRAVA, CZ**

Herewith we certify that the manufacturer has established and applies a **quality-assurance system related to the material.** This QA System has been subjected to a specific assessment acc. to directive 2014/68/EU, annex I, point 4.3 with regard to the materials mentioned in the scope of approval.

Approved acc. to directive 2014/68/EU:	**QA-System in relation to materials, EN 764-5, section 4.2**
Certification file no.:	9190/WP/0807/21
Audit report file no.:	4318311/04
Scope of approval: *(product / material)*	Seamless and Helically submerged arc-welded steel tubes Non-alloy and alloy steel, Alloy fine grain steel
Production site:	Vratimovská 689/117, Kunčice 719 00 OSTRAVA, CZ
The certificate is valid until:	10/2024

Only valid in conjunction with a valid certificate acc. to EN ISO 9001.

Attachment:
Scope of approval

notified body TÜV NORD 0045 TÜV NORD Systems

Notified Body 0045 for pressure equipment

TÜV NORD

Digitally signed by Vavra Josef
Date: 2021.11.02 10:46:20 +01'00'

TÜV NORD Systems GmbH & Co. KG, Große Bahnstraße 31, 22525 Hamburg

Contact:
E-mail tuev-nord@tuev-nord.cz
Phone +420 296 587 211

Member of CEOC
CONFÉDÉRATION EUROPÉENNE D'ORGANISMES DE CONTRÔLE

To verify the validity of the digital signature of the TÜV NORD Systems employee, the installation of the TÜV NORD GROUP root certificate is required: https://www.tuev-nord.de/en/customer-login/digital-signature/

TÜV NORD Systems GmbH & Co. KG

Geltungsbereich als Anlage zum Zertifikat / *Scope of Approval as annex to Certificate*

TÜV NORD

[X] Richtlinie 2014/68/EU, Anh. I, Pkt. 4.3 / *Directive 2014/68/EU, Ann. I, Point 4.3.* Zertifikat-Nr. / *Certificate No.:* 07/202/9190/WZ/0807/21

[X] AD 2000-Merkblatt W 0 / *AD 2000-Merkblatt W 0* Zertifikat-Nr. / *Certificate No.:* 07/203/9190/WP/0807/21

Firma / *Company:*	**Ort / *Location:***	**AZ / *File No.:***	**SAP-Nr.:**	**Datum / *Date:***
Liberty Ostrava a.s., Plant 15 – Tube plant	Vratimovská 689/117, Kunčice 719 00 Ostrava, CZ	4319368/02	9190/WZ/0807/21 Erweit	11.11.21

Nr. *No.*	Werkstoffbezeichnung *Material designation*	Spezifikation *Specification*	Lieferzustand* *Delivery cond.**	Erzeugnisform *Product type*	Abmessungen *Dimensions*		Prüfgrundlagen *Test specifications*	Bemerkungen *Remarks*
					Dicke *Thickness* [mm]	Ø / Gewicht Ø / *Weight* [mm] / [kg]		
1	2	3	4	5	6	7 / 8	9	10
1	Werkstoffe nach harmonisierten Normen (2014/68/EU) / *Materials according to harmonized standards (2014/68/EU)*							
1.1	P195TR2 to P265TR2	DIN EN 10216-1	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	In connection with the regulations
1.2	P195GH to P265GH	DIN EN 10216-2	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	within column 9, the materials meet
	16Mo3	DIN EN 10216-2	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	the general mechanical and
	10CrMo5-5, 10CrMo9-10	DIN EN 10216-2	NT	Seamless tubes	2,3-25	21,3-273	IC 3.1	technological requirements of PED.
	13CrMo4-5	DIN EN 10216-2	NT	Seamless tubes	6,3-25	139,7-273	IC 3.1	The specific operation conditions
	X11CrMo9-1+NT	DIN EN 10216-2	NT	Seamless tubes	4,5-12,7	88,9-273	IC 3.1	have to be given by the pressure
	X11CrMo9-1+NT	DIN EN 10216-2	NT	Seamless tubes	14,2-25	88,9-273	IC 3.2	equipment manufacturer. If necessary,
	X11CrMo9-1+NT	DIN EN 10216-2	NT	Seamless tubes	4,5-25	60,3-82,5	IC 3.2	the involved notified body has give
	X11CrMo5+NT1, +NT2	DIN EN 10216-2	NT	Seamless tubes	9,27	273	IC 3.1	his agreement.
	X11CrMo5+NT1, +NT2	DIN EN 10216-2	NT	Seamless tubes	2,3-25	21,3-273	IC 3.2	
1.3	P275NL1, P275NL2	DIN EN 10216-3	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
	P355N, P355NH	DIN EN 10216-3	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
	P355NL1, P355NL2	DIN EN 10216-3	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
1.4	P215NL, P265NL	DIN EN 10216-4	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
1.5	P195TR2 bis P265TR2	DIN EN 10217-1	N[1)]	SAWH pipes	5-16	324-1016	IC 3.1	[1)] = valid for coil
1.6	P235GH	DIN EN 10217-5	N[1)]	SAWH pipes	5-16	324-1016	IC 3.1	
	P265GH	DIN EN 10217-5	N[1)]	SAWH pipes	5-16	324-1016	IC 3.1	
1.7	P355N, P355NH	DIN EN 10217-3	N[1)]	SAWH pipes	8	711	IC 3.1	
	P355N, P355NH	DIN EN 10217-3	N[1)]	SAWH pipes	5-16	324-1016	IC 3.2	

Erläuterung / *Explanation:*

* +AT = Lösungsgeglüht / solution annealed, +N = normalgeglüht, normalisierend umgeformt / normalized forming, +U = unbehandelt / untreated, +NT = normalgeglüht und angelassen / normalized and tempered, +QT = vergütet / quenched and tempered, +M = thermomechanisch umgeformt / thermo mechanical formed, +AR = wie gewalzt / as rolled, +SR = spannungsarmgeglüht / stress relieved, +A = weichgeglüht / soft annealed, +CR = kaltgewalzt / cold rolled (weitere Symbole / other symbols: EN 10027-1, Tab. 18)

TÜV NORD Systems GmbH & Co. KG

Geltungsbereich als Anlage zum Zertifikat / *Scope of Approval as annex to Certificate*

X	Richtlinie 2014/68/EU, Anh. I, Pkt. 4.3 / *Directive 2014/68/EU, Ann. I, Point 4.3.*	Zertifikat-Nr. / *Certificate No.:* 07/202/9190/WZ/0807/21
X	AD 2000-Merkblatt W 0 / *AD 2000-Merkblatt W 0*	Zertifikat-Nr. / *Certificate No.:* 07/203/9190/WP/0807/21

Firma / *Company:*	**Ort / *Location:***	**AZ / *File No.:***	**SAP-Nr.:**	**Datum / *Date:***
Liberty Ostrava a.s., Plant 15 – Tube plant	Vratimovská 689/117, Kunčice 719 00 Ostrava, CZ	4319368/02	9190/WZ/0807/21 Erweit	11.11.21

Nr. *No.*	Werkstoffbezeichnung *Material designation*	Spezifikation *Specification*	Lieferzustand* *Delivery cond.**	Erzeugnisform *Product type*	Abmessungen *Dimensions* Dicke *Thickness* [mm]	 Ø / Gewicht *Ø / Weight* [mm] / [kg]	Prüfgrundlagen *Test specifications*	Bemerkungen *Remarks*
1	2	3	4	5	6	7 / 8	9	10
2	Werkstoffe nach AD 2000/*Materials according to AD 2000*							
2.1	P195TR2 to P265TR2	DIN EN 10216-1	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
2.2	P195GH to P265GH	DIN EN 10216-2	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
	16Mo3	DIN EN 10216-2	N	Seamless tubes	2,3-25	21,3-273	IC 3.1	
	10CrMo5-5, 10CrMo9-10	DIN EN 10216-2	NT	Seamless tubes	2,3-25	21,3-273	IC 3.2 for AD2000-W4	
	13CrMo4-5	DIN EN 10216-2	NT	Seamless tubes	6,3-25	139,7-273	IC 3.2 for AD2000-W4	
2.3	P275NL1, P275NL2	DIN EN 10216-3	N	Seamless tubes	2,3-25	21,3-273	IC 3.1 for AD2000-W4, W10 VdTÜV Wbl. 352/2	
	P355N, P355NH	DIN EN 10216-3	N	Seamless tubes	2,3-25	21,3-273	IC 3.1 for AD2000-W4, VdTÜV Wbl. 354/2 IC 3.2 for AD2000-W10 and VdTÜV Wbl. 354/2	Inspection certificate EN 10204-3.1. acc to AD2000-W4, table 1 a, note 2 and acc. to AD2000-W10, table 1, note 11
	P355NL1, P355NL2	DIN EN 10216-3	N	Seamless tubes	2,3-25	21,3-273	IC 3.2 for AD2000-W4, W10 and VdTÜV Wbl. 354/2	See letter of agreement, TÜV NORD file: 4320118/01 / 06.03.2020
2.4	P215NL, P265NL	DIN EN 10216-4	N	Seamless tubes	2,3-25	21,3-273	IC 3.1 for AD2000-W4, W10	
2.5	P195TR2 bis P265TR2	DIN EN 10217-1	N[1)]	SAWH pipes	5-16	324-1016	IC 3.1	[1)] = valid for coil
2.6	P235GH	DIN EN 10217-5	N[1)]	SAWH pipes	5-16	324-1016	IC 3.1	
	P265GH	DIN EN 10217-5	N[1)]	SAWH pipes	5-16	324-1016	IC 3.1	Additionals Remarks: The manufacturer fufilled the requirements acc. to TRD 100

Erläuterung / *Explanation:*

* +AT = Lösungsgeglüht / solution annealed, +N = normalgeglüht, normalisierend umgeformt / normalized forming, +U = unbehandelt / untreated, +NT = normalgeglüht und angelassen / normalized and tempered, +QT = vergütet / quenched and tempered, +M = thermomechanisch umgeformt / thermo mechanical formed, +AR = wie gewalzt / as rolled, +SR = spannungsarmgeglüht / stress relieved, +A = weichgeglüht / soft annealed, +CR = kaltgewalzt / cold rolled (weitere Symbole / other symbols: EN 10027-1, Tab. 18)

TÜV NORD Systems GmbH & Co. KG

Geltungsbereich als Anlage zum Zertifikat / *Scope of Approval as annex to Certificate*

[X] Richtlinie 2014/68/EU, Anh. I, Pkt. 4.3 / *Directive 2014/68/EU, Ann. I, Point 4.3.* Zertifikat-Nr. / *Certificate No.:* 07/202/9190/WZ/0807/21

[X] AD 2000-Merkblatt W 0 / *AD 2000-Merkblatt W 0* Zertifikat-Nr. / *Certificate No.:* 07/203/9190/WP/0807/21

Firma / *Company:*	Ort / *Location:*	AZ / *File No.:*	SAP-Nr.:	Datum / *Date:*
Liberty Ostrava a.s., Plant 15 – Tube plant	Vratimovská 689/117, Kunčice 719 00 Ostrava, CZ	4319368/02	9190/WZ/0807/21 Erweit	11.11.21

Nr. *No.*	Werkstoffbezeichnung *Material designation*	Spezifikation *Specification*	Lieferzustand* *Delivery cond.**	Erzeugnisform *Product type*	Abmessungen *Dimensions*		Prüfgrundlagen *Test specifications*	Bemerkungen *Remarks*
					Dicke *Thickness* [mm]	Ø / Gewicht *Ø / Weight* [mm] / [kg]		
1	2	3	4	5	6	7 / 8	9	10
3	Werkstoffe nach anderen Standards, Technische Regeln / *Materials according to other standards, technical rules*							
3.1	L245N, L290N, L320N, L360N PSL2	DIN EN ISO 3183	N	Seamless tubes	2,3-25	21,3-273		*) If use in area of AD2000 or PED an Particulare Material Appraisal (PMA) for Item No. 3 and 4 is necessary
	L245NE, L290NE, L360NE	DIN EN ISO 3183	N	Seamless tubes	2,3-25	21,3-273		
	St37.4	DIN 1630	N	Seamless tubes	2,3-25	21,3-273		
	Grade A, Grade B	ASME SA 53	N	Seamless tubes	2,3-25	21,3-273		
3.2	St35.8 I,St45.8 I	DIN 17175	N	Seamless tubes	2,3-25	21,3-273		
	12021.1, 12022.1	ČSN 412021,2	N	Seamless tubes	2,3-25	21,3-273		
	Grade A, Grade B	ASME SA 106	N	Seamless tubes	2,3-25	21,3-273		
	Grade 6	ASTM A 333	N	Seamless tubes	2,3-25	21,3-273		
	360	BS 3059-2	N	Seamless tubes	2,3-25	21,3-273		
	TUE 250	NF 49-211	N	Seamless tubes	2,3-25	21,3-273		
	Grade P11, P22	ASME SA 335	NT	Seamless tubes	2,3-25	21,3-273		
	Grade P12	ASME SA 335	NT	Seamless tubes	6,3-25	139,7-273		
	Grade P9	ASME SA 335	NT	Seamless tubes	4,5-25	60,3-273		
	Grade P5	ASME SA 335	NT	Seamless tubes	2,3-25	21,3-273		
3.3	L210, L245, L290 PSL1	DIN EN ISO 3183	N[1)]	SAWH pipes	5-16	324-1016		[1)] = valid for coil
	L245N, L290N PSL2	DIN EN ISO 3183	N[1)]	SAWH pipes	5-16	324-1016		
	L245NE, L290NE PSL2	DIN EN ISO 3183	N[1)]	SAWH pipes	5-16	324-1016		
	St 37.4	DIN 1628	N[1)]	SAWH pipes	5-16	324-1016		
3.4	L245N/BN, L290N/X42N PSL2	API SPEC. 5L	N	Seamless tubes	2,3-25	21,3-273		
	L320N/X46N, L360N/X52N PSL2	API SPEC. 5L	N	Seamless tubes	2,3-25	21,3-273		
3.5	L210/A, L245N/B, L290N/X42 PSL1	API SPEC. 5L	N[1)]	SAWH pipes	5-16	324-1016		
	L245/BN, L290/X42N PSL2	API SPEC. 5L	N[1)]	SAWH pipes	5-16	324-1016		

Erläuterung / *Explanation:*

* +AT = Lösungsgeglüht / solution annealed, +N = normalgeglüht, normalisierend umgeformt / normalized forming, +U = unbehandelt / untreated, +NT = normalgeglüht und angelassen / normalized and tempered, +QT = vergütet / quenched and tempered, +M = thermomechanisch umgeformt / thermo mechanical formed, +AR = wie gewalzt / as rolled, +SR = spannungsarmgeglüht / stress relieved, +A = weichgeglüht / soft annealed, +CR = kaltgewalzt / cold rolled (weitere Symbole / other symbols: EN 10027-1, Tab. 18)

TÜV NORD Systems GmbH & Co. KG

Geltungsbereich als Anlage zum Zertifikat / *Scope of Approval as annex to Certificate*

X Richtlinie 2014/68/EU, Anh. I, Pkt. 4.3 / *Directive 2014/68/EU, Ann. I, Point 4.3.* Zertifikat-Nr. / *Certificate No.:* 07/202/9190/WZ/0807/21

X AD 2000-Merkblatt W 0 / *AD 2000-Merkblatt W 0* Zertifikat-Nr. / *Certificate No.:* 07/203/9190/WP/0807/21

Firma / *Company:*	Ort / *Location:*	AZ / *File No.:*	SAP-Nr.:	Datum / *Date:*
Liberty Ostrava a.s., Plant 15 – Tube plant	Vratimovská 689/117, Kunčice 719 00 Ostrava, CZ	4319368/02	9190/WZ/0807/21 Erweit	11.11.21

Nr. *No.*	Werkstoffbezeichnung *Material designation*	Spezifikation *Specification*	Lieferzustand* *Delivery cond.**	Erzeugnisform *Product type*	Abmessungen *Dimensions* Dicke *Thickness* [mm]	 Ø / Gewicht *Ø / Weight* [mm] / [kg]	Prüfgrundlagen *Test specifications*	Bemerkungen *Remarks*
1	2	3	4	5	6	7 / 8	9	10
4	Werkstoffe nach anderen Standards, Technische Regeln / *Materials according to other standards, technical rules*							
4.1	S235JRH, S275J0H, S275J2H, S355J0H, S355J2H, S275NH, S275NLH, S355NH, S355NLH S355K2H, S420NH, S420NLH, S460NH, S460NLH	DIN EN 10210-1,2 DIN EN 10210-1,2 DIN EN 10210-1,2 DIN EN 10210-1,2 DIN EN 10210-1,2	N N N N N	Seamless tubes Seamless tubes Seamless tubes Seamless tubes Seamless tubes	2,3-25 2,3-25 2,3-25 2,3-25 2,3-25	21,3-273 21,3-273 21,3-273 21,3-273 21,3-273	Regulation 305/2011/EU CE - mark	Certifies for constructions products with "CE- Marking" according to annex ZA of EN 10210-1 and EN 10219-1. Details of the certification are published in the certificate of the Certification Body CPR of TÜV NORD Systems.
4.2	S235JRH, S275J0H, S275J2H, S355J0H, S355J2H	DIN EN 10219-1,2	N[1)]	SAWH pipes	5-16	324-1016	Regulation 305/2011/EU CE - mark	
4.3	St 37.0, St 44.0, St 52.0	DIN 1629	N	Seamless tubes	2,3-25	21,3-273	BRL Ü - mark	Certified for constructions products with "Ü - Zeichen" acc. to the German standard "Bauregelliste". Details of the certification are written in the certification documents of the "PÜZ-Body"of TÜV NORD Systems GmbH.

Erläuterung / *Explanation:*

* +AT = Lösungsgeglüht / solution annealed, +N = normalgeglüht, normalisierend umgeformt / normalized forming, +U = unbehandelt / untreated, +NT = normalgeglüht und angelassen / normalized and tempered, +QT = vergütet / quenched and tempered, +M = thermomechanisch umgeformt / thermo mechanical formed, +AR = wie gewalzt / as rolled, +SR = spannungsarmgeglüht / stress relieved, +A = weichgeglüht / soft annealed, +CR = kaltgewalzt / cold rolled (weitere Symbole / other symbols: EN 10027-1, Tab. 18)

C63-AQU-QIX-002 130 / 917

Stahlprodukte GmbH
Acéltermékgyártó Kft.
H-6100 Kiskunfélegyháza, Csanyi út 71/D-E, Pf. 116
Telefon +36 (76) 561-070 Telefax +36 (76) 561-098
E-Mail: info@torus.hu

Abnahmeprüfzeugnis
Inspection certificate
Certificat de Reception

3.1 nach EN 10204

Cert.-Nr.: 136334

für kaltgeformte und normalgeglühte Böden
for cold formed and normalized heads
pour fonds formés à froid et normalisés

Besteller: Gyémánt-Pirazol Kft.
Customer:
Comettant: Nívó utca 11.
H - 4031 Debrecen

Bestell-Nr.: MSZ-106-22
Order-No:
No de commande:

Auftrag-Nr.: T - 1493 / 2022
Works-No:
N° d´ usine:

Prüfgrundlage / Control Requirements / Conditions imposées: **AD 2000 HP 8/1, TRD 101 2014/68/EU**

Toleranzen / Tolerances / Tolérances	Klöpperböden nach DIN 28011 Torispherical Heads to DIN 28011 Fonds a GRC (NFE 81-102) selon DIN 28011					
Pos. / Item / Poste	Stück / Quant. / Quant.	Abmessung / Dimension / Dimension	Werkst./Lieferbed. / Material and Specifications / Acier et Specifications	Schmelze-Nr. / Charge No. / Coulee No.	Probe-Nr. / Sample No. / Essai No.	Kennz. / Marking / Marquage
1	16	114,3 mm äDrm x 4,7 mm MW	P265GH / SA516 Gr60	582093	90000820651	T1

Wir bestätigen, dass die gelieferten Böden nach dem Kaltumformen bei 910°C ± 10°C mit einer Haltezeit von 6 Minuten normalgeglüht wurden. Die Abkühlung auf RT erfolg an ruhender Luft.

We certify, that these cold formed heads have been normalized at 910°C ± 10°C with a holding time of 6 minutes followed by cooling at still air.

Nous certifions que les fonds livrés, après formage à froid, ont subi une normalisation à 910°C ± 10°C pendant une durée de 6 minutes, suivi d´un refroidissement en air calme

Die Wärmebehandlung entspricht den Festlegungen der AD2000-Merkblätter HP 7/1 und HP 7/2.
Heat treatment is in accordance with the determine of AD2000-Merkblatt HP 7/1 and HP 7/2.
Le traitement thermique rèpond aux prescriptions de AD2000-Merkblatt HP 7/1 et HP 7/2.

Verwendet wurden / We used / Tôles utilisées:

✘	a) Bleche gem. beiliegender(en) bzw. vorliegender(en) Bescheinigung(en) nach EN 10204 / 3.1 plates as per attached certificates to EN 10204 / 3.1 suivant certificats ci-joints selon EN 10204 / 3.1	25311619/000002	1833/2021
	b) von Ihnen angelieferte Bleche your free delivered plates approvisionées par vous-mêmes		

Unsere Fertigungsverfahren sind nach AD-W0 und TRD 100 überprüft und zugelassen, WE1092 vom 28.06.1990
Our procedures have been examined and approved according to AD-W0 and TRD 100, WE 1092 of 28.06.90.
Nos procédés de fabrication sont contrôlés et admis selon AD-W0 et TRD 100, 28.06.90 avec lettre référencée WE 1092.
Zertifiziert nach 2014/68/EU, Anh. I., Chap. 4.3.by TÜV Rheinland Industrie GmbH, notifizierte Stelle 0035, Zertifikat Nr.:01 202 H/Q-02 3011.
Certified according to 2014/68/EU, App. I., Chap. 4.3.by TÜV Rheinland Industrie GmbH, Notified Body 0035 Certificate No.: 01 202 H/Q-02 3011.
Certifié selon la recommanddation pour appareils de pression 2014/68/EU, annexe 1., paragraphe 4.3 par TÜV Rheinland Industrie GmbH, lieu notifiée 0035, Certifica no.: 01 202 H/Q-02 3011.
2014/68/EU gültig bis: 28.02.2023 ; 2014/68/EU valid until: 28.02.2023 ; 2014/68/EU valable jusqu'à: 28.02.2023
Zertifiziert nach, Certified according to, Certifié selon la: ISO 9001:2015, 01 100 1320135, Valid 17.03.2023
Wir bescheinigen, dass die Teile geprüft wurden und den Bestellanforderungen entsprechen.
We certify that the pieces has been tested and are according to the terms of the order.
Nous certifions que la livraison est conformé aux stipulations de la commande.
Die verwendeten Bleche wurden, soweit erforderlich, im Einvernehmen mit dem Sachverständigen umgestempelt.
The used plates were restamped if necessary and equiped with the maker's brand.
Les tôles utilisées ont été poinconnées autant que nécessaire.

T — Herstellerzeichen / Marker´s brand / Griffe du fabricant

Prüfung der fertigen Teile:
Control of finished parts:
Contrôle des pièces fabriqués:

Besichtigung und Maßprüfung: ohne Beanstandungen
Visual and dimensional check: without objection
Contrôle d'aspect et dimensionnel: aucune observation

Datum/date/date: 2022. 11. 24.

László Molnár
Der Werkssachverständige, The Works-Inspector, Le Responsable du Service Contrôle
Dieses Zeugnis ist mit EDV erstellt und ohne Unterschrift gültig.

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ISD DUNAFERR

Abnahmeprüfzeugnis / Inspection Certificate
3.1./MSZ EN 10204-2005

1.Seite (2)

ISD DUNAFERR ZRT
2401 Dunaújváros,
Vasmű Tér 1-3.

Nr./Datum:
25311619/000002
14.05.2021.
1.Seite (2) Angelné Zs. Noémi

H- - 2400 Dunaújváros Name of customer/Name d.Kunden: TORUS KFT
Fax: (25)584-781 **KISKUNFÉLEGYHÁZA**
KENNZEICHNUNG

1533/2021

[x] Herstellerzeichen/Producer's sign:	Auftrags Nr./ Contract nr. : **4108807/000002**
[x] Werkstoff/ Material (Y)	Erzeugnisform: warmgewalztes Grobblech (Normalisierendes Walzen) Product: hot rolled heavy plate(Normalised rolling) Stahlherstellung: Sauerstoffaufblasverfahren Steel making: Basic oxygen process Abmessungen/ Dimension (mm): 1540x5x6160
[x] Schmelzen-Nr./charge no.	Schmelzen Nr./Band nr./: Charge no./ strip Nr.
[x] Coil-Nr./Band-Nr. Coil No./strip Nr.	**582093** E19573 E19574
[ ] Stempel des WSV	
[x] Probe Nr./Sample No	

Quality/Anforderungen/Specification

P265 GH	EN 10028-2:2017	AD 2000-W1; 2014/68/EU(PED)
P 265 S	EN 10207:2017	EN 10051:2010

Pos.Nr. / *Item*	Band Nr. / *Band-No.*	Probe Nr. / *Test-No.*	Abmessungen / *Dimensions* (mm)	Masse / *Weight* (kg)	Band Stück	Stück Nr /Pieces
1.	E19573003,005	90000820651	1540x5x6160	6945	2	18
2.	E19574001	90000820652	1540x5x6160	4235	1	11

ISD DUNAFERR Zrt. Certifies and guarantees by present Certification that the above mentioned product meets the requirements of the AD 2000 W0 specification as well as the requirements of 2014/68/EU (PED) specification. The producer is certified according to ISO 9001:2015 and the tests were made at the accredited laboratories of Dunaferr Labor Nonprofit Kft.

Die ISD DUNAFERR Zrt. teilt mit dieser Bestätigung mit und garantiert, dass obiges Produkt den Vorschriften der AD 2000 W0 und den Anforderungen der Vorschrift 2014/68/EU (PED) gerecht wird. Der Hersteller ist nach ISO 9001:2015 qualifiziert, die Prüfungen werden in den akkreditierten Laboren der Dunaferr Labor Nonprofit Kft. durchgeführt.

Radioaktivity: We verify that the produced and delivered products don t increase the radioactivity in environment, the radioactivity is under the normal value of 100 Bq/kg.

Radioaktivität: Wir Bestätigen, das die von uns hergestellten und gelieferten Produkte in der Umwelt keine schädlichen Strahlenbelastungen verursachen, der spezifische Gammaaktivitätswert des Produktes befindet sich unter dem akzeptieren Wert von 100Bq/kg.

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ISD DUNAFERR

Abnahmeprüfzeugnis / Inspection Certificate

3.1./MSZ EN 10204-2005

1.Seite (2)

ISD DUNAFERR ZRT
2401 Dunaújváros,
Vasmű Tér 1-3.

Nr./Datum:
25311619/000002
14.05.2021.
1.Seite (2) Angeliné Zs. Noémi

1333/2021

H - 2400 Dunaújváros
Fax: (25) 584-781

Position Nr. (Item) / Schmelz Nr. (Cast No)	Chemische zusammensetzung in Gew. / Chem. Composition of Cast %													
	C 0,	Mn	Si 0,	P 0,0	S 0,0	Al 0,0	Cu 0,	Cr 0,	Ni 0,	V 0,0	Nb 0,0	Mo 0,0	Ti 0,0	C_{EV} 0,
Anforde-Rungen P265GH	Max: 20	0,80 1,40	Max: 40	Max: 25	Max: 10	Min: 20	Max: 30	Max: 30	Max: 30	Max: 20	Max: 30	Max: 80	Max: 30	
	N max: P265 GH: 0,012 P265S : 0,010 **582093** = 0,005				Cu+Cr+Ni+Mo: Max:0,70				**Sn:** Schm: 0,009 1. Stck: 0,007 2. Stck: 0,008					
P265S	Max: 20	0,50 1,50	Max: 40	Max: 25	Max: 25	Min: 20								
*	Max: 10	0,85 1,20	15 25	Max: 25	Max: 10	Min: 20	Max: 30	Max: 30	Max: 30	Max: 20	Max: 20	Max: 80	Max: 30	Max: 41
582093	09	1,03	23	17	05	43	16	11	06	02	01	010	01	30
1.Stck.	08	1,01	22	16	06	42	16	12	06	02	01	009	01	29
2.Stck.	08	1,00	22	16	06	41	16	12	06	02	01	009	01	29

Posi-tion Nr. / Item	Prob. lage / Pos.of sample	Streck-grenze / Yield stress	Zugfes-tigkeit / Tensile streght	Dehnung / Elon-gation A_5	Falt probe/ Bend test	Warmstreck-grenze / Warm Yield stress		Prob. lage / Pos. of sample	ISO-5/300 Kerbschlagzähigkeit/ Arbeit / Impact Value (MSZ EN ISO148-1:2017)				Bemer-kung / Remarks
									Prüf-temp.	Einzelwerte/ Unique values			Mittel-wert
	1.)	N/mm²		%		N/mm²	°C	1.)	°C	J			
Anforde Rungen/ Requirement P265GH	q	Min: 265	410-530	Min: 22		Min: 173	300	q	-20				14
P265S	q	Min: 265	410-530	Min: 22		Min: 140	300	l	-20				14
1.	Mq	373	478	32,9	o.B.	326	300	Mq	-50	50	52	52	51
								Ml	-20	88	93	93	91
2.	Mq	371	479	32,6	o.B.	326	300	Mq	-50	48	52	45	48
								Ml	-20	76	79	82	79

EK-12-a DAM/98 . 13.01.2020.// Rev.21.

* : Anforderungen des Kunden/ Requilements of the customer

1.) M:mitte/middlel: längs / longitudinal,
q: quer / transverse, t: tangential, z: senkrecht / vertical.

Der Werkssachverständige / Works inspector

ISD DUNAFERR Zrt.
Minőségügyi Főosztály
Szakértő: Horváth István
Eng.sz.: 26C-10530-13057
1032.

C63-AQU-QIX-002 133 / 917

ISD DUNAFERR

Abnahmeprüfzeugnis / Inspection Certificate
3.1./MSZ EN 10204-2005

1.Seite (2)

ISD DUNAFERR ZRT
2401 Dunaújváros,
Vasmű Tér 1-3.

Nr./Datum:
25311619/000002
14.05.2021.
1.Seite (2) Angelné Zs. Noémi

H - 2400 Dunaújváros
Fax: (25)584-781
KENNZEICHNUNG

Name of customer/Name d.Kunden: TORUS KFT
KISKUNFÉLEGYHÁZA

1533/2021

[x] Herstellerzeichen/Producer's sign:

[x] Werkstoff/ Material (Y)

[x] Schmelzen-Nr./charge no.

[x] Coil-Nr./Band-Nr.
Coil No./strip Nr.

[ ] Stempel des WSV

[x] Probe Nr./Sample No

Auftrags Nr./ Contract nr. : **4108807/000002**

Erzeugnisform: warmgewalztes Grobblech (Normalisierendes Walzen)
Product: hot rolled heavy plate (Normalised rolling)
Stahlherstellung: Sauerstoffaufblasverfahren
Steel making: Basic oxygen process
Abmessungen/ Dimension (mm) : 1540x5x6160

Schmelzen Nr./Band nr./:
Charge no./ strip Nr.

582093 E19573
E19574

Quality/Anforderungen/Specification
Gr.60 SA-516/SA-516M, SA-20/SA-20M-ASME BPVC. II.A-2019
Gr.60 ASTM A516/516M-17; ASTM A20/A20M-2019 EN 10051-2010
Gr.65 SA-516/SA516M, SA-20/SA-20M-ASME BPVC. II.A-2019
Gr.65 ASTM A516/516M-17; ASTM A20/A20M-2019

Pos.Nr. / *Item*	Band Nr. / *Band-No.*	Probe Nr. / *Test-No.*	Abmessungen / *Dimensions* (mm)	Masse / *Weight* (kg)	Band Stück	Stück Nr /Pieces
1.	E19573003,005	90000820651	1540x5x6160	6945	2	18
2.	E19574001	90000820652	1540x5x6160	4235	1	11

Radioactivity: We verify that the produced and delivered products don t increase the radioactivity in environment, the radioactivity is under the normal value of 100 Bq/kg.

Radioaktivität: Wir Bestätigen, das die von uns hergestellten und gelieferten Produkte in der Umwelt keine schädlichen Strahlenbelastungen verursachen, der spezifische Gammaaktivitätswert des Produktes befindet sich unter dem akzeptieren Wert von 100Bq/kg.

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ISD DUNAFERR

Abnahmeprüfzeugnis / Inspection Certificate

3.1./MSZ EN 10204-2005

2.Seite (2)

ISD DUNAFERR ZRT
2401 Dunaújváros,
Vasmű Tér 1-3.

Nr./Datum:
25311619/000002
14.05.2021.
1.Seite (2) Angeliné Zs. Noémi

1833/2021

H - 2400 Dunaújváros
Fax: (25) 584-781

Position Nr. *(Item)* / Schmelz Nr. *(Cast No)*	Chemische zusammensetzung in Gew. / *Chem. Composition of Cast* %													
	C	Mn	Si	P	S	Al	Cu	Cr	Ni	V	Nb	Mo	Ti	
	0,		0,	0,0	0,0	0,0	0,	0,	0,	0,0	0,0	0,	0,0	
Anforde-Rungen SA516Gr60	Max: 21	0,85 1,20	15 40	Max: 35	Max: 35	Min: 20	Max: 40	Max: 30	Max: 12	Max: 40	Max: 30	Max: 20		
					Ni+Cu+Cr+Mo<1,0% *Cr+Cu+Mo+Ni max:0,70				Cr+Mo<0,32% B:max:0,0010% ***B***:Schm:0,000 Stck:0,0000					
SA516Gr65	Max: 24	0,85 1,20	15 40	Max: 35	Max: 35	Min: 20	Max: 40	Max: 30	Max: 40	Max: 20	Max: 20	Max: 12		
*	Max: 10	0,85 1,20	15 25	Max: 25	Max: 10	Min: 20	Max: 30	Max: 30	Max: 30	Max: 20	Max: 20	Max: 080	Max: 30	
582093	09	1,03	23	17	05	43	16	11	06	02	01	010	01	

Posi-tion Nr. / *Item*	Prob. lage / *Pos.of sample* 1.)	Streck-grenze / *Yield stress* N/mm²	Zugfes-tigkeit / *Tensile streght* N/mm²	Dehnung / *Elon-gation* A_{5n} %	Falt probe/ *Bend test*	Warmstreck-grenze / *Warm Yield stress* N/mm²	°C	Prob. lage / *Pos. of sample* 1.)	ISO KV5/300Kerbschlagzähigkeit/ Arbeit / *Impact Value(MSZ EN ISO148-1:2017)* Prüf-temp. °C	Einzelwerte/ Unique values J			Mittel-wert	Bemer-kung / *Remarks*
Anforde Rungen/ requirement SA516GR60	q	Min: 220	415 550	Min: 25										
SA516GR65	q	Min: 240	450 585	Min: 23										
*	q		415 530	A5 Min:23				q	-50				14	
1.	Mq	373	478	34,5	o.B.			Mq	-50	50	52	52	51	
				A5				Ml	-20	88	93	93	91	
				32,9										
1.	Mq	371	479	33,9	o.B.			Mq	-50	48	52	45	48	
				A5				Ml	-20	76	79	82	79	
				32,6										
		Normalisert an / normalised at: 890°C +/-10 °C Haltezeit / Holding time: 8 min												

EK-12-a DAM/98 . 13.01.2020.// Rev.21.

* : Anforderungen des Kunden/ Requilements of the customer

1.) M: mitte / middlel: längs / longitudinal,
q: quer / transverse, t: tangential, z: senkrecht / vertical.

Der Werkssachverständige / Works inspector

ISD DUNAFERR Zrt.
Minőségügyi Főosztály
Szakértő: Horváth István
Eng.sz.: 26C-10530-13057
1032.

C63-AQU-QIX-002 135 / 917

Abnahmeprüfzeugnis nach EN10204:01.2005 - 3.1
Inspection Certificate according to EN10204:01.2005 - 3.1

MANFRED GELDBACH
Flansch und Fitting GmbH
Eschfeldstr. 11a
45894 Gelsenkirchen
Phone: +49209389880
Fax: +492093898811
info@manfred-geldbach.de
www.geldbach-gruppe.de

Zeichen des Herstellers Manufacturer's mark	MG	**Zeichen des Abnahmebeauftragten** Inspector's stamp	S G
Debitor Customer		**Datum** Date 25.08.23	**Prüfungsnr.** Test Cert. No. PRPF-23-1027
Auftragsnr. Your Order No. PO-23-0075/SO-23-0076/ZD/0013/04/2023/GEPO/		**Lieferungsnr.** Shipment No. DEL-23-0395	**Lieferdatum** Shipment Date 19.10.23

Prüfgrundlagen Requirements	**Lieferzustand** Delivery condition	**Werkstoff** Material
EN10222-4	QT=quenched 900°C/Water,tempered 600°C/Air	P355QH1

Pos. Nr. Pos. No.	**Menge** Quantity	**Abmessung** Dimension	**Schmelze Nr.** Heat No.	**Erschm.** Melting proc.
470	50,00	Flange EN1092-1/ TYP 11 Welding Neck Flange /PN63 Form B2/P355QH1 Chamfer unbevelled // TYP 11 Vorschweißflansch PN63 DN100/114,3 Form B2 s=11,25	2A12649	E

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Cu %	V %	Nb %	Al %	N %	CEV %				
0,18	0,24	1,31	0,014	0,006	0,02	0,003	0,005	0,006	0,002	0,002	0,03	0,006	0,404				

Mechanically Requirement

Tensile test DIN EN ISO 6892-1
Impact test DIN EN ISO148-1,
ISO V-Probe
Hardness test Brinell DIN EN
ISO 6506-1, HBW 2.5/187,5
test direction=tr

Chemical Requirement

1) Nb+V % <0,12

Mechanically Test	**R85-152**			
Yield strength Rp0,2 MPa	478			
Tensile strength Rm MPa RT	610			
Elongation A% (Lo=5do) RT	35,0			
Impact test -46°C (Joule)	103 109 117 Ø109,67			
Hardness HB	167			

Additional Test	
Dim.+visual insp. - 100% ok	
US-test acc. EN10228-3, QK 3	
Rawmaterial: China	
Forged: M.Geldbach Shanxi	
HS Code 730791	

Die gestellten Anforderungen sind erfüllt / The requirements are fulfilled:

Carsten Neuhäuser (Abnahmebeauftragter/Workinspector)

Zugelassener Hersteller nach ISO 9001, AD2000-W0, sowie DGR 2014/68/EU, Anhang I, Abs. 4.3 gemäß Zertifikat des TÜV Nord / Approved manufacturer acc. ISO 9001, AD2000-W0 and PED 2014/68/EU, Annex I, Para. 4.3 corresponding to certificate of TÜV Nord

Dieses Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig / This certificate is issued by data system an valid without signature

Wird das Ausgabejahr der Norm nicht angegeben, gilt die zum Zeitpunkt der Ausstellung des Zeugnisses gültige Norm / The components detailed on this certificate complied with the valid specification(s) issued at the date of manufacture.

CS-3905

ŽELEZIARNE PODBREZOVA

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo *Number* *Nummer* **57186/1/2020**

List č. - *Sheet No.* - *Blatt Nr* . 1 / 4

Č.ext.obj. - External order No. - Externauftragsnummer:
E3383

Číslo položky - Item number - Positionsnummer:
1

Číslo zákazky výrobcu - Manufacturer's works order number - Werksauftragsnummer:
229088/1/1 2043562

Číslo dopravného prostriedku - Transport No. - Waggon Nr.:
BR720CT BR127YF

Číslo ložného listu - *Loading Bill No* - *Ladebrief Nr* :
3010805

Číslo avíza - *Dispatch note* - *Lieferanzeige*:
3027669

Zákazník/Príjemca. - Customer/Consignee - Besteller/Empfanger:

Bepelog Kft
3043 Egyházasdengeleg
Rákóczi út 40
HU

0221789804

Výrobok - *Product* - *Erzeugnis*:

Rúry oceľové bezošvé, valcované za tepla - rúry pre tlakové účely
Seamless hot finished steel tubes - Tubes for pressure purposes
Nahtlose warmgewalzte Stahlrohre - Rohre fur Druckbeanspruchungen

Vonkajší priemer - Outside diameter - Aussendurchmesser:	**26.900** mm
Hrúbka steny - Wall thickness - Wanddicke:	**4.000** mm
Dĺžka - Length - Länge:	min.**6000** mm max.**6500** mm
Počet kusov - Number of pieces - Stuckzahl:	**362**
Celková dĺžka - Total length - Gesamtlänge:	**2200.00** m
Celková hmotnosť - Total mass - Gesamtmasse:	**5012.00** kg

Značka výrobcu - *Symbol of the manufacturer's work* - *Herstellerzeichen*

Pečiatka závodného znalca - *Works inspector's stamp* - *Stempel des Werks Sachverstandingen*

Materiál - *Material* - *Material*.

E355+N EN 10297-1 :2003, P355NH TC1 EN 10216-3 :2013, S355J2H EN 10210-1 :2006

Stav dodania - *Products as delivered condition* - *Lieferzustand*:

Normalizačné tvárnenie - *Normalizing forming* - *Normalisierendes Umformen*

Technické predpisy - *Technical requirements/Demand* - *Prufgrundlagen/ Anforderungen*:

VdTUV-Werkstoffblatt 354/2,AD 2000-Merkblatt W4, EN 10210-1 :2006, EN 10216-3 :2013, EN 10297-1 :2003, EN 10025-2 Tabelle 1 Classe 3, EN 10210-2 Tabelle 2, EN 10216-3 Tabelle 9, EN 10297-1 Tabelle 15, PED 2014/68/EU

Číslo tavby *Cast number* *Schmelze Nr*	Počet kusov *Number of pieces* *Stuckzahl*	Dĺžka *Length* *Lange* [m]	Hmotnosť *Mass* *Masse* [kg]	Druh tavenia *Steelmaking process* *Erschmelzungsart*
4285	362	2200	5012	E

E = elektrická oblúková pec - *electric arc furnace* - *elektrolichtbogenofen*

Druh ocele - *Steel grade* - *Stahlsorte*:

úplne ukludnená oceľ* - *fully killed steel* - *vollberuhigter Stahl

Miesto *Location* *Ort* v Podbrezovej koll

Dátum *Date* *Datum* 11.12.2020

Závodný znalec *Works Inspector* *Der Werks Sachverstandige* Ing. Čižmárik Miroslav

Železiarne Podbrezová a.s., Kolkárska 35, 976 81 Podbrezová, Slovak Republic
Phone +421 48 645 1011, Fax +421 48 645 3032 www.steelnube.sk
CIN 31 562 141, VAT No SK2020458704
Bank account Slovenská sporiteľňa, a.s., IBAN SK69 0900 0000 0000 7990 0086, SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banská Bystrica, Section Sa, Entry No 69/S

ŽELEZIARNE PODBREZOVA akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

Auftr: 202111427/LANG/ Datum 20210322 Dim: 26.9/4/S355J2H/E355+N/P355NH-TC1 Bestell: Proj: Meter: 24.00

04-CS-3905 26,9x4 P355NH

CS-3905

ŽELEZIARNE PODBREZOVA

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo *Number* *Nummer* **57186/1/2020**

Uprava povrchu - *Surface protection* - *Oberflachenschutz*

Bez úpravy povrchu (neolejované) - *Without surface treatment (without oil)* - *Ohne Oberflächenbehandlung (ungeölt)*

Chemické zloženie - *Chemical composition* - *Chemische Zusammensetzung*

Číslo tavby *Cast number* *Schmelze Nr*		C [%]	Mn [%]	Si [%]	P [%]	S [%]	Cu [%]	Cr [%]	Ni [%]	Al [%]	Mo [%]	Ti [%]	V [%]	Nb [%]
	Predpis *Requirements* *Vorschrift*													
	min		0 90	0 14						0 020				
	max	0 20	1 60	0 25	0 035	0 010	0 30	0 30	0 50		0 08	0 040	0 100	0 050
4285		**0.19**	**1.24**	**0.22**	**0.013**	**0.007**	**0.19**	**0.07**	**0.06**	**0.024**	**0.02**	**0.001**	**0.005**	**0.001**

Číslo tavby *Cast number* *Schmelze Nr*		N [%]	Exp.1 [%]
	min		
	max	0 0200	
4285		**0.0090**	**0.43**

Exp 1 = Ceq = C + Mn/6 + (V+Mo+Cr)/5 + (Ni+Cu)/15

Skuška ťahom - *Tensile test* - *Zugversuch* 20 °C

C Nr	Číslo tavby *Cast number* *Schmelze Nr*	Vzorka č *Test sample No* *Probe Nr*	Rozmery *Dimensions* *Masse* [mm]	Smer odberu vzorky *Direction of the test piece* *Probenrichtung*	Medza kĺzu *Yield point Proof stress* *Streck Dehngrenze* ReH [MPa]	Pevnosť v ťahu *Tensile strength* *Zugfestigkeit* Rm [MPa]	Ťažnosť *Elongation* *Bruchdehnung* A5,65 [%]
	Predpis Requirements Vorschrift			min	355	490	22 0
				max	---	630	---
1	**4285**	**A053088/20**	**13 05x4 15**	**L**	**410**	**574**	**29.1**
2	**4285**	**A053089/20**	**13 06x4 16**	**L**	**406**	**570**	**28.9**

Skuška razom v ohybe Charpy - *Charpy impact test* - *Kerbschlagbiegeversuch nach Charpy* EN ISO 148-1

C Nr	Číslo tavby *Cast number* *Schmelze Nr*	Vzorka č *Test sample No* *Probe Nr*	Predpis *Requirement* *Vorschrift* min max [J]	Jednotlivé hodnoty *Individual values* *Einzelwerte* [J]	Priemerna hodnota *Mean value* *Mittelwerte* [J]	Teplota skušania *Test temperature* *Prüftemperatur* [°C]
1	**4285**	**A053088/20**	**KV 40 - ---**	**128, 132, 136**	**132**	**-20**

C Nr	Vzorka č *Test sample No* *Probe Nr*	Rozmery *Dimensions* *Masse* [mm]	Smer odberu vzorky *Direction of the test piece* *Probenrichtung*
1	A053088/20	10 00x2 50	L

Skuška stlačením vyhovela
Flattening test without objections
Faltversuch ohne Beanstandung

Skuška rozširovaním vyhovela
Flaring test without objections
Aufweitversuch ohne Beanstandung

Miesto v Podbrezovej *Location* *Ort* koll

Datum 11.12.2020 *Date* *Datum*

Zavodny znalec *Works Inspector* *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a s Kolkáren 35 976 81 Podbrezová Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www.zeleziarne.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenská sporiteľňa a s IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banská Bystrica Section Sa Entry No 649/S

ŽELEZIARNE PODBREZOVA akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality -1-

04-CS-3905 26,9x4 P355NH

CS-3905

ŽELEZIARNE PODBREZOVÁ

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **57186/1/2020**

Skuška vírivými prúdmi vyhovela
Eddy current test without objections
Wirbelstromprüfung ohne Beanstandung
EN ISO 10893 -1 100 %

Material nie je kontaminovany ortut'ou
Material has no contamination by mercury
Material ist nicht kontaminiert mit Quecksilber

System kvality vyrobcu je certifikovany fy SGS podľa ISO 9001, číslo certifikatu HU95/4628 platnosť certifikatu je do 15 6 2023
Producer s Quality Assurance Sytem is certified according to ISO 9001 by SGS certificate no HU95/4628 validity 15 6 2023
Das Qualitatssystem des Herstellers ist nach ISO 9001 von SGS zertifiziert Zertifikatsnummer HU95/4628 Gultigkeit bis 15 6 2023

Rury su normalizačne valcovane podľa EN 10210-1-6 4
Tubes are normalized rolled under EN 10210-1-6 4
Rohren sind normalisierend gewalzt nach EN 10210-1-6 4

Radioizotopicka aktivita je max 100 Bq/kg
Radioisotopic activity is max 100 Bq/kg
Radioisotopische Aktivitat ist max 100 Bq/kg

Skušky ťahom za tepla podľa AD 2000-Merkblatt W4, časť 3 3 neboli vykonane so suhlasom TUV NORD Systems, TUV-file 18B03/012
With the approval of TUV NORD Systems TUV-file 18B03/012 hot tensile tests according to AD 2000-Merkblatt W4 section 3 3 have not been carried out
Verzicht auf Warmzugversuche gemass AD 2000-Merkblatt W4 Abschnitt 3 3 mit Zustimmung der TUV NORD Systems TUV-Az 18B03/012

Inšpekčny certifikat EN 10204 3 1 podľa AD 2000 W4 , časť 5 1, vydany na zaklade pisomneho suhlasu TUV NORD System, TUV–dokument 1326W133360
Inspection certificate EN 10204-3 1 acc to AD 2000-Guideline W4 sec 5 1 letter of agreement by TUV NORD Systems TUV-file 1326W133360
Abnahmeprüfzeugnis EN 10204-3 1 gemaß AD 2000-Merkblatt W4 Abs 5 1 Zustimmungsschreiben der TUV NORD Systems TUV-Az 1326W133360

System kvality vyrobcu bol podrobeny špecifickemu hodnoteniu pre materialy (Článok 4 3 a 7 5, Priloha I Smernice PED 2014/68/EU) Certifikat 07/202/9150/WZ/0915/20 vydalo notifikovane miesto 0045 TUV NORD Systems GmbH s platnosťou do 02/2023 Rozsah platnosti certifikatu zahŕňa predmetne vyrobky
The producer has a specific reviewed quality system for materials according to the Article 4 3 and 7 5 Annex I of the Directive PED 2014/68/EU
The certificate 07/202/9150/WZ/0915/20 with the validity till 02/2023 was issued by the Notified Body TUV NORD Systems GmbH Code 0045
The mentioned products belong to the certificate validity range
Der Hersteller hat ein spezifisch beurteiltes Qualitatssystem für die Werkstoffe nach dem Artikel 4 3 und 7 5 Anhang I der Direktive DGRL 2014/68/EU Das Zertifikat 07/202/9150/WZ/0915/20 gultig bis 02/2023 wurde von der Benannten Stelle TUV NORD Systems GmbH Kennummer 0045 erstellt Die aufgeführten Produkte sind im Geltungsbereich des Zertifikates eingeschlossen

Rury su vhodne na žiarovu galvanizaciu v zmysle EN 10025-2, tabuľka 1, trieda 3
Tubes are suitable for hot dip galvanizing acc to EN 10025 Table No 1 Class 3
Die Rohren sind für das Feuerverzinken nach EN 10025-2 die Tabelle Nr 1 die Klasse 3 geeignet

Miesto / *Location* / *Ort* v Podbrezovej koli

Datum / *Date* / *Datum* 11.12.2020

Zavodny znalec / *Works Inspector* / *Der Werks Sachverstandige* **Ing. Čižmárik Miroslav**

Železiarne Podbrezová a s Kolkáreň 35 976 81 Podbrezová Slovak Republic
Phone +421 48 645 3011 Fax +421 48 645 3032 www.steelabe.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenská sporitelňa a s IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Regester of Business Names in the District Court Banská Bystrica Section Sa Entry No 69/S

ŽELEZIARNE PODBREZOVÁ akciová spoločnosť 976 81 Podbrezová Oddelenie kontroly a zabezpečovania kvality

04-CS-3905 26,9x4 P355NH
Page 3 of 4

04-CS-3905 26,9x4 P355NH

CS-3905

ŽELEZIARNE PODBREZOVÁ

Inšpekčný certifikát
Inspection certificate
Abnahmeprüfzeugnis
EN 10204:2004/3.1

Číslo / *Number* / *Nummer* **57186/1/2020**

Všetky výrobky vyhovujú vyššie uvedeným normám a požiadavkám v objednávke.
All products meet requirements of above mentioned standards and requirements specified in the order.
Alle Produkte entsprechen den o.a. Normen und Forderungen in der Bestellung.

Vizuálna kontrola a rozmery vyhoveli (100 %).
Visual inspection and dimensional check without objections (100 %).
Visuelle Kontrolle und Abmessungskontrolle sind in Ordnung (100 %).

CE 07 0045-CPR-0915	Železarne Podbrezová a.s. Kolkárek 35 976 81 Podbrezová Slovenská republika S355J2H EN 10210-1 2006 Hot finished structural hollow sections of non alloy and fine grain steels Declaration of performance DP 003
Declaration of performance DP xxx	http://www.steeltube.sk/Product_certificates/

Overenie základných parametrov dokumentu kontroly v informačnom systeme vyrobcu ŽP a. s.
Verification of basic parameters of inspection document in the ZP information system (Manufacturers information system)
Die Verifizierung der Grundparameters der Prufbescheinigung im ZP Informationssystem (Herstellers Informationssystem)
https://check.zelpo.sk/certchk.php?ID=1527799068

Miesto v Podbrezovej *Location* *Ort*	koll	Dátum 11.12.2020 *Date* *Datum*	Závodný znalec *Works Inspector* *Der Werks Sachverstandige*	Ing. Čižmárik Miroslav

Železarne Podbrezová a.s. Kolkárek 35 976 81 Podbrezova Slovak Republic
Phone +421 48 645 3031 Fax +421 48 645 3032 www.steeltube.sk
CIN 31 562 141 VAT No SK2020458704
Bank account Slovenska sporitelna a.s. IBAN SK69 0900 0000 0000 7990 0086 SWIFT (BIC) GIBASKBX
Registered in Register of Business Names in the District Court Banska Bystrica Section Sa Entry No 6905

ŽELEZIARNE PODBREZOVÁ akciová spoločnosť 976 81 Podbrezová
Oddelenie kontroly a zabezpečovania kvality -1-

C63-AQU-QIX-002 140 / 917

HY-LOK CORPORATION

97,Noksansandan 27-ro,Gangseo-gu,Busan
618-270 Korea
Tel : 82.51.970.0940
Fax : 82.51.931.7923
www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202304-2275
PO No. : 202240847
POR No. : -
Date of issue : Apr-17-2023

HCD No	Description (Part Name)	Q'ty
DZN	Male Pipe Weld Connector 8mmOD-1/4"NPS(ACWC8M-4P)	8 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.010	0.22	1.65	0.038	0.024	10.12	16.19	2.69								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
622	701	47	78	

Remarks
* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

ISSUE No. : -

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

C63-AQU-QIX-002 141 / 917

L-7290

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
Certificat de reception 3.1
DIN EN 10204
(A02)

Nr./No./N° (A03) **1999922**
Seite/Page/Page 1/5
Datum/Date/Date 07.04.2022

Nr. (A07) G21-2504 2/2 09.12.2021
Besteller UnionStahl GmbH
Purchaser 47229 Duisburg
Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werksauftrags-Nr. 0001441116
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090067286
Dispatch note No. 04.04.2022
Avis d'expédition N°

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Abnahme WS
Inspection
Reception
(A05)

Kennzeichnung des Materials / Marking of the product / Marquage du produit (B06)
Herstellerzeichen/Stahlsorte/Schmelzen-Nr/Erzeugnis-Nr/
Sachverständigenstempel
Trademark/Steelgrade/Heat-No/Product-No/Inspector´s stamp
Sigle de l´usine/Nuance de l´acier/N° coulée/N° produit/
Poinçon de l´expert

Materialdaten / Material data / Données des matériaux (B01-B99)

Pos. Item Poste	Anzahl Quantity Nombre (B08)	Erzeugnis-Nr. Product No. N° produit (B07)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Lieferzustand Cond. of delivery Etat de livraison (B04)	Dicke x Breite x Länge Thickness x Width x Length Epaisseur x Largeur x Longueur (B09-B11) mm x mm x mm
05	38	1945282	41266	N	6,00 x 2000,0 x 6000
Σ	38	Gewicht Weight Poids (B12) 21.730 kg kgs kgs		N: normalisiert / normalized / normalisé	

Maßprüfung und Sichtkontrolle auf äußere Beschaffenheit: ohne Beanstandung
Dimensional check and visual examination of the surface condition:
without objection
Contrôle dimensionnel et examen visuel de l'état de surface: satisfaisants

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)
Koerfer

Diese durch ein geeignetes Datenverarbeitungssystem erstellte Bescheinigung ist gemäß EN 10 204, Abschnitt 5, ohne Unterschrift gültig.
This certificate was prepared by a suitable data processing system and is valid without signature according to EN 10 204, section 5.
Ce certificat a été établi par un système adéquat de traitement de données, il est valable sans signature selon EN 10 204, section 5.

C63-AQU-QIX-002 142 / 917

L-7290

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
Certificat de reception 3.1
DIN EN 10204
(A02)

Nr./No./N° (A03) **1999922**
Seite/Page/Page 2/5
Datum/Date/Date 07.04.2022

Nr. (A07) G21-2504 2/2 09.12.2021
Besteller UnionStahl GmbH
Purchaser 47229 Duisburg
Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Werksauftrags-Nr. 0001441116
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090067286
Dispatch note No. 04.04.2022
Avis d'expédition N°

Abnahme WS
Inspection
Reception
(A05)

Schmelzenanalyse / Ladle analysis / Analyse de coulée (C70-C99)

Schmelzen-Nr. Heat No. N° Coulée (B07)	C % ≤0,20	Si % ≤0,40	Mn % 0,80 - 1,40	P % ≤0,025	S % ≤0,010	N % ≤0,012	Al % ≥0,020	Cu % ≤0,30	Cr % ≤0,30	Ni % ≤0,30
41266	0,15	0,17	0,88	0,010	0,002	0,004	0,031	0,04	0,06	0,04
Schmelzen-Nr. Heat No. N° Coulée (B07)	Mo % ≤0,08	Nb % ≤0,020	Ti % ≤0,03	V % ≤0,02	EV1 1) % ≤0,70	Al/N	EV2 2) %			
41266	0,01	0,001	0,001	0,001	0,15	7,750	0,32			

1) EV1: Cr+Cu+Mo+Ni
2) EV2: CEV=C+Mn/6+Mo/5+Ni/15+Cr/5+V/5+Cu/15

Stahlherstellung: Sauerstoffaufblasverfahren
Steel making: Basic oxygen process
Fabrication d´acier: Procédé au convertisseur à l´oxygène
(C70)

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

Diese durch ein geeignetes Datenverarbeitungssystem erstellte Bescheinigung ist gemäß EN 10 204, Abschnitt 5, ohne Unterschrift gültig.
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C63-AQU-QIX-002 143 / 917

L-7290

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1
Certificat de reception 3.1
DIN EN 10204
(A02)

Nr./No./N° (A03) **1999922**
Seite/Page/Page 3/5
Datum/Date/Date 07.04.2022

Nr. (A07) G21-2504 2/2 09.12.2021
Besteller UnionStahl GmbH
Purchaser 47229 Duisburg
Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Werksauftrags-Nr. 0001441116
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090067286
Dispatch note No. 04.04.2022
Avis d'expédition N°

Abnahme WS
Inspection
Reception
(A05)

Zugversuch / Tensile test / Essai de traction (C10-C29)

Proben-Nr. Specimen No. N° éprouvette (C00)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Ort Location Lieu (C01) 1) 2) 3)	Richt. Direct. Orient. (C02) 4)	Zustand Cond. Cond. (B05) 5)	Form Type Type (C10) 6)	Dehngrenze Yield strength Limite d'élasticité (C11) Rp0,2 MPa ≥ 265	Zugfestigkeit Tensile strength Résistance (C12) Rm MPa 410 - 530	Bruchdehnung Elongation Allongement (C13) A5 7) % ≥ 22		
1945282	41266	M4G	Q	N	P	330	472	33		

1) M: 1/2 Länge / 1/2 Length / 1/2 Longueur
2) 4: 1/4 Breite / 1/4 Width / 1/4 Largeur
3) G: Erzeugnisdicke / Thickness of product / Epaisseur du produit
4) Q: quer / transversal / transversal
5) N: normalisiert / normalized / normalisé
6) P: prismatisch / prismatic / prismatique
7) A5: Lo=5,65 √So

Warmzugversuch / Hot tensile test / Essai de traction à chaud (C10-C29)

Proben-Nr. Specimen No. N° éprouvette (C00)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Ort Location Lieu (C01) 1) 2) 3)	Richt. Direct. Orient. (C02) 4)	Zustand Cond. Cond. (B05) 5)	Form Type Type (C10) 6)	Temperatur Temperature Température (C03) °C	Dehngrenze Yield strength Limite d'élasticité (C11) Rp0,2 MPa ≥ 155			
1945282	41266	M4G	Q	N	P	+300	286			

1) M: 1/2 Länge / 1/2 Length / 1/2 Longueur
2) 4: 1/4 Breite / 1/4 Width / 1/4 Largeur
3) G: Erzeugnisdicke / Thickness of product / Epaisseur du produit
4) Q: quer / transversal / transversal
5) N: normalisiert / normalized / normalisé
6) P: prismatisch / prismatic / prismatique

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

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L-7290

SALZGITTER FLACHSTAHL
Ein Unternehmen der Salzgitter Gruppe

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Acheteur
(A06)

Nr. (A07)
Empfänger UnionStahl GmbH
Customer 47229 Duisburg
Destinataire
(A06)

Erzeugnis Bandblech
Product Hot rolled sheet/plate
Produit Tôle à chaud
(B01)

Werkstoff und Lieferbedingung P265GH
Steel grade and terms of delivery DIN EN 10028-2 - 10/2017
Nuance et conditions de livraison DIN EN 10051 - 02/2011
(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Werksauftrags-Nr. 0001441116
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090067286
Dispatch note No. 04.04.2022
Avis d'expédition N°

Abnahme WS
Inspection
Reception
(A05)

Kerbschlagbiegeversuch / Impact test / Essai de résilience (C40-C49)

Proben-Nr. Specimen No. N° éprouvette (C00)	Schmelzen-Nr. Heat No. N° Coulée (B07)	Ort Location Lieu (C01) 1) 2) 3)	Richt. Direct. Orient. (C02) 4)	Zustand Cond. Cond. (B05) 5)	Probenform Type of specimen Type d'éprouvette (C40-C41)	Temperatur Temperature Tempèrature (C03) °C	Schlagarbeit Impact energy Energie de rupture (C42-C43) 1 J ≥ 11	2	3	MW 6) J ≥ 15
1945282	41266	M4O	Q	N	KV750/5,0	-020	72	81	79	77

1) M: 1/2 Länge / 1/2 Length / 1/2 Longueur
2) 4: 1/4 Breite / 1/4 Width / 1/4 Largeur
3) O: oberflächennah / near surface / près de la peau
4) Q: quer / transversal / transversal
5) N: normalisiert / normalized / normalisé
6) MW: Mittelwert / Average / Moyenne

Unsere Produkte sind frei von radioaktiven Stoffen. Der Freigabegrenzwert von 100 Bq/kg, der die Einhaltung der Grenzwerte der Strahlenschutzverordnung (StrlSchV) für die uneingeschränkte Freigabe von festen oder flüssigen Stoffen (StrlSchV Anlage 4, Spalte 3) für eisenverwandte Nuklide gewährleistet, wird nicht überschritten.

Our products are free of radioactive substances and do not exceed the clearing limit value of 100 Bq/kg, which guarantees the compliance with limit values given in the Radiation Protection Ordinance (StrlSchV) for the unrestricted clearance of solid material (StrlSchV Annex III, Section 5) for ferrous nuclides.

Nos produits ne contiennent aucun élément radioactif. La limite de 100 Bq/kg fixée par le décret concernant la protection contre la radioactivité (Strl SchV annexe III, colonne 5) pour les produits sidérurgiques n´est pas dépassée.

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
(Z02)

Koerfer

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Ein Unternehmen der Salzgitter Gruppe

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(B02-B03) DIN EN 10163-2 Kl.B UG3 03/05
AD 2000 Mbl-W1 04/20
2014/68/EU
TRD100

Werksauftrags-Nr. 0001441116
Works order No.
N° de commande
(A08)
Lieferschein-Nr. 0090067286
Dispatch note No. 04.04.2022
Avis d'expédition N°

Abnahme WS
Inspection
Reception
(A05)

Zertifiziert nach
Druckgeräte-Richtlinie 2014/68/EU durch die
TÜV CERT-Zertifizierungsstelle für Druckgeräte der
TÜV NORD GRUPPE; benannte Stelle, Kennnr. 0045
Zertifikats-Nr.: 07-202-1044-WP-0679/15

Certified acc. to
2014/68/EU TÜV CERT-Certification bodypressure equipment of the
TÜV NORD GRUPPE; notified body, Reg.No.: 0045
Certificate-No.: 07-202-1044-WP-0679/15

Certifié selon
Directive 2014/68/EU sur les équipements sous pression par la
Organisme de certification TÜV CERT pour les équipements sous pression
de la
TÜV NORD GROUP ; organisme notifié, numéro d'identification 0045
Zertifikats-Nr.: 07-202-1044-WP-0679/15

Es wird bestätigt, daß die Lieferung den Anforderungen der Lieferbedingung entspricht.
We hereby certify that the delivered material complies with the terms of the order.
Nous certifions que la fourniture répond aux conditions de livraison.
(Z01)

Herstellerzeichen
Trademark
Sigle du producteur
(A04)

Salzgitter Flachstahl GmbH
Eisenhüttenstr. 99
D-38239 Salzgitter
(A01)

AS Abnahmestempel
Inspection Stamp
Poinçon de l'expert
(Z03)

Abnahmebeauftragter
Inspection Representative
Représentant autorisé
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Koerfer

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C63-AQU-QIX-002 146 / 917

L-7290

element

Akkreditiertes Prüflabor nach DIN EN ISO 17025
(DAkkS Verfahrensnummer D-PL-11166-01-00) und
akkreditierte Inspektionsstelle Typ A nach DIN EN ISO 17020
(DAkkS Verfahrensnummer D-IS-11166-01-00)
für die in der Akkreditierungsurkunde aufgeführten Verfahren

Element Materials Technology Hamburg GmbH
Labor Mülheim
Lahnstr. 26, D 45478 Mülheim/Ruhr
Telefon: 0208 / 58 98 2 - 0
Telefax: 0208 / 58 98 2 - 10
info.muelheim@element.com
www.element.com

Prüfbericht für Werkstoffe

Test-report for materials

Prüf-Nr.: *Test-No.:* **22 07 0878 MH**

Auftraggeber: *Orderer:* UnionStahl GmbH, Europaallee 21, 47229 Duisburg

Auftrags-Nr.: *Order-No.:* B22-11460 Pirazol Kft.

Kunden-Nr.: *Customer-No.:* 349910

Werkstoff: *Material:* P265GH

Abnahmeges.: *Inspection by:* -

Werkstoff-Nr: *Material-No.:* 1.0425

Anlage zu : *Appendix to:*

Norm: *Specification:* DIN EN 10028-2:2003-09
Kundenvorgabe / to customer specification

Kontakt: *Contact:* Herr Michalak

Anzahl *Quant.*	Gegenstand *Object*	Abmessungen *Dimensions*	Schmelze *Heat-No.*	Bezeichnung *Description*	Proben-Nr. *Testpiece-No.*	Id.-Nr. *Id.-No.*
1	Probenstück / Test piece	D x B x L [mm] 12 x 150 x 150	672255	Blech-Nr. 4081011	-	G1623 / 1
1	Probenstück / Test piece	D x B x L [mm] 8 x 150 x 150	843822	Blech-Nr. 3102542	-	G1624 / 1
1	Probenstück / Test piece	D x B x L [mm] 6 x 150 x 150	41266	Blech-Nr. 1945282	-	G1625 / 1
1	Probenstück / Test piece	D x B x L [mm] 20 x 150 x 150	14833	Blech-Nr. 3423851	-	G1626 / 1

Prüfnormen: *Test specification:* DIN EN ISO 148-1

Anzahl *Quant.*	Gegenstand *Object*	Abmessungen *Dimensions*	Schmelze *Heat-No.*	Blech-Nr. *Plate-no.*	Proben-Nr. *Testpiece-No.*	Id.-Nr. *Id.-No.*
1	Probenstück / Test piece	D x B x L [mm] 12 x 150 x 150	672255	4081011	-	G1623 / 1

Hersteller *Manufact.*	Lieferzustand gem. Hersteller *Delivery condition acc. to manufacturer*
o. A. / not mentioned	o. A. / not mentioned

Bemerkungen: *Remarks:*

Kerbschlagbiegeversuch gem. DIN EN ISO 148-1 (2017-05)

Impact test acc. to DIN EN ISO 148-1 (2017-05) *G1623 / 1*

Probenform *Specimen type* : **Charpy-V** **Richtung** *Direction* : **Quer** *Transver.* **Breite** *Width [mm]* [mm] : **10**

KV2/KU (Kp 300J), max 80% (240J)			Einzelwerte [J] *Single values*			Mittelwert [J] *Average*
Temp.[°C]	min	27	27	27	27	
-30		215	258	261	245	

Mülheim/Ruhr, den 25.07.2022

element
Stempel

Goeken
Werkstoffprüfer

12-L-7453 Lv3x1500x3000 S235 11989

Inspection certificate 3.1 according to EN 10204 A02

C63 AQU QIX 002 147 / 017

U.S.Steel Košice,s.r.o. A01 Vstupný areál U.S.Steel 044 54 Košice SLOVAK REPUBLIC	Purchaser Art. No: 7H7SLBV4/02 A09 Works Order No: XC416104 A08 Advice No: 24/314020 01 A10 Your order: BRA12747 A07	DUTRADE Zrt. A06 Papírgyári út 49. 2400 DUNAUJVAROS Hungary
METALLURGICAL CERTIFICATE NO: X0249401/009 A03		B09 Size: 3,000 x 1500,0 x 3000,0 mm EN 10051/10
Desc. of goods: HOT ROLLED STEEL SHEETS B01 SHARPCUT		
Standard: EN 10025-2/19 B02	B03	Pcs: 213 B08 Net Weight: 22 780 kg B13 WeightT: 22 571 kg B12
Quality: S235JR+N B02	Delivery Note: X0249401 A10	

Unit No	Coil No	Heat B07	Unit No	Coil No	Heat B07
CA24100701001	1198901	11989	CA24100701005	1198901	11989
CA24100701002	1198901	11989	CA24100701006	1198901	11989
CA24100701003	1198901	11989	CA24100817006	5276909	52769
CA24100701004	1198901	11989	CA24100817007	5276909	52769

M E C H A N I C A L T E S T R E S U L T S

			Min. / Max.	Coil No 1198901	Coil No 5276909
C12	Rm(T)	(MPA)	360/510	431	420
C11	ReH(T)	(MPA)	235/	322	343
C13	A5(T)	(%)	24,0/	34,6	35,5

C02 Direction: (T)-transversal;

C71

C H E M I C A L C O M P O S I T I O N, %

	Min. / Max.	Heat No 11989	Heat No 52769		Min. / Max.	Heat No 11989	Heat No 52769
C	/0,17	0,12	0,12	Mn	/1,40	0,47	0,49
Si	/0,03	0,01	0,02	P	/0,035	0,014	0,011
Al	0,020/	0,034	0,038	N	/0,012	0,004	0,004
S	/0,035	0,007	0,016	Cr	/0,29	0,02	0,03
Cu	/0,55	0,03	0,05	CEV	/0,35	0,21	0,22
B	/	0,000	0,000	Mo	/0,11	0,00	0,00
Nb	/	0,00	0,00	Ni	/0,42	0,01	0,02
Ti	/	0,00	0,00	V	/0,10	0,00	0,00

THE MATERIAL IS IN COMPLIANCE WITH ORDER REQUIREMENTS. Z01

The measured weight-based activity of Co60 + Cs137 + Am241 radionuclide is not higher than 100 Bq/kg. D02

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F-USM/0063-04/10-01-12

Z04

CE 0090

06

0090-CPR-1178

DoP USSK-01/2022

www.usske.sk

Z05

Z02

Digitally signed by Ing. Vlasta Černáková
Date: 2024.02.06 10:51:49 CET
Reason: Zabezpečuje vierohodnosť pôvodu,

Z03

U. S. Steel Košice, s.r.o. 02
Vstupný areál U. S. STEEL
Odbor Analýzy kvality a špecifikácie
Uvoľňovanie výrobkov a Hutné atesty
044 54 Košice

Košice: 6.02.2024, 7:30:06

Z02

Ján Godina,AUTHORIZED INSPECTION REPRESENTATIVE.e-mail:InspectionDocument@sk.uss.com,tel.:+421-55-6739404

HEGESZTÉSI ÉS VARRATVIZSGÁLATI TERV

WEP_013-ST-2024-HP_rev0

Welding-seam examimination plan / Schweiß-Prüfplan

Munkaszám / *Work no. / Arbeitsn:*	**Megnevezés** / *Designation / Benennung:*	**Széria szám** / *Serial No / Seria N* **:**
013-ST-2024	**HP-100/40**	**GYP-2430134**

Készítette / *Prepared / Hersteller:*	**Dátum** / *Date / Datum:*	**Ellenőrizte** / *Controller / Kontrolleur:*	**Dátum** / *Date / Datum:*
Filius Balázs	2024.02.12		

Varratszám *Welding No Schweißnaht nummer*	**Varrat típusa** *Type of weld Nahtart*	**Alapanyagok** *Parent metal Werkstoff gruppe*	**WPS No.: WPQR No.:**	**Hegesztési eljárás** *Welding process Schweißverfahren*	**Hozaganyag** *Filler metal Zusatzwerkstoff*	**Roncsolásmentes vizsgálatok** *Non-destructive testing Zerstörungsfreiprüfung*				**Hegesztő neve / Beütő** *Welder name / Punch Schweißer / Einsschlag*
						VT	RT	UT	PT	
K1, K2	V	P235GH	WPS-GYP-0011_rev0	141	ESAB OK Tigrod 12.64					Danó Péter LO27
	5	P245GH	1417 ÉMI-TÜV 18.081-V105			100%	10%	-	100%	
						VT	RT	UT	PT	
N2B; N3B	V	P235GH	WPS-GYP-0003_rev0	141	ESAB OK Tigrod 12.64					Danó Péter LO27
	4,5		1417 ÉMI-TÜV 18.081-V105			100%	-	-	100%	
						VT	RT	UT	PT	
N4B	V	P235GH	WPS-GYP-0083_rev0	141	Corweld INOX TIG 309LSi					Danó Péter LO27
	5	316	ÉMI-TÜV 21.101-V129			100%	-	-	100%	

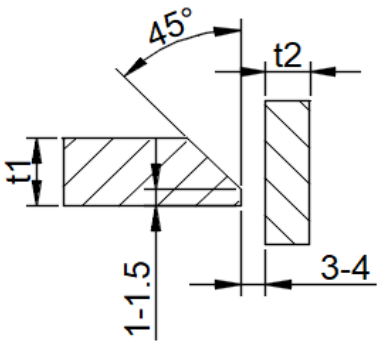
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

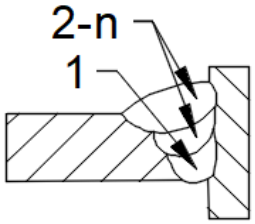
GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0003_rev0	*Hegesztő gép Welding machine*	-
WPQR száma *WPQR No.*	1417 ÉMI-TÜV 18.081-V105	Hegesztési helyzet (ISO 6947) *Welding position*	PA / PC / PF

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	BW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*





	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 P235-P355	S235-S355 P235-P355
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	1.1 / 1.2 (TR/ISO 15608)
Vastagság / Thickness t (mm)	3-24	2-16
Átmérő / Diameter ØD (mm)	>=25	>=25

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	ESAB OK Tigrod 12.64	EN ISO 636-A: W 46 4 4Si1	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	2,0	100 - 120	12 - 13	DC -	-	60 - 80	0,54 - 0,94
2-n	141	2,4	130 - 160	13 - 14	DC -	-	60 - 80	0,76 - 1,34

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munakdarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	*200*	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét Stamp	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.10.04		

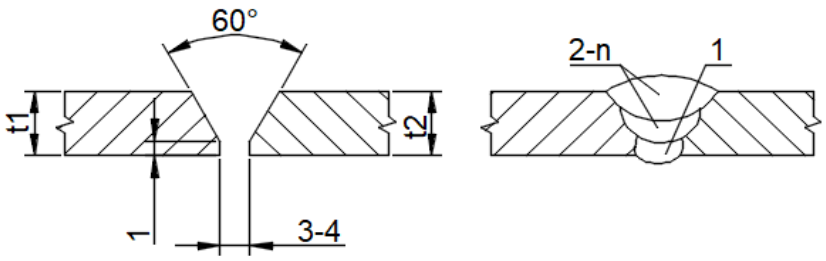
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0011_rev0	*Hegesztő gép* *Welding machine*	-
WPQR száma *WPQR No.*	1417 ÉMI-TÜV 18.081-V105	Hegesztési helyzet (ISO 6947) *Welding position*	PA / PC / PH

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	BW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*



	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 P235-P355	S235-S355 P235-P355
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	1.1 / 1.2 (TR/ISO 15608)
Vastagság / Thickness t (mm)	3-5	3-5
Átmérő / Diameter ØD (mm)	>=25	>=25

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	ESAB OK Tigrod 12.64	EN ISO 636-A: W 46 4 4Si1	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	2,0	85 - 95	11 - 12	DC -	-	60 - 70	0,48 - 0,68
2-n	141	2,4	90 - 120	12 - 13	DC -	-	60 - 80	0,49 - 0,94

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munakdarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	*200*	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét Stamp	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.10.10		

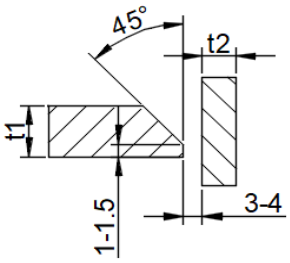
WPS - hegesztési utasítás
Welding Procedure Specification (ISO 15609-1)

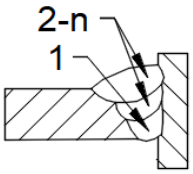
GYÉMÁNT-PIRAZOL KFT.

Gyártó *Manufacturer*	Gyémánt-Pirazol Kft.	Hegesztési eljárás (ISO 4063) *Welding process*	141 - TIG
WPS szám / revízió *WPS No. / revision*	WPS-GYP-0083_rev0	*Hegesztő gép* *Welding machine*	-
WPQR száma *WPQR No.*	ÉMI-TÜV 21.101-V129	Hegesztési helyzet (ISO 6947) *Welding position*	PA / PC / PH

A kötés kialakítása / *Joint details*

Kötéstípus / Weld type	BW	Előkészítés / *Joint preparation*	*Leélezés, zsírtalanítás, heftelés*





	Alapanyag 1 / *Material 1*	**Alapanyag 2 / *Material 2***
Alapanyag / *Base material*	S235-S355 / P235-P355	1.4301 / 1.4306 / 1.4307 / 1.4404 / 1.4435 / 1.4541 / 1.4571
Anyagcsoport / *Material group*	1.1 / 1.2 (TR/ISO 15608)	8.1 (TR/ISO 15608)
Vastagság / Thickness t (mm)	3-16	2-16
Átmérő / Diameter ØD (mm)	>=21,3	>=21,3

Hegesztő anyagok, fedőpor / *Filler metals, SAW-flux*

Hegesztési eljárás *Welding process*	Gyártó, típus *Brand, type*	Szabványos megnevezés *Standard designation*	Szárítás (°C, h) *Drying*
141	Corweld INOX TIG 309LSi	EN ISO 14343-A: W 23 12 L Si	-

Védőgázok / *Shielding gas*

Hegesztési eljárás *Welding process*	Név, szabványos jelölés *Name, specification*	Gázterelő átmérője (mm) *Nozzle diameter*	Gázmennyiség (l/min) *Gas flow*
141	Ar4.6 (ISO 14175 I1)	8-12	10-12
öblítés / backing	Ar4.6 (ISO 14175 I1)	-	5-6

Hegesztéstechnológiai adatok / *Welding parameters*

Varratsor *Layers*	Hegesztési eljárás *Welding process*	Hozaganyag átmérője *Filler metal diameter (ø mm)*	Áramerősség *Current (A)*	Ívfeszültség *Voltage (V)*	Áramnem, polaritás *Current type and polarity*	Huzalelőtolási sebesség *Wire feed speed (m/min)*	Hegesztési sebesség *Travel speed (mm/min)*	Fajlagos hőbevitel *Heat input (kJ/mm)*
1	141	1,6	80 - 100	11 - 12	DC -	-	60 - 70	0,5 - 0,7
2-n	141	2,0	80 - 100	12 - 13	DC -	-	60 - 80	0,4 - 0,8

Volfrámelektróda típusa és mérete (ISO 6848-ø mm) *Thungsten electrode type and diameter*	WG La17Zr0,8Y0,8 Ø3,2 (lila / purple)	Pisztoly dőlési szöge *Torch angle*	-
Az áramátadó és a munakdarab távolsága (mm) *Distance contact tube / work piece*	-	Ívelés max. szélessége (mm) *Weaving, max. width of run*	-
Előmelegítési hőmérséklet / *Preheat temperature (°C)* Hegesztés közbeni hőmérséklet / *Preheat maintenance temp.*	-	Anyagátmenet *Mode of metal transfer*	-
Rétegek közötti max.hőmérséklet / *Interpass max. temp. (°C)*	*100*	Gyökfaragás részletei *Details of back gaugung*	-

Hegesztés utáni hőkezelés / *Postweld heat treatment*

Hőmérséklet / *Temperature (°C)*	-	Hőntartási idő / *Holding time (min)*	-
Hevítési sebesség / *Temp. rise rate (°C/min)*	-	Hűtési sebesség / *Temp. fall rate (°C/min)*	-

Készítette *Authorized by*	Filius Balázs	Pecsét Stamp	International Institute of Welding IWE B. Filius HU 00550 Issue date: 17/12/2015 Personnel Qualification System
Dátum *Date*	2022.12.15		

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

ÉMI-TÜV

HEGESZTŐ MINŐSÍTÉSI BIZONYÍTVÁNY

2	Megnevezés(ek)	**EN ISO 9606-1 141 T BW FM1 S s12 D49 H-L045 ss nb**
3	Gyártói heg. ut. (WPS):	4 Tanúsító szervezet - Vizsg. szám.: 1417 ÉMI-TÜV 22.157.0809
5	Hiv. szám (ha van):	LO27
6	A hegesztő neve:	**Danó, Péter** **LO 27**
7	A hegesztő azonosítója:	Ellenőrizve
8	Az azonosítás módja:	Személyi igazolvány
9	Születési idő és hely:	1968. 10. 09., Fehérgyarmat
10	Munkáltató:	PIRAZOL Kft.
11	Előírás/vizsg. szabvány:	MSZ EN ISO 9606-1:2017
	Megjegyzés: AD2000-HP3	
12	Szakmai ismeretek: megfelelt	

Fénykép (ha szükséges)

13		Vizsgálati adatok	Érvényességi tartomány
14	Hegesztési eljárás(ok)	**141**	141, 142, 143 és 145
15	Az anyagátmenet típusa		
16	Lemez vagy cső	**T (cső)**	T, P
17	Kötéstípus	**BW (Tompavarrat)**	BW (csőelágazás, szög >= 60°)
18	Alapanyagcsoport(ok)/-alcsoport(ok)	**1.1**	
19	Hozaganyagcsoport(ok)	**FM1**	FM1, FM2
20	Hozaganyag (megjelölés)	**S**	Gyök: S, nm; Többi: S, M, nm
21	Védőgáz		----------
22	Segédanyagok		----------
23	Áramnem típusa és polaritás	**DC(-)**	----------
24	Anyagvastagság t (mm)		
25	Varratvastagság s (mm)	**12**	s >= 3 mm
26	Cső külső átmérője D (mm)	**49**	D >= 25 mm
27	Hegesztési helyzet	**H-L045**	PA,PC,PE,PF,PH,H-L045
28	Hegfürdő megtámasztás	**ss nb**	ss nb, ss mb, bs, ss gb, ss fb
29	Több réteg/egy réteg		

30 Kiegészítő sarokvarratos vizsgálat (tompavarrattal együtt hegesztett): **nincs**

31 Egyéb információk: Kielégíti a 2014/68/EU irányelv (PED) (44/2016 (XI.28.) NGM rendelet) követelményeit

32 33	A vizsgálat megnevezése	Elvégezve és megfelelt	Nem szükséges
34	Szemrevételezés	**igen**	-
35	Radiográfiai / ultrahangos vizsgálat	**igen**	-
36	Törésvizsgálat	-	X
37	Hajlítóvizsgálat	-	X
38	Bemetszéses szakítóvizsgálat	-	X
39	Makroszkópos vizsgálat	-	X
40	Kiegészítő vizsglatok *)	-	X

*) ha szükséges, adatok kiegészítő lapon

Tanúsító személy és/vagy szervezet:
ÉMI-TÜV SÜD Kft.

ÉMI-TÜV SÜD Kft. Notified Body 1417 TÜV SÜD Group

Szentendre, 2022. 05. 16., Juhász Gergely
Név, dátum, aláírás
Tanúsító személy vagy szervezet

Hegesztés dátuma: 2022. 03. 31.
Érvényesség: **2025. 03. 30.**

42 Az érvényesség igazolása a szabvány **9.3 a)** fejezete szerint
Újraminősítés 3 év múlva

41 **6 havonkénti érvényesítés a hegesztési felelős/ minősítő, vagy tanúsító szervezet által (a 9.2 szakasz szerint)**

43

Dátum	Aláírás	Beosztás v. megszólítás
2022.09.30		IWE B. Filius HU 00550 Issue date: 17/12/2015
2023.03.30		
2023. 09. 30		

44

45

Dátum	Aláírás	Beosztás v. megszólítás

TÜV®

C63-AQU-QX-002-153 / 2007 ®

SZAKÉRTŐI MINŐSÉGI BIZONYÍTVÁNY (3.1) - Vegyelemzés
VIZSGÁLATI BIZONYLAT (2.2) - Mechanikai tulajdonságok/
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Kelt/Date: 2022-08-03 Bizonylat száma/Cert no: EC26875391 rev. 0

Rendelésünk/Our order:	0100572583	Vevõ rendelési száma/Your order:	1459-220802
Hivatkozásunk/Our ref:	HYBRIS PRD account	Vevõ hivatkozása/Your ref:	
Vevõ száma/Cust no:	HUB00075	Vevõ fax száma/Your fax:	
Vevõ rendelési dátuma/Your date:	20220802	Vevõ e-mail címe/Your e-mail:	

Számla címe/Invoice address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

A bizonylat címzettje/Cert receiver

Szállítási cím/Delivery address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

KISZÁLLÍTÁS/DELIVERY Adagszám/Lot no: PVW2111870 Mennyiség/Quantity: 225 KGM

TERMÉK/PRODUCT

Márkanév/Brand:	ESAB
Megnevezés/Desc:	OK Tigrod 12.64 1.6x1000mm 5kg
Cikkszám/Item no:	**126416R150**
Adagszám/Heat number:	**693026**

BESOROLÁSOK/CLASSIFICATIONS

EN ISO 636-A: W 4Si1
EN ISO 636-A: W 46 5 4Si1
SFA/AWS A5.18: ER70S-6

VEGYI ÖSSZETÉTEL/ CHEMICAL COMPOSITION

Actual results: acc to EN 10204 - 3.1

Wire/strip

Segédanyag/Auxiliary:

C		0.07%
Si		0.88%
Mn		1.66%
P		0.012%
S		0.009%
Cr		0.03%
Ni		0.01%
Mo	<	0.01%
Cu		0.06%
V	<	0.01%
Al	<	0.01%
Ti+Zr		0.01%

MECHANIKAI TULAJDONSÁGOK/MECHANICAL PROPS

Typical data: acc to 10204 - 2.2

Szabvány/Standard: EN
Segédanyag/Auxiliary: I1
Állapot/Condition:

SZAKÍTÓ SZILÁRDSÁG/TENSILE

ReL	Rm	A5
525 MPa	595 MPa	26 %

ÜTÕMUNKA/IMPACT

Temp	-40 °C	-50 °C
KV	150 J	90 J

MEGJEGYZÉSEK/COMMENTS

A terméket az EN ISO 9001 szabványnak megfelelõ minõségbiztosítási rendszerrel összhangban szállítottuk.
A bizonylat elektronikusan készült, aláírás nélkül érvényes.
Legyen szíves érdeklõdésével keresse:

ESAB Kft. 1083 Budapest, Bókay János u. 44-46., C6 épület, 7. emelet +36 1 382-12-00

Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically and is valid without signature.
Please refer any queries to: (see above)

Validation - Chemical Analysis
Josef Moravek Quality Manager

Validation - Others
H. Rasmuson Product Manager

Ellenőrzési bizonyítvány (3.1) – Kémiai elemzés
Tesztjelentés (2.2) – Mechanikai tulajdonságok
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Kelt/Date: 2023-08-18

Bizonylat száma/Cert no: EC27247226 rev. 0

Rendelésünk/Our order: 0100833590
Hivatkozásunk/Our ref: HYBRIS PRD account
Vevõ száma/Cust no: HUB00075
Vevõ rendelési dátuma/Your date: 20230807

Vevõ rendelési száma/Your 1430-233314
Vevõ hivatkozása/Your ref:
Vevõ fax száma/Your fax:
Vevõ e-mail címe/Your e-mail:

Számla címe/Invoice address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

A bizonylat címzettje/Cert receiver

Szállítási cím/Delivery address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

KISZÁLLÍTÁS/DELIVERY Adagszám/Lot no: PVX2810438 Mennyiség/Quantity: 75 KGM

TERMÉK/PRODUCT

Márkanév/Brand: ESAB
Megnevezés/Desc: OK Tigrod 12.64 2.0x1000mm 5kg
Cikkszám/Item no: 126420R150
Adagszám/Heat number: 330968
Mennyiség/Quantity: 75 KGM

BESOROLÁSOK/CLASSIFICATIONS

EN ISO 636-A: W 4Si1
EN ISO 636-A: W 46 5 4Si1
SFA/AWS A5.18: ER70S-6

VEGYELEMZÉS/CHEMICAL ANALYSIS

Actual results: acc to EN 10204 - 3.1

Wire/strip	
C	0.06%
Si	0.99%
Mn	1.65%
P	0.009%
S	0.009%
Cr	0.02%
Ni	0.01%
Mo	0.01%
Cu	0.05%
V	< 0.01%
Al	< 0.01%
Ti+Zr	< 0.01%

MECHANIKAI TULAJDONSÁGOK/MECHANICAL PROPS

Typical data: acc to 10204 - 2.2

Tensile

Standard	Shielding Gas	ReL [MPa/ksi]	Rm [MPa/ksi]	A5 [%]
EN	I1	525/76	595/86	26

Impact

Standard	Shielding Gas	Temp [°C/°F]	KV[J/ft-lb]
EN	I1	-40/-40	150/111
EN	I1	-50/-58	90/66

A4, A5 = Elongation
ReH = Upper Yield Point
ReL = Lower Yield Point
Rm = Ultimate Tensile Strength (UTS)
Rp0.2 = Yield Strength 0.2 offset
Rp1.0 = Yield Strength 1.0 offset

MEGJEGYZÉSEK/COMMENTS

A terméket az EN ISO 9001 szabványnak megfelelõ minõségbiztosítási rendszerrel összhangban szállítottuk.
A bizonylat elektronikusan készült.
Legyen szíves érdeklõdésével keresse:
ESAB Kft. 1083 Budapest, Bókay János u. 44-46., C6 épület, 7. emelet +36 1 382-12-00
Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically.
Please refer any queries to: (see above)

Érvényesség/Validation

Josef Moravek Quality Manager Helene Rasmuson Product Manager

Ellenőrzési bizonyítvány (3.1) – Kémiai elemzés
Tesztjelentés (2.2) – Mechanikai tulajdonságok
INSPECTION CERTIFICATE (3.1) - Chemical analysis
TEST REPORT (2.2) - Mechanical properties

Kelt/Date: 2023-11-30

Bizonylat száma/Cert no: EC27356092 rev. 0

Rendelésünk/Our order: 0100911921
Hivatkozásunk/Our ref: Anikó Seregné Horváth
Vevõ száma/Cust no: HUB00075
Vevõ rendelési dátuma/Your date: 20231130

Vevõ rendelési száma/Your 2023.11.30.
Vevõ hivatkozása/Your ref:
Vevõ fax száma/Your fax:
Vevõ e-mail címe/Your e-mail:

Számla címe/Invoice address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

A bizonylat címzettje/Cert receiver

Szállítási cím/Delivery address
SKATT KFT.
RÁKÓCZI ÚT 59.
3100 SALGÓTARJÁN
Hungary

KISZÁLLÍTÁS/DELIVERY Adagszám/Lot no: PVX4312480 Mennyiség/Quantity: 75 KGM

TERMÉK/PRODUCT

Márkanév/Brand: ESAB
Megnevezés/Desc: OK Tigrod 12.64 2.4x1000mm 5kg
Cikkszám/Item no: 126424R150
Adagszám/Heat number: 32246
Mennyiség/Quantity: 75 KGM

BESOROLÁSOK/CLASSIFICATIONS

EN ISO 636-A: W 4Si1
EN ISO 636-A: W 46 5 4Si1
SFA/AWS A5.18: ER70S-6

VEGYELEMZÉS/CHEMICAL ANALYSIS

Actual results: acc to EN 10204 - 3.1

Wire/strip	
C	0.06%
Si	0.94%
Mn	1.66%
P	0.013%
S	0.014%
Cr	0.04%
Ni	0.01%
Mo	< 0.01%
Cu	0.04%
V	< 0.01%
Al	< 0.01%
Ti+Zr	0.02%

MECHANIKAI TULAJDONSÁGOK/MECHANICAL PROPS

Typical data: acc to 10204 - 2.2

Tensile

Standard	Shielding Gas	ReL [MPa/ksi]	Rm [MPa/ksi]	A5 [%]
EN	I1	525/76	595/86	26

Impact

Standard	Shielding Gas	Temp [°C/°F]	KV[J/ft-lb]
EN	I1	-40/-40	150/111
EN	I1	-50/-58	90/66

A4, A5 = Elongation
ReH = Upper Yield Point
ReL = Lower Yield Point
Rm = Ultimate Tensile Strength (UTS)
Rp0.2 = Yield Strength 0.2 offset
Rp1.0 = Yield Strength 1.0 offset

MEGJEGYZÉSEK/COMMENTS

A terméket az EN ISO 9001 szabványnak megfelelõ minõségbiztosítási rendszerrel összhangban szállítottuk.
A bizonylat elektronikusan készült.
Legyen szíves érdeklõdésével keresse:
ESAB Kft. 1083 Budapest, Bókay János u. 44-46., C6 épület, 7. emelet +36 1 382-12-00
Product supplied under a QA Programme fulfilling the EN ISO 9001 standard.
This certificate is produced electronically.
Please refer any queries to: (see above)

Érvényesség/Validation

Josef Moravek Quality Manager Helene Rasmuson Product Manager

GYÉMÁNT-PIRAZOL KFT.	**Szemrevételezéses vizsgálati jegyzőkönyv** *Visual test record*	**Sorszám** / *No.:* VT- 013-ST-2024-2

Megnevezés: *Product name*	**HP-100/40 vessel**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430134**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-02-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Vizsgálati adatok / *Test data*

Vizsgálati előírás: *Regulation*	**MSZ EN ISO 17637**	**Átvételi követelmény:** *Requirement*	**EN ISO 5817-B**
Vizsgálati terjedelem: *Test scope*	**100%**	**Felület állapota:** *Surface condition*	**Tisztított** *Cleaned*
Eszközök: *Tools*	**Mérőszalag, varratmérő, elemlámpa** *Tape measure, seam gauge, flashlight*		

Vizsgálat eredménye / *Result of examination*

A szemrevételezéses vizsgálat során a nyomáshatároló és a teherviselő hegesztési varratokon, valamint a varratok környezetében a hőhatás övezetben nemmegfelelőség nem észlelhető.

During the visual inspection, non-conformance on pressure-limiting and load-bearing seams or in the heat-affected zone is not detected.

Megjegyzés / *Remark*:

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.20

Vizsgálatot végezte *Examined by:*		**Vizsgálatot jóváhagyta** *Approved by:*	
Név: *Name*	**Lázár Krisztián**	**Név:** *Name*	**Bakos Gyula**
Tanúsítvány száma: *Cert. No.*	**VT20102090504Ú**	**Tanúsítvány száma:** *Cert. No.*	**VT20101050201 Ú**
Aláírás: *Signature*		**Aláírás:** *Signature*	

GYÉMÁNT-PIRAZOL KFT.	**Folyadékbehatolásos vizsgálati jegyzőkönyv** *Penetration test record*	**Sorszám** / *No.*: PT- 013-ST-2024-2

Megnevezés: *Product name*	**HP-100/40 vessel**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430134**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-02-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Vizsgálati adatok / *Test data*			
Vizsgálati terjedelem: *Test scope*	**A WEP_013-ST-2024-HPrev0 hegesztési és vizsgálati terv szerint.** **Acc. to the WEP_013-ST-2024-HP_rev0 welding-seams examination plan**		
Vizsgálati előírás: *Regulation*	**MSZ EN ISO 3452**	**Átvételi követelmény:** *Requirement*	**MSZ EN ISO 23277 2X**
Behatolási idő: *Penetration time*	**15 min**	**Előhívási idő:** *Development time*	**15 min**
Felület állapota: *Surface condition*	**Tisztított / Cleaned**	**Tisztító folyadék:** *Washing fluid*	**MR-85**
Behatoló folyadék: *Penetrating fluid*	**MR-67 PS**	**Előhívó folyadék:** *Developing fluid*	**MR-70**

Vizsgálat eredménye / *Result of examination*

A folyadékbehatolásos vizsgálat során a vizsgált hegesztési varratokon, valamint a varratok környezetében a hőhatás övezetben jegyzőkönyvezendő hibajelzés nem észlelhető.

During the liquid penetration test, no fault indication is recorded on the welding seams and heat-affected zones.

Megjegyzés / *Remark*:

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.20

Vizsgálatot végezte *Examined by:*		**Vizsgálatot jóváhagyta** *Approved by:*	
Név: *Name*	**Bakos Gyula**	**Név:** *Name*	**Tari Szilárd**
Tanúsítvány száma: *Cert. No.*	**PT2202020012**	**Tanúsítvány száma:** *Cert. No.*	**PT2201614704**
Aláírás: *Signature*		**Aláírás:** *Signature*	

GYÉMÁNT-PIRAZOL KFT.	**Radiográfiai vizsgálati jegyzőkönyv** *Radiographic test record*	**Sorszám** / *No.:* RT- 013-ST-2024-2

Megnevezés: *Product name*	**HP-100/40 vessel**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430134**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-02-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Vizsgálati adatok / *Test data*

Készülék: *Machine*	**TELEDYNE ICM CP300D**	**Film típusa és mérete:** *Film type and size*	**FUJI IX80 10x16cm**
Erősítő fólia: *Screens*	**Pb**	**Huzaletalon:** *Image quality indicator*	**10 FE EN**
Csőfeszültség: *Tube voltage*	**160 kV**	**Csőáram:** *Tube amperage:*	**3 mA**
Expozíció ideje: *Exposure time*	**15 sec**	**Film-fókusz távolság:** *Film-focus distance*	**500 mm**
Feketedés: *Density*	**>=2,3**	**Megjegyzés:** *Remarks*	**10 %**
Vizsgálati előírás: *Regulation*	**MSZ EN ISO 17636-1 „B" 7.1.8**	**Átvételi követelmény:** *Requirement*	**MSZ EN ISO 10675-1 Level 1** **MSZ EN ISO 5817 B**

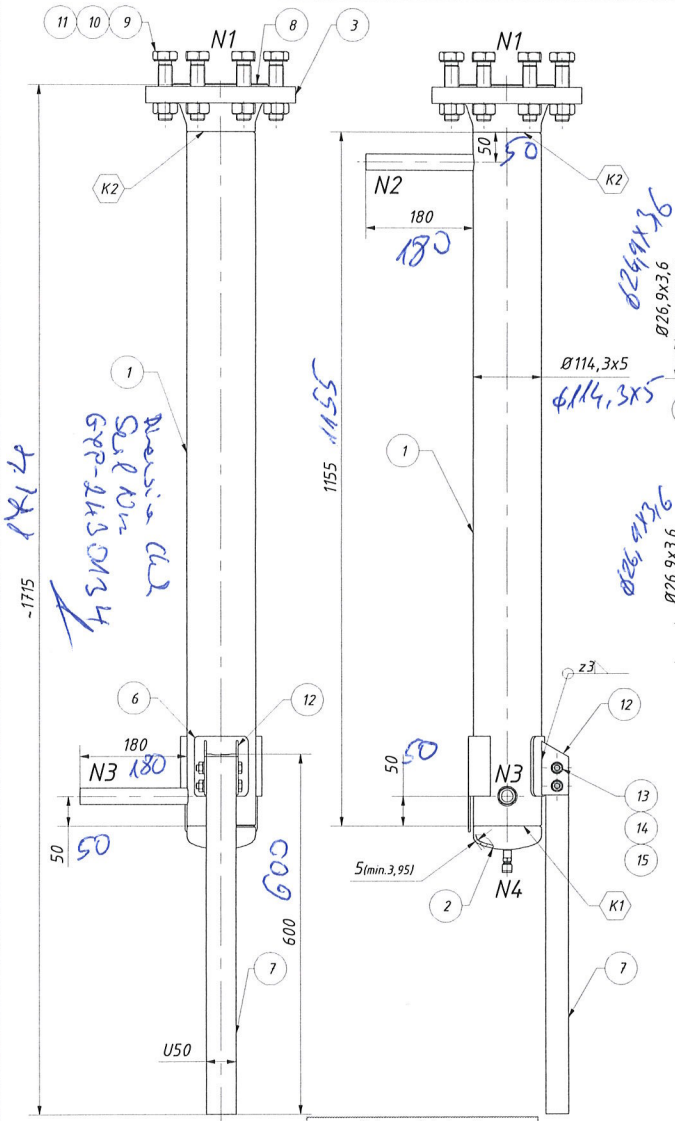
Vizsgálat eredménye / *Result of examination*

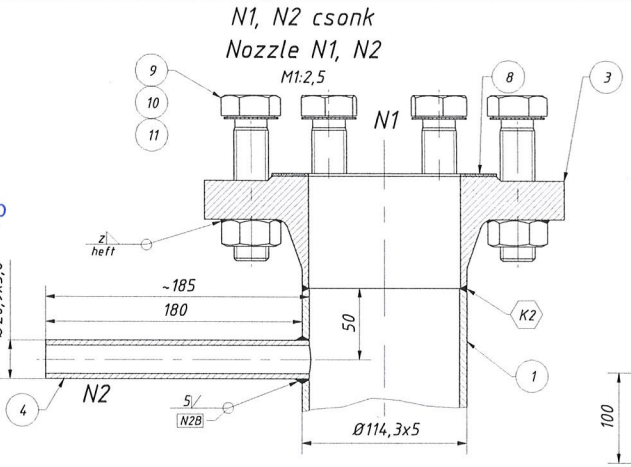
Film azonosító *Film Id.*	**Varrat azonosító** *Weld seam Id.*	**Hegesztő** *Welder*	**Méret** *Dimension*	**Képminőség** *IQI*	**Értékelt szakasz** *Evaluated section*	**Eltérés** *Deviation*	**Értékelés** *Evaluation*	
							e	*ne*
3013 7	GYP-2430134 K2	LO27	Ø114,3x5	W15F	Ø		x	
3013 8	GYP-2430134 K1	LO27	Ø114,3x5	W15F	Ø		x	

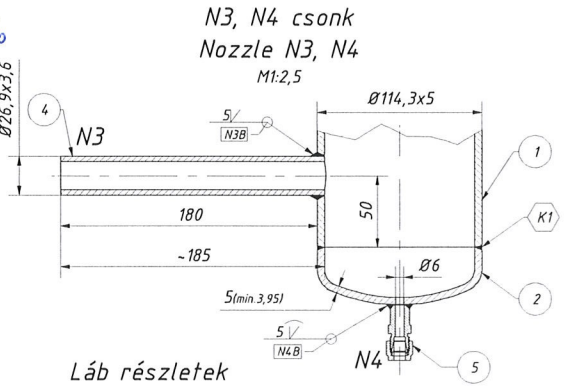
2024. 03. 26

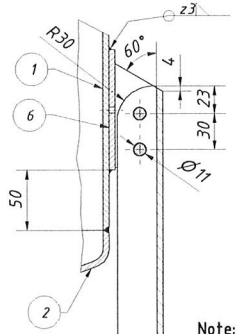
Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.18

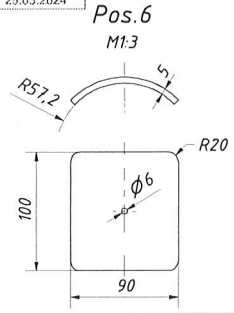
Vizsgálatot végezte *Examined by:*		**Vizsgálatot jóváhagyta** *Approved by:*	
Név: *Name*	**Lázár Krisztián**	**Név:** *Name*	**Bakos Gyula**
Tanúsítvány száma: *Cert. No.*	**RT20108140107**	**Tanúsítvány száma:** *Cert. No.*	**RT20101050201**
Aláírás: *Signature*		**Aláírás:** *Signature*	

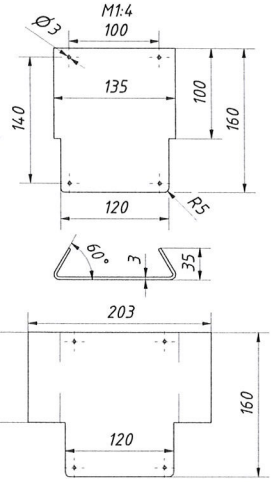












Gyémánt-Pirazol Kft.
4031 Debrecen, Nővé u. 11.
gyemantpirazol@gyemantpirazol.hu
www.gyemantpirazol.hu
CE 0090

Tervezési kód / Design code	
Gyártási szám: / Serial No.	-
MSZ EN 13445: 2021	
Gyártási év: / Year of built	2024
Megnevezés: / Designation:	HP-100/40
	Munkatér / Shellside
Űrtartalom (bruttó) / Volume	[Liter] 10
Min./Max. megengedett nyomás: / Min./Max. allowable pressure:	[barg] -1 / +39
Min./Max. megengedett hőmérséklet / Min./Max. allowable temperature:	[°C] -20 / +270
PED kategóriamodul: / PED category/module:	III.G
Próbanyomás: / Test pressure:	[barg] +69,7
Próbanyomás dátuma: / Date of last pressure:	2024. .
Tömeg üresen: / Empty weight:	[kg] ~35

AQUAGAS
www.aquagas.se SWEDEN AB
Phone: +46 (0)8 554 204 70

Gyári számok / Serial No.:
HP-100/40: GYP-2430134

MEGJEGYZÉSEK:
- A csonkok külső erőből adódó terhelésekre nincsenek méretezve.
- Csonk hegesztési varratok az MSZ EN 13445-3:2021 szerint.
- Karima csavarfuratok fő síkba nem eshetnek.
- Felületkikészítés: -
- Az 5-ös tételt a megrendelő (AQUAGAS) biztosítja.
- A készülék a gyártóműben hőszigetelés nélkül készül.
- Készül: 1 db
- A tervhez tartozó tételjegyzék száma: PL-GYP-243013-02

Note:
- External loads on nozzles are not taken into account
- Nozzles welding seams according to MSZ EN 13445-3:2021.
- Flange bolting holes shall not lie in principal planes
- Surface treatment: -
- Item 5 supplied by AQUAGAS
- The vessel is manufactured without thermal insulation.
- 1 pc. to be made
- The parts list number associated with the plan: PL-GYP-243013-02

MŰSZAKI ADATOK (TECHNISCHE DATEN) [TECHNICAL DATA]

Üzemeltetés (Betrieb) [Working]	Nyomástartó edény PED Art. 4 Absatz 1 PED Art. 13 Absatz 1 Behälter nach PED Art. 4	HP-100/40
	Tartály neve (Name der Kammer) Name of vessel	Munkatér / Shellside
	Közeg (Medium) Fluid	Sűrített hidrogén / Compressed hydrogen
	Megengedett sűrűség (Bei Gase Gas-Kategorie) Fluidgroup (Gases)	[kg/m³] <0,071
	Térfogat / Űrtartalom (Geometrisch bestimmt / gasförmig) Volume (Geometric / Gaseous)	[liter] ~10
	Közeg csoport PED 4 cikk. (Mitgliedgruppen PED Art. 4) Fluidgroups acc. to Art. 4	1
	Hőközlő felület (Wärmeaustauschfläche) Heat exchanger area	[m²] -
	Közeg állapot PED, 1 cikk. (Zustandsstufen PED Art. 1) Condition of fluid acc. to PED, Art. 1	Gáz / Gas
	Üzemi hőmérséklet (Betriebstemperatur) Operating temperature	-1 / +39
	Kategória PED 4. cikk. (Kategorie PED Art. 4) Category PED, Art. 4	III. kategória
	Modul PED 14. cikk. (Modul PED Art. 14) Module PED, Art. 14	G modul
	Tervezési üzemi hőmérséklet (Betriebstemperatur) Design temperature	[°C] -20 / +270
	Próbanyomás (PT) (Prüfdruck) (PT) Test pressure (PT)	[barg] +69,7
	Vizsgálati hőmérséklet (Prüftemperatur) Test temperature	[°C] +10 / +25
	Vizsgáló közeg (Prüfmedium) Test fluid	Víz / Water
Tervezés (Auslegung) [Design]	Tervezési nyomás (PD) (Berechnungsdruck PD) Design pressure (PD)	[barg] -1 / +39
	Tervezési hőmérséklet (TS) (Berechnungstemperatur (TS)) Design temperature (TS)	[°C] -20 / +270
	Tervezési közeg (Berechnungsgrundlage Medium) Fluid (see 10.1 a))	-
	Korrózió miatti vastagságcsökkenő (Korrosionszuschlag) Corrosion allowance	[mm] 1
	Élettartam (Lebensdauer) Fluid (others)	20000
	Nyomás-/Hőfok (Druck-/Temperaturbereich) Pressure-/Temperature	0-38 bar / -20°C - +50°C
	Biztonsági tényező (Sicherheitsbeiwert, Bauteil) Safety factor, Equipment	1.5
	Üres tömeg (Eigengewicht) Weight (empty)	[kg] ~35
	Tömeg víz feltöltéssel (Gewicht mit Wasserfüllung) Weight with water filling	[kg] ~45
	Tömeg vízen kívüli (Gewicht während des Betriebs) Operating weight	[kg] ~36
	Tervezés előírás (Auslegung, Herstellung) Design (rules)	MSZ EN 13445-3:2021
	Tervezésirányítás (Entwurfsprüfung) Design examination	MSZ EN 13445-3:2021
	Vizsgálatok, hegesztés (Schweiß- und Druckprüfung) Weld inspection and pressure tests	MSZ EN 13445-5:2021
	Gyári szám (Fabriknummer) Serial No.)	GYP-2430134
	Gyártás ev. (Herstellungsjahr) Year of manufacture	2024

RONCSOLÁSMENTES ANYAGVIZSGÁLAT

	0,85						
	VT	100%					
	PT / MT	-	-	100%	-	100%	-
	PT / UT	-	-	100%	-	-	-

FILLET WELDS Sarokvarratok | NOZZLE WELDS Csonkbehegesztések | CIRCULAR WELDS Körvarratok

CSONKJEGYZÉK (STUTZEN) (NOZZLE)

Jel	Megnevezés	Méret	Nyomás	Megjegyzés
N1	Fűtőegység csatlakozó / Heating unit connection	DN100	PN63	EN 1092-1 Typ.11/B
N2	Hidrogén kilépő / Hydrogen outlet	DN20	-	EN 10217-2
N3	Hidrogén belépő / Hydrogen inlet	DN20	-	EN 10217-2
N4	Technológiai csonk	CWC-BM-4P-S316	-	Hy-Lok csatl.

Rev.	Dátum:	Módosítás oka:	Módosította:
Készítette / Prepared by	2024. 01. 31.	Pásku P.	GYÉMÁNT-PIRAZOL KFT.
Ellenőrizte / Checked by	2024. 01. 31.		GYÉMÁNT-PIRAZOL KFT.

TÜV Thüringen Hungary Kft.
H-1023 Budapest
Árpád fejedelem útja 26-28

Anlage zu / attachment to
Prüfbericht / report N°: HU04/62979/24
Datum / date: 25.03.2024

Aquagas Sweden AB.
HP-100/40
Összeállítási rajz

Rajzszám / Drawing No.	013-ST-2024
Méretarány / Scale	M 1:6
Anyagminőség / Material	P265GH,P245GH,P235GH
Kiadva / Released on	2024. 01. 31.
Ellenőrizve / Checked on	2024. 01. 31.
Rajzszám / Drawing No.	DG-GYP-243013-02-00
Módosítási index / Revision	0
Lapok száma / Sheet	1 of 1
Méret / Size	A2

A jelen dokumentumban megtestesülő eljárás, műszaki megoldások, ismeretek és gyakorlat a tervező tulajdona. A szolgáltatás alapját képező szerződés értelmében védett, és kizárólag annak korlátai között használható fel. A szerződéstől eltérő felhasználása, másolása, közlése, hozzáférhetővé tétele TILOS!

C63-AQU-QIX-002 159 / 917

GYÉMÁNT-PIRAZOL KFT.	**Nyomáspróba, tömörségi próba jegyzőkönyv** *Pressure test, tightness test record*	**Sorszám** / *No.:* NY- 013-ST-2024-2

Megnevezés: *Product name*	**HP-100/40 vessel**	**Munkaszám:** *Job No.*	**013-ST-2024**
Gyári szám: *Serial No.*	**GYP-2430134**	**Gyártó:** *Manufacturer*	**Gyémánt-Pirazol Kft.** **4031 Debrecen, Nívó utca 11.**
Rajzszám: *Drawing No.*	**DG-GYP-243013-02-00 rev.0**	**Megrendelő:** *Customer*	**AQUAGAS SWEDEN AB.**
Anyagminőség: *Material*	**P265GH, P235GH**	**Előírás:** *Regulation*	**MSZ EN 13445**

Tér: *Space*	**Shell side**	-	-
Térfogat [l] *Volume*	**10**	-	-
Min / max megengedett nyomás [bar]: *Min / max allowed pressure*	**-1/+39**	-	-
Próbanyomás [bar]: *Test pressure*	**69,7**	-	-
Alkalmazott közeg: *Used fluid*	**water**	-	-
Közeg hőmérséklet [°C] *Fluid temperature*	**16**	-	-
Időtartam [min.] *Holding time*	**30**	-	-
Nyomásmérők azonosító száma: *Pressure Gauges ID No.*	**33866; 33867**	-	-
Nyomásmérők mérési tartománya (bar): *Measuring range of pressure gauges*	**0 - 160**	-	-
Pontossági osztály: *Accuracy class:*	**1,6 %**	-	-
Kalibráció érvényessége: *Calibration validity:*	**2025.02.02**	-	-
Értékelés (OK / nOK): *Evaluation*	**OK**	-	-

Megjegyzés / *Remark* :

A vizsgálat során a készüléken folyás, szivárgás, alakváltozás nem észlelhető.
During the test, no water leakage or deformation is found.

Vizsgálat helye, időpontja: *Place, date*	Gyémánt-Pirazol Kft. - 3100. Salgótarján Fülemüle út 9.	2024.03.26

Vizsgálat résztvevői / *Participants of the pressure test*

Gyártó *Manufacturer*	**Független szervezet** *Notified body*	**Megrendelő** *Customer*
Bakos Gyula	2024.03.26.	

Név, aláírás / ***Name, signature***

PANNONMŰSZER LTD
Calibration laboratory

NAH-2-0297/2021
KALIBRÁLÓLABORATÓRIUM

Location: 6750 Algyő, Külterület Hrsz.: 01884/17. Mailing address: 6750 Algyő, Pf. 16
Tel./Fax: (62) 267-424 e-mail: info@pannonmuszer.hu http://www.pannonmuszer.hu

Certificate number: **MM-84202/24**

CERTIFICATE OF CALIBRATION

PM job number: PM-24-125 **Customer job number:** 999-ST-2024

Customer name: Gyémánt-Pirazol Kft. (admin: László Fekete)
Customer address: 3100 Salgótarján, Fülemüle út 9.
Calibration place, date: PANNONMŰSZER LTD Calibration laboratory, 2024. february 2.
Method of calibration: calibration was performed using direct comparison according to **KE-MM-01/2020** calibration process of manometers operating on indirect principle with ethalons selected properly to prescribed accuracy tolerances.

Calibrated measuring instrument: Manometer

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Accuracy class:	Measuring medium:	Condition:
Suku	*4451*	*33866*	*0...160 bar*	*5 bar*	*1,6*	*oil*	*appropriate*

Standard used for calibration: Dead Weight Tester

Manufacturer:	Type:	Serial number:	Measuring range:	Certificate number:	Validity:
OMIKSZ	*M8*	*7942*	*25.....250 bar*	*81796*	*11/20/2026*

Other measuring instrument: Temperature and humidity sensor

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Measurement uncertainty:	Certificate number:
DOSTMAN	*KVDLOG220*	*22019070006*	*-10...+60 °C*	*0,1*	*0,1 °C*	*H108003 R017007 N034044*

The measurements could be originate to the national ethalons based on calibration certifications of in-use ethalons and gauges.

Ambient temperature: 22,2 – 22,1 °C
Measurement results: (during preloading, the calibrated measuring instrument conformed):

Reference value [bar]	Measured value [bar]				Error (of measurement) [bar]				Expanded measurement uncertainty [bar]
	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	
0	0,0	0,0	0,0	0,0	0	0	0	0	0,6
30	30,0	30,0	30,0	30,0	0	0	0	0	0,6
60	60,0	60,0	60,0	60,0	0	0	0	0	0,6
90	90,0	90,0	90,0	90,0	0	0	0	0	0,6
120	120,0	120,0	120,0	120,0	0	0	0	0	0,6
160	160,0	160,0	160,0	160,0	0	0	0	0	0,6

Maximum permissible absolute error; $|h_{op}|$: 2,56 bar
Maximum measured absolute error; $|h_i|$: 0 bar

The reported expanded measurement uncertainty is the value of standard uncertainty multiplied by k=2 factor that means 95% reliability probability in case of normal distribution. The standard uncertainty of measurement has been determined in accordance to Publication EA-4/02 (Expression of the Uncertainty of Measuremen in Calibration).

Certification: according to ILAC G8:09/2019 using safety lanes.
Based on the metrological characteristics found, the measuring instrument:

Accepted: ☒ Not accepted: ☐ - the requirements of the specification (accuracy class).

The measurement results and the determination of compliance with the specification apply only to the calibrated measuring instrument.

Note: Please pay attention to the fact, that identifying and supervising a re-calibration date is basically the task of the owner of the measuring instrument.
The reported data refer to the metrological specifications of the calibrated measuring instrument.
Certificate can be issued.

Gábor Molnár
examiner

P.H.

Zsolt Balázs
calibration laboratory manager

Place and date of issue of the certificate: Algyő, 2024. february 2.

This certificate is valid and copyable to third parties only in its entirety and in full. A copy may be made only with the consent of the body issuing the certificate and the customer.

PANNONMŰSZER LTD
Calibration laboratory

Location: 6750 Algyő, Külterület Hrsz.: 01884/17. Mailing address: 6750 Algyő, Pf. 16
Tel./Fax: (62) 267-424 e-mail: info@pannonmuszer.hu http://www.pannonmuszer.hu

NAH-2-0297/2021
KALIBRÁLÓLABORATÓRIUM

Certificate number: **MM-84203/24**

CERTIFICATE OF CALIBRATION

PM job number: PM-24-125 **Customer job number:** 999-ST-2024

Customer name: Gyémánt-Pirazol Kft. (admin: László Fekete)
Customer address: 3100 Salgótarján, Fülemüle út 9.
Calibration place, date: PANNONMŰSZER LTD Calibration laboratory, 2024. february 2.
Method of calibration: calibration was performed using direct comparison according to **KE-MM-01/2020** calibration process of manometers operating on indirect principle with ethalons selected properly to prescribed accuracy tolerances.

Calibrated measuring instrument: **Manometer**

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Accuracy class:	Measuring medium:	Condition:
Suku	*4451*	*33867*	*0...160 bar*	*5 bar*	*1,6*	*oil*	*appropriate*

Standard used for calibration: **Dead Weight Tester**

Manufacturer:	Type:	Serial number:	Measuring range:	Certificate number:	Validity:
OMIKSZ	*M8*	*7942*	*25.....250 bar*	*81796*	*11/20/2026*

Other measuring instrument: **Temperature and humidity sensor**

Manufacturer:	Type:	Serial number:	Measuring range:	Resolution:	Measurement uncertainty:	Certificate number:
DOSTMAN	*KVDLOG220*	*22019070006*	*-10...+60 °C*	*0,1*	*0,1 °C*	*H108003 R017007 N034044*

The measurements could be originate to the national ethalons based on calibration certifications of in-use ethalons and gauges.

Ambient temperature: 22,2 – 22,1 °C
Measurement results: (during preloading, the calibrated measuring instrument conformed):

Reference value [bar]	Measured value [bar]				Error (of measurement) [bar]				Expanded measurement uncertainty [bar]
	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	Increasing load	Decreasing load	
0	0,0	0,0	0,0	0,0	0	0	0	0	0,6
30	29,0	30,0	29,0	30,0	-1	0	-1	0	0,6
60	59,0	60,0	60,0	60,0	-1	0	0	0	0,6
90	89,0	89,0	89,0	90,0	-1	-1	-1	0	0,6
120	120,0	120,0	120,0	120,0	0	0	0	0	0,6
160	160,0	160,0	160,0	160,0	0	0	0	0	0,6

Maximum permissible absolute error; $|h_{op}|$: 2,56 bar
Maximum measured absolute error; $|h_i|$: 1 bar

The reported expanded measurement uncertainty is the value of standard uncertainty multiplied by k=2 factor that means 95% reliability probability in case of normal distribution. The standard uncertainty of measurement has been determined in accordance to Publication EA-4/02 (Expression of the Uncertainty of Measuremen in Calibration).

Certification: according to ILAC G8:09/2019 using safety lanes.
Based on the metrological characteristics found, the measuring instrument:

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Note: Please pay attention to the fact, that identifying and supervising a re-calibration date is basically the task of the owner of the measuring instrument.
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Certificate can be issued.

.....
Gábor Molnár
examiner

PANNONMŰSZER KFT
Kalibrálólaboratórium
P.H.

.....
Zsolt Balázs
calibration laboratory manager

Place and date of issue of the certificate: Algyő, 2024. february 2.

This certificate is valid and copyable to third parties only in its entirety and in full. A copy may be made only with the consent of the body issuing the certificate and the customer.

GYÉMÁNT-PIRAZOL KFT.

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó utca 11.
www.gyemantpirazol.hu

Doc.No./Szám:	HA-GYP-243013-02	Rev.:	0

Aquagas Sweden AB.

Veszélyelemzés

Hazard analysis

Dwg. No. / Rajzszám:
DG-GYP-243013-02

Task No.: / Munkaszám:
013-ST-2024

0	2024.01.31		Pásku P.	Kristóf G.
Rev:	Date/Dátum:	Remark/Megjegyzés:	Designer/Tervező:	Checked/Ellenőr:

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-02**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-02**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**III./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430134**

Veszélyek és forrásaik összegzése
SUMMARY OF HAZARDS & THEIR SOURCES

I. Nyomástartó héj műszaki hibájából adódó veszély
Hazard from mechanical failure of pressure retaining shell

	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
1	Hibás számítás *Incorrect calculation*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 5-10. sor *see Page 3, Line 5 to 10*	□ igen/*yes* ■ nem/*no*	
2	Konstrukciós hiba *Incorrect construction*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 12-15. sor *see Page 3, Line 12 to 15*	□ igen/*yes* ■ nem/*no*	
3	Helytelen anyagmegválasztás *Incorrect material selection*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 17-23. sor *see Page 3, Line 17 to 23*	□ igen/*yes* ■ nem/*no*	
4	Korrózió helytelen megítélése *Incorrect rating of corrosion anticipated*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 19. és 20. sor *See Page 3, Line 19 and 20*	□ igen/*yes* ■ nem/*no*	
5	Hibás gyártás *Defective fabrication*	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 25-27. sor *see Page 3, Line 25 to 27*	□ igen/*yes* ■ nem/*no*	
6	Elégtelen vizsgálat és a vizsgálat helytelen megválasztása	■ igen/*yes* □ nem/*no*	lásd 3. oldal, 28-32. sor *see Page 3, Line 28 to 32*	□ igen/*yes* ■ nem/*no*	
7	Megengedett terhelések túllépése *Exceeding of the allowable loads*	■ igen/*yes* □ nem/*no*	lásd 4. oldal, 5-18. sor *see Page 4, Line 5 to 18*	■ igen/*yes* □ nem/*no*	lásd 5. oldal see Page 5.

II. Végátvétel utáni helytelen kezelésből adódó veszély
Hazard from incorrect Handling after Final Inspection

	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
8	Hibás csomagolás *False packing*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 5. sor *see Page 5, Line 5*	□ igen/*yes* ■ nem/*no*	
9	Hibás szállítás, rakodás, tárolás *False transport, loading, storage*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 6. és 7. sor *see Page 5, Line 6 and 7*	□ igen/*yes* ■ nem/*no*	
10	Hibás összeszerelés és felállítás *False assembly and erection*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 8-11. sor *see Page 5, Line 8 to 11*	□ igen/*yes* ■ nem/*no*	

III. Tömítetlenségből adódó veszély
Hazard by loss of Technical Tightness

	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
11	Szivárgás eltávolítható és nem eltávolítható csatlakozásoknál	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 21-28. sor *see Page 5, Line 21 to 28*	□ igen/*yes* ■ nem/*no*	
12	Szivárgás mozgó alkatrészeknél *Leakage at moving parts*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 30. sor *see Page 5, Line 30*	□ igen/*yes* ■ nem/*no*	

IV. Üzemelés közbeni helytelen tevékenységekből adódó veszély
Hazard from incorrect Activities during Operation

	Veszély alapvetően az alábbiak miatt: ***Hazard basically through :***	**Alkalmazandó** ***Applicable***	**Teendő** ***Remedy***	**Megmaradó veszély kiértékelése** ***Evaluation of remainig Hazard***	
13	Nyomástartó edény normál üzemelése *Normal operation of pressure vessel*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 13. és 14. sor *see Page 5, Line 13 and 14*	□ igen/*yes* ■ nem/*no*	
14	Edény kinyitása hozzáférés céljából *Opening of vessel for entering*	■ igen/*yes* □ nem/*no*	lásd 5. oldal, 15-19. sor *see Page 5, Line 15 to 19*	■ igen/*yes* □ nem/*no*	lásd 5. oldal see Page 5.
15	Edény kinyitása üzemelés közben *Opening of vessel during operation*	□ igen/*yes* ■ nem/*no*		□ igen/*yes* ■ nem/*no*	

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-02**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-02**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**III./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430134**

Veszélykontrol vagy -csökkentés
HAZARD CONTROL OR REDUCTION

V. **Nyomástartó héj műszaki hibája**
Mechnical failure of pressure retaining shell

	Veszélykontrolra és -csökkentésre tett intézkedések **Measures for Hazard Control / Reduction**	**V**	**U**	**Alkalmazott módszer** **Applied Method**	**P**	**Megmaradó veszély** **Remain Hazard**
1	Igazolt számítási módszerek és programok használata	M	M	EN13445	TP	nincs / none
2	Minden üzemelési feltétel figyelembevétele az elvárt folyamathoz	O	M	Adatlap, Igénybevétel, specifikáció *Data sheet, Requisition, Spec.*	TP	nincs / none
3	Helyi külső terhelések figyelembevétele *Consideration of local external loadings*	O	M	Adatlap, specifikáció *Data sheet, Specifications*	TP	nincs / none
4	Különféle általános és helyi belső terhelések figyelembevétele	O	N/A	Adatlap *Data sheet*	N/A	nincs / none
5	A létesítményi helyszínre vonatkozó további terhelések figyelembevétele	O	N/A	Adatlap, specifikáció *Data sheet, Specifications*	N/A	nincs / none
6	Ciklikus terhelések figyelembevétele *Consideration of cyclic loadings*	O	N/A		N/A	nincs / none
7	Elfogadott konstrukciós gyakorlatok és igazolt konstrukciók használata	O	M	Tervezési kód, műszaki specifikáció Design code, techn. Specification	TP	nincs / none
8	Minősített személyzet és megbízható programok használata	M	M	Minőségbiztosítási rendszer QM-System	M	nincs / none
9	Jó minőségű műszaki dokumentáció biztosítása	M	M	Minőségbiztosítási rendszer QM-System	O	nincs / none
10	Dokumentáció rendszeres frissítésének biztosítása	M	M	Minőségbiztosítási rendszer QM-System	M	nincs / none
11	Anyagmegválasztás a közeg figyelembevételével	O	M	Adatlap, specifikáció *Data sheet, Specification*	O	nincs / none
12	Anyagmegválasztás üzemi körülmények alapján	O	M	Adatlap, specifikáció *Data sheet, Specification*	O / M	nincs / none
13	A tervezésben figyelembevett korróziós követelmények elemzése	O	M	Adatlap, specifikáció *Data sheet, Specification*	O	nincs / none
14	Közeg és üzemelés miatti kopás figyelembevétele (pl. erózió)	O	M	Adatlap, specifikáció *Data sheet, Specification*	O	nincs / none
15	Megbízható anyagbeszállítók kiválasztása *Selection of reliable material suppliers*	M	M	PED szerinti minősítés *Qualification acc. to PED*	TP	nincs / none
16	A megrendelési dokumentumokban meghatározandó, anyagra vonatkozó speciális	O / M	M	Adatlap, specifikáció *Data sheet, Specification*	M / TP	nincs / none
17	Előírások betartásának ellenőrzése megrendeléskor	M	M	Minőségbiztosítási rendszer QM-System	M	nincs / none
18	Engedélyezett és igazolt gyártási módszerek használata	M	M	EN13445	TP	nincs / none
19	Engedélyezett és igazolt hegesztési kötések használata	M	M	EN13445	TP	nincs / none
20	Engedélyezett és igazolt hőkezelési eljárások használata	M	M	Adatlap, általános specifikáció *Data sheet, Gen. Spec.*	M	nincs / none
21	Gyártási és vizsgálati ütemterv szerinti vizsgálatok teljesítése	O	M	Vizsgálatokat jelenteni /visszaigazolni *Inspections inform. / confirm.*	TP / O	nincs / none
22	Engedélyezett vizsgálati eljárások és eszközök használata	M	M	Minőségbiztosítási rendszer QM-System	TP / M	nincs / none
23	Vizsgálatokat megfelelően minősített személyzetnek kell végeznie	M	M	Minőségbiztosítási rendszer QM-System	TP / M	nincs / none
24	Vizes nyomáspróbát megfelelő vizsgálati közeggel kell végezni	O	M	Adatlap, igénylés *Data sheet / requisition*	TP / M	nincs / none
25	Teljes gyártási és vizsgálati dokumentáció biztosítása	O	M	Dokumentáció ellenőrzés *Documentation check*	TP / M	nincs / none

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-02**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-02**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**III./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430134**

Veszélykontrol vagy -csökkentés
HAZARD CONTROL OR REDUCTION

V. Nyomástartó héj műszaki hibája / Mechnical failure of pressure retaining shell

	Veszélykontrolra és -csökkentésre tett intézkedések Measures for Hazard Control / Reduction	V	U	Alkalmazott módszer Applied Method	P	Megmaradó veszély Remain Hazard
26	Túlzott mértékű túlnyomás elleni védelem normál üzemelés közben	O	O	A rendszer biztonsági szelep beállítása Pressure setting of safety valve in system	TP / O	nincs / none
27	Hőtágulás miatti, túlzott mértékű túlnyomás elleni védelem	O	O	A rendszer biztonsági szelep beállítása Pressure setting of safety valve in system	TP / O	nincs / none
28	Exotermikus reakció során fellépő túlzott mértékű túlnyomás elleni védelem	O	N/A		N/A	nincs / none
29	Túlzott külső nyomás elleni védelem *Protection against excessive external pressure*	O	M	Adatlap / Igazolt számítási módszer *Data sheet / Proven calculation method*	TP	nincs / none
30	Ciklikus nyomás miatti alakváltozás elleni védelem	O	N/A		N/A	nincs / none
31	Átmoszferikus körülményekből származó alakváltozás elleni védelem	O	O	Szigetelés, hőmérséklet szabályozás *Insulation, temperature contol*	N/A	nincs / none
32	Túlzott hőmérséklet miatti szilárdság csökkenés elleni védelem	O	B	Hőmérsékletszabályozás TI/TC *Temperature control TI/TC*	B	nincs / none
33	Korrózív közegek lecsapódásából adódó korrózió elleni védelem	O	B	Anyagmegválasztás *Material selection*	B	nincs / none
34	Vizes nyomáspróba után maradó vízből adódó korrózió elleni védelem	M	M	Anyagmegválasztás, szárítás *Material selection, drying*	M / B	nincs / none
35	Üzemszünet közbeni maradék közeg miatt fellépő korrózió elleni védelem.	O	B	Anyagmegválasztás *Material selection*	B	nincs / none
36	Helytelen konstrukció miatti korróziós sérülés elleni védelem	O	N/A		N/A	nincs / none
37	Külső tűzből adódó instabilitás elleni védelem *Protection against instability arising from an*	O	O		O	nincs / none
38	Alakváltozásból adódó plasztikus deformálódás elleni védelem	O	M	Számítás / anyagmegválasztás / Terv.kód Calculation / mat. select / Design code	TP	nincs / none
39	Dinamikus nyomáshullámok ellni védelem (nyomáslengés)	O	N/A		N/A	nincs / none

VI. Végátvétel utáni és üzemelés közbeni / tömítetlenség esetén nem megfelelő kezelés / Improper Handling after Final Inspection and during operation and loss of tightness

	Veszélykontrolra és -csökkentésre tett intézkedések Measures for Hazard Control / Reduction	V	U	Alkalmazott módszer Applied Method	P	Megmaradó veszély Remain Hazard
1	Szállítóeszköznek és időnek megfelelő csomagolás	O	M	Az igénylésben meghatározott követelmények	M / O	nincs / none
2	Várható rakodáshoz megfelelő szállító támasztékok	M	M		O	nincs / none
3	Szállítási sérülések ellenőrzése átrakodásnál és a végső rendeltetési helyen	O	O		O	nincs / none
4	Alapozás és alapcsavarok kivitelezésének (minőség) ellenőrzése	O	*)		O	nincs / none
5	Felállítás felügyelete *Supervision of erection*	O	*)	Minősített összeszerelő cég *Qualified assembly corp.*	O	nincs / none
6	Helyszíni összeépítés jóváhagyott felállítási dokumentumok szerint	O	O	Minősített összeszerelő cég *Qualified assembly corp.*	O	nincs / none
7	Összeszerelések teljesítése és helyességük vizsgálata	O	O	Minősített összeszerelő cég *Qualified assembly corp.*	O	nincs / none
8	Közeg nem szabályozott kiengedése, (pl. lefújás)	O	O	A teljes rendszer tömítettségvizsgálata *Leaktest of complete system*	O	nincs / none
9	Statikus elektromos feltöltődés megelőzése, villámvédelem	O	M / O	Földelés *Earthing*	TP / O	nincs / none

GYÉMÁNT-PIRAZOL KFT.

Veszélyelemzés
Hazard analysis

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**HA-GYP-243013-02**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-02**
Dátum / Date:	2024.01.31	Task No. / Munkaszám:	**013-ST-2024**
Kategória / Categorie:	**III./G**	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-2430134**

Veszélykontrol vagy -csökkentés
HAZARD CONTROL OR REDUCTION

VI. Végátvétel utáni és üzemelés közbeni / tömítetlenség esetén nem megfelelő kezelés
Improper Handling after Final Inspection and during operation and loss of tightness

	Veszélykontrolra és -csökkentésre tett intézkedések Measures for Hazard Control / Reduction	V	U	Alkalmazott módszer Applied Method	P	Megmaradó veszély Remain Hazard
10	Közegből és az üzemelés közbeni reakciókból adódó veszélyek megelőzése	O	O		B	nincs / none
11	Nyomásellenőrzés megnyitás előtt *Pressure check before opening*	O	B	Helyi nyomásjelző ellenőrzése *Check of local PI*	B	igen / yes
12	Ellenőrizni, hogy be lehet-e jutni a tartályba veszély nélkül (analízis)	O	B		B	nincs / none
13	Magas felületi hőmérséklet ellenőrzése *Check against elevated surface temperature*	O	B		B	nincs / none
14	Kiegészítő eszközök, pl. létrák, stb. a biztonságos bejutáshoz	O	M		B	nincs / none
15	Oldható csatlakozások funkcionális terve *Functional design of removeable connections*	O	M		M	nincs / none
16	Tömítés megválasztása és igazolt termékek megszerzése	O	M		O	nincs / none
17	Tömítőfelületek gondos kezelése és ellenőrzése összeszerelés előtt	M	M	Minősített összeszerelő cég *Qualified assembly corp.*	O / B	nincs / none
18	Szakszerű és dokumentált összeszerelés (csavarmeghúzó nyomaték)	O / M	O / M	Minősített összeszerelő cég *Qualified assembly corp.*	O / B	nincs / none
19	Minden oldható és nem oldható kötés nyomáspróbája és tömítettségvizsgálata	M	M	Vizes nyomáspróba *Hydrostatic Test*	TP / O	nincs / none
20	Cső / csőköteg kötések speciális tömítettségvizsgálata	M	M		TP / O	nincs / none
21	Kiegészítő roncs. mentes vizsg. vagy felülethiba vizsgálat	n/a	n/a		n/a	nincs / none
22	Próbaüzem, ideértve az üzemelés előtti tömítettségvizsgálatot is	O	O		B	nincs / none

VII. RÖVIDÍTÉSEK
ABBREVATIONS

1. **3-5. oldal, 4. sor:** Felelősség a specifikációért (**V**), megvalósításért, (**U**), vizsgálatért (**P**)
   Sheet 3 up to 5, line 4 *: Responsibility for the specification (**V**), realization (**U**), inspection (**P**)*
2. **Megrendelő (O**), Gyártó (**M**), Harmadik fél általi vizsgálat (**TP**), Felhasználó (**B**)
   Order (**O**), *Manufacturer (**M**), Third Party Inspection (**TP**), User (**B**),*
3. **n/a : nem** alkalmazandó, HST: Vizes nyomáspróba
   *n/a : **not** applicable, HST: Hydro Static Test*

VIII. Megmaradó veszélyek kiértékelése és üzemeltetőre vonatkozó utasítások
EVALUATION OF REMAINING HAZARD AND OPERATOR INSTRUCTIONS

	Megmaradó veszély megnevezése Description of remaining Hazard	Kockázat Risk	Intézkedés Action
1	Végátvétel utáni korrózió a vizes nyomáspróba utáni nem teljes víztelenítés miatt *Corrosion after final inspection due to incomplete drainage after hydro test*	nincs / none	
2	A rendszer leállása utáni korrózió nem teljes víztelenítés miatt *Corrosion after shut down of unit due to incomplete drainage*	nincs / none	
3	A rendszer átmeneti leállása utáni korrózió nem teljes víztelenítés miatt *Corrosion after temporary shut down of unit due to incomplete drainage*	nincs / none	
4	Nem teljes víztelenítés vagy tisztítás miatti folyadékokból származó veszély *Danger from fluids due to incomplete drainage or cleaning*	nincs / none	
5	Kinyitás előtt a készüléknek nyomásmentesnek kell lennie *Chamber to be pressureless before opening*	igen / yes	Oktatás Instruction
6	60°C-ot meghaladó felületi hőmérséklet miatti potenciális veszély a személyzetre *Potential danger for personnel by surface temperatures over 60°C*	igen / yes	Oktatás Instruction

GYÉMÁNT-PIRAZOL KFT.

Gyémánt-Pirazol Kft.
4031 Debrecen, Nívó utca 11.
www.gyemantpirazol.hu

Doc.No./Szám:	OI-GYP-243013-02	Rev.:	0

Aquagas Sweden AB.

Üzemeltetési utasítás

Operating instructions

Dwg. No. / Rajzszám:
DG-GYP-243013-02

Task No.: / Munkaszám:
013-ST-2024

0	2024.01.31		Pásku P.	Kristóf G.
Rev:	Date/Dátum:	Remark/Megjegyzés:	Designer/Tervező:	Checked/Ellenőr:

GYÉMÁNT-PIRAZOL KFT.

Üzemeltetési utasítás
Operating instructions

Készítette / Prepared:	Pásku P.	Dok. Szám / Doc. No.:	**OI-GYP-243013-02**
Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-02**
Dátum / Date:	2024.01.31	Task No.: / Munkaszám:	**013-ST-2024**
Tervezési kód / Design code:	PED-2014/68/EU + MSZ EN 13445-3:2021	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-243014**

I.	Üzemeltetési és tervezési adatok összegzése Summary of operating- and design date		*HP-DN100 PN40*	
1	Tér megnevezése Description of the chamber		*Munkatér* Shell side	
2	Közeg, töltet Fluid		Sűrített hidrogén Compressed hydrogen	
3	Közegcsoport Fluid group		1 - gáz / gas	
4	Térfogat Capacity	[liter]	~10	
5	Tervezési nyomás Design pressure	[barg]	-1 / +39	
6	Tervezési hőmérséklet Design temperature	[°C]	-20/+270	
7	PED II. mell. szerinti kategória Category in acc. to PED Att. II		III.	
8	Üzemi nyomás Operating pressure	[bara]	-1 / +39	
9	Üzemi hőmérséklet Operating temperature	[°C]	-20/+270	
10	Próbanyomás Test pressure	[barg]	+69,7	
11	Biztonsági szelep beállítási nyomása Set pressure relief valve	[barg]	-	
12	Hegesztési tényező Joint efficiency		0,85	
13	Korróziós pótlék Corrosion allowance	[mm]	1	
14	Hegesztés utáni hőkezelés Post weld heat treatment		-	
15	Megengedett ciklusszám Number of allowable load cycles		20000	
16	Megengedett ciklikus terhelés Allowable load cycle range		0 - 38, (-20°C - +50°C)	
II.	*Fő méretek és súlyok* Main dimensions and weights		*I. tér* Chamber I.	
1	Köpeny magasság Length of shell	[mm]	1155	
2	Átmérő (szélesség) Diameter (width)	[mm]	OD 114,3	
3	Teljes magasság Total Height	[mm]	~1715	
4	Üres tömeg Empty weight	[kg]	~35	
5	Üzemi súly Operating weight	[kg]	~36	
6	Vizes nyomáspróba súly Hydro test weight	[kg]	~45	

GYÉMÁNT-PIRAZOL KFT.

Üzemeltetési utasítás
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Dátum / Date:	2024.01.31	Task No.: / Munkaszám:	**013-ST-2024**
Tervezési kód / Design code:	PED-2014/68/EU + MSZ EN 13445-3:2021	Gyártó / Manufactureer:	**Gyémánt-Pirazol Kft.**
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III.	Általános megjegyzések General remarks
1	*Az Üzemeltető a felelős azért, hogy a szerelést, üzemeltetést és karbantartást végző személyzet ismerje ezeket az utasításokat.* *The Operator is responsible that these instructions are known to the erection, operating and maintaince personnel.*
2	*A gyártó azokért a károkért nem vállal felelősséget, amelyek ezen utasítások be nem tartásából származnak.* The Manufacturer disavows any responsibility for damages resulting from inobservance of these instructions.
3	*Az utasítások a gyártó gyakorlati és elméleti tapasztalataiból származnak. Azonban nem mentesítik az üzemeltetőt az üzemeltetésre, a nyomástartó készülék biztonságára és a személyzet oktatására vonatkozó felelőssége alól.* The instructions derive from practical and theoretical experience of the manufacturer. They, however, do not relieve the operator of his responsibility for the operation, for the safety of the pressure apparatus and for personnel schooling.
4	*Az üzemeltetőnek kell biztosítania megfelelő és alkalmas biztonsági intézkedésekkel, hogy a megengedett üzemi feltételeket és/vagy terhelési ciklusokat ne lépjék túl.* The Operator is to ensure through suitable and functionable safety measures that the allowable operation conditions and/or load cycles are not exceeded.
5	*A meghatározott üzemi feltételektől, a gyártó jóváhagyása nélküli bármilyen eltérés vagy a jelen utasítások figyelembe nem vétele érvényteleníti a gyártó felelősségét.* Any deviation from the specified operation conditions without the manufacturer's approval or nonobservance of these instructions nullifies the manufacturer's responcibility.
IV.	Szállítási és beszerelési megjegyzések Remarks on shipment and installation
1	*A szállítást, tárolást és beszerelést úgy kell végezni, hogy sem a nyomástartó részek, sem a tartozékok ne sérüljenek, sem pedig a belső és külső felületek állagmegóvása ne károsodjon.* The transport, storage and installation shall be done so that neither the pressure parts and attachments are damaged nor that the inner or outer surfaces respective preservation impaired.
2	*Szállításnál és beszerelésnél a készülék emelését a szállítási utasítás szerint kell végezni. A beszerelést szakképzett személyzetnek kell végezni, megfelelő emelőgépekkel és -kötelekkel, eszközökkel, stb.* The lifting of apparatus for transport or installation shall be made according to the transport-instructions. Installation shall be done with suitable lifting machines and lines, tools etc and by trained personnel.
3	*Az alaphoz vagy konstrukcióhoz történő helyes rögzítést ellenőrizni kell .* The correct anchoring to the foundation or construction is to be checked.
4	*A csővezetékeket csak a hozzájuk meghatározott csonkokra lehet csatlakoztatni.* Piping is to be attached only to their designated nozzles.
5	*A karimák újra lezárása előtt a használt tömítéseket le kell cserélni. A tömítőfelületeket le kell tisztítani, és ellenőrizni kell, hogy van-e rajtuk sérülés, szükség esetén újra kell őket forgácsolni. Szerelés után tömörségvizsgálatot kell végezni.* Used gaskets are to be replaced before re-closing flanges. Gasket surfaces are to be cleaned and checked for damage and re-machined if necessary. New leek test shall be performed.
6	*A készülék belsejének állapotát ellenőrizni kell közvetlenül lezárás előtt.* The condition inside the apparatus is to be checked just before closing.
7	*A készülék nyomástartó részein tilos a hegesztés vagy a hőkezelés.* No welding or heat treating is allowed on the pressurized parts of the apparatus.
8	*Csak a pótalkatrészlistán és/vagy a darabjegyzékben meghatározott anyagokat lehet beépíteni vagy beszerelni a készülékbe.* Only material as specified in the spare parts list and / or parts lists may be installed or mounted in the apparatus.
9	*A sikeres felállítást, beszerelést, rögzítést, csőcsatlakoztatást, a készülék belsejének vizsgálatát és a készülék lezárását jegyzőkönyvezni kell, és felhatalmazott személyeknek kell az átvételt végezniük.* The satisfactory erection, alignment, attachment, piping attachment, inspection of the equipment interior and closing of the equipment are to be recorded and accepted by authorized persons.
10	*A pótalkatrészeket, különösen a tömítéseket, zárt helységben, gondosan, vízszintes pozícióban kell tárolni.* *Spare parts, particularly gaskets, are to be stored carefully in the horizontally position in a closed room.*

GYÉMÁNT-PIRAZOL KFT.

Üzemeltetési utasítás
Operating instructions

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Ellenőrízte / Checked:	Kristóf G.	Rajzszám / Dwg.No.:	**DG-GYP-243013-02**
Dátum / Date:	2024.01.31	Task No.: / Munkaszám:	**013-ST-2024**
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Felhasználó / User:	Aquagas Sweden AB.	Gyári szám / Serial No.:	**GYP-243014**

V.	Üzemeltetési megjegyzések Remarks to operation
1	*Ügyelni kell az üzemeltetési paraméterekben történő hirtelen ingadozások elkerülésére.* *A következő értékeket nem szabad túllépni: Nyomás: 1 bar/min.* Care is to be taken to avoid surges in the operation parameters. The following values are not to be exceeded: Pressure: 1 bar/min.
2	*Ha üzemelés közben abnormális körülmények jelentkeznek, pl. nyomásnövekedés, akkor az üzemeltetőnek meg kell állapítani az okot, és ki kell javítania, szükség esetén pedig le kell állítania a készüléket.* Should abnormal conditions appear in operation, e.g. pressure increases, the operator is to determine the cause and correct or, if necessary, shut down the apparatus.
3	*A tervezett leállítások során is kerülni kell az üzemeltetési paraméterekben történő hirtelen ingadozásokat.* Also during planned shut downs, surges in the operation parameters are to be avoided.
4	*Tartós üzemszünet esetén javasolt a készülék nitrogénnel történő védelme. A tömítő felületeket állagmegóvó szerrel kell bevonni és óvni a mechanikai sérülésektől.* By extended shut downs, it is recommended to protect the apparatus with nitrogen. Gasket surfaces are to be coated with a preservation agent and protected from mechanical damage.
5	*Mielőtt újra üzembe helyeznék, a készüléken ellenőrizni kell a szivárgásokat, nyomáspróbával vagy tömörségvizsgálattal.* The apparatus is to be checked for leaks, e.g. hydrotest or leaktest, before placing in operation again.
VI.	Karbantartás Maintenance
1	*Amenyiben a készülék hosszabb ideig üzemen kívül van, pl. 6 hónapig, akkor a puha (soft) anyagból készült tömítéseket le kell cserélni.* If the apparatus has been out of operation for extended periods, e.g. 6 months, as can occur by delayed start-ups or longer shut down - renewed start-up interruptions, soft material gaskets should be replaced.
2	*A készülékben vagy a készüléken használandó tisztító anyagoknak a környezetet vagy a készüléket károsító vagy a személyzetre veszélyes anyogoktól mentesnek kell lenniük. Szükség esetén védőruhát és -felszerelést kell viselni.* Cleaning materials for use in or on the apparatus are to be free of substances damaging to the environment or the apparatus or injurious to personnel. If necessary, protective clothing and gear are to be worn.
3	*A készülék belsejét meg kell vizsgálni, hogy vannak-e rajta mechanikai, korróziós, vagy egyéb sérülések.* The interior of the apparatus is to be inspected for mechanical and corrosion damage etc.
4	*Lezárás előtt ellenőrizni kell a tömítő felületeket és a csavarkötéseket. Új tömítéseket kell használni.* Gasket surfaces and bolting are to be checked before closing. New gaskets are to be used.
5	*Próba utáni leürítés során biztosítani kell a rendszer vagy a készülék megfelelő mértékű légzését.* A sufficient venting of the system or apparatus is to be provided during draining after hydrotest.
6	*Keverős tartályok, készülékek esetében a hajtómű és a hozzá tartozó részek legalább negyedévente való karbantartása és ellenőrzése szükséges.* *A karbantartást és ellenőrzést a gyártó által készített kezelési, karbantartási utasításban megfogalmazottaknak megfelelően kell elvégezni, ellenkező esetben a készülék meghibásodásával, garanciavesztéssel járhat.* That vessels which have agitators, the mixer and its parts (gearbox, shafts, etc.) need to mantenance and inspection at least quarterly every year. Maintenance and inspection must be carried out in accordance with the instructions for use and maintenance prepared by the manufacturer, otherwise the device may malfunction and void the warranty.
7	*A karbantartási intézkedéseket jegyzőkönyvezni kell.* Maintaince measures are to be recorded.
VII.	Rendszeres vizsgálatok Regularity inspections
1	*Az illetékes hatóság határozza meg a rendszeres vizsgálatok közti időszakokat a veszélyanalízis és az alkalmazandó törvények alapján.* The responsible authority determines the intervals between regulatory inspections based on the hazard analysis and applicable laws.
2	*A gyártó 5 évente belső vizsgálatokat javasol, és 10 évente pedig nyomáspróbát.* Manufacturer recommends internal inspections every 5 years and every 10 years for pressure tests.

MultiCert Europe

CERTIFICATE

Hereby we certify that

GYÉMÁNT-PIRAZOL KFT.

Headquarters: H-4031 Debrecen, Nívó u. 11.
Locations: 4031 Debrecen, Nívó u. 10; 4032 Debrecen, Pallagi út 13; 4026 Debrecen, Péterfia utca 13-19. 5. em. 505; 2220 Vecsés, Dózsa György u. 86; 3100 Salgótarján, Fülemüle u. 9.

within the scope

design, manufacturing, installation, maintenance and repair activities of pressure equipment, storage tanks, facilities for storing dangerous liquids and molten material, equipment intended for use in potentially explosive environments (EX operating area), unique machines, metal structures, industrial technological systems and pipelines

has implemented and applied a quality management system, which meets the requirements of the standard

MSZ EN ISO 9001:2015

The certificate is valid until 23. 02. 2025.

The certificate remains valid subject to annual audit reports.

Certificate registration No.: 1 2004 22

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

NAH-4-0143/2020 MANAGEMENT SYSTEM CERTIFICATION BODY

Budapest, 30. 09. 2022

In the name of the certification body

CERTIFICATE

The Certification Body TÜV Thüringen Hungary Kft.
certifies that the company

GYÉMÁNT-PIRAZOL Kft.
H-4031 Debrecen,
Nívó u. 11.

Manufacturing plants: H-4031 Debrecen, Nívó u. 10-11.
H-2220 Vecsés, Dózsa György u. 86.
H-3100 Salgótarján, Fülemüle u. 9.

fulfils the requirements according to

MSZ EN ISO 3834-2:2021

Comprehensive quality requirements
in the specified scope of the report.

report no: **TTHU-3834-23-111J**

certificate no: **TTHU-3834-23-111T**

certificate expires: **2026-06-05.**

TÜV Thüringen Hungary Kft.

Budapest, 2023-06-08.

TÜV THÜRINGEN HUNGARY

(K.Wiegand.)
TÜV Thüringen Hungary Kft.

CERTIFICATE

The Certification Body TÜV Thüringen Hungary Kft.
certifies that the company

GYÉMÁNT-PIRAZOL Kft.

H-4031 Debrecen,
Nívó u. 11.

Manufacturing plants: H-4031 Debrecen, Nívó u. 10-11.
H-2220 Vecsés, Dózsa György u. 86.
H-3100 Salgótarján, Fülemüle u. 9.

fulfils the requirements of MSZ EN ISO 3834-2:2021 as well as the requirements for production of pressure equipment according to

Directive 2014/68/EU and to AD 2000 HP0

in the specified scope of the report.

report no: **TTHU-3834-23-111J**

certificate no: **TTHU-3834P-23-111T**

certificate expires: **2026-06-05.**

Budapest, 2023-06-08.

TÜV Thüringen Hungary Kft.

(Wiegand K.)
TÜV Thüringen Hungary Kft.

TÜV THÜRINGEN HUNGARY

01 - PRESSURE VESSEL DOCUMENTATION

01.4 Pressure Test Record

AQUAGAS SWEDEN AB

Document ID: PTR / A-23/24 140

QREC-AQ2209001-rev2
Revised: 2022-09-30

PRESSURE TEST RECORD

OBJECT INFORMATION

Inspected object	DEDR 500/36 acc. to PED
P&ID	20230440 Rev.3 Note 1.1
GA drawing	21231803 Note 1.1
Customer Order No.	BC0006223
Aquagas order No.	A-23/24 140
Manufacturer	AQUAGAS Sweden AB

VESSEL INFORMATION

Type of vessel	Deoxo vessel
Pressure vessel No.	GYP-2430131
Equipment category/Module	IV/G
Design pressure min/max	-1 / +39 bar(g)
Design temperature min/max	-20 / +270°C
Fluid	Group 1 (Hydrogen)
Drawing number	DG-GYP-233013-01-00
Design reviewer / Notified body	TÜV Thüringen e.V.
Statement of design examination no.	HU05/62993/24
Certificate	Declaration of conformity

Type of vessel	Dryer vessels
Pressure vessel No.	A: GYP-2430132 / B: GYP-2430133
Equipment category/Module	IV/G
Design pressure min/max	-1 / +39 bar(g)
Design temperature min/max	-20 / +270°C
Fluid	Group 1 (Hydrogen)
Drawing number	DG-GYP-233031-02-00
Design reviewer / Notified body	TÜV Thüringen e.V.
Statement of design examination no.	HU05/62994/24 - HU05/62995/24
Certificate	Declaration of conformity

Type of vessel	Heat Exchanger Coolers
Serial No.	
Equipment category/Module	II/A2
Design pressure	+45 bar(g) gas side / +16 bar(g) water side
Design temperature min/max	-20 / +270°C gas side ; -20 / +90°C water side
Fluid	Group 1 gas side / Group 2 water side
Drawing number	21231851
Design reviewer / Notified body	KIWA
Statement of design examination no.	N/A
Certificate	Declaration of conformity

Type of vessel	Particle filter from Classic Filters
Pressure vessel No.	SS 425.621 -Batch No 68305
Equipment category/Module	SEP
Design pressure min/max	0/100 bar(g)
Design temperature min/max	-20/200°C
Fluid	Group 1
Drawing number	N/A
Certificate	N/A

Type of vessel	Heater pipe
Pressure vessel No.	GYP-2430134
Equipment category/Module	III / G
Design pressure	-1 / +39 bar(g)
Design temperature min/max	-20 / +270°C
Fluid	Group 1
Drawing number	DG-GYP-243013-02-00
Design reviewer / Notified body	Kiwa Sweden AB
Certificate	Declaration of conformity

PRESSURE TEST INFORMATION

Tested object	DEDR 500/36 acc. to PED / Sr. no. A-23/24 140
Test fluid	Tapped water
Fluid temperature	Approx. 10°C
Ambient temperature	15°C
Test method	Hydrostatic
Technician	Richard P-Rimgaard

PRESSURE TEST RESULTS

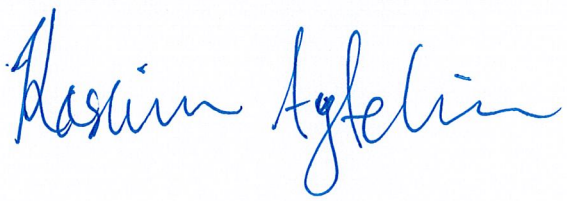
	Gas Side	Water Side
Test date	2024-06-03	2024-06-03
Start pressure	69,7 bar(g)	15 bar(g)
Finish pressure after >1 hour	69,7 bar(g)	15 bar(g)

PRESSURE TEST ACCEPTANCE

Wittness	Kasim Aytekin
Inspector / Notified body	/ Kiwa Sweden AB
EU certificate of conformity no.	

Note 1.1 Excluding non-welded parts like pneumatic tubes, fittings etc.

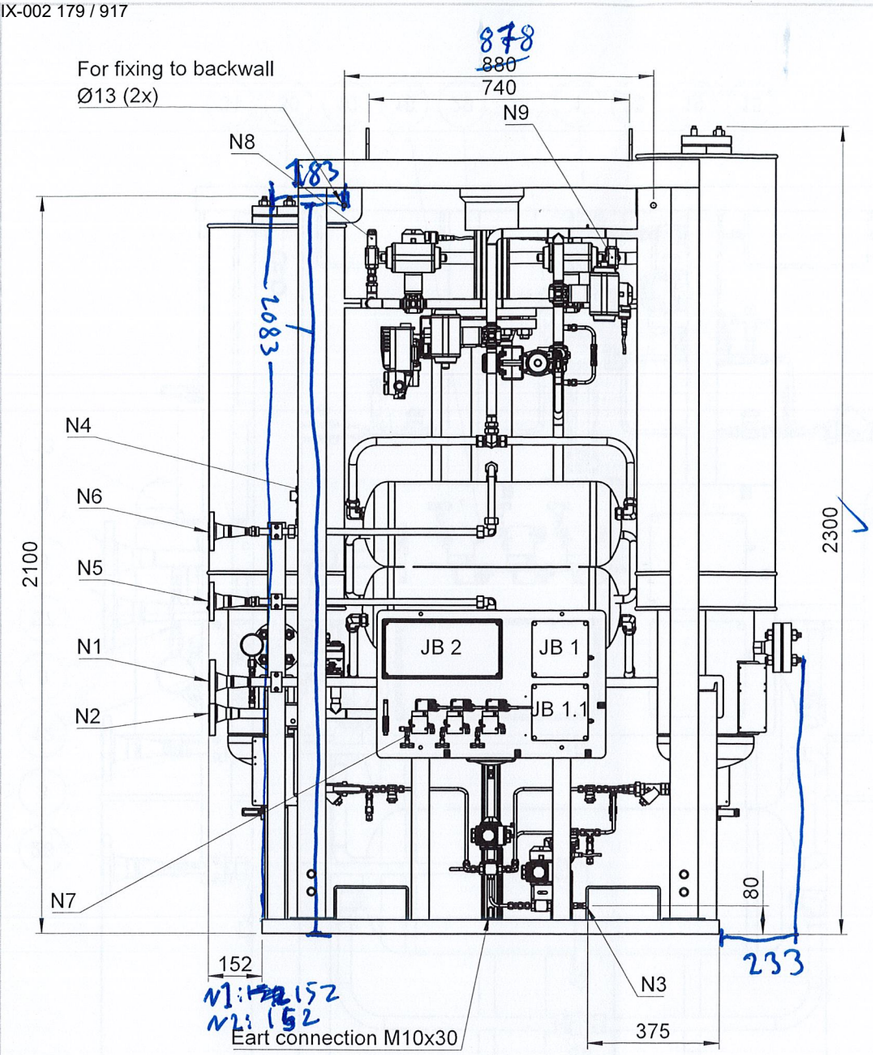
Södertälje 2024-06-03
AQUAGAS Sweden AB

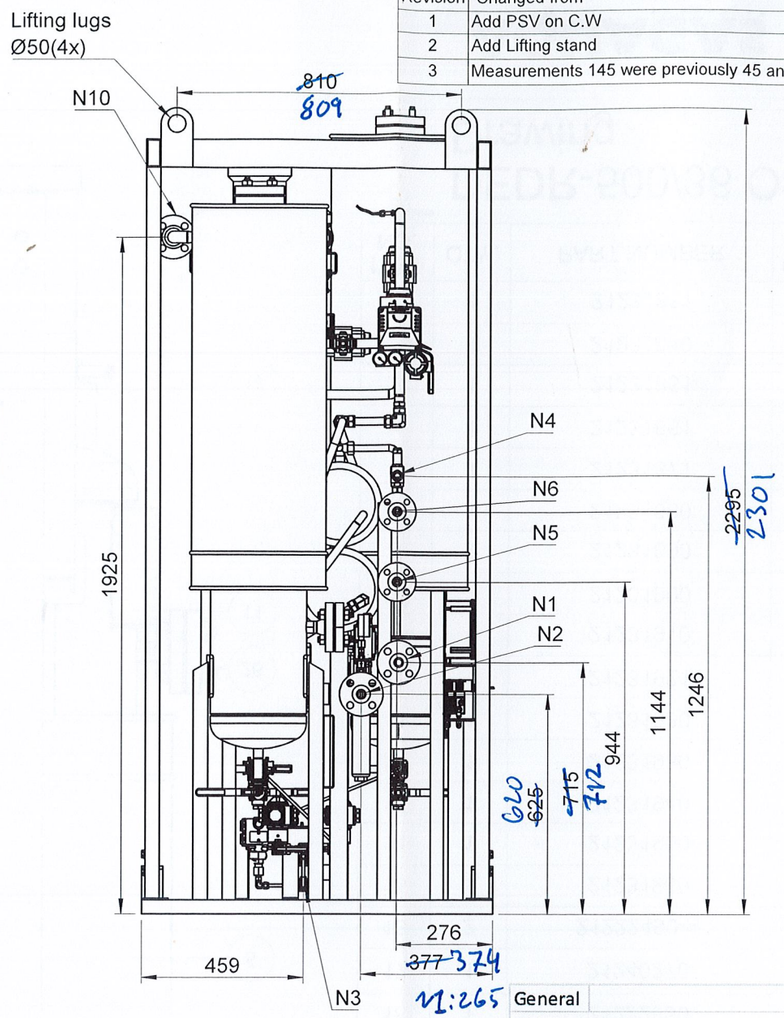


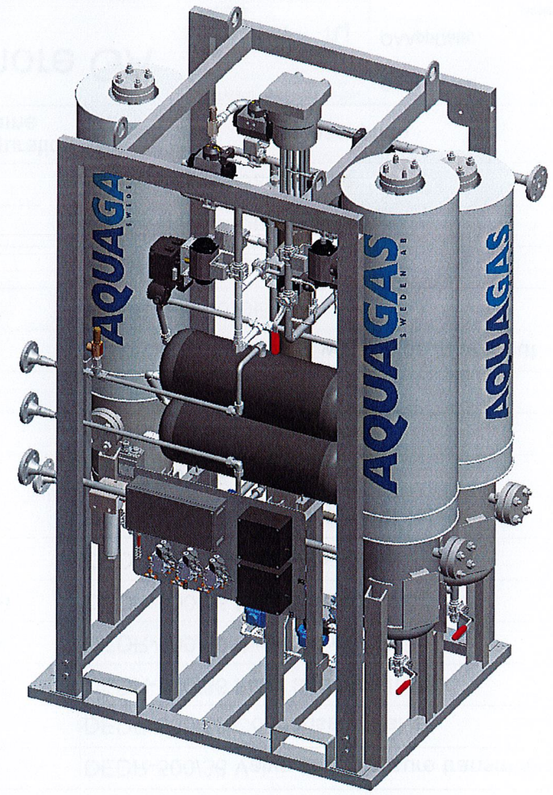
01 PRESSURE VESSEL DOCUMENTATION

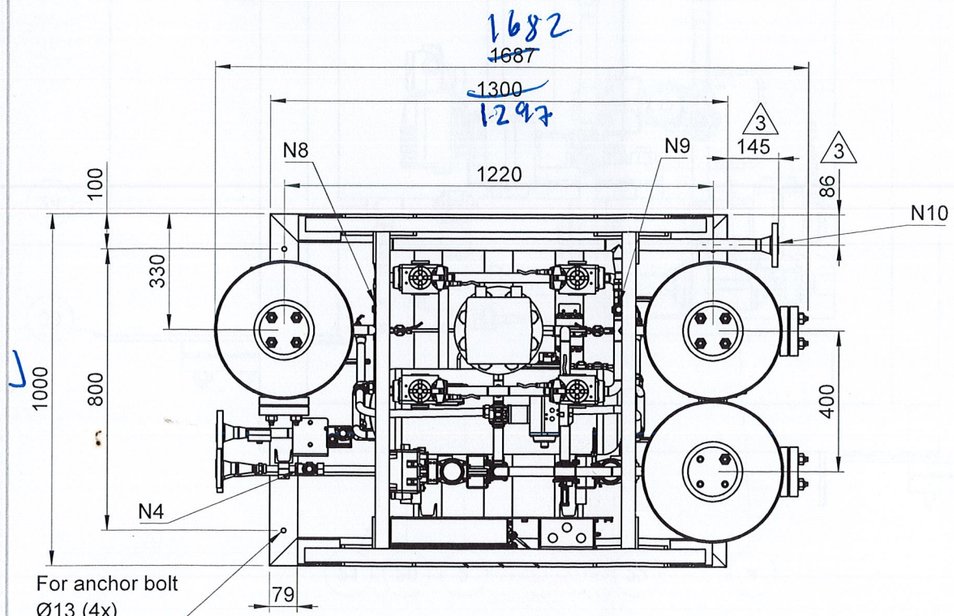
01.5 Weld Assembly Inspection

Revision	Changed from	Date	Sign
1	Add PSV on C.W	2023-11-10	TLj
2	Add Lifting stand	2024-01-31	TLj
3	Measurements 145 were previously 45 and 86 were previously 72. Electrical sheet lowered 250mm.	2024-04-23	TLj









Tolerances for indicated measures +/- 15 mm

General					
Process gas		Hydrogen			
Volume of the Hydrogenprocess		240	litres	approx.	
Weight	empty	1400	kg	approx.	
Weight	filled w/Cat.+Desiccant	1520	kg	approx.	
Connections / Interfaces					
Tag	Function	Type	Characteristics	Material	Code
N1	H2 gas inlet	Flange	R 1" Class 300	A105	ASME B16.5
N2	H2 gas outlet	Flange	R 1" Class 300	316L	ASME B16.5
N3	Condensate outlet	HyLok Coupling	Ø 8 mm	316L	
N4	PSV on C.W.	Female threaded	G 1/2"	Brass	
N5	C.W. inlet	Flange	R 1" Class 150	A105	ASME B16.5
N6	C.W. outlet	Flange	R 1" Class 150	A105	ASME B16.5
N7	Instrument Air/Nitrogen	Connector for Plastic Hose	Ø 6 mm	Antistatic PU	
N8	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N9	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N10	PSV to Vent	Flange	R 1" Class 300	A105	ASME B16.5

Name
DEDR-500/36 Offshore
GA Drawing

View placement

Date 2023-06-07 | Constr. TLj

QAApproval:

QAAppDate:

Filename 21231803

Scale 1:17

Material

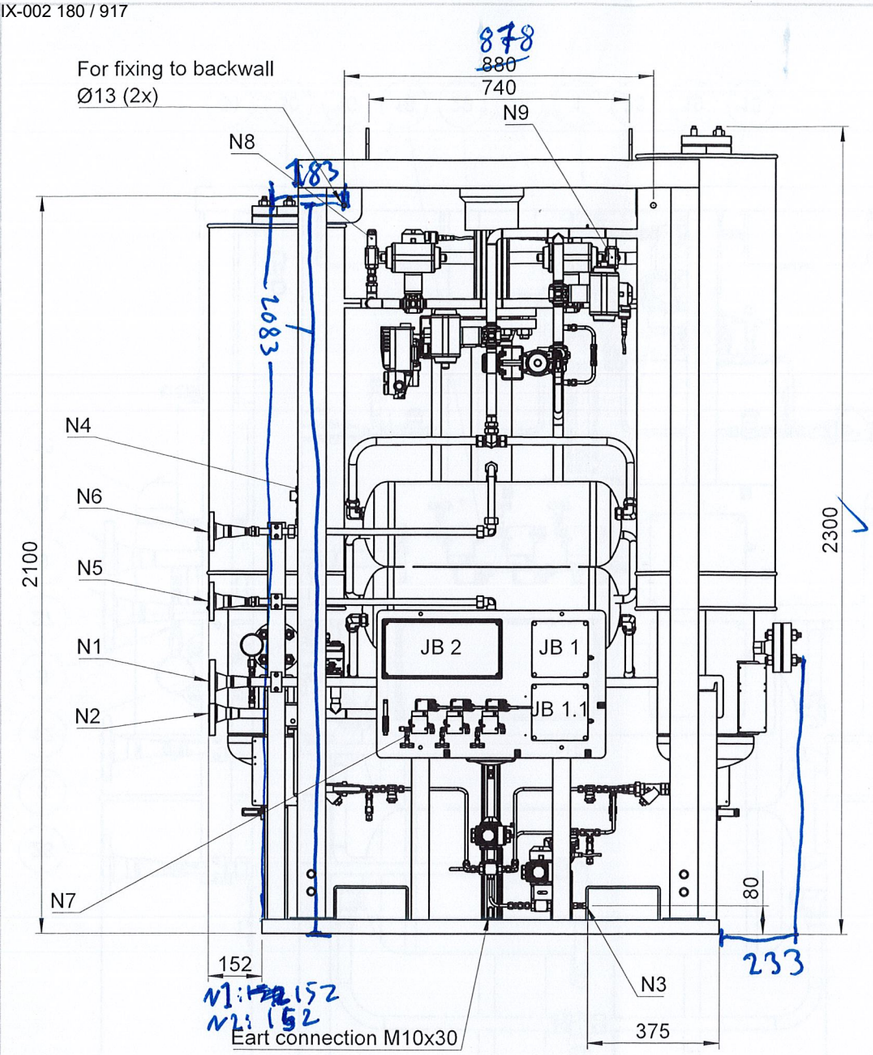
Drawing no. 21231800

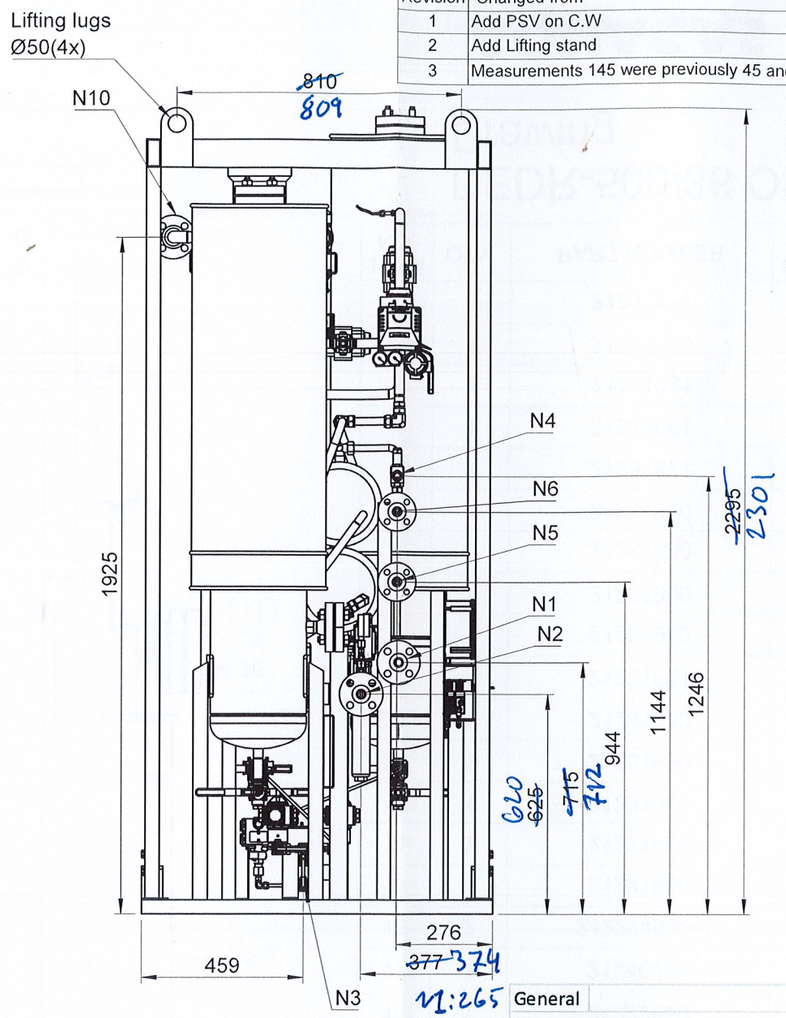
Rev. 3

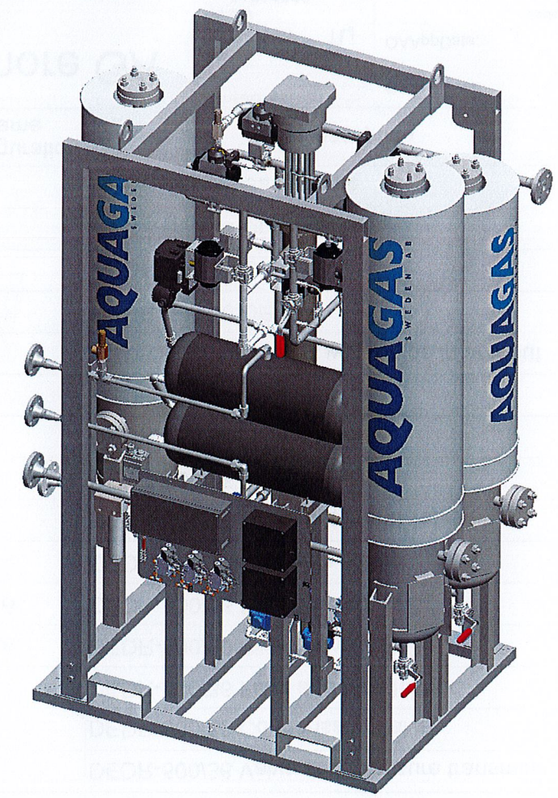
AQUAGAS SWEDEN AB

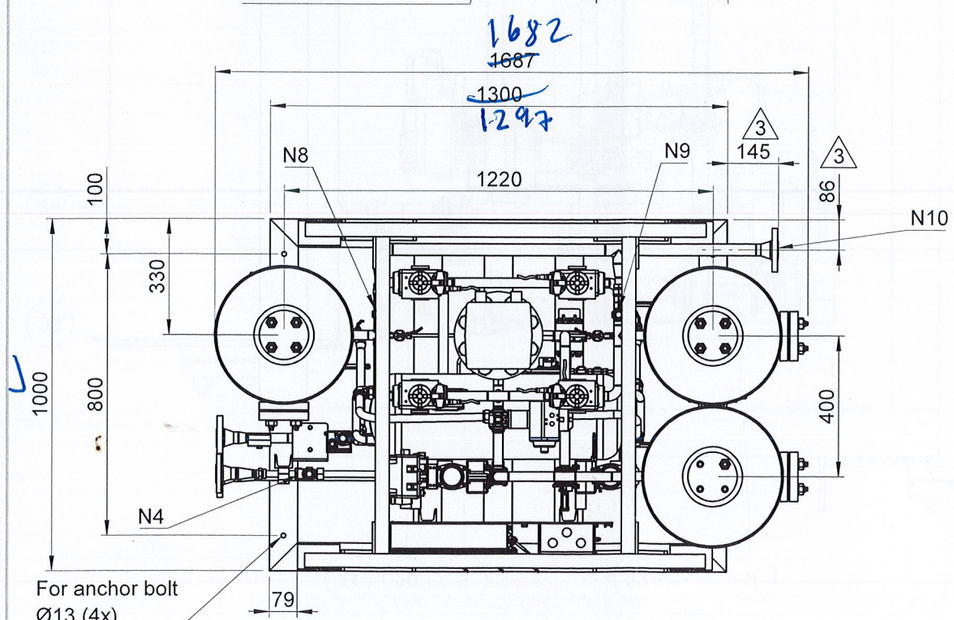
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Revision	Changed from	Date	Sign
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N2	H2 gas outlet	Flange	R 1" Class 300	316L	ASME B16.5
N3	Condensate outlet	HyLok Coupling	Ø 8 mm	316L	
N4	PSV on C.W.	Female threaded	G 1/2"	Brass	
N5	C.W. inlet	Flange	R 1" Class 150	A105	ASME B16.5
N6	C.W. outlet	Flange	R 1" Class 150	A105	ASME B16.5
N7	Instrument Air/Nitrogen	Connector for Plastic Hose	Ø 6 mm	Antistatic PU	
N8	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N9	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N10	PSV to Vent	Flange	R 1" Class 300	A105	ASME B16.5

Name
DEDR-500/36 Offshore
GA Drawing

View placement

Date 2023-06-07 | Constr. TLj

QAApproval:

QAAppDate:

Filename 21231803

Scale 1:17

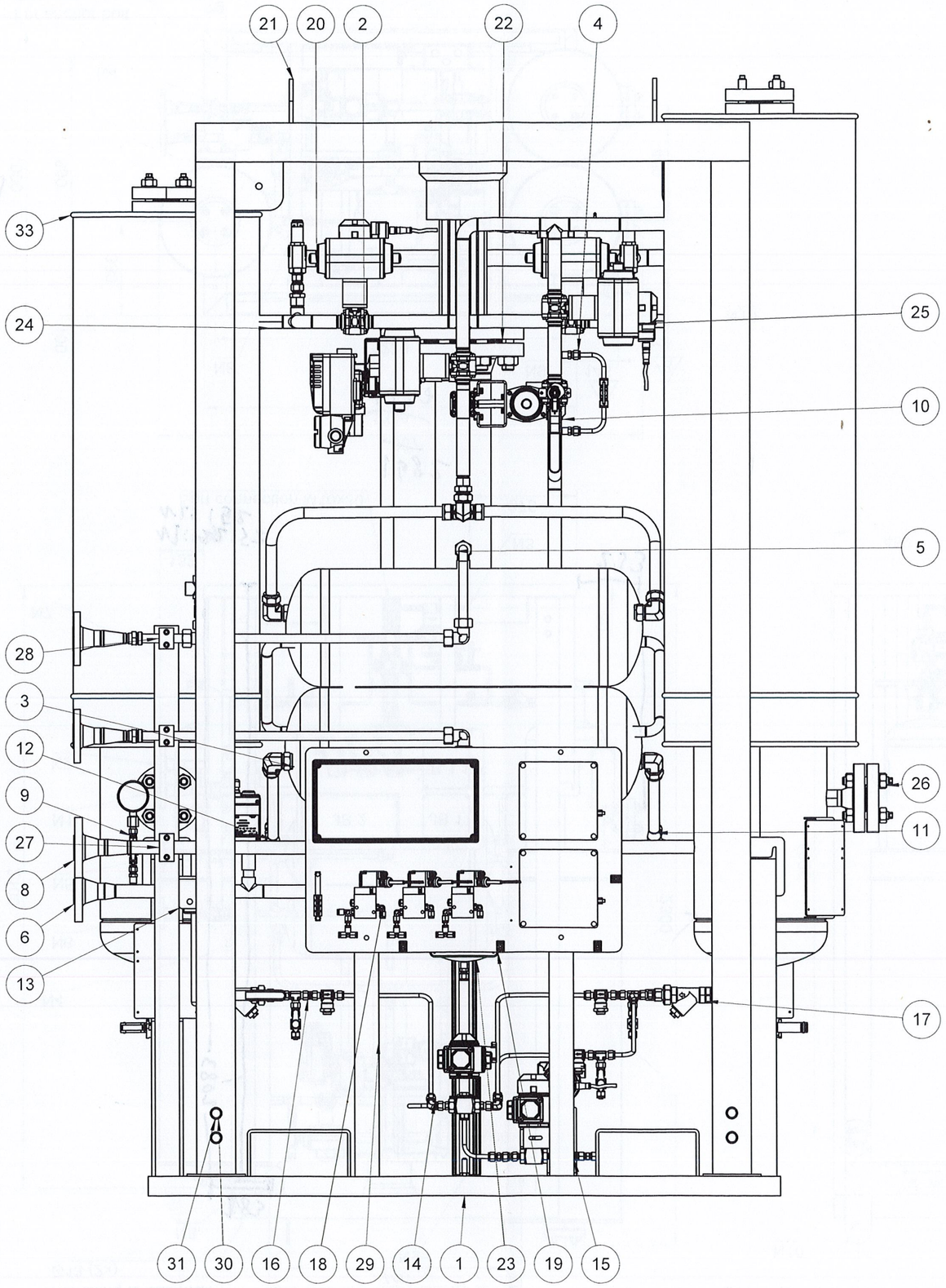
Material

Drawing no. 21231800

Rev. 3

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ITEM NO.	QTY.	PART NUMBER	Configuration Name	Description
34	2	L-30x30x3	L=0287	Angle iron
31	8	M6S M12x25		Bolt
30	8	Bricka M12		Washer
29	2	L=0880	L=0880	U-Beam
28	2	Clamp-5390-03-18-hydroscand		Clamp
27	1	Clamp-5390-05-269-hydroscand		Clamp
26	1	DE-DN250 PN40		
25	1	DR-DN250 PN40 torn B		
24	1	DR-DN250 PN40 torn A		
23	1	HP	DEDR-411_39	
22	1	60000054 Element Elmess		Element Elmess
21	1	21240260		DEDR-500/36 Lifting stand
20	1	21240240		DEAR-500/36 Safety valve outport
19	1	21231750		DEDR-500/36 Cubicle plate Assembly
18	1	21222850		Tube holder DN20 Ø26,9
17	1	21240270		2 DN20 Valves and 2 filter and P1V-H-8M DE
16	2	21222490-A	A	2 DN20 Valves and 2 filter and P1V-H-8M A-B
15	1	21231960		DEDR-500/36 Valve and Pressure transmitter
14	1	21231950		DEDR-500/36 Condensator valves
13	1	21231940		DEDR-500/36 Filter and pipe holder
12	1	21231930	A	DEDR-500/36 Pipe Tower A & B
11	1	21231930	B	DEDR-500/36 Pipe Tower A & B
10	1	21231921		DEDR-500/36 Pipe with ejector
9	1	21231910		DEDR-500/36 Manometer and valve
8	1	21231900		DEDR-500/36 Pipe Gas IN
7	2	21231890		DEDR-200/36 Cooler frame
6	1	21231880		DEDR-500/36 Pipe Gas out
5	1	21231871		DEDR-500/36 Cooling water pipe in and out
4	1	21231861		DEDR-500/36 DE pipe
3	1	21231851		DEDR-500/36 Cooler
2	1	21231840		DEDR-500/36 Upper piping
1	1	21231831		DEDR-500/36 Base frame

Name

DEDR-500/36 Offshore GA Drawing

View placement

QAApproval:

Date 2023-06-07 Constr. TLj

QAAppDate:

Filename 21231803

Scale 1:10

Material

Drawing no. 21231800

Rev. 3

AQUAGAS SWITZERLAND AG

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No.	Qty.	Modified from	Date	Inhr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

N7 Φ6mm Instrument air or Nitrogen

TO CP

64-V17 64-V8 64-V3 64-V2 64-V1 64-V12

TSA 64.4 HH
TS 64.4
≤60°C

PI 64.1
64-V9

AQUAGAS Customer
Flange
1", 300Lbs
ASME B16.5, 316L
N2 Hydrogen
N10 Vent
Flange
1", 300Lbs
ASME B16.5, A105

66 Particle filter 5µm

N8 PSV 64.1 36bar
N9 PSV 64.2 36bar

GSA 64.1.1 LL/HH
GS 64.1.1 Open=I
GSA 64.1.3 LL/HH
GS 64.1.3 Open=I
GS 64.1.2 Open=I
GSA 64.1.2 LL/HH
GS 64.1.4 Open=I
GSA 64.1.4 LL/HH

64-V4.1 64-V4.2 64-V4.3 64-V4.4

TSA 64.6 HH L/H
TA 64.6
TE 64.6
TI 64.6
TT 64.6

TT 64.8 TI 64.8 TC 64.8 TA 64.8 TSA 64.8 L/H HH

TSA 61.1 HH L/H
TA 61.1
TC 61.1
TI 61.1
TT 61.1

TSA 60.1 LL/HH L/H
TA 60.1
TC 60.1
TI 60.1
TT 60.1

TSA 60.2 LL/HH L/H
TA 60.2
TC 60.2
TI 60.2
TT 60.2

*Note 1

61 Deoxidizer

Trace heater cable HE61.1

TSA 64.3 HH
TS 64.3
≤200°C

TSA 64.2 HH
TS 64.2
TSTC 64.1
Heater HE64.1
64-V14.1
64-V14
64-V5
64-V7
GSA 64.3 LL/HH
GS 64.3 Open=I

TSA 64.5 HH L/H
TA 64.5
TC 64.5
TI 64.5
TT 64.5

GSA 64.2 LL/HH
GS 64.2 Open=I

64A Dryer
64B Dryer

PC 64.1 4-20mA
64-T4
FO
64-V6

64-T1

64-V15 64-V10
64-V16 64-V11

TT 64.7 TI 64.7 TC 64.7 TA 64.7 TSA 64.7 L/H HH

Hydrogen
N1
Flange
1", 300Lbs
ASME B16.5
A105

61-V2 61-V1

CW N6
CW N5
Flange
1", 150Lbs
ASME B16.5
A105

Customer AQUAGAS

G 3/4"
PSV-64.3
6bar

Discharge
N4

64-F1.1 1mm
64-F1.2 0.5mm
64-V13 0A 0B
64-F2.2 0.5mm
64-V33
64-F2.1 1mm

61-F1.1 61-F1.2 61-V3

64-V32 64-V31 0-Deoxq 0-Dryer
(R-Φ1.0mm)
64-T2
(R-Φ1.2mm)

PSA 64.1 LL/HH
PA 64.1 L/H
PT 64.1
GS 64-T2 Closed=I
GSA 64-T2 LL/HH

AQUAGAS

Pipe coupling
Φ8mm Hy-Loc
N3
Customer

*Note 1: Flange to fill/drain desiccant/catalyst.
– – – – = Customer scope of supply

Pos. No.	Qty.	Designation	Material	Dimension	Remark
					Replaces / Replaced of

Design. RE | Drawn RE | Copy | Checked | Stand. | Appr. | Scale

AQUAGAS SWEDEN AB
www.aquagas.se
Tel. +46 (0) 8 554 204 70

DEDR-500/36 OffShore
P&I Diagram

Filename 20230443.dwg | Date 23-07-03
Drawing no. 20230440

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AQUAGAS SWEDEN AB

Document ID: A-23/24 140 / BC0006223

PROC-AQ23020601-rev1
Revised: 2023-02-06

Weld assembly inspection

Inspected object	DEDR 500/36 – A-23/24 140
Pressure vessel No.	DE: GYP-2430131 A: GYP-2430132 B: GYP-2430133 HE: GYP-2430134
Customer Order No.	BC0006223
Aquagas order No.	A-23/24 140
Manufacturer	Gyémánt-Pirazol Kft.
P&ID nr. (Appendix A)	20230440 Rev. 3 ✓
GA drawing nr. (Appendix B)	21231800 Rev. 3 ✓

Check points	Result	Remark / Setpoint
Build and dimensions		
With P&ID nr. acc. to above, check build	✓	Dryer must correspond to P&ID.
With dimensional drawing nr. acc. to above, check all dimensions	✓	Dryer must correspond to dimensional drawing.
Check that all pressure vessels have welded data plate holders	✓	
Inlet and outlet ports are according to P&ID	✓	Size, type, and pressure rating
Weld quality control		
Check weld quality on vessel	✓	Check for defects as pipes, slag, and cracks
Check weld quality on piping	✓	Check for defects as pipes, slag, and cracks
Cleaning inspections		
Check if cleaning has been performed on the inside of the vessel	✓	
Check if all weld spatter has been removed	✓	
Conformity related		
Check that pressure vessels have pressure numbers stamped on the vessel.	✓	
Check that the pressure vessels have heat numbers stamped on the vessel.	✓	221224 A, B, DE 499784U Heater
Check that the pressure vessel dished end have heat numbers stamped on the dished end.	✓	A: P265GH0 / 6307235820 (Top & bot) B: P265GH0 / 6307235820 (Top & bot) DE: P265GH0/6307235820 (Top & bot) HE: 532093

AQUAGAS SWEDEN AB

Document ID: A-23/24 140 / BC0006223

PROC-AQ23020601-rev1
Revised: 2023-02-06

Punch list

Tag nr. or explain location/equipment	Notes/Remarks/Missing component	Corrected or accepted
SK72	Uneven skid	Corr. RPR
N2	Flange needs to be moved 1cm in	Corr. RPR

Södertälje:
Technician: Richard P-Ringvall
Approved by:
Approved by customer:

RPR

Signatures













02 - VALVES AND MECHANICAL PARTS DATA SHEETS

EU Declaration of Conformity

In accordance to 2014/34/UE ATEX Directive

Equipment and Protective Systems intended for use in potentially explosive atmospheres

SIRCA INTERNATIONAL S.p.A. Via Trieste, 8 - 20060 Trezzano Rosa (Mi) ITALY
Tel +39 0292010204 - Fax +39 0292011954 - E-mail: sirca@tin.it - www.sircainternational.com

Dichiara sotto la propria esclusiva responsabilità chi i seguenti prodotti:
Declares under its sole responsibility that the following products:

Attuatori Pneumatici rotanti serie **AP** e **APM** versioni **DA** e **SR**
Pneumatic Rotary Actuators AP and APM series DA and SR versions

Attuatori a glifo serie **HT70 - APG200 - RGP500/250** versioni **DA** e **SR**
Scotch-joke Pneumatic Actuators HT70 - APG - RGP500/250 series DA and SR versions

ai quali questa dichiarazione si riferisce, sono conformi alla direttiva:
to which this declaration relates, comply with the following directive:

2014/34/UE - ATEX (annex VIII - Non electric devices and components group II)
"Apparecchiature o Sistemi di Protezione o Componenti destinati ad essere utilizzati in atmosfere potenzialmente esplosive.
"Equipment or Protective System intended for use in Potentially Explosive Atmospheres"

La conformità è stata verificata sulla base dei requisiti delle norme seguenti:
The conformity is under observance of the following standards:

EN1127-1 : 2011 / EN13463-1 : 2009 / EN13463-5 : 2011

Marcatura delle apparecchiature sopra elencate:
Marking of the above mentioned products:

CE Ex **II 2 GD c TX**

destinate quindi ad essere utilizzate esclusivamente nelle zone **1,2** per gas e zone **21,22** per polveri
*Intended for use only in **1,2** zone for Gas and **21,22** zone for Dust*

File tecnico di riferimento */ Technical file of riferiment:*
TF-94/9-AP-001/14

In accordo all'articolo 8 b) ii) della Direttiva 2014/34/UE
il fascicolo è stato depositato presso l'organismo notificato:
In according to the article 8 b) ii) of the 2014/34/UE Directive, the technical documentation was consigned to the notified body:

TUV Italia s.r.l. - Gruppo TUV SUD
Via Carducci 125 pal. 23
20099 Sesto S. Giovanni (Mi)

L'ente notificato ha emesso l'avviso di ricevimento n°
The notified body has issued the acknowledgement n°

TUV IT 14 ATEX 022

Le apparecchiature elencate sono inoltre conformi alle seguenti norme tecniche:
The above mentioned equipments are in according to the following technical standards:

ISO 5211 : 2003 - VDI / VDE 3845 : 2010 - EN 15714-3 : 2009

Trezzano Rosa, 20TH April, 2016

Managing Director
Cassinari

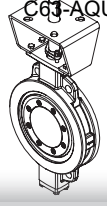
JIRCA INTERNATIONAL S.p.a.

SIRCA INTERNATIONAL S.P.A.

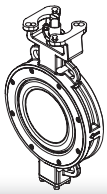


AP/APM series
Pneumatic Rotary Actuators

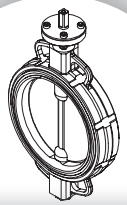
OUR PRODUCTION



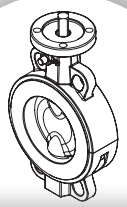
501M series - Triple Eccentric Metal Seated Butterfly Valves



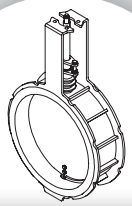
401N series - Double Eccentric Butterfly Valves



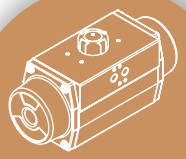
301 / 301E series - Butterfly Valves with Rubber Seat



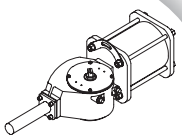
301TSS / 301TT series - Butterfly Valves with PTFE Lined



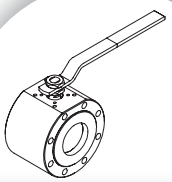
HT600 series - Damper Valves for High Temperature



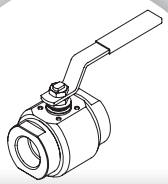
AP / APM series - Pneumatic Rotary Actuators



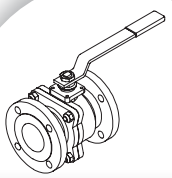
APG series - Scotch Yoke Pneumatic Actuators



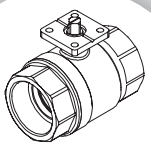
S10 series - Wafer Flat Body Ball Valves



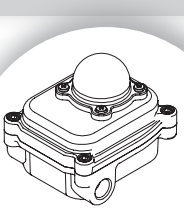
S20 series - Two-pieces 800 p.s.i. Ball Valves



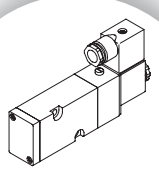
S30 series - Split Body Ball Valves / **S30T series** - Trunnion Ball Valves



S40, S50, S60, S70, S80 series - Threaded Actuated and Manual Ball Valves



MBX Series - Limit Switch Box



SVS Series - Solenoid Valves 5/2 or 3/2 way

ACCESSORIES

JIRCA INTERNATIONAL S.P.A.



COMPANY PROFILE

Sirca International SpA was founded in the late seventies, and started doing business as a manufacturer of complete automation and pneumatic regulation systems.
Our flagship product is rotating pneumatic quarter-turn actuators which are compact, lightweight and highly reliable.

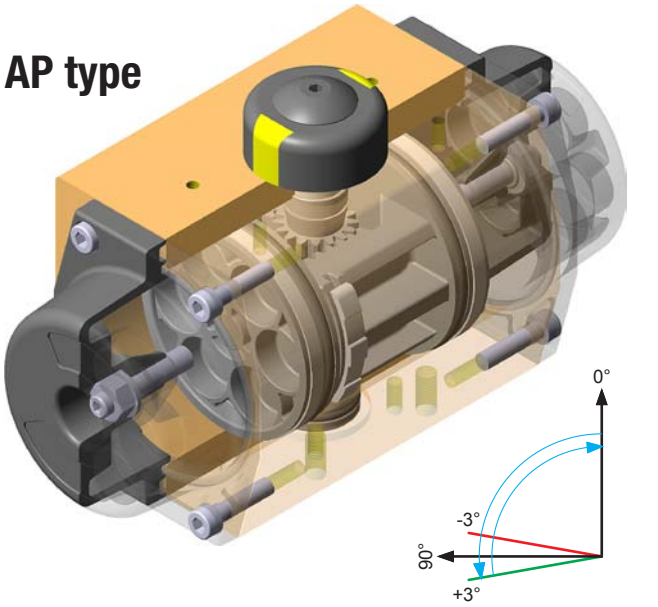
Subsequently, our company entered the Italian market with the production and sale of rubber-seated butterfly valves, double eccentric butterfly valves, ball valves and check valves.
In time at Sirca International we began marketing and producing accessories to actuate, control and regulate valves. These were installed on our own valves and actuators in order to offer our customers complete “assemblies” that are capable of meeting the most varied system requirements.

Beginning in the 1990s, our company began looking at foreign markets and in a short time we started exporting more than 60% of our production.
This type of market development requires continuous product innovation as well as continuous effort to maintain product competitiveness and quality.
With this motivation and these objectives, with the arrival of the new millenium we at Sirca International began designing and producing the triple eccentric butterfly valve metal-seated that are currently top of the range of the valves produced at Sirca.

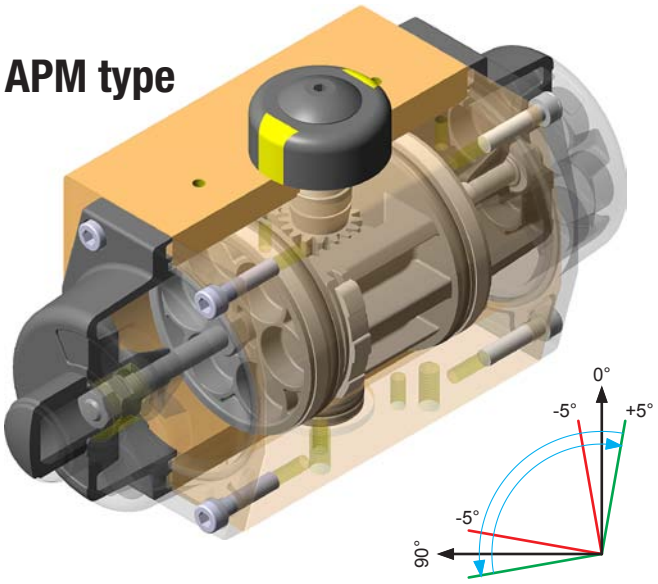
The main strong points of Sirca International SpA lie in our product quality, competitive price, large warehouse stocks and in the reliability of our services. These confirm our status as a Leading Company on the national and international markets.

Constructive features

AP type



APM type



Two type of model: **AP** and **APM** series.

AP series, with single adjustment, allows only the adjustment of the stroke of the pistons in opening position 90° ± 3°.

APM series, with double adjustment, allows to adjust the stroke of the pistons in closing and opening of ± 5°.

Dual piston rack and pinion design for compact construction, symmetric mounting piston. One compact design with identical body and end caps for double acting and spring return model.

Extruded aluminium body, available with two types of corrosion protection, gold anodised or hard anodised. All bodies are machined with CNC controlled machines in order to obtain the highest quality and precision.

End caps and pistons are made of die-cast aluminum. End caps are painted.

Pinion is made in nickel plated steel alloy. An anti-blowout system prevents the stem from slipping out of the actuator body.

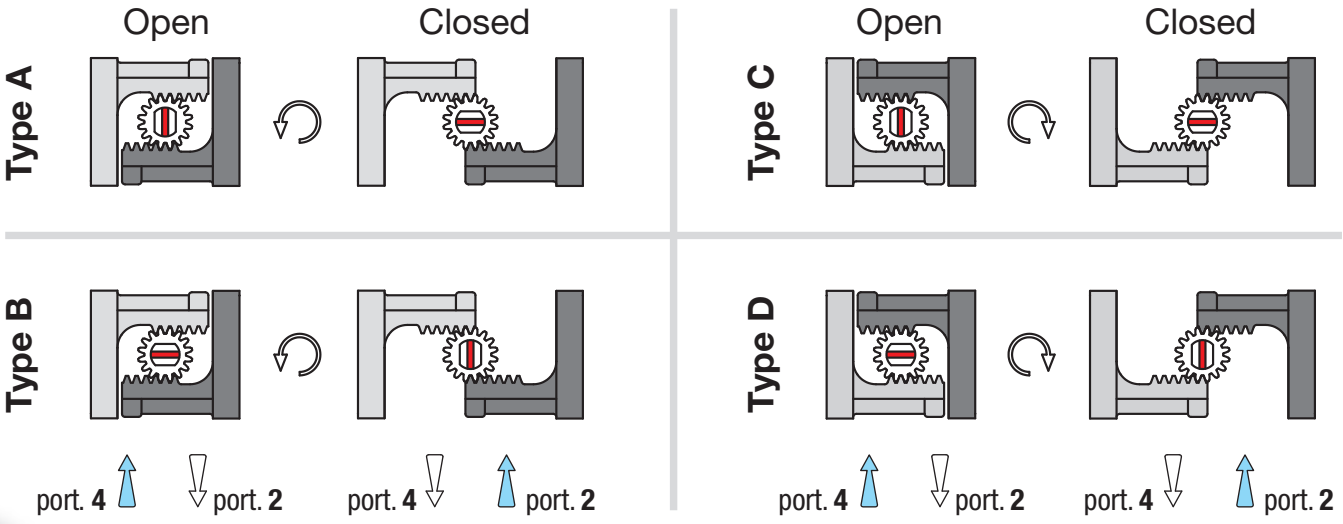
All moving components, are equipped with special anti-friction rings or bearing.

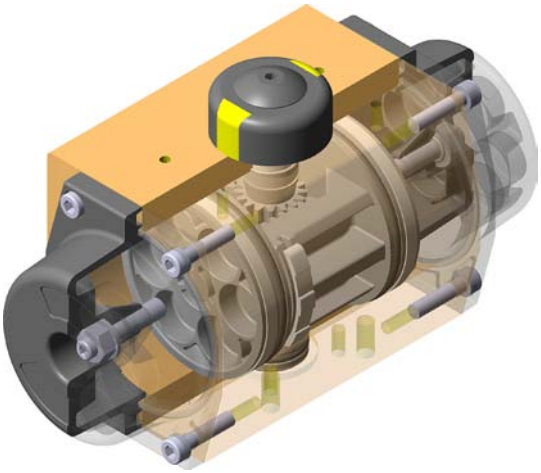
All springs are made with an encapsulated system that avoids the risk of accidents during the disassembly phases of the actuator.

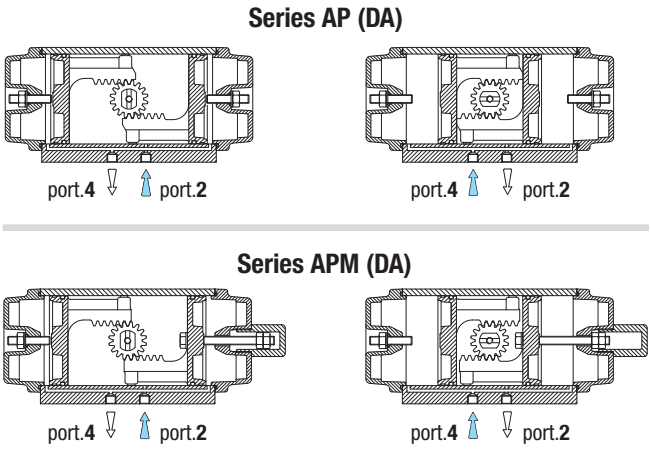
Internal and external stainless steel fasteners for long term corrosion resistance.

Conform to technical specifications:
ISO 5211, DIN3337 and VDI / VDE 3845 NAMUR for product interchangeability and easy mounting of solenoids valve, limit switches and other accessories.

Mounting variation







DOUBLE ACTING ACTUATOR (DA)

Counter clockwise output operation is achieved by inserting pressure into **Port '2'**, to force the pistons apart thus rotating the actuator pinion counter clockwise. During the operation, air from the outer chambers is exhausted through **Port '4'**. Clockwise output operation is achieved by reverse of the above and inserting pressure into **Port '4'**.

DATA REQUIRED FOR ACTUATOR SIZING

1) Valve torque (min. 25% safety recommended).
2) Double acting or spring return operation.
3) Minimum available operating pressure.

SELECTION OF DOUBLE ACTING ACTUATORS (DA)

Determine the required valve torque, this should include 25% safety margin, and the minimum operating pressure available. Refer to the pressure/torque table abd select the minimum pressure column applicable. Follow this column down until a value not less than that required is found. Next read across to the left hand column and read the model number to be ordered.
EXAMPLE: Valve torque 80Nm plus 25% = 100 Nm Minimum operating pressure 5 bar. By reading the 5 bar column, nearest value greather than 100 Nm is 119 Nm. The model number therefore shown in the left hand column is AP4DA.

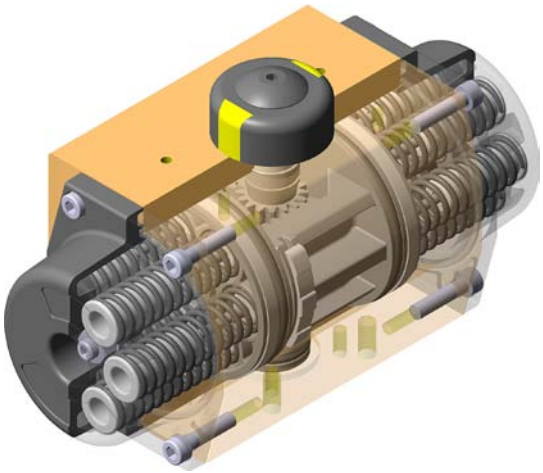
REMARK: the chosen torque valve, which fixes the type of actuator, has never to be lower than the requested torque value of the valve.

DOUBLE ACTING TORQUE RATINGS (DA)

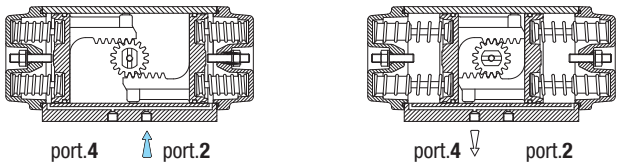
		OPERATING PRESSURE						
MODEL	bar / p.s.i.	2 / 30	3 / 44	4 / 58	5 / 73	6 / 87	7 / 102	8 / 116
AP0 DA	N m	2,4	3,6	4,8	6	7,3	8,5	9,7
	lb f.In	21.4	32.1	42.8	53.5	65.1	75.8	86.5
AP1 DA	N m	5,9	8,9	11,8	14,8	17,7	21,7	24,8
	lb f.In	52.6	79.3	105.2	132	157.8	193.5	221.1
AP2 DA	N m	9,4	14,1	18,8	23,5	28,2	32,9	37,6
	lb f.In	83.8	125.7	167.7	209.6	251.5	293.5	335.4
AP3 DA	N m	20	30	40	50	60	70	80
	lb f.In	178.4	267.6	356.8	446	535.2	624.4	713.6
AP3.5 DA	N m	34	51	68	85	102	119	136
	lb f.In	303.3	454.9	606.5	758.2	909	1061.5	1213.2
AP4 DA	N m	48	71	95	119	142	168	192
	lb f.In	428.2	633.3	847.4	1061	1266.6	1498.5	1712.6
AP4.5 DA	N m	87,2	130,8	174,4	218	261,6	305,2	348,8
	lb f.In	777.8	1166.7	1555.6	1944.5	2333.4	2722.3	3111.2
AP5 DA	N m	111	167	222	278	333	388.5	444
	lb f.In	990.1	1489.6	1980.2	2479.7	2970.4	3465.4	3960.5
AP5.5 DA	N m	157,6	236,4	315,3	394,1	473	551,8	630,6
	lb f.In	1405.7	2108.6	2812.4	3515.3	4219.1	4922	5624.9
AP6 DA	N m	227	340	454	567	680	794.5	908
	lb f.In	2024.8	3032.8	4049.6	5057.6	6065.6	7087	8099.4
AP8 DA	N m	426	638	851	1064	1276	1491	1704
	lb f.In	3800	5691	7591	9491	11382	13299	15200
AP10 DA	N m	1078	1617	2156	2695	3234	3773	4312
	lb f.In	9615.8	14423.6	19231.5	24039.4	28847.3	33655.2	38463
AP12 DA	N m	1880	2820	3760	4701	5641	6581	7522
	lb f.In	16770	25155	33539	41933	50318	58703	67096

NOTE: The output torque of selected actuator mentioned in the table are suitable also for APM series and the value should never be less the required valve torque.

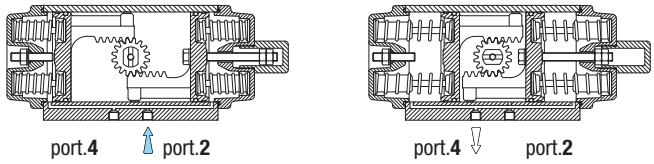
Principle of operation SR



Series AP (SR)



Series APM (SR)



SPRING RETURN ACTUATORS (SR)

Pressure applied to **Port '2'** will cause the inner chambers to be pressurised, forcing the pistons outward to compress the spring. The pinion is rotated counter counteil clockwise. Upon release of pressure through **Port '2'** the springs will exert pressure to close the pistons and rotate the pinion clockwise rapidly. This action will often be used to close a 90° turn valve in shutdown mode.

SELECTION OF SPRING RETURN ACTUATORS (SR)

Determine the required valve torque (this should include 25% safety margin), andthe minimum operating pressure available. Select from the **"SPRING STROKE /"0"** table a value that s not less than the required valve torque (including safety margin). Next refer to the pressure table and select under your minimum pressure and **"90"** torque column a figure not less than required (including safety margin).

EXAMPLE: Valve torque 60 Nm plus 25% = 75 Nm. Checking the **"SPRING STROKE /"0"** column, it will be noted that the nearest value is 108 Nm. By following the line across to the vertical 5 bar **"90"** torque column, a figure of 109 Nm is shown therefore, the suitable actuators is the **AP5SR5**. In a normal valve shut-down situation the actuator would operate the valve to break out a less than 108 Nm. If the **"90"** torque at operating pressure is too low, continue down the column until an acceptable vlua is found, compare with the corresponding **"SPRING STROKE /"0"** column to ensure that this also is adeguate. This model may be used.

RIGHT ARRANGEMENT OF SPRINGS



SR-2 **SR-3** **SR-4** **SR-5** **SR-6**

SPRING RETURN TORQUE RATINGS (SR)

MODEL	N° OF SPRINGS FOR EACH SIDE OF CAP	U.M.	SUPPLY PRESSURE												SPRING STROKE	
		bar / p.s.i.	3 / 44		4 / 58		5 / 73		6 / 87		7 / 102		8 / 118			
			0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
AP1 SR	2	N m	6,5	5,4	9,4	8,3	12,4	11,3	15,3	14,2	19,3	18,2	22,4	21,3	3,5	2,4
		lb f.in	58.0	48.2	83.8	74.0	110.6	100.8	136.5	126.7	172.2	162.3	199.8	190.0	31.2	21.4
	3	N m	5,3	3,7	8,2	6,6	11,2	9,6	14,1	12,5	18,1	16,5	21,2	19,6	5,2	3,6
		lb f.in	47.3	33.0	73.1	58.9	99.9	85.6	125.8	111.5	161.5	147.2	189.1	174.8	46.4	32.1
	4	N m	4,1	1,9	7,0	4,8	10,0	7,8	12,9	10,7	16,9	14,7	20,0	17,8	7,0	4,8
		lb f.in	36.6	16.9	62.4	42.8	89.2	69.6	115.1	95.4	150.7	131.1	178.4	158.8	62.4	42.8
	5	N m	//	//	3,1	2,7	8,8	6,1	11,7	9,0	15,7	13,0	18,8	16,1	8,7	6,0
		lb f.in	//	//	27.7	24.1	78.5	54.4	104.4	80.3	140.0	116.0	167.7	143.6	77.6	53.5
	6	N m	//	//	//	//	7,6	4,3	10,5	7,2	14,5	11,2	17,6	14,3	10,5	7,2
		lb f.in	//	//	//	//	67.8	38.4	93.7	64.2	129.3	99.9	157.0	127.6	93.7	64.2
AP2 SR	2	N m	10,3	8,5	15,0	13,2	19,7	17,9	24,4	22,6	29,1	27,3	33,8	32,0	5,6	3,8
		lb f.in	91.9	75.8	133.8	117.7	175.7	159.7	217.6	201.6	259.6	243.5	301.5	285.4	50.0	33.9
	3	N m	8,4	5,7	13,1	10,4	17,8	15,1	22,5	19,8	27,2	24,5	31,9	29,2	8,4	5,7
		lb f.in	74.9	50.8	116.9	92.8	158.8	134.7	200.7	176.6	242.6	218.5	284.5	260.5	74.9	50.8
	4	N m	//	//	11,2	7,6	15,9	12,3	20,6	17,0	25,3	21,7	30,0	26,4	11,2	7,6
		lb f.in	//	//	99.9	67.8	141.8	109.7	183.8	151.6	225.7	193.6	267.6	235.5	99.9	67.8
	5	N m	//	//	//	//	14,0	9,5	18,7	14,2	23,4	18,9	28,1	23,6	14,0	9,5
		lb f.in	//	//	//	//	124.9	84.7	166.8	126.7	208.7	168.6	250.7	210.5	124.9	84.7
	6	N m	//	//	//	//	12,1	6,7	16,8	11,4	21,5	16,1	26,2	20,8	16,8	11,4
		lb f.in	//	//	//	//	107.9	59.8	149.9	101.7	191.8	143.6	233.7	185.5	149.9	101.7
AP3 SR	2	N m	22,0	18,0	32,0	28,0	42,0	38,0	52,0	48,0	62,0	58,0	72,0	68,0	12,0	8,0
		lb f.in	196.2	160.6	285.4	249.8	374.6	339.0	463.8	428.2	553.0	517.4	642.2	606.6	107.0	71.4
	3	N m	18,0	12,0	28,0	22,0	38,0	32,0	48,0	42,0	58,0	52,0	68,0	62,0	18,0	12,0
		lb f.in	160.6	107.0	249.8	196.2	339.0	285.4	428.2	374.6	517.4	463.8	606.6	553.0	160.6	107.0
	4	N m	//	//	24,0	16,0	34,0	26,0	44,0	36,0	54,0	46,0	64,0	56,0	24,0	16,0
		lb f.in	//	//	214.1	142.7	303.3	231.9	392.5	321.1	481.7	410.3	570.9	499.5	214.1	142.7
	5	N m	//	//	//	//	30,0	20,0	40,0	30,0	50,0	40,0	60,0	50,0	30,0	20,0
		lb f.in	//	//	//	//	267.6	178.4	356.8	267.6	446.0	356.8	535.2	446.0	267.6	178.4
	6	N m	//	//	//	//	26,0	14,0	36,0	24,0	46,0	34,0	56,0	44,0	36,0	24,0
		lb f.in	//	//	//	//	231.9	124.9	321.1	214.1	410.3	303.3	499.5	392.5	321.1	214.1

MODEL	NUMBER OF SPRINGS FOR EACH SIDE OF CAP	U.M.	SUPPLY PRESSURE												SPRING STROKE	
		bar / p.s.i.	3 / 44		4 / 58		5 / 73		6 / 87		7 / 102		8 / 118			
			0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
AP3,5 SR	2	N m	41,5	30,0	58,5	47,0	75,5	64,0	92,5	81,0	109,5	98,0	126,5	115,0	21,0	9,5
		lb f.in	370.2	267.6	521.8	419.2	673.5	570.9	825.1	722.5	976.7	874.2	1128.4	1025.8	187.3	84.7
	3	N m	32,0	20,0	49,0	37,0	66,0	54,0	83,0	71,0	100,0	88,0	117,0	105,0	31,0	19,0
		lb f.in	285.4	178.4	437.1	330.0	588.7	481.7	740.4	633.3	892.0	785.0	1043.6	936.6	276.5	169.5
	4	N m	//	//	43,0	20,0	60,0	37,0	77,0	54,0	94,0	71,0	111,0	88,0	48,0	25,0
		lb f.in	//	//	383.6	178.4	535.2	330.0	686.8	481.7	838.5	633.3	990.1	785.0	428.2	223.0
	5	N m	//	//	//	//	53,0	33,0	70,0	50,0	87,0	67,0	104,0	84,0	52,0	32,0
		lb f.in	//	//	//	//	472.8	294.4	624.4	446.0	776.0	597.6	927.7	749.3	463.8	285.4
	6	N m	//	//	//	//	47,0	22,0	64,0	39,0	81,0	56,0	106,4	73,0	63,0	38,0
		lb f.in	//	//	//	//	419.2	196.2	570.9	347.9	722.5	499.5	949.1	651.2	562.0	339.0
AP4 SR	2	N m	52,7	42,4	76,7	66,4	100,7	90,4	123,7	113,4	149,7	139,4	173,7	175,2	28,6	18,3
		lb f.in	470.1	378.2	684.2	592.3	898.2	806.4	1103.4	1011.5	1335.3	1243.4	1549.4	1562.8	255.1	163.2
	3	N m	43,0	28,0	67,0	52,0	91,0	76,0	114,0	99,0	140,0	125,0	164,0	153,6	43,0	28,0
		lb f.in	383.6	249.8	597.6	463.8	811.7	677.9	1016.9	883.1	1248.8	1115.0	1462.9	1370.1	383.6	249.8
	4	N m	//	//	58,0	38,0	82,0	62,0	105,0	85,0	131,0	111,0	155,0	132,0	57,0	37,0
		lb f.in	//	//	517.4	339.0	731.4	553.0	936.6	758.2	1168.5	990.1	1382.6	1177.4	508.4	330.0
	5	N m	//	//	//	//	73,0	47,0	96,0	70,0	122,0	96,0	146,0	110,4	72,0	46,0
		lb f.in	//	//	//	//	651.2	419.2	856.3	624.4	1088.2	856.3	1302.3	948.8	642.2	410.3
	6	N m	//	//	//	//	64,0	33,0	87,0	56,0	113,0	82,0	137,0	88,8	86,0	55,0
		lb f.in	//	//	//	//	570.9	294.4	776.0	499.5	1008.0	731.4	1222.0	792.1	767.1	490.6
AP4,5 SR	2	N m	96,8	77,5	140,4	121,1	184,0	164,7	227,6	208,3	271,2	251,9	314,8	295,5	53,3	34,0
		lb f.in	950.6	761.1	1378.7	1189.2	1806.9	1617.4	2235.0	2045.5	2663.2	2473.7	3091.3	2901.8	475.4	303.2
	3	N m	79,8	50,9	123,4	94,5	167,0	138,1	210,6	181,7	254,2	225,3	297,8	268,9	79,9	51,0
		lb f.in	783.6	499.8	1211.8	928.0	1639.9	1356.1	2068.1	1784.3	2496.2	2212.4	2924.4	2640.6	712.7	454.9
	4	N m	//	//	106,4	67,8	150,0	111,4	193,6	155,0	237,2	198,6	280,8	242,2	106,6	68,0
		lb f.in	//	//	1044.8	665.8	1473.0	1093.9	1901.2	1522.1	2329.3	1950.3	2757.5	2378.4	950.8	606.5
	5	N m	//	//	//	//	133,0	84,7	176,6	128,3	220,2	171,9	263,8	215,5	133,3	85,0
		lb f.in	//	//	//	//	1306.1	831.8	1734.2	1259.9	2162.4	1688.1	2590.5	2116.2	1189.0	758.2
	6	N m	//	//	//	//	116,0	58,0	159,6	101,6	203,2	145,2	246,8	188,8	160,0	102,0
		lb f.in	//	//	//	//	1139.1	569.6	1567.3	997.7	1995.4	1425.9	2423.6	1854.0	1427.2	909.8
AP5 SR	2	N m	123,7	99,4	178,7	154,4	234,7	210,4	289,7	265,4	345,2	320,9	400,7	376,4	67,6	43,3
		lb f.in	1103.4	886.6	1594.0	1377.2	2093.5	1876.8	2584.1	2367.4	3079.2	2862.4	3574.2	3357.5	603.0	386.2
	3	N m	103,0	66,0	158,0	121,0	214,0	177,0	269,0	232,0	324,5	287,5	380,0	343,0	101,0	64,0
		lb f.in	918.8	588.7	1409.4	1079.3	1908.9	1578.8	2399.5	2069.4	2894.5	2564.5	3389.6	3059.6	900.9	570.9
	4	N m	//	//	136,0	87,0	192,0	143,0	247,0	198,0	302,5	253,5	358,0	309,0	135,0	86,0
		lb f.in	//	//	1231.1	776.0	1712.6	1275.6	2203.2	1766.2	2698.3	2261.2	3193.4	2756..3	1204.2	767.1
	5	N m	//	//	//	//	170,0	109,0	225,0	164,0	280,5	219,5	336,0	275,0	169,0	108,0
		lb f.in	//	//	//	//	1516.4	972.3	2007.0	1462.9	2502.1	1957.9	2997.1	2453.0	1507.5	963.4
	6	N m	//	//	//	//	148,0	75,0	203,0	130,0	258,5	185,5	314,0	241,0	203,0	130,0
		lb f.in	//	//	//	//	1320.2	669.0	1810.8	1159.6	2305.8	1654.7	2800.9	2149.7	1810.8	1159.6
AP5,5 SR	2	N m	179,8	136,4	258,7	215,3	337,5	294,1	416,4	373,0	495,2	451,8	574,0	530,6	100,0	56,6
		lb f.in	1765.6	1339.4	2540.4	2114.2	3314.3	2888.1	4089.0	3662.9	4862.9	4436.7	5636.7	5210.5	892.0	504.8
	3	N m	151,5	86,4	230,4	165,3	309,2	244,1	388,1	323,0	466,9	401,8	545,7	480,6	150,0	84,9
		lb f.in	1487.7	848.4	2262.5	1623.2	3036.3	2397.1	3811.1	3171.9	4585.0	3945.7	5358.8	4719.5	1338.0	757.3
	4	N m	//	//	202,0	115,3	280,8	194,1	359,7	273,0	438,5	351,8	517,3	430,6	200,0	113,3
		lb f.in	//	//	1983.6	1132.2	2757.5	1906.1	3532.3	2680.9	4306.1	3454.7	5079.9	4228.5	1784.0	1010.6
	5	N m	//	//	//	//	252,5	144,1	331,4	223,0	410,2	301,8	489,0	380,6	250,0	141,6
		lb f.in	//	//	//	//	2479.6	1415.1	3254.3	2189.9	4028.2	2963.7	4802.0	3737.5	2230.0	1263.0
	6	N m	//	//	//	//	224,1	94,1	303,0	173,0	381,8	251,8	460,6	330,6	300,0	170,0
		lb f.in	//	//	//	//	2200.7	924.1	2975.5	1698.9	3749.3	2472.7	4523.1	3246.5	2676.0	1516.4
AP6 SR	2	N m	257,0	200,0	371,0	314,0	484,0	427,0	597,0	540,0	711,5	654,5	825,0	768,0	140,0	83,0
		lb f.in	2292.4	1784.0	3309.3	2800.9	4317.3	3808.8	5325.2	4816.8	6346.6	5838.1	7359.0	6850.6	1248.8	740.4
	3	N m	215,0	130,0	329,0	244,0	442,0	357,0	555,0	470,0	669,5	584,5	783,0	698,0	210,0	125,0
		lb f.in	1917.8	1159.6	2934.7	2176.5	3942.6	3184.4	4950.6	4192.4	5971.9	5213.7	6984.4	6226.2	1873.2	1115.0
	4	N m	//	//	287,0	174,0	400,0	287,0	513,0	400,0	627,5	514,5	741,0	628,0	280,0	167,0
		lb f.in	//	//	2560.0	1552.1	3568.0	2560.0	4576.0	3568.0	5597.3	4589.3	6609.7	5601.8	2497.6	1489.6
	5	N m	//	//	//	//	358,0	217,0	471,0	330,0	585,5	444,5	699,0	558,0	350,0	209,0
		lb f.in	//	//	//	//	3193.4	1935.6	4201.3	2943.6	5222.7	3964.9	6235.1	4977.4	3122.0	1864.3
	6	N m	//	//	//	//	316,0	147,0	429,0	260,0	543,5	374,5	657,0	488,0	420,0	251,0
		lb f.in	//	//	//	//	2818.7	1311.2	3826.7	2319.2	4848.0	3340.5	5860.4	4353.0	3746.4	2238.9
AP8 SR	2	N m	478,0	386,0	691,0	599,0	904,0	812,0	1116,0	1024,0	1331,0	1239,0	1704,0	1452,0	252,0	160,0
		lb f.in	4263.8	3443.1	6163.7	5343.1	8063.7	7243.0	9954.7	9134.1	11872.5	11051.9	15199.7	12951.8	2247.8	1427.2
	3	N m	398,0	260,0	611,0	473,0	824,0	686,0	1036,0	898,0	1251,0	1113,0	1464,0	1326,0	378,0	240,0
		lb f.in	3550.2	2319.2	5450.1	4219.2	7350.1	6119.1	9241.1	8010.2	11158.9	9928.0	13058.9	11827.9	3371.8	2140.8
	4	N m	//	//	531,0	347,0	744,0	560,0	956,0	772,0	1171,0	987,0	1384,0	1200,0	504,0	320,0
		lb f.in	//	//	4736.5	3095.2	6636.5	4995.2	8527.5	6886.2	10445.3	8804.0	12345.3	10704.0	4495.7	2854.4
	5	N m	//	//	//	//	664,0	434,0	876,0	646,0	1091,0	861,0	1304,0	1074,0	630,0	400,0
		lb f.in	//	//	//	//	5922.9	3871.3	7813.9	5762.3	9731.7	7680.1	11631.7	9580.1	5619.6	3568.0
	6	N m	//	//	//	//	584,0	308,0	796,0	520,0	1011,0	735,0	1224,0	948,0	756,0	480,0
		lb f.in	//	//	//	//	5209.3	2747.4	7100.3	4638.4	9018.1	6556.2	10918.1	8456.2	6743.5	4281.6
AP10 SR	2	N m	1181,0	957,0	1720,0	1496,0	2259,0	2035,0	2798,0	2574,0	3337,0	3113,0	3876,0	3652,0	660,0	436,0
		lb f.in	11597.4	9397.7	16890.4	14690.7	22183.4	19983.7	27476.4	25276.7	32769.3	30569.7	38062.3	35862.6	6481.2	4281.5
	3	N m	963,0	628,0	1502,0	1167,0	2041,0	1706,0	2580,0	2245,0	3119,0	2784,0	3658,0	3323,0	989,0	654,0
		lb f.in	9456.7	6167.0	14749.6	11459.9	20042.6	16752.9	25335.6	22045.9	30628.6	27338.9	35921.6	32631.9	9712.0	6422.3
	4	N m	//	//	1284,0	837,0	1823,0	1376,0	2362,0	1915,0	2901,0	2454,0	3440,0	2993,0	1319,0	872,0
		lb f.in	//	//	12608.9	8219.3	17901.9	13512.3	23194.8	18805.3	28487.8	24098.3	33780.8	29391.3	12952.6	8563.0
	5	N m	//	//	//	//	1605,0	1046,0	2144,0	1585,0	2683,0	2124,0	3222,0	2663,0	1649,0	1090,0
		lb f.in	//	//	//	//	15761.1	10271.7	21054.1	15564.7	26347.1	20857.7	31640.0	26150.7	16193.2	10703.8
	6	N m	//	//	//	//	//	//	1909,0	1254,0	2448,0	1793,0	2987,0	2332,0	1980,0	1325,0
		lb f.in	//	//	//	//	//	//	18746.4	12314.3	24039.4	17607.3	29332.3	22900.2	19443.6	13011.5
AP12 SR	2	N m	2082,0	1723,0	3022,0	2663,0	3963,0	3604,0	4903,0	4544,0	5843,0	5484,0	6783,0	6424,0	1097,0	738,0
		lb f.in	20445.2	16919.9	29676.0	26150.7	38916.7	35391.3	48147.5	44622.1	57378.3	53852.9	66609.1	63083.7	10772.5	7247.2
	3	N m	1715,0	1174,0	2655,0	2114,0	3596,0	3055,0	4536,0	3995,0	5476,0	4935,0	6416,0	5875,0	1646,0	1105,0
		lb f.in	16841.3	11528.7	26072.1	20759.5	35312.7	30000.1	44543.5	39230.9	53774.3	48461.7	63005.1	57692.5	16163.7	10851.1
	4	N m	//	//	2286,0	1565,0	3227,0	2506,0	4167,0	3446,0	5107,0	4386,0	6047,0	5326,0	2195,0	1474,0
		lb f.in	//	//	22448.5	15368.3	31689.1	24608.9	40919.9	33839.7	50150.7	43070.5	59381.5	52301.3	21554.9	14474.7
	5	N m	//	//	//	//	2859,0	1958,0	3799,0	2898,0	4739,0	3838,0	5679,0	4778,0	2743,0	1842,0
		lb f.in	//	//	//	//	28075.4	19227.6	37306.2	28458.4	46537.0	37689.2	55767.8	46920.0	26936.3	18088.4
	6	N m	//	//	//	//	//	//	3430,0	2349,0	4370,0	3289,0	5310,0	4229,0	3292,0	2211,0
		lb f.in	//	//	//	//	//	//	33682.6	23067.2	42913.4	32298.0	52144.2	41528.8	32327.4	21712.0

NOTE: The output torque of selected actuator mentioned in the table are suitable also for APM series and the value should never be less the required valve torque.

Technical features Pneumatic Actuator AP0÷AP12

Series	AP / APM DA Double Acting / SA Single Acting
Size range	AP0 ÷ AP12 (Ø32 mm to Ø330 mm)
Stroke	90° with single travel adjustment ±3° (AP series) 90° with double travel adjustment ±5° (APM series)
Pressure range	2 bar ÷ 8 bar for Double Acting 3 bar ÷ 8 bar for Single Acting
Torque range	2,4 ÷ 7500 Nm (21,4 ÷ 66875 lbf.in)
Operating temperature	-20 °C ÷ +80 °C (-4 °F ÷ +175 °F) standard
Design reference	UNI EN 15714-3, ISO 5211, VDI / VDE 3845
Flange interface	ISO 5211
Stem connection	Square or polygonal shape ISO 5211
Interface for pilot valve	NAMUR type
Accessories flange	VDI / VDE 3845, UNI EN 15714-3
Applications	They find their best application for actuation of quarter turn valves, such as: ball valve, butterfly valve, plug valve
Certifications	2014/34//UE ATEX, SIL IEC 61508 - IEC 61511 GOST-R, CU TR 10 CU TR 32

Air consumption for stroke (free air) - Liters

Model	AP1 DA/SR	AP2 DA/SR	AP3 DA/SR	AP3,5 DA/SR	AP4 DA/SR	AP4,5 DA/SR	AP5 DA/SR	AP5,5 DA/SR	AP6 DA/SR	AP8 DA/SR	AP10 DA/SR	AP12 DA/SR
Counter clockwise	0,08	0,12	0,24	0,48	0,68	1,00	1,40	1,60	3,20	5,30	14,20	22,00
Clockwise (DA only)	0,10	0,16	0,44	0,56	0,96	1,60	2,16	2,56	4,00	8,60	16,50	49,00

Air consumption for stroke (free air) - Cu.ft.

Model	AP1 DA/SR	AP2 DA/SR	AP3 DA/SR	AP3,5 DA/SR	AP4 DA/SR	AP4,5 DA/SR	AP5 DA/SR	AP5,5 DA/SR	AP6 DA/SR	AP8 DA/SR	AP10 DA/SR	AP12 DA/SR
Counter clockwise	0,0030	0,004	0,008	0,017	0,024	0,035	0,049	0,057	0,11	0,19	0,50	0,78
Clockwise (DA only)	0,0035	0,006	0,016	0,020	0,034	0,057	0,076	0,09	0,14	0,30	0,59	1,75

Weights (Kg)

Model (DA)	AP1 APM1		AP2 APM2		AP3 APM3		AP3,5 APM3,5		AP4 APM4		AP4,5 APM4,5		AP5 APM5		AP5,5 APM5,5		AP6 APM6		AP8 APM8		AP10 APM10		AP12 APM12	
	1,00	1,05	1,42	1,44	2,54	2,62	3,68	3,78	5,10	5,15	8,24	8,33	10,10	10,38	13,94	14,86	19,66	20,40	36,60	37,70	77,00	78,30	150,00	156,00

Model (SR)	AP1 APM1		AP2 APM2		AP3 APM3		AP3,5 APM3,5		AP4 APM4		AP4,5 APM4,5		AP5 APM5		AP5,5 APM5,5		AP6 APM6		AP8 APM8		AP10 APM10		AP12 APM12	
	1,12	1,16	1,56	1,60	3,10	3,18	4,30	4,40	6,20	6,25	9,67	9,76	12,62	12,90	17,09	18,01	23,86	24,60	44,82	45,93	101,00	102,30	192,00	198,00

Weights considering 6 (six) spring on each side of the caps

Weights (lbs)

Model (DA)	AP1 APM1		AP2 APM2		AP3 APM3		AP3,5 APM3,5		AP4 APM4		AP4,5 APM4,5		AP5 APM5		AP5,5 APM5,5		AP6 APM6		AP8 APM8		AP10 APM10		AP12 APM12	
	2.20	2.31	3.13	3.17	5.60	5.78	8.11	8.33	11.24	11.35	18.17	18.36	22.27	22.88	30.73	32.76	43.34	44.97	80.69	83.11	169.76	172.62	330.69	343.92

Model (SR)	AP1 APM1		AP2 APM2		AP3 APM3		AP3,5 APM3,5		AP4 APM4		AP4,5 APM4,5		AP5 APM5		AP5,5 APM5,5		AP6 APM6		AP8 APM8		AP10 APM10		AP12 APM12	
	2.47	2.56	3.44	3.53	6.83	7.01	9.48	9.70	13.67	13.78	21.32	21.52	27.82	28.44	37.68	39.71	52.60	54.23	98.81	101.26	222.67	225.53	423.29	436.51

Weights considering 6 (six) spring on each side of the caps

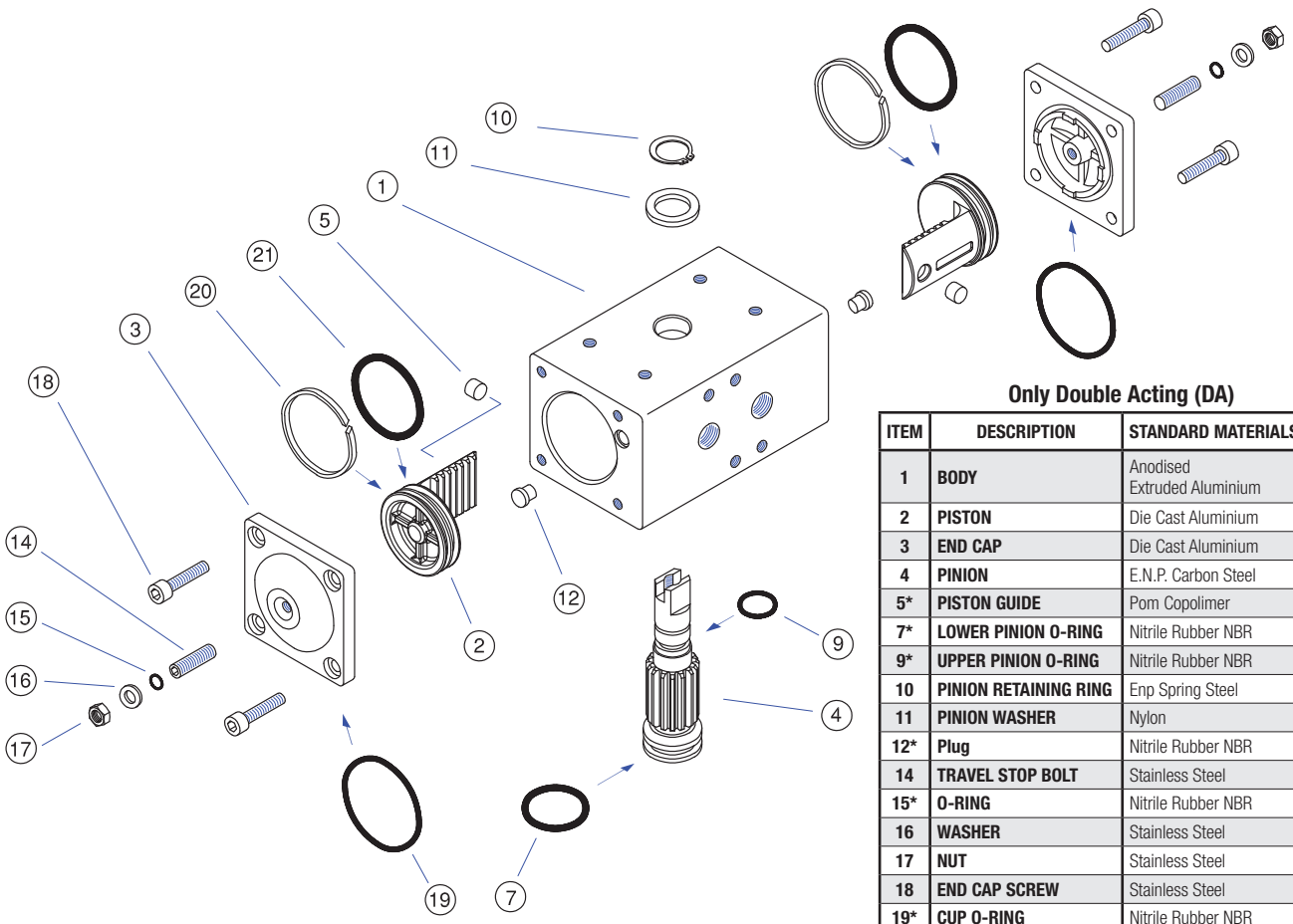
Opening / Closing Time (sec.) at 5.5 bar - (80 p.s.i.)

Model	AP1	AP2	AP3	AP3,5	AP4	AP4,5	AP5	AP5,5	AP6	AP8	AP10	AP12
Double Acting (DA)	Less than 0,5	Less than 1	Less than 1	Less than 1	Less than 1	Less than 1	Less than 1,25	Less than 1,5	1,5 - 2	3 - 4	5 - 6	5 - 6
Spring Return (SR)	Less than 0,5	Less than 1	Less than 1	Less than 1	Less than 1	Less than 1	1,5 - 2	Less than 2	2 - 3	4 - 6	7 - 8	7 - 8

NOTE: The times indicated above are refer to bench-trial without torque applied. Actuator power supply: 5 bar.

NOTE: **AP0 model** see page 7 →

Exploded view Pneumatic Actuator AP0 DA - Standard material configuration

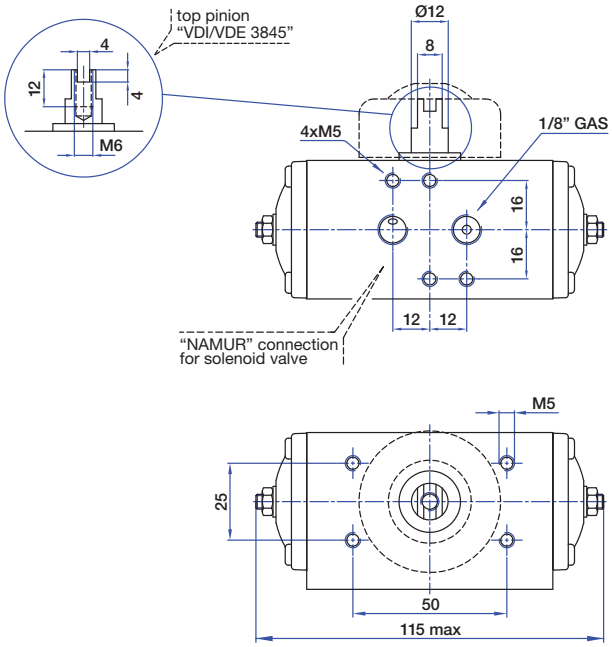


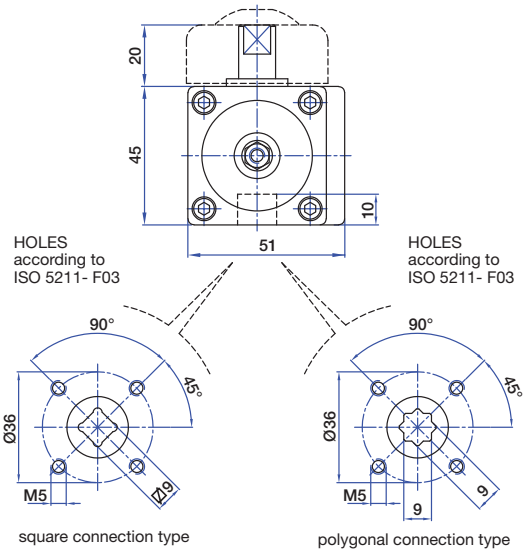
Only Double Acting (DA)

ITEM	DESCRIPTION	STANDARD MATERIALS	Q.TY
1	BODY	Anodised Extruded Aluminium	1
2	PISTON	Die Cast Aluminium	2
3	END CAP	Die Cast Aluminium	2
4	PINION	E.N.P. Carbon Steel	1
5*	PISTON GUIDE	Pom Copolimer	2
7*	LOWER PINION O-RING	Nitrile Rubber NBR	1
9*	UPPER PINION O-RING	Nitrile Rubber NBR	1
10	PINION RETAINING RING	Enp Spring Steel	1
11	PINION WASHER	Nylon	1
12*	Plug	Nitrile Rubber NBR	2
14	TRAVEL STOP BOLT	Stainless Steel	2
15*	O-RING	Nitrile Rubber NBR	2
16	WASHER	Stainless Steel	2
17	NUT	Stainless Steel	2
18	END CAP SCREW	Stainless Steel	8
19*	CUP O-RING	Nitrile Rubber NBR	2
20*	PISTON RING	Nylon	2
21*	PISTON O-RING	Nitrile Rubber NBR	2

* Suggested spare parts for maintenance included in spare parts kit

Overall dimensions - Technical features Pneumatic Actuator AP0 DA





Torque output Double Acting (DA)

OPERATING PRESSURE							
bar / p.s.i.	2 / 29	3 / 44	4 / 58	5 / 73	6 / 87	7 / 102	8 / 116
N m	2,4	3,6	4,8	6,0	7,3	8,5	9,7
lb f.In	21.4	32.1	42.8	53.5	65.1	75.8	86.5

Air consumption for stroke (free air)

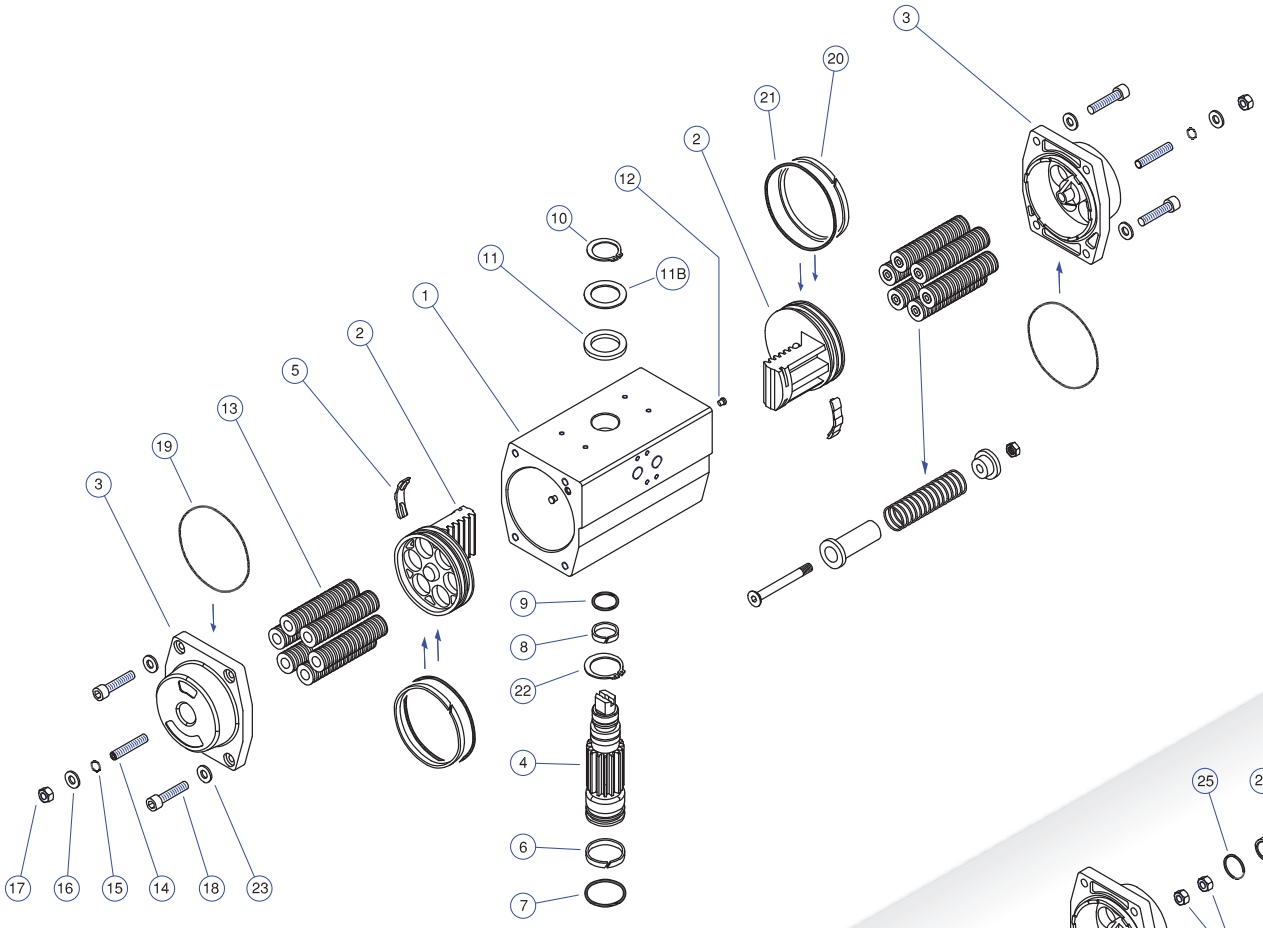
Counter clockwise	Liters	0,04
	Cu.ft.	0.0014
Clockwise (DA only)	Liters	0,05
	Cu.ft.	0.0018

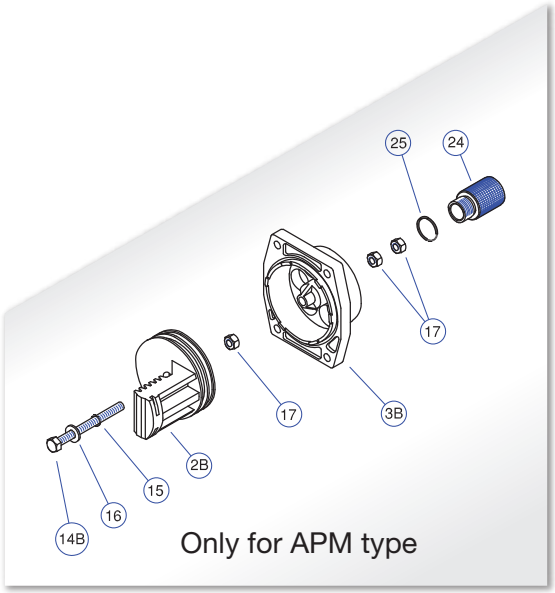
Opening / Closing Time (sec.) at 5.5 bar - (80 p.s.i.)

Double Acting	Less than 0,5 sec.

Weight Kg 0,51 - lbs. 1.12

Exploded view Pneumatic Actuator AP1÷ AP10 - Standard material configuration



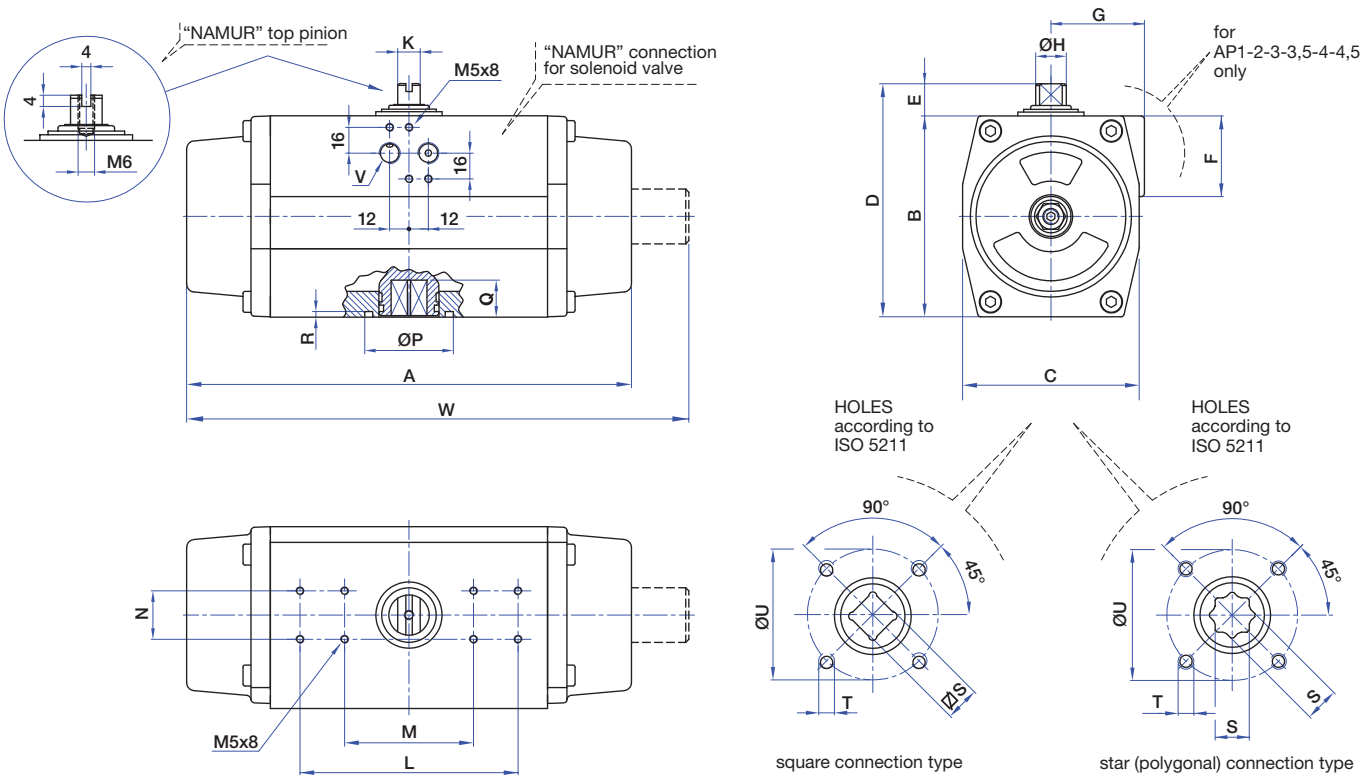


Double Acting (DA) and Spring Return (SR)

ITEM	DESCRITPION	STANDARD MATERIALS	QUANTITY AP	QUANTITY APM
1	**BODY**	Anodised Extruded Aluminium	1	1
2	**PISTON**	Die Cast Aluminium	2	1
2B	**PISTON**	Die Cast Aluminium	0	1
3	**END CAP**	Die Cast Aluminium	2	1
3B	**END CAP**	Die Cast Aluminium	0	1
4	**PINION**	E.N.P. Carbon Steel	1	1
5*	**PISTON GUIDE**	Pom Copolimer	2	2
6*	**LOWER PINION**	Ring Nylon	1	1
7*	**LOWER PINION O-RING**	Nitrile Rubber NBR	1	1
8*	**UPPER PINION RING**	Nylon	1	1
9*	**UPPER PINION O-RING**	Nitrile Rubber NBR	1	1
10	**PINION RETAINING RING**	Enp Spring Steel	1	1
11	**PINION WASHER**	Nylon	1	1
11B	**STEEL PINION WASHER** (only for AP10 model)	E.N.P. Carbon Steel	1	1
12*	**PLUG**	Nitrile Rubber NBR	2	2
13	**SPRING (Cartridge)**	Spring Steel Coated	4÷12	4÷12
14	**TRAVEL STOP BOLT**	Stainless Steel	2	1
14B	**TRAVEL STOP SCREW**	Stainless Steel	0	1
15*	**O-RING**	Nitrile Rubber NBR	2	1
16	**WASHER**	Stainless Steel	2	2
17	**NUT**	Stainless Steel	2	4
18	**END CAP SCREW**	Stainless Steel	8	8
19*	**CUP O-RING**	Nitrile Rubber NBR	2	2
20*	**PISTON RING**	Nylon	2	2
21*	**PISTON O-RING**	Nitrile Rubber NBR	2	2
22	**INTERNAL PINION RETAINING RING** (on request)	Enp Spring Steel	1	1
23	**WASHER SCREW**	Stainless Steel	4÷8	4÷8
24	**CUP PLUG**	Aluminium	0	1
25*	**O-RING**	Nitrile Rubber NBR	0	1

* Suggested spare parts for maintenance included in spare parts kit

Overall dimensions AP1÷ AP10



MODEL	U.M.	A	W*	B	C	D	E	F	G	H	K	L	M	N	P	Q	R	☐ S-S H11	T	ØU	V*	ISO 5211 std	ISO 5211 spec
AP1 DA/SR	mm	142	162	67	60	87	20	42	41	12	8	//	80	30	25	10	2	9/11**	M5/M6	36/50	1/8"	F03/F05	F04
	ins.	5.59	6.38	2.64	2.36	3.43	0.79	1.65	1.61	0.47	0.31	//	3.15	1.18	0.98	0.39	0.08	0.35/0.43**		1.42/1.97			
AP2 DA/SR	mm	155	171	83	73	103	20	42	44,5	12	8	//	80	30	30 / 35	12	2	11/14**	M5/M6	42/50	1/4"	*** F04 or F05	//
	ins.	6.10	6.73	3.27	2.87	4.06	0.79	1.65	1.75	0.47	0.31	//	3.15	1.18	1.18/1.38	0.47	0.08	0.43/0.55**		1.65/1.97			
AP3 DA/SR	mm	213	240	100	85	120	20	50	49,5	14	10	//	80	30	35	16	2	14/17**	M6/M8	50/70	1/4"	F05/F07	//
	ins.	8.33	9.45	3.94	3.35	4.72	0.79	1.97	1.95	0.55	0.39	//	3.15	1.18	1.38	0.63	0.12	0.43/0.67**		1.97/2.76			
AP3,5 DA/SR	mm	236	268	110	98	130	20	50	53	19	14	//	80	30	55	20	3,5	17/22**	M8	70	1/4"	F07	F05
	ins.	9.29	10.55	4.33	3.86	5.12	0.79	1.97	2.09	0.75	0.55	//	3.15	1.18	2.17	0.79	0.14	0.67/0.87**		2.76			
AP4 DA/SR	mm	276	304	125	110	145	20	50	58	19	14	//	80	30	55	20	3,5	17/22**	M8/M10	70/102	1/4"	F07/F10	//
	ins.	10.87	11.97	4.92	4.33	5.71	0.79	1.97	2.28	0.75	0.55	//	3.15	1.18	2.17	0.79	0.14	0.67/0.87**		2.76/4.02			
AP4,5 DA/SR	mm	310	350	142	128	172	30	58	69	28	20	130	80	30	70	24	3,5	17**/22	M10	102	1/4"	F10	F07
	ins.	12.20	13.78	5.59	5.04	6.77	1.18	2.28	2.72	1.10	0.79	5.12	3.15	1.18	2.76	0.94	0.14	0.67**/0.87		4.02			
AP5 DA/SR	mm	366	405	155	140	185	30	//	//	28	20	130	80	30	70	24	3,5	17**/22	M10	102	1/4"	F10	F07/F12
	ins.	14.41	15.94	6.10	5.51	7.28	1.18	//	//	1.10	0.79	5.12	3.15	1.18	2.76	0.94	0.14	0.67**/0.87		4.02			
AP5,5 DA/SR	mm	388	442	176	160	206	30	//	//	36	28	130	80	30	85	29	3,5	22**/27	M12	125	1/4"	F12	F10
	ins.	15.27	17.40	6.93	6.30	8.11	1.18	//	//	1.42	1.10	5.12	3.15	1.18	3.35	1.14	0.14	0.87**/1.06		4.92			
AP6 DA/SR	mm	468	500	200	175	230	30	//	//	36	28	130	80	30	85	29	3,5	22**/27	M12	125	1/4"	F12	F10
	ins.	18.42	19.68	7.87	6.89	9.06	1.18	//	//	1.42	1.10	5.12	3.15	1.18	3.35	1.14	0.14	0.87**/1.06		4.92			
AP8 DA/SR	mm	563	612	250	215	300	50	//	//	48	32	130	//	30	100	38	5	27**/36	M16	140	F14	F14	F12
	ins.	22.16	24.09	9.84	8.46	11.81	1.97	//	//	1.89	1.26	5.12	//	1.18	3.94	1.50	0.20	1.06**/1.42		5.51			
AP10 DA/SR	mm	750	838	335	290	385	50	//	//	48	32	130	//	30	130	50	5	36**/46	M20	165	1/4"	F16	F14
	ins.	29.53	32.99	13.19	11.42	15.16	1.97	//	//	1.89	1.26	5.12	//	1.18	5.12	1.97	0.20	1.42**/1.81		6.50			

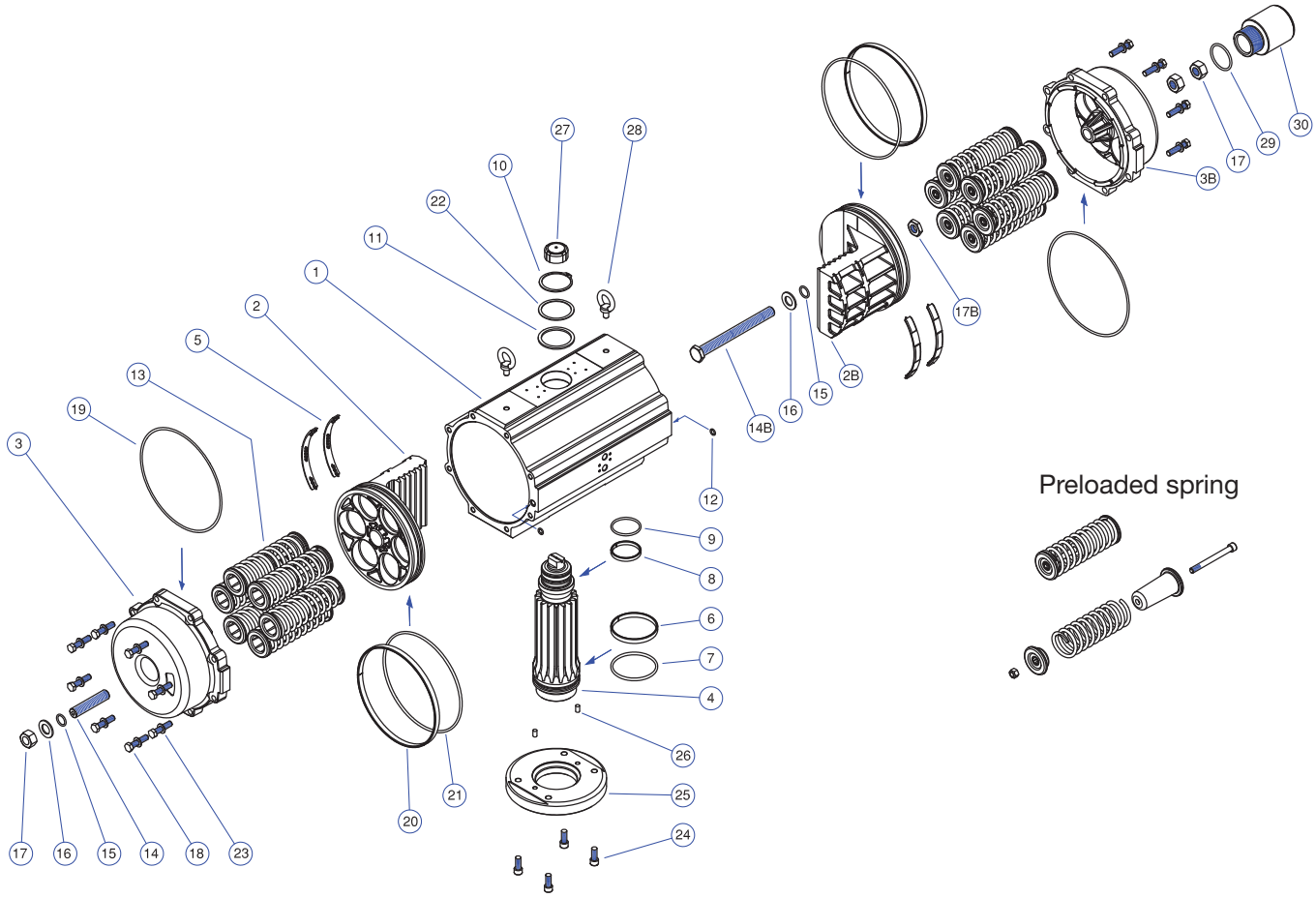
W* dimension only for APM series

** S dimension with (**) only request

V* dimensions threated GAS or NPT

*** To be chosen when ordering

Exploded view Pneumatic Actuator AP12 - Standard material configuration (only APM Type)

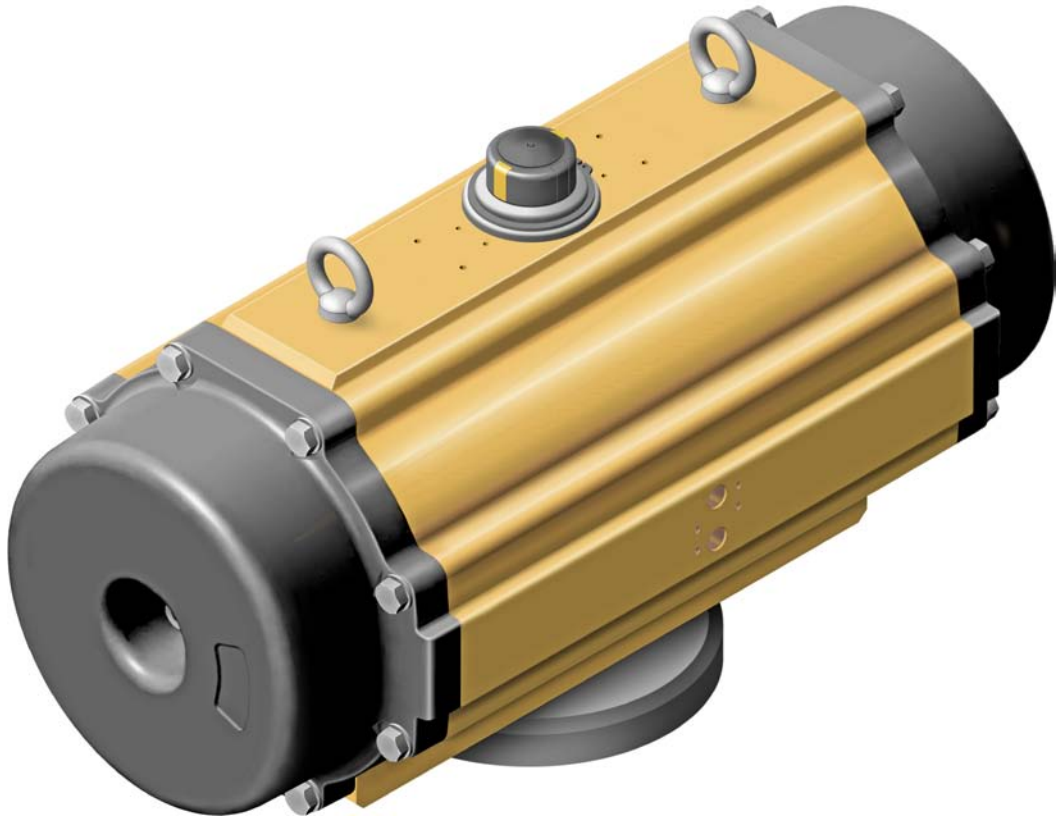


Double Acting (DA) and Spring Return (SR)

ITEM	DESCRITPION	STANDARD MATERIALS	QUANTITY AP	QUANTITY APM
1	BODY	Anodised Extruded Aluminium	1	1
2	PISTON	Die Cast Aluminium	2	1
2B	PISTON	Die Cast Aluminium	0	1
3	END CAP	Die Cast Aluminium	2	1
3B	END CAP	Die Cast Aluminium	0	1
4	PINION	E.N.P. Carbon Steel	1	1
5*	PISTON GUIDE	Pom Copolimer	4	4
6*	LOWER PINION RING	Nylon	1	1
7*	LOWER PINION O-RING	Nitrile Rubber NBR	1	1
8*	UPPER PINION RING	Nylon	1	1
9*	UPPER PINION O-RING	Nitrile Rubber NBR	1	1
10	PINION RETAINING RING	Enp Spring Steel	1	1
11	PINION WASHER	Nylon	1	1
12*	O-RING	Nitrile Rubber NBR	2	2
13	SPRING (Cartridge)	Spring Steel Coated	4÷12	4÷12
14	TRAVEL STOP BOLT	Stainless Steel	2	1
14B	TRAVEL STOP SCREW	Stainless Steel	0	1
15*	O-RING	Nitrile Rubber NBR	2	1
16	WASHER	Stainless Steel	2	2
17	NUT	Stainless Steel	2	3
17B	NUT (LOW TYPE)	Stainless Steel	0	1
18	END CAP SCREW	Stainless Steel	16	16
19*	CUP O-RING	Nitrile Rubber NBR	2	2
20*	PISTON RING	Nylon	2	2
21*	PISTON O-RING	Nitrile Rubber NBR	2	2
22	STEEL PINION WASHER	E.N.P. Carbon Steel	1	1
23	WASHER SCREW	Stainless Steel	16	16
24	FLANGE SCREW	Stainless Steel	4	4
25	FLANGE	Carbon Steel Coated	1	1
26	CILINDRIC PIN	Stainless Steel	2	2
27	INDICATOR or CAM	Polypropilene	1	1
28	EYE BOLT	Stainless Steel	2	2
29*	O-RING	Nitrile Rubber NBR	0	1
30	END CUP PLUG	Aluminium	0	1

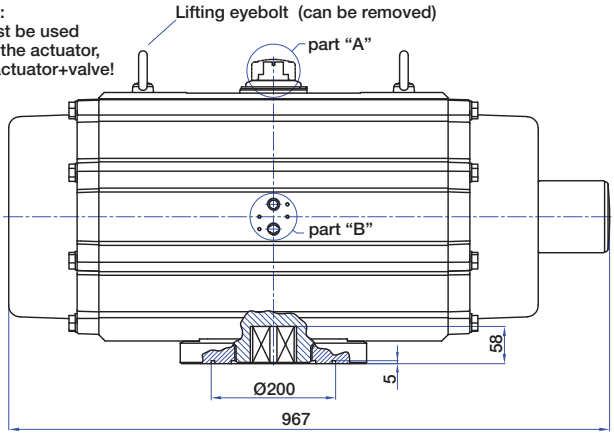
* Suggested spare parts for maintenance included in spare parts kit

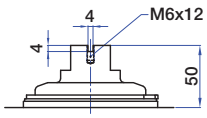
Pneumatic Actuator AP12



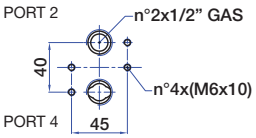
Overall dimensions

ATTENTION:
Eyebolt must be used
ONLY to lift the actuator,
NOT to lift actuator+valve!

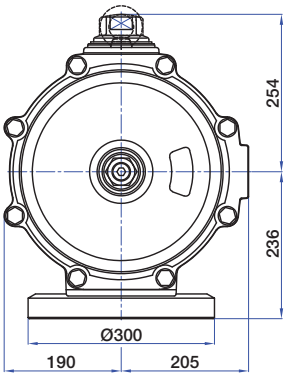


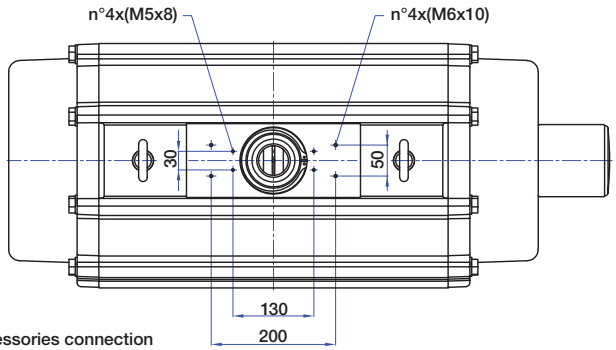


Part "A" scale 1: 2
Accessories connection
according to:
VDI/VDE 3845
UNI EN 15714-3

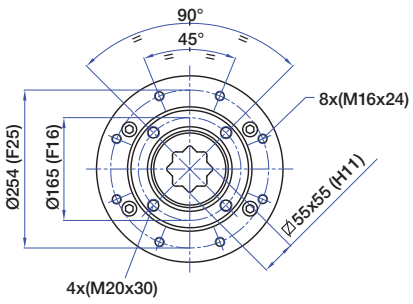


Part "B" scale 1: 2
Interface for directly
attached solenoid valve
according to:
VDI/VDE 3845
UNI EN 15714-3





Flange accessories connection
according to:
VDI/VDE 3845
UNI EN 15714-3



Flange connection
according to:
UNI EN ISO 5211

AP | M | 0 1 | Y | D A 0 | B G | 1 | 0 9 | B | I | S | 0 1

DOUBLE STROKE ADJUSTMENT	
On request	M

MODEL	
AP0	00
AP1	01
AP2 (F04)	2A
AP2 (F05)	2B
AP3	03
AP3,5	35
AP4	04
AP4,5	45
AP5	05
AP5,5	55
AP6	06
AP8	08
AP10	10
AP12	12

SPECIAL DRILLING	
F04	Z
F05/F07	Y
F07	X
F07/F12	W
F10	V
F12	U
F14	J

SPRINGS
* DAO
** S04
S05
S06
S07
S08
S09
S10
S11
S12

* Double Action (DA) No Springs

** Spring Return (SR)
Total number of springs for action
(from 4 to 12 springs)

THREAD	
GAS	B
NPT	N
for NAMUR connection	

BODY COVERING	
Gold anodizing	G
Hard anodizing	H
Neutral anodizing	N
Grey anodizing	X
E.N.P.	K
Coated P.T.F.E.	T

PINION CONNECTION	
E.N.P. free cutting steel ■	1
E.N.P. free cutting steel ✹	2
AISI303 stainless steel ■	3
AISI303 stainless steel ✹	4

SPECIAL CONNECTION	
9 mm	09
11 mm	11
14 mm	14
17 mm	17
22 mm	22
27 mm	27
34 mm	34
36 mm	36
Square or star	

END CAP FINISHING	
Black epoxy coated	B
Hard anodizing	H
E.N.P.	K
Blue epoxy coated	X
RILSAN coated	R
P.T.F.E. coated	T

POSITION INDICATOR	
Indicator	I
Cam	C
Without	W

SEALS MATERIAL	
1) Buna	S
2) Viton	H
3) Silicon	L

1) - 20°C to +80°C
2) +20°C to +145°C
3) - 50°C to +95°C

SPECIAL EXECUTION	
Center ring	01
0°÷90° stroke regulation	03

LIMIT SWITCH BOX



PNEUMATIC POSITIONER



ELECTRO-PNEUMATIC POSITIONER 4÷20 mA signal



LIMIT SWITCH BOX + ELECTRO-PNEUMATIC POSITIONER 4÷20 mA signal



SOLENOID VALVE



DISANGEABLE GEAR BOX



CAT-AP/APM-03-05/2022

SIRCA INTERNATIONAL S.P.A.

Via Trieste n° 8 - 20060 TREZZANO ROSA (MI - ITALY) - Phone ++39 02 92010204
Fax ++39 02 92010216 Purchase Dept. - Fax ++39 02 92011954 Sales Dept.
E-mail: info@sircainternational.com - web site: www.sircainternational.com

CERTIFICATE

1 Production Quality Assurance Notification

2 Equipment or Protective System Intended for use in Potentially Explosive Atmospheres
Directive 2014/34/EU

3 Notification Number: **KIWA 20ATEXQ0055 Issue: 1**

4 This Notification is issued for the equipment, protective systems and components which are described in the EU-Type Examination Certificates listed in the schedule of this Notification.

5 Manufacturer: **Habonim Industrial Valves & Actuators**
Address: **Kfar Hanassi, Upper Galilee, 1230500**
Israel

6 Production site: **Habonim Industrial Valves & Actuators**
Address: **Kfar Hanassi, Upper Galilee, 1230500**
Israel

7 Kiwa Nederland B.V., notified body number 0063 in accordance with Article 17 of the Council Directive 2014/34/EU of 26 February 2014, notifies to the manufacturer that the production site satisfies the requirements of Annex IV and VII of the Directive.

8 This Notification is based on Audit Report No. 191000892 and is valid until 24 June 2023.
Periodical surveillance of the production process is part of this notification.
This Notification can be withdrawn if the manufacturer no longer satisfies the requirements of Annex IV and VII.

9 According to Article 16 (3) of Directive 2014/34/EU the CE marking shall be accompanied by the identification number 0063 of Kiwa Nederland B.V. as notified body involved in the production control stage.
According to Article 13 (3) components shall not be provided with the CE marking.

Type of protection: Constructional safety "c"

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Unit Kiwa ExVision
Wilmersdorf 50
P.O. Box 137
7300 AC Apeldoorn
The Netherlands

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ExVision@kiwa.nl
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Kiwa Nederland B.V.

Ron Scheepers
Managing Director

Issue date: 24 June 2020

First issue: ---

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C63-AQU-QIX-002 210 / 917

HABONIM
Industrial Valves & Actuators

Inspired By Challenge

Pneumatic actuator



Introduction

Proven advantage



The COMPACT actuator is a quarter-turn rack & pinion pneumatic actuator that doubles the torque of standard pneumatic actuators. The superior performance is achieved by Habonim's patented four piston design, which generates torque around a centrally located piston. This translates into double the power for the same size actuator or half the size for the same amount of power.

Space saving, fast acting

The COMPACT has four small cylinders, each located on one of the four sides of the cube.
The smaller pinion and shorter travel distance of the pistons in the COMPACT require less air pressure than a larger double-piston actuator to produce the same torque output. The end result is faster response times for emergency shutdown, lower air pressure for operation and reduced maintenance.

Technical summary

Pressure range	20-120 PSI (1.5 - 8 bar) for Double Acting (DA) actuators 30-120 PSI (2- 8 bar) for Spring Return (SR) actuators		
Size range	C15, C20, C25, C30, C30M, C35, C35M, C45, C45M, C60, C60M, C75, C75M		
Operating temperature	NBR	-20 °C to 80 °C	(-4 °F to 176 °F)
	Viton	-20 °C to 120 °C	(-4 °F to 250 °F)
	EPDM	-40 °C to 80 °C	(-40 °F to 176 °F)
	NBR FX428	-53 °C to 100 °C	(-63 °F to 213 °F)
Compressed gas	Air, Nitrogen, CO_2, Natural gas (sweet)		

Standards of compliance

Factory certification	ISO 9001:2015	Quality management system
Actuator design	ISO 5211:2017	Industrial valves - part-turn actuator attachments
	VDI/VDE 3845:2010 (NAMUR)	Industrial process control - pneumatic control valves - Interfaces of valves and auxiliary equipment
Certifications	ATEX 2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres
	DNV	Rules of classification of ships 'Det Norske Veritas' offshore standards
	IEC 61508-2/3:2010 SIL2/3	Safety integrity level - functional safety of electrical/ electronic/programmable electronic safety-related systems (optional for actuated unit only)
Documentation	EN 10204:2004 2.2/3.1/3.2	Metallic materials - types of inspection documents

Main pneumatic actuator features

Balanced forces

The cube-shaped configuration positions the pistons in a way that allows each piston to develop thrust along its own axis with zero side load. This efficient design eliminates the use of guide rods and thrust bearings. The result is less stress on the seals than off-axis piston thrust, which is caused by the piston side loading that is inherent in the geometry of traditional actuator configurations.



Less air consumption

Fast action is one of the most attractive features of the COMPACT 4-piston actuator. The distinctive four-piston design allows for a smaller diameter actuator pinion that significantly shortens piston travel and response time.



Less wear

The COMPACT's unique 4-piston design achieves a more uniform load distribution than standard single- or double-piston actuators, therefore greatly reducing the wear on gears at the points of contact between rack and pinion. The force-balanced, shorter-stroke piston prevents uneven wear of O-rings, gears and pistons. This design eliminates the need for bearings and guiding rods and reduces the number of soft parts, thereby resulting in longer maintenance schedules and lower cost of repair kits. The surface of the four cylinders is hardened by an anodizing treatment, which protects their high surface finish.

Fast action

Fast action is one of the most attractive features offered by the COMPACT 4-piston actuator. The unique four-piston design allows for a smaller diameter actuator pinion that significantly shortens piston travel, resulting in a shorter response time.



Superior corrosion resistance

The body and covers are anodized internally and externally to protect against corrosive atmospheres tested to more than 336 hours of life in a salt spray bath. An external epoxy base layer and a second layer of polyurethane paint provide additional protection against aggressive environments. Optional: Electroless-Nickel (EN) coating of body, covers and pistons.

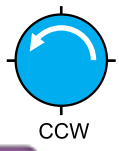


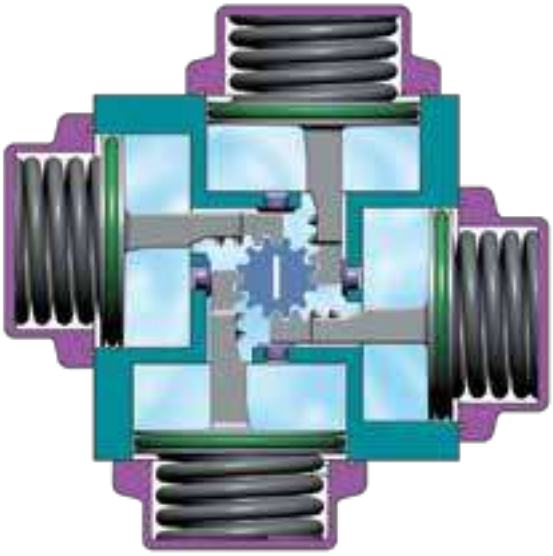
Spring return and double acting configurations

The COMPACT can be configured for either spring return or double-action operation. In both cases the air supply to drive the pistons flows into Port A of the NAMUR cover. Port A is connected to the center chamber, and Port B is connected to the four outside chambers.

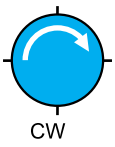
Spring return (fail-safe)

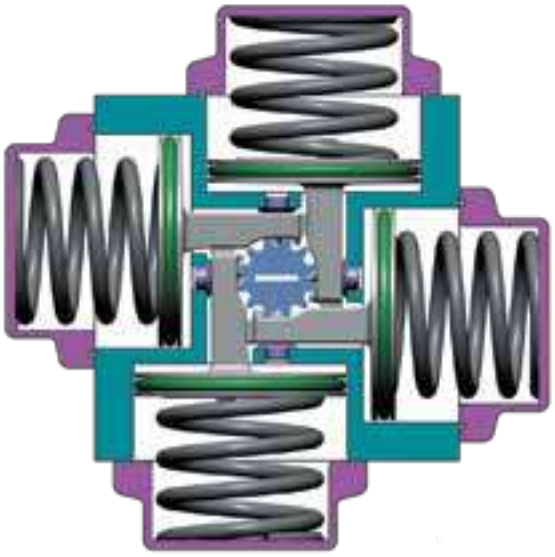
Pressure entering Port A to open:
Center chamber is pressurized and pistons move outward
Springs are compressed
Pinion rotates counterclockwise





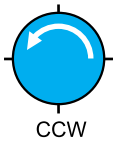
Pressure exiting Port A to close:
Air released from center chamber
Springs drive pistons inward
Pinion rotates clockwise

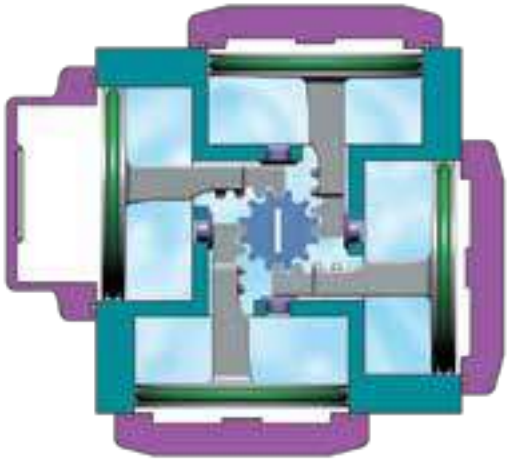




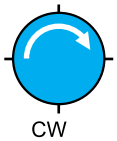
Double action (increased torque)

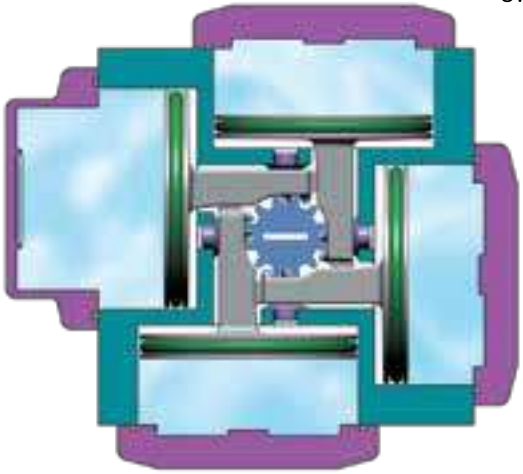
Pressure entering Port A to open:
Center chamber is pressurized
Pistons move outward
Pinion rotates counterclockwise





Pressure entering Port B to close:
Outside chambers are pressurized
Pistons move inward
Pinion rotates clockwise





Main pneumatic actuator components

Pinion



The pinion has a double-square female drive on its bottom plane that complies with ISO 5211 standard. The top plane has the NAMUR slot for attachment to switches or positioners. There is a machined flat below the NAMUR interface to enable manual operation of the actuator with a wrench. The pinion is made from carbon steel with Electroless-Nickel (EN) plating that results in a hard-wearing surface with added protection against corrosive environments.

Limit stop



The pinion and stop rotation can be adjusted by four large-diameter, diametrically-opposed adjustable set-screws that are threaded into the actuator body.
Each opposing pair of screws exerts simultaneous and equal force on opposite sides of the stop when the rotation limit is reached, thus preventing the generation of off-center forces.
The stop screws allow for +/-5° rotation adjustment in both directions of travel. Larger span can be achieved with a longer set of stop screws. This feature is built into the actuator stop mechanism and eliminates the need for additional plates and screws. The stop material is stainless steel for better wear and corrosion resistance.



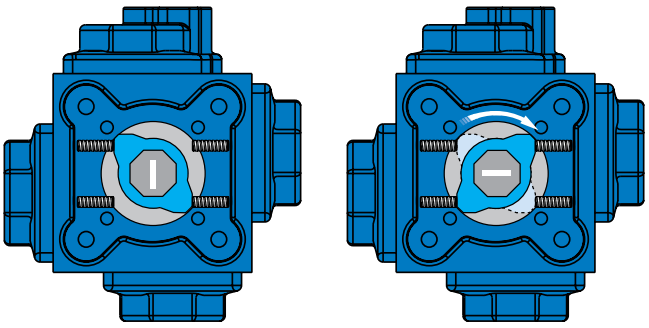
Indicator & puck



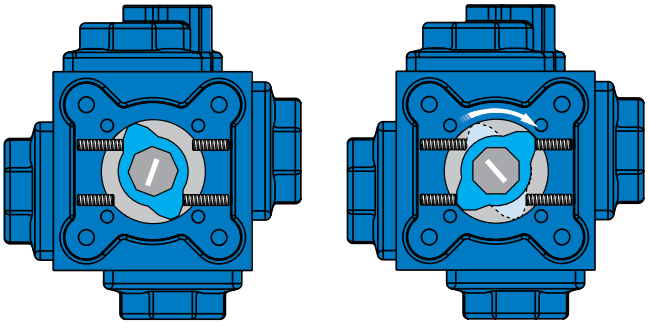
A highly visible indicator with flow direction arrows is snapped on to the pinion, to provide easy identification of the valve position. These indicator arrows allow true positioning of any type of valve porting. The modular design makes it easy to change the indicator to match various flow pattern.

Safety features

The COMPACT's built-in safety features ensure secure and safe operation.
Assembly and dismantling of the actuator are simple tasks. Long cover-bolts for spring return actuators relieve the spring load before they disengage from their threads.
Before the pistons can be removed, the stop screw must be released and the pinion removed thus ensuring that any trapped and potentially hazardous pressure in the body will escape.



Close | Open



Partially closed | Partially open

Nested springs

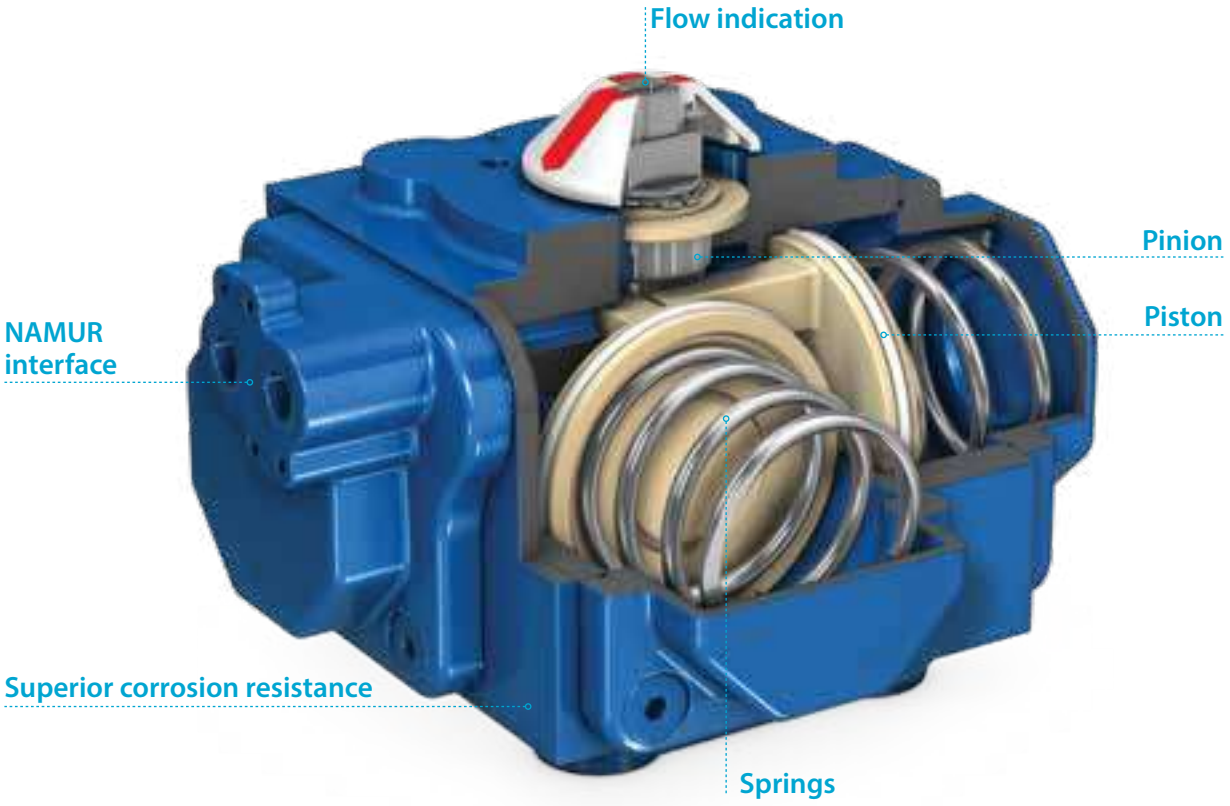
The COMPACT can be used with up to three different spring sizes for the spring that, in each of the four cylinders, is nested between the cover and the piston and aligned by a centering ring. Each spring is wound in the opposite direction to its neighbor to avoid entanglement. All the springs act at the piston center axis so that no side load will occur if one spring fails to operate. By virtue of the four-cylinder design, there are many more spring combination possibilities than with double piston actuators, providing superior solutions for any air supply pressure required. Special painting of the springs provides higher corrosion resistance to the environment, resulting in more than 250 hours of life in a salt spray bath.



Spring cartridge

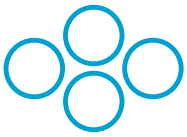
Using a modified spring set in a cartridge improves the torque characteristics of the COMPACT actuator. A spring cartridge is available only in the C30M, C35M, C45M, C60M and C75M actuators. Modifications include deeper covers to allow sufficient volume for the spring cartridge, thereby increasing the overall dimensions of the actuator. The spring cartridge is comprised of a shaped tube in which the extended springs have been preloaded and are held safely in place by two rigid discs. Changing a spring set configuration in this design requires changing the complete cartridge.

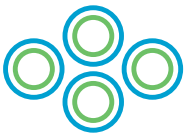


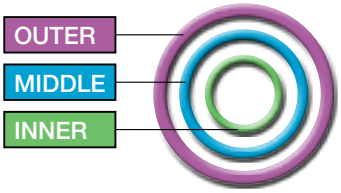


Spring combinations

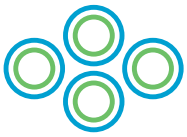
C15 only

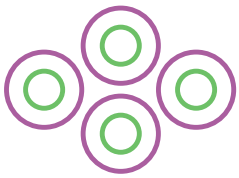
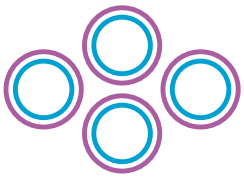
Code	Spring combinations
1A	
1B	

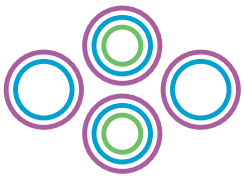
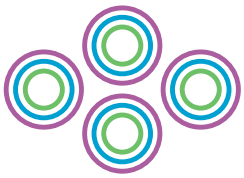
Code	Spring combinations
1B2	
2	



C20-C75M

Code	Spring combinations
2AB	
2A	
2A2B	

Code	Spring combinations
2B	
2A3	
2C	

Code	Spring combinations
2C3	
3	

Sizing a spring return actuator requires that the torque output at the start and end of both the spring and air drive strokes is greater than the valve torque at that position.

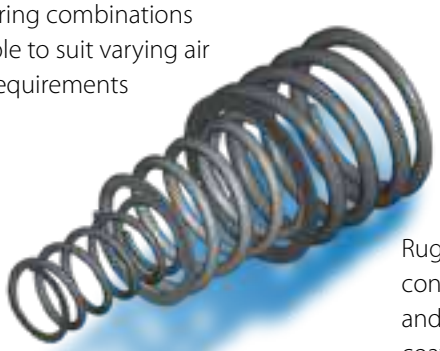


NAMUR output drive for limit switches and positioners



NAMUR VDI/VDE 3845 connection to limit switches

Springs painted for protection and fitted coaxially in a chamber. Various spring combinations are available to suit varying air pressure requirements



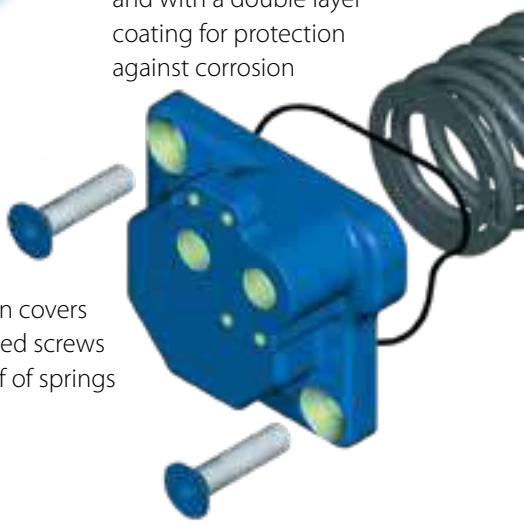


Smaller in the overall size compared to double piston actuators



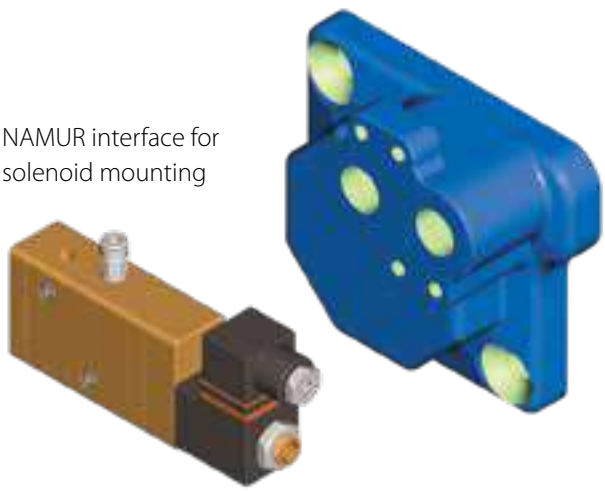
Spring cartridge:
The modified spring set design improves the torque characteristics of the COMPACT actuator

Rugged body construction, anodized and with a double layer coating for protection against corrosion



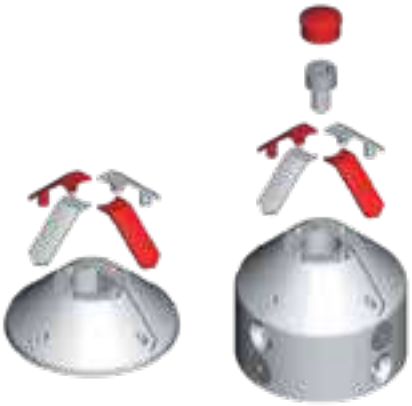
Spring return covers with extended screws for safe relief of springs

NAMUR interface for solenoid mounting

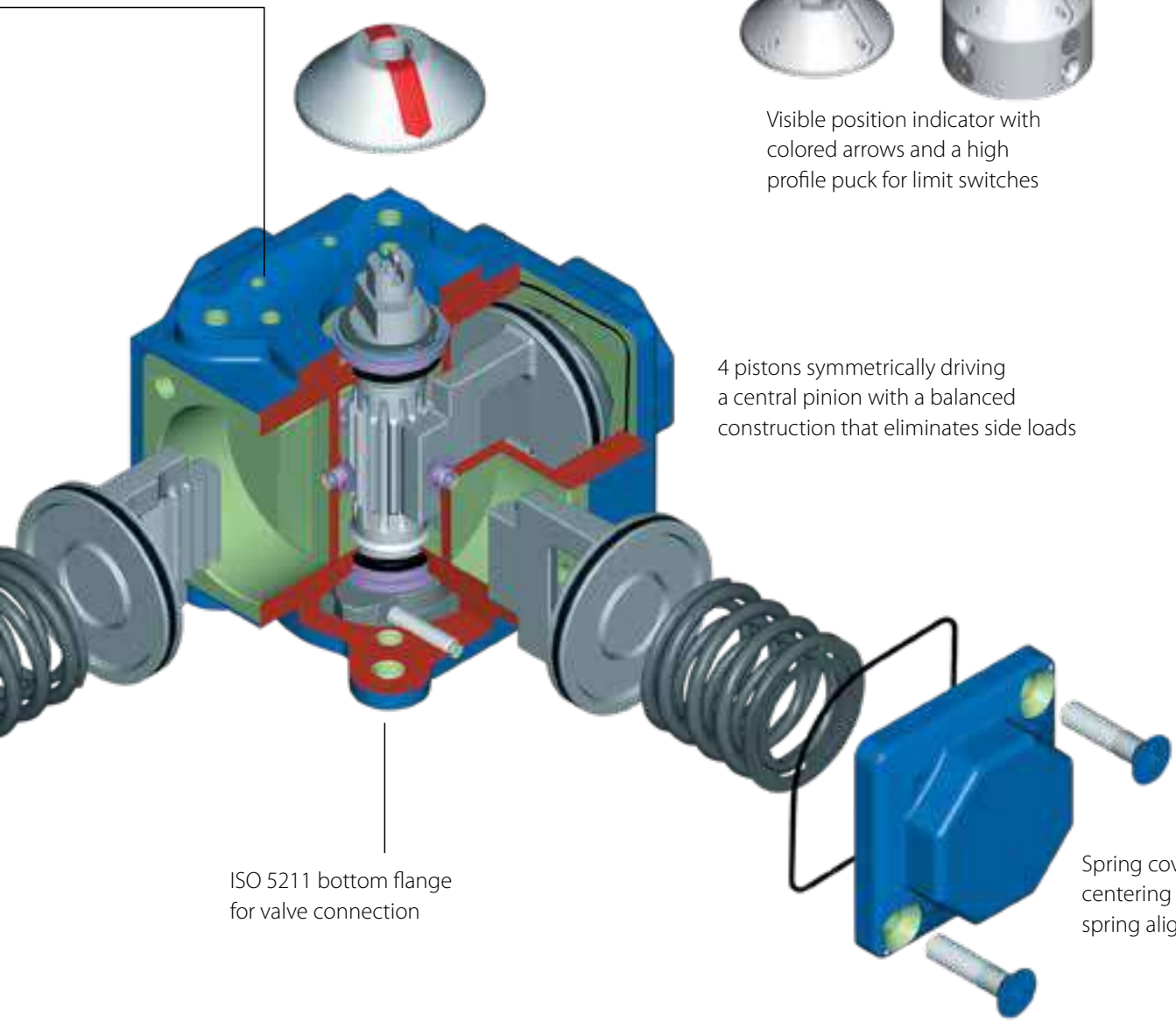




Limit stop for open-close and intermediate positions



Visible position indicator with colored arrows and a high profile puck for limit switches



4 pistons symmetrically driving a central pinion with a balanced construction that eliminates side loads

ISO 5211 bottom flange for valve connection

Spring covers with centering rings for spring alignment

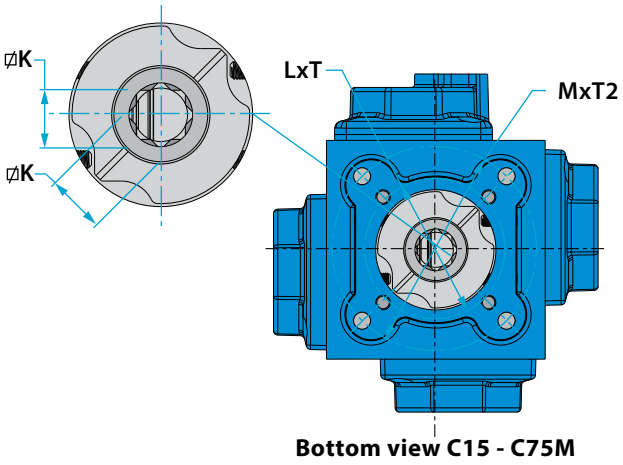


Patented 4-piston actuator provides double the torque output of a double piston actuator

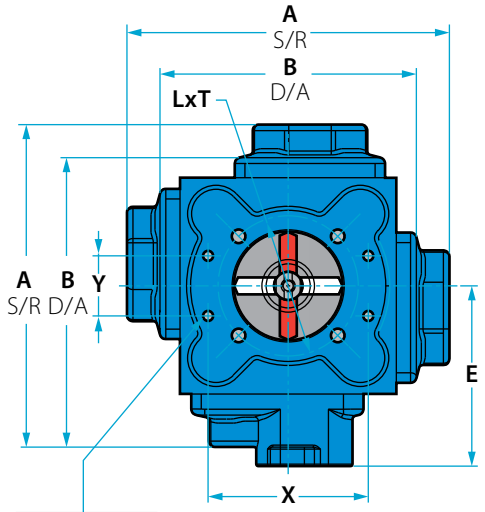


Compact size with flat covers for double acting applications and minimum air consumption

Actuator dimensions

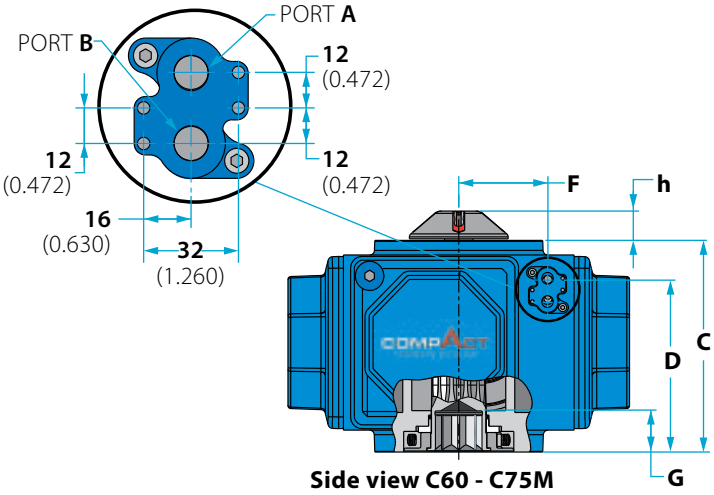


Bottom view C15 - C75M

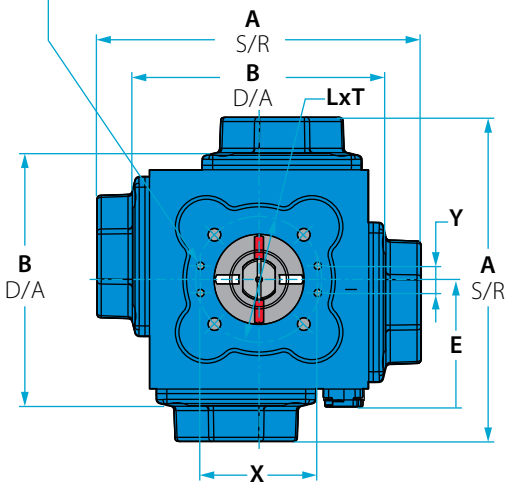


Top view C15 - C45M

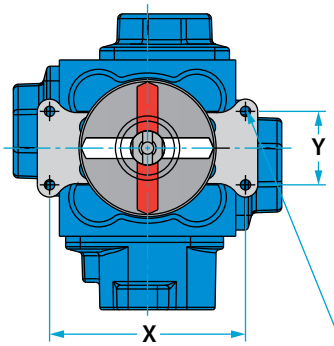
M5 (for metric)
10/24 UNC
(for imperial)



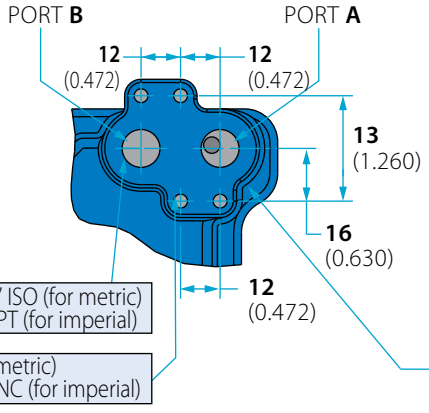
Side view C60 - C75M

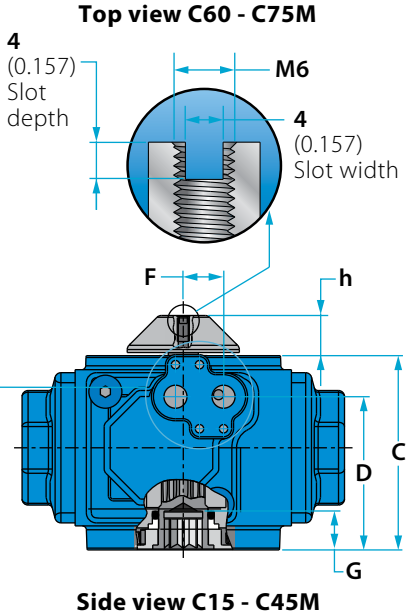


Top view C60 - C75M



Top view C15 only
VDI/VDE brackets on request





Side view C15 - C45M

VDI / VDE 3845	
Sizes	**X x Y x h**
C15 - C45M	80 x 30 x 20
C60 - C75M	130 x 30 x 30

Port **A** is connected to the center chamber
Port **B** is connected to the outside chambers

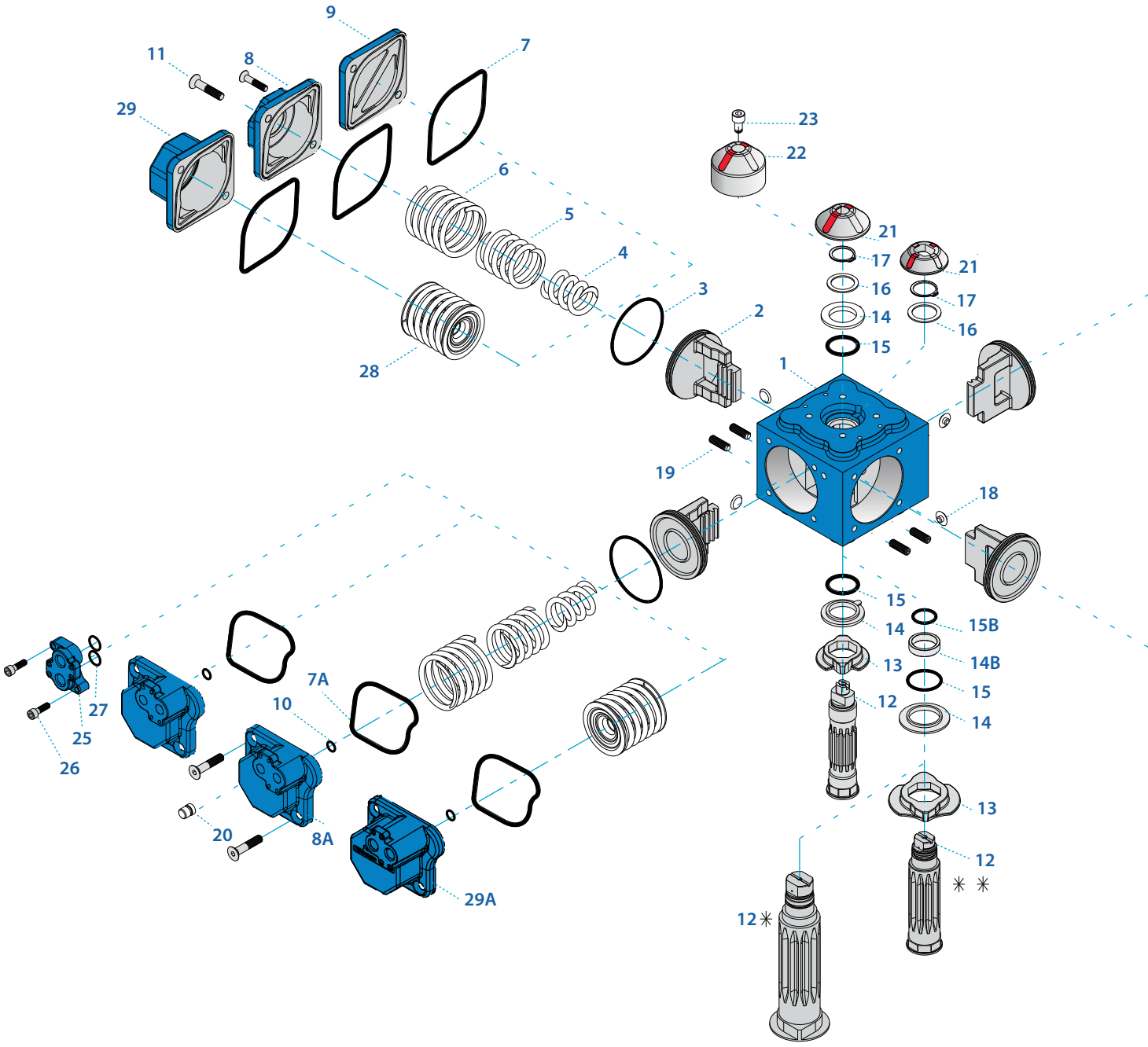
Size	A S/R		B D/A		B1 D/A		C		D		E		F		G		Øk		L PCD		T Thread		M PCD (2)		T2	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
C15	110	4.31	86	3.39	97.8	3.85	68.8	2.71	50.8	2.00	66.0	2.60	16.0	0.63	13.5	0.53	9	0.35	50 (F05)	1.97 (F05)	M6x8	¼"X0.314	-	-	-	-
C20	131	5.17	102	4.03	117.0	4.6.0	80.5	3.17	61.5	2.42	77.2	3.04	16.5	0.65	15.0	0.59	11	0.43	50 (F05)	1.97 (F05)	M6x8	¼"X0.314	70 (F07)	2.76 (F07)	M8x11	5⁄16"X0.43
C25	161	6.34	132	5.24	147.0	5.79	97.0	3.82	76.5	3.01	90.0	3.54	20.0	0.79	19.5	0.77	14	0.55	70 (F07)	2.76 (F07)	M8x9	5⁄16"X0.354	102 (F10)	4.02 (F10)	M10X11	3⁄8"X0.43
C30	186	7.33	151	5.94	169.0	6.64	116.0	4.58	93.4	3.68	105.0	4.15	22.3	0.88	22.0	0.87	17	0.67	70 (F07)	2.76 (F07)	M8x11	5⁄16"X0.43	102 (F10)	4.02 (F10)	M10X12	3⁄8"X0.47
C30M	216	8.50	-	-	-	-	116.0	4.58	93.4	3.68	120.0	4.72	22.3	0.88	22.0	0.87	17	0.67	70 (F07)	2.76 (F07)	M8x11	5⁄16"X0.43	102 (F10)	4.02 (F10)	M10X12	3⁄8"X0.47
C35	222	8.74	182	7.15	202.0	7.94	135.0	5.31	102.0	4.02	114.0	4.48	22.5	0.89	26.0	1.02	22	0.87	102 (F10)	4.02 (F10)	M10x13	3⁄8"X0.51	-	-	-	-
C35M	256	10.07	-	-	-	-	135.0	5.31	102.0	4.02	131.0	5.15	22.5	0.89	26.0	1.02	22	0.87	102 (F10)	4.02 (F10)	M10x13	3⁄8"X0.51	-	-	-	-
C45	269	10.59	221	8.70	245.0	9.65	164.0	6.46	127.0	5.00	147.0	5.79	31.0	1.22	33.0	1.30	27	1.06	125 (F12)	4.92 (F12)	M12x15	½"X0.59	102* (F10)	4.02* (F10)	M10X15	3⁄8"X0.59
C45M	303	11.93	-	-	-	-	164.0	6.46	127.0	5.00	164.0	6.45	31.0	1.22	33.0	1.30	27	1.06	125 (F12)	4.92 (F12)	M12x15	½"X0.59	102* (F10)	4.02* (F10)	M10X15	3⁄8"X0.59
C60	360	14.17	285	11.22	-	-	218.0	8.58	180.0	7.09	141.0	5.57	94.0	3.70	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-
C60M	390	15.35	-	-	-	-	218.0	8.58	180.0	7.09	141.0	5.57	94.0	3.70	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-
C75	437	17.20	342	13.46	-	-	270.0	10.63	223.0	8.76	166.0	6.54	110.0	4.33	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-
C75M	467	18.38	-	-	-	-	270.0	10.63	223.0	8.76	166.0	6.54	110.0	4.33	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-

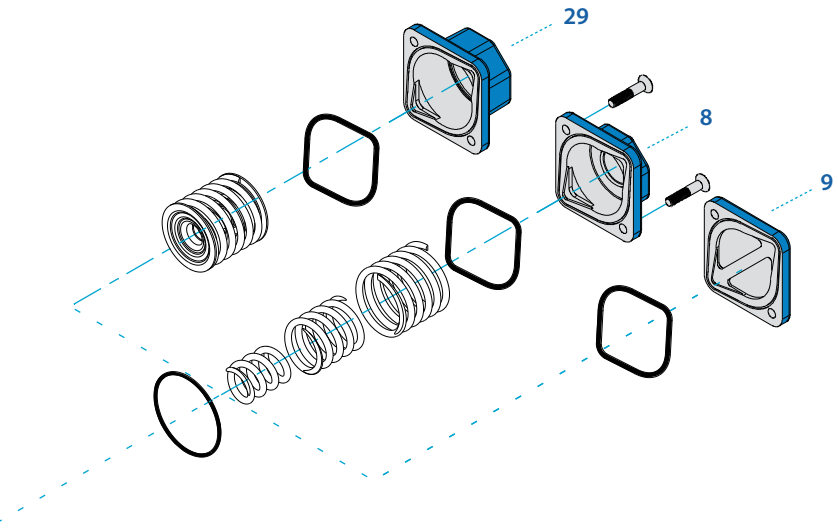
* The C45 bottom PCD can be either F12 or F10, but not both. The standard is F12. When ordering C45 with F10, you must add it to the code.

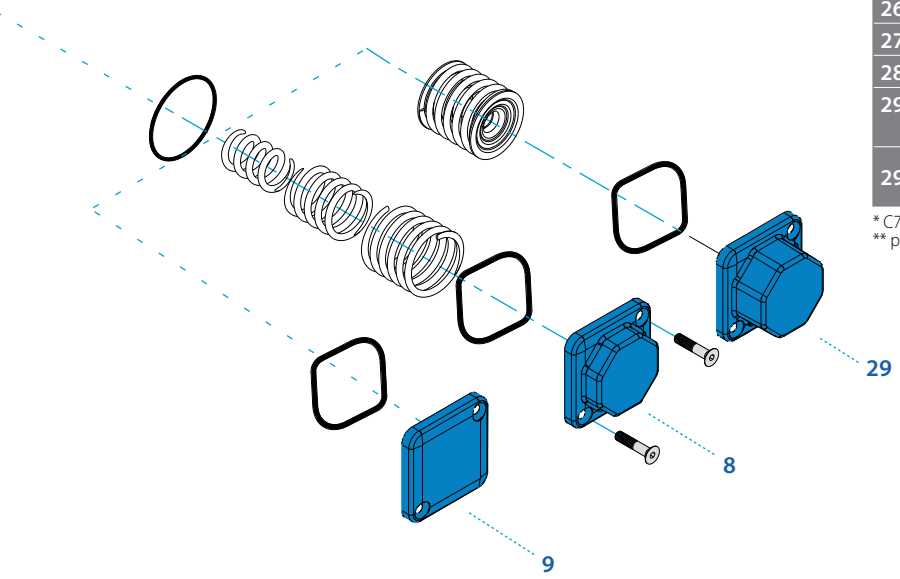
Technical Data

Actuator size		Unit	C15	C20	C25	C30	C30M	C35	C35M	C45	C45M	C60	C60M	C75	C75M
Weight Spring return		kg	1.10	1.90	3.50	5.00	6.10	9.00	10.40	15.00	16.70	35.00	39.40	64.00	72.00
		lb	2.40	4.20	7.70	11.00	13.40	19.80	22.00	33.10	37.40	77.20	86.00	141.10	158.00
Weight Double acting		kg	0.90	1.50	2.60	4.40	-	7.10	-	11.00	-	26.00	-	51.00	-
		lb	1.98	3.30	62.00	9.70	-	15.70	-	24.30	-	57.30	-	112.40	-
Air consumption per stroke actual volume	CCW	liter	0.07	0.12	0.25	0.44	0.44	0.74	0.74	1.33	1.33	3.20	3.2	5.76	5.76
	CW		0.09	0.15	0.33	0.54	-	0.80	-	1.33	-	3.20	-	5.76	-
	Total		0.16	0.27	0.58	0.98	-	1.54	-	2.66	-	6.40	-	11.52	-
Air consumption per stroke actual volume	CCW	in^3	4.30	7.30	15.00	27.00	27.00	45.00	45.00	81.00	81.00	195.00	195	351.00	351.00
	CW		5.50	9.20	20.00	33.00	-	49.00	-	81.00	-	195.00	-	351.00	-
	Total		9.80	16.50	35.00	60.00	-	94.00	-	162.00	-	391.00	-	703.00	-
Stroke time with S.V. with 0.9 Cv at 80 psi	D/A	sec.	0.10	0.13	0.20	0.24	-	0.40	-	0.75	-	1.50	-	2.50	-
	S/R Open		0.10	0.15	0.23	0.29	0.30	0.54	0.60	1.00	1.10	2.20	2.4	3.70	4.00
	S/R Close		0.15	0.15	0.23	0.28	0.28	0.48	0.50	0.77	0.80	1.60	1.6	2.90	2.90

Actuator components & materials







Item	Description	Material specifications	Qty.
1	Body	AL 356-T6	1
2	Piston	AL 356/380	4
3	Piston O-ring	NBR. Viton, EPDM, NBR FX428	4
4	Inner spring	Spring steel, painted	4
5	Middle spring	Spring steel, painted	4
6	Outer spring	Spring steel, painted	4
7	Cover O-ring	NBR, Viton, EPDM, NBR FX428	3
7a	NAMUR cover O-ring	NBR, Viton, EPDM, NBR FX428	1
8	Spring return cover	AL 380	3
8a	NAMUR cover	AL 380	1
9	Double acting cover	AL 380	3
10	Air supply O-ring	NBR, Viton, EPDM, NBR FX428	1
11	Cover screw	Stainless steel	8-16
12	Pinion	Steel ENP	1
13	Stop plate	Stainless steel CF8M	1
14	Thrust washer	Delrin, CF PTFE, UHMWPE	2
14B	Bearing	Delrin, CF PTFE, UHMWPE	1
15	Pinion O-ring	NBR. Viton, EPDM, NBR FX428	2
15B	Top pinion O-ring	NBR. Viton, EPDM, NBR FX428	1
16	Disc bearing	Stainless steel / Delrin	1
17	Circlip	Stainless steel, spring steel zinc plated	1
18	Pad	Delrin, CF PTFE, UHMWPE	4
19	Stroke adjustment screw	Stainless steel	4
20	Exhaust plug (silencer)	Delrin, brass	1
21	Indicator	Plastic ABS, red & white	1
22	Puck	Plastic ABS, red & white	1
23	Indicator screw	Stainless steel	1
24	Tag (not shown)	Stainless steel	4
25	NAMUR insert	AL 380	1
26	Insert screw	Stainless steel	2
27	NAMUR insert O-ring	NBR, Viton, EPDM, NBR FX428	2
28	Spring cassette	Spring steel, painted	4
29	Spring return cover for M series	AL 380	3
29A	NAMUR cover for M series	AL 380	1

* C75 & C75M Pinion (12) and stop (13) are one pcs
** pinion assembly for actuators C35 and above

Torque chart (Nm)

Double acting

Size	Operating pressure (bar)						
	3.0	4.0	5.0	5.5	6.0	7.0	8.0
C15	10	14	17	19	21	24	27
C20	18	25	32	35	38	45	51
C25	39	52	65	72	79	92	105
C30	62	84	107	119	130	153	176
C35	114	151	190	208	226	265	304
C45	222	297	371	408	445	519	593
C60	527	703	879	967	1,055	1,230	1,406
C75	974	1,299	1,624	1,786	1,948	2,273	2,596

Spring return single acting

Size	Spring set	Air pressure - bar (psi)														Spring torque	
		3.0 (44)		4 (58)		5 (73)		5.5 (80)		6 (87)		7 (102)		8 (116)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C15	1A	**7**	**4**	10	7	13	11	15	12	17	14	20	17	24	21	6	3
	1B			**8**	**4**	**12**	**8**	13	10	15	11	18	14	22	18	9	5
	1B2					10	5	**12**	**7**	**13**	**9**	16	11	20	15	12	7
	2									11	6	**14**	**8.5**	**18**	**12**	15	9
C20	2A			**16**	**10**	22	16	26	19	29	22	35	29	41	35	15	9
	2A2B			14	7	**20**	**13**	24	16	27	19	33	26	39	32	18	11
	2B					18	10	**22**	**13**	**25**	**17**	31	23	38	29	21	13
	2C							19	10	22	13	**28**	**19**	35	25	25	16
	3									19	9	24	15	**30**	**21**	29	19
C25	2A	**23**	**11**	36	23	49	36	55	42	62	49	75	62	88	74	28	16
	2A2B			**33**	**19**	46	32	53	39	60	45	73	58	86	70	32	18
	2B					**43**	**27**	50	34	57	41	70	53	83	66	36	21
	2C					38	18	**45**	**24**	**52**	**31**	64	44	77	56	47	27
	3									47	21	**60**	**34**	**73**	**46**	57	31
C30	2A	**36**	**19**	57	40	80	62	91	73	102	84	125	107	148	129	42	26
	2A2B			**52**	**30**	75	52	86	63	98	74	120	96	143	118	53	31
	2B			48	18	**70**	**43**	81	54	93	65	115	87	138	109	62	36
	2C					64	25	**73**	**39**	**85**	**50**	107	72	130	94	78	44
	3									75	33	**98**	**55**	**120**	**77**	96	54
C30M	2A	**27**	**19**	48	40	70	62	81	73	92	84	113	106	135	128	42	34
	2A2B	21	12	**42**	**33**	64	55	75	67	85	77	107	99	129	121	49	40
	2B			36	26	**57**	**48**	69	60	79	70	101	92	123	114	56	46
	2C					48	36	**59**	**47**	**69**	**58**	91	80	113	102	69	57
	3									58	44	**80**	**66**	**102**	**88**	83	68
C35	2A	**75**	**39**	111	74	150	112	168	129	186	147	224	184	262	221	74	38
	2A2B	64	26	**100**	**62**	139	99	157	117	175	134	213	171	251	208	87	49
	2B			92	44	**130**	**82**	148	99	166	117	204	154	242	191	105	58
	2C							**133**	**68**	**151**	**86**	189	123	227	160	137	73
	3									135	63	**173**	**100**	**211**	**137**	161	89
C35M	2A	**54**	**42**	89	77	126	114	143	131	160	148	197	185	234	223	70	57
	2A2B	43	28	**78**	**63**	115	110	132	117	149	134	186	171	223	209	85	69
	2B			67	49	**104**	**86**	121	103	139	120	176	157	213	195	99	80
	2C					86	65	**103**	**82**	**120**	**99**	157	136	194	173	122	100
	3									102	76	**139**	**114**	**176**	**151**	146	119
C45	2A	**134**	**60**	208	132	280	203	317	239	353	275	426	346	499	417	159	86
	2A2B			**197**	**113**	269	184	306	219	342	255	415	326	488	397	179	97
	2B			179	82	**252**	**153**	288	188	325	224	398	295	471	366	212	115
	2C					223	102	**260**	**137**	**296**	**173**	369	244	442	315	265	144
	3									268	122	**341**	**193**	**414**	**264**	318	173
C45M	2A	**90**	**60**	162	131	232	201	267	236	302	271	373	342	443	412	134	107
	2A2B	110	83	**181**	**154**	251	225	286	260	321	295	392	365	462	436	160	127
	2B			142	107	**213**	**177**	248	213	283	248	353	318	424	388	184	147
	2C					180	136	**215**	**171**	**250**	**206**	321	277	391	347	228	182
	3									216	163	**286**	**234**	**357**	**304**	273	218
C60	2A	**328**	**160**	501	329	675	498	762	583	848	667	1021	835	1194	1004	360	194
	2A2B			**478**	**285**	651	454	738	538	824	623	997	791	1170	960	406	218
	2B			442	221	**615**	**390**	702	475	789	559	961	727	1134	896	473	254
	2C					548	268	**635**	**352**	**721**	**437**	894	605	1067	774	600	323
	3									657	322	**830**	**490**	**1003**	**659**	720	388
C60M	2A	**212**	**148**	379	315	546	483	630	566	714	650	880	816	1047	983	371	304
	2A2B	259	203	**426**	**370**	593	537	677	621	760	704	927	871	1094	1038	314	255
	2B			333	261	**500**	**428**	583	512	667	595	833	762	1000	929	429	353
	2C					411	321	**495**	**404**	**578**	**488**	744	654	912	821	542	447
	3									502	393	**668**	**559**	**835**	**726**	642	527
C75	2A	**614**	**345**	935	657	1255	969	1414	1124	1574	1280	1894	1592	2212	1902	615	350
	2A2B			**891**	**582**	1211	894	1370	1049	1530	1205	1850	1517	2168	1827	693	395
	2B			820	461	**1140**	**773**	1299	928	1459	1084	1779	1396	2097	1706	819	467
	2C					1025	576	**1184**	**632**	**1344**	**887**	1664	1199	1982	1509	1024	584
	3									1229	691	**1549**	**1003**	**1867**	**1313**	1229	700
C75M	2A	**480**	**360**	789	668	1098	977	1252	1131	1406	1285	1714	1594	2021	1900	596	468
	2A2B	406	269	**715**	**578**	1024	887	1177	1041	1331	1195	1640	1503	1947	1810	691	547
	2B			641	488	**949**	**797**	1103	951	1257	1104	1566	1413	1873	1720	786	624
	2C					799	606	**953**	**760**	**1107**	**913**	1415	1222	1722	1529	986	783
	3									959	726	**1268**	**1035**	**1575**	**1342**	1184	938

Torque chart (in-lb)

Double acting

Size	Operating pressure (psi)						
	40	60	70	80	90	100	120
C15	81	125	149	172	188	207	244
C20	146	229	271	311	351	390	468
C25	317	476	555	639	723	802	961
C30	505	769	914	1,052	1,190	1,334	1,611
C35	928	1,382	1,624	1,848	2,073	2,311	2,780
C45	1,807	2,719	3,170	3,622	4,074	4,525	5,429
C60	4,289	6,436	7,511	8,585	9,659	10,725	12,872
C75	7,926	11,893	13,877	15,856	17,834	19,819	23,767

Spring return single acting

Size	Spring set	Air pressure - psi (bar)														Spring torque	
		40 (2.8)		60 (4.1)		70 (4.8)		80 (5.5)		90 (6.2)		100 (6.9)		120 (8.3)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C15	1A	**56**	**32**	92	64	110	93	133	106	156	128	174	148	220	192	53	27
	1B			**73**	**37**	**102**	**68**	115	89	137	101	156	121	201	165	80	44
	1B2					85	42	**106**	**62**	**119**	**82**	139	95	183	137	106	62
	2									101	55	**121**	**74**	**165**	**110**	133	80
C20	2A			**146**	**92**	187	136	230	168	266	201	304	252	375	320	133	80
	2A2B			128	64	**170**	**110**	212	142	247	174	286	226	357	293	159	97
	2B					153	85	**195**	**115**	**229**	**156**	269	200	348	266	186	115
	2C							168	89	201	119	**243**	**165**	320	229	221	142
	3									174	82	208	130	**275**	**192**	257	168
C25	2A	**185**	**89**	330	211	416	306	487	372	568	449	651	538	806	677	248	142
	2A2B			**302**	**174**	390	272	469	345	549	412	633	503	787	641	283	159
	2B					**365**	**229**	443	301	522	375	607	460	760	604	319	186
	2C					322	153	**398**	**212**	**476**	**284**	555	382	705	513	416	239
	3									430	192	**521**	**295**	**668**	**421**	504	274
C30	2A	**290**	**153**	522	366	679	526	805	646	934	769	1085	928	1355	1181	372	230
	2A2B			**476**	**275**	636	441	761	558	897	677	1041	833	1309	1080	469	274
	2B			439	165	**594**	**365**	717	478	851	595	998	755	1263	998	549	319
	2C					543	212	**646**	**345**	**778**	**458**	928	625	1190	861	690	389
	3									687	302	**850**	**477**	**1099**	**705**	850	478
C30M	2A	**217**	**153**	439	366	594	526	717	646	842	769	980	920	1236	1172	372	301
	2A2B	169	97	**385**	**302**	543	467	664	593	778	705	928	859	1181	1108	434	354
	2B			330	238	**484**	**407**	611	531	723	641	876	798	1126	1044	496	407
	2C					407	306	**522**	**416**	**632**	**531**	790	694	1035	934	611	504
	3									531	403	**694**	**573**	**934**	**806**	735	602
C35	2A	**603**	**314**	1016	677	1273	950	1487	1142	1703	1346	1944	1596	2399	2023	655	336
	2A2B	515	209	**916**	**568**	1180	840	1389	1035	1602	1227	1848	1484	2298	1904	770	434
	2B			842	403	**1103**	**696**	1310	876	1520	1071	1770	1336	2216	1749	929	513
	2C							**1177**	**602**	**1382**	**787**	1640	1067	2078	1465	1212	646
	3									1236	577	**1501**	**868**	**1932**	**1254**	1425	788
C35M	2A	**434**	**338**	815	705	1069	967	1266	1159	1465	1355	1709	1605	2142	2042	620	504
	2A2B	346	225	**714**	**577**	976	933	1168	1035	1364	1227	1614	1484	2042	1913	752	611
	2B			613	449	**883**	**730**	1071	912	1273	1099	1527	1362	1950	1785	876	708
	2C					730	552	**912**	**726**	**1099**	**906**	1362	1180	1776	1584	1080	885
	3									934	696	**1206**	**989**	**1611**	**1382**	1292	1053
C45	2A	**1078**	**483**	1904	1208	2376	1723	2805	2115	3232	2518	3696	3002	4568	3818	1407	761
	2A2B			**1804**	**1035**	2283	1561	2708	1938	3131	2335	3601	2829	4468	3635	1584	858
	2B			1639	751	**2139**	**1298**	2549	1664	2975	2051	3453	2560	4312	3351	1876	1018
	2C					1892	866	**2301**	**1212**	**2710**	**1584**	3202	2117	4047	2884	2345	1274
	3									2454	1117	**2959**	**1675**	**3790**	**2417**	2814	1531
C45M	2A	**724**	**483**	1483	1199	1969	1706	2363	2089	2765	2481	3236	2967	4056	3772	1186	947
	2A2B	885	668	**1657**	**1410**	2130	1909	2531	2301	2939	2701	3401	3167	4230	3992	1416	1124
	2B			1300	980	**1808**	**1502**	2195	1885	2591	2270	3063	2759	3882	3552	1628	1301
	2C					1528	1154	**1903**	**1513**	**2289**	**1886**	2785	2403	3580	3177	2018	1611
	3									1978	1492	**2481**	**2030**	**3268**	**2783**	2416	1929
C60	2A	**2639**	**1287**	4587	3012	5728	4226	6744	5160	7764	6107	8859	7245	10931	9192	3186	1717
	2A2B			**4376**	**2609**	5525	3853	6531	4761	7544	5704	8650	6863	10712	8789	3593	1929
	2B			4047	2023	**5219**	**3310**	6213	4204	7223	5118	8338	6308	10382	8203	4186	2248
	2C					4650	2274	**5620**	**3115**	**6601**	**4001**	7757	5249	9769	7086	5310	2859
	3									6015	2948	**7201**	**4251**	**9183**	**6033**	6372	3434
C60M	2A	**1706**	**1191**	3470	2884	4634	4099	5576	5009	6537	5951	7635	7080	9585	9000	3283	2690
	2A2B	2084	1633	**3900**	**3387**	5032	4557	5991	5496	6958	6445	8043	7557	10016	9503	2779	2257
	2B			3049	2390	**4243**	**3632**	5160	4531	6107	5447	7228	6611	9155	8505	3797	3124
	2C					3488	2724	**4381**	**3575**	**5292**	**4468**	6455	5674	8350	7516	4797	3956
	3									4596	3598	**5796**	**4850**	**7645**	**6647**	5682	4664
C75	2A	**4940**	**2776**	8560	6015	10650	8223	12514	9947	14410	11719	16433	13813	20251	17413	5443	3098
	2A2B			**8157**	**5328**	10277	7587	12125	9284	14007	11032	16051	13162	19848	16727	6133	3496
	2B			7507	4221	**9674**	**6560**	11496	8213	13357	9924	15435	12112	19198	15619	7248	4133
	2C					8698	4888	**10478**	**5593**	**12305**	**8121**	14438	10403	18146	13815	9062	5168
	3									11252	6326	**13440**	**8703**	**17093**	**12021**	10877	6195
C75M	2A	**3862**	**2896**	7223	6116	9318	8291	11080	10009	12872	11764	14871	13830	18503	17395	5275	4142
	2A2B	3266	2164	**6546**	**5292**	8690	7527	10416	9213	12186	10940	14229	13041	17825	16571	6115	4841
	2B			5868	4468	**8054**	**6764**	9762	8416	11508	10107	13587	12260	17148	15747	6956	5522
	2C					6781	5143	**8434**	**6726**	**10135**	**8359**	12277	10603	15765	13998	8726	6930
	3									8780	6647	**11002**	**8980**	**14419**	**12286**	10478	8301

NAMUR & ISO interface

An extensive range of accessories such as solenoids, positioners and limit switches are available for direct mounting to the COMPACT actuator. Any accessory whose connections comply with ISO 5211 and VDI/VDE 3845 (NAMUR) mounting can be connected to the actuator.

NAMUR VDI/VDE 3845

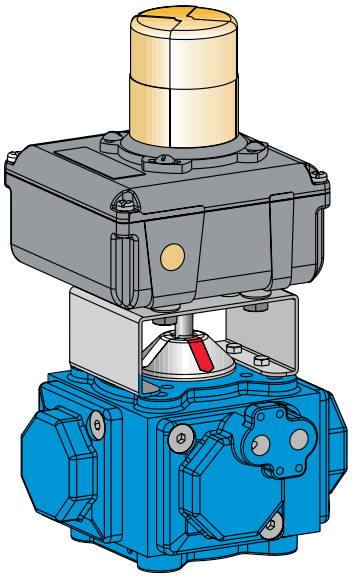
This standard provides for a range of accessories such as limit switches, pucks, indicators and positioners with a VDI/VDE interface so that they can be easily mounted onto the actuator top face.

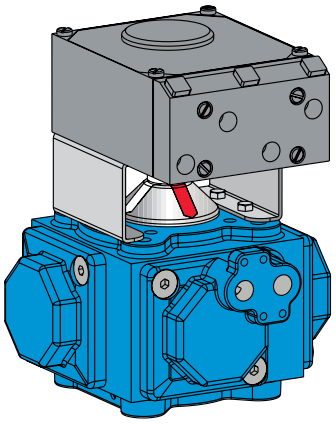
NAMUR solenoid mounting

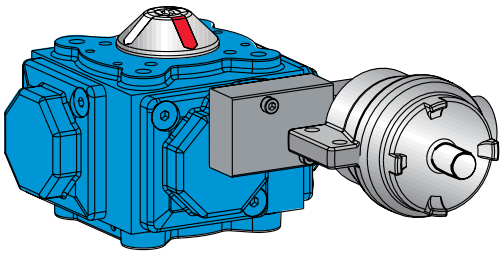
One of the four available actuator covers incorporates a pad for solenoid mounting according to the NAMUR international standard. Any solenoid that conforms to the NAMUR interface can be directly mounted to the actuators, thus simplifying the installation of solenoids and eliminating additional piping. It also allows quick actuation response as pressurized air supply is available at the port entrance.

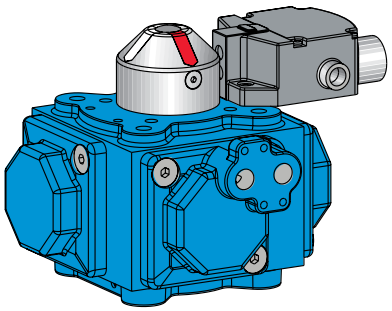
ISO 5211

The actuator bottom flange is in accordance with the ISO 5211 international standard and incorporates a star-shaped female drive to flexibly fit a variety of valve output shafts. The valve can be attached by a bracket or mounted directly onto the actuator, using one of the various ISO hole patterns.









Emergency Shut-Down system (ESD)

Short response time

A short response time is essential for valves operating in Emergency Shut Down (ESD) systems such as in refineries, power stations, mining and other applications where Safety Integrity Level (SIL) loops are a mandatory requirement.
The values in the table below indicate the closing time (seconds) of an unloaded actuator and a loaded actuator with torque values simulating real-life situations. The stroke time measures the actual movement of the actuator without a solenoid or any other accessory delay.

COMPACT actuator stroking time (sec.)

¼" NAMUR solenoid valve

Compact actuator closing time (sec.)					
Compact Actuator for Emergency Shut-Down (ESD) Systems		Normal		Improved	Fast
		¼" Namur solenoid valve Cv = 0.9		¼" Namur solenoid valve Cv = 0.9, & Breather Block	¼" Non-Namur Solenoid valve Cv = 1, & ¼" quick exhaust
Size	Load	3/2	5/2	3/2	5/2
C20-2C	0	0.09	0.08	0.05	0.05
	10 Nm / 89 lbf-in	0.14	0.09	0.07	0.07
C25-2C	0	0.17	0.12	0.07	0.06
	22 Nm / 195 lbf-in	0.35	0.15	0.17	0.15
C30-2C	0	0.26	0.20	0.12	0.10
	36 Nm / 319 lbf-in	0.49	0.23	0.25	0.20
C35-2C	0	0.39	0.29	0.26	0.17
	60 Nm / 531 lbf-in	0.58	0.35	0.41	0.27
C45-2C	0	0.71	0.52	0.43	0.30
	116 Nm / 1027 lbf-in	1.23	0.64	0.76	0.57
C60-2C	0	1.79	1.30	1.21	0.73
	260 Nm / 2300 lbf-in	2.36	1.38	1.73	1.13
C75-2C	0	2.78	2.00	1.86	1.08
	460 Nm / 4071 lbf-in	3.90	2.42	2.91	1.75

Compact actuator closing time (sec.)					
Compact Actuator for Emergency Shut-Down (ESD) Systems		Normal		Improved	Fast
		½" Namur solenoid valve Cv = 3.5		½" Namur solenoid valve Cv = 3.5, & Breather Block	½" Non-Namur Solenoid valve Cv = 3.5, & ½" quick exhaust
Size	Load	3/2	5/2	3/2	5/2
C60-2C	0	0.71	0.49	0.99	0.53
	260 Nm / 2300 lbf-in	1.22	0.60	1.50	0.80
C75-2C	0	1.12	-	-	1.04
	460 Nm / 4071 lbf-in	1.79	-	-	1.52

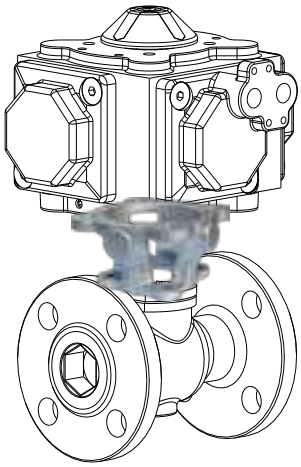
Mounting kits

Mounting kits play a major role in the proper functioning of an automated unit. A rigid bracket must connect the actuator to the valve so they become a single unit with zero movement between the three components. The coupler is an element that transfers the torque from the actuator to the valve shaft. It must fit tightly and accurately so as to minimize hysteresis and to turn the valve shaft on its center axis without side loading.

The mounting kit is designed for safe installation and operation of the complete unit, having rigid construction and no sharp corners. This well-engineered product provides a wide range of movement for the spanner, allowing for easy installation and maintenance, as well as maximum worker safety.

Whether pairing Habonim valves with the Habonim Compact™ actuators, customizing a mounting kit to pair the Habonim Compact™ actuator with other valve brands or mounting Habonim valves on a wide variety of other actuator brands; Habonim is a one stop shop, offering valve automation linkage hardware for a wide range of applications.

Cast brackets



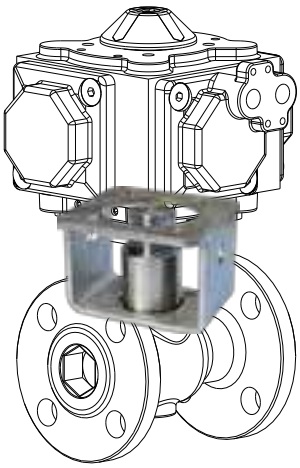
Habonim's rigid cast bracket, has a unique shape and precise construction with dual ISO 5211 standard hole patterns on both the top and bottom. The cast bracket is designed for installation on all Habonim valves, and the Compact™ pneumatic actuator which conform to ISO 5211 standard.

An aesthetic shape and rounded corners, allow clear visibility of the valve stem and coupler from all directions. This well-engineered product provides a wide range of movement for the spanner, allowing for easy installation and maintenance, as well as maximum worker safety.

The cast bracket is made from cast grade CF8 (AISI304) stainless steel for better corrosion resistance. Each pad is marked with the relevant ISO "F" number for clear identification. The coupler is made from stainless steel 303 as standard, and the fasteners are from stainless steel 304. Other materials are available upon special request.

Sample MK code description 'MK47C-25-C35'

'Closed box' mounting kit



The 'closed box' mounting kit design is used mainly for Non-ISO 5211 compliant top pads, platforms larger than ISO 5211 F14 PCD, or for unique applications which are not covered by the cast bracket.

A 'closed box' bracket is comprised of a top and bottom element connected by a precisely welded tongue and groove construction. This configuration delivers the load from the actuator to the valve mainly through this latch mechanism and less is applied through the welding seam.

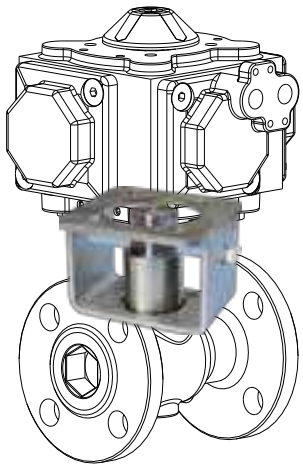
The Closed box bracket is made from stainless steel sheet AISI 304, however, for off-shore applications, desalination plants and applications exposed to corrosive environments stainless steel 316/316L is used.

An epoxy painted carbon steel bracket is used to connect large scotch-yoke actuators to large high pressure valves or trunnion mounted valves.

As standard the coupler is made from stainless steel 303, and the fasteners are made from stainless steel 304. Other materials are also available upon special request.

Sample MK code description 'MK47-25-C35'

'Lock Pin' mounting kit



To enhance site safety by preventing unintentional remote operation of an automated valve, Habonim provides a special lockable mounting kit.

The '-LP' mounting kit consists of a special bracket and coupler. A concentric hole drilled through the coupler and bracket allows a rigid stainless steel pin to be slid through both elements, blocking the valve stem and actuator pinion.

The '-LP' mounting kit does not include the lock pin itself, only the preparation to fit the lock pin as lock pins are normally part of maintenance toolbox.

Sample MK code description 'MK47-25-C35-LP'

Sample Lock pin kit codes:
LOCK PIN KIT C15/C30
LOCK PIN KIT C35/C45
LOCK PIN KIT C60/C75

'IFM' mounting kit

When a small footprint automated valve is required, Habonim provides a special mounting kit to allow easy installation of a barrel type proximity switch between the valve and actuator.

The '-IFM' mounting kit consist of a special bracket drilled to match the proximity switch OD, and a unique coupler with two ferromagnetic pin targets connected to it. The targets are aligned with the proximity switch unit so that when the actuator turns the valve to the open or closed position, the proximity switch signals the valve's position. This solution is an ideal non-contact detection of metal targets in position sensing applications, combined with smaller footprint allows for reduced space on the plant floor, but also minimizes the mounting space for sensors used for position control.

Sample MK code description 'MK47-10/12-C25-IFM12'

IFM shows the proximity switch type, followed by a number (8, 12, 18 or 30 mm) which indicates the outside diameter of the proximity switch cylinder.

'MOL' mounting kit

Manual operation of an automated valve is necessary during commissioning of a plant when an energy source is not stable, in case of an emergency, when there is a power outage and the valve must remain in the open or closed position, or due to an actuator malfunction.

Normally a declutchable gear would be used to integrate human intervention in an automated loop, however for small size valves up to 1 1/2" (DN40), Habonim recommends a cost effective mounting kit that allows the operator to turn the valve manually.

The 'MOL' mounting kit consists of a unique coupler with milled flats, and a drilled hole in its center. The 'MOL' closed box bracket is designed with an additional groove that allows a full quarter turn of a spanner. The kit also includes a lock pin and 19 mm spanner chained to the bracket. To rotate the pneumatically automated valve, disconnect the air pressure from the actuator. Hold the coupler flats with the spanner, and turn the drive train to its counter position, slide the lock pin all the way through the bracket and coupler to hold the valve and actuator in the new position.

Sample MK code description 'MK47-10/12-C25-MOL'

Standard

Series in range: 47P, 47X, 47W, 47G
31P, 31X, 31W, 31G (sizes 1¼", 2½", 4" FB are excluded)
32P, 32X, 32W, 32G (sizes 1¼", 2½", 4" FB are excluded)

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15		MK47C-10/12-C15		-	
C20		MK47C-05/07-C20		MK47C-10/12-C20		MK47C-15/20-C20	
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25	
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	
C45 / C45M		-		-		MK47-15/20-C45	
C60 / C60M / C75 / C75M		-		-		-	
C90M		-		-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	4" FB	6"	8"
	mm	DN65	DN80	DN100	DN100	DN150	DN200
C15		-	-			-	
C20		-	-			-	
C25		MK47C-25-C25	-			-	
C30 / C30M		MK47C-25-C30	MK47C-30/40-C30			-	
C35 / C35M		MK47C-25-C35	MK47C-30/40-C35			-	
C45 / C45M		MK47C-25-C45	MK47C-30/40-C45			MK47-60/80-C45	
C60 / C60M / C75 / C75M		-	MK47C-30/40-C60/C75			MK47-60/80-C60/C75	
C90M		-	-			MK47-60/80-C90	

Series in range: 73P, 73X, 73W, 73G
74P,74X, 74W, 74G
77P, 77X, 77W, 77G (Applicable for sizes 3" - 6")
78P, 78X, 78W, 78G (Applicable for sizes ½" - 2")

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1½"	2"
	mm	DN15	DN20	DN25	DN40	DN50
C15		MK47C-05/07-C15	MK47C-10/12-C15		-	-
C20		MK47C-05/07-C20	MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47-05/07-C25	MK47C-10/12-C25		MK47C-15/20-C25	MK47C-25-C25
C30 / C30M		MK47-05/07-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK47C-25-C30
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK47C-25-C35
C45 / C45M		-	-		MK47-15/20-C45	MK47C-25-C45
C60 / C60M / C75 / C75M		-	-		-	-
C90M		-	-		-	-

Valve Size Standard port / Actuator size	inch	3"	4"	6"	8"
	mm	DN80	DN100	DN150	DN200
C15		-		-	-
C20		-		-	-
C25		-		-	-
C30 / C30M		MK47C-30/40-C30		-	-
C35 / C35M		MK47C-30/40-C35		-	-
C45 / C45M		MK47C-30/40-C45		MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75		MK47-60/80-C60/C75	MK47-A0-C60/C75
C90M		-		MK47-60/80-C90	MK47-A0-C90

Series in range: 48, 48X, 48W, 48G

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15		MK47C-10/12-C15		-	-
C20		MK47C-05/07-C20		MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-		-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-		-		-	-
C90M		-		-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"
	mm	DN65	DN80	DN100	DN150
C15		-			-
C20		-			-
C25		-			-
C30 / C30M		MK47C-30/40-C30			-
C35 / C35M		MK47C-30/40-C35			-
C45 / C45M		MK47C-30/40-C45			MK47-60/80-C45
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75			MK47-60/80-C60/C75
C90M		-			-

Series in range: 61P, 61X
62P, 62X

Valve Size Standard port / Actuator size	inch	½" Full port	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-10/12-C15		-		-	-
C20		MK47C-10/12-C20		MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47C-10/12-C25		MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47C-10/12-C30		MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-		-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-		-		-	-
C90M		-		-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"
	mm	DN65	DN80	DN100
C15		-	-	-
C20		-	-	-
C25		-	-	-
C30 / C30M		MK48C-20-C30	MK47C-30/40-C30	-
C35 / C35M		MK48C-20-C35	MK47C-30/40-C35	-
C45 / C45M		MK48C-20-C45	MK47C-30/40-C45	MK47-60/80-C45
C60 / C60M / C75 / C75M		MK48-20-C60/C75	MK47C-30/40-C60/C75	MK47-60/80-C60/C75
C90M		-	-	-

Standard

Series in range: 24, 24X, 24W

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"
	mm	DN15	DN20	DN25	DN32	DN40
C15		MK24-05-C15	MK24-07-C15	-	-	-
C20		MK24-05-C20	MK24-07-C20	MK24-10-C20	MK24-12-C20	MK24-15-C20
C25		MK24-05-C25	MK24-07-C25	MK24-10-C25	MK24-12-C25	MK24-15-C25
C30 / C30M		-	-	MK24-10-C30	MK24-12-C30	MK24-15-C30
C35 / C35M		-	-	-	-	MK24-15-C35

Series in range: 27, 27X, 27W

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK27-05-C15	MK27-07-C15	-		-	-
C20		MK27-05-C20	MK27-07-C20	MK27-10/12-C20		MK27-15-C20	-
C25		MK27-05-C25	MK27-07-C25	MK27-10/12-C25		MK27-15-C25	MK27-20-C25
C30 / C30M		MK27-05-C30	MK27-07-C30	MK27-10/12-C30		MK27-15-C30	MK27-20-C30
C35 / C35M		-	-	MK27-10/12-C35		MK27-15-C35	MK27-20-C35
C45 / C45M		-	-	-		MK27-15-C45	MK27-20-C45
C60 / C60M / C75 / C75M		-	-	-		-	-
C90M		-	-	-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"
	mm	DN65	DN80	DN100	DN150	DN200
C15		-	-	-	-	-
C20		-	-	-	-	-
C25		-	-	-	-	-
C30 / C30M		MK27-25-C30	MK27-30-C30	MK27-40-C30	-	-
C35 / C35M		MK27-25-C35	MK27-30-C35	MK27-40-C35	-	-
C45 / C45M		MK27-25-C45	MK27-30-C45	MK27-40-C45	MK27-60-C45	-
C60 / C60M / C75 / C75M		-	MK27-30-C60/C75	MK27-40-C60/C75	MK27-60-C60/C75	MK27-A0-C60/C75
C90M		-	-	-	MK27-60-C90	MK27-A0-C90

Series in range: 28, 28X, 28W

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-	-	-	-	-
C20		MK47C-05-C20	MK47C-10/12-C20	-	-	-	-
C25		MK47C-05-C25	MK47C-10/12-C25	MK28C-10-C25	MK28C-12-C25	-	-
C30 / C30M		MK47-05-C30	MK47C-10/12-C30	MK28C-10-C30	MK28C-12-C30	MK48-20-C30	MK28C-15/20-C30
C35 / C35M		-	MK47-10/12-C35	MK28-10-C35	MK28-12-C35	MK48-20-C35	MK28C-15/20-C35
C45 / C45M		-	-	MK28-10-C45	MK28-12-C45	MK48-20-C45	MK28-15/20-C45
C60 / C60M / C75 / C75M		-	-	-	-	-	-
C90M		-	-	-	-	-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"
	mm	DN65	DN80	DN100	DN150	DN200
C15		-	-	-	-	-
C20		-	-	-	-	-
C25		-	-	-	-	-
C30 / C30M		-	-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK28-30-C35	-	-	-
C45 / C45M		MK47C-30/40-C45	MK28-30-C45	MK28-40-C45	-	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK28-30-C60/C75	MK28-40-C60/C75	MK28-60-C60/C75	MK28-80-C60/C75
C90M		-	-	-	MK28-60-C90	MK28-80-C90

Series in range: 26, 26X, 26W

Valve Size Standard port / Actuator size	inch	2"	3"	4"	6"	8"
	mm	DN50	DN80	DN100	DN150	DN200
C15		-	-		-	-
C20		-	-		-	-
C25		-	-		-	-
C30 / C30M		MK47C-30/40-C30	-		-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35		-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45		MK47-A0-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75		MK47-A0-C60/C75	MK26-80-C60/C75
C90M		-	-		MK47-A0-C90	MK26-80-F16

Cryogenic

Series in range: C47C, C47W
C31C, C31W (sizes 1¼", 2½", 4" FB are excluded)
C32C, C32W (sizes 1¼", 2½", 4" FB are excluded)

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15		MK47C-10/12-C15		-	
C20		MK47C-05/07-C20		MK47C-10/12-C20		MK47C-15/20-C20	
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25	
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	
C45 / C45M		-		-		MK47-15/20-C45	
C60 / C60M / C75 / C75M		-		-		-	
C90M		-		-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	4" FB	6"	8"
	mm	DN65	DN80	DN100	DN100	DN150	DN200
C15		-	-			-	
C20		-	-			-	
C25		MK48C-20-C25	-			-	
C30 / C30M		MK48C-20C30	MK47C-30/40-C30			-	
C35 / C35M		MK48C-20-C35	MK47C-30/40-C35			-	
C45 / C45M		MK48C-20-C45	MK47C-30/40-C45			MK47-60/80-C45	
C60 / C60M / C75 / C75M		-	MK47C-30/40-C60/C75			MK47-60/80-C60/C75	
C90M		-	-			MK47-60/80-C90	

Series in range: C73C, C73W
C74C, C74W
C77C, C77W (Applicable for sizes 3" - 6")
C78C, C78W (Applicable for sizes½" - 2")

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1½"	2"
	mm	DN15	DN20	DN25	DN40	DN50
C15		MK47C-05/07-C15	MK47C-10/12-C15		-	-
C20		MK47C-05/07-C20	MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47-05/07-C25	MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47-05/07-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-	-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-	-		-	-
C90M		-	-		-	-

Valve Size Standard port / Actuator size	inch	3"	4"	6"	8"
	mm	DN80	DN100	DN150	DN200
C15		-		-	-
C20		-		-	-
C25		-		-	-
C30 / C30M		MK47C-30/40-C30		-	-
C35 / C35M		MK47C-30/40-C35		-	-
C45 / C45M		MK47C-30/40-C45		MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75		MK47-60/80-C60/C75	MK47-A0-C60/C75
C90M		-		MK47-60/80-C90	MK47-A0-C90

Series in range: C26C, C26W

Valve Size Standard port / Actuator size	inch	2"	3"	4"	6"	8"
	mm	DN50	DN80	DN100	DN150	DN200
C15		-	-		-	-
C20		-	-		-	-
C25		-	-		-	-
C30 / C30M		MK47C-30/40-C30	-		-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35		-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45		MK47-A0-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75		MK47-A0-C60/C75	MK26-80-C60/C75
C90M		-	-		MK47-A0-C90	MK26-80-F16

Series in range: C61C, C62C

Valve Size Standard port / Actuator size	inch	½" Full port	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-10/12-C15		-		-	-
C20		MK47C-10/12-C20		MK47C-10/12-C20		MK47C-15/20-C20	-
C25		MK47C-10/12-C25		MK47C-10/12-C25		MK47C-15/20-C25	MK48C-20-C25
C30 / C30M		MK47C-10/12-C30		MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-		-		MK47-15/20-C45	MK48C-20-C45
C60 / C60M / C75 / C75M		-		-		-	-
C90M		-		-		-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"
	mm	DN65	DN80	DN100
C15		-	-	-
C20		-	-	-
C25		-	-	-
C30 / C30M		MK47C-30/40-C30	-	-
C35 / C35M		MK47C-30/40-C35	-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45	MK47-60/80-C45
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75	MK47-60/80-C60/C75	MK47-60/80-C60/C75
C90M		-	-	-

Series in range: C28C, C28W

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-		-	-	
C20		MK47C-05-C20	MK47C-10/12-C20		-	-	
C25		MK47C-05-C25	MK47C-10/12-C25		MK47C-15/20-C25	-	
C30 / C30M		MK47-05-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK48-20-C30	
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK48-20-C35	
C45 / C45M		-	-		MK47-15/20-C45	MK48-20-C45	
C60 / C60M / C75 / C75M		-	-		-	MK48-20-C60/C75	
C90M		-	-		-	-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"
	mm	DN65	DN80	DN100	DN150	DN200
C15		-	-	-	-	-
C20		-	-	-	-	-
C25		-	-	-	-	-
C30 / C30M		-	-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35	-	-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45	MK47-60/80-C45	-	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75	MK47-60/80-C60/C75	MK28-60-C60/C75	MK28-A0-C60/C75
C90M		-	-	-	MK28-60-C90	MK28-A0-C90

MTM

Series in range: Z47, Z47T

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		MK47C-05/07-C15 *		-		-	
C20		MK47C-05/07-C20		MK47C-10/12-C20 (DA ONLY)		-	
C25		MK47-05/07-C25		MK47C-10/12-C25		MK47C-15/20-C25 (DA ONLY)	
C30 / C30M		MK47-05/07-C30		MK47C-10/12-C30		MK47C-15/20-C30	
C35 / C35M		-		MK47-10/12-C35		MK47-15/20-C35	
C45 / C45M		-		-		MK47-15/20-C45	
C60 / C60M / C75 / C75M		-		-		-	
C90M		-		-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"	8"	8" FB
	mm	DN65	DN80	DN100	DN150	DN200	DN200
C15		-		-		-	-
C20		-		-		-	-
C25		-		-		-	-
C30 / C30M		MK47C-30/40-C30 (DA ONLY)		-		-	-
C35 / C35M		MK47C-30/40-C35		-		-	-
C45 / C45M		MK47C-30/40-C45		MK47-60/80-C45		-	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75		MK47-60/80-C60/C75		MK47-A0-C60/C75	MK26-80-C60/C75
C90M		-		-		MK47-A0-C90	MK26-80-F16

* (DA ONLY)

Series in range: Z73, Z73T, Z74, Z74T, Z78, T78Z, Z77, Z77T

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1½"	2"
	mm	DN15	DN20	DN25	DN40	DN50
C15		MK47C-05/07-C15 *	-		-	-
C20		MK47C-05/07-C20	MK47C-10/12-C20 *		-	-
C25		MK47-05/07-C25	MK47C-10/12-C25		MK47C-15/20-C25 *	-
C30 / C30M		MK47-05/07-C30	MK47C-10/12-C30		MK47C-15/20-C30	MK48C-20-C30 *
C35 / C35M		-	MK47-10/12-C35		MK47-15/20-C35	MK48C-20-C35
C45 / C45M		-	-		MK47-15/20-C45	MK48C-20-C30
C60 / C60M / C75 / C75M		-	-		-	-
C90M		-	-		-	-

Valve Size Standard port / Actuator size	inch	3"	4"	6"	8"
	mm	DN80	DN100	DN150	DN200
C15		-	-	-	-
C20		-	-	-	-
C25		-	-	-	-
C30 / C30M		-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK47C-30/40-C30 *	-	-
C45 / C45M		MK47C-30/40-C45	MK47Z-40-C45	MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-C60/C75	MK47Z-40-C60/C75	MK47-60/80-C60/C75	MK47-A0-C60/C75
C90M		-	-	-	MK47-A0-C90

* (DA ONLY)

Series in range: Z28

Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-	-	-	-	-
C20		MK47C-05-C20	MK47C-10/12-C20	-	-	-	-
C25		MK47C-05-C25	MK47C-10/12-C25	MK28C-10-C25	MK28C-12-C25	-	-
C30 / C30M		MK47-05-C30	MK47C-10/12-C30	MK28C-10-C30	MK28C-12-C30	MK48-20-C30	MK28C-15/20-C30
C35 / C35M		-	MK47-10/12-C35	MK28-10-C35	MK28-12-C35	MK48-20-C35	MK28C-15/20-C35
C45 / C45M		-	-	MK28-10-C45	MK28-12-C45	MK48-20-C45	MK28-15/20-C45
C60 / C60M / C75 / C75M		-	-	-	-	-	-
C90M		-	-	-	-	-	-

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"
	mm	DN65	DN80	DN100	DN150
C15		-	-	-	-
C20		-	-	-	-
C25		-	-	-	-
C30 / C30M		-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK28-30-C35	-	-
C45 / C45M		MK47C-30/40-C45	MK28-30-C45	MK28-40-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK28-30-C60/C75	MK28-40-C60/C75	MK28-60-C60/C75
C90M		-	-	-	MK28-60-C90

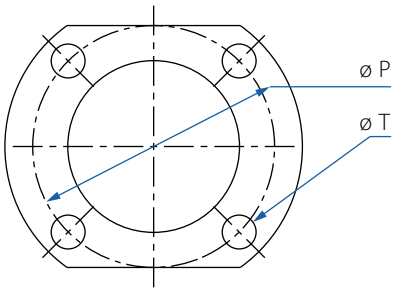
Series in range: Z28T

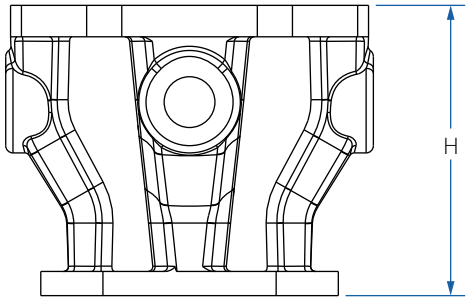
Valve Size Standard port / Actuator size	inch	½"	¾"	1"	1¼"	1½"	2"
	mm	DN15	DN20	DN25	DN32	DN40	DN50
C15		-	-	-		-	
C20		MK47C-05-C20	MK47C-10/12-C20	-		-	
C25		MK47C-05-C25	MK47C-10/12-C25	MK47C-15/20-C25		-	
C30 / C30M		MK47-05-C30	MK47C-10/12-C30	MK47C-15/20-C30		MK48-20-C30	
C35 / C35M		-	MK47-10/12-C35	MK47-15/20-C35		MK48-20-C35	
C45 / C45M		-	-	MK47-15/20-C45		MK48-20-C45	
C60 / C60M / C75 / C75M		-	-	-		MK48-20-C60/C75	
C90M		-	-	-		-	

Valve Size Standard port / Actuator size	inch	2½"	3"	4"	6"
	mm	DN65	DN80	DN100	DN150
C15		-	-	-	-
C20		-	-	-	-
C25		-	-	-	-
C30 / C30M		-	-	-	-
C35 / C35M		MK47C-30/40-C35	MK47-60/80-C35	-	-
C45 / C45M		MK47C-30/40-C45	MK47-60/80-C45	MK47-60/80-C45	-
C60 / C60M / C75 / C75M		MK47C-30/40-60/C75	MK47-60/80-C60/C75	MK47-60/80-C60/C75	MK28-60-C60/C75
C90M		-	-	-	MK28-60-C90

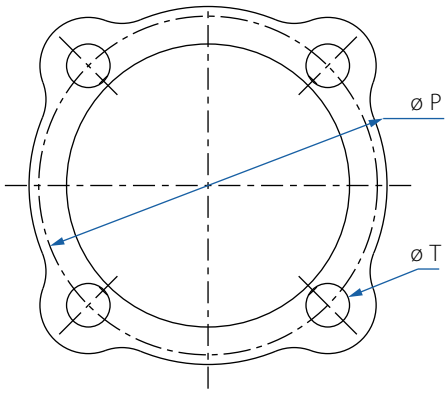
Cast mounting kit

Bottom view:





Top view:



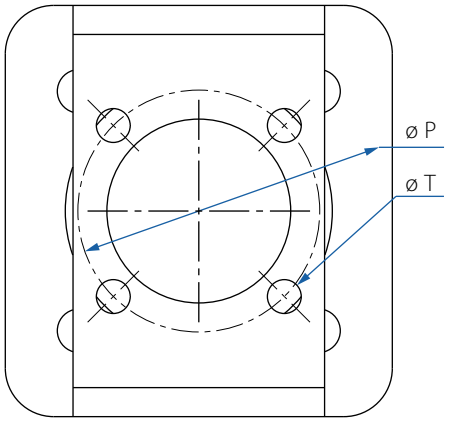
	F03	F04	F05	F07	F10	F12	F14
ø P	ø 36	ø 42	ø 50	ø 70	ø 102	ø 125	ø 140
ø T	ø 6	ø 6	ø 7	ø 9	ø 12	ø 14	ø 18

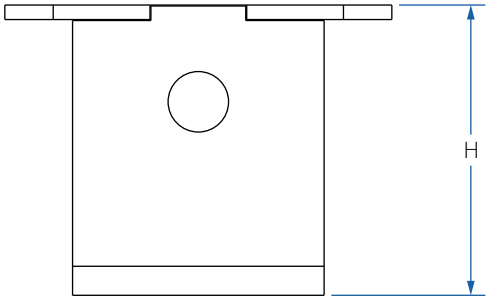
Mounting kits	Bridge	H
MK47C-05/07-C15	CP-F03-F05	40
MK47C-05/07-C20	CP-F03-F05	40
MK47C-10/12-C15	CP-F04-F05	50
MK47C-10/12-C20	CP-F04-F05	50
MK47C-10/12-C25	CP-F04-F07	50
MK47C-10/12-C30	CP-F04-F07	50
MK47C-15/20-C20	CP-F05-F05	60
MK47C-15/20-C25	CP-F05-F07	60
MK47C-15/20-C30	CP-F05-F07	60
MK48C-20-C20	CP-F07-F07	60
MK48C-20-C25	CP-F07-F07	60
MK48C-20-C30	CP-F07-F07	60
MK48C-20-C35	CP-F07-F10	60
MK47C-25-C25	CP-F07-F07	60
MK47C-25-C30	CP-F07-F08	60
MK47C-25-C35	CP-F07-F10	60
MK47C-30/40-C30	CP-F10-F10/12	80
MK47C-30/40-C35	CP-F10-F10/12	80
MK47C-30/40-C45	CP-F10-F10/12	80
MK47C-30/40-C30-WR	CP-F10-F10/12	80
MK47C-30/40-C35-WR	CP-F10-F10/12	80
MK47C-30/40-C45-WR	CP-F10-F10/12	80

Also avaolable with cast bridge

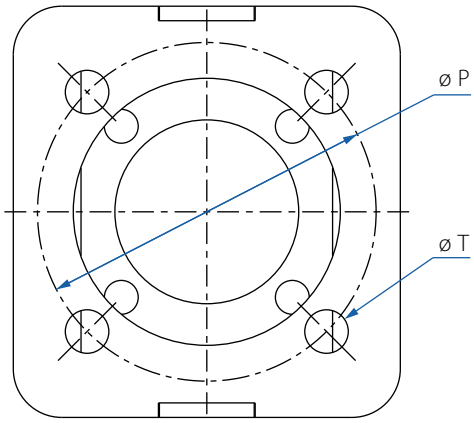
Close Box Mounting Kit

Bottom view:





Top view:



	F03	F04	F05	F07	F10	F12	F14
ø P	ø 36	ø 42	ø 50	ø 70	ø 102	ø 125	ø 140
ø T	ø 6	ø 6	ø 7	ø 9	ø 12	ø 14	ø 18

Mounting kits	Bridge	H
MK47-05/07-C15	F03-F05	40
MK47-05/07-C20	F03-F05	40
MK47-10/12-C15	F04-F05	50
MK47-10/12-C20	F04-F05	50
MK47-10/12-C25	F04-F07	50
MK47-10/12-C30	F04-F07	50
MK47-15/20-C20	F05-F05	60
MK47-15/20-C25	F05-F07	60
MK47-15/20-C30	F05-F07	60
MK48-20-C20	F07-F07	60
MK48-20-C25	F07-F07	60
MK48-20-C30	F07-F07	60
MK48-20-C35	F07-F10	60
MK47-25-C25	F07-F07	60
MK47-25-C30	F07-F08	60
MK47-25-C35	F07-F10	60
MK47-30/40-C30	F10-F10/12	80
MK47-30/40-C35	F10-F10/12	80
MK47-30/40-C45	F10-F10/12	80
MK47-30/40-C60	F10-F14	80
MK47-30/40-C30-WR	F10-F10/12	80
MK47-30/40-C35-WR	F10-F10/12	80
MK47-30/40-C45-WR	F10-F10/12	80
MK47-30/40-C60-WR	F10-F14	80

Ordering code system

The HABONIM COMPACT identification code

Size
C15
C20
C25
C30
C30M
C35
C35M
C45
C45M
C60
C60M
C75
C75M

Type	
SR	Spring return
DA	Double acting

Springs set		
C15	C20 to C75M	
1A	2AB	2A3
1B	2A	2C
1B2	2A2B	2C3
2	2B	3

Threads	
I	Imperial

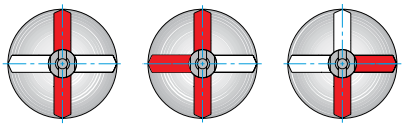
Indicator	
Default standard white with red arrows	
D	Red with white arrows
P	High profile
Flow	
Default straight	
T	3-Way
L	2-Way 90 deg

Options	
V	Viton O-rings
E	EPDM O-rings
N	Electroless nickel plating
U	UHMWPE
LT	FX428 special NBR compound for low temperature
RFS	Reverse fail safe for CCW rotation

Examples:
C35 SR 2C-N Size C35, spring return, 2C spring set, metric thread, standard indicator, electroless nickel coating.
C60 DA I-DT-LT Size C60, double acting, imperial thread, indicator red with white arrows, flow 3-way, FX428 O-rings.

In some applications the options described above are limited to specific sizes. Consult with Habonim for details.

Flow directions



Standard | T (3-Way) | L (2-Way 90º)

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www.habonim.com

Three piece valves Cat.

MAXMARK CAT-ACT-MAIN 04/18 REV2.04



HABONIM Industrial Valves & Actuators	ATEX	REV date	09/2020
ATEX	DECLARATION OF CONFORMITY IN ACCORDANCE WITH EUROPEAN DIRECTIVE 2014/34/EU Ball Valves & Actuators	REV number	05
First Issue: 04/2003		Page 1 of 1	

Equipment Type: Range of 1-, 2- & 3-Piece Ball Valves, Compact II Range of Spring Return & Double Acting Actuators

Manufacturer: Habonim Industrial Valves & Actuators

Address: Kfar Hanassi, M.P Upper Galilee 1, 1230500, Israel

This declaration of conformity is issued under the sole responsibility of the manufacturer.

This declaration relates to the Valves and related variations as described in the certificate, coded:	Group II, Category 2GD c/g T1-T6 XTR202980.01
This declaration relates to the Actuators and related variations as described in the certificate, coded:	Group II, Category 2GD c/g T4-T6 XTR202980.01
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:	2014/34/EU

The following harmonised standards and other technical specifications were used in support of this declaration:

Harmonised Standards:	EN ISO 80079-36:2016 EN ISO 80079-37:2016

Notified body Kiwa Nederland B.V (number 0063) holds a copy of Audit Report No. 191000892 created by the manufacturer in accordance with Annex IV and VII of the directive, and deposited in accordance with article 16 (3) of Directive 2014/34/EU, and has issued receipt number: KIWA 20ATEXQ0055

Signed for and on behalf of : Habonim Industrial Valves & Actuators	Place and date of issue: Habonim, Kfar Hanassi 24/06/2020	Yoel Hadar, Engineering Manager

Description of Equipment or Protective System	
Valves	**Series**
1 Piece	31,32,73,74,78,52
2 Piece	29,73,74,77,78,81,82,83
3 Piece	24,26,27,28,47,48,61,62,91,92,93,94,95,96

Actuators	**Series**
	C15-C90, C15M-C90M, C15DA-C90DA

The information given herein is limited to Product that has not been altered or damaged by reason of accident, abuse, neglect or misuse or improper or inadequate handling; improper or inadequate wiring utilized or installed in connection with the Product; installation, operation or use of the Product not made in strict accordance with the specifications and written instructions provided by Habonim; use of the Product for any purpose other than those for which it was designed.

Type Examination Certificate CML 22UKEX6258X Issue 0

United Kingdom Conformity Assessment

1 Product or Protective System Intended for use in Potentially Explosive Atmospheres UKSI 2016:1107 (as amended)

2 Equipment **Range of pneumatic actuators and mechanical ball valves**

3 Manufacturer **Habonim Industrial Valves & Actuators Ltd**

4 Address **Kibbutz Kfar Hanassi**
1230500
Israel

5 The equipment is specified in the description of this certificate and the documents to which it refers.

6 Eurofins E&E CML Limited, Newport Business Park, New Port Road, Ellesmere Port, CH65 4LZ, United Kingdom, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Schedule 1 of the Regulations.

The examination and test results are recorded in the confidential reports listed in Section 12.

7 If an 'X' suffix appears after the certificate number, it indicates that the equipment is subject to specific conditions of use (affecting correct installation or safe use). These are specified in Section 14.

8 This Type Examination certificate relates only to the design and construction of the specified equipment. Further requirements of the Regulations apply to the manufacturing process and supply of the product. These are not covered by this certificate.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the confidential report, has been demonstrated through compliance with the following documents:

EN ISO 80079-36:2016 EN ISO 80079-37:2016

10 The equipment shall be marked with the following:

Actuators

II 2 G D

Ex h IIC T6-T4 Gb

Ex h IIIC T85°C-T135°C Db

Ta=-40°C to +60°C for open environments

Ta =-40°C to +100°C for closed rooms

Valves

II 2 G D

Ex h IIC T6-T3 Gb

Ex h IIIC T85°C – T150°C Db

Ta=-40°C to +60°C for open environments

Ta =-40°C to +100°C for closed rooms





11 Description

C15-C100 actuator series

The Habonim Industrial Valves and Actuators Ltd Quarter Turn COMPACT Pneumatic Actuators - series C15-C90 are pneumatic quarter-turn rack & pinion actuators. Air pressure (maximum 8 bar) applied to the piston surface area generates thrust which transforms linear motion to rotary motion of the pinion. Both actuator types consist of a main aluminium body (complete with four aluminium covers with O-rings). Four pistons (each complete with a rack and O-ring) and one pinion/shaft (complete with O-ring). At the top of the actuator, there is a plastic indicator beacon complete with indicator arrows; this is secured to the pinion for easy indication of the valve position. There are two sizes of the beacon; a small 56mm x 19mm and a large 56mm x 41 mm. The external aluminium components are anodized then coated with two layers of paint. Snap

The actuator air connections are marked A and B. Port B connects via a series of holes to all the four pistons. The air passes into the Namur cover (or insert) and through holes which are connected to the two neighbouring pistons.

The spring return models are fitted with a Namur breather block, which is connected to both port A and B. The breather block prevents any external atmosphere from entering the internal parts of the actuator and prevents any explosive atmosphere from being pressurised.

The Quarter Turn COMPACT Pneumatic Actuators - series C15-C100 comprise uniform mechanical structure throughout all the series. The difference in the method of transferring the linear force from the pistons to the rotational torque of the operating shaft, can be found in C100 model. The C100 model comprises a scotch yoke mechanism, while the rest of the series from C15 to C90 are based on a rack and pinion mechanism.

The C100 actuator is a pneumatic quarter-turn (90°) scotch yoke actuator. Air pressure applied to the piston surface area generates thrust which transforms linear motion to rotary motion of the yoke. The Compact SY has four pistons centrally located around one yoke. When the pistons move away from the yoke, the yoke rotates counter-clockwise (CCW) – CCW stroke. When the pistons move towards the yoke, the yoke rotates clockwise (CW) – CW stroke.

Ball Valves – H29 and H99 series

The H29 and H99 series high pressure ball valves can come in a range of sizes and have a metallic construction with a PVC sleeve that is located on the handle of the valve. The Ball Valves are connected in series with the pipes that supply the actuators with compressed air. The valves are comprised of the following critical parts: valve body, rotary ball, stem seats and slide bearing. The valve body contains the integral components that allow on/off control. The rotatory ball valve is designed with a centre bore that the compressed medial flows through and permits or blocks its passage. The stem of the valve connects the ball to the external control mechanism which allows the valve/ball to be moved into the on/off position. The seats allow the ball to stay in position, ensuring that the on/off position is maintained. They also permit free movement of ball between the 2 positions, reducing wear of the parts.

The ball valves can be separately used with other suitably certified equipment or as an integral part of the actuator range listed in this evaluation certificate.





CML 22UKEX6258X
Issue 0

12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	21 Sep 2022	R14538A/00	Issue of prime certificate.

Note: Drawings that describe the equipment are listed in the Annex.

13 Conditions of Manufacture

***Only Applicable to Range of pneumatic actuators (C15 – C100)**

The following conditions are required of the manufacturing process for compliance with the certification.

i. It is the manufacturer's responsibility to ensure that all electrical equipment/devices fitted to the equipment are suitably certified and meet the ATEX/UKEX marking requirements of the equipment. In addition, the separately certified equipment, devices/ parts incorporated into the equipment shall be installed on the equipment and commissioned in accordance with the OEM instructions and recommendations.

ii. The manufacturer shall provide the end-user and/or installer with an appropriate copy of the certificate for each separately certified product that is fitted to the equipment.

iii. The manufacturer shall provide the end-user with the necessary operating instructions, settings, and operating parameters as appropriate for all non-electrical and electrical parts fitted to the equipment.

14 Specific Conditions of Use

The following conditions relate to safe installation and/or use of the equipment.

C15-C100 Actuator Series

i. The manufacturer marks the Temperature Classification/Maximum Surface Temperature as T6…T4 (T85°C to T135°C). This is because the maximum surface temperature of the equipment depends on the temperature of the process in which it is employed; refer to table below. It is therefore the responsibility of the user/installer to determine which values are applicable to their particular application:

Process temperature (Tp)	Temperature classification (maximum surface temperature)
Tp ≤ 80°C	T6 and T85°C
80°C ≤ Tp ≤ 95°C	T5 and T100°C
95°C ≤ Tp ≤ 130°C	T4 and T135°C

ii. For any electrical equipment (e.g., solenoid valves, limit switches) that may be incorporated with the equipment, the user shall ensure that they are suitably certified and meet the ATEX/UKEX marking requirements of the equipment. In addition, any separately certified equipment, devices/ parts incorporated into the equipment shall be installed on the equipment, commissioned and operated in accordance with the OEM instructions.

iii. The air compressor must incorporate a filter on the intake system and contain only lubricants that are resistant to ignition or carbonisation at anticipated temperatures.





iv. The air delivery must not be provided by hoses that are manufactured from elastomeric materials that can carbonise and/or form glow particles in anticipated temperatures.

v. It is the user's responsibility to ensure that the supplied air is from a non-hazardous area, and that it is clean, dry, oil free and dust free.

vi. At regular intervals, cleaning cycles shall be carried out to avoid deposit of a dust layer.

vii. The actuators must have a cycle rate of ≤1 cycle per minute.

viii. Prior to putting the equipment into operation, the internal chambers of the actuator shall be purged with clean, dry air from a non-hazardous area or an inert gas; refer to equipment IOM manual.

ix. All spring return actuator models shall have the Namur breather block fitted to both port A and B as shown in the manufacturer's drawings at all times.

x. Any lubricant(s) used with the equipment shall have an auto-ignition temperature 50K above the marked maximum surface temperature and shall be resistant to carbonisation.

xi. It is the user's responsibility to ensure that any conditions and/or limitations specified by the manufacturer regarding the use and operation of the equipment, are observed prior to installing and commissioning the products and during service as appropriately.

xii. It is the user's responsibility to ensure that the equipment is connected to earth appropriately. Electrical continuity shall be checked at regular intervals.

xiii. The equipment shall be protected from mechanical impact in service by location or suitable guarding.

xiv. The bearings and springs used with the equipment shall be maintained in accordance with the manufacturer's instructions, and shall not be exposed to liquids, solvents or vapours that are likely to cause damage. Checks must be carried out at appropriate intervals as specified in the IOM manual of the equipment; if excessive noise, vibration, heat is experienced the equipment must be stopped and examined until the fault is found and rectified.

Ball Valves – H29 and H99 Series

i. The manufacturer marks the Temperature Classification/Maximum Surface Temperature as T6…T3. This is because the maximum surface temperature of the equipment depends on the temperature of the process in which the valves are employed; refer to table below. It is therefore the responsibility of the user/installer to determine which values are applicable to their particular application:

Process temperature (Tp)	Temperature classification (maximum surface temperature)
Tp ≤ 80°C	T6 and T85°C
80°C ≤ Tp ≤ 95°C	T5 and T100°C
95°C ≤ Tp ≤ 130°C	T4 and T135°C
130°C ≤ Tp ≤ 145°C	T3 and 150°C

ii. It is the user's responsibility to ensure that any conditions and/or limitations specified by the manufacturer regarding the use and operation of the equipment, are observed prior to installing and commissioning the products and during service as appropriately.





iii. It is the user's responsibility to ensure that the equipment is connected to earth appropriately. Electrical continuity shall be checked at regular intervals.

iv. The equipment comprises a non-metallic sleeve; care shall be taken to avoid potential electrostatic charging hazards – wipe only with a damp cloth.

v. At regular intervals, cleaning cycles shall be carried out to avoid deposit of a dust layer.

vi. The equipment shall be protected from mechanical impact in service by location or suitable guarding.

Certificate Annex

Certificate Number	**CML 22UKEX6258X**
Equipment	**Range of pneumatic actuators and mechanical ball valves**
Manufacturer	**Habonim Industrial Valves & Actuators Ltd**

The following documents describe the equipment defined in this certificate:

Issue 0

Drawing No	Sheets	Rev	Approved date	Title
H-29 Series	1 to 3	HA00	21 Sep 2022	H-29 Series
H-99 Series	1 to 2	HA00	21 Sep 2022	H-99 Series
Sleeve-05-10-15-HAB	1 of 1	HM	21 Sep 2022	Plastic cover 05
C100-022	1 of 1	HA00	21 Sep 2022	C100 Body
C100-032	1 of 1	HA00	21 Sep 2022	C100 Piston
C100-033	1 of 1	HA00	21 Sep 2022	C100P Piston Pin 4340 Quenched
C100-034	1 of 1	HA00	21 Sep 2022	C100P Piston Roller Quenched
C100-057	1 of 2	HA00	21 Sep 2022	C100 Gas Nitrided Yoke
C100-057	2 of 2	HA00	21 Sep 2022	C100 Yoke Machining
C100-181-182	1 of 1	HA00	21 Sep 2022	C100 SR Cassette Arrangement
C15-C90M Series	2 of 2	HC00	21 Sep 2022	C15-C90M SER. Actuators
Breather-Block-02+05	1 of 1	HA00	21 Sep 2022	GA Drawing For 1/4" and 1/2" Breather Block
BREATHER-BLOCK	1 of 1	HA	21 Sep 2022	Breather block assembly
Cxx-Tolerances	1 to 1	HA00	21 Sep 2022	C15-C100 Min. & Max Tolerances Between Rotating/Moving And Stationary Parts
C100M-SR Actuator MET + Breather Block	1 of 2	HD00	21 Sep 2022	C100M-SR Scotch Yoke Actuator
M08200019-CE	1 of 1	HG00	21 Sep 2022	C15-C100 tag universal 46mmX15mm
TAG-H29-35x20-UNI-ATEX	1 of 1	HA00	21 Sep 2022	35x20 Universal Tag Template

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Certificate / Certificat

Zertifikat / 合格証

BUE 2006049 P0042 C002

exida hereby confirms that the:

Pilot-operated solenoid valves:

2/2 way 0290-A-*, 2/2 way 5404-A-***,
3/2 way 6518-C-***, 3/2 way 6518-D-***,
3/2 way and 5/2 way 6519-W-***,
5/2 way 6519-H-***, 4/2 way 5470-G-***

Bürkert Werke GmbH & Co. KG
Ingelfingen, Germany

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

Safety Function:
The Valve will move to the designed safe position within the specified safety time.

Application Restrictions:
The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.

The manufacturer may use the mark:

CERTIFIED • IEC 61508 • SIL 3 CAPABLE • exida

Revision 1.0 April 26, 2021
Surveillance Audit Due
April 30, 2024

ABD 10004908-49 EN Version: - Status: RL (released | freigegeben) printed: 07.06.2021

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004

exida Certification

Evaluating Assessor

Certifying Assessor

Certificate / Certificat / Zertifikat / 合格証

BUE 2006049 P0042 C002

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

Pilot-operated solenoid valves:
2/2 way 0290-A-*,**
2/2 way 5404-A-*,**
3/2 way 6518-C-*,**
3/2 way 6518-D-*,**
3/2 way and 5/2 way 6519-W-*,**
5/2 way 6519-H-*,**
4/2 way 5470-G-*

ABD 1000490849 EN Version: - Status: RL (released freigegeben) printed: 07.06.2021

Systematic Capability:

The products have met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This element meets *exida* criteria for Route 2_H.

IEC 61508 Failure Rates in FIT*

Device	λ_{Safe}	λ_{Dang}
2/2 way 0290-A-***	52	87
2/2 way 5404-A-***	87	66
3/2 way 6518-C-***	62	277
3/2 way 6518-D-***	62	287
5/2 way 6519-H-***	62	425
3/2 way and 5/2 way 6519-W-***	62	421
4/2 way 5470-G-***	55	231

* FIT = 1 failure / 10^9 hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: BUE 20-06-049 R008 V1R0 Assessment Report Valves

Safety Manual: Safety Manual_00_00815378, Rev -

80 N Main St
Sellersville, PA 18960

Anco Catalysts Ltd

Glenfield House, Worcester Road, Upton Warren, Worcestershire B61 7EP
Telephone: (01527) 861535 E-mail: johnchattoe@ancocatalysts.com
Web site: http://www.ancocatalysts.com

DATA SHEET
CATALYST DEOXO DSL2
CODE:4593

Metal Content (wt/wt)	0.2% Pd (Not less than 0.15% Pd)
Support	activated alumina spheres
Dimensions Smaller than 3mm Greater than 5mm	3 to 5mm diameter spheres < 5% < 5%
Colour	Grey
Tapped bulk density	Approx 0.6 kg/litre
Side crushing strength	> 10 daN
Porosity of unconsolidated bed	40% free space
Surface area	> 200 m2/gm
Pore volume	Approx 0.45 ml/gm
General Application	(1) Removal of O2 in H2 or CO to less than 1 ppm (2) Removal of CO (3) Removal of NOx (4) Removal of C2H2
Advantages	(1) Pressure drop marginally lower than cylinders (2) Strong support,low dusting (3) Resistance to poisoning (4) Good uniform activity (5) More economic than Type DS2 due to its lower density.

I:DATASHEET.DSL2

SAFETY DATA SHEET	Page: 1 of 5 Date: 16.03.2022 Issue no: 7 **Doc.no:SDS-DSL2-16/03/2022**

SECTION 1: IDENTIFICATION OF THE SUBSTANCE
1.1 PRODUCT NAME: DEOXO DSL2 CATALYST
PRODUCT CODE: 4593
REACH No: This product is a mixture.REACH Registration Number see section 3
1.2 TRADE NAME: 0.2% Palladium, on 3 to 5 mm alumina spheres, reduced
1.3 MANUFACTURER/SUPPLIER : ANCO CATALYSTS LTD
ADDRESS : GLENFIELD HOUSE, WORCESTER ROAD,
UPTON WARREN, WORCESTERSHIRE, B61 7EP
ENGLAND
1.4 TELEPHONE : 01527 861 535
EMERGENCY PHONE NUMBER : 01527 861 535

SECTION 2: HAZARDS IDENTIFICATION
2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 The product is not classified as hazardous to health or environment according to CLP Regulation.
Classification according to Directive 67/548 / EEC or Directive 1999/45 / EC Void.
Information concerning particular hazards for human and environment:
The product is labeled due to the calculation procedure of the "General Classification guideline for preparations of the EU", DIR.
Other hazards which do not result in classification No information known.
2.2 Label elements
Labelling according to Regulation (EC) No. 1272/2008 Not applicable
Indication of danger Not applicable
Signal word Not applicable
Hazard statements Not applicable
2.3 Other risks
This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS
3.2

COMPONENT	PRODUCT IDENTIFIER	CONCENTRATION (%)	REACH REGISTRATION NO.
Palladium	**CAS-No.** 7440-05-3 **EC-No.** 231-115-6	Less than 0.2%	01-2120140175-66-0007
Aluminium oxide	CAS-No. 1344-28-1 EC-No. 215-691-6	Greater than 99.8%	01-2119529248-35

SECTION 4: FIRST AID MEASURES
4.1 Description of first aid measures
After Inhalation: In dust form, somewhat annoying eyes and respiratory system. Move to fresh air. Finding if necessary doctor.
After skin contact: Wash with soap and water
After eye contact: Rinse immediately with plenty of water for at least 15 minutes with eyelids open
Ingestion: Rinse mouth with water. Drink lots of water
4.2 Most important symptoms and effects, both acute and delayed
No further relevant information available.

4.3 Indication of immediate medical attention and special treatment needed
No further relevant information available.
After swallowing Seek immediate medical advice

SECTION 5: FIRE-FIGHTING MEASURES
5.1 Extinguishing
Suitable extinguishing agents Use firefighting measures to the surroundings.
5.2 Special hazards arising from the substance or mixture
If this product is involved in a fire the following can be released:
alumina
Palladium oxide
5.3 Advice for firefighters
Protective equipment:
Use pressurized air mask fighting if necessary
Additional information: The residue remaining after a fire can have catalytic properties and can promote the re-ignition of combustible materials.

SECTION 6: ACCIDENTAL RELEASE MEASURES
6.1 Personal precautions: Avoid contact with eyes
Avoid breathing dust
6.2 Environmental precautions: Prevent product from reaching sewage waters or water
6.3 Methods for cleaning up: Sweep up and shovel. Keep in suitable, closed containers for disposal
6.4 Reference to other sections: For waste, refer to Section 13

SECTION 7: HANDLING AND STORAGE
7.1 Precautions for safe handling
Keep container tightly closed.
Store in cool, dry conditions in well-sealed containers.
Information about fire and explosion protection: The product is not flammable.
Upon removal from the process, the catalyst can be self-heating when it is contacted with air after it has been in contact previously with H2 or organic compounds.
7.2 Conditions for safe storage, including any incompatibilities
Storage:
Requirements for storage areas and containers: No special requirements.
Further information about storage: Do not store with organic materials.
Keep away from flammable substances.
Further information about storage conditions: Keep container tightly closed.
Store in cool, dry conditions in well-sealed containers.
7.3 Specific end uses: No further relevant information available.

SECTION 8: EXPOSURE / PERSONAL PROTECTION
8.1 Control parameters
Ingredients with occupational exposure limits to be monitored
1344-28-1 aluminum oxide (98.0%)
(OEL) value: 10 * 4 ** mg / m³
Al: * total dust
** respirable dust
Additional information: No data
Palladium compounds: 0.002 mg / m3
Biological limit values
This product does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.
8.2 Exposure
Personal protective equipment: Respiratory design with particulate filters. Use a respirator with type N95 (US) or PE (EN 143) cartridges as a backup to engineering controls.
Hand protection: Wear gloves (EU standard EN374)
Eye protection: Safety goggles (EU standard EN166)
Hygiene measures: Wash hands and face after contact with soap and warm water.

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES
9.1 Information on basic physical and chemical properties
General information:
Appearance: Spherical pellets 3mm to 5 mm
Form: light grey pellets
Odour: none
pH: Not applicable
Melting point: > 2000°C
Boiling point: Not applicable
Bulk density: approx 0.8 Kg/l
Solubility: insoluble
Auto ignition temperature: Not applicable
9.2 Other information: No further relevant information available

SECTION 10: STABILITY AND REACTIVITY
10.1 Reactivity: No information known.
10.2 Chemical stability: Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided: No decomposition if used and stored.
10.3 Possibility of hazardous reactions: The catalytic properties of this product can promote the oxidation and combustion of organic materials.
10.4 Conditions to avoid: No further relevant information available.
10.5 Incompatible materials: Combustible substances
10.6 Hazardous decomposition products: Aluminum oxide
Palladium oxide

SECTION 11: TOXICOLOGICAL INFORMATION
11.1 Information on toxicological effects
Acute toxicity: Registry of toxic effects of chemical substances (RTECS) contains data on acute toxicity of the components of this product.
LD / LC50 values: No information
Skin irritation or corrosion: May cause irritations
Eye irritation or corrosion: May cause irritation
Sensitization: No sensitizing effects known.
Germ cell mutagenicity: No known side effects.
Carcinogenic effects:
ACGIH A4: Not possible to make a classification of the carcinogenicity to humans: Inadequate data on which to classify the agent
the basis of its carcinogenic effects in humans and / or animals.
Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and / or carcinogenic and / or neoplastic data concerning this product.
Reproductive toxicity: No effects known.
Specific target organ systemic toxicity - repeated exposure: No known side effects.
Specific target organ systemic toxicity - single exposure: No known side effects.
Aspiration Hazard: No effects known.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains several tasks dosage for this topic.
Additional toxicological information:
To our knowledge this substance is acute and chronic toxicity is not fully known.
The product is not subject to classification according to the calculation method of the General EC Classification Guidelines for Preparations as issued in the latest version.

SECTION 12: ECOLOGICAL INFORMATION
12.1 Toxicity
Aquatic toxicity: No further relevant information available.
12.2 Persistence and degradability: No further relevant information available.
12.3 Bio accumulative: potential No further relevant information available.
12.4 Mobility in soil: No further relevant information available.
Additional ecological information:
General information:
Water hazard class 1 (Self-assessment): hazardous for water.
Do not allow product to reach ground water, water course or sewage system in small quantities in larger quantities.
Avoid transfer into the environment.
12.5 Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
12.6 Other adverse effects: No further relevant information available.

SECTION 13 : DISPOSAL
13.1 Waste treatment
Recommendation:
Waste from residues: This safety data sheet does not apply to used DSL2 catalyst as they may have different hazards or properties than the original product.
See Anco for advice on disposal.
Can be provided as a solid waste.

SAFETY DATA SHEET	Page: 5 of 5 Date: 16.03.2022 Issue no: 7 **Doc.no:SDS-DSL2-16/03/2022**

14.TRANSPORT INFORMATION **UN-NUMBER**	
ADR, IMDG, IATA	Not applicable
14.2 UN proper shipping name	
ADR, IMDG, IATA	Not applicable
14.3 Transport hazard class(es) **ADR, IMDG, IATA**	
Class	Not applicable
Packing group	
ADR, IMDG, IATA	Not applicable
14.5 Environmental hazards:	
Marine pollutant	No
14.6 Special precautions for user	Not applicable
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable
Transport/Additional information	Not dangerous according to the above specifications

SECTION 15: REGULATORY

15.1 Regulations / legislation for the substance or mixture Safety, health and environment

National regulations:

Information about limitation of use: For use only by technically qualified personnel.

Classification according to VbF (Regulations on flammable substances):
Not applicable

Water pollution - class 1 (Self-assessment): hazardous for water.

Substances of very high concern (SVHC) according to REACH Regulation (EC) No 1907/2006.
None of the ingredients are listed.

Terms of limitations in accordance with Article 67 and Annex XVII to Regulation (EC) No. 1907/2006 (REACH) for the manufacture, placing on the market and use shall be considered.
None of the ingredients are listed.

Annex XIV of the REACH regulations (which requires permits for use)
None of the ingredients are listed.

REACH - pre-registered substances
All ingredients are listed.

15.2 Chemical Safety Assessment: A Chemical Safety Assessment has not been made.

16.OTHER INFORMATION

The information given in this safety data sheet is based on our knowledge of this product, at the time of publication. It is given in good faith. However, no representation, warrant or guarantee is made to the accuracy, liability or completeness and we assume no responsibility therefore, and disclaim any liability for any loss, damage or injury howsoever arising using this information.

Certificate

Quality-Assurance System

acc. to Directive 2014/68/EU

Certificate no.: **01 202 ROK/Q-02 0017**

Name and address of the manufacturer:

Hy-Lok Corporation
Head office & 1st factory: 97,
Noksansandan 27-Ro, Gangseo-gu,
Busan, 46751, Korea

Herewith we certify that the above -mentioned manufacturer operates a quality system according to the European Directive 2014/68/EU. The manufacturer has the permission to affix the following CE marking to pressure equipment described and manufactured in accordance to the scope covered by this Quality-Assurance System:

CE 0035

Tested acc. to Directive 2014/68/EU: **QA-System (Module H)**
(the QA-Modules E1, E, D1, D are covered by Module H)

Audit report no.: ROK/Q-02 0017

Area of validity: Design and Manufacturing of Industrial Valves and Filters, see annex to certificate

Manufacturing plant: 2nd factory: 176, Dadae-Ro, Saha-gu, Busan, 49444, Korea

Valid until: November 30, 2023

Cologne, November 13, 2020

Dipl.-Ing. (FH) Vera Ruff

TÜV Rheinland Industrie Service GmbH
Notified Body for Pressure Equipment, ID-No. 0035
Am Grauen Stein, D-51105 Köln

E-008-E-Rev22

® TÜV, TUEV and TUV are registered trademarks. Utilisation and application requires prior approval.

Details of the Validity of the Approval as Manufacturer of Pressure Equipment with certified QA-System acc. PED 2014/68/EU

TÜVRheinland®
Precisely Right.

Annex to Certificate No.: 01 202 ROK/Q-02 0017

Manufacturer	Production Plant	Nationality	Date	Page No..	
Name: Hy-Lok Corporation Adress: Head office & 1st factory: 97, Noksansandan 27-Ro, Gangseo-gu, Busan, 46751, Korea 2nd factory: 176, Dadae-Ro, Saha-gu, Busan, 49444, Korea	Head office & 1st factory: 97, Noksansandan 27-Ro, Gangseo-gu, Busan, 46751, Korea 2nd factory: 176, Dadae-Ro, Saha-gu, Busan, 49444, Korea	**Korea**	Oct.28, 2020 Rev.: 3	1 of: 2	TÜV Rheinland Industrie Service GmbH

Current No.	Valve Type	Series No.	Pressure Class	Nominal Diameter	Until now applied codes	Listing of Module B/B1 certificates (for QS-module D/E)	Remarks
1	2	3	4	5	6	7	8
1	BALL VALVE	102, 105, 110, 112, 115, 116, 118, SO, T, CNG, CRYOB	10,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
2	GATE VALVE	GATE	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
3	GLOBE VALVE	GLOBE	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
4	PLUG VALVE	P, RP	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
5	MANIFOLD VALVE	M	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
6	CHECK VALVE	700, 700H, 701, 700A, CVL, CNG, CCV, CGH2	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
7	DOUBLE BLOCK & BLEED VALVE	DBB	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3, B16.34		
8	RELIEF VALVE	RV1, RV2, CRV, CNGRV	6,000 PSI	25mm < DN ≤ 150mm	ASME B31.3, B16.34		
9	NEEDLE VALVE	NV, SV, SVH, GB, CRYO, GVL, CGNS	6,000 PSI	25mm < DN ≤ 150mm	ASME B31.3, B16.34		
10	EXCESS FLOW VALVE	CGH2	6,000 PSI	25mm < DN ≤ 150mm	ASME B31.3, B16.34		
11	AIR MANIFOLD	AIR MANIFOLD	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.3		
12	CONDENSATE POT	CONDENSATE POT	6,000 PSI	25mm < DN ≤ 200mm	ASME B31.1		

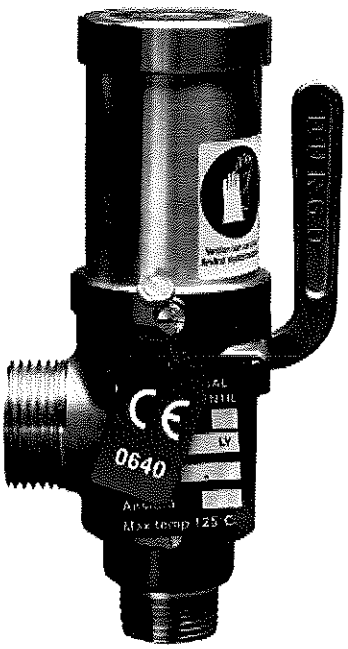
Details of the Validity of the Approval as Manufacturer of Pressure Equipment with certified QA-System acc. PED 2014/68/EU

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Annex to Certificate No.: 01 202 ROK/Q-02 0017

Manufacturer	Production Plant	Nationality	Date	Page No..	
Name: Hy-Lok Corporation Adress: Head office & 1st factory: 97, Noksansandan 27-Ro, Gangseo-gu, Busan, 46751, Korea 2nd factory: 176, Dadae-Ro, Saha-gu, Busan, 49444, Korea	Head office & 1st factory: 97, Noksansandan 27-Ro, Gangseo-gu, Busan, 46751, Korea 2nd factory: 176, Dadae-Ro, Saha-gu, Busan, 49444, Korea	**Korea**	Oct.28, 2020 Rev.: 3	2 of: 2	TÜV Rheinland Industrie Service GmbH

Current No.	Valve Type	Series No.	Pressure Class	Nominal Diameter	Until now applied codes	Listing of Module B/B1 certificates (for QS-module D/E)	Remarks
1	2	3	4	5	6	7	8
13	Cryogenic Ball Valve	Cryogenic	6,000 PSI	25mm < DN < 300mm	ASME B31.3,B16.34 BS 6364		
14	Cryogenic Globe Valve	Cryogenic	6,000 PSI	25mm < DN < 200mm	ASME B31.3,B16.34 BS 6364		
15	Cryogenic Block & Bleed Valve	Cryogenic	6,000 PSI	25mm < DN < 200mm	ASME B31.3,B16.34 BS 6364		
16	Filters	FI, FT	6,000 PSI	25mm < DN < 200mm	ASME B31.3		



Safety Valve Durgo SV55 (4155) DN25 Set pressure 6.0 bar (0.60 MPa)

Durgo Safety Valve, or Pressure Relief Valve, type SV55 (4155) operates progressively and can be used in pressurised systems with cold and hot water, air, oils and other media. The valve housing, nipple and cone are in dezincification resistant brass with seal material of fluorinated rubber (FPM/FKM) or EPDM. Durgo Safety Valves are Class 4 categorized and CE labelled in accordance with the Pressure Equipment Directive (PED 2014/68/EU).

Model	SV55 (4155)
Article Number	SV-55-G25/G32-0600
RSK No	5002696
GTIN-13	7392948506038
Connection	G25 / G32
Connection type	Threaded external/external (ISO-G)
Set Pressure	6.0 bar(g)
Temperature range	-30°C to +125°C
Type	Progressive, soft sealing
Material	Brass / FKM seal
Function	Pressure relief valve
Approval / standard	Approved PED 2014/68/EU Class 4
Operation and Care Manual	OCM-SV-55-FKM_EN-2020-r1
Product brochure	Brochure SV Eng
Height	192 mm
Net weight	1.5 kg
Drawing (External dimensions)	SV55 DN25_32 Dimension drawing
Customs Stat No	81814090
REACH - info ENG	The valve is made of brass with more than 0.1% by weight of lead; CAS No. 7439-92-1 a substance listed on the EC Candidate List of Substances of Very High Concern, SVHC
REACH - dok ENG	REACH info Durgo 2020-06-15_1 EN

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About BASF

BASF Catalysts is the Global Leader in Catalysis, and is part of BASF - The Chemical Company. By leveraging our industry-leading R&D platforms, BASF's global research infrastructure and our passionate pursuit of innovation, we develop unique, proprietary technologies that drive customer success. Our catalytic solutions cover a wide range from chemical and refinery processes, to adsorbents and mobile emissions. In addition, we offer broad experience in trading base and precious metals.

BASF - The Chemical Company

Service

At BASF, we know that our success is dependent upon your success. That is why we are dedicated to offering intelligent system solutions, supported by our outstanding customer and technical assistance. An analysis of your current processes will reveal the BASF products and services that will greatly improve your efficiency and bottom line.

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BF-8945

FSC
Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber
Cert no. SGS-COC-003419
www.fsc.org
© 1996 Forest Stewardship Council

BASF
The Chemical Company



Sorbead®/ KC-Trockenperlen® Adsorbents

We make adsorbents differently

BASF
The Chemical Company

Sorbead® Product Suite

Properties and Benefits of BASF's Sorbead Adsorbents

Sorbead Properties	Benefits
Low regeneration temperatures	■ Reduced energy consumption ■ Minimal hydrothermal aging ■ Lower operational costs
Bead shape	■ High abrasion resistance ■ Low pressure drop ■ Reduction of energy and operational costs
Long-life	■ Decreased adsorbent replacement expense ■ Lower service and operational costs
Large specific surface area	■ Greater adsorption capacity ■ Increased drying performance ■ Low pressure dew points (minus 70°C)
High bulk density/high loading capacity	■ Reduction of plant size ■ Increased capacity of existing equipment ■ Substantial savings in both construction and operational costs ■ Improved operational benefits due to longer regeneration cycles

For over 50 years, BASF has been a leading supplier of adsorbents for a wide-range of industries. We help companies to meet and exceed demanding environmental and government standards with solutions tailored to companies' specific needs.

At BASF, we do this by thinking differently. We control all aspects of product development from design to packaging and quality control. We provide customized products to meet specific production requirements. We offer highly-reliable technical service that incorporates the skills, expertise, and knowhow found throughout BASF.

** In Europe, Sorbead adsorbents are also known by the registered trade name KC-Trockenperlen®*

Sorbead H

- Reduces the hydrocarbon and water dew point of natural gas to levels lower than those achieved by most other technologies
- Like other Sorbead adsorbents, it is regenerated by applying heat
- Adding a 10 – 20% protective layer of Sorbead WS to Sorbead H for protection against liquid carry-over is recommended

Sorbead R

- Widest range of adsorptive drying applications
- Economical to use with an above-average drying capacity and low regeneration temperature demands
- Best suited for drying compressed air, technical gases (e.g. N_2, O_2, CO_2), liquefied gases, and natural gas
- Durable and dependable with high mechanical strength and low product loss
- Can be regenerated by applying heat or pressure swing

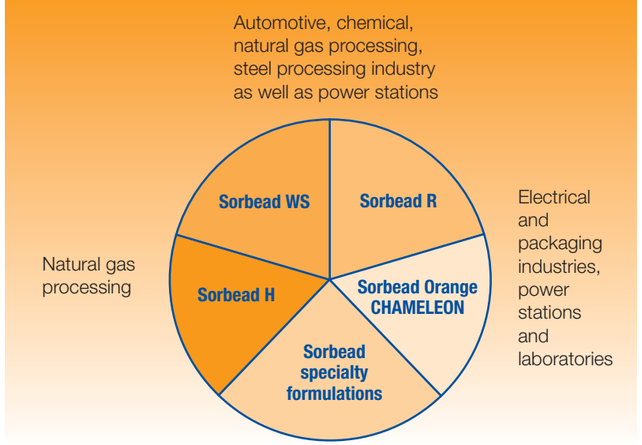
Sorbead WS

- The only water-resistant, high-capacity, porous silica gel
- Ideal for applications where adsorbent regeneration with humid gas occurs such as with Heat-of-Compression and Blower-Purge air dryers and air separation plants
- High resistance against hydrothermal aging and low regeneration temperature
- Protects other adsorbents and catalysts from water and moisture in a broad range of applications

Sorbead Orange CHAMELEON®

- Offers maximum moisture monitoring process assurance
- Used in:
  - Drying plants
  - Transformer air-dehumidifiers
  - Laboratory drying towers, U-tubes, and desiccators
- Environmentally friendly indicator which provides safe moisture indication without any concerns regarding carcinogenic ingredients
  - Sorbead pearls change color from orange to translucent when the adsorbent captures a certain amount of moisture
  - Water adsorption continues beyond the threshold point until maximum capacity is reached
  - Regains its orange color and is fully functional after regeneration

Sorbead Portfolio and Various Applications



Comprehensive Technical Services

Customized Sorbead Formulations

BASF can design and supply a variety of specialty Sorbead formulations to conform to specific production requirements, such as:

- Grain size
- Pore volume
- Pore diameter
- Chemical compositions

Technical Support

- Comprehensive support and advice for operating existing plants
- Assessment support in the planning of new drying units, particularly in the selection of appropriate adsorbents
- Sizing, from adsorbent inventory to fully operational plants
- Determining the optimum regeneration conditions to reduce energy consumption
- On-site supervision and service during fill-in, commissioning and startups
- In-house analysis of adsorbent samples, followed by technical recommendations

With superior design, diligent monitoring and regular maintenance, the potential operational lifetimes of adsorptive units can be fully maximized.

The Chemical Company

Safety data sheet

BASF Safety data sheet according to Regulation (EC) No. 1907/2006
Date / Revised: 22.11.2010 Version: 4.1
Product: **KC-Trockenperlen® WS 2050**
(ID no. 30516263/SDS_GEN_EU/EN)
Date of print 23.11.2010

1. Identification of the substance/mixture and of the company/undertaking

Product identifier

KC-Trockenperlen® WS 2050

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses: Solid material for drying of liquids and gases

Details of the supplier of the safety data sheet

Company:
BASF SE
67056 Ludwigshafen
GERMANY
Operating Division Catalysts

Telephone: +49 621 60-42587
E-mail address: product-safety-catalysts@basf.com

Emergency telephone number

International emergency number:
Telephone: +49 180 2273-112

2. Hazards Identification

Label elements

According to Regulation (EC) No 1272/2008 [CLP]

The product does not require a hazard warning label in accordance with GHS criteria.

According to Directive 67/548/EEC or 1999/45/EC

Directive 1999/45/EC ('Preparation Directive')

The product does not require a hazard warning label in accordance with EC Directives.

Classification of the substance or mixture

According to Regulation (EC) No 1272/2008 [CLP]

No need for classification according to GHS criteria for this product.

According to Directive 67/548/EEC or 1999/45/EC

Possible Hazards:
The product does not require a hazard warning label in accordance with EC Directives.

Other hazards

According to Regulation (EC) No 1272/2008 [CLP]

Other Hazards (GHS):
No specific dangers known, if the regulations/notes for storage and handling are considered.

Assessment PBT / vPvB:
Not applicable for inorganic substances.

3. Composition/Information on Ingredients

Substances

Chemical nature

Contains: mineral salts

Hazardous ingredients (GHS)
according to Regulation (EC) No. 1272/2008

No particular hazards known.

4. First-Aid Measures

Description of first aid measures

Remove contaminated clothing.

If inhaled:
Keep patient calm, remove to fresh air.

On skin contact:
Wash thoroughly with soap and water.

On ingestion:
Rinse mouth and then drink plenty of water.

Most important symptoms and effects, both acute and delayed
Symptoms: No significant reaction of the human body to the product known.

Indication of any immediate medical attention and special treatment needed
Treatment: Symptomatic treatment (decontamination, vital functions).

5. Fire-Fighting Measures

Extinguishing media
Suitable extinguishing media:
carbon dioxide, dry powder, foam, water spray

Special hazards arising from the substance or mixture

No particular hazards known.

Advice for fire-fighters
Special protective equipment:
Wear a self-contained breathing apparatus.

Further information:
Product itself is non-combustible; fire extinguishing method of surrounding areas must be considered.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Do not breathe dust. Avoid contact with the skin, eyes and clothing. Use personal protective clothing. Information regarding personal protective measures see, chapter 8.

Environmental precautions
Discharge into the environment must be avoided.

Methods and material for containment and cleaning up
Avoid raising dust. Sweep/shovel up. Dispose of absorbed material in accordance with regulations. Reclaim for processing if possible.

Reference to other sections
Information regarding exposure controls/personal protection and disposal considerations can be found in section 8 and 13.

7. Handling and Storage

Precautions for safe handling
Avoid the formation and deposition of dust. Ensure adequate ventilation.

Protection against fire and explosion:
The product does not contribute to the spreading of flames, nor is it self combustible, not explosive.

Conditions for safe storage, including any incompatibilities

Suitable materials for containers: carbon steel (iron), Low density polyethylene (LDPE)
Further information on storage conditions: Containers should be stored tightly sealed in a dry place.

Storage stability:
Contents are stable at room temperature.

Specific end use(s)

For the relevant identified use(s) listed in Section 1 the advice mentioned in this section 7 is to be observed.

8. Exposure Controls/Personal Protection

Control parameters

Components with workplace control parameters

The general dust limit value is to be kept.

Exposure controls

Personal protective equipment

Respiratory protection:
Breathing protection if dusts are formed. Particle filter with low efficiency for solid particles (e.g. EN 143 or 149, Type P1or FFP1)

Hand protection:
Suitable chemical resistant safety gloves (EN 374) also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN 374): E.g. nitrile rubber (0.4 mm), chloroprene rubber (0.5 mm), butyl rubber (0.7 mm) and other

Eye protection:
Safety glasses with side-shields (frame goggles) (e.g. EN 166)

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit (according to EN 14605 in case of splashes or EN ISO 13982 in case of dust).

General safety and hygiene measures
When using, do not eat, drink or smoke. Hands and/or face should be washed before breaks and at the end of the shift.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Form:	beads
Colour:	light brown to brown
Odour:	odourless
pH value:	4
Freezing point:	> 1,000 °C
Boiling point:	2,980 °C

Flash point:
not applicable
Evaporation rate:
not applicable
Flammability: does not ignite
Lower explosion limit:
not applicable
Upper explosion limit:
not applicable
Vapour pressure:
not applicable
Solubility in water: not soluble
Partitioning coefficient n-octanol/water (log Kow):
The value has not been determined
because the substance is inorganic.
Self ignition: not self-igniting

Thermal decomposition: No decomposition if correctly stored and handled.
Viscosity, dynamic:
not applicable
Explosion hazard: not explosive
Fire promoting properties: not fire-propagating

Other information

Bulk density: 400 - 900 kg/m3

10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals: No corrosive effect on metal.

Chemical stability

The product is chemically stable.

Possibility of hazardous reactions
No hazardous reactions known.
The product is chemically stable.

Conditions to avoid
Avoid dust formation. Avoid deposition of dust. Avoid humidity.

Incompatible materials

Substances to avoid:
No substances known that should be avoided.

Hazardous decomposition products

Hazardous decomposition products:

No hazardous decomposition products known.

11. Toxicological Information

Information on toxicological effects

Acute toxicity

Assessment of acute toxicity:
Virtually nontoxic after a single ingestion.

Experimental/calculated data:
LD50 rat (oral): > 5,000 mg/kg (OECD Guideline 401)
The product has not been tested. The statement has been derived from the properties of the individual components.

Irritation

Assessment of irritating effects:
Not irritating to the eyes. Not irritating to the skin.

Experimental/calculated data:
Skin corrosion/irritation rabbit: non-irritant (OECD Guideline 404)
The product has not been tested. The statement has been derived from the properties of the individual components. Literature data.

Serious eye damage/irritation rabbit: non-irritant (OECD Guideline 405)
The product has not been tested. The statement has been derived from the properties of the individual components. Literature data.

Respiratory/Skin sensitization

Assessment of sensitization:
Skin sensitizing effects were not observed in animal studies.

Experimental/calculated data:
Guinea pig maximization test guinea pig: Non-sensitizing.
The product has not been tested. The statement has been derived from products of a similar structure or composition.

Germ cell mutagenicity

Assessment of mutagenicity:
The substance was not mutagenic in bacteria.

Carcinogenicity

Assessment of carcinogenicity:
No data available.

Reproductive toxicity

Assessment of reproduction toxicity:
No data available.

Developmental toxicity

Assessment of teratogenicity:
Lack of data.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:
No data available.

Aspiration hazard

No data available.

Other relevant toxicity information

Because of the product's consistency and low water solubility, bioavailability is improbable.

12. Ecological Information

Toxicity

Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms.

Toxicity to fish:
No observed effect concentration (96 h) 10,000 mg/l, Brachydanio rerio (Fish test acute)
The product has not been tested. The statement has been derived from products of a similar structure or composition.

Aquatic invertebrates:
No observed effect concentration (24 h) 1,000 mg/l, Daphnia magna (OECD Guideline 202, part 1)
The product has not been tested. The statement has been derived from products of a similar structure or composition.

Aquatic plants:
No observed effect concentration (72 h) 10,000 mg/l (growth rate), Scenedesmus subspicatus (Algal growth inhibition test)
The product has not been tested. The statement has been derived from products of a similar structure or composition.

Persistence and degradability

Assessment biodegradation and elimination (H2O):
Not applicable for inorganic substances.

Bioaccumulative potential

Assessment bioaccumulation potential:
Accumulation in organisms is not to be expected.

Mobility in soil (and other compartments if available)

Assessment transport between environmental compartments:
Adsorption to solid soil phase is not expected.

Results of PBT and vPvB assessment

Not applicable for inorganic substances.

Additional information

Other ecotoxicological advice:
The product has not yet been fully tested.

13. Disposal Considerations

Waste treatment methods

Observe national and local legal requirements.
Contact specialized companies about recycling.

Contaminated packaging:
Dispose of in accordance with national, state and local regulations.
Contaminated packaging should be emptied as far as possible and disposed of in the same manner as the substance/product.

14. Transport Information

Land transport

ADR

Not classified as a dangerous good under transport regulations

RID

Not classified as a dangerous good under transport regulations

Inland waterway transport
ADNR

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

16. Other Information

Vertical lines in the left hand margin indicate an amendment from the previous version.

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. The data do not describe the product's properties (product specification). Neither should any agreed property nor the suitability of the product for any specific purpose be deduced from the data contained in the safety data sheet. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.

HY-LOK CORPORATION

Manufacturer`s Declaration

Manufacturer`s name: HY,LOK CORPORATION
Manufacturer`s address: 1467-1, Songjeong-Dong, Gangseo-Gu
Busan, 618-270
Korea

Description of product:

Tube Fittings	H200TF	Super Duplex Tube Fittings	H-200TF-SD
Fitting Din 2353	H-230CF	Clean Fittings(Weld & ZCR)	H-250CF
ZCO-Fittings	H-260CF	Instrument Thread & Weld Fittings	H-300PF
Calibration Fittings	H-CF100	Hose connectors (metric sizes)	H-CF100

Applied EU directive: 2016/34/EU
Equipment intended for use in potentially explosive atmospheres

Applied standards: EN 1127-1: 1997
Explosive atmospheres

EN 13463-1: 2001
Non-electrical equipment for potentially explosive atmospheres

Hy-Lok fittings are manufactured in accordance with ISO 9001 Quality Systems and appropriated National and International product standards.

Accordingly to a performed assessment of Hy-Lok Corporation we have determined that the product mentioned above does not have any own potentional source of ignition. As such the product is not covered by the Directive 2016/34/EU, must not be CE marked and must be used within the scope of intended use only as described in data

sheet and the operating and maintenance instructions.

Important note:
The fittings must be hooked up into the tubing system in electrically conducting manner to ensure proper grounding. The environmental neighborhood was not subject to Hy-Lok`s assessment is within the responsibility of the plants owner, designer, commissioner or user.

This declaration does not pertain to atmospheres outside of the scope on its validity, such as oxygen enriched atmospheres. When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation and maintenance are the responsibilities of the system designer and user.

HY-LOK CORPORATION

HY-LOK CORPORATION

CEO & PRESIDENT C.H. MOON

HY-LOK CORPORATION

Manufacturer`s Declaration

Manufacturer`s name: HY,LOK CORPORATION
Manufacturer`s address: 1467-1, Songjeong-Dong, Gangseo-Gu
Busan, 618-270
Korea

Description of product:

Bleed and Purge Valves	H-100BPV	700, 700H, 701, 700A, CVL Series Check Valves	H-700T
NV Series Integral Bonnet Needle Valves	H-100NV	Bellow Valves	H-BL100
Integral Block and Bleed Valves	H-100PIV	CNG Product	H-CNG100
T Series Trunnion Ball Valves	H-100TBV	CRYO Product	H-CRYO100
SV Series Integral Bonnet Needle Valves	H-101NV	Diaphragm Valves	H-DV100
102 Series Ball Valves	H-102BV	Exess Flow Valves	H-EF100
GB Series Union Bonnet Needle Valves	H-102NV	FT Micron Tee Filters	H-F100
SVH Series Union Bonnet Needle Valves	H-103NV	FI Micron Inline Filters	H-F200
105 Series High Pressure Ball Valves	H-105BV	Series Plug Valves	H-P100
110P Series Ball Valves	H-110BPTV	Q-Series Quick Connects	H-Q100
110 Series Ball Valves	H-110BV	RP-Series	H-RP100
112 Series Ball Valves	H-112BV	RV Series Relief Valves	H-RV100
115 Series Ball Valves	H-115BV	SO Series Ball Valves	H-SOBV
Manifolds & Gauge Root Valves	H-120MV	Toggle Valves	H-TG100

HY-LOK CORPORATION

Applied EU directive: 2016/34/EU
Equipment intended for use in potentially explosive atmospheres

Applied standards: EN 1127-1: 1997
Explosive atmospheres

EN 13463-1: 2001
Non-electrical equipment for potentially explosive atmospheres

The above mentioned valves are manufactured in accordance with ISO 9001 Quality Systems and appropriate National and International product standards.

Accordingly to a performed assessment of Hy-Lok Corporation we have determined that the product mentioned above does not have any own potentional source of ignition. As such the product is not covered by the Directive 2016/34/EU, must not be CE marked and must be used within the scope of intended use only as described in data sheet and the operating and maintenance instructions.

Important note:
The valves must be hooked up into the piping/tubing system in electrically conducting manner to ensure proper grounding. Since some valves provided with non-conductive handles, special system design must be considered if the use of the product is intended in hazardous areas (particular zones), environments, or use with cetain system fluids. Stem grounding and Conductive bar assessment. This assessment is within the responsibility of the plants owner, designer, commissioner or user.

This declaration does not pertain to atmospheres outside of the scope on its validity, such as oxygen enriched atmospheres. When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation and maintenance are the responsibilities of the system designer and user.

HY-LOK CORPORATION

HY-LOK CORPORATION

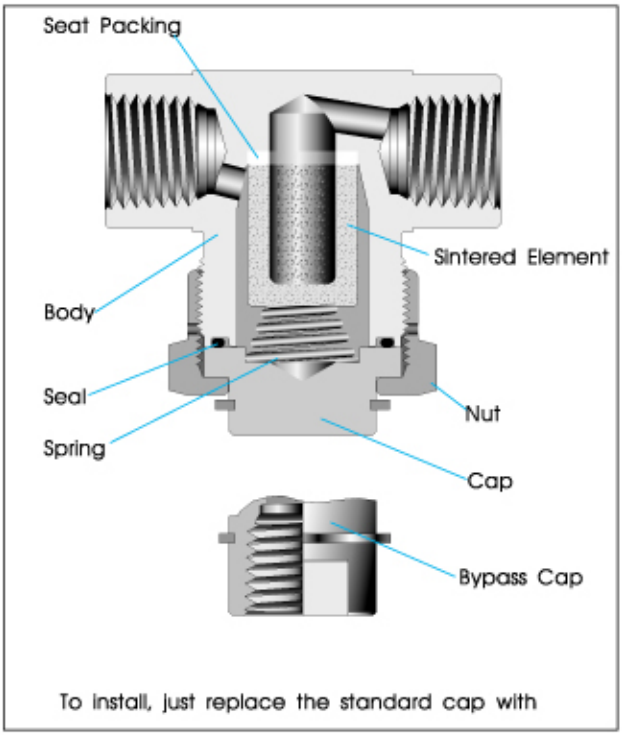
CEO & PRESIDENT C.H. MOON

Hy-Lok FT Series



Micron Tee Filters

Catalog No. H-F100
Jun. 2003



To install, just replace the standard cap with

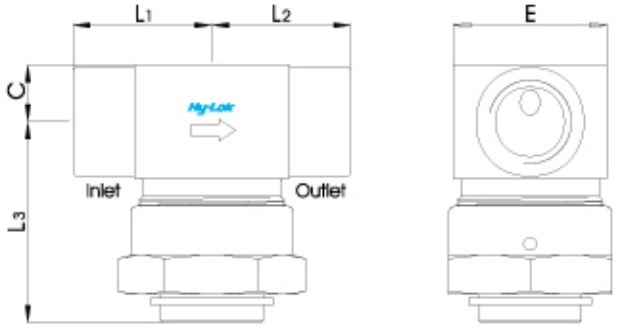


Table of Dimensions

Basic Part No.			Orifice	End Connections	Dimensions				
				Inlet & Outlet	L_1	L_2	L_3	C	E
FT	H	-4T-	4.4	1/4" Hy-Lok	33.0	33.0	38.8	11.0	28.5
	H	-6T-		3/8" Hy-Lok	36.2	36.2			
	H	-8T-		1/2" Hy-Lok	38.7	38.7			
	F	-2N-		1/8" Female NPT	25.0	25.0			
	M	-4N-		1/4" Male NPT	25.5	25.5			
	F	-4N-		1/4" Female NPT	27.0	27.0			
	F	-6N-		3/8" Female NPT			41.0	12.7	
	F	-8N-		1/2" Female NPT	31.0	31.0	44.0	15.8	31.75

All dimensions are in millimeters.

Features

- **SS316 body** material as standard
- **Replacement of filter elements** with body in line
- **Compact and robust** integral union bonnet design
- **Particle trapping for clean fluid**

Technical Data

- **Maximum Operating Pressure:**
  6000 psig @ 70°F(21°C)for Stainless Steel
  3000 psig @ 70°F(21°C)for Brass
- **Operating Temperature:** -60°F to 400°F (-51°C to 204°C)
- **Effective Filteration Area:**
  1.73 sq. in. (0.0011 sq. meter) for all sizes.

Materials of Construction

Description	Material / ASTM Specification	
Body	SS 316 / A479	Brass / B16
Cap		
Bypass Cap		
Nut		
Sintered Element	316 Stainless Steel	
Seat Packing	PTFE	
Seal	Viton	
Spring	SS 302	

Filter Element and Cv

Element Micron Rating	Filtered Particle Size	Cv
1	1 micron	0.01
10	10 micron	0.02
50	50 micron	0.11
100	100 micron	0.30
150	150 micron	0.42

Operation and Filter Replacement

The filter element, which is made of sintered stainless steel, is porous and has lots of tiny holes. The particles bigger than the holes are not allowed to pass through, hence clean fluid. After certain period, the holes may be blocked by particles and pressure drop will increase. This depends upon the total flow through elements and cleanliness of upstream flow. The element needs to be replaced for clean fluid with minimum pressure drop.

HY-LOK CORPORATION

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Hy-Lok Tee Filters FT Series

How to Replace the Element

1. Bleed the line to remove system pressure.
2. Unscrew the nut while holding the body steady with back-up wrench.
3. Remove the nut, cap, spring, and seal all together.
4. Remove the element out of the body and pull out the seat packing with care. It is recommeneded to replace the seat packing and seal at the same time.
5. Clean metal parts if necessary.
6. Insert new element into tapered bore with smooth faced tool until it seats firmly.
7. Put the seal back in place.
8. Place the spring on the cap and retighten the nut.

Bypass Cap

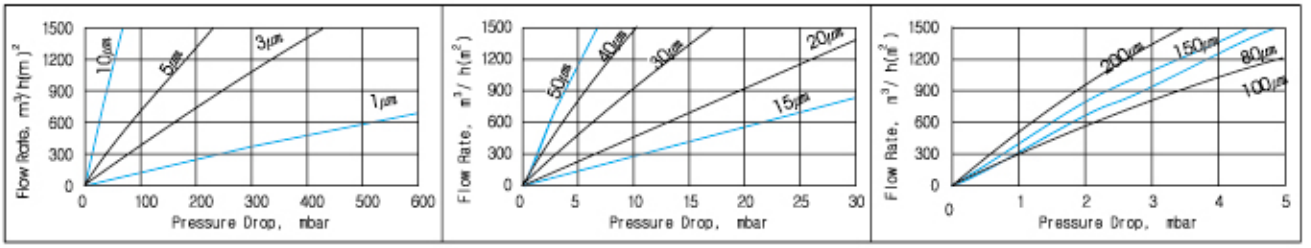
For sampling and purging, bypass cap is available with 1/4" female NPT threaded port.

Spares

For maintenance and changeover to bypass, the following spares are available.

Part No.	Description	Q'ty / Pack
KFT - F	Filter	1 pc
KFT - P	Seat Packing	1 pc
KFT - S	Seal	1 pc
KFT - B	Bypass Cap	1 pc

Pressure Drop vs Flow Rate of Air



Please note the above Flow Rate is elements' co-efficient in cubic meters per hour per square meter. To get the flow rate of FT series filter, find the flow rate in the graph and then multiply it with effective filtration area on previous page.

Ordering Information

FT — Filter Type Designator

F — End Connection Designator
- M : Both End Male Pipe Thread
- F : Both End Female Pipe Thread
- H : Both End Hy-Lok Tube Fitting

B — Bypass Cap Designator*
- Nil : Without(Standard)
- B : With

4N — Size Designator

- NPT (ISO/BSP)

Thread(In.)	1/8	1/4	3/8	1/2
Designator	2N(R)	4N(R)	6N(R)	8N(R)

- Tube

O.D.(In)	1/4	3/8	1/2
Designator	4T	6T	8T

10 — Filter Element Designator
- 1 : 1 micron
- 10 : 10 micron
- 50 : 50 micron
- 100 : 100 micron
- 150 : 150 micron

S316 — Body Material Designator
- S316 : 316 Stainless Steel
- BRAS : Brass

Note* : No designator is reguired for standard e.g. FTF-4N-10-S316

SAFETY in VALVE SELECTION

Proper installation, materials compatibility, operation and maintenance of these valves are the responsibility of the user. The total system design must be taken into consideration to ensure optimal performance and safety.

■ QUALITY SYSTEM CERTIFICATES

ISO 9001
CERTIFICATE NO.GQC 212

ASME SECT Ⅲ (MO)
CERTIFICATE NO. QSC 584

■ TYPE APPROVALS (for Hy-Lok Tube Fittings)

American Bureau Shipping
CERTIFICATE NO.00-BK50288-X

Lloyd's Register
CERTIFICATE NO.01/10075

GERMANISCHER LLOYD
CERTIFICATE NO.57798 - 91 HH

DET NORSKE VERITAS
CERTIFICATE NO.P - 9100

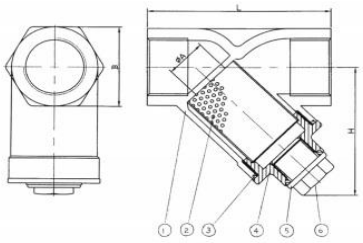
ISO 9001 CERTIFIED

Distributed by :

www.hy-lok.com

Strainers Y-Type Stainless steel AISI 316 with Stainless steel filter
Applications: water, heating, air conditioning,
compressed air and fuel systems.
Only to be use in horizontal systems.
Body - End adapter - Drain plug Stainless steel AISI 316,
filter Stainless steel AISI 316, seal and ring PTFE.
Temperature resistant from -20º to +110ºC.
Both sides BSP female thread. Mesh 12MESH

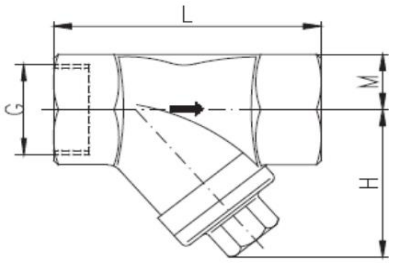




Number	Size	PN	L mm	H mm
43A42500	1/4"	55	65	46
43A42501	3/8"	55	65	46
43A42502	1/2"	55	65	46
43A42503	3/4"	55	80	55
43A42504	1"	55	90	70
43A42505	1.1/4"	55	105	73
43A42506	1.1/2"	55	120	81
43A42507	2"	55	140	94

Strainers Y-Type Stainless steel AISI 316 with Stainless steel filter
Applications: water, heating, air conditioning, compressed air and fuel systems.
Mounting position; bonnet upside down, please refer to flow direction.
Body consist of two screwed parts.
Connection Female Thread 1/2" - 3" (DIN ISO 228 T1).
Pressure range: Max. 40 Bar.
Temperature resistant from -30º to +180ºC. (tested and guaranteed)
PTFE withstand temperatures up to +260ºC and disintegrate above +350ºC
into a harmful gas. (temperature not guaranteed by manufacturer strainers).
Body-bonnet-Drain plug Stainless steel 1.4408
Mesh stainless steel 1.4301
Seal PTFE
Mesh DN15-DN50 / 1/2" - 2"
Standard filter 0.50 mm, Fine filter 0.25 mm
Mesh DN65-DN80 / 2.1/2" - 3"
Standard filter 1.00 mm, Fine filter 0.50 mm





Number	Size	DN	PN	L mm	H mm
43A42512	1/2"	15	55	40	42.5
43A42513	3/4"	20	55	40	49
43A42514	1"	25	55	40	57.5
43A42515	1.1/4"	32	55	40	65
43A42516	1.1/2"	40	55	40	74
43A42517	2	50	55	40	85
43A42518	2.1/2"	65	55	40	118
43A42519	3"	80	55	40	128

To order always provide the required mesh size.



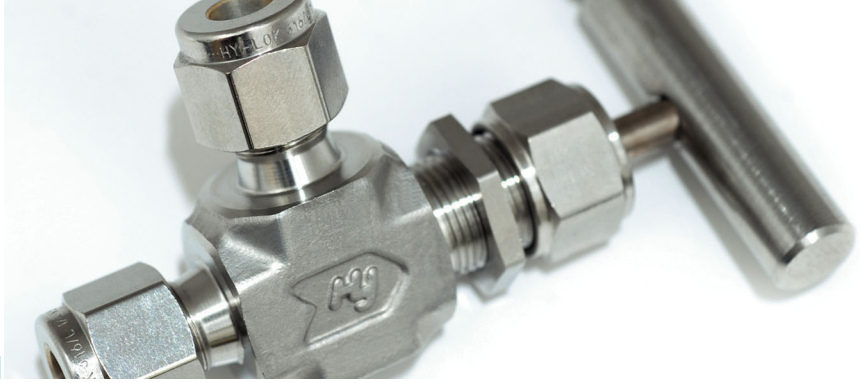






Many other ball valves, check valves and strainers on request availble.

C63-AQU-QIX-002 279 / 917



Integral Bonnet Needle Valves

NV & SV Series



- Pressure up to 6000psig (413bar)
- Temperature up to 600°F (316°C)
- Sizes from 1/8" to 3/4" (3mm-18mm)
- Positive leak tight shut-off
- Metal to metal and soft seat tip
- Straight & Angle pattern body

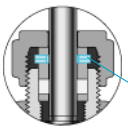
HY-LOK CORPORATION

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Integral Bonnet Needle Valves

Features

Packing Nut
• allows smooth packing adjustment.



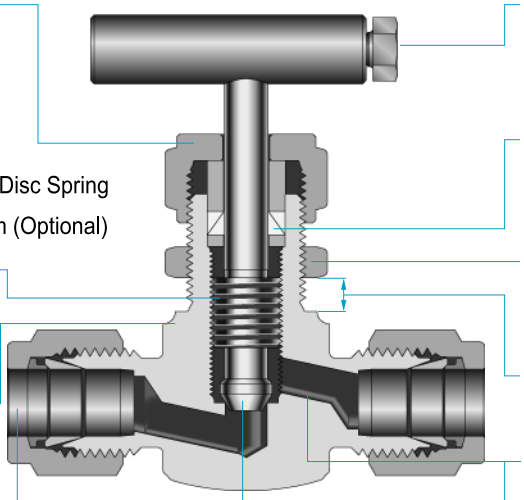
Disc Spring

* Live-Loaded Packing System (Optional)

Stem Threads
• rolled threads provides improved cycle life.

Integral Bonnet
• is available with straight and angle pattern.

Variety of End Connections
• include Hy-Lok tube fittings, male/female NPT threads, male/female ISO threads.



Best Suited Standard Handles
• stainless steel bar handle
• black phenolic round handle

Packing Materials
• are available in PTFE (standard) and PEEK.(option)

Panel Mounting Nut
• allows easy mounting. (NV series standard)
• is optional at SV Series.

Panel Mount Thickness
• 3.2 min. to 6.4 max. (1/8 min. to 1/4 max.)

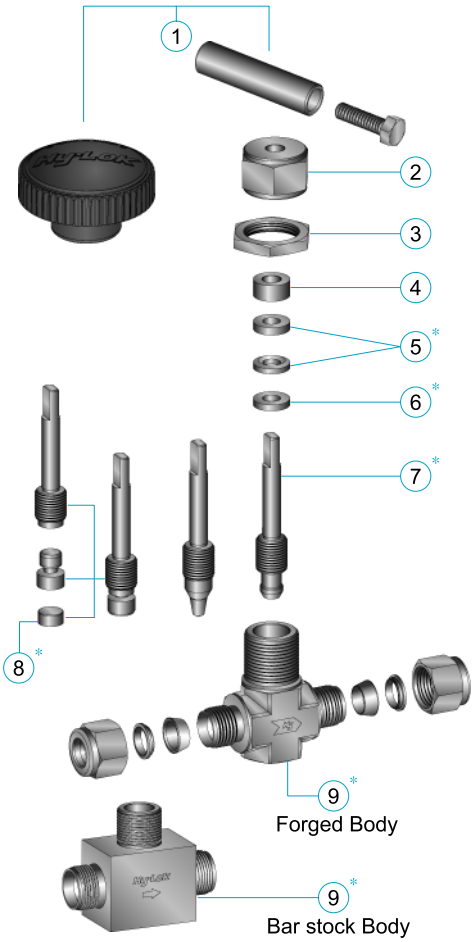
Orifice sizes
• From 0.08 to 0.375 in. (2.0 to 9.5mm)

Flow coefficients (Cv)
• From 0.09 to 1.80

Variety of Stem Tips
• include vee, regulating, and soft seat with PCTFE



Vee Tip | Regulating Tip | Soft Seat Tip



Materials of Construction

Description			Grade / ASTM Specification			
			Valve Body Materials			
			SS 316	Brass	Carbon Steel	Alloy 400
1	Handle		Stainless Steel	Black Phenolic Knob	Aluminum Bar	Stainless Steel
2	Packing Nut		SS316 / A479	C 360 / B16	1020 / A108	Alloy 400 / B164
3	Panel Nut		SS316 / A276		SS316 / A479	Stainless Steel
4	Gland					SS 316 / A479
5	Packing*		PTFE			
6	Packing Washer*		SS316 / A479			Alloy 400 / B164
7	Stem*	Vee	SS316 / A479	C 360 / B16	SS316 / A479	Alloy 400 / B164
		Regulating				
		Soft Seat				
8	Soft Seat Tip*		PCTFE			
9	Body*	NV	SS316 / A182	C 377 / B283	S20C or A105	Alloy 400 / B564
		SV	SS316 / A479	-	-	-

Note : " * "marked are wetted parts.
Panel nut is optional at SV Series.
Soft Seat is only available on NV Series.

Technical Data

Pressure-Temperature Ratings

- PTFE (Standard) used up to 450°F (232°C)
- PEEK (Optional) used up to : 316 Stainless Steel 600°F (316°C) / Alloy 400 500°F (260°C)

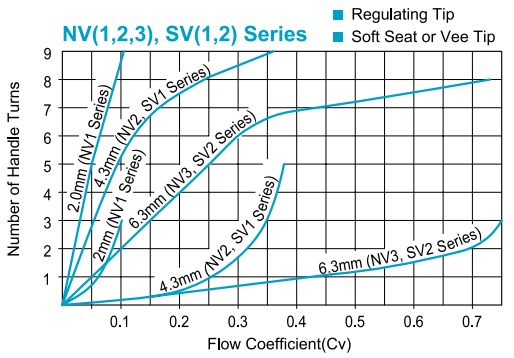
ASME Class	2500	N/A		2500
Material Group	2.2	N/A		3.4
Materials	316 SS	Brass	Carbon Steel	Alloy 400
Temperature	Working Pressure (psig)			
-65°F (-54°C) to -20°F (-29°C)	6000 (413)	3000 (206)	-	5000 (344)
100°F (38°C)	6000 (413)	3000 (206)	6000 (413)	5000 (344)
200°F (93°C)	5160 (355)	2600 (179)	5420 (373)	4380 (301)
300°F (148°C)	4660 (321)	2210 (152)	5320 (366)	4080 (281)
350°F (176°C)	4470 (308)	1470 (101)	5230 (360)	4010 (276)
400°F (204°C)	4280 (295)	740 (51)	-	3940 (271)
450°F (232°C)	4130 (284)	-	-	3940 (271)
500°F (260°C)	3980 (274)	-	-	3940 (271)
600°F (316°C)	3760 (259)	-	-	3940 (271)

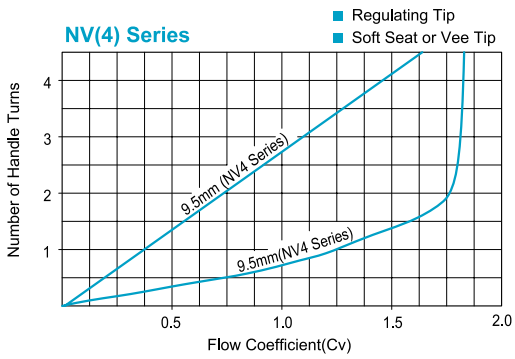
- To determine kPa, multiply psig by 6.89 and bar by 0.0689
- When valves with Hy-Lok Fitting end connections are connected to tubing, the working pressure of tubing must be the considered in the calculation of total system working pressure
- Extreme temperature fluctuations may require packing adjustment

Stem

- Vee & Regulating stem can be used up to 450°F (232°C)
- Vee & Regulating stem in Brass can be used up to 400°F (204°C)
- Soft seat stem with PCTFE stem tip can be used up to 200°F (93°C)
- Carbon steel is rated at a low temperature of -20°F (-29°C)

Flow Data





Handle

- Stainless steel bar is standard on all SS316 and alloy 400 body valves.
- Black phenolic knob is standard for brass body and soft seat stem valves.
- Black aluminum bar handles are basically carbon steel on standard. Other materials are available as an option.

Testing

- Each valve is tested with nitrogen @ 1000psig (69bar) to max leak rate of 0.1SCCM.
- Hydrostatic shell test is performed at 1.5 times the working pressure
- Optional tests are available upon request.

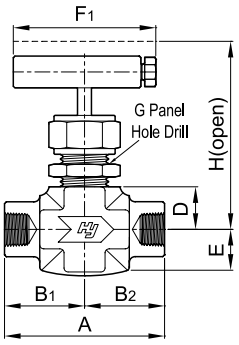
Sour Gas Service

- This service is provided to meet NACE Standard MR-0175 & MR-0103.

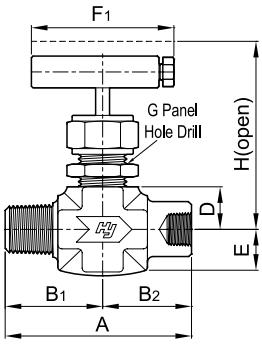
Cleaning and Packaging

- All integral bonnet needle valves are cleaned and packaged in accordance with Hy-Lok standard cleaning and packaging.
- A special cleaning and packaging are available as an option.

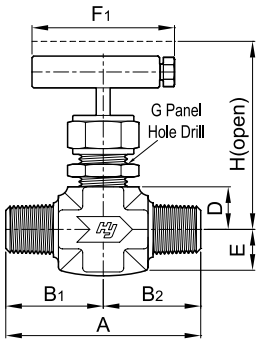
NV Series forged body



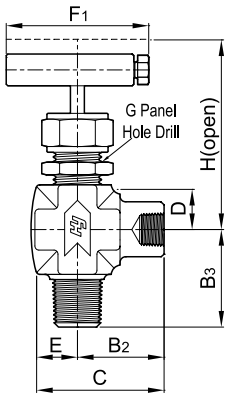
Female



Male/Female



Male

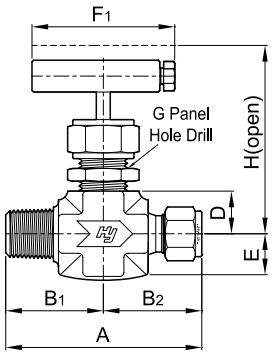


Male/Female Angle Pattern

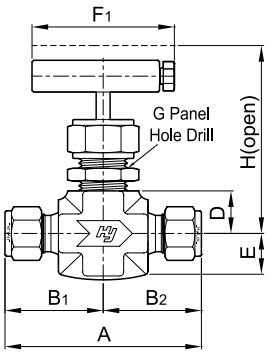
End Connections		Orifice in. (mm)	Cv	Ordering Number	Dimensions in. (mm)										
Inlet & Outlet	Size				A	B1	B2	B3	C	D	E	F1	F2 *	G	H
Female NPT	1/8"	0.08(2.0)	0.09	NV1F-2N	1.65 (42.0)	0.82 (21.0)			1.13 (28.9)	0.44 (11.2)	0.31 (7.9)	1.42 (36.0)	1.00 (25.4)	0.47 (11.9)	1.71 (43.4)
	1/4"	0.17(4.3)	0.37	NV2F-4N	1.96 (50.0)	0.98 (25.0)			1.49 (38.0)	0.50 (12.5)	0.51 (13.0)	1.77 (45.0)	1.50 (38.0)	0.53 (13.5)	2.02 (51.2)
	3/8"	0.25(6.3)	0.73	NV3F-6N	2.20 (56.0)	1.10 (28.0)			1.61 (41.0)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	1/2"	0.37(9.5)	1.80	NV4F-8N	2.99 (76.0)	1.50 (38.0)			2.24 (57.0)	0.75 (19.0)	0.75 (19.0)	2.99 (76.0)	2.60 (66.0)	0.89 (22.5)	3.61 (91.7)
	3/4"	0.37(9.5)	1.80	NV4F-12N	3.66 (93.0)	1.83 (46.5)			2.58 (65.5)						
Female ISO[1]	1/4"	0.17(4.3)	0.37	NV2F-4R	1.96 (50.0)	0.98 (25.0)			1.49 (38.0)	0.43 (11.0)	0.51 (13.0)	1.77 (45.0)	1.50 (38.0)	0.53 (13.5)	2.02 (51.2)
	3/8"	0.25(6.3)	0.73	NV3F-6R	2.20 (56.0)	1.10 (28.0)			1.61 (41.0)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	1/2"	0.37(9.5)	1.80	NV4F-8R	2.99 (76.0)	1.50 (38.0)			2.24 (57.0)	0.75 (19.0)	0.75 (19.0)	2.99 (76.0)	2.60 (66.0)	0.89 (22.5)	3.61 (91.7)
	3/4"	0.37(9.5)	1.80	NV4F-12R	3.66 (93.0)	1.83 (46.5)			2.58 (65.5)						
Male / Female NPT	1/4"	0.25(6.3)	0.73	NV3MF-4N	2.20 (56.0)	1.10 (28.0)			1.61 (41.0)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	1/2"	0.37(9.5)	1.80	NV4MF-8N	2.99 (76.0)	1.50 (38.0)			2.24 (57.0)	0.75 (19.0)	0.75 (19.0)	2.99 (76.0)	2.60 (66.0)	0.89 (22.5)	3.61 (91.7)
Male NPT	1/8"	0.08(2.0)	0.09	NV1M-2N	1.65 (42.0)	0.75 (19.1)			1.06 (26.9)	0.44 (11.2)	0.31 (7.9)	1.42 (36.0)	1.00 (25.4)	0.47 (11.9)	1.71 (43.4)
	1/4"	0.17(4.3)	0.37	NV2M-4N	1.97 (50.0)	0.98 (25.0)			1.33 (33.7)	0.43 (11.0)	0.34 (8.7)	1.77 (45.0)	1.50 (38.0)	0.53 (13.5)	2.02 (51.2)
	3/8"	0.25(6.3)	0.73	NV3M-6N	2.28 (58.0)	1.14 (29.0)			1.65 (42.0)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	1/2"	0.37(9.5)	1.80	NV4M-8N	2.99 (76.0)	1.50 (38.0)			2.24 (57.0)	0.75 (19.0)	0.75 (19.0)	2.99 (76.0)	2.60 (66.0)	0.89 (22.5)	3.61 (91.7)

[1] Ref. Specifications ISO 7/1, BS EN 10226-1, DIN-2999, JIS B0203
Dimensions in inches (millimeters) are for reference only, subject to change
* Dimension of F2 refers to the drawing on page 5.

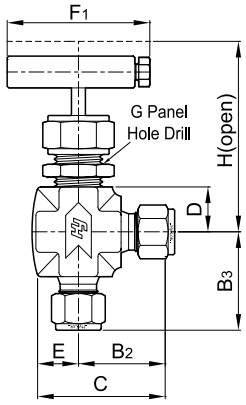
NV Series forged body



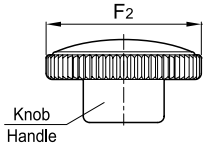
Male Hy-Lok tube fitting



Hy-Lok tube fitting



Hy-Lok tube fitting Angle Pattern

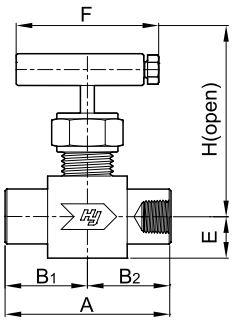


End Connections		Orifice in. (mm)	Cv	Ordering Number	Dimensions in. (mm)										
Inlet & Outlet	Size				A	B1	B2	B3	C	D	E	F1	F2	G	H
Male NPT Hy-Lok tube fittings	1/8"	0.08 (2.0)	0.09	NV1MH-2N2T	1.79 (45.6)	0.75 (19.1)	0.96 (24.6)	0.83 (21.0)	1.29 (32.8)	0.44 (11.2)	0.31 (7.9)	1.42 (36.0)	1.00 (25.4)	0.47 (11.9)	1.71 (43.4)
	1/4"	0.17 (4.3)	0.37	NV2MH-4N4T	2.12 (53.8)	0.98 (25.0)	1.13 (28.8)	0.98 (25.0)	1.65 (41.8)	0.43 (11.0)	0.51 (13.0)	1.77 (45.0)	1.50 (38.0)	0.53 (13.5)	2.02 (51.2)
	1/4" Male NPT 6.0mm Hy-Lok	0.17 (4.3)	0.37	NV2MH-4N6M				0.98 (25.0)	1.35 (34.4)						
	1/4" Male NPT 3/8" Hy-Lok	0.25 (6.3)	0.73	NV3MH-4N6T	2.41 (61.2)	1.10 (28.0)	1.31 (33.2)	1.10 (28.0)	1.82 (46.2)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	3/8"	0.25 (6.3)	0.73	NV3MH-6N6T	2.45 (62.2)	1.14 (29.0)		1.14 (29.0)							
Fractional Hy-Lok tube fittings	1/8"	0.08 (2.0)	0.09	NV1H-2T	1.93 (49.2)	0.96 (24.6)			1.27 (32.5)	0.44 (11.2)	0.31 (7.9)	1.42 (36.0)	1.00 (25.4)	0.47 (11.9)	1.71 (43.4)
	1/4"	0.17 (4.3)	0.37	NV2H-4T	2.27 (57.6)	1.13 (28.8)			1.65 (41.8)	0.43 (11.0)	0.51 (13.0)	1.77 (45.0)	1.50 (38.0)	0.53 (13.5)	2.02 (51.2)
	3/8"	0.25 (6.3)	0.73	NV3H-6T	2.61 (66.4)	1.31 (33.2)			1.82 (46.2)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	1/2"	0.25 (6.3)	0.73	NV3H-8T	2.83 (72.0)	1.42 (36.0)			1.93 (49.0)						
	1/2"	0.37 (9.5)	1.80	NV4H-8T	3.81 (97.0)	1.91 (48.5)			2.66 (67.5)	0.75 (19.0)	0.75 (19.0)	2.99 (76.0)	2.60 (66.0)	0.89 (22.5)	3.61 (91.7)
	3/4"	0.37 (9.5)	1.80	NV4H-12T											
Metric Hy-Lok tube fittings	3mm	0.08 (2.0)	0.09	NV1H-3M	1.93 (49.2)	0.96 (24.6)			1.27 (32.5)	0.44 (11.2)	0.31 (7.9)	1.42 (36.0)	1.00 (25.4)	0.47 (11.9)	1.71 (43.4)
	6mm	0.17 (4.3)	0.37	NV2H-6M	2.27 (57.6)	1.13 (28.8)			1.53 (38.8)	0.43 (11.0)	0.39 (10.0)	1.77 (45.0)	1.50 (38.0)	0.53 (13.5)	2.02 (51.2)
	8mm	0.17 (4.3)	0.37	NV2H-8M	2.33 (59.2)	1.17 (29.6)			1.56 (39.6)						
	10mm	0.25 (6.3)	0.73	NV3H-10M	2.61 (66.4)	1.31 (33.2)			1.82 (46.2)	0.53 (13.5)	0.51 (13.0)	2.52 (64.0)	1.89 (48.0)	0.79 (20.0)	2.50 (63.6)
	12mm	0.25 (6.3)	0.73	NV3H-12M	2.83 (72.0)	1.42 (36.0)			1.93 (49.0)						
	16mm	0.37 (9.5)	1.80	NV4H-16M	3.04 (77.2)	1.52 (38.6)			2.27 (57.6)	0.75 (19.0)	0.75 (19.0)	2.99 (76.0)	2.60 (66.0)	0.89 (22.5)	3.61 (91.7)
	18mm	0.37 (9.5)	1.80	NV4H-18M											

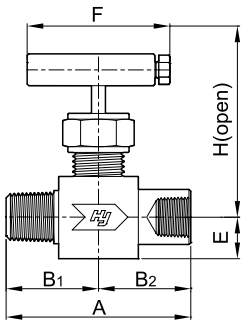
Dimensions in inches (millimeters) are for reference only, subject to change
Dimensions shown with Hy-Lok Nuts in finger-tight position, where applicable

Integral Bonnet Needle Valves

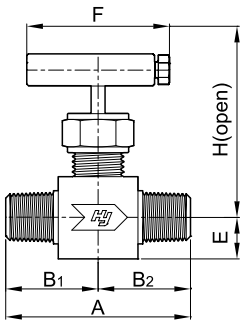
SV Series barstock body



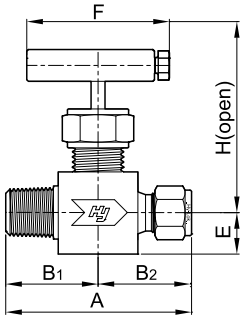
Female



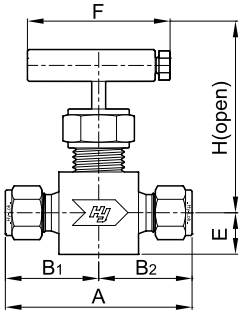
Male / Female



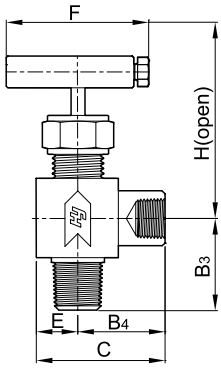
Male



Male
Hy-Lok tube fitting



Hy-Lok tube fitting



Male / Female
Angle Pattern

End Connections		Orifice in. (mm)	Cv	Ordering Number	Dimensions in. (mm)								
Inlet & Outlet	Size				A	B_1	B_2	B_3	B_4	C	E	F	H
Female NPT	1/4"	0.13 (3.2)	0.37	SV1F-4N	1.87 (47.6)	0.94 (23.8)	0.94 (23.8)	1.00 (25.4)	1.00 (25.4)	1.44 (36.5)	0.44 (11.2)	1.77 (45.0)	1.71 (43.5)
	3/8"	0.25 (6.3)	0.73	SV2F-6N	2.50 (63.6)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	1.91 (48.6)	0.66 (16.8)	2.52 (64.0)	2.48 (63.0)
	1/2"	0.25 (6.3)	0.73	SV2F-8N									
Male / Female NPT	1/4"	0.13 (3.2)	0.37	SV1MF-4N	1.91 (48.4)	0.97 (24.6)	0.94 (23.8)	1.03 (26.2)	1.00 (25.4)	1.44 (36.5)	0.44 (11.2)	1.77 (45.0)	1.71 (43.5)
	3/8"	0.25 (6.3)	0.73	SV2MF-6N	2.50 (63.6)	1.25 (31.8)	1.25 (31.8)	1.22 (31.0)	1.25 (31.8)	1.91 (48.6)	0.66 (16.8)	2.52 (64.0)	2.48 (63.0)
	1/2"	0.25 (6.3)	0.73	SV2MF-8N				1.41 (35.8)					
Male NPT	1/4"	0.13 (3.2)	0.37	SV1M-4N	1.87 (49.2)	0.97 (24.6)	0.97 (24.6)	0.99 (25.2)	0.97 (24.6)	1.41 (35.8)	0.44 (11.2)	1.77 (45.0)	1.71 (43.5)
Male NPT/ Hy-Lok tube fittings	1/4" Male NPT 1/4" Hy-Lok	0.13 (3.2)	0.37	SV1MH-4N4T	2.20 (55.8)	0.97 (24.6)	1.23 (31.2)	0.99 (25.2)	1.13 (28.7)	1.57 (39.8)	0.44 (11.2)	1.77 (45.0)	1.71 (43.5)
Hy-LoK tube fittings	1/4"	0.13 (3.2)	0.37	SV1H-4T	2.46 (62.4)	1.23 (31.2)	1.23 (31.2)	1.17 (29.7)	1.13 (28.7)	1.57 (39.8)	0.44 (11.2)	1.77 (45.0)	1.71 (43.5)
	3/8"	0.25 (6.3)	0.73	SV2H-6T	3.08 (78.2)	1.54 (39.1)	1.54 (39.1)	1.25 (31.8)	1.25 (31.8)	1.91 (48.6)	0.66 (16.8)	2.52 (64.0)	2.48 (63.0)
	1/2"	0.25 (6.3)	0.73	SV2H-8T	3.30 (83.8)	1.65 (41.9)	1.65 (41.9)	-	-	-			

Dimensions in inches (millimeters) are for reference only, subject to change
Dimensions shown with Hy-Lok Nuts in finger-tight position, where applicable

Ordering Information

NV3 | F | A† | 6N | S† | PK† | K† | FE† | SOG† | S316

Series Designator
- NV* : NV Series
- SV* : SV Series

Body Pattern Designator
- Nil : Straight Pattern (Standard)
- A : Angle Pattern

Size Designator

Stem Packing Designator
- Nil : PTFE (Standard)
- PK : PEEK

Sour Gas Service
- Nil : without (Standard)
- SOG : NACE MR-01-75

End Connector Designator
- F : Both Ends Female Pipe Thread
- M : Both Ends Male Pipe Thread
- H : Both Ends Hy-Lok Tube Fitting
- MF : Male Pipe Thread and Female Pipe Thread
- MH : Male Pipe Thread and Hy-Lok Tube Fitting

Stem Tip Designator
- Nil : Vee (Standard)
- R : Regulating
- S : Soft Seat with PCTFE

Material Designator
- S316 : 316 Stainless Steel
- BRAS : Brass
- STEL : Carbon Steel
- MONE : Alloy 400 (Monel)

- Nil : without (Standard)
- FE : Live Loaded System

Handle Designator
- Nil : Stainless Steel Bar (Standard)
- K : Black Phenolic Knob
  Available only with Soft Seat Tip

Pipe Thread Designation NPT (ISO / BSP)

Nom. Size	1/8"	1/4"	3/8"	1/2"	3/4"
Designator	2N(R)	4N(R)	6N(R)	8N(R)	12N(R)

Tube O.D. Designation

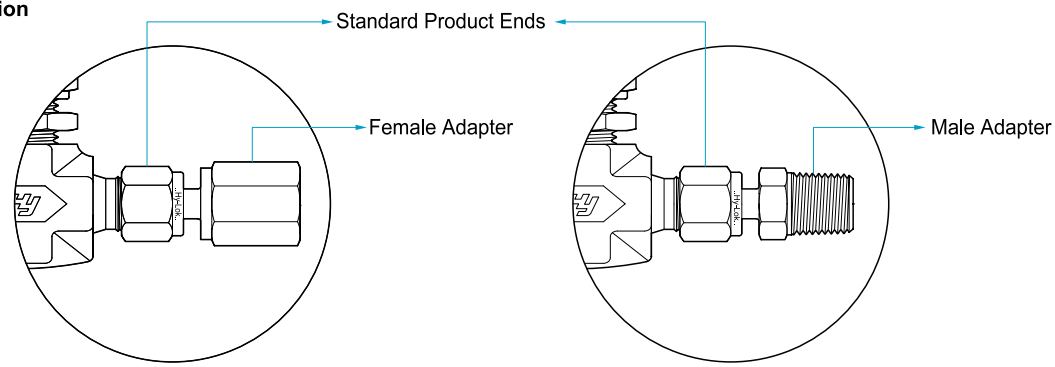
Inch Tube	Tube O.D.	1/8"	1/4"	3/8"	1/2"	3/4"
	Designation	2T	4T	6T	8T	12T
Metric Tube	Tube O.D.	3mm	6mm	10mm	12mm	18mm
	Designation	3M	6M	10M	12M	18M

Note †: No designator is required for standard
e.g. NV3F-6N-S316

Use of Non-Standard Products

For non-standard not shown in dimension table, it can be used by assembling Hy-Lok tube fittings to standard products.
This use of way is easily available to the construction of system, especially it is more reasonable in aspects of delivery and purchasing costs. For the more information and types of connector, please refer to the Hy-Lok Tube Fitting Catalog.

Example of Connection



Note :This figure is only for reference, please refer to Hy-Lok tube fittings catalog for varios connection.



SAFETY in VALVE SELECTION

Proper installation, materials compatibility, operation and maintenance of these valves are the responsibility of the user. The total system design must be taken into consideration to ensure optimal performance and safety

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contact your authorized Hy-Lok representative.
Catalog No, H-100NV Jul. 2017

Filter Elements
Disposable Grades & Dimensions

All disposable filter elements have a part number arranged in three sections, for example 25.64.7K

The first part refers to the inside diameter of the element in millimetres, the second figure refers to the overall length in millimetres and the third part is the designation for the grade and binder.

Standard Sizes

Filter Elements are available inn a wide range of standard diameters and lengths. These are based on traditional industry standard sizes and allow the elements to be installed in other proprietary equipment.

12.32.☐ 12.57.☐ 25.64.☐ 25.127.☐ 25.178.☐ 38.58.☐ 38.152.☐ 45.127.☐ 51.230.☐ 51.89.☐ 51.476.☐ 63.762.☐

Replace the ☐ in the part numbers shown with the grade selected from the tables below. More information about the binder types can be found on page CF/2.0/021.

Efficiency

Each filter element type is available in a selection of grades covering a efficiency range from coarse bulk contamination removal and the essentially complete removal of submicron particles.

The standard grades are shown in the tables below.

Particulate Applications - Gas								
% Removal of 0.1 micron particles								
Binder		**Max. Temp.**	**+99.99998%**	**+99.9999%**	**+99.99%**	**+99.5%**	**+95%**	**+75%**
E	Epoxy Ester	150ºC	3E	4E	5E	6E	7E	8E
K	PVDF Flourocarbon	150ºC	3K	4K	5K	6K	7K	8K
S	Silica Inorganic	500ºC	3S	4S	5S	6S	7S	8S
L	Silicone	200ºC		4L		6L		

Coalescing Applications - Gas						
% Removal of 0.1 micron particles & aerosols						
Binder		**Max. Temp.**	**+99.99%**	**+99.5%**	**+95%**	**+75%**
CE	Epoxy Ester	150ºC	5CE	6CE	7CE	8CE
CK	PVDF Flourocarbon	150ºC	5CK	6CK	7CK	8CK
CR	PVDF Flourocarbon	150ºC	5CR	6CR	7CR	8CR
CS	Silica Inorganic	500ºC	5CS	6CS	7CS	8CS
W	Silicone	200ºC	5W	6W	7W	8W

Particulate Applications - Liquid								
+98% Removal of particles at stated size								
Binder		**Max. Temp.**	**0.3 µm**	**1 µm**	**2 µm**	**8 µm**	**25 µm**	**75 µm**
E	Epoxy Ester	150ºC	3E	4E	5E	6E	7E	8E
K	PVDF Flourocarbon	150ºC	3K	4K	5K	6K	7K	8K
S	Silica Inorganic	500ºC	3S	4S	5S	6S	7S	8S

Special Sizes

Special size filter elements can also be manufactured in a wide range of different diameters and lengths.

Inside Diameters - 7mm to 150mm

Lengths - 9mm to 1000mm

Please enquire with any specific requirements.

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SS425 & SHS425
Filter Housing

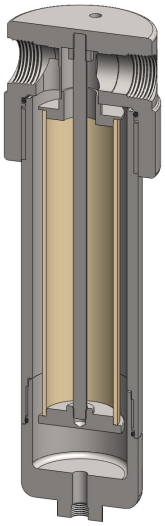
Materials 316L Stainless Steel
Pressure 1500 psi
Ports 1” to 2"
Element 51.230.☐

SS425 series filter housings are specified for 1" line size applications up to 1500 psi. The SHS425 series are for 1&1/2" and 2" applications and are designed to have a full bore flow path to give higher flow rates. For applications over 1500 psi high pressure versions are available, see the SS426 and SS428 filter housings.

Standard housings have NPT ports and Viton seals. Other seal types are available as an option. BSPT and BSPP port types are also available.

The housings are free from welds and comply with NACE MR-01-75 and are CE marked in accordance with PED 97/23/EC.

These housings can also be supplied in a wide range of exotic materials, such as Hastelloy, Monel, Titanium etc.





Technical Specifications

Housing Model	SS425.621	SS425.641	SHS425.721	SHS425.741	SHS425.821	SHS425.841
Port Size	1" NPT	1" NPT	1&1/2" NPT	1&1/2" NPT	2" NPT	2" NPT
Drain	1/4" NPT	1/2" NPT	1/4" NPT	1/2" NPT	1/4" NPT	1/2" NPT
Maximum Pressure, psi (1)	1500	1500	1500	1500	1500	1500
Maximum Temperature, ºF (2)	390	390	390	390	390	390
Materials of Construction (3)						
Head, Bowl & Internals	316L SS	316L SS	316L SS	316L SS	316L SS	316L SS
Seal (4)	Viton	Viton	Viton	Viton	Viton	Viton
Filter Element Code (5)	51.230.☐	51.230.☐	51.230.☐	51.230.☐	51.230.☐	51.230.☐
Adsorber Cartridge Code (6)	51.230.AD☐	51.230.AD☐	51.230.AD☐	51.230.AD☐	51.230.AD☐	51.230.AD☐
Principle Dimensions in inches						
Diameter	4.35	4.35	7.10	7.10	7.10	7.10
Height	15.30	15.30	15.60	15.60	16.00	16.00
Volume, cc	1350	1350	1550	1550	1550	1550
Weight, lbs	33.00	33.00	53.90	53.90	60.50	60.50
Accessories						
Support Core	SCSS42	SCSS42	SCSS42	SCSS42	SCSS42	SCSS42
Mounting Bracket	MBSS42	MBSS42	MBSHS42	MBSHS42	MBSHS42	MBSHS42

Notes

(1) Above 390ºF the pressure rating is reduced, consult us for the exact rating at any specific temperature

(2) Maximum temperature 390ºF using standard seal. For temperatures up to 615ºF use a Chemraz seal

(3) Material abbreviations, 316L SS = 316L Stainless Steel

(4) Add suffix for other seal types, Chemraz = .C, Nitrile = N, Kalrez = .K, EPDM = .E, Silicone = .S, (e.g. SS425.621.N)

(5) Replace the ☐ with the grade required, e.g. 51.230.5CK, 51.230.S20V, 51.230.T20

(6) Replace the ☐ with the type required, e.g. 51.230.AD01

Contact Us

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CERTIFICATO
CERTIFICATE

(di conformità) / (of conformity)

Conformità basata sulla garanzia totale di qualità
Conformity based on full quality assurance

In accordo alla direttiva 2014/68/UE / according to directive 2014/68/EU

Certificato-Nr. / Certificate No.: H – 2021/L/1153

Nome ed Indirizzo del Fabbricante
Name and address of bearer/ manufacturer:

Classic Filters Limited
16 Sextant Park, Neptune Close,
Rochester, Kent, ME2 4LU (England)

Si certifica che il fabbricante ha istituito un sistema di qualità per la fabbricazione, progettazione e prove di attrezzature a pressione in accordo alla direttiva 2014/68/UE. Il costruttore è autorizzato a contrassegnare le attrezzature a pressione prodotte all'interno della gamma di sistema di qualità con il seguente marchio:
We hereby certify that the manufacturer has established a quality system for the manufacturing, design and testing of pressure equipment according to directive 2014/68/EU. The manufacturer is entitled to mark the pressure equipment produced within the range of the quality system with the following mark:

CE 2580

Verificato in accordo alla dir. 2014/68/UE *Tested according to dir. 2014/68/EU*	**Conformità basata sulla garanzia totale di qualità (Modulo H)** **Conformity based on full quality assurance *(module H)***
Rapporto Nr. / Test No.:	**921/P/2021/L/1303; 921/P/2021/L/1303 Supplement 1**
Gamma di prodotti: / Range of product.:	**Progettazione, fabbricazione, ispezione, prova e fornitura di filtri realizzati in acciaio inossidabile 316L senza saldatura e classificati come categoria di rischio II e III *I Design, manufacture, inspection, testing and supply of Filter Housings manufactured from grade 316L stainless steels without welding and classified as hazard category II and III* (dettagli in Allegato 1 *I details in Annex 1*)**
Luogo di Produzione Place of manufacture:	**Classic Filters Ltd - 16 Sextant Park, Neptune Close, Rochester, Kent, ME2 4LU (England)**

lì /Luogo
Date/ Place

03/08/2021, Cerro Maggiore

Prima emissione *First issue*	03/08/2021
Emissione corrente *Current issue*	03/08/2021
Scadenza *Expiry*	02/08/2024

notified body TÜV NORD 2580 TÜV NORD Italia S.r.l.

TÜV NORD Italia S.r.l.
Organismo di Certificazione

Porelli, Ing. Stefano
Organismo Notificato / Notified Body, 2580

TÜV NORD Italia S.r.l.
Sede legale e operativa Cerro Maggiore
Via Filippo Turati, 70 20023 CERRO MAGGIORE (MI),
Phone: +39 0331 541488, Fax: +39 0331 478854 E-Mail: info@tuev-nord.it

Organismo Notificato per la direttiva sugli apparecchi a pressione (2014/68/UE)
Notified Body for Pressure Equipment Directive (2014/68/EU)

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 224 B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

Il presente certificato può essere pubblicato solo in forma integrale.
Estratti o modifiche richiedono il previo consenso di TÜV NORD Italia S.r.l.
This Certificate may be issued only in integral form.
Extracts or alterations require the prior consent of TÜV NORD Italia S.r.l.

ATEX Directive (2014/34/EU) Declaration

Equipment Intended for Use in Potentially Explosive Atmospheres (ATEX)

Product Group	Series	Category
Filters Housings	SS325, SiS325, SS326, SiS326	for Zone 1, 21
Filters Housings	SS337, S328, SIS328, SG421	for Zone 1, 21
Filters Housings	SS424, SS425, SHS425, SS426	for Zone 1, 21
Filters Housings	SHS426, SS428, SHS428, SS434	for Zone 1, 21
Filters Housings	SS435, SHS435, SS436, SHS436	for Zone 1, 21
Filters Housings	SS438, SHS438	for Zone 1, 21

This declaration is issued following Ignition Hazard Assessments performed on the non-electrical products listed above in accordance with the requirements of EN 13463-1:2009 and it is considered that the products do not contain any source of ignition and therefore not within the scope of directive 2014/34/EU.

The products can be used in a Group II Category 2 environment assuming that ATEX directive is complied with, the equipment is installed by qualified personnel and they are mounted in an area where impact cannot occur.

Directive 2014/34/EU provides for the first time harmonised requirements for non-electrical equipment, equipment intended for use in environments which are potentially explosive due to dust hazards and protective systems. Safety devices intended for use outside explosive atmospheres which are required for or contribute to the safe functioning of equipment or protective systems with respect to risks of explosion are also included. This is an increase in scope compared to former national regulations for equipment and systems intended for use in potentially explosive atmospheres.

The manufacturer, his authorised representative or the person who first places a product on the EU market or puts a product into service in the EU market has to decide whether it is covered by the Directive 2014/34/EU and, if so, apply its provisions. The manufacturer must therefore make an ATEX analysis on the basis of Directive 2014/34/EU.

Directive 2014/34/EU also covers equipment not included the scope. In general, many simple mechanical products do not fall under the scope of Directive 2014/34/EU as they do not have their own source of ignition (see chapter 3.7.3 of the directive for more information about this).

Approved by -

Ian Bovington
Managing Director

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DURGO



SAFETY VALVES

THE TRUSTED LINK

SINCE 1921

DURGO SAFETY VALVES

Durgo safety valves have a unique design and functionality. The safety valves we produce today are still based on our patented 1930s design of a compression spring in a dry spring housing. Strict requirements on material standards and manufacturing precision, assembly and testing are the key elements in producing a good reliable safety valve.

We use state-of-the-art machinery and testing equipment in combination with solid craftsmanship to make safety valves of the highest capacity and precision, safety valves that open at the set pressure to prevent injury and costly damage to property.

Durgo safety valves can be used on pressurised systems with cold and hot water, air, oils and other media, and as overflow valves in pressurised systems or pumping plants.

Durgo safety valves have a high blow-off capacity and precise opening and shutting pressure. All our safety valves have a dry spring housing and a Teflon®-coated cone to prevent adhesion and ensure a high level of reliability. The safety valve's opening pressure is set according to the customer's request adapted to existing installation and pressure level. After individual testing in calibrated test rig, the valve is sealed and marked with its set pressure and unique serial number.

Durgo's safety valves are CE labelled and classed as category 4 valves in compliance with AFS 2016:1; Pressure Equipment Directive (PED 2014/68/EU). A declaration of conformity is enclosed with all safety valves.



Durgo Safety Valve 4155 / Overflow Valve 4156 in brass

Durgo safety valve 4155 and overflow valve 4156, in brass. The valves operate progressively and can be used in installations with e.g. air, water or oil. The valve housing, nipple and cone are in dezincification resistant brass with seal material of fluorinated rubber (FPM/FKM) or EPDM.



- Connection (Inlet/Outlet) 15/20, 20/25, 25/32, 32/40, 40/50 and 50/65, male thread (ISO-G)
- Set pressure 0.05 – 2.0 MPa for DN15-25 and 0,05-1,6 MPa for DN32-50. Can be ordered with optional set pressure within the given interval.
- Temperature range -30°C to +125°C.

Blow-off capacity without discharge pipe. Litres of cold water per minute at a 10% pressure increase.

SET PRESSURE	CAPACITY (ART. NO.**)					
MPa*	DN15	DN20	DN25	DN32	DN40	DN50
0.10	20 (500 22 66)	47 (500 25 63)	68 (500 28 60)	133 (500 31 65)	210 (500 08 15)	250 (500 10 11)
0.20	28 (500 20 19)	67 (500 23 16)	92 (500 26 13)	150 (500 29 10)	250 (500 08 31)	290 (500 10 37)
0.30	33 (500 20 35)	83 (500 23 32)	113 (500 26 39)	180 (500 29 36)	300 (500 08 49)	456 (500 10 45)
0.40	35 (500 20 50)	95 (500 23 57)	131 (500 26 54)	215 (500 29 51)	480 (500 08 56)	600 (500 10 52)
0.50	40 (500 20 76)	107 (500 23 73)	147 (500 26 70)	260 (500 29 77)	610 (500 08 64)	750 (500 10 60)
0.60	43 (500 20 92)	117 (500 23 99)	161 (500 26 96)	280 (500 29 93)	650 (500 08 72)	800 (500 10 78)
0.70	47 (500 21 18)	126 (500 24 15)	174 (500 27 12)	295 (500 30 17)	690 (500 08 80)	865 (500 10 86)
0.80	50 (500 21 34)	135 (500 24 31)	186 (500 27 38)	320 (500 30 33)	710 (500 09 06)	(500 11 02)
0.90	55 (500 21 59)	144 (500 24 56)	196 (500 27 53)	360 (500 30 58)	(500 09 22)	(500 11 28)
1.00	60 (500 21 75)	152 (500 24 72)	208 (500 27 79)	(500 30 74)	(500 09 48)	(500 11 44)
1.20	62 (500 22 17)	166 (500 25 14)	229 (500 28 11)	(500 31 16)	(500 09 63)	(500 11 69)
1.40	66 (500 22 25)	180 (500 25 22)	247 (500 28 29)	(500 31 24)	(500 09 71)	(500 11 77)
1.60	70 (500 22 33)	190 (500 25 30)	260 (500 28 37)	(500 31 32)	(500 09 89)	(500 11 85)

*Opening pressure 0.05–2.0 MPa. Can be ordered with optional opening pressure within the given intervals.
**ART. NO. refers to valve with seal material of fluorinated rubber (FPM/FKM).

CONNECTION		PRESSURE RANGES	HEIGHT
Inlet DN (Male ISO G)	Outlet DN (Male ISO G)	(MPa)	(pressure range dependent) (mm)
15	20	0.05–2.00	145 – 190
20	25	0.05–2.00	145 – 190
25	32	0.00–2.00	150 – 195
32	40	0.05–2.00	180 – 225
40	50	0.05–1.60	255
50	65	0.05–1.60	255

Durgo Safety Valve 4165 / Overflow Valve 4166 in stainless steel

Durgo safety valve 4165 and overflow valve 4166, in non-corrosive stainless steel. The valves operate progressively and can be used in installations with e.g. air, water, oil, and other aggressive media. The valve housing, nipple and cone are in non-corrosive steel with seal material in fluorinated rubber (FPM/FKM) or EPDM, alternatively perfluor rubber (ISOLAST®).



- Connection (Inlet/Outlet) 15/25, 20/25, 25/32, 32/40, 40/50 and 50/65, male thread (ISO-G)
- Opening pressure 0.05 – 2.2 MPa. Can be ordered with optional opening pressure within the given intervals.
- Temperature range
  - EPDM: -30°C to +180°C
  - Fluorinated rubber: -30°C to +200°C, (water max. +125°C)
  - Perfluor rubber: -25°C to +220°C

Blow-off capacity without discharge pipe. Litres of cold water per minute at a 10% pressure increase.

SET PRESSURE	CAPACITY (ART. NO.**)					
MPa*	DN15	DN20	DN25	DN32	DN40	DN50
0.10	20 (5004011)	47 (5004029)	68 (5004047)	133 (5004065)	210 (5004083)	250 (5004101)
0.20	28 (5004012)	67 (5004030)	92 (5004048)	150 (5004066)	250 (5004084)	290 (5004102)
0.30	33 (5004013)	83 (5004031)	113 (5004049)	180 (5004067)	300 (5004085)	46 (5004103)
0.40	35 (5004014)	95 (5004032)	131 (5004050)	215 (5004068)	480 (5004086)	600 (5004104)
0.50	40 (5004015)	107 (5004033)	147 (5004051)	260 (5004069)	610 (5004087)	750 (5004105)
0.60	43 (5004016)	117 (5004034)	161 (5004052)	280 (5004070)	650 (5004088)	800 (5004106)
0.70	47 (5004017)	126 (5004035)	174 (5004053)	295 (5004071)	690 (5004089)	865 (5004107)
0.80	50 (5004019)	135 (5004037)	186 (5004055)	320 (5004073)	710 (5004091)	(5004109)
0.90	55 (5004021)	144 (5004039)	196 (5004057)	360 (5004075)	(5004093)	(5004111)
1.00	60 (5004023)	152 (5004041)	208 (5004059)	(5004071)	(5004095)	(5004113)
1.20	62 (5004025)	166 (5004043)	229 (5004061)	(5004079)	(5004097)	(5004115)
1.40	66 (5004026)	180 (5004044)	247 (5004062)	(5004080)	(5004098)	(5004116)
1.60	70 (5004027)	190 (5004045)	260 (5004063)	(5004081)	(5004099)	(5004117)

*Opening pressure 0.05 – 2.2 MPa. Can be ordered with optional opening pressure within the given intervals.
**ART. NO. refers to valve with seal material of fluorinated rubber (FPM/FKM).

CONNECTION		PRESSURE RANGES	HEIGHT
Inlet DN (Male ISO G)	Outlet DN (Male ISO G)	(MPa)	(pressure range dependent) (mm)
15	25	0.05 – 2.20	145 – 190
20	25	0.05 – 2.20	145 – 190
25	32	0.00 – 2.20	150 – 195
32	40	0.05 – 2.20	170 – 220
40	50	0.05 – 1.20	255
50	65	0.05 – 1.20	255

Durgo GT-77 – Safety Valve in brass

Durgo safety valve GT-77 in brass The valves are progressive and can be used in installations with e.g. water and oil. The valve housing, nipple and cone are in dezincification resistant brass with seal material of fluorinated rubber (FPM/FKM).

- Connection (Inlet/Outlet)
  - 15/22, 20/22, inlet male thread (ISO-G), outlet compression fitting.
  - 15/20, 20/20, inlet and outlet male thread (ISO-G).
- Opening pressure 0.1 – 1.0 MPa. Can be ordered with optional opening pressure within the given intervals.
- Temperature range -30°C to +125°C.



Blow-off capacity without discharge pipe. Litres of cold water per minute at a 10% pressure increase.

SET PRESSURE MPa*	CAPACITY (ART. NO.)	
	Connection 15/22	Connection 20/22
0.10	16 (5001219)	34 (5001342)
0.20	18 (5001235)	60 (5001367)
0.30	22 (5001243)	69 (5001375)
0.40	30 (5001805)	72 (5001383)
0.50	47 (5001813)	83 (5001391)
0.60	50 (5001821)	98 (5001979)
0.70	64 (5001862)	102 (5001904)
0.80	60 (5001839)	115 (5001920)
0.90	75 (5001847)	120 (5001946)
1.00	80 (5001854)	125 (5001953)

*Opening pressure 0.1–1.0 MPa. Can be ordered with optional opening pressure within the given intervals.

CONNECTION		PRESSURE RANGES	HEIGHT
Inlet DN (Male ISO-G)	Outlet Compress fitting.	(MPa)	(mm)
15	Dy22*	0.1 – 1.00	90
20	Dy22*	0.1 – 1.00	100

*Also available with outlet DN20 male thread (ISO-G), add R after article number.

C63-AQU-QIX-002 298 / 917

DURGO

THE TRUSTED LINK

SINCE 1921

DURGO – TOP QUALITY RIGHT DOWN TO THE FINEST DETAIL

Because Durgo's products are vital parts of a larger system, we always strive to be the strongest link in the chain. As we have done since 1921. Our craftsmanship tradition is close to our hearts, but only in combination with modern technology can we guarantee compliance with the highest demands on safety and quality.
That is the secret behind the renowned Durgo quality.

DURGO AB
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RÅSUNDAVÄGEN 25, SE-169 67 SOLNA, SWEDEN
PHONE +46 8 730 5280, FAX +46 8 735 6955
SALES@DURGO.SE
WWW.DURGO.SE

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Durgo Säkerhetsventil 4155 / Överströmningsventil 4156 i mässing

Durgo säkerhetsventil typ 4155 och överströmningsventil typ 4156 i mässing. Ventilerna arbetar progressivt, är mjukstängande och kan användas i anläggningar med bland annat luft, vatten eller olja. Ventilhus, nippel och kägla i avzinkningshärdig mässing, packningsmaterial i fluorgummi (FPM/FKM) alternativt EPDM.



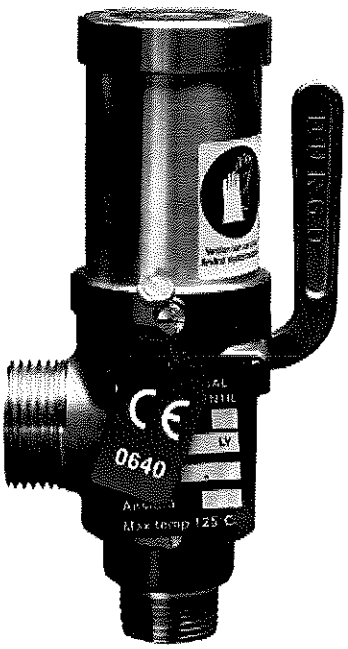
- Anslutning (Inlopp/Utlopp) 15/20, 20/25, 25/32, 32/40, 40/50 och 50/65, utvändig gänga (ISO-G)
- Öppningstryck 0,05 – 2,0 MPa för DN15-25 och 0,05-1,6 MPa för DN32-50. Kan beställas med valfritt öppningstryck inom intervallet.
- Temperaturområde -30°C till +125°C.

Avblåsningskapacitet utan spillvattenrör. Liter kallvatten per minut vid 10 % tryckökning.

ÖPPN.TRYCK MPa*	KAPACITET (RSK NR.**)					
	DN15	DN20	DN25	DN32	DN40	DN50
0,10	20 (500 22 66)	47 (500 25 63)	68 (500 28 60)	133 (500 31 65)	210 (500 08 15)	250 (500 10 11)
0,20	28 (500 20 19)	67 (500 23 16)	92 (500 26 13)	150 (500 29 10)	250 (500 08 31)	290 (500 10 37)
0,30	33 (500 20 35)	83 (500 23 32)	113 (500 26 39)	180 (500 29 36)	300 (500 08 49)	456 (500 10 45)
0,40	35 (500 20 50)	95 (500 23 57)	131 (500 26 54)	215 (500 29 51)	480 (500 08 56)	600 (500 10 52)
0,50	40 (500 20 76)	107 (500 23 73)	147 (500 26 70)	260 (500 29 77)	610 (500 08 64)	750 (500 10 60)
0,60	43 (500 20 92)	117 (500 23 99)	161 (500 26 96)	280 (500 29 93)	650 (500 08 72)	800 (500 10 78)
0,70	47 (500 21 18)	126 (500 24 15)	174 (500 27 12)	295 (500 30 17)	690 (500 08 80)	865 (500 10 86)
0,80	50 (500 21 34)	135 (500 24 31)	186 (500 27 38)	320 (500 30 33)	710 (500 09 06)	(500 11 02)
0,90	55 (500 21 59)	144 (500 24 56)	196 (500 27 53)	360 (500 30 58)	(500 09 22)	(500 11 28)
1,00	60 (500 21 75)	152 (500 24 72)	208 (500 27 79)	(500 30 74)	(500 09 48)	(500 11 44)
1,20	62 (500 22 17)	166 (500 25 14)	229 (500 28 11)	(500 31 16)	(500 09 63)	(500 11 69)
1,40	66 (500 22 25)	180 (500 25 22)	247 (500 28 29)	(500 31 24)	(500 09 71)	(500 11 77)
1,60	70 (500 22 33)	190 (500 25 30)	260 (500 28 37)	(500 31 32)	(500 09 89)	(500 11 85)

*Öppningstryck 0,05 – 2,0 MPa. Kan beställas med valfritt öppningstryck inom intervallet.
**RSK NR gäller standardutförande med packningsmaterial i fluorgummi (FPM/FKM).

ANSLUTNING		TRYCKOMRÅDEN	BYGGHÖJD
Inlopp DN (Utv. ISO G)	Utlopp DN (Utv. ISO G)	(MPa)	(tryckområdesberoende) (mm)
15	20	0,05 – 2,00	145 – 190
20	25	0,05 – 2,00	145 – 190
25	32	0,00 – 2,00	150 – 195
32	40	0,05 – 2,00	180 – 225
40	50	0,05 – 1,60	255
50	65	0,05 – 1,60	255



Safety Valve Durgo SV55 (4155) DN25 Set pressure 6.0 bar (0.60 MPa)

Durgo Safety Valve, or Pressure Relief Valve, type SV55 (4155) operates progressively and can be used in pressurised systems with cold and hot water, air, oils and other media. The valve housing, nipple and cone are in dezincification resistant brass with seal material of fluorinated rubber (FPM/FKM) or EPDM. Durgo Safety Valves are Class 4 categorized and CE labelled in accordance with the Pressure Equipment Directive (PED 2014/68/EU).

Model	SV55 (4155)
Article Number	SV-55-G25/G32-0600
RSK No	5002696
GTIN-13	7392948506038
Connection	G25 / G32
Connection type	Threaded external/external (ISO-G)
Set Pressure	6.0 bar(g)
Temperature range	-30°C to +125°C
Type	Progressive, soft sealing
Material	Brass / FKM seal
Function	Pressure relief valve
Approval / standard	Approved PED 2014/68/EU Class 4
Operation and Care Manual	OCM-SV-55-FKM_EN-2020-r1
Product brochure	Brochure SV Eng
Height	192 mm
Net weight	1.5 kg
Drawing (External dimensions)	SV55 DN25_32 Dimension drawing
Customs Stat No	81814090
REACH - info ENG	The valve is made of brass with more than 0.1% by weight of lead; CAS No. 7439-92-1 a substance listed on the EC Candidate List of Substances of Very High Concern, SVHC
REACH - dok ENG	REACH info Durgo 2020-06-15_1 EN

EU-DECLARATION OF CONFORMITY

DURGO PRESSURE RELIEF VALVE TYPE SV-55 (4155),
DN15/20, DN20/25, DN25/32, DN32/40, DN40/50, DN50/65
BRASS, WITH FKM (FLUOROCARBON RUBBER) WASHER

The manufacturer, AB Durgo, hereby certifies that the pressure relief valve complies with the basic safety requirements of the pressure equipment directive 2014/68/EU, converted to Swedish regulations as AFS 2016:1, Pressure containing devices.



Manufacture has taken place through module combination B + D.

The following standards are fully or partly complied with:

SS-EN 12165-CW602N, SS-EN 12164-CW602N, ISO 4126-1, SS-EN 10204, SS-EN 1655

EC type approval certificate:	K1204735
Modul D certificate:	K1902534

This EU Declaration of Conformity has been issued on the sole responsibility of the manufacturer.

Solna 15 January 2020

Hans Hansson
Engineering manager

Manufacturer:
AB Durgo
Box 3021
SE-169 03 SOLNA

Notified body:
DEKRA Industrial AB
Id.nr. 0640
P.O. Box 1357
SE-171 26 SOLNA

AB Durgo
P.O Box 3021
SE-169 03 SOLNA
SWEDEN

Phone: +46 8 730 52 80
e-mail: sales@durgo.se
www.durgo.se

OPERATION AND CARE MANUAL

DURGO PRESSURE RELIEF VALVE TYPE SV-55 (4155) DN15/20, DN20/25, DN25/32, DN32/40, DN40/50, DN50/65 BRASS, WITH FKM (FLUOROCARBON RUBBER) WASHER

The Durgo pressure relief valve (PRV) type SV-55 (4155) operates progressively. It is designed to open at the specified set pressure and ensure that the plant is not subjected to a short pressure increase greater than 10%. When the pressure is reduced, the valve will return to being fully closed at the specified opening pressure minus 5%.
The PRV set pressure is fixed in accordance with customer order, and is adjusted to suit the existing installation and pressure used.
The label attached to the valve shows the valve type [Type], year of manufacture and serial number [Year/Id.no.], set pressure [Set pressure], connection [Conn. In/Out], maximum allowable pressure [PS], test pressure [PT], fluid category [Fluid cat.] and temperature range [Max/Min temp].



Märkskylt



Applications:

Durgo pressure relief valve (PRV) type SV-55 (4155) in brass, with FKM (fluorocarbon rubber) washer, is intended for use with installations containing air, water or oil.
Max temperature 125°C, min temperature -30°C. If the medium contains anything apart from pure air or water, the resistance of the sealing and valve material must be verified, to avoid compromising the sealing / durability of the valve. If there is any uncertainty, please contact Durgo.

Maintenance instruction:

Regular function checks must be done on the PRV at least once every 3 months. The valve can be hot, be careful and use protective gloves if necessary. The function check is done by firmly pulling the pressure relief handle and allowing the PRV to blow out medium for about 2 seconds, then release the handle. If the PRV does not open during the function check, it must be exchanged as soon as possible. If the PRV leaks after the function check, this is probably caused by particles which have got stuck between the washer and the sealing surface. Pull the handle again to clear any particles out. The seal must be checked at the same time as the function check. If the seal is broken, the valve must be exchanged. Renovation or service of the PRV must only be done by AB Durgo.

Installation:

Valves used for pressure relief during thermal expansion can be installed in any position, since the valve is designed to have its spring housing isolated from the medium.
The PRV valve outlet pipe must be terminated in such a manner that medium which blows out can be discharged without risk of personal injury or property damage.
When installed in a facility where the valve may be exposed to freezing, the valve must be placed or protected so that freezing media can not enter the valve's spring housing.

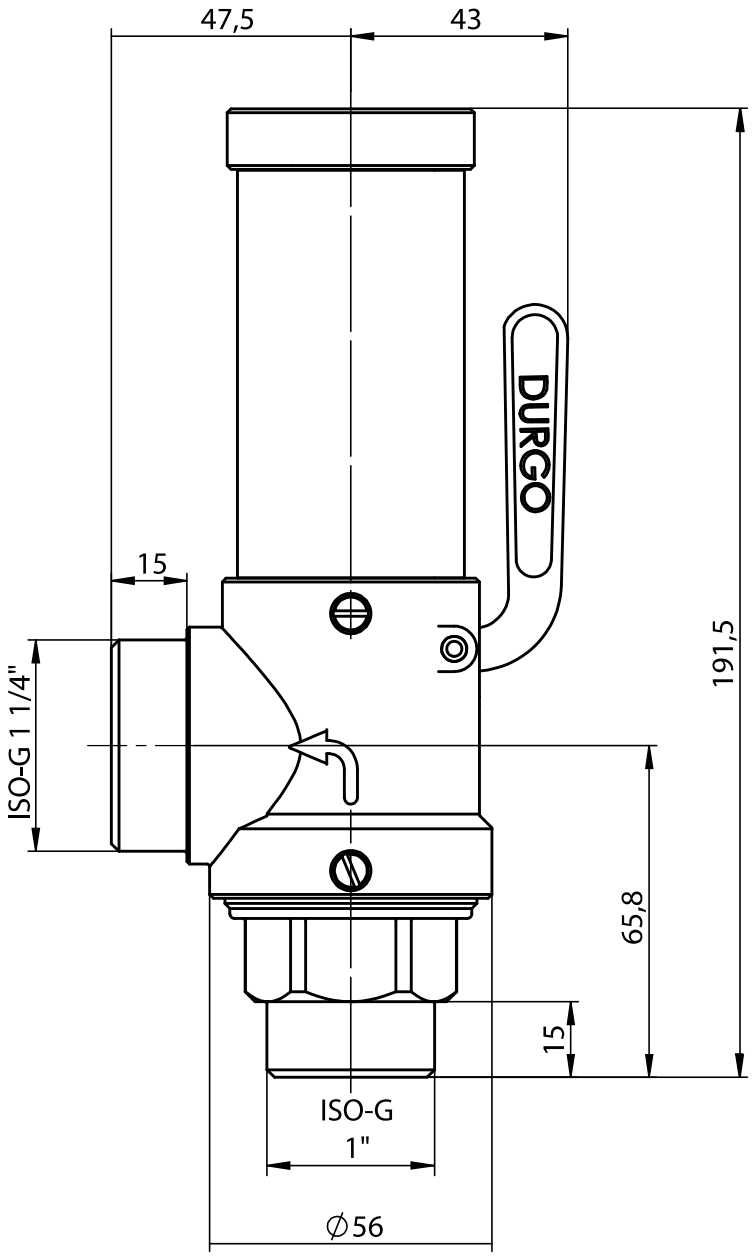
Approval:

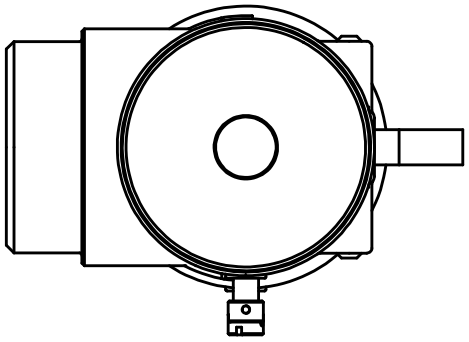
Durgo's PRVs are classified as class 4 valves and are CE marked in accordance with AFS 2016:1; Pressure Containing Devices (PED 2014/68/EU).
A EU-declaration of conformity is supplied with all valves.

DURGO

AB Durgo
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e-mail: sales@durgo.se
www.durgo.se





Dat.	Skala	Ritad	Konstr.	Ersätter	Hänvisning	Anmärkning
2011-01-20	2:3	HH				

Aktiebolaget Durgo
Box 3021, S-169 03 SOLNA
Tel. 08-730 52 80, Fax. 08-735 69 55
www.durgo.se, e-mail. staff@durgo.se

Säkerhetsventil 4155

DN25 / utl. DN32 Lång

Vikt: 1507 gram

Ritn.-nr. SVAA00-3-3-DIM r1

C63140UQUQIK002 001 1917

4374326

Werkszeugnis 2.2 gemäß DIN EN 10204
Test report 2.2 according to DIN EN 10204
Certificat d'usine 2.2 selon DIN EN 10204

ARMATUREN GOETZE

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USt.- ID.DE 146 139 484

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Customer / Client
PROCAB AB
Marieholmsgatan 10A
SE 415 02 Göteborg

Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Prüfgegenstand / *Test specimen / Objet du test*

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Artikel
Article / Article
461 tGFO
1000000613038

	Eintritt / Inlet / Entrée	*Austritt / Outlet / Sortie*
Nominalgröße *Nominal size / Diamètre nominal*	Nennweite *Nominal diam. / taille nominale*	Nennweite *Nominal diam. / taille nominale*
DN 8	DN 08	DN 15
	Anschluß *Connection thread / raccord fileté*	Anschluß *Connection thread / raccord fileté*
	m	f

Bauteilkennzeichen
Type-test-mark
Numéro d'homologation
TÜV-SV. 21-2061.6.D/G.0,68.
TÜV-SV. 21-2061.6.F.0,5.

Konformitätsbewertungsverfahren
Conformity assessment procedure
Procédure d'évaluation de la conformité
Kategorie IV gemäß DGRL 2014/68/EU; Modul B, D
Category IV according to PED 2014/68/EU; module B, D
Catégorie IV selon PED 2014/68/EU; module B, D

Notifizierte Stelle
Notified body / Organisme notifié
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln

Kennnummer
Identification no./ n° d'identification
CE 0035

Prüfungen / *Tests / Tests*

Einstelldruck gem. DIN EN ISO 4126-1
Set pressure according to DIN EN ISO 4126-1
Tarage selon DIN EN ISO 4126-1
36 bar | 522 psi | 3,6 MPa

Stückzahl
Pieces
Quantité
6

Prüfmedium
Test medium / Fluide du test
Luft
Air / Air

Prüftemperatur
Test temperature / Température du test
Umgebungstemperatur
Ambient temperature / Température ambiante

Bemerkung
Remark / Notes

Werkszeugnis 2.2 gemäß DIN EN 10204
Test report 2.2 according to DIN EN 10204
Certificat d'usine 2.2 selon DIN EN 10204

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www.goetze-armaturen.de

USt.-ID.DE 146 139 484

Bestellangaben ***/ Order information / Informations commande***

Bestellung *Customers order no. / n° commande client*
8467

Goetze Vorgangsnummer *Goetze Transaction-no. / Référence Goetze*
348839

Pos.
1

Herstellerprüfungen ***/ Manufacturer's Tests / Tests du fabricant***

Das Sicherheitsventil wurde durch den Hersteller gemäß DIN EN ISO 4126-1 auf Druckfestigkeit und Dichtheit geprüft. Die Prüfanforderungen sind eingehalten.
Der Einstelldruck wurde auf einem überwachten Prüfstand mit kalibrierten Feinmessmanometern justiert. Die Ventile sind gegen Verstellung durch eine Werksplombierung gesichert.

The safety valve was tested by the manufacturer according to DIN EN ISO 4126-1 for resistance to pressure and tightness. The test requirements were complied with.
The set pressure was adjusted on a monitored test rig with calibrated precision pressure gauges. The valves are protected against adjustment by means of a factory seal.

Le fabricant a testé la résistance à la pression et l'étanchéité de la soupape selon DIN EN ISO 4126-1. Les exigences pour le test ont été respectées.
Le tarage a été réalisé sur un banc d'éssai contrôlé à l'aide de manomètres calibrés de haute précision. Les soupapes sont protégées du déréglage par un capuchon de plombage.

Werkstoffspezifikationen ***/ Material specification / spécificités du matériau***

Bezeichnung *Designation / Désignation*	Werkstoff EN *Material / Matériau*	Norm EN *Standard/ Norme*	Werkstoff ASME *Material / Matériau*	Norm ASME *Standard/ Norme*
Gehäuse *Body / corps*	1.4408	DIN EN 10213	CF8M	SA-351
Ventilsitz *Valve seat / Siége de la soupape*	1.4404	DIN EN 10272	316L	SA-479
Federhaube *Spring housing / Chapeau du ressort*	1.4404	DIN EN 10272	316L	SA-479
Druckfeder *Spring / Ressort*	1.4310	DIN EN 10270-3	302	ASTM A-228
Sitzdichtung *Gasket / Portée*	PTFE TFM 1600			

Ludwigsburg, 18.07.2023

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

ARMATUREN GOETZE

Qualitätssicherung des Herstellers
Quality Assurance of the manufacturer
Expert autorisé du fabricant

C66-AQU-QIX-002 696 1917

4374326

Abnahmeprüfzeugnis 3.1 gemäß DIN EN 10204
Inspection certificate 3.1 according to DIN EN 10204
Certificat d´inspection 3.1 selon DIN EN 10204

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Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Prüfgegenstand / *Test specimen / Objet du test*

Bezeichnung *Designation / Désignation*	Artikel *Article / Article*	Herstellnummer *Series No. / n° de série*
Sicherheitsventil *Safety valve* *Soupape de sûreté*	461 tGFO 1000000613038	1000971956-1000971961

	Eintritt / Inlet / Entrée	*Austritt / Outlet / Sortie*
Nominalgröße *Nominal size / Diamètre nominal*	Nennweite *Nominal diam. / taille nominale*	Nennweite *Nominal diam. / taille nominale*
DN 8	DN 08	DN 15
	Anschluß *Connection thread / raccord fileté*	Anschluß *Connection thread / raccord fileté*
	m	f

Bauteilkennzeichen
Type-test-mark
Numéro d'homologation
TÜV-SV. 21-2061.6.D/G.0,68.
TÜV-SV. 21-2061.6.F.0,5.

Konformitätsbewertungsverfahren
Conformity assessment procedure
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Kategorie IV gemäß DGRL 2014/68/EU; Modul B, D
Category IV according to PED 2014/68/EU; module B, D
Catégorie IV selon PED 2014/68/EU; module B, D

Notifizierte Stelle
Notified body / Organisme notifié
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln

Kennnummer
Identification no./ n° d'identification
CE 0035

Prüfungen / *Tests / Tests*

Einstelldruck gem. DIN EN ISO 4126-1
Set pressure according to DIN EN ISO 4126-1
Tarage selon DIN EN ISO 4126-1
36 bar | 522 psi | 3,6 MPa

Stückzahl
Pieces
Quantité
6

Prüfmedium
Test medium / Fluide du test
Luft
Air / Air

Prüftemperatur
Test temperature / Température du test
Umgebungstemperatur
Ambient temperature / Température ambiante

Bemerkung
Remark / Notes

Abnahmeprüfzeugnis 3.1 gemäß DIN EN 10204
Inspection certificate 3.1 according to DIN EN 10204
Certificat d´inspection 3.1 selon DIN EN 10204

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USt.-ID.DE 146 139 464

Bestellangaben / *Order information / Informations commande*

Bestellung *Customers order no. / n° commande client*
8467

Goetze Vorgangsnummer *Goetze Transaction-no. / Référence Goetze*
348839

Pos.
1

Herstellnummer *Series No. / n° de série*
1000971956-1000971961

Herstellerprüfungen / *Manufacturer's Tests / Tests du fabricant*

Das Sicherheitsventil wurde durch den Hersteller gemäß DIN EN ISO 4126-1 auf Druckfestigkeit und Dichtheit geprüft. Die Prüfanforderungen sind eingehalten.
Der Einstelldruck wurde auf einem überwachten Prüfstand mit kalibrierten Feinmessmanometern justiert. Die Ventile sind gegen Verstellung durch eine Werksplombierung gesichert.

The safety valve was tested by the manufacturer according to DIN EN ISO 4126-1 for resistance to pressure and tightness. The test requirements were complied with.
The set pressure was adjusted on a monitored test rig with calibrated precision pressure gauges. The valves are protected against adjustment by means of a factory seal.

Le fabricant a testé la résistance à la pression et l'étanchéité de la soupape selon DIN EN ISO 4126-1. Les exigences pour le test ont été respectées.
Le tarage a été réalisé sur un banc d'éssai contrôlé à l'aide de manomètres calibrés de haute précision. Les soupapes sont protégées du déréglage par un capuchon de plombage.

Werkstoffspezifikationen / *Material specification / spécificités du matériau*

Bezeichnung *Designation / Désignation*	Werkstoff EN *Material / Matériau*	Norm EN *Standard/ Norme*	Werkstoff ASME *Material / Matériau*	Norm ASME *Standard/ Norme*
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Ventilsitz *Valve seat / Siége de la soupape*	1.4404	DIN EN 10272	316L	SA-479
Federhaube *Spring housing / Chapeau du ressort*	1.4404	DIN EN 10272	316L	SA-479
Druckfeder *Spring / Ressort*	1.4310	DIN EN 10270-3	302	ASTM A-228
Sitzdichtung *Gasket / Portée*	PTFE TFM 1600			

Ludwigsburg, 18.07.2023

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

ARMATUREN GOETZE

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

Herstellererklärung zur EU-Richtlinie ATEX 2014/34/EU
Manufacturer's Declaration to European Directive ATEX 2014/34/EU
Déclaration du Fabricant de la Directive ATEX 2014/34/EU

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Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Bestellung *Customers order no. / n° commande client*
8467

Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
348839

Pos.
1

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Typ
Type / Type
461 tGFO
1000000613038

Herstellnummer
Series No. / n° de série
1000971956-1000971961

Nominalgröße
Nominal size / Diamètre nominal
DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
Der oben angeführte Ventiltyp in der geprüften Ausführung ist gemäß technischem Bericht der TÜV SÜD Product Service GmbH zu Bescheinigung Nr. 713082362 vom 14.04.16 für die Verwendung in der Gerätegruppe I Kategorie M2 und Gerätegruppe II Zonen 1, 21 und 2, 22 verwendbar.

In co-operation with the TÜV SÜD Product Service GmbH, the products were subject to a hazard analysis according to Directive 2014/34/EU with the following result:
The valve type specified above in the tested version, is according to the technical report of the TÜV SÜD Product Service GmbH relating to Attestation No. 713082362 dd. 14.04.16 suitable for use in Group I category M2 and Equipment Group II zones 1, 21 and 2, 22.

Les produits ont été soumis à une procédure d 'évaluation de risque de danger selon la directive 2014/34/EU en collaboration avec le TÜV SÜD Product Service GmbH, dont le résulat est le suivant:
Le type de robinettrie specifiée ci-dessus est dans la version contrôlée, selon le rapport téchnique en relation de l'attestation no. 713082362 dd. 14.04.16 du TÜV SÜD Product Service GmbH, convenable pour utilisation dans les Groupes des Appareils I catégorie M2 et Groupes des Appareils II zones 1, 21 et 2, 22.

Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 18.07.2023

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

Herstellererklärung zur EU-Richtlinie ATEX 2014/34/EU
Manufacturer's Declaration to European Directive ATEX 2014/34/EU
Déclaration du Fabricant de la Directive ATEX 2014/34/EU

ARMATUREN GOETZE

Goetze KG Armaturen
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www.goetze-armaturen.de

USt.-ID.DE 146 139 484

Besteller
Customer / Client
PROCAB AB
Marieholmsgatan 10A
SE 415 02 Göteborg

Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Bestellung *Customers order no. / n° commande client*
8467

Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
348839

Pos.
1

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Typ
Type / Type
461 tGFO
1000000613038

Herstellnummer
Series No. / n° de série
1000971956-1000971961

Nominalgröße
Nominal size / Diamètre nominal
DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
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Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 18.07.2023

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

ARMATUREN GOETZE

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

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Bestellung *Customers order no. / n° commande client*
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Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
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Bezeichnung
Designation / Désignation
Sicherheitsventil
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Soupape de sûreté

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Type / Type
461 tGFO
1000000613038

Herstellnummer
Series No. / n° de série
1000971956-1000971961

Nominalgröße
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DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
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Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 18.07.2023

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ARMATUREN GOETZE

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Authorized inspector of the manufacturer
Expert autorisé du fabricant

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Bestellung *Customers order no. / n° commande client*
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Goetze Vorgangsnummer
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Pos.
1

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
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Type / Type
461 tGFO
1000000613038

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Series No. / n° de série
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Nominalgröße
Nominal size / Diamètre nominal
DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
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Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 18.07.2023

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Authorized inspector of the manufacturer
Expert autorisé du fabricant

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Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
348839

Pos.
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Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

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Type / Type
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1000000613038

Herstellnummer
Series No. / n° de série
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Nominalgröße
Nominal size / Diamètre nominal
DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

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Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 18.07.2023

Goetze KG
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D-71636 Ludwigsburg

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Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

Herstellererklärung zur EU-Richtlinie ATEX 2014/34/EU
Manufacturer's Declaration to European Directive ATEX 2014/34/EU
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Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Bestellung *Customers order no. / n° commande client*
8467

Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
348839

Pos.
1

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Typ
Type / Type
461 tGFO
1000000613038

Herstellnummer
Series No. / n° de série
1000971956-1000971961

Nominalgröße
Nominal size / Diamètre nominal
DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
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Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 18.07.2023

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

ARMATUREN GOETZE

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

DE Konformitätserklärung

gemäß Anhang IV der Richtlinie 2014/68/EU

C63-AQU-QIX-002 314 / 917

Goetze KG Armaturen
Robert-Mayer-Straße 21
D-71636 Ludwigsburg

Name und Anschrift des Herstellers

Wir erklären in alleiniger Verantwortung, dass das gelieferte Produkt:
Sicherheitsventil

Baureihe	Nennweite	TÜV-Bauteilprüfnummer	EU-Baumusterprüfung
451 bH / 851 bH	DN15 - DN32	665	01 202 642-B-18 T023, Revision 2
451 G / 851 G	DN15 - DN32	666	01 202 642-B-18 T023, Revision 2
451 F / 851 F	DN15 - DN32	684	0045/202/1042/Z/00718/21/D/001(00)
352 / 452 / 852	DN40 - DN50	2007	01 202 642TR-B(B)-16 0012, Rev. 1
652 mFK	DN15 - DN50	293	0045/202/1042/P/00574/22/D/001(00)
652 sGK	DN15 - DN50	312	01 202 642-B-11028, Rev. 1
861 / 461	DN8 - DN15	2061	01 202 642TR/B-21 0027
420	DN8 - DN10	2069	01 202 642/B-18 T033, Rev. 1
460	DN10 - DN25	2067	01 202 642/B-22 T025

mit der Richtlinie 2014/68/EU und der harmonisierten Norm DIN EN ISO 4126-1 übereinstimmt und folgendem Konformitätsbewertungsver-fahren unterzogen wurde:

Kategorie IV, Modul B + D

Sonstige angewandte Normen und technische Spezifikationen:

AD 2000-A2, AD 2000-A4, VdTÜV SV 100

Name der notifizierten Stelle für die EU-Baumus-terprüfung

TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
D-51105 Köln

Identifikationsnummer 0035

Name und Anschrift der notifizierten Stelle

Die Überwachung der Qualitätssicherung Produktion erfolgt durch

TÜV SÜD Industrie Service GmbH
Westendstraße 199
D-80686 München

Zertifikat-Nr: DGR-0036-QS-993-20

Identifikationsnummer 0036

Name und Anschrift der notifizierten Stelle

Ludwigsburg, 01.06.2022
(Ort und Datum der Ausstellung)

D. Weimann
Geschäftsleitung

EN Declaration of conformity

according to Annex IV of Directive 2014/68/EU

C63-AQU-QIX-002 315 / 917

Goetze KG Armaturen
Robert-Mayer-Straße 21
D-71636 Ludwigsburg

Name and address of the manufacturer

We declare under sole responsibility that the delivered product:
Safety Valve

Series	Nominal size	TÜV type approval no.	EU type examination
451 bH / 851 bH	DN15 - DN32	665	01 202 642-B-18 T023, Revision 2
451 G / 851 G	DN15 - DN32	666	01 202 642-B-18 T023, Revision 2
451 F / 851 F	DN15 - DN32	684	0045/202/1042/Z/00718/21/D/001(00)
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652 mFK	DN15 - DN50	293	0045/202/1042/P/00574/22/D/001(00)
652 sGK	DN15 - DN50	312	01 202 642-B-11028, Rev. 1
861 / 461	DN8 - DN15	2061	01 202 642TR/B-21 0027
420	DN8 - DN10	2069	01 202 642/B-18 T033, Rev. 1
460	DN10 - DN25	2067	01 202 642/B-22 T025

has been manufactured in compliance with the directive 2014/68/EU and DIN EN ISO 4126-1 and was subjected to the following conformity assessment procedure:

Category IV, Module B + D

Other applied standards and technical specifications:

AD 2000-A2, AD 2000-A4, VdTÜV SV 100

Name of authorizing notified body for EU-type examination

TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
D-51105 Köln

Identification number 0035

Name and address of the notified body

The monitoring of the production quality assurance is performed by

TÜV SÜD Industrie Service GmbH
Westendstraße 199
D-80686 München

Certification number: DGR-0036-QS-993-20

Identification number 0036

Name and address of the notified body

Ludwigsburg, 01.06.2022
(Place and date of issue)

D. Weimann
Managing Director

FR Déclaration de conformité

conformément à l'annexe IV de la directive 2014/68/EU

C63-AQU-QIX-002 316 / 917

Goetze KG Armaturen
Robert-Mayer-Straße 21
D-71636 Ludwigsburg

Nom et adresse du fabricant

Nous soussignés déclarons sous notre seule responsabilité que le produit livré :
Soupapes de sûreté

Série	Diamètre nominal	N° de certification TÜV	Examens UE de type
451 bH / 851 bH	DN15 - DN32	665	01 202 642-B-18 T023, Revision 2
451 G / 851 G	DN15 - DN32	666	01 202 642-B-18 T023, Revision 2
451 F / 851 F	DN15 - DN32	684	0045/202/1042/Z/00718/21/D/001(00)
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420	DN8 - DN10	2069	01 202 642/B-18 T033, Rev. 1
460	DN10 - DN25	2067	01 202 642/B-22 T025

est conforme à la directive 2014/68/UE et à la norme harmonisée DIN EN ISO 4126-1 et a été soumis à la procédure d'évaluation de la conformité suivante:

Catégorie IV, Module B + D

Autres normes et spécifications techniques appliquées: AD 2000-A2, AD 2000-A4, VdTÜV SV 100

Nom de l'organisme notifié pour l'examen de type UE

TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
D-51105 Köln

Numéro d'identification 0035

Nom et adresse de l'organisme notifié

Le contrôle de l'assurance qualité de la production est effectué par

TÜV SÜD Industrie Service GmbH
Westendstraße 199
D-80686 München

Numéro du certificat: DGR-0036-QS-993-20

Numéro d'identification 0036

Nom et adresse de l'organisme notifié

Ludwigsburg, 01.06.2022
(Lieu et date de l'émission)

D. Weimann
Direction de l'entreprise

C63-AQU-QIX-002 317 / 917

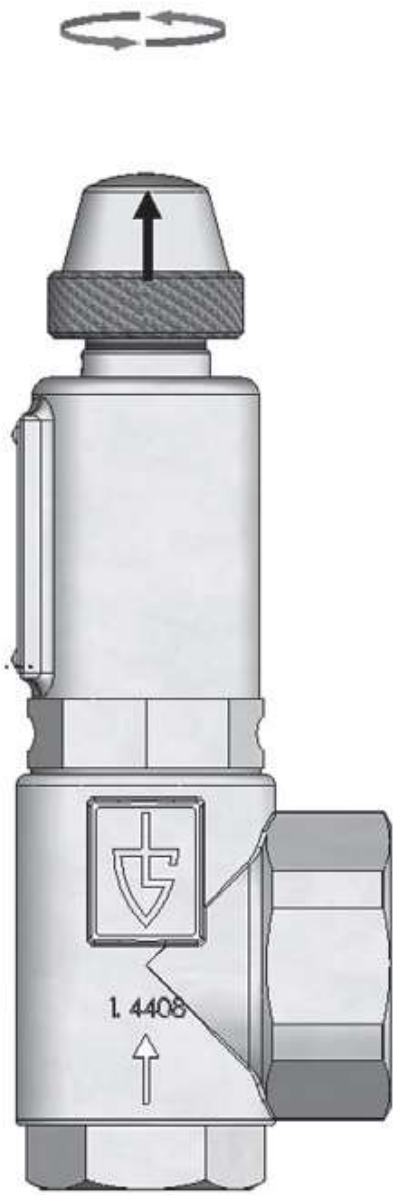
ARMATUREN GOETZE

851 / 451, 852 / 452 / 352, 652 mFK, 652 sGK, 861 / 461, 420, 460

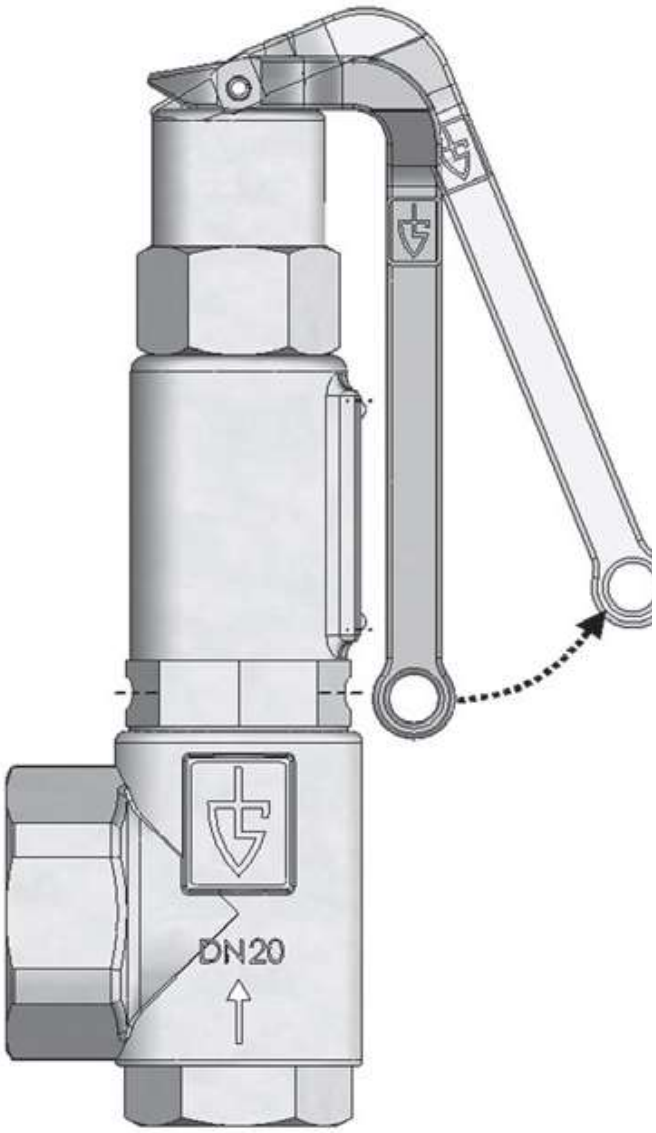


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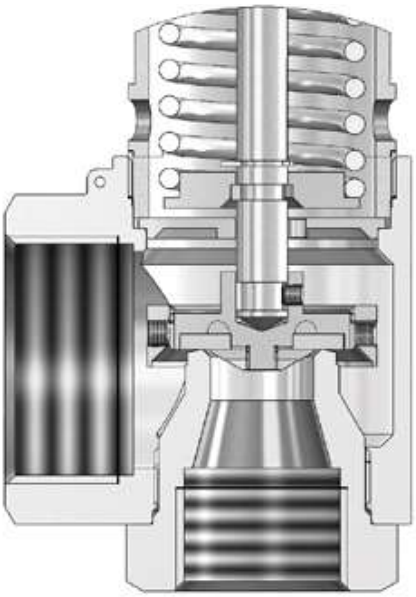
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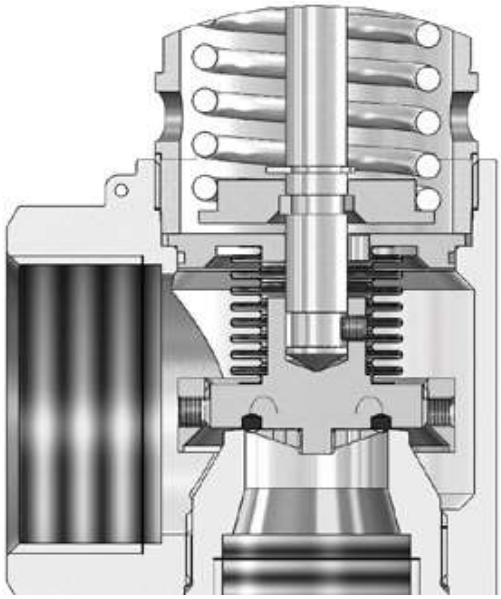
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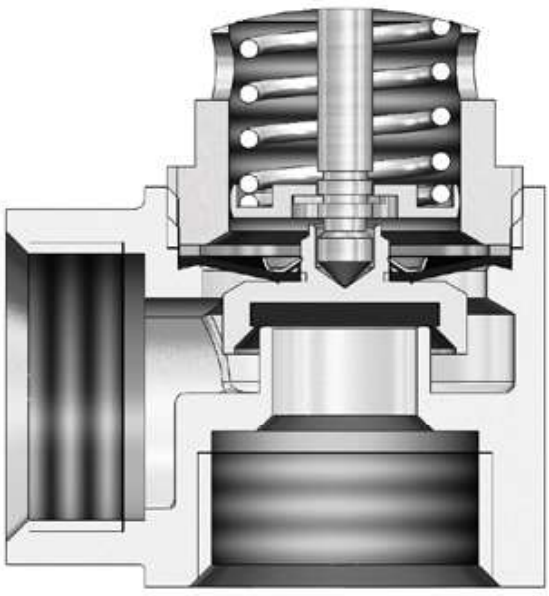
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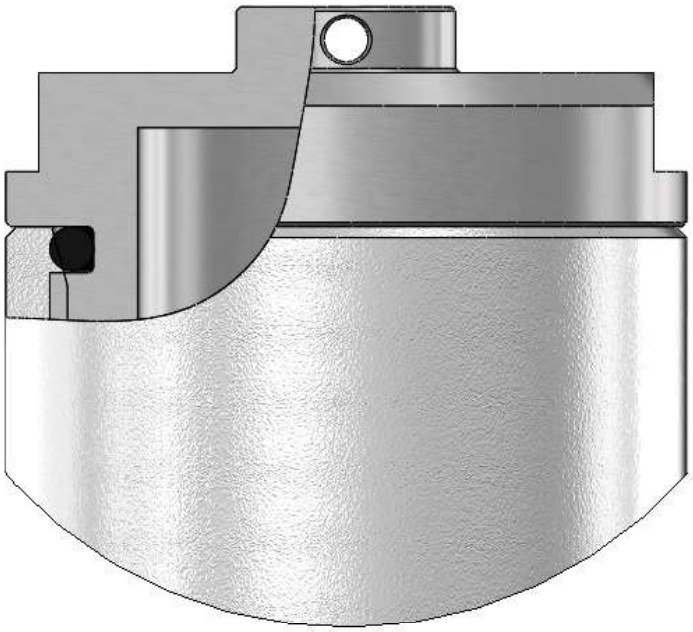
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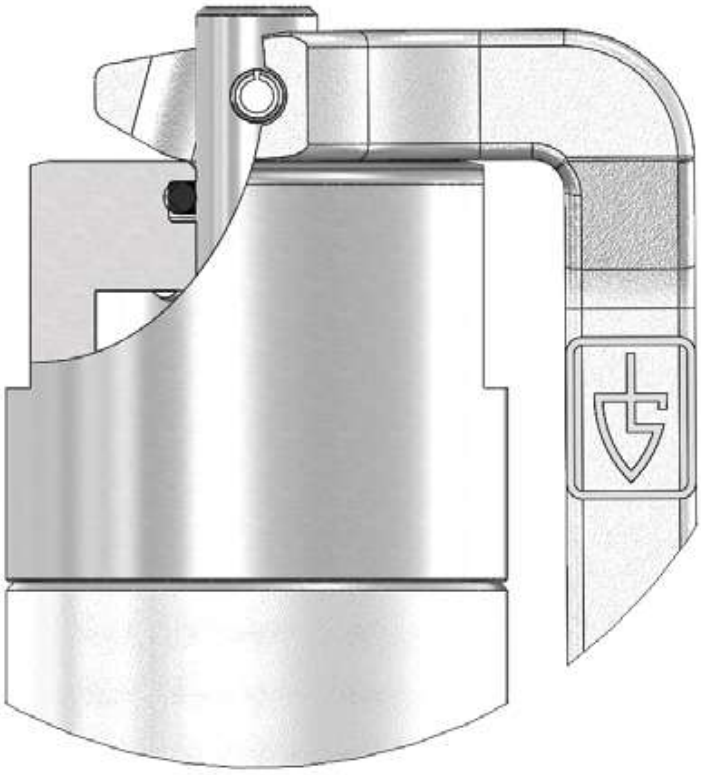
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f)



g)



Montage-, Wartungs- und Betriebsanleitung

Sicherheitsventil 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Allgemeine Sicherheitshinweise

de

Originalsprache

- Benutzen Sie das Ventil nur:
  - bestimmungsgemäß
  - in einwandfreiem Zustand
  - sicherheits- und gefahrenbewusst
- Die Einbauanleitung ist zu beachten.
- Störungen, welche die Sicherheit beeinträchtigen können, sind umgehend zu beseitigen.
- Das Sicherheitsventil ist ausschließlich für den in dieser Einbauanleitung angeführten Verwendungsbereich bestimmt. Eine andere oder darüber hinausgehende Benutzung gilt als nicht bestimmungsgemäß.
- Mit dem Entfernen der Plombierung erlischt die Werksgarantie.
- Alle Montagearbeiten sind durch autorisiertes Fachpersonal durchzuführen.

2 Allgemeine Hinweise

Sicherheitsventile sind hochwertige Armaturen, die besonders sorgfältig behandelt werden müssen. Die Dichtflächen sind an Sitz und Kegel feinstbearbeitet, dadurch wird die notwenidge Dichtheit erreicht. Das Eindringen von Fremdkörpern in das Ventil ist bei Montage und während des Betriebs zu vermeiden. Die Dichtheit eines Sicherheitsventils kann durch Hanf, Teflonband oder anderen Dichtmitteln sowie durch Schweißperlen u.ä. beeinträchtigt werden. Auch eine raue Behandlung des fertigen Sicherheitsventils während Lagerung, Transport und Montage kann ein Sicherheitsventil undicht werden lassen. Werden die Sicherheitsventile mit einem Farbanstrich versehen, so ist darauf zu achten, dass die gleitenden Teile nicht mit Farbe in Berührung kommen.

3 Verwendungsbereich

Einzelheiten zum Verwendungsbereich der einzelnen Ausführungen sind den Datenblättern des Herstellers zu entnehmen.

4 Einbau und Montage

Feder-Sicherheitsventile sind mit senkrecht nach oben stehender Federhaube einzubauen. Um eine einwandfreie Funktion der Sicherheitsventile zu gewährleisten, müssen diese so montiert werden, dass keine unzulässigen statischen, dynamischen oder thermischen Beanspruchungen auf das Sicherheitsventil wirken können. Wenn durch das Gehäuse im Ansprechfalle austretende Medium direkt oder indirekt Gefahren für Personen oder die Umgebung entstehen können, so müssen geeignete Schutzmaßnahmen getroffen werden. Dabei sind auch Ausschwadungen durch die Entlastungsbohrungen der Federhaube zu berücksichtigen.

Zuleitung

Zuleitungsstutzen für Sicherheitsventile sollen so kurz wie möglich sein und sind so zu gestalten, dass bei voller Ventilleistung keine höheren Druckverluste als max. 3% vom Ansprechdruck auftreten können.

Kondensatableitung

Die Leitungen oder die Ventile selbst (bei Flanschausführung) müssen bei möglichem Kondensatabfall an ihrem tiefsten Punkt mit einer ständig wirkenden Einrichtung zu Kondensatabführung versehen sein. Für gefahrenlose Abführung des Kondensats oder austretenden Mediums ist zu sorgen. Die Gehäuse, Leitungen und Schalldämpfer sind gegen Einfrieren zu sichern.

Abblaseleitung / Gegendruck

Die Abblaseleitung der Sicherheitsventile sind so auszuführen, dass beim Abblasen der erforderliche Massestrom drucklos abgeführt werden kann. Bei Sicherheitsventilen mit Metall-Faltenbalg beeinträchtigt ein beim Abblasen auftretender Gegendruck bis max. 4 bar den Ansprechdruck des Sicherheitsventils nicht.

5 Betriebsweise / Wartung

Der Arbeitsdruck der Anlage soll mindestens 5% unter dem Schließdruck des Sicherheitsventils liegen. Dadurch wird erreicht, dass das Sicherheitsventil nach dem Abblasen wieder einwandfrei schließen kann. Bei kleineren Undichtheiten, die durch Verunreinigungen zwischen den Dichtflächen hervorgerufen werden können, kann das Ventil zur Reinigung durch Anlüftung zum Abblasen gebracht werden. Kann dadurch die Undichtheit nicht beseitigt werden, liegt wahrscheinlich eine Beschädigung der Dichtfläche vor, die nur in unserem Werk oder durch autorisierte Fachleute repariert werden kann.
Die Anlüftung erfolgt ausführungsspezifisch entweder über eine Rändelmutter oberhalb der Federhaube (Abb. a) durch Drehen gegen den Uhrzeigersinn (anschließend ist die Rändelmutter wieder bis zum Anschlag zurück zu drehen) oder durch Betätigen des Anlüfthebels am Oberteil des Ventils (Abb. b). Der Anlüfthebel ist bei Auslieferung mit einem Band arretiert, welches für die Betätigung der Anlüftung entfernt werden muss.

Sicherheitsventile ohne Faltenbalg und ohne gasdichte Kappe (Abb. c)

Bei Sicherheitsventilen ohne Faltenbalg und ohne gasdichte Kappe kann zusätzlich durch Abschrauben des Oberteils mit entsprechendem Werkzeug das gesamte Oberteil aus dem Gehäuse genommen und eventueller Rückstand auf Sitz und Sitzdichtung entfernt werden.

Vor Demontage ist darauf zu achten, dass das Sicherheitsventil nicht mit Druck beaufschlagt ist. Durch wieder Anbringen des Oberteils in das Gehäuse hat sich der Ansprechdruch des Sicherheitsventils nicht geändert.

Sicherheitsventile mit Metall-Faltenbalg (Abb. d)

Bei den Sicherheitsventilen mit Faltenbalg darf das Oberteil vom Gehäuse nicht getrennt werden, da sonst eine Dichtheit bei auftretendem Gegendruck nicht mehr gewährleistet ist.

Sicherheitsventile mit gasdichter Kappe (Abb. f) oder gasdichter Hebelanlüftung (Abb. g)

Bei Sicherheitsventilen mit gasdichter Kappe oder gasdichter Hebelanlüftung darf das Oberteil nicht vom Gehäuse getrennt werden, da sonst die Gasdichtheit nicht mehr gewährleistet ist. Sollte für Reparaturzwecke ein Abschrauben des Oberteiles dennoch notwendig sein, so ist darauf zu achten, dass vor der Demontage die Feder entspannt wird. Vor der Demontage ist ebensfalls zu kontrollieren, ob und welches Medium sich in der Haube befinden könnte. Es besteht die Gefahr einer möglichen Verätzung oder Vergiftung.

Anlüftung zu Wartung

Bei Sicherheitsventilen mit Anlüftvorrichtung ist zu empfehlen und anlagenspezifisch auch Vorschrift, das Sicherheitsventil von Zeit zu Zeit durch Anlüften zum Abblasen zu bringen, um sich von der Funktion des Sicherheitsventils zu überzeugen. Sie lassen sich daher spätestens ab einem Betriebsdruck von ≥85% des Ansprechdruckes zum Öffnen bringen. Die Anlüftung sollte nicht im drucklosen Zustand erfolgen. Eine Prüfung auf Gängigkeit der Sicherheitsventile hat nach TRD 601 bei Dampferzeugern mindestens in Abständen von 4 Wochen zu erfolgen. Sicherheitsventile stellen die letzte Sicherheit für den Behälter bzw. das System dar. Sie sollen in der Lage sein, einen unzulässigen Überdruck auch dann zu verhindern, wenn alle anderen vorgeschalteten Regel-, Steuer- und Überwachungsgeräte versagen. Um diese Funktionseigenschaften sicherzustellen, bedürfen Sicherheitsventile einer regelmäßigen und wiederkehrenden Wartung. Die Wartungsintervalle sind entsprechend den Einsatzbedingungen vom Betreiber festzulegen.

6 Demontage der Armatur

Zusätzlich zu den allgemein gültigen Montagerichtlinien ist zu beachten, dass vor Demontage des Sicherheitsventils die Anlage drucklos gemacht werden muss.

7 Reparaturen

Reparaturen an Sicherheitsventilen dürfen nur von der Firma Goetze KG Armaturen oder durch autorisierte Fachwerkstätten, unter ausschließlicher Verwendung von Originalersatzteilen, durchgeführt werden.

8 Gewährleistung

Dieses Ventil wurde vor Verlassen des Werkes geprüft. Für unsere Produkte leisten wir in der Weise Garantie, dass wir die Teile gegen Rückgabe kostenlos instand setzen, die nachweislich infolge Werkstoff- oder Fabrikationsfehlern vorzeitig unbrauchbar werden sollten. Leistung von Schadenersatz und dergleichen andere Verpflichtungen übernehmen wir nicht. Bei Beschädigungen der Werksplombierung, unsachgemäßer Behandlung bzw. Installation, Nichtbeachtung dieser Montage- ,Wartungs- und Betriebsanleitung, Verschmutzung oder normalem Verschleiß erlischt die Werksgarantie.

Abb. a): Anlüften über Rändelmutter

Abb. b): Anlüften mit Anlüfthebel

Abb. c): Sicherheitsventil ohne Faltenbalg und ohne Membrane

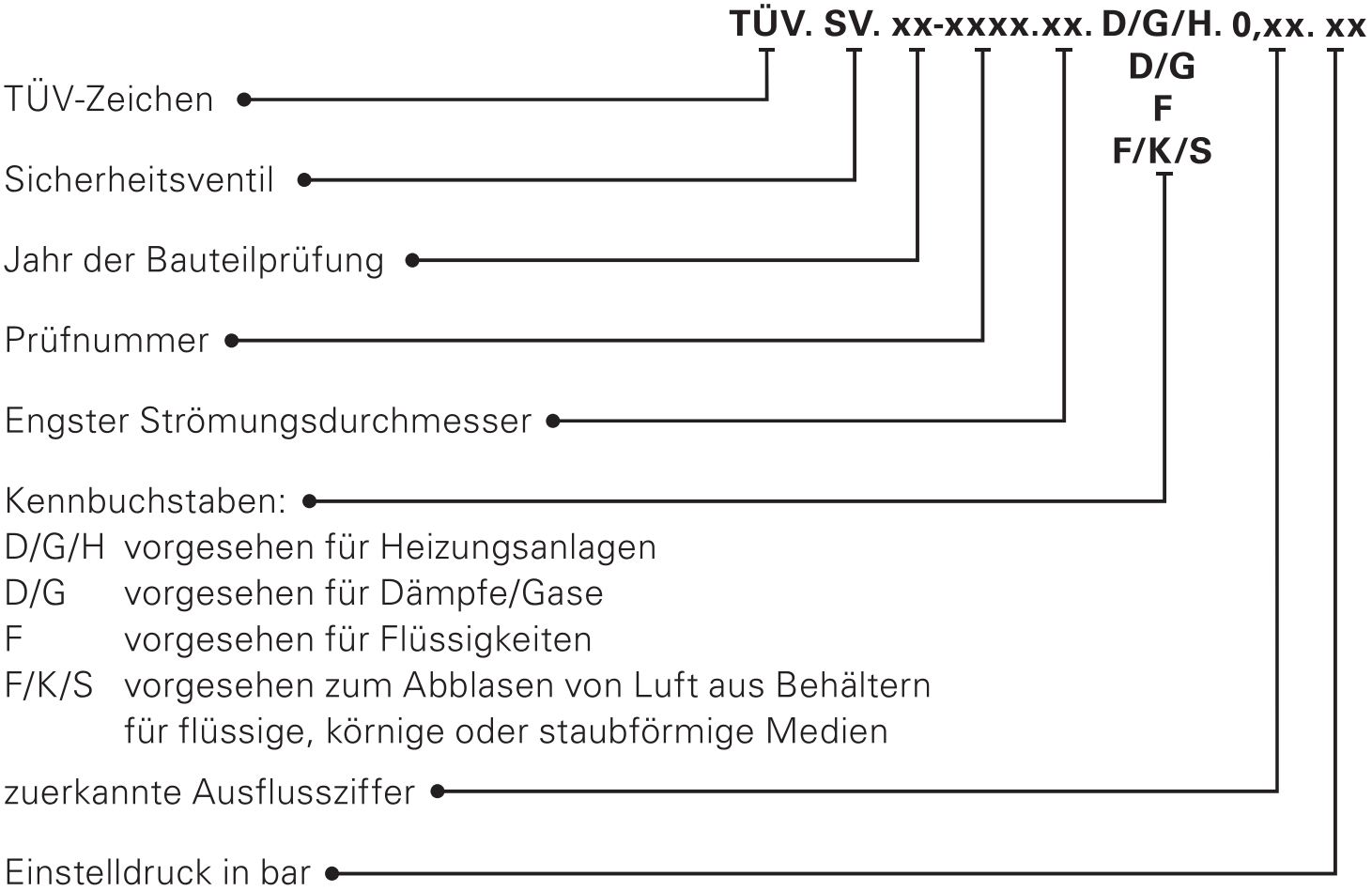
Abb. d): Sicherheitsventil mit Faltenbalg

Abb. e): Sicherheitsventil mit Membrane

Abb. f): Sicherheitsventil mit gasdichter Kappe

Abb. g): Sicherheitsventil mit gasdichter Hebelanlüftung

9 Kennzeichnung / Prüfung



D/G/H vorgesehen für Heizungsanlagen
D/G vorgesehen für Dämpfe/Gase
F vorgesehen für Flüssigkeiten
F/K/S vorgesehen zum Abblasen von Luft aus Behältern für flüssige, körnige oder staubförmige Medien

Sicherheitsventile werden von uns auf Druckfestigkeit und Dichtheit geprüft, auf den gewünschten Einstelldruck einjustiert und plombiert.
Die Kennzeichnung erfolgt unauslöschlich auf dem Typenschild, bzw. auf der Federhaube des Ventils. Zusätzlich enthält die Kennzeichnung die notwendigen Angaben gemäß DIN EN ISO 4126-1.

Assembly and maintenance instructions

Safety valve 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 General Notes of Safety

en

- Only use the valve:
  - for the specified purpose
  - in satisfactory condition
  - with respect for safety and potential hazards
- Always observe the installation instructions.
- Faults that may impair safety must be addressed immediately.
- The valves are exclusively intended for the application area stated in these installation instructions. Any other or further use is not valid as the intended use.
- The manufacturer´s warranty shall be null and void if the sealed cover is removed.
- All assembly work is to be carried out by authorized specialist staff.

2 General Notes

Safety valves are high-quality fittings which require a particularly careful handling. The sealing surfaces are precision-machined at the seat and cone to attain the required tightness. Always avoid the penetration of foreign particles into the valve during assembly and during the operation. The tightness of a safety valve can be impaired when using hemp, Teflon tape, as well as through welding beads, among other things. Also rough handling of the finished valve during storage, transport and assembly can result in a safety valve leaking. If the safety valves are painted, make sure that the sliding parts do not come into contact withe the paint.

3 Range of Application

For details on the range of application of the individual versions please refer to the datasheets of the manufacturer.

4 Installation and Assembly

Spring-loaded safety valves are to be installed with the spring bonnet pointing vertically upward. To ensure a satisfactory operation of the safety valves they must be installed in such a way that the safety valve is not exposed to any impermissible static, dynamic or thermal loads. Appropriate protection devices must be applied if the medium that discharges upon actuation of the valve can lead to direct or indirect hazards to people or the environment. Always pay attention to possible fumes discharging from the relief bores in the spring bonnet.

Supply

Supply connection pieces for safety valves are to be kept as short as possible and are to be designed in such a way that there can be no pressure loss greater than max. 3% of the response pressure.

Removal of condensate discharge

In the event of possible condensate formation the pipes or the valves themselves (in flanged version) must be fitted at their lowest point with a continuously operating condensate discharge device. Hazard-free removal of the condensate or medium discharge must be ensured. The body, pipes and silencers must be protected against freezing.

Blowing-off pipe / backpressure

The blow-off pipe of the safety valves must be designed to ensure that the required mass flow can be discharged pressure-free during the blowing-off process. In safety valves with metal bellows a backpressure of up to max. 4 bar has no impact on the response pressure of the safety valve.

5 Operation/maintenance

The operating pressure of the plant is to be least 5% lower than the closing pressure of the safety valve. In this way, the valve can satisfactorily close again after blowing off. In the event of minor leaks, which may be caused by contamination between the sealing surfaces, the valve can be made to blow off through lifting, for cleaining purposes. If this does not remove the leak, the sealing surface is probably damaged and this can only be repaired at our factory or by authorized specialists. Depending on the version, lifting is either carried out by means of a knurled nut above the spring bonnet (Fig. a) which is turned counterclockwise (afterwards the knurled nut has to be turned back to the stop) or by actuating the lifting lever on the upper part of the valve (Fig. b). For delivery purposes the lifting lever is blocked by means of strap which has to be removed for actuating the lifting device.

Safety valves without bellows and without gastight cap (Fig. c)

In addition, in the case of safety valves without bellows and without gastight cap, the entire upper part can be unscrewed from the housing using appropriate tools and any residue removed from the seat and the seat sealing.

Prior to removal make sure that the safety valve is not under pressure.

The response pressure of the safety valve is not altered through the reassembly of the upper part in the housing.

Safety valve with metal bellows (Fig. d)

In the case safety valves with metal bellows the upper part is not to be separated from the housing, because otherwise tightness is no longer guaranteed in the event of backpressure occurring.

Safety valves with gas-tight cap (Fig. f) or gastight lifting (Fig. g)

On safety valves with gas-tight cap or gastight lifting lever, the top part may not be separated from the housing as this compromises gas tightness. However, if the top part does have to be unscrewed for a repair, it should be ensured that the tension on the spring is released before dismantling. You should also check before dismantling the valve whether there is any medium in the cap and if so, what it is. Potential risk of chemical burns or poisoning.

Lifting for maintenance purposes

In the case of safety valves with a lifting device it is recommended, and in certain plant-specific cases even stipulated that the valves from time to time must be made to blow-off by lifting the seal off the seat, in order to assure the correct functioning of the safety valve. This is why they can be made to open at the latest as from an operating pressure of ≥ 85% of the response pressure. The lifting device is not to be operated when in a pressure-free state. In steam generating equipment, testing the ease of movement of safety valves must be carried at least every 4 weeks in compliance with TRD 601. Safety valves are the ultimate safety device for the tank or system. They must be able to prevent impermissible overpressure even when all other upstream control and monitoring equipment fail. To ensure these functional characteristics safety valves require regular and recurring maintenance. The maintenance intervals are determined by the operator in dependence of the operating conditions.

6 Dismantling the fitting

In addition to the general installation instructions it must be ensured that the system is made pressure free prior to disassembly of the safety valve.

7 Repairs

Repair work on safety valves is only to be carried out by Goetze KG Armaturen or by officially approved specialist workshops authorized by Goetze KG Armaturen using original spare parts only.

8 Warranty

Every valve is tested prior to leaving the factory. We grant a warranty for our products which entails the repair, free of charge, of any parts that are returned and verified as being prematurely unsuitable for use due to defective material or manufacturing. We shall not assume any liability for any damage ar other such obligations. If the factory seal is damaged, in the event of any incorrect handling or installation, non-observance of there operating and maintenance instructions, contamination or normal wear, warranty claims shall be null and void.

Fig. a): Lifting by means of a knurled nut

Fig. b): Lifting by means of a lever

Fig. c): Safety valve without bellows and without diaphragm

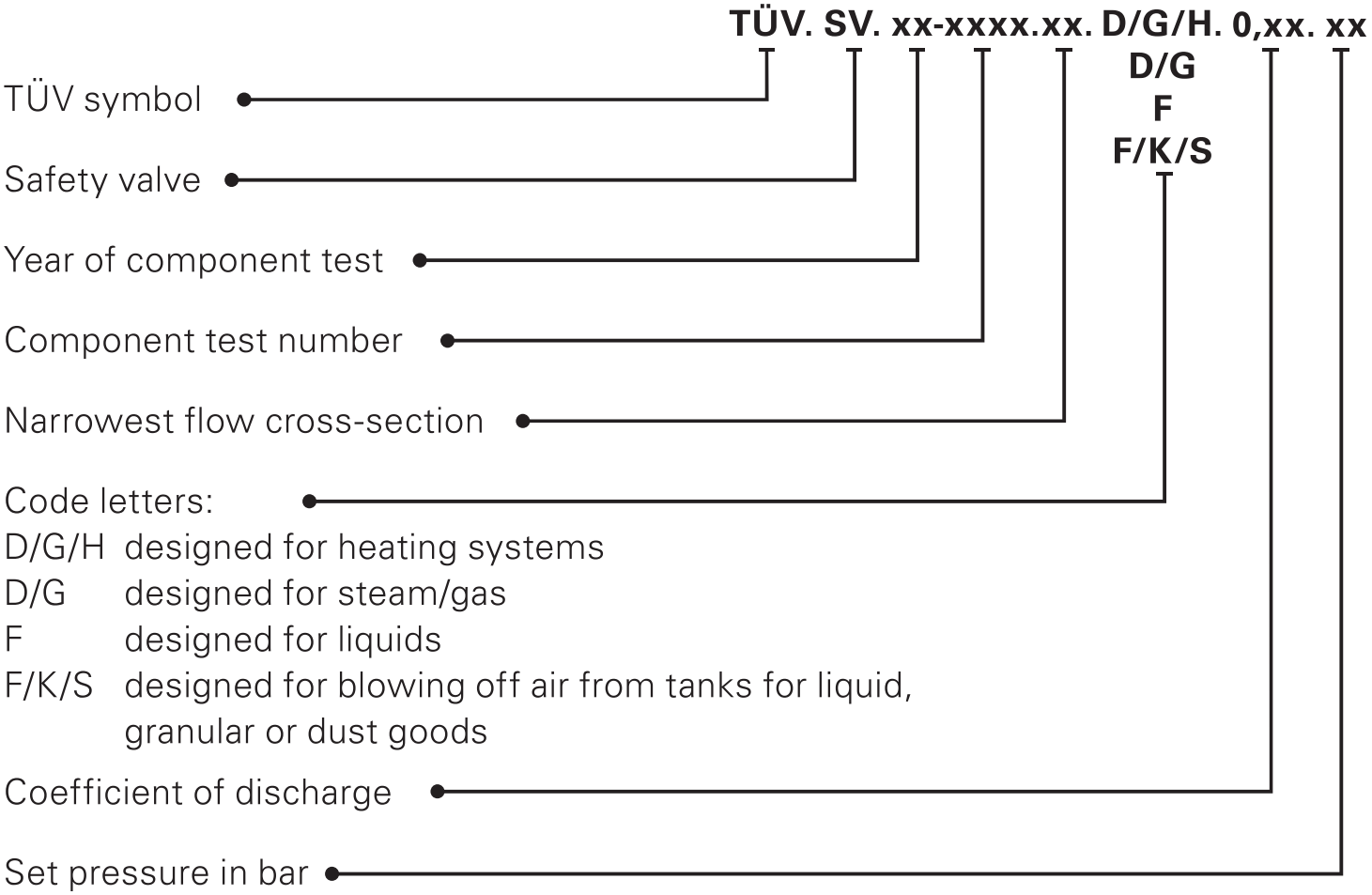
Fig. d): Safety valve with bellows

Fig. e): Safety valve with diaphragm

Fig. f): Safety valve with gastight cap

Fig. g): Safety valve with gastight lifting lever

9 Marking/testing



We check the safety valves for pressure resistance and tightness, adjust the requested set pressure and seal them. The identification on the type plate or on the spring bonnet of the valve is applied using a permanent marking system.
The type plate is additionally marked with identification codes and technical data in compliance with DIN EN ISO 4126-1.

Instructions de montage, d'utilisation et d'entretien

Soupape de sûreté 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Conseils de sécurité – Généralités

fr

- La soupape doit être utilisée uniquement :
  - aux fins auxquelles elle est destinée
  - en parfait état de fonctionnement
  - en connaissance des règles de sécurité et des dangers qu'elle comporte
- Respecter les instructions de montage.
- Remédier immédiatement à tout défaut susceptible de nuire à la sécurité.
- Les soupapes sont destinées exclusivement au domaine d'application indiqué dans la présente notice de montage. Toute utilisation différente ou toute utilisation allant au-delà de celle recommandée est considérée comme non conforme.
- La suppression du plombage d'usine fait perdre le bénéfice de la garantie.
- Les travaux de montage doivent uniquement être confiés au personnel qualifié autorisé.

2 Recommandations générales

Les soupapes de sureté sont des appareils de grande qualité qui demandent à être manipulées avec soin. Les surfaces du siège et du clapet ont subi un usinage minutieux propre à leur confèrer l'étanchéité nécessaire. Eviter la pénétration de corps étrangers durant le montage et le fonctionnement de l'appareil. Son étanchéité peut être endommagée par l'utilisation de chanvre, de ruban de Teflon ou d'autres matériaux d'étanchéité, ainsi que par des perles de soudure, etc. De même, une manipulation peu précautionneuse de la soupape de sécurité au cours du stockage, du transport et du montage peut être à l'origine d'un défaut d'étanchéité. Si les soupapes de sûreté doivent être mises en peinture, veiller à ce que les éléments mobiles ne reçoivent pas de traces de peintures.

3 Domaine d'utilisation

Pour tous details concernant le domaine d'application des différentes versions d'appareil, veuillez consulter les fiches techniques du fabricant.

4 Installation et montage

Les soupapes de sûreté à ressort doivent être montée e position verticale, le chapeau à ressort vers le haut. Monter la soupape de sécurité de telle façon qu'elle ne soit exposée à aucune contrainte non admissible que ce soit statique, dynamique ou thermique. Sur les sites où l'échappement du fluide par le corps de l'appareil peut constituer un danger direct ou indirect pour le personnel, il est indispensable de prévoir les mesures de protection qui s'imposent. Ceci est valable également pour les exsudations de vapeur qui peuvent se produire à travers les perçages de décharge du chapeau à ressort.

Adductions

Les manchons d'adductions des soupapes de sûreté doivent être le plus court possible et être conçus de façon à éviter que les pertes de charge à plein débit de la soupape ne dépassent pas plus de 3% de la pression de réglage.

Purge des condensats

Les conduites ou les soupapes elles-mêmes (pour les versions à brides) qui sont susceptibles de générer des condensats doivent être dotées au point le plus bas d'un dispositif de purge automatique. Veiller à une élimination des produits de condensation ou du fluide exsudé en toute sécurité. Protéger les corps de la soupape, conduites et silencieux contre le gel.

Conduite de décharge / contrepression

La conduite de décharge d'une soupape de sécuité doit être installée de telle manière qu'en cas d'échappement le fluide puisse être évacué sans pression. Pour les soupapes de sûreté avec soufflet métallique, une contrepression jusqu'à 4 bar maxi qui peut apparaître au moment de l'échappement, n'influe pas sur la pression de réglage de l'appareil.

5 Fonctionnement / Entretien

La pression de service de l'installation doit être au moins de 5% inférieure à la pression de fermeture de la soupape de sécurité. On parvient ainsi à une parfaite fermeture de la soupape de sécurité après l'opération de décharge. En cas d'apparition de légères fuites pouvant être causées par la pénétration d'impuretés entre les surfaces d'étanchéité, la soupape peut être nettoyée par un essai de décharge.
Si après cette opération la fuite persiste, la surface d'étanchéité est sans doute endommagée et ne peut être réparée que dans notre usine ou par des spécialistes autorisés. L'opération de décharge se fait, selon le type de soupape, soit par une molette au-dessus du chapeau de ressort (fig. a) en tournant l'écrou cranté dans le sens contraire aux aiguilles d'une montre (ensuite faire revenir la molette jusqu'à l'arrêt), soit en soulevant le levier de décharge de la soupape (fig. b). Lorsque la soupape quitte l'usine, le levier de décharge est immobilisé par un ruban de fixation qui doit être supprimé pour l'opération de décharge.

Soupapes de sûreté sans soufflet et sans bonnet étanche (fig. c)

Dans le cas des soupapes de sécurité sans soufflet et sans bonnet étanche,

l'élément supérieur de l'appareil peut être dévissé en entier du corps avec un outillage adéquat afin de débarrasser le siège et les surfaces d'étanchéité d'éventuelles impuretés.
Avant le démontage, veiller à ce que la soupape de sécurité ne soit pas sous pression. Le fait de réinsérer l'élément supérieur dans le corps de l'appareil ne modifie pas la pression de réglage.

Soupape de sécurité avec soufflet métallique (fig. d)
Dans le cas des soupapes de sécurité avec soufflet métallique, l'élément supérieur ne doit pas être désolidarisé du corps, car l'étanchéité ne pourrait plus être garantie dès l'apparition d'une contrepression.

Soupapes de sûreté avec clapet étanche au gaz (fig. f) ou avec levier comme dispositif de décharge étanche au gaz (fig. g)
Dans le cas de soupapes de sûreté avec clapet étanche au gaz ou levier comme dispositif de décharge étanche au gaz, ne pas désolidariser la partie supérieure du corps car l'étanchéité au gaz ne pourrait plus être garantie. Cependant si à des fins de réparations, il faut en dévisser la partie supérieure, veiller à ce que les ressorts soient détendus avant d'exécuter le démontage. De même qu'avant le démontage, contrôler le chapeau pour constater s'il y a un fluide et de quel fluide il s'agit. Il existe un danger de brûlure par acide ou un risque d'intoxication.

Essai de décharge pour entretien
Dans le cas de soupapes de sûreté avec dispositif de décharge, il est recommandé et même obligatoire selon les directives en vigeur, de vérifier de temps en temps le bon fonctionnement de la soupape de sûreté en purgeant la soupape par le devis de décharge. Il faut alors qu'elle ouvre sans moyen auxiliaire à partir de ≥ 85% de la pression de réglage. Ne pas effectuer l'opération de décharge en absence de pression. Selon TRD 601 le contrôle de bon fonctionnement des soupapes de sûreté utilisées dans les générateurs de vapeur doit avoir lieu à intervalles d'au moins 4 semaines. Les soupapes de sécurité sont l'ultime sécurité du réservoir ou du système de production. Elles doivent permettre d'empêcher l'apparition d'une pression non admissible même si tous les autres appareils de commande, de régulation et de contrôle installés en amont tombent en panne. Les soupapes de sécurité nécessitent un entretien regulier et répetitif afin de garantir cette disponibilité opérationnelle. Les intervalles d'entretien sont à définier par l'exploitant en fonction des conditions de service.

6 Démontage

En complément des directives de montage généralement applicables, vérifier avant le démontage des soupapes de sécurité si l'installation est bien mise hors pression.

7 Réparation

La réparation des soupapes peut être effectuée exclusivement par la société Goetze KG Armaturen elles-même ou par un atelier de réparation qualifié, qui n'utilisera que des pièces de réchange d'origine.

8 Garantie

Cette soupape a été contrôlée avant de quitter l'usine. La garantie que nous offrons sur nos produits couvre la remise en état gratuite des pièces retournées dont il peut être prouvé qu'elles sont devenues prématurément inutilisables suite à des défauts de fabrication ou de matériau. Nous ne prendrons en charge aucun dédommagement ou autre obligation de cette sorte. La garantie du fabricant ne peut être invoquée en cas d'endommagement du plombage d'usine, manipulation ou installation inadéquates, non-observation des présentes instructions de montage et d'entretien.

Fig. a Essai de décharge par molette

Fig. b Essai de décharge par levier

Fig. c Soupape de sûreté sans soufflet et sans membrane

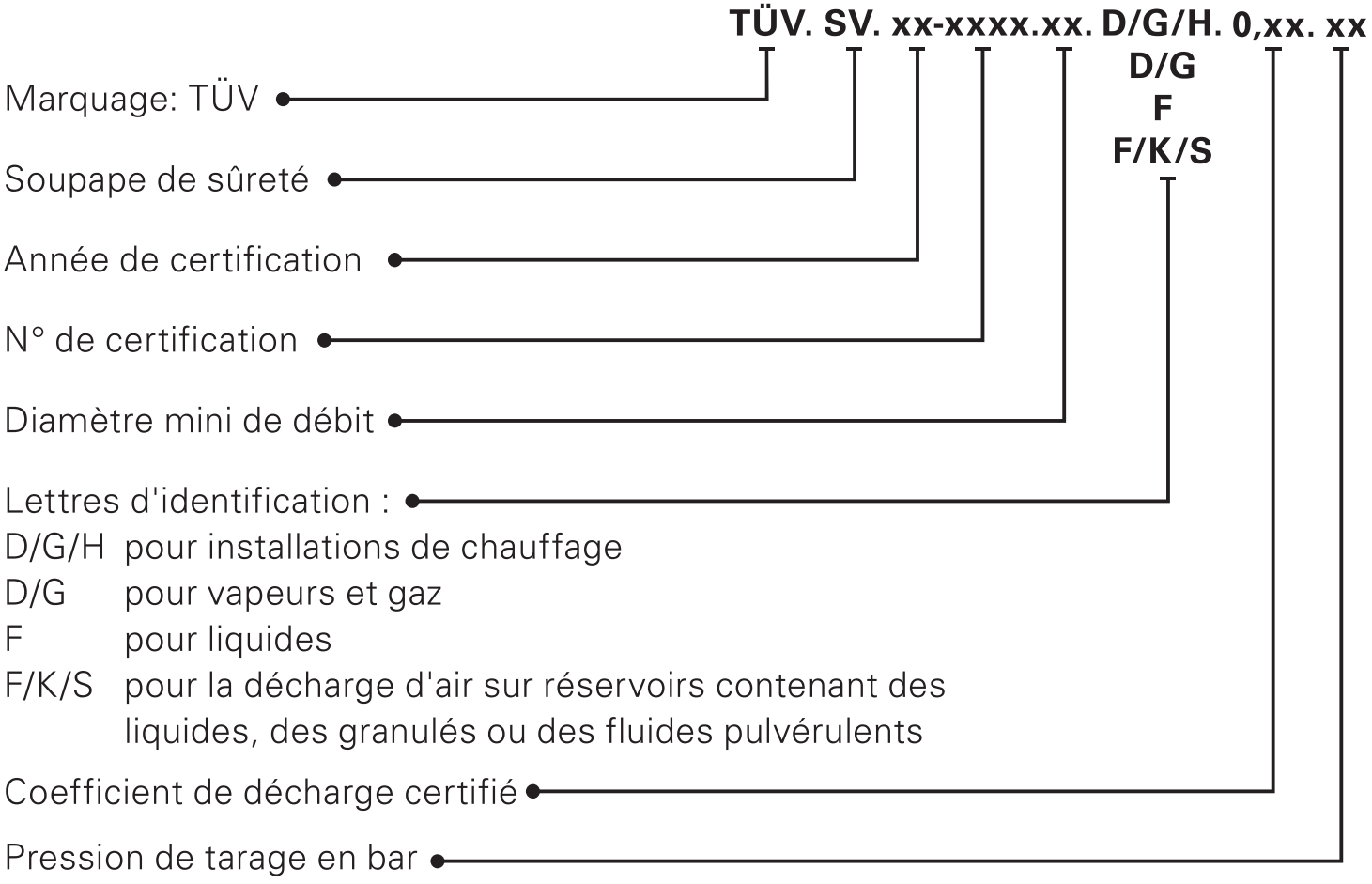
Fig. d Soupape de sûreté avec soufflet

Fig. e Soupape de sûreté avec membrane

Fig. f Soupape de sûreté avec clapet étanche au gaz

Fig. g Soupape de sûreté avec levier comme dispositif de décharge étanche au gaz

9 Marquage / contrôle



D/G/H pour installations de chauffage
D/G pour vapeurs et gaz
F pour liquides
F/K/S pour la décharge d'air sur réservoirs contenant des liquides, des granulés ou des fluides pulvérulents

Nos soupapes de sécurité sont contrôlées quant à leur résistance à la pression et à leur étanchéité; elles sont réglées à la pression de tarage souhaitée et dotées d'un plombage. Le marquage est indiqué de façon indélébile sur une plaquette attachée à chaque appareil, ou sur le chapeau à ressort de la soupape. Sur la plaquette d'identification figurent de plus des marquages et informations techniques requises suivant la DIN EN ISO 4126-1.

Instrucciones de servicio, montaje y mantenimiento

Válvula de seguridad 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Indicaciones generales de seguridad

es

- Solo utilice esta válvula:
  - para la finalidad de uso prevista
  - estando en perfecto estado
  - con conciencia de la seguridad y peligros
- Tenga en cuenta las instrucciones de montaje.
- Todos los fallos que puedan afectar la seguridad, deben eliminarse de inmediato.
- La válvula se destina exclusivamente para la finalidad de uso indicada en estas instrucciones de montaje. Cualquier otra utilización, o su uso más allá de la finalidad indicada, se considerará como no conforme a lo prescrito.
- En el caso de que se quite el precinto de fábrica, la garantía de regulación de la válvula quedará cancelada.
- Los trabajos de montaje sólo podrán ser realizados por personal técnico autorizado.

2 Indicaciones generales

Las válvulas de seguridad son accesorios de alta calidad que requieren ser manejados con especial cuidado. Las superficies de sellado se han maquinado con precisión en el asiento y el cono para conseguir la estanqueidad exigida. Evite siempre la entrada de partículas extrañas en la válvula durante el montaje y durante su funcionamiento. Se puede afectar la estanqueidad de una válvula de seguridad cuando se usa cáñamo, cinta de teflón, y a través de las bolas de soldadura, entre otras cosas. Del mismo modo, si se maneja bruscamente la válvula terminada durante el almacenamiento, transporte o montaje, se pueden ocasionar fugas en la válvula de seguridad. Si las válvulas de seguridad están pintadas, asegúrese de que las partes deslizantes no entren en contacto con la pintura.

3 Campo de aplicación

Para información sobre el campo de aplicación de las versiones individuales, le rogamos consulte la ficha técnica del fabricante.

4 Instalación y montaje

Las válvulas de seguridad de resorte cargado deben ser instaladas con el sombrerete de resorte apuntando verticalmente hacia arriba. Para asegurar el funcionamiento satisfactorio de la válvula de seguridad debe instalarse de tal modo que la válvula

de seguridad no esté expuesta a ninguna carga que no esté permitida, bien sea estática, dinámica o térmica. Deben aplicarse dispositivos de protección adecuados si el material que se descarga con la operación de la válvula puede crear peligros directos o indirectos a personas o al medio ambiente. Preste atención siempre a los posibles gases que se despidan de los orificios de alivio en el sombrerete de resorte.

Suministro

Las piezas de conexión de suministro para válvulas de seguridad deben mantenerse lo más cortas posibles y deben diseñarse de tal modo que no se produzca una pérdida de la presión superior a un máximo de un 3% de la presión de respuesta.

Eliminación de la emisión de condensado

En el caso de la posible formación de condensado, se debe colocar en las tuberías o las válvulas mismas (en versión de pestaña), en su punto más bajo, un dispositivo de emisión de condensado de funcionamiento continuo. Se debe asegurar que la eliminación del condensado o de la emisión de materiales no acarree ningún peligro. La carcasa, las tuberías y los silenciadores deben protegerse contra la congelación.

Tubería de expulsión / contrapresión

La tubería de expulsión de las válvulas de seguridad debe estar diseñada de modo que se asegure la expulsión sin presión del flujo de masa requerido durante el proceso de expulsión. En las válvulas de seguridad con muelles de metal una contrapresión de hasta un máximo de 4 bar no tiene impacto sobre la presión de respuesta de la válvula de seguridad.

5 Operación /Mantenimiento

La presión de trabajo de la planta debe ser por lo menos un 5% inferior a la presión de cierre de la válvula de seguridad. De este modo, la válvula puede cerrarse satisfactoriamente otra vez tras el proceso de expulsión. En el caso de que haya pequeñas fugas, las que pueden ser causadas por contaminación entre las superficies de sellado, se puede hacer que la válvula expulse a través de su levantamiento, y así efectuar su limpieza. Si esto no detiene la fuga, es posible que la superficie del sello esté dañada, y sólo se podrá arreglar en nuestra fábrica o con especialistas autorizados. Dependiendo de la versión, el levantamiento se efectúa bien a través de una tuerca estriada encima del sombrerete de resorte (Fig. a), la que se gira en sentido contrario a las agujas del reloj (a continuación la tuerca estriada se debe girar de vuelta al punto de parada) o bien accionando la palanca de levantamiento en la parte superior de la válvula (Fig. b). Para la seguridad en la entrega del producto, la palanca de levantamiento está bloqueada a través de una correa que hay que quitar para accionar el dispositivo de levantamiento.

Válvulas de seguridad sin fuelles y sin caperuza estanca al gas (fig.c)

Adicionalmente, en el caso de las válvulas de seguridad sin fuelles y sin caperuza estanca al gas, la parte superior entera de la válvula se puede desenroscar de la carcasa usando las herramientas correspondientes y para eliminar todo residuo del asiento de la válvula y de la junta del asiento.

Antes de eliminar residuos asegúrese de que la válvula de seguridad no esté bajo presión.

La presión de respuesta de la válvula de seguridad no se modifica al volver a montar la parte superior de la carcasa.

Válvulas de seguridad con fuelles de metal (fig. d)

En el caso de válvulas de seguridad con fuelles de metal, la parte superior no se separa de la carcasa porque de otro modo no podría garantizarse la estanqueidad de las válvulas en el caso de que se produzca una contrapresión.

Válvulas de seguridad con caperuza estanca al gas (fig. f) y con sistema de palanca estanca al gas (fig. g)

En las válvulas de seguridad con caperuza estanca al gas o sistema de palanca estanca al gas la parte superior no se debe separar de la carcasa ya que, de lo contrario, no está garantizada ya la estanqueidad al gas. Si resulta necesario desatornillar la parte superior para fines de reparación, hay que tener que cuenta que el muelle se destense antes del desmontaje. Asimismo, hay que controlar antes del desmontaje si hay algún medio en la caperuza y, en caso dado, cuál. Existe peligro de quemadura por ácido o envenenamiento.

Levantamiento para realizar mantenimiento

En las válvulas de seguridad con dispositivo para levantar el cono se recomienda, y ségun las disposiciones relevantes es también obligatorio purgar la válvula de seguridad regularmente activándola brevemente de forma especifica de la instalacón para cerciorarse asì del funcionamiento de la válvula de seguridad. Es por este motivo por el que pueden abrirse por último a una presión de trabajo de ≥ 85% de la presión de respuesta. El dispositivo de levantamiento no debe operarse cuando la válvula no tenga presión alguna. En maquinaria de generación de vapor, la facilidad de movimiento de la válvula de seguridad debe ponerse a prueba por lo menos cada cuatro semanas, de conformidad con TRD 601. La válvula de seguridad es el último dispositivo de seguridad de un tanque o sistema y por lo tanto debe ser capaz de evitar que se produzca una sobrepresión inadmisible incluso en el caso de que fallase todo el otro equipo de control y monitorización preconectado. Para garantizar un tal funcionamiento de las válvulas de seguridad, deben someterse a mantenimiento con regularidad y de repetición. La frecuencia de los servicios de mantenimiento será determinada por el operador dependiendo de las condiciones de funcionamiento.

6 Desmontaje del accesorio

Además de las instrucciones generales para el desmontaje, se debe asegurar que el sistema no tenga presión alguna antes de desmontar la válvula de seguridad.

7 Reparaciones

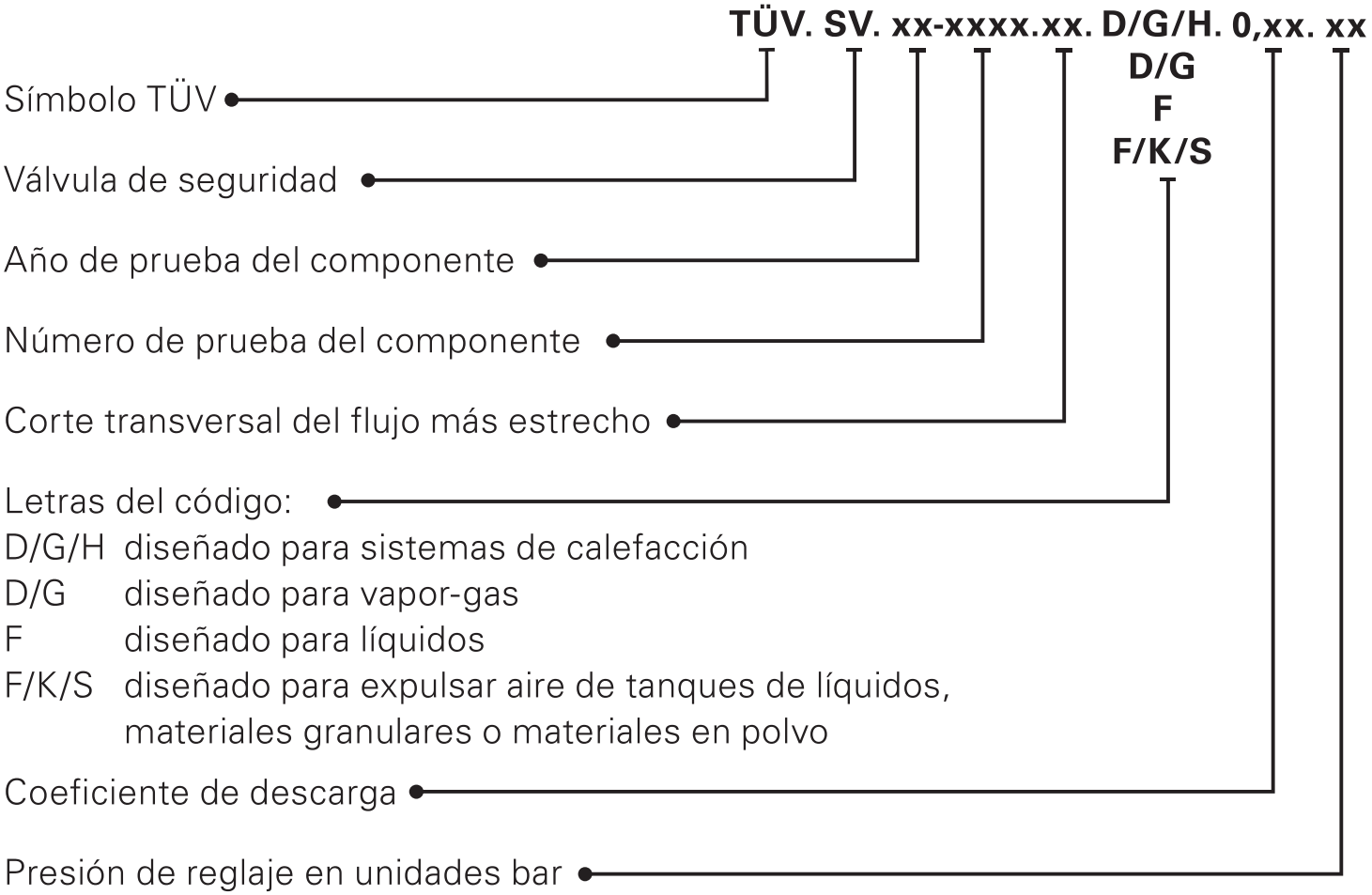
Las reparaciones que deban realizarse en las válvulas de seguridad solo deben ser efectuadas por Goetze KG Armaturen o por talleres especializados aprobados, usando sólo piezas de recambio originales.

8 Garantía

Cada válvula es puesta a prueba antes de salir de la fábrica. La garantía de nuestros productos cubre la reparación libre de cargo de toda pieza que se devuelva y quede comprobado que es prematuramente inadecuada para su uso debido a un defecto en el material o en la fabricación. No somos responsables de ningún daño ni estamos sujetos a ninguna otra obligación. Las reclamaciones a la garantía no serán válidas en los siguientes casos: el sello o precinto de fábrica ha sido violado, el manejo o la instalación son incorrectos, no se ha cumplido con estas instrucciones de funcionamiento y mantenimiento, se ha producido una contaminación, o por el desgaste normal de la válvula.

Fig. a Levantamiento mediante tuerca
Fig. b Levantamiento con palanca estriada
Fig. c Válvula de seguridad sin fuelles y sin membrana
Fig. d Válvula de seguridad con fuelles
Fig. e Válvula de seguridad con membrana
Fig. f Válvula de seguridad con caperuza estanca al gas
Fig. g Válvula de seguridad con sistema de palanca estanca al gas

9 Identificación / Verificación



D/G/H diseñado para sistemas de calefacción
D/G diseñado para vapor-gas
F diseñado para líquidos
F/K/S diseñado para expulsar aire de tanques de líquidos, materiales granulares o materiales en polvo

Revisamos las válvulas de seguridad para comprobar la resistencia a la presión y la estanqueidad, ajustamos la presión de reglaje requerida y las sellamos. La identificación en la placa del tipo o en el sombrerete de resorte de la válvula se aplica mediante un sistema de marcado permanente. La placa del tipo se marca adicionalmente con códigos de identificación y datos técnicos de conformidad con DIN EN ISO 4126-1.

安装、保养与使用说明书

安全阀 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

zh

1 通用安全提示

- 使用本型号阀门只在以下情况：
  - 符合预期规划
  - 在良好状态下
  - 具备安全与危险意识
- 请注意组装说明书信息。
- 凡影响安全的故障，请务及时排除。
- 本安全阀仅限于本使用说明书中罗列的使用范围。任何其他用途一律 视为违反符合预期规划。
- 拆除铅封，即视为自动解除保修。
- 所有安装工作必须由授权的专业人员进行。

2 一般提示

安全阀属于高值组件，务必格外谨慎对待。阀座和阀锥之间经过精加工的密封面能保障足够的的密封性。安装和使用中避免异物侵入阀门内部。印度大麻纤维、特氟龙胶带或其他密封物品以及焊瘤等这些物质会影响安全阀的密封性能。另外，粗鲁地仓储、运输和安装安全阀，也会造成该安全阀密封性能失效。如安全阀上要喷涂彩色涂料，请注意滑动部件不可接触涂料。

3 使用范围

关于本型号范围内各个安全阀使用范围的详尽信息，请参照制造商技术指标执行。

4 安装和组装

弹簧式安全阀应和垂直向上的弹簧腔阀盖一起安装。这种朝向安装是为了确保安全阀完美的工作性能，防止运行中不允许的静态、动态或者热力学载荷干扰安全阀功能。如发生介质通过阀体泄漏而可能直接或者间接造成人身危险或环境污染，务必采取适当的保护措施。在此，也不要忽视透过弹簧腔阀盖上的卸载孔排出的间断性微弱气流喷发。

入口接管

用于安全阀的入口连接管件应尽可能短。同时该入口连接管件设置上也要确保安全阀处于最大功率，不出现超过整定压力3%的压力损耗。

冷凝水排放

安装安全阀的管道以及安全阀本身（法兰连接方式）必须考虑到可能出现的冷凝水沉积而为此在管件系统最低点安置可持续性排放冷凝水的装置。要安全地排放冷凝水或者渗出的介质。谨防阀体、管道和消音器结冰。

泄压排放与背压

安全阀的泄压排放管道，必须确保泄压排放时所要求的介质流能在无压状态下排出。配有金属波纹管的安全阀，在泄压排放中，当背压不超过4bar时，不会影响安全阀的整定压力。

5 作业模式与维护

设备的工作压力应至少低于安全阀回座压力的5%。这样保证了泄压排放后，安全阀又能完全回座。如果密封面之间的脏污引起微量泄漏，可以利用透气排泄方式对阀门进行清洁。如果还是不能消除泄漏，则可能是密封面受损，这种情况下就必须在我们的工厂或者被授权的专业人员进行修理。

视阀门型号配置而定，或者通过逆时针旋转弹簧腔阀盖上(插图a)的滚花螺母(然后旋回滚花螺母，直至撞击处)进行透气泄压，或者通过操作阀门 上部件上 的透气拉杆(图b)来进行透气。出 厂 时 ，如果透气拉杆使 用 金 属 丝 线 铅 封过，操作阀门透气前需拆除该铅封丝线。

无波纹管和无气密阀帽的安全阀（插图c）

无波纹管和无气密阀帽的安全阀的上部件，可以使用相应的工具将上部件从阀体上卸下来。如有必要，清除阀座和密封件上的残留物。

小心拆卸安全阀，之前确认，在安全阀上不可加压。通过重新将上部件装入阀体后，能确保安全阀的整定压力保持不变。

带金属波纹管的安全阀（插图d）

对于带金属波纹管的安全阀，其阀体上部件不可与阀体分离，否则出现背压时再也无法保障其密封性。

带气密帽的安全阀（插图f)或者带气密透气拉杆的安全阀（插图g）

对于带气密帽或带气密透气拉杆的安全阀， 其阀体上部件不可与阀体分离，否则时再也无法保障其气密性。如因维修有必要卸下阀体上部件，那么拆卸法体上部件之前一定让弹簧卸载。同时，阀门拆卸前要留意查看，弹簧腔阀盖内是否以及会存有哪种介质。这里有腐蚀和中毒危险!

维护的透气泄压

为了确保安全阀的功能正常，对于带透气装置的安全阀，建议视设备具体情形而定，要按规定要求，时不时地对安全阀进行透气泄压事宜。必须保障阀门最迟的开启压力在工作压力达到整定压力值85 %。透气泄压不可在零压力状 态下进行。根据（德国蒸汽锅炉技术规范）TRD 601对锅炉设备运行的要求，至 少 每 隔 4个月检查一次蒸汽发生器的安全阀是否处于运行平稳状态。安全阀是容器和系统的最后安全防线。即使在所有其他的前置调节、控制和监控器件都失灵的状态下，安全阀也要能够阻止不允许过压的出现。为了确保这一功能，需要定期并反复维护安全阀。 安全阀维护的周期取决于用户具体使用环境。

6 阀门拆卸

拆卸阀门时，除了要遵守通用的安装指令外，务必在开始阀门拆卸之前使设备系统达到零压状态。

7 修理

安全阀的修理，只允许Goetze KG Armaturen（高策阀门责任无限公司）或者经高策阀公司授权的专业公司完成，而且仅限于使用高策原装配件进行作业。

8 保修

出厂前，本阀门已通过检验合格。本公司对产品保修模式是：凡确因材料缺陷或制造缺陷致使过早怠工的阀门，本公司承诺收到客户寄回的阀门后免费维修。本公司恕不承担赔偿损失以及类似其他义务。因出厂封口损坏、产品安装及使用不当、忽视本安装保养与使用说明书提示、污垢或正常性的磨损均不属保修之列。

插图. a)：滚花螺母的透气功能

插图. b)：透气拉杆的透气功能

插图. c)：无波纹管和无隔膜的安全阀

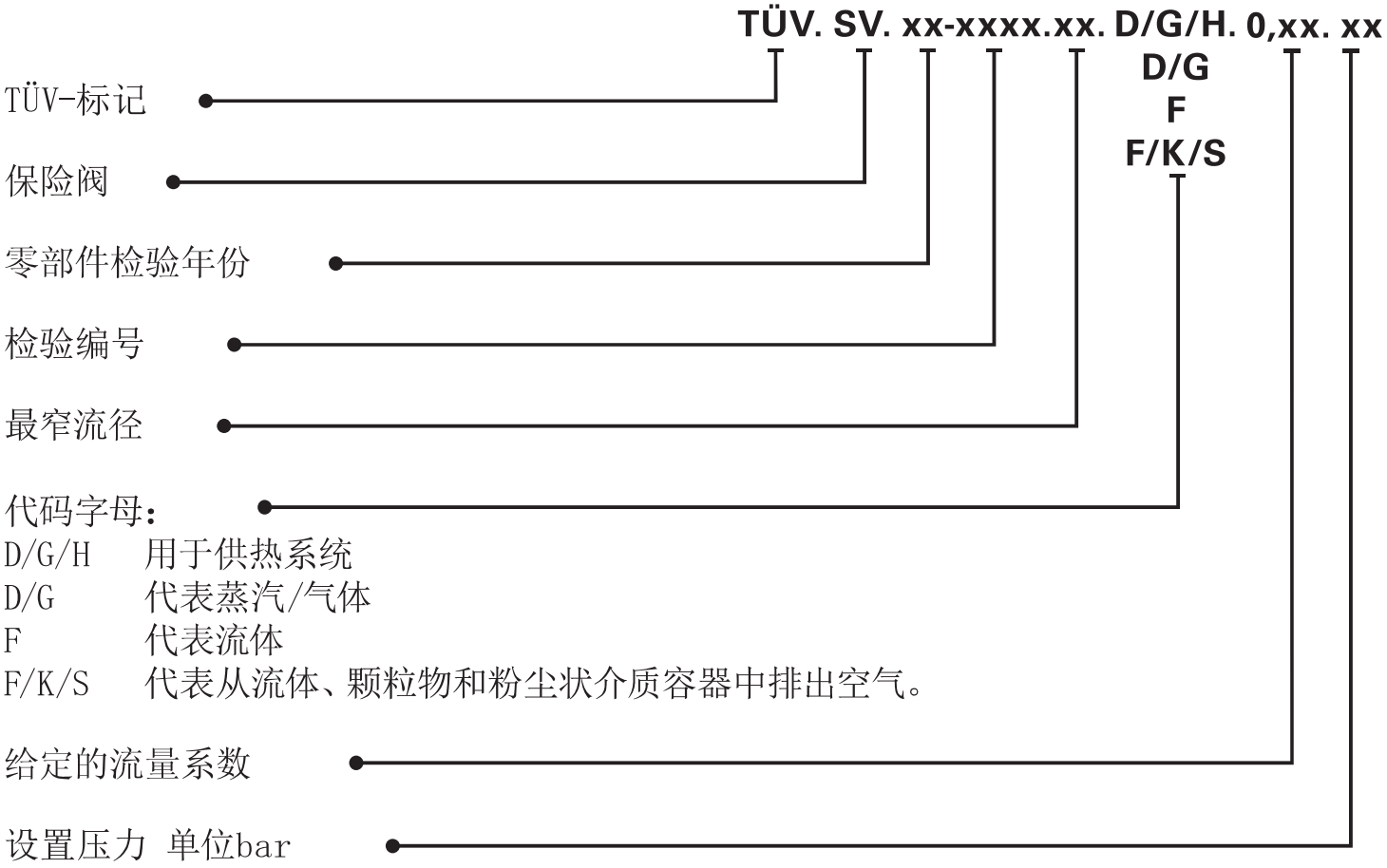
插图. d)：带有波纹管的安全阀

插图. e)：带有隔膜的安全阀

插图. f)：带气密帽的安全阀

插图. g)：带气密拉杆透气功能的安全阀

9 标记与检验



出厂前，所有安全阀通过了抗压强度试验和密封性试验，按客户需求调试好了设置压力并予以铅封。

上述检验标记已经永久性印制在安全阀产品铭牌或者弹簧腔阀盖上。此外，根据DIN EN ISO 4126-1要求，标记上附有必要的参数信息。

中华人民共和国特种设备制造许可证

系列	中国TS认证
851 P/PL; T/ TL	A2
851 bH	A2
851 G	A2
851 E/EI	A2
851 F	A2
352	A2
861	A2
461	A1
460	A2

Instruções de montagem, manutenção e operação

Válvula de segurança 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Indicações gerais de segurança

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- Use a válvula somente:
  - para o fim a que se destina,
  - em condições impecáveis,
  - em plena consciência dos aspectos de segurança e dos riscos
- As instruções de instalação devem ser observadas.
- Falhas que possam prejudicar a segurança devem ser eliminadas imediatamente.
- A válvula de segurança destina-se exclusivamente ao uso pretendido especificado nestas instruções de instalação. Qualquer outro uso ou uso posterior é considerado impróprio.
- A remoção do lacre anula a garantia de fábrica.
- Todo o trabalho de montagem deve ser realizado por pessoal especializado autorizado.

2 Informações gerais

Válvulas de segurança são válvulas de alta qualidade que devem ser manuseadas com cuidado especial. As superfícies de vedação são finamente trabalhadas na sede e disco, assim, o aperto necessário é alcançado. A penetração de corpos estranhos na válvula deve ser evitada durante a montagem e durante a operação. A vedação de uma válvula de segurança pode ser afetada por cânhamo, fita de teflon ou outros selantes e por respingos de solda. Mesmo o manuseio agressivo da válvula de segurança acabada durante o armazenamento, transporte e instalação pode causar vazamento da válvula. Se as válvulas de segurança forem pintadas, certifique-se de que as partes deslizantes não entrem em contato com a tinta.

3 Área de aplicação

Os detalhes sobre a área de aplicação das versões individuais podem ser encontrados nas folhas de dados do fabricante.

4 Instalação e montagem

As válvulas de segurança de mola devem ser instaladas com o castelo apontando para cima. Para garantir que as válvulas de segurança funcionem corretamente, elas devem ser montadas de modo que nenhuma carga estática, dinâmica ou térmica possa agir sobre elas. Se puderem surgir, direta ou indiretamente, riscos para as pessoas ou para o meio ambiente através do corpo em casos de abertura, devem ser tomadas medidas de proteção. Também devem ser consideradas as eliminações pelos orifícios de alívio do castelo.

Alimentação

Os bocais de alimentação para as válvulas de segurança devem ser os mais curtos possíveis e devem ser projetados de tal forma que, no desempenho total da válvula, não haja perdas de pressão maiores do que 3% da pressão de abertura.

Drenagem do condensado

As linhas ou as próprias válvulas (na versão com flange) devem ser fornecidas com um dispositivo de descarga de condensado, de ação constante, em seu ponto mais baixo, no caso de uma possível condensação. Deve-se assegurar uma drenagem segura do condensado ou do meio derramado. Os corpos, linhas e silenciadores devem ser protegidos contra congelamento.

Linha de descarga/contrapressão

A linha de descarga das válvulas de segurança deve ser projetada de modo que o fluxo de massa necessário possa ser dissipado sem pressão durante a descarga. No caso de válvulas de segurança com fole de metal, uma contrapressão que ocorre durante a descarga não afeta a pressão de abertura da válvula até no máx. 4 bar.

5 Modo de operação/manutenção

A pressão de trabalho do sistema deve estar pelo menos 5% abaixo da pressão de fechamento da válvula de segurança. Isso garante que a válvula de segurança possa fechar corretamente novamente após a descarga. Para vazamentos menores, que podem ser causados por sujeira entre as superfícies de vedação, a válvula pode ser retirada para limpeza na ventilação para descarga. Se o vazamento não puder ser eliminado, provavelmente haverá danos na superfície de vedação que só poderão ser reparados em nossa fábrica ou por profissionais autorizados. A ventilação é feita por meio de uma porca serrilhada sobre o castelo (fig. a), rodando-o no sentido anti-horário (depois a porca serrilhada deve voltar a girar até o batente) ou acionando a alavanca de ventilação na parte superior da válvula (fig. b). Na entrega, a alavanca está travada com uma correia, que deve ser removida para o acionamento da ventilação.

Válvulas de segurança sem fole e sem tampa estanque a gás (fig. c)

No caso de válvulas de segurança sem fole e sem tampa estanque a gás, toda a parte superior pode ser removida do corpo desparafusando-a com a ferramenta apropriada e qualquer resíduo na sede e na vedação da sede pode ser removido.

Antes da desmontagem, certifique-se de que a válvula de segurança não esteja pressurizada. Ao recolocar a parte superior no corpo, a pressão de abertura

da válvula de segurança não foi alterada.

Válvulas de segurança com fole metálico (fig. d)

Para as válvulas de segurança com foles, a parte superior do corpo não deve ser separada, caso contrário, não haverá garantia de vedação se ocorrer contrapressão.

Válvulas de segurança com tampa impermeável aos gases (fig. f) ou ventilação com alavanca estanque ao gás (fig. g)

Para válvulas de segurança com tampa estanque a gás ou ventilação com alavanca estanque ao gás, a parte superior não deve ser separada do corpo, pois caso contrário, a estanqueidade do gás não é mais garantida. Se ainda for necessário desaparafusar a parte superior para fins de reparo, certifique-se de que a mola seja liberada antes da desmontagem. Antes da desmontagem, também deve ser verificado se e qual meio pode estar no castelo. Existe o risco de possíveis queimaduras químicas ou envenenamento.

Dispositivo de ventilação para manutenção

No caso de válvulas de segurança com dispositivo de ventilação, é recomendado e também regra específica para o sistema que a válvula de segurança seja purgada de tempos em tempos pela descarga, a fim de garantir seu funcionamento. Por conseguinte, elas podem ser abertas no máximo com uma pressão de funcionamento igual ou superior a 85% da pressão de abertura. A ventilação não deve ocorrer no estado despressurizado. Deve ser realizado um teste de abertura das válvulas de segurança de acordo com a TRD 601 para geradores de vapor pelo menos a cada 4 semanas.
As válvulas de segurança representam a última segurança para o reservatório ou o sistema. Eles devem ser capazes de evitar uma sobrepressão inadmissível, mesmo se todos os outros dispositivos reguladores, de monitoramento e controle a montante falharem. Para garantir essas características funcionais, as válvulas de segurança exigem manutenção regular e periódica. Os intervalos de manutenção devem ser determinados pelo operador de acordo com as condições de uso.

6 Desmontagem da válvula

Além das diretrizes de instalação geralmente válidas, deve ser observado que o sistema deve ser despressurizado antes de desmontar a válvula de segurança.

7 Reparos

Os reparos nas válvulas de segurança só podem ser realizados pela Goetze KG Armaturen ou por oficinas especializadas autorizadas, utilizando apenas peças de reposição originais.

8 Garantia

Esta válvula foi testada antes de sair da fábrica. Fornecemos, para os nossos produtos, garantia de reparo gratuito contra devolução, de peças que estejam comprovadamente inutilizadas como resultado de defeitos de fabricação ou de material. Não assumimos indenização por danos e outras obrigações. Danos ao selo de fábrica, tratamento ou instalação inadequados, falha em seguir estas instruções de montagem, manutenção e operação, sujeira ou desgaste normal anularão a garantia de fábrica.

fig. a): Ventilação por porca serrilhada

Fig. b): Ventilação com alavanca

fig. c): Válvula de segurança sem fole e sem membrana

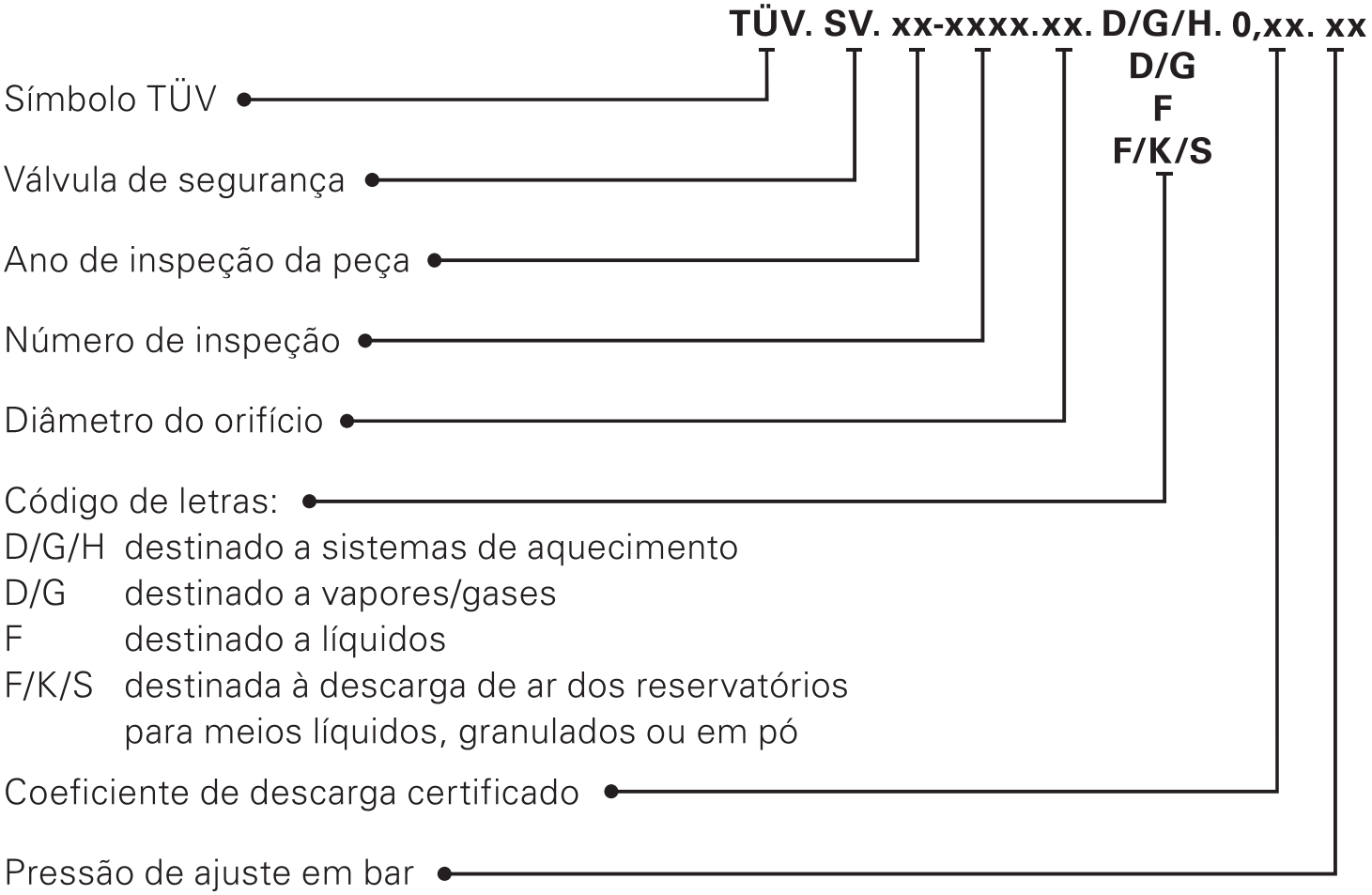
Fig. d): Válvula de segurança com fole

fig. e): Válvula de segurança com membrana

fig. f): Válvula de segurança com tampa impermeável aos gases

fig. g): Válvula de segurança com ventilação com alavanca estanque ao gás

9 Identificação/inspeção



D/G/H destinado a sistemas de aquecimento
D/G destinado a vapores/gases
F destinado a líquidos
F/K/S destinada à descarga de ar dos reservatórios para meios líquidos, granulados ou em pó

As válvulas de segurança são testadas por nós para resistência à pressão e estanqueidade, ajustadas à pressão de ajuste desejada e vedadas. A identificação está marcada de maneira indelével na placa de identificação ou no castelo da válvula. Além disso, a identificação contém as informações necessárias de acordo com a DIN EN ISO 4126-1.

Pokyny pro instalaci, údržbu a provoz

Pojistný ventil 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Všeobecná bezpečnost

CS

- Ventil používejte pouze:
  - jak je zamýšleno
  - v perfektním stavu
  - bezpečně a obezřetně
- Instalační pokyny se musí dodržovat.
- Poruchy, které mohou ovlivnit bezpečnost, musí být ihned odstraněny.
- Pojistný ventil je určen pouze pro použití v rozsahu uvedeném v těchto pokynech pro instalaci. Jakékoli jiné použití nebo použití nad rámec specifikací je nevhodné.
- Při odstranění plomby pozbývá záruka platnost.
- Všechny instalační práce musí provádět autorizovaní pracovníci.

2 Všeobecné informace

Pojistné ventily jsou armatury s vysokou kvalitou, které vyžadují obzvlášť pečlivé zacházení. Těsnicí povrchy jsou přesně obráběny v místě sedla a kuželu, takže je dosahována potřebná těsnost. Během montáže a provozu se musí zabránit vniknutí cizorodých těles do ventilu. Těsnost pojistných ventilu může být ovlivněna nečistotou, teflonovou páskou nebo jinými způsoby utěsnění, například návary, kovovými odštěpky apod. Při hrubém zacházení se sestaveným pojistným ventilem během skladování, přepravy nebo montáže může dojít k tomu, že bude pojistný ventil netěsný. Pokud jsou pojistné ventily chráněny nátěrem, musí se zajistit, aby posuvné části nepřišly s tímto nátěrem do styku.

3 Oblast použití

Podrobnosti o oblasti použití jednotlivých verzí jsou uvedeny v datových listech výrobce.

4 Instalace a montáž

Pružinové pojistné ventily se montují s krytem pružiny ve svislé pozici. Pro zajištění správné funkce musí být pojistné ventily instalovány tak, aby nebyly vystaveny nadměrném statickému, dynamickému nebo tepelnému namáhání. V případě, že při aktivaci ventilu mohou být ohroženy osoby nebo prostředí unikajícím médiem, musí se přijmout vhodná ochranná opatření. Rovněž je možné zvážit odvod přes odvětrávací otvory krytu pružiny.

Vedení

Přívodní vedení k pojistným ventilům musí být co nejkratší a navrženo tak, aby při plném otevření ventilu nedošlo k vyššímu poklesu tlaku než max. 3 % tlaku odezvy.

Odvod kondenzátu

Vedení nebo samotný ventil (s přírubou) musí být opatřeny odvodem případného kondenzátu v nejnižším bodě s kontinuálním způsobem odvodu kondenzátu. Musí být zajištěno bezpečné odvádění kondenzátu nebo vypouštění média. Těleso ventilu, vedení a tlumiče musí být chráněny proti zamrzání.

Odpouštění / protitlak

Odpouštěcí potrubí pojistných ventilů musí být navrženo tak, aby odpouštění požadovaného hmotnostního průtoku probíhalo bezpečně. U pojistných ventilů s kovovými vlnovci nemá protitlak při odfukování o velikosti až 4 bary vliv na nastavení tlaku pojistného ventilu.

5 Provoz / údržba

Pracovní tlak zařízení by měl být přinejmenším o 5 % nižší než uzavírací tlak pojistného ventilu. Zajistí to, že se pojistný ventil po odpuštění znovu správně zavře. V případě drobných netěsností, které mohou být způsobeny kontaminací těsnicích povrchů, je možné vyčistit pojistný ventil přes odfuk. Pokud nedojde k odstranění netěsnosti, je pravděpodobně poškozený těsnicí povrch, který je možné opravit pouze ve výrobním závodu nebo autorizovanými specialisty.

Spuštění odfuku se provádí otočením drážkované matice umístěné nad krytem pružiny (obr. a), otočením proti směru hodinových ručiček (a následně opětovným otočením až k zarážce) nebo páčkou v horní části ventilu (obr. b). Zvedací páka je při dodání zajištěna páskou, kterou je nutnou odstranit, aby bylo možné ovládat odfukovací mechanismus.

Pojistné ventily bez vlnovců a bez plynotěsného krytu (obr. c)

U pojistných ventilů bez vlnovců a bez plynotěsného krytu je možné navíc odšroubovat horní část vhodnými nástroji, vyjmout celou horní část z tělesa ventilu a odstranit nečistoty ze sedla a těsnění sedla.

Před demontáží je třeba ověřit, zda není ventil pod tlakem. Po opětovném umístění horní části tělesa se nastavený tlak pojistných ventilů nezmění.

Pojistné ventily s kovovými vlnovci (obr. d)

U pojistných ventilů s vlnovci nesmí být horní část oddělena od tělesa, protože v takovém případě by nadále nebylo možné zaručit těsnost při protitlaku.

Pojistné ventily s plynotěsným víčkem (obr. f) nebo plynotěsnou ruční páčkou (obr. g)

U pojistných ventilů s plynotěsným víčkem nebo plynotěsnou ruční páčkou by horní část neměla být odstraněna z tělesa ventilu, protože v takovém případě nelze plynotěsnost nadále zaručit. Pokud je pro účely oprav odšroubování horní části přesto nezbytné, musí být před demontáží uvolněna pružina. Před demontáží je třeba zkontrolovat, které médium může být v tělese ventilu. Hrozí nebezpečí poleptání nebo otravy.

Odfuk pro údržbu

Pro pojistné ventily s odfukem se v rámci konkrétních instalací doporučuje čas od času pojistný ventil nechat spustit a odfouknout, aby se ověřila funkce pojistného ventilu. To by mělo proběhnout při vyšším tlaku než je 5 % minimálního provozního tlaku pro otevření. Odfuk by se neměl provádět v odtlakovaném stavu. Kontrolu správné funkce pojistných ventilů je třeba provádět podle TRD 601 pro parní generátory v intervalech nejméně 4 týdny. Pojistné ventily jsou posledním bezpečnostním prvkem nádoby nebo systému. Měly by být schopny zabránit nadměrnému zvýšení tlaku i v případě, že selžou všechny ostatní regulační, kontrolní a sledovací prvky zapojené před nimi. Pro zajištění těchto funkčních charakteristik vyžadují pojistné ventily pravidelnou údržbu. Intervaly údržby určuje operátor podle podmínek použití.

6 Demontáž ventilu

Kromě všeobecných principů řídicích instalaci je třeba uvést, že před. Před demontáží pojistných ventilů musí být systém odtlakován.

7 Opravy

Opravy pojistných ventilů smí provádět pouze společnost Goetze KG Armaturen nebo autorizovaná servisní střediska za použití originálních náhradních dílů.

8 Záruka

Před odesláním ze závodu byl tento ventil testován. Pro naše uvedené produkty zaručujeme, že uvedeme součásti od opětovně provozuschopného stavu, bezplatně, v případě, že dojde k jejich předčasnému selhání z důvodu materiálové nebo výrobní vady. Odpovědnost za následné škody ani jiné závazky nepřijímáme. V případě poškození plomby z výroby, nesprávné manipulace nebo instalace, nedodržení těchto pokynů pro instalaci, údržbu a provoz, kontaminace nebo běžného opotřebení tato záruka pozbývá platnost.

Obr. a): Odfuk drážkovanou maticí

Obr. b): Odfuk zdvihací páčkou

Obr. c): Pojistný ventil bez vlnovce a bez membrány

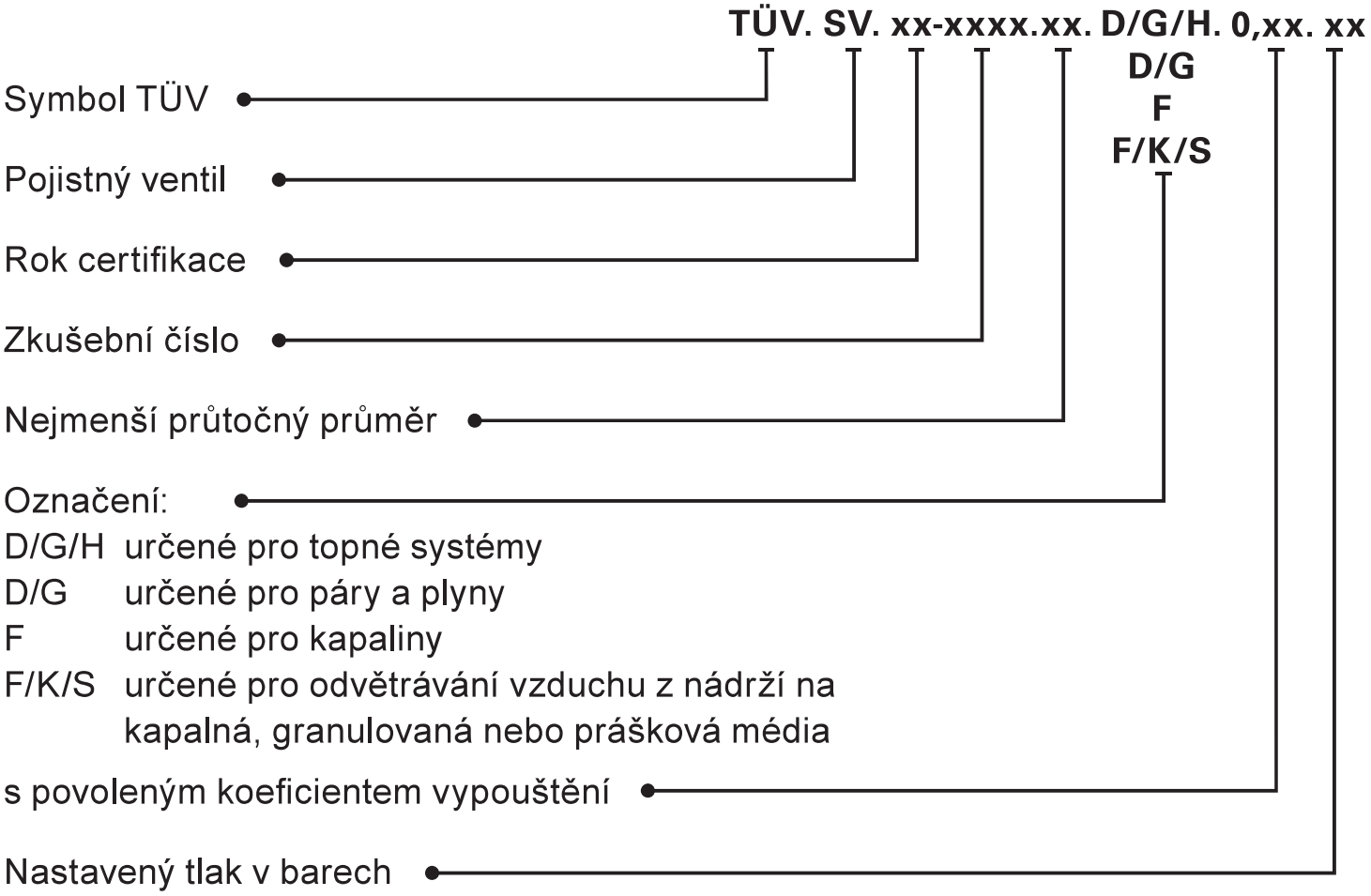
Obr. d): Pojistný ventil s vlnovcem

Obr. e): Pojistný ventil s membránou

Obr. f): Pojistný ventil s plynotěsným víčkem

Obr. g): Pojistný ventil s plynotěsnou páčkou

9 Značení / kontrola



Pojistné ventily jsou zkoušeny na pevnost a těsnost a seřízeny a zaplombovány na požadovaný nastavený tlak.

Značení je nesmazatelně vyznačeno na typovém štítku nebo na krytu pružiny ventilu. Kromě toho štítek obsahuje všechny potřebné informace podle DIN EN ISO 4126 -1.

Monterings-, og vedligeholdelses-, og driftsvejledning

Sikkerhedsventil 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Generelle sikkerhedsinformationer

da

- Brug kun ventilen:
  - formålsbestemt
  - i upåklagelig tilstand
  - sikkerheds- og farebevidst
- Følg monteringsvejledningen.
- Fejl, der kan påvirke sikkerheden, skal omgående afhjælpes.
- Ventilerne er udelukkende beregnet til det i denne monteringsvejledning anførte anvendelsesområde. En anden eller derudover gående anvendelse anses som ikke-formålsbestemt.
- Fabriksgarantien bortfalder, hvis plomberingen fjernes.
- Alle montagearbejder skal udføres af autoriseret fagpersonale.

2 Generelle informationer

Sikkerhedsventiler er anordninger af høj kvalitet, som kræver særlig omhyggelig håndtering. Tætningsfladerne på sæde og kegle er præcisions-bearbejdet, hvorigennem man opnår den nødvendige tæthed. Undgå, at der kommer fremmedlegemer ind i ventilen under montage og drift. Tætheden af en sikkerhedsventil kan blive forringet, hvis der bruges hamp, teflontape, svejseperler eller andet. Den færdige ventil kan også blive utæt af en hårdhændet behandling under opbevaring, transport og montage. Bliver ventilen malet, skal man være opmærksom på, at der ikke kommer maling på de bevægelige dele.

3 Anvendelsesområder

Enkeltheder om anvendelsesområdet for de enkelte udførelser kan ses i producentens datablade.

4 Installation og montage

Fjederbelastede sikkerhedsventiler skal installeres med fjederkappen pegende lodret op. For at sikre, at ventilerne fungerer korrekt, skal disse monteres således, at de ikke udsættes for utilladelige statiske, dynamiske eller termiske kræfter. Hvis der pga. huset i tilfælde af en reaktion kan opstå direkte eller indirekte fare for personer eller omgivelser pga. det udtrædende medium, skal der træffes egnede beskyttelses-foranstaltninger. Vær altid opmærksom på eventuelle dampe, som kan strømme ud fra udslipshullerne i fjederkappen.

Tilførsel

Tilførselsstudser til sikkerhedsventiler skal være så korte som muligt og skal udformes således, at der ved fuld ventilydelse ikke kan opstå et større tryktab end max. 3 % af reaktionstrykket.

Kondensatafløb

Ved mulighed for kondensdannelse skal selve rørene eller ventilerne (i flangeversionen) på deres laveste sted påmonteres en kondensudledningsanordning. Man skal sørge for et ufarligt afløb af kondensatet eller det udtrædende medium. Huse, ledninger og lyddæmpere skal sikres mod frysning.

Udblæsningsledning / modtryk

Sikkerhedsventilernes udblæsningsledning skal udformes således, at den nødvendige massestrøm kan afledes trykløst ved udblæsning. Ved sikkerhedsventiler med metalbælg påvirker et ved udblæsning optrædende modtryk op til max. 4 bar ikke ventilens reaktionstryk.

5 Driftsmåde / vedligeholdelse

Anlæggets arbejdstryk bør ligge mindst 5% under sikkerhedsventilens lukketryk. Derved opnår man, at sikkerhedsventilen lukker korrekt igen efter udblæsningen. Ved mindre utætheder, der kan skylles urenheder mellem tætningsfladerne, kan ventilen bringes til udblæsning via ventilering. Kan utætheden ikke fjernes ved dette, er der sandsynligvis en beskadigelse af tætningsoverfladerne, som kun kan repareres på vores fabrik eller af autoriserede fagfolk.
Afhængigt af versionen udføres løftning enten ved hjælp af en fingermøtrik over fjederkappen (fig. a), som drejes mod uret (bagefter skal fingermøtrikken drejes tilbage til stoppet) eller ved at aktivere løftestangen på ventilens øverste del (fig. b). Af hensyn til levering er løftestangen blokeret med et bånd, som skal fjernes for at aktivere løfteanordningen.

Sikkerhedsventiler uden harmonikabælg og uden gastæt kappe (figur c)

Ved sikkerhedsventiler uden harmonikabælg og uden gastæt kappe, kan hele overdelen desuden tages ud af huset ved at skrue overdelen af med relevant værktøj, så eventuelle rester på sæde og sædepakning kan fjernes.

Inden afmontering skal man være opmærksom på, at ventilen ikke står under tryk. Sikkerhedsventilens reaktionstryk ændres ikke ved genmontering af husets øverste del.

Sikkerhedsventiler med metalbælge (fig. d)

Ved sikkerhedsventiler med metalbælge (fig. d), må den øverste del ikke adskilles fra huset, da tæthed i forbindelse med forekomst af bagtryk da ikke længere kan garanteres.

Sikkerhedsventiler med gastæt kappe (figur f) eller gastæt udluftningsfunktion (figur g)

Ved sikkerhedsventiler med gastæt kappe eller gastæt udluftningsfunktion, må overdelen ikke adskilles fra huset, da gastætheden ellers ikke kan garanteres mere. Skulle det til reperationsmæssige formål være nødvendigt at skrue overdelen af, skal det påagtes, at fjederen før demonteringen skal være afspændt. Før demonteringen skal det ligeledes kontrolleres, om og hvilke medier, der befinder sig i motorhjelmen. Der er en mulig fare for ætsning eller forgiftning.

Ventilering til vedligeholdelse

Ved sikkerhedsventiler med trykaflastningsanordning anbefales det, og er også anlægsspecifikt foreskrevet, at bringe sikkerhedsventilen til udblæsning fra tid til anden ved at lette trykket for at sikre, at sikkerhedsventilen fungerer. Den kan senest bringes til at åbne fra et driftstryk på ≥85 % af reaktionstrykket. Løfteanordningen må ikke betjenes i trykfri tilstand. Iht. TRD 601 skal der ved dampgeneratorer foretages en funktionskontrol af sikkerhedsventilerne mindst en gang om måneden. Sikkerhedsventiler udgør den sidste sikkerhed for beholderen hhv. systemet. De bør også være i stand til at forhindre et utilladeligt overtryk, hvis alle andre forudgående regulerings-, styre- og overvågningsenheder svigter. For at sikre disse funktionsegenskaber har sikkerhedsventiler brug for regelmæssigt og tilbagevendende eftersyn. Vedligeholdelsesintervallerne til disse ventiler skal fastlægges af den driftsansvarlige iht. anvendelses-betingelserne.

6 Afmontering af ventilen

Foruden de generelt gyldige montageretningslinjer skal man være opmærksom på, at anlægget principielt skal gøres trykløst inden afmontering af ventilen.

7 Reparationer

Reparationer på sikkerhedsventiler må kun udføres af firmaet Goetze KG Armaturen eller af autoriserede værksteder, udelukkende med brug af originale reservedele.

8 Garantie

Denne ventil blev afprøvet inden den forlod fabrikken. På vores produkter yder vi garanti på den måde, at vi gratis istandsætter indsendte dele, som påviseligt er blevet førtidigt ubrugelige på grund af materiale- eller fabrikationsfejl. Skadeserstatning og lignende forpligtelser er udelukket. Fabriksgarantien bortfalder/dækker ikke ved beskadigelse af fabriksplomberingen, usagkyndig behandling hhv. installation, ignorering af denne montage- og vedligeholdelsesvejledning, tilsmudsning eller normalt slid.

Fig. a): Løftning ved hjælp af fingermøtrik

Fig. b): Løftning ved hjælp af stang

Fig. c): Sikkerhedsventil uden bælge + uden membran

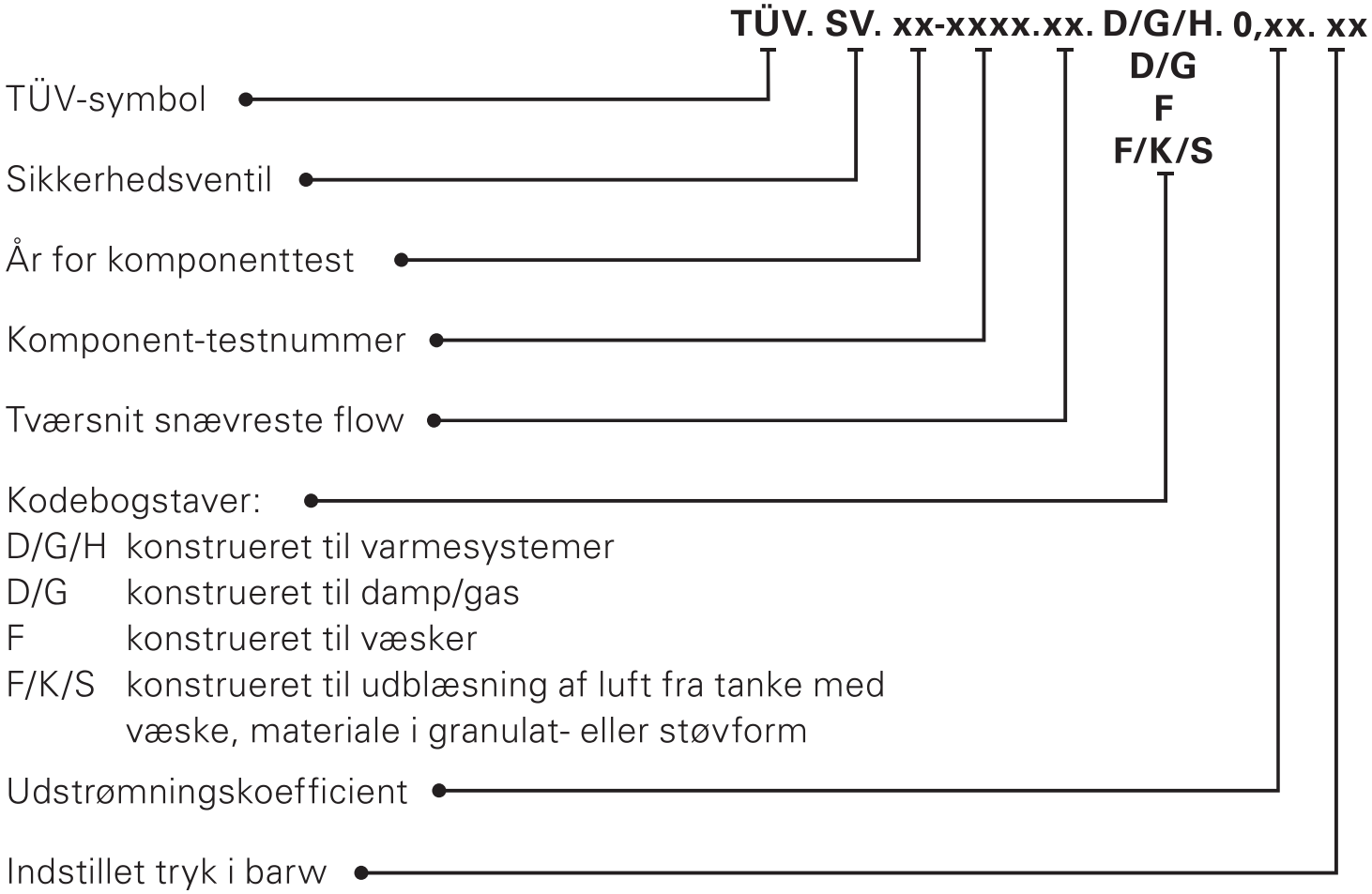
Fig. d): Sikkerhedsventil med bælge

Fig. e): Sikkerhedsventil med membran

Fig. f): Sikkerhedsventil med gastæt kappe

Fig. g): Sikkerhedsventil med gastæt udluftningsfunktion

9 Mærkning / afprøvning



D/G/H konstrueret til varmesystemer
D/G konstrueret til damp/gas
F konstrueret til væsker
F/K/S konstrueret til udblæsning af luft fra tanke med væske, materiale i granulat- eller støvform

Vi kontrollerer sikkerhedsventilerne for trykstyrke og tæthed, justerer det krævede indstillede tryk og forsegler dem.

Identifikationen på typeskiltet eller på ventilens fjederkappe er anført med et permament afmærkningssystem. Desuden indeholder mærkningen de nødvendige data iht. DIN EN ISO 4126-1.

Asennus-, huolto- ja käyttöohje

Varoventtiili 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Yleiset turvallisuusohjeet

fi

- Käytä venttiiliä vain:
  - määräysten mukaisesti
  - moitteettomassa kunnossa
  - turvallisuuden ja vaarat huomioon ottaen
- Asennusohjetta on noudatettava.
- Turvallisuuden vaarantavat häiriöt on korjattava välittömästi.
- Venttiilit on tarkoitettu ainoastaan tässä asennusohjeessa mainittuun käyttöalueeseen. Muunlainen tai tämän ylittävä käyttö katsotaan määräystenvastaiseksi.
- Jos sinetit poistetaan, tehdastakuu ei ole enää voimassa.
- Valtuutetun ammattitaitoisen henkilöstön on tehtävä kaikki asennustyöt.

2 Yleiset ohjeet

Varoventtiilit ovat korkealaatuisia laitteita, joita on käsiteltävä erityisen varovasti. Tiivistepinnat ovat istuvuudeltaan ja muodoltaan mitä tarkimmin viimeisteltyjä niin, että ne saavat aikaan tarvittavan tiiviyden. Roskien pääsyä venttiiliin on asennuksen ja käytön aikana vältettävä. Varoventtiilin tiiviys voi kärsiä hampun, teflonteipin ja muiden tiivisteaineiden tai hitsaushelmien vaikutuksesta. Valmiin venttiilin kovakourainen käsittely varastoinnin, kuljetuksen ja asennuksen aikana voi myös saada sen vuotamaan. Jos venttiili maalataan, on varmistettava, etteivät liukuvat osat joudu kosketuksiin maalin kanssa.

3 Käyttöalue

Valmistajan dokumenteissa on tarkempia tietoja eri toteutusten käyttöalueesta.

4 Kokoonpano ja asennus

Jousitetut varoventtiilit on asennettava jousen hatun ollessa pystysuorassa. Jotta venttiilit toimivat moitteettomasti, on ne asennettava niin, ettei niihin vaikuta mitkään kielletyt staattiset, dynaamiset tai termiset kuormitukset. Jos pesän läpi käynnistystilassa purkautuva aine voi aiheuttaa suoraan tai epäsuorasti vaaran ihmisille tai ympäristölle, on sen varalta suojauduttava sopivilla toimenpiteillä. Myös jousen hatussa olevien kevennysporausten päästöt on otettava huomioon.

Tulojohto

Varoventtiilien tulojohtoyhteiden tulee olla niin lyhyet kuin vain mahdollista, ja ne on muotoiltava niin, että täydellä venttiiliteholla ei voi syntyä suurempaa painehäviötä kuin 3 % vastepaineesta.

Lauhteen poistojohto

Putkien ja itse venttiilien (laippamalleissa) on oltava varustettu matalimmalla kohdalla olevalla pysyvällä lauhteenpoistolla. Lauhdeveden ja vuotavan aineen vaarattomasta johtamisesta pois on huolehdittava. Venttiilinpesä, johdot ja äänenvaimentimet on suojattava jäätymiseltä.

Tyhjennysjohto / vastapaine

Varoventtiilien tyhjennysjohto, ulospuhallusjohto, on asennettava niin, että puhallukseen tarvittava massavirta voidaan johtaa paineettomasti pois. Varoventtiileissä, joissa on metallinen palje, ei puhalluksessa esiintyvä korkeintaan 4 baarin vastapaine heikennä varoventtiilin vastepainetta.

5 Käyttötapa / huolto

Laitteiston työpaineen tulee olla vähintään 5 % varoventtiilin sulkupaineen alapuolella. Tällä varmistaan, että varoventtiili sulkeutuu puhalluksen jälkeen jälleen kunnolla. Pienemmissä epätiiviyksissä, jotka ovat aiheutuneet tiivistepintojen väliin jääneestä liasta, voidaan venttiili ilmavirralla tehtävää puhdistusta varten käynnistää puhaltamaan ulos. Mikäli vuotoa ei saada korjattua näillä toimenpiteillä, syynä on luultavasti tiivistyspinnan vioittuminen.
Tämä vika on annettava kunnostaa joko valmistajan tehtaalla tai valtuutetun huoltoliikkeen toimesta. Puhallus tapahtuu mallista riippuen joko jousen hatun päällä olevan pyöritettävän mutterin avulla (kuva a) kiertämällä sitä vastapäivään (sen jälkeen mutteri on kierrettävä takaisin loppuun asti) tai käyttämällä venttiilin yläpuolella olevaa puhallusvipua (kuva b). Puhallusvipu on tehtaalla kiinnitetty nauhalla, joka on poistettava puhallusta varten.

Varoventtiili, jossa ei ole paljesuojainta eikä kaasutiivistä suojusta (kuva c)

Varoventtiileissä, joissa ei ole paljesuojainta eikä kaasutiivistä suojusta, voidaan lisäksi koko yläosa irrottaa suojuksesta ruuvaamalla se irti oikeita työkaluja käyttäen ja poistaa istukassa ja istukan tiivisteessä olevat mahdolliset jäämät.

Ennen irrotusta on varmistettava, ettei venttiilissä ole painetta. Varoventtiilin aukeamispaine on sama kuin ennen, kun yläosa on asennettu paikalleen koteloon.

Varoventtiilit, joissa on metallinen palje (kuva d)
Jos varoventtiilissä on metallinen palje (kuva d), sen yläosaa ei saa irrottaa kotelosta, muutoin tiiviys ei ole enää taattu vastapaineen esiintyessä.

Varoventtiilit, joissa on kaasutiivis suojus (kuva f) tai vipukäyttöinen kaasutiivis ilmanvaihto (kuva g)
Kaasutiiviyden takaamiseksi ei varoventtiileissä, joissa on kaasutiivis suojus tai vipukäyttöinen kaasutiivis ilmanvaihto saa yläosaa irrottaa kotelosta. Mikäli kunnostustöiden takia on kuitenkin välttämätöntä irrottaa yläosa, on katsottava, että ennen purkamista löysätään jousi. Ennen purkamista on niinikään tarkastettava, onko venttiilikopassa vielä väliainetta. Mikäli näin on, sitä on varottava – syöpymis- tai myrkytysvaara.

Huoltoa varten tehtävä ilmaus
Järjestelmästä riippuen on suositeltavaa tai jopa välttämätöntä, että varoventtiilejä, joissa on nostokiinnike, on nostettava ajoittain ylöspäin, jotta paine purkautuu. Näin varmistetaan varoventtiilien toimivuus. Ne voidaan siksi saada aukeamaan viimeistään, kun käyttöpaine on ≥85 % vastepaineesta. Puhallusta ei saa suorittaa paineettomassa tilassa. Varoventtiilien liikkuvuuden tarkastus on TRD 601:n mukaan tehtävä höyrykattiloissa vähintään 4 viikon välein. Varoventtiilit muodostavat säiliössä tai järjestelmässä viimeisen varokeinon. Niiden tulee pystyä estämään liian suuri ylipaine myös silloin, kun kaikki muut niiden eteen kytkettyinä olevat säätö-, ohjaus- ja valvontalaitteet ovat pettäneet. Varoventtiilit vaativat säännöllistä huoltoa, jotta niiden toimivuus voidaan aina taata. Toimenharjoittajan on määritettävä näiden putkivarusteiden huoltovälit käyttöolosuhteiden mukaan.

6 Putkivarusteen irrotus

Yleisesti voimassa olevien asennusohjeiden lisäksi on otettava huomioon, että ennen kuin venttiiliä aletaan irrottaa, laitteistosta on aina poistettu paine.

7 Korjaukset

Varoventtiilejä saavat korjata vain Goetze KG Armaturen tai valtuutetut korjaamot. Vain alkuperäisten varaosien käyttö on sallittua.

8 Takuu

Tämä venttiili on tarkastettu, ennen kuin se lähti tehtaalta. Tuotteillemme annamme takuun siinä muodossa, että kunnostamme palautettaessa sellaiset osat ilmaiseksi, jotka materiaali- tai valmistusvirheen vuoksi ovat ennenaikaisesti tulleet käyttökelvottomiksi. Emme myönnä vahingonkorvausta tai vastaa muista samankaltaisista velvollisuuksista. Tehtaan takuu ei ole voimassa, jos tehtaan sinetti on rikottu, venttiiliä on käsitelty tai se on asennettu epäasianmukaisesti, tätä asennus- ja huolto-ohjetta ei ole noudatettu tai kun venttiili on normaalisti kulunut.

Kuva a): Puhallus pyöritettävän mutterin avulla

Kuva b): Puhallus vivun avulla

Kuva c): Varoventtiili ilman paljetta + ilman kalvoa

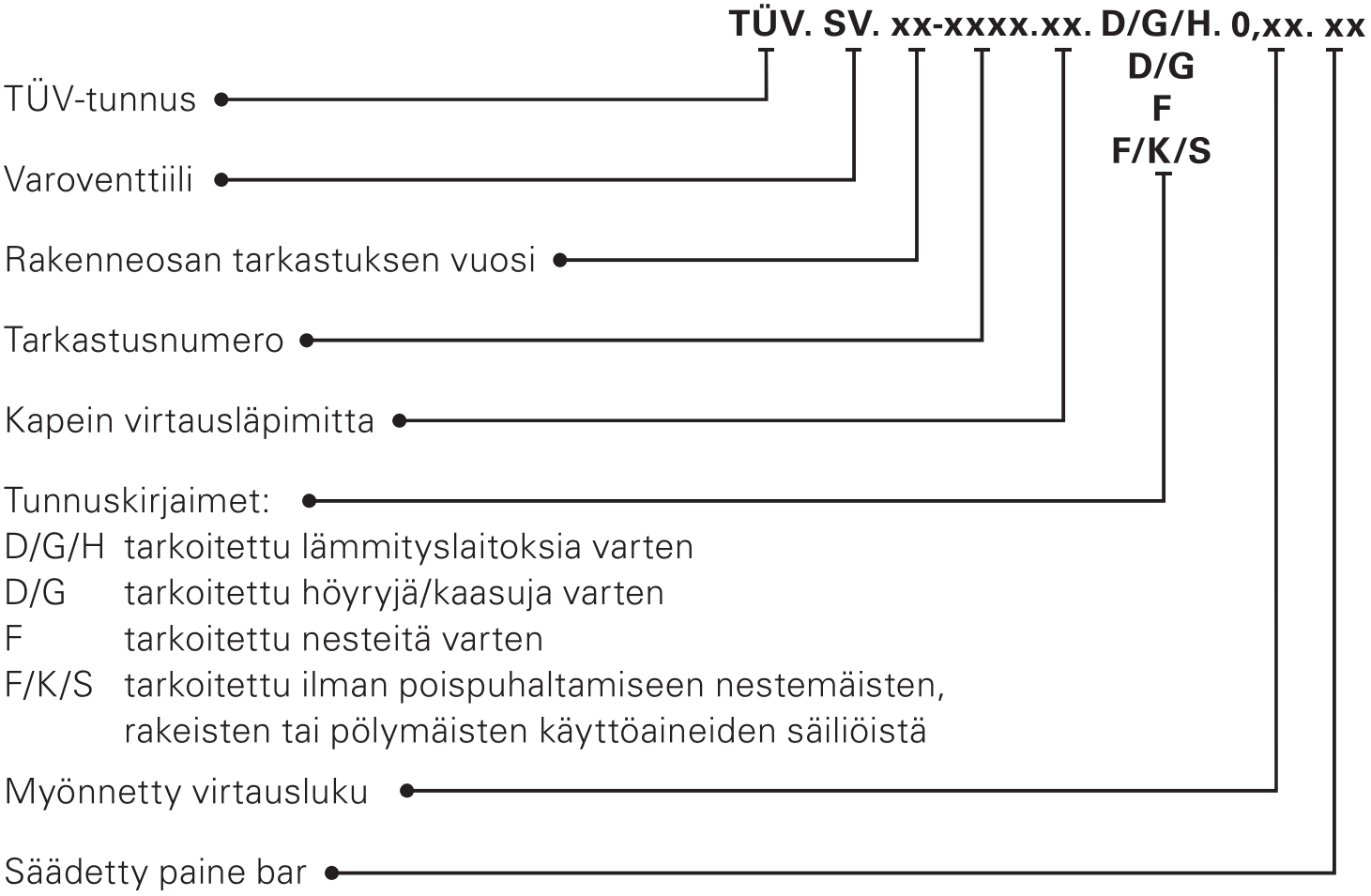
Kuva d): Varoventtiili, jossa on palje

Kuva e): Varoventtiili, jossa on kalvo

Kuva f): Varoventtiili, jossa on kaasutiivis suojus

Kuva g): Varoventtiili, jossa on kaasutiivis vipukäyttöinen ilmanvaihto

9 Merkintä / tarkastus



Tunnuskirjaimet:

D/G/H tarkoitettu lämmityslaitoksia varten
D/G tarkoitettu höyryjä/kaasuja varten
F tarkoitettu nesteitä varten
F/K/S tarkoitettu ilman poispuhaltamiseen nestemäisten, rakeisten tai pölymäisten käyttöaineiden säiliöistä

Tehtaalla tarkastetaan varoventtiilien paineenkestävyys ja tiiviys, säädetään ne haluttuun säätöpaineeseen ja sinetöidään.

Tunnukset ovat kestävässä muodossa tyyppikilvessä tai venttiilin jousen hatussa. Merkintä sisältää lisäksi tarpeelliset tiedot DIN EN ISO 4126-1 mukaisesti.

Istruzioni per l'assemblaggio, la manutenzione e l'uso

Valvola di sicurezza 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Avvertenze generali sulla sicurezza

it

- Usare la valvola esclusivamente:
  - per il suo scopo specifico
  - in condizioni perfette
  - prestando attenzione a sicurezza e possibili rischi
- Attenersi sempre alle istruzioni per l'installazione.
- Eliminare immediatamente eventuali difetti che possono pregiudicare la sicurezza.
- Le valvole sono progettate esclusivamente per il campo d'impiego indicato in queste istruzioni per l'installazione. Qualsiasi uso diverso o che esuli da questo campo d'impiego viene considerato come improprio.
- Con la rimozione della piombatura, la garanzia del fabbricante decade.
- Tutti i lavori di montaggio devono essere eseguiti da personale specializzato appositamente autorizzato.

2 Avvertenze generali

Le valvole di sicurezza sono componenti di alta qualità e vanno maneggiate con particolare cura. Le superfici di tenuta su sede e cono sono state lavorate con macchinari di massima precisione per raggiungere l'ermeticità richiesta. Durante il montaggio e il funzionamento evitare l'infiltrazione di corpi estranei nella valvola. L'ermeticità della valvola di sicurezza può essere compromessa se si fa uso di canapa, nastri di teflon, cordoni di saldatura e alcuni altri tipi di materiale e dispositivi. Anche un handling non accurato della valvola finita durante lo stoccaggio, il trasporto e il montaggio può comprometterne l'ermeticità. Se la valvola viene verniciata, assicurarsi che le parti scorrevoli non vengano in contatto con la vernice.

3 Gamma di applicazione

I dettagli relativi all'ambito di utilizzo delle singole applicazioni sono riportati nelle schede di dati del produttore.

4 Installazione e assemblaggio

Le valvole di sicurezza caricate a molla vanno installate con il coperchio a molla rivolto verticalmente verso l'alto. Per assicurare un funzionamento perfetto delle valvole, montarle in modo da evitare l'azione di sollecitazioni statiche, dinamiche o termiche non consentite. Se in caso di attivazione, il mezzo fuoriuscente dalla cassa può rappresentare un pericolo diretto o indiretto per le persone o l'ambiente, adottare misure di protezione adatte. Prestare sempre attenzione a eventuali effluvi provenienti dai fori di sfiato del coperchio a molla.

Tubo di alimentazione

I raccordi per le valvole di sicurezza devono essere possibilmente corti e strutturati in modo che a piena capacità della valvola non possano verificarsi perdite di pressione superiori al 3% della pressione di risposta.

Scarico della condensa

Qualora sia possibile la formazione di condensa, i tubi o le stesse valvole (nella versione a flangie) vanno dotate nel punto più basso di un dispositivo di scarico della condensa a funzionamento continuo. Assicurare uno scarico sicuro della condensa o del mezzo fuoriuscente. Le casse, tubazioni e silenziatori devono essere protetti contro il congelamento.

Tubo di scarico / contropressione

Il tubo di scarico delle valvole di sicurezza deve essere realizzato in modo che durante lo scarico il flusso di massa necessario possa essere fatto defluire senza pressione. In caso di valvole di sicurezza con soffietto metallico, una contropressione fino a max. 4 bar durante lo scarico non ne influenza la pressione di risposta.

5 Modo di funzionamento / manutenzione

La pressione d'esercizio dell'impianto deve essere di almeno il 5% inferiore a quella di chiusura della valvola di sicurezza. Questo fa sì che dopo lo scarico, la valvola di sicurezza possa di nuovo chiudere perfettamente. In caso di piccole anermeticità, che possono essere causate da sporco tra le superfici di tenuta, per la pulizia la valvola può essere fatta scaricare mediante aerazione. Se ciò non elimina la fuoriuscita, ciò significa probabilmente che la superficie di sigillatura è danneggiata. La riparazione di questa superficie può essere effettuata solamente presso la nostra fabbrica da specialisti autorizzati.

Secondo la versione, il sollevamento avviene tramite un dado zigrinato posto sopra il coperchio a molla (Fig. a) che viene ruotato in senso antiorario (successivamente il dado dev'essere riavvitato fino alla battuta) oppure attuando la leva di sollevamento sulla parte superiore della valvola (Fig. b). Ai fini della consegna la leva di sollevamento viene bloccata tramite una cinghia che deve essere rimossa per attuare il dispositivo di sollevamento.

Valvole di sicurezza senza mantici e senza calotta a tenuta di gas (Fig. c)

Inoltre, in caso di valvole di sicurezza senza mantici (Fig. c) e senza calotta a tenuta di gas, l'intera parte superiore può essere svitata dall'involucro tramite utensili idonei per poi rimuovere eventuali residui dalla sede e dalla guarnizione.

Prima dello smontaggio assicurarsi che la valvola non sia sotto pressione. La pressione di sollecitazione della valvola di sicurezza non viene alterata attraverso il riassemblaggio della parte superiore con l'involucro.

Valvole di sicurezza con mantici metallici (Fig. d)

In caso di valvole di sicurezza con mantici metallici (Fig. d), la parte superiore non dovrà essere separata dall'involucro, poiché in caso contrario l'ermeticità non sarebbe più garantita in caso di contropressione.

Valvole di sicurezza con coperchio a tenuta di gas (Fig. f) o dispositivo di ventilazione a leva a tenuta di gas (Fig. g)

Nelle valvole di sicurezza con coperchio o dispositivo di ventilazione a leva a tenuta di gas, la parte superiore non deve essere separata dall'involucro, in quanto altrimenti non è più garantita la tenuta ai gas. Qualora, a scopi di riparazione, dovesse comunque rendersi necessario svitare la parte superiore, occorre assicurare che prima dello smontaggio venga allentata la molla. Prima dello smontaggio va altrettanto verificata l'eventuale presenza di un mezzo di scarico nella calotta e la natura di tale mezzo, in quanto potrebbe sussistere il rischio di intossicazione o ustioni da agenti chimici.

Aerazione per la manutenzione

Nelle valvole di sicurezza con dispositivo di ventilazione è consigliabile, e a seconda del tipo di impianto può essere obbligatorio, far scaricare di tanto in tanto la valvola di sicurezza tramite ventilazione, al fine di accertare il funzionamento della valvola di sicurezza. Al più tardi a partire da una pressione d'esercizio del ≥85 % della pressione di risposta, possono quindi essere aperte. Il dispositivo di sollevamento non dovrà essere azionato in assenza di pressione. Un controllo della funzionalità delle valvole di sicurezza nei generatori di vapore, conf. TRD 601 deve essere eseguito almeno a intervalli di 4 settimane.

Le valvole di sicurezza rappresentano l'ultima protezione per il serbatoio e il sistema. Devono essere in grado di impedire una sovrappressione non consentita anche quando tutte le altre apparecchiature di regolazione, comando e monitoraggio installate a monte falliscono. Al fine di garantire queste proprietà di funzionamento, le valvole di sicurezza devono essere regolarmente e periodicamente sottoposte a manutenzione. Gli intervalli di manutenzione di questo valvolame devono essere fissati dall'utente in base alle condizioni d'impiego.

6 Smontaggio della valvola

Oltre alle disposizioni per il montaggio generalmente valide si deve considerare che prima dello smontaggio della valvola l'impianto deve sempre essere depressurizzato.

7 Riparazioni

Le riparazioni alle valvole di sicurezza devono essere eseguite esclusivamente dalla ditta Goetze KG Armaturen o da officine specializzate autorizzate, utilizzando esclusivamente ricambi originali.

8 Garanzia

Questa valvola è stata controllata prima di lasciare la fabbrica. La garanzia per i nostri prodotti prevede una riparazione gratuita delle parti restituite di cui venga accertata la prematura inadeguatezza all'uso in seguito a difetti di materiale o fabbricazione. Non ci assumiamo alcuna responsabilità per eventuali danni né obblighi di qualsiasi altro tipo. In caso di danneggiamento della piombatura della fabbrica, handling e/o installazione inappropriati, inosservanza di queste istruzioni per l'assemblaggio e la manutenzione, contaminazione o normale usura, la garanzia decade.

Fig. a): Sollevamento tramite dado zigrinato

Fig. b): Sollevamento tramite leva

Fig. c): Valvola di sicurezza senza mantici e senza diaframma

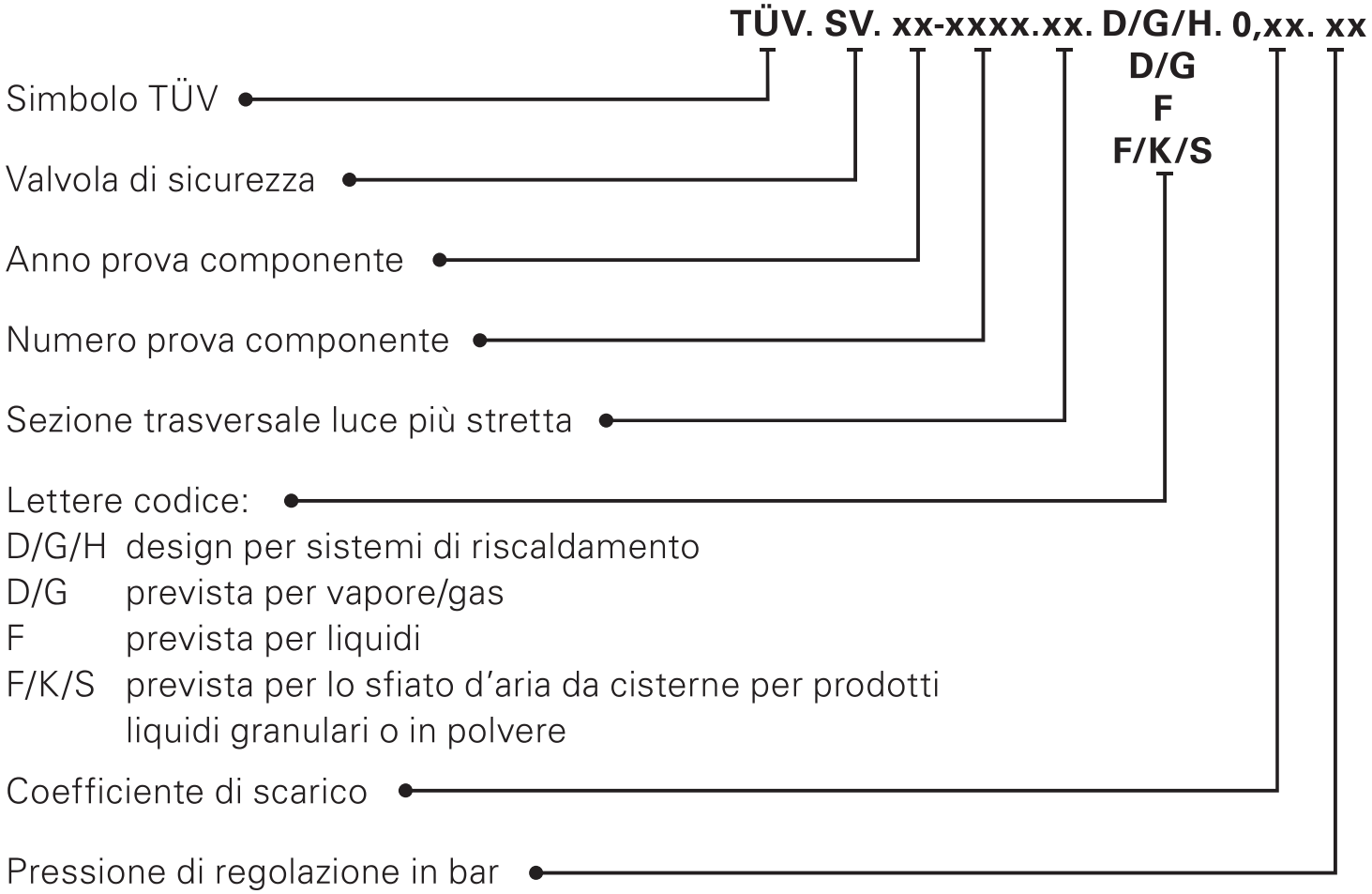
Fig. d): Valvola di sicurezza con mantici

Fig. e): Valvola di sicurezza con diaframma

Fig. f): Valvola di sicurezza con coperchio a tenuta di gas

Fig. g): Valvola di sicurezza con dispositivo di ventilazione a leva a tenuta di gas

9 Identificazione / Controllo



D/G/H design per sistemi di riscaldamento
D/G prevista per vapore/gas
F prevista per liquidi
F/K/S prevista per lo sfiato d'aria da cisterne per prodotti liquidi granulari o in polvere

L'azienda verifica le caratteristiche di resistenza alla pressione ed ermeticità delle valvole di sicurezza, procede alle regolazioni secondo la pressione richiesta e sigilla le valvole.
L'identificazione sulla targhetta tipologica o sul coperchio a molla della valvola è eseguita usando una stampa indelebile. L'identificazione contiene inoltre le indicazioni necessarie conf. DIN EN ISO 4126-1.

어셈블리 및 유지 보수 지침

안전밸브 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 안전 일반 사항

ko

- 다음의 경우에만 밸브를 사용합니다.
  - 의도된 목적을 위해
  - 만족스러운 조건에서
  - 안전 및 잠재적 위험과 관련하여.
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- 안전을 해칠 수 있는 결함은 즉시 해결되어야 합니다.
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3 적용 범위

각 버전의 적용 범위에 대한 상세 내용은 제조사의 데이터시트를 참조하십시오.

4 설치 및 어셈블리

스프링 장착 안전밸브는 스프링 보닛이 수직 상향이 되도록 설치해야 합니다. 안전밸브가 순조롭게 작동하려면 안전밸브가 용인할 수 없는 정전기, 동적 또는 열 부하에 노출되지 않는 방법으로 설치해야 합니다. 밸브 작동 시 방출되는 매질로 인해 사람이나 환경에 직간접적인 위험을 초래할 수 있는 경우 적절한 보호 장치를 적용해야 합니다. 스프링 보닛의 릴리프 보어에서 연기가 방출될 수 있다는 점을 항상 유의하십시오.

공급

안전밸브의 공급 연결 부분은 가능한 한 짧게 유지하고 압력 손실이 반응 압력의 최대 3%보다 크지 않도록 할 수 있는 방법으로 설계되어야 합니다.

응축물이 형성될 가능성이 있는 경우, 응축물 방출 장치를 계속 작동하면서 파이프나 밸브 자체(플랜지형 버전)를 가장 낮은 지점에 설치해야 합니다. 응축물 또는 매질 방출을 위험하지 않게 제거해야 합니다. 본체, 파이프 및 소음기가 얼지 않도록 보호해야 합니다.

블로우 오프 파이프 / 배압

안전밸브의 블로우 오프 파이프는 필요한 질량 흐름이 블로우 오프(분출) 과정 중에 압력이 없는 상태로 방출될 수 있도록 설계되어야 합니다. 금속 벨로우즈가 장착된 안전밸브에서 배압은 최대 4bar까지 안전밸브의 반응 압력에 영향을 미치지 않습니다.

5 작동 모드/유지 보수

공장의 작동 압력은 안전밸브의 분출정지압력보다 적어도 5%는 낮아야 합니다. 이렇게 하면 블로우 오프 후 밸브가 순조롭게 다시 닫힐 수 있습니다. 실링 표면 사이의 오염으로 일어날 수 있는 경미한 누출의 경우, 세척 목적을 위해 리프팅을 통해 밸브를 블로우 오프하도록 만들 수 있습니다. 이렇게 해서도 누출을 제거하지 못하는 경우 실링 표면이 손상되었을 수 있으며 이는 당사 공장이나 공인 전문가를 통해서만 수리할 수 있습니다. 버전에 따라 스프링 보닛 위의 널드 너트(knurled nut)(그림 a)를 시계 반대 방향으로 돌리거나(이후 널드 너트를 다시 정지 상태로 돌려놓아야 함) 밸브 위에 위치한 리프팅 레버(그림 b)를 작동시켜 리프팅을 수행합니다. 배송 목적을 위해 리프팅 레버를 끈으로 막아 놓았지만 리프팅 장치를 작동시키기 위해서는 이를 제거해야 합니다.

벨로우즈와 가스차단 뚜껑이 장착되지 않은 안전밸브(그림 c)
벨로우즈(bellows)와 가스차단 뚜껑(gastight cap)이 장착되지 않은 안전밸브의 경우 상단부 전체를 적절한 도구를 사용하여 하우징에서 떼어 내고 시트와 시트 실링에서 모든 잔류물을 제거할 수 있습니다. 제거하기 전에 안전밸브에 압력이 가해지고 있지는 않은지 확인합니다. 안전밸브의 반응 압력은 하우징의 상단부를 다시 어셈블리해도 바뀌지 않습니다.

금속 벨로우즈가 장착된 안전밸브(그림 d)
금속 벨로우즈가 장착된 안전밸브에서 배압이 발생한 경우 기밀성을 보장할 수 없기 때문에 상단부를 하우징에서 분리하지 않도록 합니다.

가스차단 뚜껑(그림 f) 또는 가스차단 리프팅(그림 g)이 장착된 안전밸브
가스차단 뚜껑이나 가스차단 리프팅 레버가 장착된 안전밸브의 경우 기밀성(gas tightness)에 문제가 생길 수 있으므로 상단부를 하우징에서 분리하지 않을 수 있습니다. 하지만, 수리를 위해 상단부를 떼어 내야 하는 경우, 분해하기 전에 스프링의 장력을 풀어주어야 합니다. 밸브를 분해하기 전에 뚜껑에 매질이 있는지, 있다면 무엇인지 확인해야 합니다. 화학 화상 또는 중독의 위험 가능성.

유지 보수 목적을 위한 리프팅
리프팅 장치가 장착된 안전밸브의 경우, 안전밸브가 올바르게 기능하도록 하기 위해 가끔 시트에서 실(seal)을 들어 올려 밸브가 블로우 오프하도록 해야 한다고 권장되며, 특정 공장별 사례에 규정되어 있습니다. 그렇기 때문에 늦어도 작동 압력이 반응 압력의 ≥85%

에서 안전밸브가 열릴 수 있습니다. 리프팅 장치는 압력이 없는 상태에서는 작동되지 않습니다. 증기가 생성되는 장비의 경우, TRD 601에 따라 안전밸브의 움직임 용이성 검사를 최소 4주에 한 번 실시해야 합니다. 안전밸브는 탱크나 시스템을 위한 최고의 안전장치입니다. 모든 다른 업스트림 컨트롤과 모니터링 장비가 작동이 되지 않더라도 안전밸브가 허용할 수 없는 초과 압력을 방지할 수 있어야 합니다. 이러한 기능적 특성을 보장하기 위해 안전밸브는 정기적 및 순환적 유지 보수가 필요합니다. 유지 보수 간격은 작동 조건에 따라 작동자가 결정합니다.

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6 부속품 해체

일반 설치 지침 외에도 안전밸브의 분해 전에 시스템이 압력이 없는 상태가 되도록 해야 합니다.

7 수리

안전밸브에 대한 수리 작업은 Goetze KG Armaturen 또는 Goetze KG Armaturen에서 공식적으로 승인한 전문 작업장에서 정품 예비 부품만 사용하여 수행되어야 합니다.

8 품질보증

이 밸브는 공장을 떠나기 전에 테스트를 받았습니다. 당사는 모든 제품에 대한 품질을 보증하며 반송되었거나 이른 시기에 발생한 자재 결함 또는 제조적 결함으로 인해 사용하기에 적합하지 않은 것으로 검증된 모든 부품에 대한 무료 수리가 수반됩니다. 당사는 모든 손상에 대해 어떠한 책임이나 기타 이러한 의무를 지지 않습니다. 공장의 실이 손상된 경우(압력 제한 밸브의 경우) 올바르지 않은 취급 또는 설치, 오염 또는 정상적인 마모의 경우 품질 보증이 무효가 됩니다.

그림. a): 널드 너트를 이용한 리프팅

그림. b): 레버를 이용한 리프팅

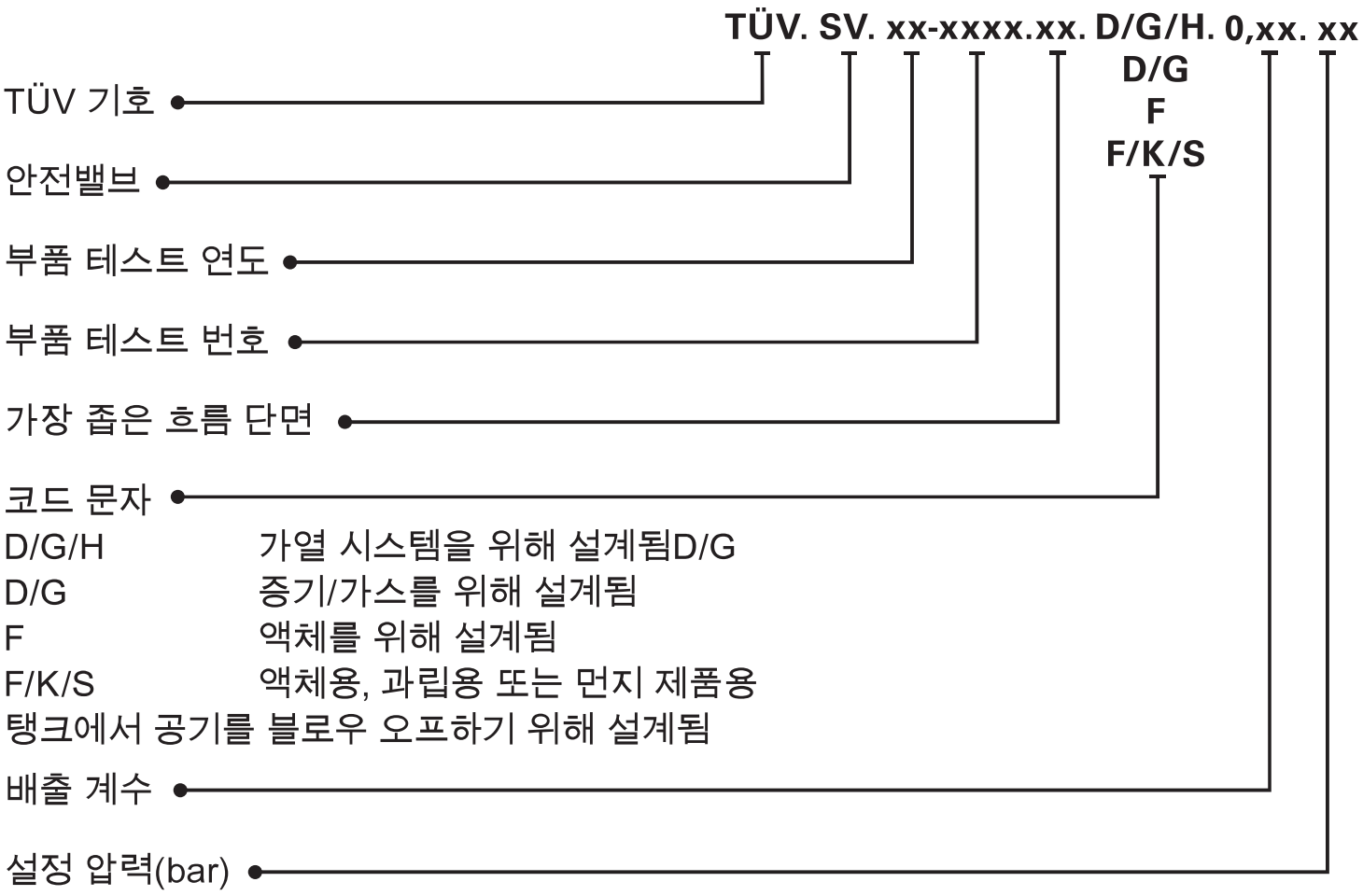
그림. c): 벨로우즈 및 다이아프램이 장착되지 않은 안전밸브

그림. d): 벨로우즈가 장착된 안전밸브

그림. e): 다이아프램이 장착된 안전밸브

그림. f): 가스차단 뚜껑이 장착된 안전밸브

그림. g): 가스차단 리프팅 레버가 장착된 안전밸브



D/G/H	가열 시스템을 위해 설계됨D/G
D/G	증기/가스를 위해 설계됨
F	액체를 위해 설계됨
F/K/S	액체용, 과립용 또는 먼지 제품용

탱크에서 공기를 블로우 오프하기 위해 설계됨

배출 계수

설정 압력(bar)

압력 저항 및 기밀성에 대해 안전밸브를 확인하고 요청된 설정 압력을 조정하여 밀봉합니다. 영구 마킹 시스템을 이용해 타입 플레이트 또는 밸브의 스프링 보닛에 식별 ID를 적용합니다. 타입 플레이트는 DIN EN ISO 4126-1에 따라 식별 코드와 기술자료를 이용해 추가로 표시합니다.

Montage-, onderhouds- en bedieningshandleiding

Veiligheidsklep 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Algemene veiligheidsinformatie

nl

- Gebruik de klep alleen:
  - voor het gespecificeerde doel
  - in een onberispelijke toestand
  - met inachtneming van de veiligheid en de mogelijke gevaren
- Volg altijd de montage-instructies.
- Eventuele defecten die van invloed kunnen zijn op een veilige werking van de klep moeten onmiddellijk worden verholpen.
- De kleppen zijn exclusief ontwikkeld voor de toepassingen die in deze installatie-intructies zijn beschreven. Gebruik dat afwijkt van of zich verder uitstrekt dan de genoemde toepassingen wordt beschouwd als oneigenlijk gebruik.
- De fabrieksgarantie vervalt als de afdichting wordt verwijderd.
- Alle montagewerkzaamheden dienen te worden uitgevoerd door daartoe bevoegd gespecialiseerd personeel.

2 Algemene aanwijzingen

Veiligheidskleppen zijn hoogwaardige armaturen die bijzonder, zorgvuldig behandeld moeten worden. Om de vereiste dichtheid te verkrijgen, zijn de afdichtingsoppervlakken van de zitting en de kegel fijn bewerkt. Voorkom dat er tijdens de montage en de bediening vreemde deeltjes in de klep komen. De afdichting van een veiligheidsklep kan belemmerd worden door hennep, teflontape, andere afdichtingsmiddelen of lasparels enz. Een ruwe behandeling van de gemonteerde klep tijdens de opslag, het transport en de montage kan eveneens leiden tot een lekkende klep. Als de klep moet worden geverfd, moet er worden vermeden dat de glijdelen met de verf in contact komen.

3 Toepassingsgebied

Raadpleeg voor bijzonderheden aangaande het toepassingsgebied van de afzonderlijke uitvoeringen de gegevensbladen van de fabrikant.

4 Installatie en montage

Veer-veiligheidskleppen moeten ingebouwd worden met verticaal naar boven gerichte veerkap. Om te verzekeren dat de kleppen onberispelijk functioneren, moeten deze zodanig worden gemonteerd dat er geen ontoelaatbare statische, dynamische of thermische belastingen kunnen ontstaan. Als het medium, dat uit de behuizing stroomt, direct of indirect gevaren voor personen of de omgeving kan veroorzaken, dan moeten er geschikte veiligheidsmaatregelen worden genomen. Daarbij moeten ook uitwasemingen door de ontlastingsboringen van de veerkap in acht worden genomen.

Toevoer

De toevoerstompen voor de veiligheidskleppen dienen zo kort mogelijk te zijn en moeten zodanig zijn gevormd dat bij volledig klepvermogen geen hogere drukverliezen dan max. 3% van de aanspreekdruk kunnen optreden.

Condensafvoer

De leidingen of de kleppen zelf (bij flensuitvoering) moeten voor het afvoeren van eventueel optredend condensatievocht op het laagste punt worden uitgerust met een permanent actieve inrichting voor het afvoeren van condensatievocht. Het condensaat of het naar buiten stromende medium moet zonder gevaar worden afgevoerd. De behuizingen, de leidingen en de geluiddempers moeten tegen bevriezing worden beschermd.

Afblaasleiding / tegendruk

De afblaasleiding van de veiligheidskleppen moet zodanig worden uitgevoerd dat bij het afblazen de vereiste massastroom drukloos kan worden afgevoerd. Bij veiligheidskleppen met metalen vouwbalg beïnvloedt een bij het afblazen optredende tegendruk van max. 4 bar de aanspreekdruk van de veiligheidklep niet.

5 Bediening / onderhoud

De werkdruk van de installatie moet minstens 5% lager zijn dan de sluitdruk van de veiligheidsklep. Dit zorgt ervoor dat de veiligheidsklep na het afblazen weer onberispelijk kan sluiten. Bij kleine lekkages, die veroorzaakt kunnen worden door verontreinigingen tussen de afdichtingsoppervlakken, kan de klep voor de reiniging worden afgeblazen door het openen van de klepschotel. Als daarmee de lekkage niet is verholpen, dan is waarschijnlijk het oppervlak van de afdichting beschadigd; dit kan alleen in onze fabriek of door erkend personeel worden gerepareerd. Het openen gebeurt afhankelijk van de uitvoering door de kartelmoer boven de veerkap (fig. a) tegen de klokrichting in te draaien (vervolgens moet de kartelmoer tot tegen de aanslag teruggedraaid worden) of met behulp van de openingshendel aan de bovenkant van de klep (fig. b). De openingshendel is bij levering bevestigd met een band, die voor de bediening moet worden verwijderd.

Veiligheidskleppen zonder balg en zonder gasdichte kap (Afb. c)

Bij veiligheidskleppen zonder balg en zonder gasdichte kap kan bovendien door het afschroeven van het bovenstuk met een passend gereedschap het volledige bovenstuk uit de behuizing worden genomen en kan eventuele aanslag van de zitting

en afdichting worden verwijderd.

Voor de demontage moet u erop letten dat de klep niet onder druk staat.

Door het aanbrengen van het bovenste gedeelte in de behuizing is de aanspreekdruk van de veiligheidsklep niet gewijzigd.

Veiligheidskleppen met metaal-vouwbalg (fig. d)

Bij de veiligheidskleppen met vouwbalg mag het bovenste gedeelte niet van de behuizing gescheiden worden, daar de dichtheid bij optredende tegendruk anders niet meer verzekerd is.

Veiligheidskleppen met gasdichte kap (Afb. f) of met een gasdichte hendel bedienbare veiligheidskleppen (Afb. g)

Bij veiligheidskleppen met gasdichte kap, of bij met een gasdichte hendel bedienbare veiligheidskleppen, mag het bovenstuk niet van de behuizing worden gescheiden, omdat anders de gasdichtheid niet meer kan worden gegarandeerd. Indien voor reparatiedoeleinden het losschroeven van het bovengedeelte toch nodig is, moet erop worden gelet dat voor de demontage de veer wordt ontspannen. Voor de demontage moet bovendien gecontroleerd worden of en welk medium zich in de kap zou kunnen bevinden. Er bestaat gevaar voor een eventuele brandwonden of vergiftiging.

Openen voor het onderhoud

Bij veiligheidsventielen met een verluchtingsinrichting strekt het tot aanbeveling, en kan het naargelang de installatie ook voorgeschreven zijn, van tijd tot tijd het veiligheidsventiel tot uitblazen te brengen door het te verluchten, teneinde zich te vergewissen van het functioneren van het veiligheidsventiel. Ze kan ten laatste worden geopend vanaf een bedrijfsdruk van ≥85 % van de aanspreekdruk. Deze opening mag niet in drukloze toestand gebeuren. Overeenkomstig TRD 601 moet bij stoomketels minstens om de 4 weken worden gecontroleerd of de veiligheidskleppen goed functioneren.

Veiligheidskleppen zijn de laatste veiligheid voor de tank resp. het systeem. Zij moeten een ontoelaatbare druk kunnen verhinderen ook als alle andere voorgeschakelde regel- en bedieningsapparaten alsook monitoren weigeren. Om deze functie-eigenschappen veilig te stellen, hebben veiligheidsventielen een regelmatig en herhaaldelijk onderhoud van doen. De onderhoudsintervallen voor deze kleppen moeten worden vastgelegd overeenkomstig de gebruiksomstandigheden van de exploitant.

6 Demontage van de klep

Naast de algemeen geldige montagerichtlijnen moet erop worden gelet dat de klep voor de demontage van de installatie drukloos wordt gemaakt.

7 Reparaties

Herstellingen aan veiligheidsventielen mogen enkel door de firma Goetze KG Armaturen of door geautoriseerde werkplaatsen worden uitgevoerd, met exclusief gebruik van originele vervangingsonderdelen. Daarbij moeten uitsluitend originele reservedelen worden gebruikt.

8 Wettelijke garantie

Deze klep werd gecontroleerd voor het verlaten van de fabriek. De garantie op onze producten omvat een kosteloze reparatie van ingestuurde producten, waarvoor aangetoond kan worden dat ze als gevolg van materiaal- of fabricagefouten voortijdig onbruikbaar werden. Eisen tot schadevergoeding of andere verplichtingen aanvaarden wij niet. Bij beschadiging van de fabrieksafdichting, ondeskundig gebruik resp. ondeskundige installatie, niet-inachtneming van deze montage- en onderhoudsaanwijzing, vervuiling of normale slijtage vervalt de fabrieksgarantie.

Fig. a): Openen met kartelmoer

Fig. b): Openen met openingshendel

Fig. c): Veiligheidskleppen zonder vouwbalg + zonder membraan

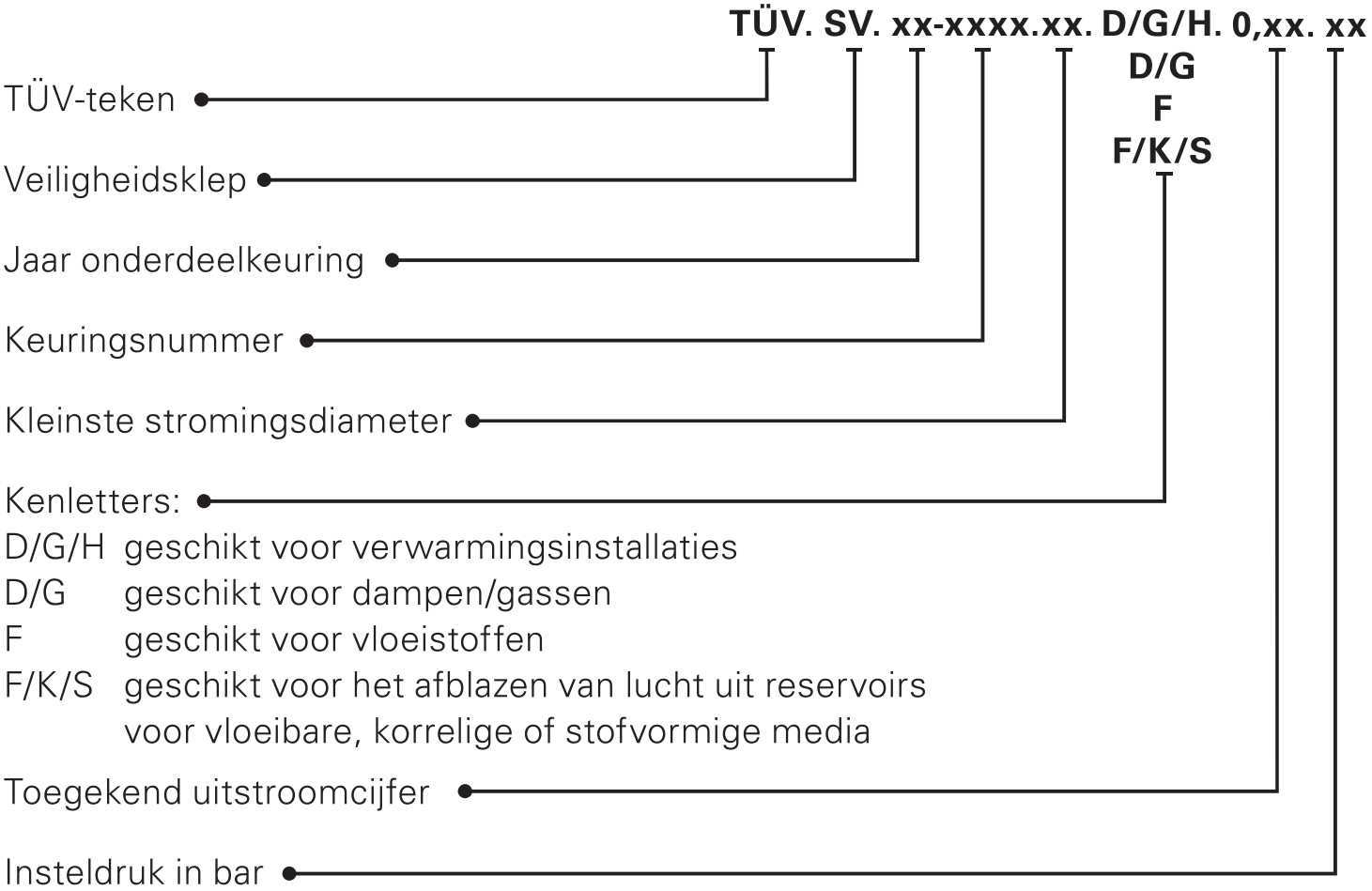
Fig. d): Veiligheidsklep met vouwbalg

Fig. e): Veiligheidsklep met membraan

Fig. f): Veiligheidsklep met gasdichte kap

Fig. g): Met een gasdichte hendel bedienbare veiligheidsklep

9 Identificatie / controle



D/G/H geschikt voor verwarmingsinstallaties
D/G geschikt voor dampen/gassen
F geschikt voor vloeistoffen
F/K/S geschikt voor het afblazen van lucht uit reservoirs voor vloeibare, korrelige of stofvormige media

Veiligheidskleppen worden door ons gecontroleerd op drukvastheid en dichtheid en op de gewenste insteldruk ingeregeld en verzegeld.
De markering is onwisbaar aangebracht op het typeplaatje resp. op de kap van de klep. De identificatie bevat bovendien de noodzakelijke gegevens overeenkomstig DIN EN ISO 4126-1.

Monterings-, vedlikeholds- og bruksanvisning

Sikkerhetsventil 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Generelle sikkerhetsanvisninger

no

- Bruk ventilen kun:
  - som tiltenkt
  - i feilfri tilstand
  - sikkerhets- og farebevisst
- Det skal tas hensyn til monteringsanvisningene.
- Forstyrrelser som kan påvirke sikkerheten, skal utbedres omgående.
- Ventilene er utelukkende ment for det bruksområdet som er oppført i denne monteringsanvisningen. All annen bruk eller bruk utover dette gjelder som feil bruk.
- Når plomberingen fjernes, opphører fabrikkgarantien.
- Alle monteringsarbeider skal gjennomføres av autorisert fagpersonell.

2 Generelle anvisninger

Sikkerhetsventiler er rørdeler av høy kvalitet som krever særlig forsiktig behandling. Tetningsflatene er finbearbeidet på sete og kjegle, på den måten oppnås den nødvendige tettheten. Under montering og drift må det unngås at det trenger inn fremmedlegemer i ventilen. Tetningen på en sikkerhetventil kan forringes ved å bruke hamp, teflonteip i tillegg til sveisestrenger, med mer. Også røff behandling av den ferdige ventilen under lagring, transport og montering kan gjøre armaturen utett. Dersom ventilen skal overmales, må det påses at glidende deler ikke kommer i berøring med malingen.

3 Bruksområder

Se produsentens datablad for detaljer om utvalget for individuelle versjoner.

4 Innbygging og montering

Sikkerhetsventiler med fjær skal monteres med fjærkappen vendt opp. For å garantere at ventilene fungerer helt korrekt må de monteres slik at ingen ulovlige statiske, dynamiske eller termiske innvirkninger kan oppstå. Dersom personer eller omgivelser kan komme direkte eller indirekte i fare på grunn av at medium utløper under start, skal det treffes egnede beskyttelsestiltak. Følg alltid nøye med på mulig dunst som kan komme ut av fjærkappens avlastningsåpninger.

Tilførselsledning

Tilførselsstussene for sikkerhetsventilene skal være så korte som mulig og skal arrangeres slik at det ikke kan oppstå høyere trykktap enn maks. 3 % fra starttrykket ved full ventilytelse.

Kondensatavledning

Hvis det dannes kondensat, må rørene eller ventilene (på de versjonene som har flens) utstyres med en avløpsinnretning for kondensat som er i kontinuerlig drift, på det laveste punktet. Det skal sørges for at kondensat eller utløpende medium bortledes på forsvarlig måte. Hus, ledninger og lyddempere skal sikres mot frost.

Utblåsningsledning / mottrykk

Sikkerhetsventilenes utblåsningsledning skal arrangeres slik at den nødvendige massestrømmen kan føres trykkløst bort ved utblåsning. På sikkerhetsventiler med metallbelg blir ikke starttrykket i sikkerhetsventilen negativt påvirket når mottrykket på maks. 4 bar som dannes blir utblåst.

5 Driftsmåte / vedlikehold

Anleggets arbeidstrykk skal ligge minst 5 % under sikkerhetsventilens stengetrykk. På den måten oppnår man at sikkerhetsventilen kan stenges skikkelig igjen etter utblåsning. Ved mindre lekkasjer som kan være forårsaket av forurensninger mellom tetningsflatene, kan ventilen stilles på utblåsning for rengjøring med påluftning. Hvis utettheten ikke kan fjernes, er sannsynligvis tetningsflaten skadet. Denne kan bare repareres i vår fabrikk eller av autoriserte fagfolk.
Løfteteknikken avhenger av versjon. Det gjøres enten ved hjelp av en serratert skrue ovenfor fjærkappen (fig. a) som skrus mot klokken (den serraterte skruen må deretter skrus tilbake til startstilling) eller ved å bruke løftespaken på ventilens øvre del (fig. b). Løftespaken er blokkert med en snor som må fjernes før løftingen kan foretas.

Sikkerhetsventiler uten belg og uten gasstett hette (Fig.c)

Ved sikkerhetsventiler uten belg og uten gasstett hette kan man også skru av hele overdelen med egnet verktøy fra dekselet og fjerne eventuelle rester og setetetning på stedet.

Før demontering må du kontrollere at ventilen ikke er trykkpåsatt. Sikkerhetsventilens responstrykk endres ikke gjennom at den øvre delen monteres tilbake i huset.

Sikkerhetsventiler med metallbelg (fig. d)

På sikkerhetsventiler med metallbelg (fig. d) kan ikke den øvre delen fjernes fra huset fordi tetningen ikke lenger kan garanteres hvis det skulle oppstå mottrykk.

Sikkerhetsventiler med gasstett hette (Fig.f) eller gasstett løfteventilasjon (Fig.g)

Ved sikkerhetsventiler med gasstett hette eller gasstett løfteventilasjon, må ikke overdelen fjernes fra dekselet da gasstettheten ikke lengre er garantert. Hvis det for reparasjonen likevel skulle være nødvendig å skru ut overdelen, må man passe på at fjæren avspennes før demonteringen. Det må før demonteringen likeledes kontrolleres at det finnes medium i hetten og hvilket medium det er. Det er fare for mulige etseskader eller forgiftning.

Påluftning for vedlikehold

For sikkerhetsventiler med en løfteinnretning anbefales det for spesifikke installasjoner at sikkerhetsventilen justeres fra tid til annen for å sørge for at den fortsatt er i god stand. Derfor kan de åpnes senest fra og med et driftstrykk på ≥85 % av starttrykket. Løfteinnretningen skal ikke benyttes mens ventilen ikke er trykksatt. Minst hver 4. uke skal det kontrolleres at sikkerhetsventilen går lett ifølge TRD 601 for dampgeneratorer.
Sikkerhetsventilene utgjør den siste sikringen for beholderne eller systemet.
De skal være i stand til å kunne forhindre et ulovlig overtrykk selv om alle andre formonterte regulerings-, styre- og overvåkningsenheter svikter. Sikkerhetsventiler krever jevnlig og periodisk vedlikehold for å sikre at utstyret er i god stand. Vedlikeholdsintervallene til disse armaturene skal fastsettes av operatøren i samsvar med bruksbetingelsene.

6 Demontere armaturen

I tillegg til generelle, gjeldende monteringsdirektiver skal det sikres at anlegget gjøres trykkløst før ventilen demonteres.

7 Reparasjoner

Reparasjoner av sikkerhetsventilene må kun utføres av firmaet Goetze KG Armaturen eller av autoriserte servicesenter som kun bruker originale reservedeler ved behov for erstatningsdeler.

8 Garantie

Denne ventilen ble kontrollert før den forlot fabrikken. Vi tilbyr garanti for våre produkter ved at vi gratis setter i stand deler som beviselig grunnet materialfeil eller fabrikasjonsfeil ikke er brukbare. Vi overtar ingen ytelser om skadeserstatning eller liknende. Fabrikkgarantien opphører ved skader på fabrikkplomberingen, feil behandling eller installasjon, dersom det ikke har vært tatt hensyn til denne monterings- og vedlikeholdsanvisningen eller ved forurensning eller normal slitasje.

Fig. a): Løfting med serratert skrue

Fig. b): Løfting med spak

Fig. c): Sikkerhetsventil uten belg + uten membran

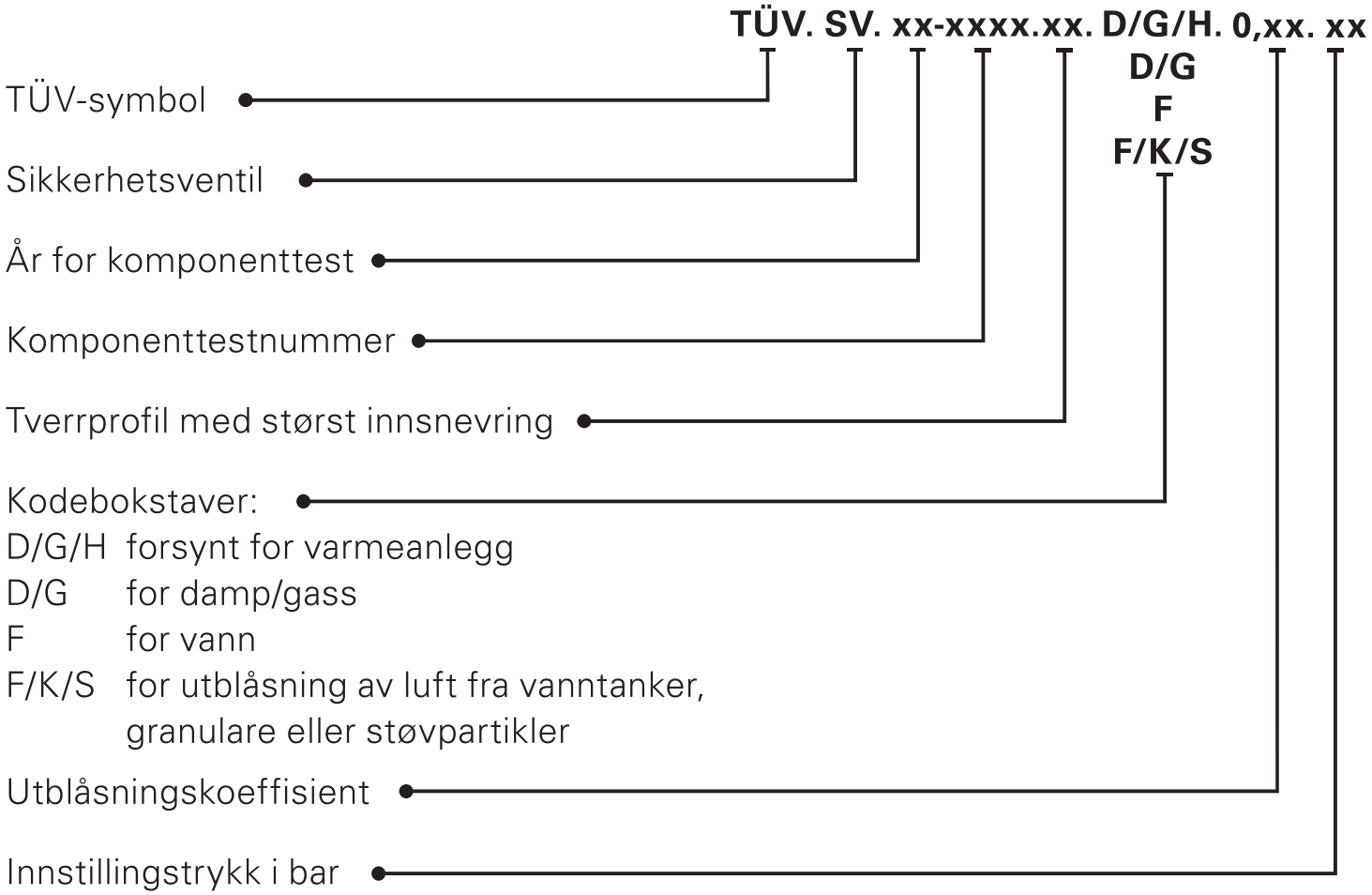
Fig. d): Sikkerhetsventil med belg

Fig. e): Sikkerhetsventil med membran

Fig. f): Sikkerhetsventil med gasstett hette

Fig. g): Sikkerhetsventil med gasstett løfteventilasjon

9 Merking / kontroll



D/G/H forsynt for varmeanlegg
D/G for damp/gass
F for vann
F/K/S for utblåsning av luft fra vanntanker, granulare eller støvpartikler

Vi kontrollerer sikkerhetsventilene for trykkmotstand og stramhet, justerer påkrevd innstillingstrykk og forsegler dem.
Angivelsen på typeplaten eller på sikkerhetsventilens fjærkappe påføres med et permanent merkesystem. I tillegg inneholder merkingen de nødvendige angivelsene i samsvar med DIN EN ISO 4126-1.

Instrukcja montażu, konserwacji i eksploatacji

Zawór bezpieczeństwa 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Informacje ogólne na temat bezpieczeństwa

pl

- Zawór należy stosować wyłącznie:
  - w sposób zgodny z przeznaczeniem
  - jeśli znajduje się w nienagannym stanie
  - przy uwzględnieniu bezpieczeństwa i zagrożeń
- Przestrzegać instrukcji montażu.
- Niezwłocznie usuwać usterki, które mogą zagrażać bezpieczeństwu.
- Zawory są przeznaczone wyłącznie do użytku w zakresie zastosowania określonym w niniejszej instrukcji montażu. Inne lub wykraczające poza ten zakres użycie jest użyciem niezgodnym z przeznaczeniem.
- Usunięcie plomby skutkuje wygaśnięciem gwarancji udzielonej przez producenta.
- Wszystkie prace montażowe należy zlecać autoryzowanemu, specjalistycznemu personelowi.

2 Informacje ogólne

Zawory bezpieczeństwa są delikatnymi podzespołami, wymagającymi szczególnie ostrożnego postępowania. Powierzchnie uszczelniające przy gnieździe i grzybku stożkowym są poddawane precyzyjnej obróbce umożliwiającej uzyskanie niezbędnej szczelności. Podczas montażu i eksploatacji należy zapobiegać przedostawaniu się do wnętrza zaworu ciał obcych. Negatywny wpływ na szczelność zaworu mają między innymi pakuły, taśma teflonowa i pozostałości po pracach spawalniczych. Nieostrożne postępowanie z gotowym zaworem podczas przechowywania, transportu i montażu może prowadzić do powstania nieszczelności. W przypadku malowania zaworu należy uważać, by części ruchome nie stykały się z malowaną powierzchnią.

3 Zakres stosowania

Szczegółowe informacje dotyczące zastosowania poszczególnych wersji są dostępne w kartach danych producenta.

4 Instalacja i montaż

Zawory bezpieczeństwa ze sprężyną muszą być montowane tak, by pokrywa sprężyny była w pionowej pozycji i znajdowała się na górze. Aby zapewnić nienaganne działanie zaworów, zamontować zawory w sposób wykluczający oddziaływanie niedopuszczalnych obciążeń statycznych, dynamicznych lub termicznych. Jeśli medium wydostające się z obudowy w momencie zadziałania zaworu może stanowić bezpośrednie lub pośrednie zagrożenia dla osób lub otoczenia, należy przedsięwziąć właściwe środki bezpieczeństwa. Zawsze należy zwrócić uwagę na możliwość uwalniania oparów przez otwory w pokrywie sprężyny.

Przewód doprowadzający

Króćce przewodu doprowadzającego zaworów bezpieczeństwa powinny być jak najkrótsze oraz muszą mieć taką formę, by przy pełnym obciążeniu zaworu nie występowały straty ciśnienia wyższe od maks. 3% wartości ciśnienia uruchamiającego zawór.

Odprowadzanie kondensatu

W przypadku możliwości gromadzenia się wykroplonej substancji rury lub same zawory (wersja wyposażona w kołnierze) w najniższym miejscu muszą być zaopatrzone w ciągle działające elementy odprowadzające kondensat. Zadbać o bezpieczne odprowadzanie kondensatu lub wydostającego się medium. Zabezpieczyć obudowę, przewody i tłumiki przed zamarznięciem.

Przewód odprowadzający / przeciwciśnienie

Przewód odprowadzający zaworów bezpieczeństwa musi umożliwiać bezciśnieniowe odprowadzenie wymaganego przepływu masowego. W zaworach bezpieczeństwa z metalowym mieszkiem sprężystym powstające podczas odprowadzania przeciwciśnienie o wartości maks. 4 bar nie wpływa negatywnie na ciśnienie uruchamiające zawór.

5 Eksploatacja / konserwacja

Wartość ciśnienia roboczego instalacji powinna być co najmniej 5% niższa od ciśnienia zamykania zaworu bezpieczeństwa. Dzięki temu po odprowadzeniu wody zawór bezpieczeństwa może się swobodnie zamknąć. W razie pomniejszych nieszczelności, które mogą powstać na skutek zanieczyszczeń pomiędzy powierzchniami uszczelniającymi, można oczyścić zawór, napowietrzając go w celu odprowadzenia wody. Jeżeli w ten sposób nieszczelność nie może być usunięta, prawdopodobnie ma miejsce uszkodzenie powierzchni uszczelniającej, które może być naprawione tylko w naszym zakładzie lub przez autoryzowany personel specjalistyczny.

W zależności od wersji zaworu grzybek można podnieść obracając moletowaną nakrętkę nad pokrywą sprężyny w kierunku przeciwnym do ruchu wskazówek zegara (rys. a), przy czym po tej operacji nakrętkę należy obrócić w przeciwnym kierunku, by zamknąć zawór, albo podnosząc dźwignię zamontowaną w górnej części zaworu (rys. b). Na czas transportu dźwignia jest przymocowana opaską do korpusu, opaskę te należy zdjąć przed użyciem dźwigni.

Zawory bezpieczeństwa bez osłony mieszkowej i bez gazoszczelnej pokrywy (rys. c)

W przypadku zaworów bezpieczeństwa bez osłony mieszkowej i bez gazoszczelnej pokrywy

można dodatkowo ściągnąć całą górną część z obudowy przez odkręcenie jej za pomocą odpowiedniego narzędzia i usunąć ewentualne pozostałości z gniazda i uszczelki gniazda.

Przed demontażem sprawdzić, czy do zaworu nie jest doprowadzone ciśnienie. Ciśnienie zadziałania i zamykania zaworu nie zmienia się po ponownym skręceniu górnej części z korpusem.

Zawory bezpieczeństwa z mieszkami metalowymi (rys. d)

W przypadku zaworów bezpieczeństwa z mieszkami metalowymi (rys. d) nie wolno odkręcać górnej części od korpusu, gdyż po odkręceniu nie można gwarantować szczelności w przypadku wystąpienia wzrostu ciśnienia w rurze odprowadzającej.

Zawory bezpieczeństwa z gazoszczelną pokrywą (rys. f) lub gazoszczelnym mechanizmem napowietrzenia obrotowego (rys. g)

W przypadku zaworów bezpieczeństwa z gazoszczelną pokrywą lub gazoszczelnym mechanizmem napowietrzenia z dźwignią nie wolno oddzielać górnej części od obudowy, w przeciwnym razie bowiem szczelność gazowa nie jest gwarantowana. Jeżeli w celach remontowych odkręcenie górnej części jest jednak konieczne, należy pamiętać o odprężeniu sprężyny przed demontażem. Przed demontażem należy również sprawdzić, czy i jakie medium może się znajdować pod kołpakiem. Istnieje niebezpieczeństwo ewentualnego sparzenia środkiem żrącym lub zatrucia.

Napowietrzanie w celu konserwacji

W przypadku zaworów bezpieczeństwa z mechanizmem napowietrzania zaleca się zgodnie z przepisami dla danego urządzenia, co pewien czas napowietrzyć, a następnie odpowietrzyć zawór bezpieczeństwa, aby przekonać się o jego sprawności. Z tego względu zawory bezpieczeństwa otwierają się najpóźniej przy ciśnieniu roboczym ≥ 85% ciśnienia uruchamiającego. Grzybka nie wolno podnosić, gdy w instalacji brak ciśnienia. Zgodnie z regulacjami technicznymi w zakresie kotłów parowych TRD 601 kontrolę działania zaworów bezpieczeństwa w wytwornicach pary należy przeprowadzać co najmniej co 4 tygodnie. Zawory bezpieczeństwa są ostatnim zabezpieczeniem zbiornika lub systemu. Powinny uniemożliwiać powstanie niedozwolonego nadciśnienia również w sytuacji, gdy zawiodą wszystkie pozostałe zamontowane urządzenia regulacyjne, sterujące i nadzorcze. W celu zapewnienia właściwego funkcjonowania zawory bezpieczeństwa wymagają regularnej i stałej konserwacji. Częstotliwość konserwacji zaworów określa użytkownik odpowiednio do warunków użytkowania.

6 Demontaż zaworu

Oprócz ogólnie obowiązujących wytycznych montażowych należy pamiętać, że zasadniczo przed demontażem zaworu w instalacji należy zredukować ciśnienie.

7 Naprawy

Napraw zaworów bezpieczeństwa może dokonywać wyłącznie firma Goetze KG Armaturen lub mogą je też wykonywać specjalistyczne autoryzowane warsztaty, pod warunkiem stosowania oryginalnych części zamiennych.

8 Gwarancja

Przed opuszczeniem fabryki niniejszy zawór został poddany kontroli. Nasze produkty objęte są gwarancją polegającą na bezpłatnej naprawie zwróconych części, które w potwierdzony sposób przedwcześnie stały się bezużyteczne na skutek błędów materiałowych lub fabrycznych. Nie realizujemy roszczeń odszkodowawczych i innych tego typu zobowiązań. Uszkodzenie fabrycznej plomby, nieprawidłowe postępowanie lub instalacja, nieprzestrzeganie niniejszej instrukcji montażu i konserwacji, zanieczyszczenie lub standardowe zużycie powoduje wygaśnięcie gwarancji producenta.

Rys. a): Podnoszenie z użyciem nakrętki moletowanej

Rys. b): Podnoszenie z użyciem dźwigni

Rys. c): Zawór bezpieczeństwa bez mieszka + bez membrany

Rys. d): Zawór bezpieczeństwa z mieszkiem

Rys. e): Zawór bezpieczeństwa z membraną

Rys. f): Zawór bezpieczeństwa z gazoszczelną pokrywą

Rys. g): Zawór bezpieczeństwa z gazoszczelnym napowietrzaniem dźwigniowym

9 Oznaczenie / kontrola

TÜV. SV. xx-xxxx.xx. D/G/H. 0,xx. xx

D/G
F
F/K/S

Symbol TÜV

Zawór bezpieczeństwa

Rok testowania urządzenia

Numer testu urządzenia

Najwęższy przekrój przepływu

Znaczenie liter:

D/G/H zaprojektowany do systemów ogrzewania
D/G zaprojektowany dla pary wodnej / gazu
F zaprojektowany dla cieczy
F/K/S zaprojektowany do upuszczania powietrza ze zbiorników cieczy, granulatu lub artykułów sypkich

Współczynnik uwalniania

Ciśnienie robocze w barach
(1 bar = 100 kPa)

Sprawdzamy zawory bezpieczeństwa pod kątem odporności na ciśnienie i szczelność, ustawiamy ciśnienie robocze według wymagań klienta i plombujemy je. Kod identyfikacyjny na tabliczce znamionowej lub pokrywie sprężystej zaworu jest nanoszony z użyciem systemu permanentnego oznaczania. Dodatkowo oznaczenie zawiera informacje wymagane normą DIN EN ISO 4126-1.

Navodila za sestavljanje, vzdrževanje in uporabo

Varnostni ventil 851/451, 852/452/352,
652mFK, 652sGK, 861/461, 420, 460

1 Splošne varnostne informacije

sl

- Ventil uporabljajte le:
  - če ustreza predvidenemu namenu
  - če je v neoporečnem stanju
  - z ozirom na zagotavljanje varnostni in na možne nevarnosti
- Vedno upoštevajte navodila za namestitev.
- Vse napake, ki bi lahko ogrožale varno delovanje ventila, je treba nemudoma odpraviti.
- Ventili so projektirani izključno za področje uporabe, opisano v teh navodilih za namestitev. Vsaka druga uporaba, ali uporaba, ki presega opisano področje uporabe, se smatra kot neprimerna uporaba.
- Z odstranitvijo plombe tovarniška garancija preneha veljati.
- Vsa monterska dela mora opraviti pooblaščeno, strokovno sposobljeno osebje.

2 Splošne informacije

Varnostni ventili so visoko kakovosten pribor, ki zahteva posebej skrbno ravnanje. Tesnilni površini sedeža in konusa sta precizno strojno obdelani, da se doseže zahtevana tesnost. Med montažo in med delovanjem ventila preprečite vstop tujkov v njegovo notranjost. Tesnjenje varnostnega ventila se lahko poslabšča zaradi konoplje, teflonskega traku ali drugih tesnilnih sredstev, pa tudi zaradi ostankov varjenja. Tudi grobo ravnanje z že nameščenim ventilom med skladiščenjem, prevozom ali montažo lahko povzroči puščanje ventila. V primeru pobarvanja ventila je treba paziti na to, da barva ne pride v neposreden stik z gibljivimi sestavnimi deli.

3 Možna uporaba

Za podrobnosti o področju uporabe posamičnih izvedb glejte podatkovne liste proizvajalca.

4 Namestitev in sestavljanje

Vzmetne varnostne ventile je potrebno namestiti s pokrovom vzmeti, usmerjenim navpično navzgor. Za zagotovitev brezhibnega delovanja ventilov, je treba le-te namestiti tako, da niso izpostavljeni nobenim nedopustnim statičnim, dinamičnim ali termičnim obremenitvam. Če bi lahko prišlo pri delovanju zaradi medija, ki izteka iz ohišja, do neposredne ali posredne nevarnosti za osebe ali okolico, potem je treba sprejeti ustrezne varnostne ukrepe. Vedno bodite pozorni na možne dime, ki se sproščajo iz razbremenilnih odprtin pokrova ventila.

Dovod

Dovodni priključki za varnostne ventile naj bodo kar se da kratki in narejeni tako, da pri polni zmogljivosti ventila ne bo moglo prihajati do izgub tlaka večjih od 3 % odzivnega tlaka.

Odvod kondenzata

V primeru možnega pojava kondenzata, je potrebno cevi ventila (v pririobnični izvedbi) oskrbeti na najnižji točki z napravo za stalni izpust delovnega kondenzata. Poskrbeti je treba za nenevarno odvajanje kondenzata ali iztekajočega se medija. Ohišje, napeljavo in dušilce zvoka je treba zavarovati proti zamrznitvi.

Oddušna napeljava / protitlak

Oddušno napeljavo varnostnih ventilov je treba izvesti tako, da se lahko pri sproščanju potrebni masni pretok odvaja brez tlaka. Pri varnostnih ventilih s kovinskim nagubanim mehom protitlak do največ 4 barov pri sproščanju ne vpliva na delovanje varnostnega ventila.

5 Delovanje / vzdrževanje

Delovni tlak naprave mora biti vsaj 5 % nižji od zapiralnega tlaka varnostnega ventila. S tem je zagotovljeno, da se lahko varnostni ventil po sproščanju ponovno uspešno zapre. V primeru manjših netesnosti, ki so posledica umazanije med tesnilnimi površinami, je možno ventil očistiti preko oddušnika s sproščanjem. Če vam ne uspe odpraviti netesnost, je verjetno poškodovana tesnilna površina, ki jo lahko popravijo samo v naši tovarni ali v pooblaščenem servisu.

Odvisno od izvedbe, se dviganje izvede z narebričeno matico nad pokrovom vzmeti (slika a), ki se obrne v nasprotni smeri urinega kazalca (potem je treba narebričeno matico vrniti v zaustavitveno lego) ali s sproženjem dvižnega vzvoda na zgornjem delu ventila (slika b). Med prevozom je dvižni vzvod blokiran s trakom, ki ga je potrebno odstraniti, če želite, da dvižna naprava deluje.

Varnostni ventili brez nagubanega meha in brez pokrova, neprepustnega za plin (Slika c)

Pri varnostnih ventilih brez nagubanega meha in brez pokrova, neprepustnega za plin, je mogoče dodatno s privijanjem zgornjega dela z ustreznim orodjem vzeti iz ohišja celoten zgornji del in odstraniti morebitne ostanke na sedežu in sedežnem tesnilu.

Pred montažo je treba paziti na to, da ventil ni pod tlakom. Tlak pri katerem se sproži varnostni ventil, se s ponovnim sestavljanjem zgornjega dela v ohišju ne spremeni.

Varnostni ventili s kovinskim mehom (slika d)

V primeru varnostnih ventilov s kovinskim mehom (slika d) se zgornji del ne sme ločiti od ohišja, ker sicer tesnjenje v primeru povratnega tlaka ni več zajamčeno.

Varnostni ventili s pokrovom, neprepustnim za plin (slika f) ali dvižnim mehanizmom z vzvodom, neprepustnim za plin (slika g)

Pri varnostnih ventilih s pokrovom, neprepustnim za plin ali dvižnim mehanizmom z vzvodom, neprepustnim za plin, zgornjega dela ni dovoljeno ločiti od ohišja, saj neprepustnost za plin v nasprotnem primeru ni več zagotovljena.Če je zaradi popravila nujno potrebno odviti zgornji del, bodite pozorni na to, da pred odstranitvijo sprostite vzmet. Pred odstranitvijo je potrebno preveriti, če je prisoten medij oz. kateri medij je pristoten v pokrovu. Obstaja nevarnost razjed ali zastrupitve!.

Odzračenje za vzdrževanje

Pri varnostnih ventilih z zračno napravo se priporoča in je tudi predpisano, da je treba varnostni ventil glede na specifično napravo občasno prezračiti in izpustiti zrak, da se prepričate o pravilnem delovanju varnostnega ventila. S tem ga je možno odpreti najpozneje pri delovnem tlaku ≥85 % odzivnega tlaka. Dvižnega mehanizma ne smete uporabiti v breztlačnem stanju. Kontrole delovanje varnostnih ventilov so v skladu s TRD 601 pri razvijalcih pare potrebne najmanj v časovnih intervalih 4 tednov.

Varnostni ventili predstavljajo zadnjo zaščito posode oz. sistema. Ventili morajo biti v položaju, da preprečijo nedopusten nadtlak tudi takrat, ko odpovejo vse druge prednameščene regulirne, krmilne in nadzorne naprave. Za zagotovitev teh lastnosti delovanja je treba varnostne ventile redno in periodično vzdrževati. Intervale vzdrževanja teh armatur mora določiti upravljavec skladno s pogoji uporabe.

6 Demontaža armature

Dodatno k splošno veljavnim montažnim smernicam je treba upoštevati, da mora biti pred demontažo poskrbljeno za to, da je naprava brez tlaka.

7 Popravila

Popravila varnostnih ventilov sme izvajati samo podjetje Goetze KG Armaturen ali pooblaščeni servis z uporabo izključno originalnih nadomestnih delov.

8 Garancija

Preden je ta ventil zapustil tovarno, je bil testiran. Za naše proizvode zagotavljamo garancijo, ki vključuje brezplačno popravilo vseh tistih delov, ki so bili vrnjeni v tovarno in za katere se ugotovi, da so postali predčasno neuporabni zaradi defektnega materiala ali napak pri izdelavi. Plačila odškodnine in drugih podobnih obveznosti ne prevzemamo. Pri poškodbi tovarniške plombe, nepravilni uporabi ali instalaciji, neupoštevanju teh navodil za montažo in vzdrževanje, onesnaženju ali običajni obrabi tovarniška garancija preneha veljati.

Slika a): Dviganje s pomočjo narebričene matice
Slika b): Dviganje s pomočjo vzvoda
Slika c): Varnostni ventil brez meha + brez membrane
Slika d): Varnostni ventil s kovinskim mehom
Slika e): Varnostni ventil z membrano
Slika f): Varnostni ventil s pokrovom, neprepustnim za plin
Slika g): Varnostni ventil z dvižnim mehanizmom z vzvodom, neprepustnim za plin

9 Označevanje / kontrola

TÜV. SV. xx-xxxx.xx. D/G/H. 0,xx. xx

D/G
F
F/K/S

Znak TÜV

Varnostni ventil

Leto preizkušanja komponente

Št. preizkusa komponente

Najmanjši presek za pretok

Koda:
D/G/H predviden za ogrevalne sisteme
D/G predviden za paro/plin
F predviden za tekočine
F/K/S predviden za izpuščanje zraka iz rezervoarjev za tekoče, zrnate ali praškaste izdelke

Koeficient praznjenja

Nastavljeni tlak v barih

Preizkusili smo tlačno odpornost in tesnjenje ventilov, nastavili zahtevani tlak in jih zatesnili.
Za oznake na napisni ploščici ali na pokrovu vzmeti ventila se uporablja stalni sistem oznak. Dodatno vsebuje oznaka vse potrebne podatke ustrezno DIN EN ISO 4126-1.

Monterings-, underhålls- och bruksanvisning

Säkerhetsventil 851/451, 852/452/352, 652mFK, 652sGK, 861/461, 420, 460

1 Allmänna säkerhetsanvisningar

SV

- Ventilen får endast användas:
  - för avsett syfte
  - i felfritt skick
  - säkerhets- och riskmedvetet
- Beakta alltid monteringsanvisningen.
- Fel som kan påverka säkerheten negativt ska åtgärdas omedelbart.
- Ventilerna är avsedda endast för det användningsområde som anges i den här bruksanvisningen. Ventilerna får inte användas för något annat ändamål.
- När plomberingen brutits upphör fabriksgarantin att gälla.
- Monteringsarbeten får endast utföras av behörig fackpersonal.

2 Allmän information

Säkerhetsventiler är armaturer som måste hanteras varsamt. För att uppnå den nödvändiga tätheten har tätytor på fäste och kona polerats. Undvik att främmande föremål hamnar i ventilen under montering och drift. Säkerhetsventilernas täthet kan påverkas av hampa, teflonband eller andra tätningsmedel samt svettdroppar el.dyl. Även oaktsam hantering av den färdiga ventilen under lagring, transport och montering kan påverka armaturens täthet. Om du målar ventilen ska du se till att de glidande delarna inte kommer i kontakt med målarfärg.

3 Användningsområde

I databladen från tillverkaren kan du hitta detaljer om användningsområdet för de enskilda utföranden.

4 Inbyggnad och montering

Fjädersäkerhetsventiler ska byggas in lodrätt med fjäderhuven uppåt. För att ventilerna ska fungera korrekt ska de installeras så att de inte utsätts för statiska, dynamiska eller termiska belastningar. Om det kan uppstå direkt eller indirekt fara för personer eller omgivningen när produkt rinner ut ur huset vid aktivering av ventilen måste lämpliga skyddsåtgärder vidtas. Observera även att ånga kan strömma ut genom fjäderhuvens avlastningshål.

Tilledning

Tilledningsanslutningar för säkerhetsventiler ska vara så korta som möjligt och utformas så att tryckförlusten vid full ventileffekt inte överstiger tre procent av aktiveringstrycket.

Kondensatutloppsledning

Ledningarna eller själva ventilerna (vid flänsmodeller) måste på sin lägsta punkt vara försedda med en anordning för avledning av kondensat vid möjligt kondensatfall. Se till att kondensat eller läckande medium leds bort på ett säkert sätt. Hus, ledningar och ljuddämpare ska skyddas mot frost.

Avluftningsledning / mottryck

Säkerhetsventilernas avluftningsledningar ska utformas så att det nödvändiga massflödet kan ledas bort utan tryck vid avluftning. På säkerhetsventiler med metallbälgar påverkar ett mottryck på högst 4 bar vid avluftning inte säkerhetsventilens aktiveringstryck.

5 Driftsätt / underhåll

Anläggningens arbetstryck ska vara minst fem procent lägre än säkerhetsventilens stängningstryck. Detta säkerställer att säkerhetsventilen fungerar korrekt efter avluftning. Vid mindre otätheter som kan orsakas av smuts mellan tätytorna kan ventilen avluftas genom ventilering för att få bort smutsen. Om läckaget inte kan avhjälpas med denna åtgärd är troligen tätningsytan skadad. En sådan skada kan bara repareras på vår fabrik eller av auktoriserad fackman.
Tilluftning sker (beroende på typ) antingen via en profilmutter ovanför fjäderhuven (bild a) som vrids motsols (sedan ska profilmuttern vridas tillbaka till anslaget) eller med hjälp av lättverket på ventilens överdel. Lättverksarmen är fäst med ett snöre vid leverans, detta måste avlägsnas före en funktionstest.

Säkerhetsventil utan skyddsbälg och utan gastätt lock (bild c)

Hos säkerhetsventiler utan skyddsbälg och gastätt lock kan även hela överdelen tas ut ur kapslingen om man skruvar loss överdelen med rätt verktyg, och eventuella rester kan tas bort från fäste och sätestätning.
Kontrollera att ventilen är trycklös innan du demonterar den. Efter återmontering av överdelen i kapslingen är säkerhetsventilens öppningstryck oförändrat.

Om säkerhetsventil med skyddsbälg i metall (bild d) används, får överdelen inte separeras från kapslingen eftersom en täthet vid uppkomst av mottryck inte längre kan garanteras i så fall.

Säkerhetsventiler med gastätt lock (bild f) eller gastät lyft (bild g)

Hos säkerhetsventiler med gastätt lock eller gastät lyft får inte överdelen separeras från kapslingen eftersom gastätheten inte längre kan garanteras i så fall. Skulle det ändå bli nödvändigt att skruva av överdelen vid en reparation, ska man ge akt på att fjädern avlastas före demonteringen. Före demonteringen ska man likaså kontrollera, om och vilket medium som kan befinna sig i huven. Eventuellt består risk för frätskador eller förgiftning.

Ventilering för underhåll

För säkerhetsventiler med ventilationsanordningen rekommenderas det och på vissa specifika anläggningar är det även föreskrivet att säkerhetsventilen blåses ut emellanåt genom ventilering för att vara övertygad om att säkerhetsventilen fungerar. Detta är också föreskrift enligt gällande bestämmelser. Den går därför att öppna senast från och med ett drifttryck på ≥85 % av aktiveringstrycket. Funktionstest får därför inte ske när ventilerna är trycklösa. Enligt de tyska tekniska reglerna TRD 601 ska säkerhetsventiler i ånggeneratorer kontrolleras minst var fjärde vecka så att de går lätt.
Säkerhetsventiler är det sista säkerhetssteget i en behållare eller ett system. De måste motverka otillåtet höga tryck även om övriga förkopplade regler-, styr- och övervakningsenheter skulle sluta fungera. Säkerhetsventilerna behöver ett regelbundet och upprepat underhåll för att kunna säkerställa dessa funktionsegenskaper. Underhållsintervallerna för ventilerna ska fastställas av operatören med utgångspunkt i ventilernas driftvillkor.

6 Demontering

Utöver de allmänna riktlinjerna för montering är det viktigt att tänka på att hela anläggningen ska göras trycklös innan ventilen demonteras.

7 Reparationer

Endast företaget Goetze KG Armaturen eller fackverkstäder som auktoriserats genom detta får genomföra reparationer på säkerhetsventilerna och endast genom att använda originalreservdelar. Reparationer får endast ske med originalreservdelar.

8 Garanti

Alla ventiler kontrolleras innan de lämnar fabriken. Vår garanti innebär att vi utför gratis reparation av delar som lämnas in till oss, om dessa bevisligen blivit funktionsodugliga i förtid till följd av material- eller fabrikationsfel. Vi betalar inte skadestånd eller liknande skadeersättning. Fabriksgarantin gäller inte om plomberingen skadats, om produkten hanterats eller installerats på felaktigt sätt, om anvisningarna i den här monterings- och bruksavisningen inte har beaktas samt om produkten smutsas ned eller slits ner normalt.

Bild a): Funktionstest med en profilmutter

Bild b): Funktionstest med lättverksarm

Bild c): Bild d) Säkerhetsventil utan skyddsbälg + utan Membrane

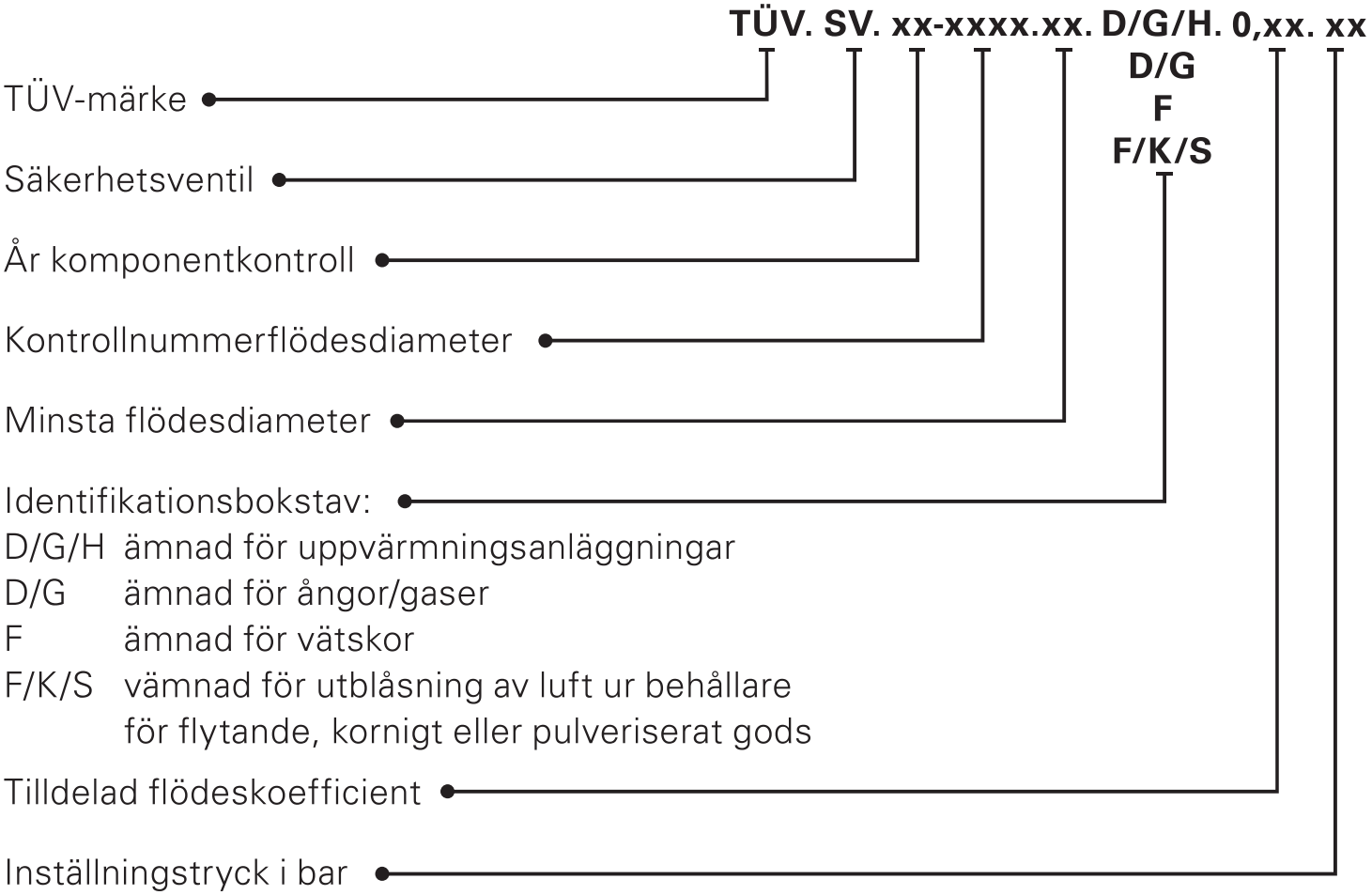
Bild d): Säkerhetsventil med skyddsbälg

Bild e): Säkerhetsventil med Membrane

Bild f): Säkerhetsventil med gastätt lock

Bild g): Säkerhetsventil med gastät lyft

9 Märkning / kontroll



D/G/H ämnad för uppvärmningsanläggningar
D/G ämnad för ångor/gaser
F ämnad för vätskor
F/K/S vämnad för utblåsning av luft ur behållare för flytande, kornigt eller pulveriserat gods

Säkerhetsventilerna kontrolleras på tryckhållfasthet och täthet, justeras in på önskat inställningstryck och plomberas.
Märkningen på typskylten resp. ventilens fjäderhuv är outplånlig. Dessutom omfattar märkningen de nödvändiga uppgifterna enligt SS-EN ISO 4126-1.

Общи указания за безопасност

bg

- Използвайте вентила само:
  - по предназначение
  - в безупречно състояние
  - с осъзнаване на безопасността и опасностите
- Да се спазва ръководството за монтаж.
- Неизправности, които могат да влошат безопасността, трябва незабавно да се отстраняват.
- Вентилите са предназначени за използване само в посочената в това ръководство за монтаж област на използване. Друго или надхвърлящо това използване се счита за не по предназначение.
- С отстраняването на пломбата се губи фабричната гаранция.
- Всички монтажни работи трябва да се извършват от оторизирани специалисти.

Všeobecné bezpečnostní pokyny

cs

- Používejte ventil pouze:
  - v souladu s určením
  - v bezvadném stavu
  - bezpečně a s ohledem na možné nebezpečí
- Dodržujte pokyny uvedené v návodu na montáž.
- Poruchy, které mohou omezit bezpečnost, se musí okamžitě odstranit.
- Ventily jsou určeny pouze pro oblast použití uvedenou v tomto návodu na montáž. Jiné použití nebo použití přesahující stanovený rozsah je v rozporu s určením.
- Odstraněním plomby zaniká záruka výrobce.
- Všechny montážní práce musí provádět autorizovaný odborný personál.

Generelle sikkerhedsanvisninger

da

- Brug kun ventilen:
  - formålsbestemt
  - i upåklagelig tilstand
  - sikkerheds- og farebevidst
- Følg monteringsvejledningen.
- Fejl, der kan påvirke sikkerheden, skal omgående afhjælpes.
- Ventilerne er udelukkende beregnet til det i denne monteringsvejledning anførte anvendelsesområde. En anden eller derudover gående anvendelse anses som ikke-formålsbestemt.
- Fabriksgarantien bortfalder, hvis plomberingen fjernes.
- Alle montagearbejder skal udføres af autoriseret fagpersonale.

Γενικές υποδείξεις ασφαλείας

el

- Να χρησιμοποιείτε αυτή τη βαλβίδα μόνο:
  - με τον ενδεδειγμένο τρόπο
  - εφόσον βρίσκεται σε άψογη κατάσταση
  - με γνώση της ασφάλειας και των κινδύνων
- Πρέπει να λαμβάνετε υπόψη τις οδηγίες τοποθέτησης.
- Βλάβες οι οποίες θα μπορούσαν να επηρεάσουν δυσμενώς την ασφάλεια, πρέπει να εξαλείφονται αμέσως.
- Οι βαλβίδες προορίζονται αποκλειστικά για τον τομέα χρήσης που αναφέρεται στις παρούσες οδηγίες τοποθέτησης. Άλλη χρήση θεωρείται ως μη ενδεδειγμένη.
- Αφαιρώντας την εργοστασιακή σφράγιση παύει να ισχύει η εργοστασιακή εγγύηση.
- Όλες οι εργασίες συναρμολόγησης πρέπει να εκτελούνται από ιαπιστευμένο εξειδικευμένο προσωπικό.

Üldised ohutusjuhised

et

- Kasutage klappi ainult:
  - nagu ettenähtud
  - kui see on töökorras
  - ohutust ja ohtusid teadvustades
- Jälgida tuleb paigaldamisjuhiseid.
- Vead, mis võivad mõjutada ohutust, tuleb koheselt kõrvaldada.
- Klapid on valmistatud kasutamiseks ainult käesolevates paigaldamisjuhistes toodud kasutuspiirkondades. Kogu muud kasutamist või laiendatud kasutamist loetakse vääraks.
- Plommi eemaldamine toob kaasa tehasepoolse garantii lõppemise.
- Kogu paigaldustöö tuleb läbi viia selleks volitatud professionaalide poolt.

Yleiset turvallisuusohjeet

fi

- Käytä venttiiliä vain:
  - määräysten mukaisesti
  - moitteettomassa kunnossa
  - turvallisuuden ja vaarat huomioon ottaen
- Asennusohjetta on noudatettava.
- Turvallisuuden vaarantavat häiriöt on korjattava välittömästi.
- Venttiilit on tarkoitettu ainoastaan tässä asennusohjeessa mainittuun käyttöalueeseen. Muunlainen tai tämän ylittävä käyttö katsotaan määräystenvastaiseksi
- Jos sinetit poistetaan, tehdastakuu ei ole enää voimassa.
- Valtuutetun ammattitaitoisen henkilöstön on tehtävä kaikki asennustyöt.

General safety instructions

ga

- Only use the valve:
  - as intended
  - in proper condition
  - with safety- and danger awareness
- The installation instructions are to be observed.
- Faults that could affect safety must be rectified immediately.
- Valves are exclusively designed for the areas of use listed in these installation instructions. Any other use or extended use is considered improper.
- Removal of the seal will void the factory warranty.
- All installation work is to be performed by authorized professionals.

Opće sigurnosne napomene

hr

- Ventil koristiti samo:
  - za navedenu namjenu
  - u besprijekornom stanju
  - uzimajući u obzir sigurnost i moguće opasnosti
- Uvijek poštujte upute za postavljanje.
- Sve smetnje koje bi mogle ugroziti sigurnost, moraju se odmah otkloniti.
- Ventili su namijenjeni isključivo za raspon primjene, opisan u ovim uputama za postavljanje. Druga ili posredna mogućnost uporabe smatra se nepropisnom.
- Jamstvo proizvođača za podešenost ventila postaje ništavno i nevažeće ako se ukloni zapečaćena kapa.
- Sve montažne radove mora obaviti ovlašteno stručno osoblje.

Avvertenze generali sulla sicurezza

it

- Usare la valvola esclusivamente:
  - per il suo scopo specifico
  - in condizioni perfette
  - prestando attenzione a sicurezza e possibili rischi
- Attenersi sempre alle istruzioni per l'installazione.
- Eliminare immediatamente eventuali difetti che possono pregiudicare la sicurezza.
- Le valvole sono progettate esclusivamente per il campo d'impiego indicato in queste istruzioni per l'installazione. Qualsiasi uso diverso o che esuli da questo campo d'impiego viene considerato come improprio.
- Con la rimozione della piombatura, la garanzia del fabbricante decade.
- Tutti i lavori di montaggio devono essere eseguiti da personale specializzato appositamente autorizzato.

Pagrindiniai saugaus darbo nurodymai

lt

- Vožtuvą naudokite tik:
  - pagal paskirtį
  - geros būklės
  - laikydamiesi saugos taisyklių ir žinodami apie gresiantį pavojų.
- Būtina vadovautis montavimo nurodymais.
- Saugai įtakos galinčius turėti gedimus būtina nedelsiant pašalinti.
- Vožtuvai yra išskirtinai pagaminti tik šiose montavimo instrukcijose nurodytoms naudojimo paskirtims. Bet koks kitas jų naudojimas yra netinkamas.
- Pašalinus sandariklį, garantija nebegalioja.
- Visus montavimo darbus turi atlikti tik įgalioti specialistai.

Vispārīgie drošības norādījumi

lv

- Lietojiet ventili tikai:
  - atbilstoši priekšrakstiem
  - nevainojamā stāvoklī
  - atbilstoši drošības noteikumiem un apdraudējumu brīdinājumiem
- Jāņem vērā montāžas instrukcija.
- Traucējumi, kuri var ietekmēt drošību, nekavējoties jānovērš.
- Ventiļi ir paredzēti tikai montāžas instrukcijā paredzētajai lietojuma jomai. Cita, tajā neminēta izmantošana uzskatāma par priekšrakstiem neatbilstošu.
- Noņemot plombu, zūd rūpnīcas garantija.
- Visi montāžas darbi jāveic autorizētiem speciālistiem.

Struzzjonijiet ġenerali dwar is-sikurezza

mt

- Uża biss il-valv:
  - kif maħsub
  - f'kundizzjoni xierqa
  - b'għarfien dwar is-sikurezza u l-periklu
- L-istruzzjonijiet tal-installazzjoni għandhom jiġu obduti.
- Ħsarat li jistgħu jaffettwaw is-sikurezza għandhom jiġu kkoreġuti minnufih.
- Il-valvi huma ddisinjati esklussivament għaż-żoni ta' użu elenkati f'dawn l-istruzzjonijiet ta' installazzjoni. Kwalunkwe użu ieħor jew kwalunkwe użu estiż huwa meqjus mhux xieraq.
- It-tneħħija tas-siġill irendi l-garanzija tal-fabbrika nulla.
- Ix-xogħol kollu ta' installazzjoni għandu jsir minn professjonisti awtorizzati.

Algemene veiligheidsinformatie

nl

- Gebruik de klep alleen:
  - voor het gespecificeerde doel
  - in een onberispelijke toestand
  - met inachtneming van de veiligheid en de mogelijke gevaren
- Volg altijd de montage-instructies.
- Eventuele defecten die van invloed kunnen zijn op een veilige werking van de klep moeten onmiddellijk worden verholpen.
- De kleppen zijn exclusief ontwikkeld voor de toepassingen die in deze installatie-intructies zijn beschreven. Gebruik dat afwijkt van of zich verder uitstrekt dan de genoemde toepassingen wordt beschouwd als oneigenlijk gebruik.
- De fabrieksgarantie vervalt als de afdichting wordt verwijderd.
- Alle montagewerkzaamheden dienen te worden uitgevoerd door daartoe bevoegd gespecialiseerd personeel.

Generelle sikkerhetsanvisninger

no

- Bruk ventilen kun:
  - som tiltenkt
  - i feilfri tilstand
  - sikkerhets- og farebevisst
- Det skal tas hensyn til monteringsanvisningene.
- Forstyrrelser som kan påvirke sikkerheten, skal utbedres omgående.
- Ventilene er utelukkende ment for det bruksområdet som er oppført i denne monteringsanvisningen. All annen bruk eller bruk utover dette gjelder som feil bruk.
- Når plomberingen fjernes, opphører fabrikkgarantien.
- Alle monteringsarbeider skal gjennomføres av autorisert fagpersonell.

Informacje ogólne na temat bezpieczeństwa

pl

- Zawór należy stosować wyłącznie:
  - w sposób zgodny z przeznaczeniem
  - jeśli znajduje się w nienagannym stanie
  - przy uwzględnieniu bezpieczeństwa i zagrożeń
- Przestrzegać instrukcji montażu.
- Niezwłocznie usuwać usterki, które mogą zagrażać bezpieczeństwu.
- Zawory są przeznaczone wyłącznie do użytku w zakresie zastosowania określonym w niniejszej instrukcji montażu. Inne lub wykraczające poza ten zakres użycie jest użyciem niezgodnym z przeznaczeniem.
- Usunięcie plomby skutkuje wygaśnięciem gwarancji udzielonej przez producenta.
- Wszystkie prace montażowe należy zlecać autoryzowanemu, specjalistycznemu personelowi.

Indicações gerais de segurança

pt

- A válvula só pode ser utilizada:
  - de acordo com a finalidade prevista
  - se estiver em perfeitas condições
  - de forma consciente em relação à segurança e aos perigos
- É obrigatório observar as instruções de instalação.
- As anomalias que possam comprometer a segurança têm de ser reparadas de imediato.
- As válvulas destinam-se exclusivamente à área de aplicação especificada nestas instruções de instalação. Utilizações diferentes daquelas referidas não correspondem à finalidade prevista.
- A remoção do selo resulta na anulação da garantia da fábrica.
- Todos os trabalhos de montagem têm de ser realizados por técnicos autorizados.

Instrucţiuni generale de siguranţă

ro

- Utilizaţi supapa doar:
  - în mod conform
  - în stare ireproşabilă
  - cu conştientizarea problemelor de siguranţă şi a pericolelor
- Se vor respecta instrucţiunile de montare.
- Defecţiunile ce pot afecta siguranţa trebuie remediate imediat.
- Supapele au fost construite exclusiv în scopul descris în aceste instrucţiuni. Orice altă utilizare este considerată neconformă.
- Îndepărtarea sigiliului duce la pierderea garanţiei.
- Toate lucrările de montaj se vor face de către personal de specialitate.

Общая информация по технике безопасности

ru

- Клапан нужно использовать только:
  - в предусмотренных целях
  - если клапан находиться в безупречном состоянии
  - учитывая меры безопасности и возможные опасности
- Всегда соблюдайте инструкцию по установке.
- Любые дефекты, которые могут повлиять на безопасную работу клапана, необходимо незамедлительно устранять.
- Клапаны предназначены исключительно для области применения, описанной в инструкции по установке. Использование в любых других целях либо вне установленного диапазона считается несоответствующим.
- Гарантия производителя аннулируется при нарушении пломбы.
- Все работы по сборке должен выполнять только авторизованный персонал.

Полное техническое руководство по эксплуатации можно скачать здесь:
http://www.goetze-armaturen.de/ru/servisskachivanie/instrukcii-po-ehkspluatacii/

Všeobecné bezpečnostné pokyny

sk

- Používajte ventil iba:
  - podľa predpisov
  - v bezchybnom stave
  - s uvedomovaním si bezpečnosti a nebezpečenstiev
- Dodržiavajte montážny návod.
- Poruchy, ktoré by mohli negatívnym spôsobom ovplyvniť bezpečnosť, sa musia bezodkladne odstrániť.
- Ventily sú určené výlučne na používanie uvedené v tomto montážnom návode. Iné používanie alebo používanie nad rámec návodu sa považuje za používanie proti predpisom.
- Ak odstránite plombu, zaniká akýkoľvek nárok na záruku od našej firmy.
- Všetky montážne činnosti musí vykonať autorizovaný kvalifikovaný personál.

Splošne varnostne informacije

sl

- Ventil uporabljajte le:
  - če ustreza predvidenemu namenu
  - če je v neoporečnem stanju
  - z ozirom na zagotavljanje varnostni in na možne nevarnosti
- Vedno upoštevajte navodila za namestitev.
- Vse napake, ki bi lahko ogrožale varno delovanje ventila, je treba nemudoma odpraviti.
- Ventili so projektirani izključno za področje uporabe, opisano v teh navodilih za namestitev. Vsaka druga uporaba, ali uporaba, ki presega opisano področje uporabe, se smatra kot neprimerna uporaba.
- Z odstranitvijo plombe tovarniška garancija preneha veljati.
- Vsa monterska dela mora opraviti pooblaščeno, strokovno sposobljeno osebje.

Allmänna säkerhetsanvisningar

sv

- Ventilen får endast användas:
  - för avsett syfte
  - i felfritt skick
  - säkerhets- och riskmedvetet
- Beakta alltid monteringsanvisningen.
- Fel som kan påverka säkerheten negativt ska åtgärdas omedelbart.
- Ventilerna är avsedda endast för det användningsområde som anges i den här bruksanvisningen. Ventilerna får inte användas för något annat ändamål.
- När plomberingen brutits upphör fabriksgarantin att gälla.
- Monteringsarbeten får endast utföras av behörig fackpersonal.

Genel emniyet bilgileri

tr

- Vanayı sadece:
  - amacına uygun
  - hatasız ve arızasız bir durumda
  - emniyet ve tehlike bilinci ile kullanınız
- Kurulum talimatına dikkat edilmelidir.
- Emniyeti olumsuz etkileyebilecek arızaların derhal giderilmesi gerekmektedir.
- Vanalar sadece bu kurulum talimatında belirtilen kullanım sahası için öngörülmüştür. Başka bir amaçla veya bunun dışındaki kullanım amacına uygun kullanım olarak geçerli değildir.
- Kurşun mühürün çıkartılması durumunda fabrika tarafından verilen garanti ortadan kalkmaktadır.
- Bütün montaj çalışmalarının sadece yetkili uzman personel tarafından yapılması gerekmektedir.

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Fax +49 (0) 71 41 4 88 94 88
info@goetze-armaturen.de
www.goetze-armaturen.de
Germany

→ Series 461

461

Safety valves made of stainless steel, angle-type with threaded connections



SUITABLE FOR

Liquids	neutral and non-neutral	
Air, gases and vapours	neutral and non-neutral	
Steam		

EXAMPLES OF USE

For the protection of:
- pressure tanks and -systems for neutral / non-neutral vapours, gases and liquids
- steam boilers and steam plants

Please observe plant-specific regulations and use of appropriate valve version and sealing material.

- chemical plants, biogas plants
- desalination plants
- process equipment construction and medical technology
- shipbuilding industry and marine equipment
- secondary areas in the food-, beverage-, pharmaceutical- and cosmetics-industries
- offshore-applications

Safety valves are set and sealed at the factory.

CE 0035 UKCA 0168 TS EAC

MATERIAL

EDELSTAHL Rostfrei

SPECIFICATION

1/4“ – 1/2“	– 60°C to + 225°C depending on version	0,5 – 70 bar

APPROVALS

TÜV-Type test approval 2061	**D/G, F**
EU type examination	**S/G, L**
TSG ZF001-2006	**D/G (S/G), F (L)**
TR ZU 032/2013 - TR ZU 010/2011	**D/G (S/G), F (L)**

Requirements

AD 2000 Data sheet A2	PED 2014/68/EU
TRD 421	UK PESR 2016 No. 1105
DIN EN ISO 4126-1	

Classification society

DNV	DNV
Lloyd’s Register EMEA	LR EMEA
American Bureau of Shipping	ABS
Russian Maritime Register of Shipping	RS
Registro Italiano Navale	RINA

MATERIALS

Component	Material	DIN EN	ASME
Inlet body	Stainless steel	1.4404	316 L
Outlet body	Stainless steel	1.4408	CF8M
Internal parts	Stainless steel	1.4404	316 L
Spring	Stainless steel	1.4310	302

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s	Standard, non-gastight version of the spring housing	for neutral media without counter pressure, not for medium in combination GF
t	gastight version of spring housing	for neutral and non-neutral media, not counter pressure compensated. The environment is protected from being affected by the medium.

■ MEDIUM

G	gaseous	Air, vapours, gases and steam
F	liquid	The temperature of the medium under atmospheric pressure must not reach boiling point
GF	gaseous and liquid	Air, vapours, gases, steam and liquids Only available as gastight version of the spring housing

■ TYPE OF LIFTING MECHANISM

K	Standard with twist-type lifting mechanism, non-gastight version
L	Lifting lever, non-gastight version
O	without lifting device, standard for gastight version

■ AVAILABLE NOMINAL DIAMETERS AND CONNECTION SIZES

Nominal diameter DN		**8**	**10**	**15**
Inlet		1/4“ (8)	3/8“ (10)	1/2“ (15)
Outlet	1/2“ (15)	■	■	■

■ TYPE OF CONNECTION INLET / OUTLET THREADED CONNECTIONS

m / f	Standard	Male thread BSP-P / Female thread BSP-P	DIN EN ISO 228-1 / DIN EN ISO 228-1

Other connection types possible on request

■ SEALS

PTFE	Polytetrafluoroethylene	Flat seal up to 25 bar	–60°C to +225°C
PTFE+Kohle	Polytetrafluoroethylene + carbon	Flat seal from 25,1 bar	–60°C to +225°C

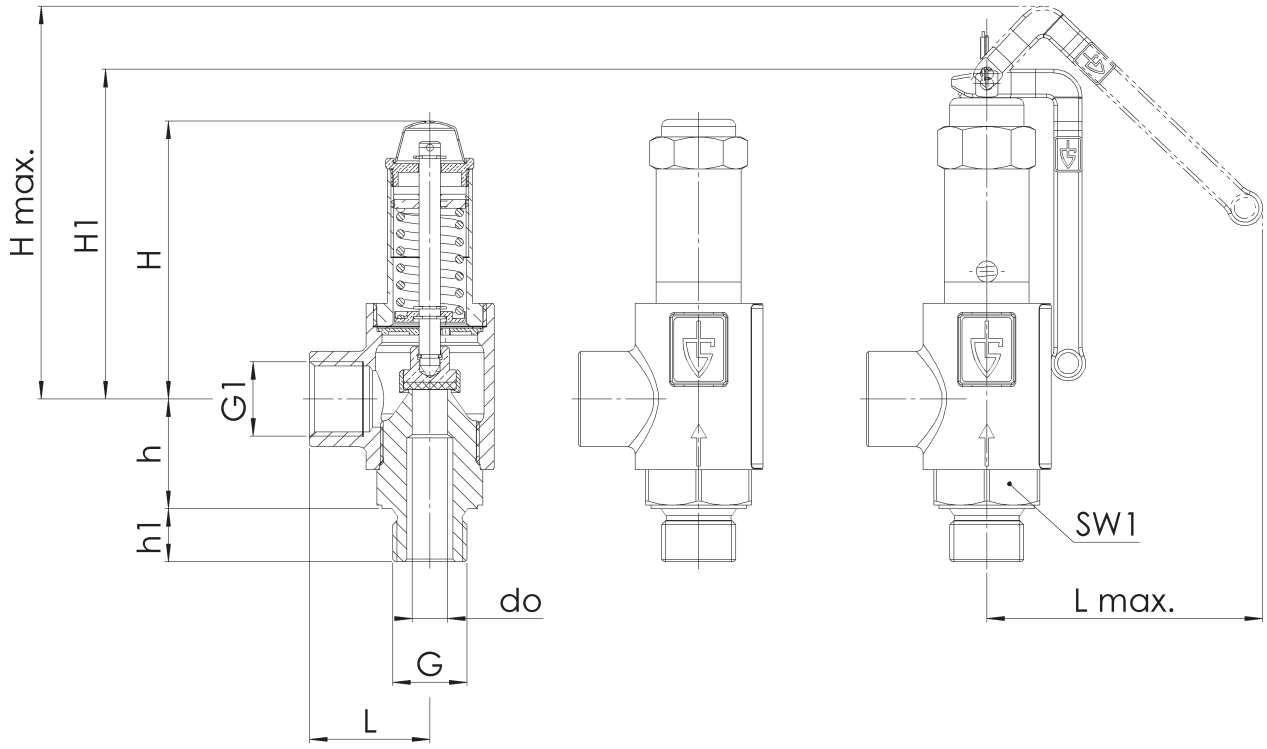
NOMINAL DIAMETERS, CONNECTIONS, INSTALLATION DIMENSIONS

Series 461: Connection, installation dimensions, ranges of adjustment

Nominal diameter	DN	8	10	15	
Connection DIN EN ISO 228	G	1/4" (8)	3/8" (10)	1/2" (15)	1/2" (15)
Outlet DIN EN ISO 228	G1	1/2" (15)	1/2" (15)	1/2" (15)	1/2" (15)
Installation dimensions in mm	L	34	34	34	34
	Lmax	78	78	78	78
	H	79	79	79	133
	H1	93	93	93	150
	Hmax	111	111	111	168
	h	31	31	31	31
	h1	12	12	15	15
	SW	30	30	30	30
Coefficients of flow ISO 4126-1	αw /Kdr (F)	0,5	0,44	0,47	0,47
Coefficients of flow ISO 4126-1	αw /Kdr (D/G)[1])	0,68	0,64	0,71	0,71
	do	6	8	10	10
Weight	kg	0,5	0,5	0,6	1
Range of adjustment	bar	0,5-70	0,5-70	0,5-30	30,1-70

[1]Coefficients of flow for blow-off pressures >3,0 bar. For lower pressures refer to values in the capacity table.

MAIN DIMENSIONS, INSTALLATION DIMENSIONS



www.goetze-group.com | info@goetze-armaturen.de | Phone: +49 (0) 7141 / 488 94 60

C63-AQU-QIX-002 400 / 917

Series	Valve version	Medium	Lifting device	Nominal diameter DN	Connection type		Connection size		Seal	Options	Set pressure	Quantity
					Inlet	Outlet	Inlet	Outlet				
461	*t*	*G*	*0*	*8*	m	f	*8*	15	*PTFE*		*12,3*	*2*
461					m	f		15				
461					m	f		15				
461					m	f		15				

■ PROPERTIES

GOX	Especially for gaseous O2 applications by employment of specific materials including oil- and grease free production process	☐			☐
P01	Oil- and grease-free production	☐			☐
		☐			☐

■ CERTIFICATES / APPROVALS

C01	Factory certificate acc. DIN EN 10204 2.2 (WKZ 2.2)	☐	**C06**	ATEX evaluation acc. to 2014/34/EU	☐
C02	Test certificate acc. DIN EN 10204 3.1 (WPZ 3.1)	☐	**C07**	SIL evaluation relating to IEC 61508-2	☐
C03	Material test certificate acc. DIN EN 10204 3.1 (MPZ 3.1) (pressure retaining part)	☐	**C09**	Seat tightness test with helium, leak detection method under vacuum incl. Factory Inspection Certificate 3.1 acc. to DIN EN 10204	☐
C04	TÜV/DEKRA individual inspection acc. EN 10204 3.2 (TÜV/DEKRA-APZ)	☐	**C10**	Certificate of oil- and grease free production	☐
C05	Sealing material Manufacturer certification (FDA, USP 3, 3-A,…), Please indicate description of certificate:	☐	**C11**	Certification of the production process especially for gaseous oxygen applications by employment of specific materials	☐

■ ADMISSIONS / ACCREDITATIONS

AA1	EC Type examination acc. to Directive 2014/68/EU	☐	**AK1**	Det Norske Veritas (DNV) type approval	☐
AA2	TÜV component test acc. to VdTÜV specification sheet SV 100	☐	**AK2**	Lloyd's Register (LR) type approval	☐
AA4	EAC - certificate/declaration with passport for the valve and laser marking of the valve	☐	**AK3**	American Bureau of Shipping (ABS) type approval	☐
AA5	Manufacture License of Special Equipment People's Republic of China (ML)	☐	**AK4**	Bureau Veritas (BV) type approval	☐
AA11	UK Type examination acc. to Directive UK PESR 2016 No. 1105	☐	**AK5**	Russian Maritime Register of Shipping (RMRS) type approval	☐
		☐	**AK6**	Registro Italiano Navale (RINA) type approval	☐
		☐	**AL**	Individual inspection by notified body inspector – (body to be indicated):	☐

■ ENQUIRY

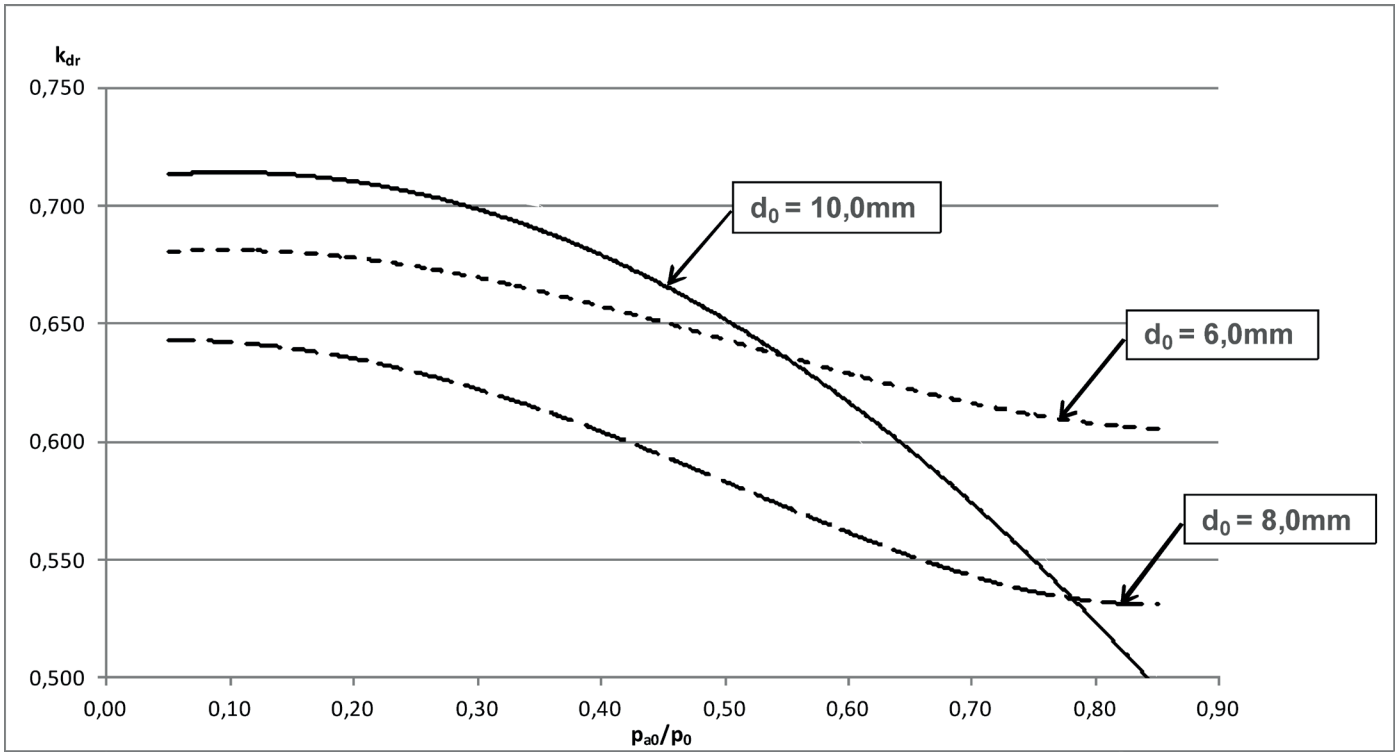
Copy and send to: order@goetze-armaturen.de.

Order form easily to be found online under the section for each series.

Series 461: Blowing-off rates at 10% above set pressure

Nominal diameter DN		8			10			15		
		d0 = 6 mm			d0 = 8 mm			d0 = 10 mm		
Set pressure bar		I	II	III	I	II	III	I	II	III
Air I Nm³/h Steam II kg/h Water III m³/h	0,5	18,9	15,5	0,6	29,7	24,3	0,9	49,4	40,4	1,4
	1,0	26,1	20,8	0,8	41,9	33,4	1,2	73,5	58,5	2,0
	1,5	33,8	26,7	0,9	55,3	43,8	1,4	97,5	77,2	2,4
	2,0	41,3	32,5	1,1	68,4	53,8	1,7	120,1	94,5	2,8
	2,5	48,8	38,2	1,2	81,0	63,4	1,9	141,7	110,9	3,1
	3,0	56,2	43,8	1,3	93,4	72,8	2,0	163,3	127,3	3,4
	3,5	63,4	49,3	1,4	105,8	82,2	2,2	184,2	143,1	3,7
	4,0	70,6	54,7	1,5	118,3	91,6	2,4	205,1	158,8	3,9
	4,5	77,8	60,1	1,6	130,4	100,7	2,5	226,0	174,5	4,2
	5,0	85,1	65,5	1,7	142,4	109,7	2,6	246,9	190,2	4,4
	5,5	92,3	70,9	1,8	154,5	118,8	2,8	267,8	205,9	4,6
	6,0	99,5	76,3	1,8	166,6	127,8	2,9	288,7	221,5	4,8
	6,5	106,7	81,7	1,9	178,6	136,8	3,0	309,6	237,1	5,0
	7,0	113,9	87,1	2,0	190,7	145,8	3,1	330,5	252,7	5,2
	7,5	121,1	92,5	2,1	202,7	154,8	3,2	351,4	268,3	5,4
	8,0	128,3	97,8	2,1	214,8	163,7	3,3	372,3	283,8	5,6
	8,5	135,5	103,2	2,2	226,8	172,7	3,4	393,2	299,4	5,7
	9,0	142,8	108,6	2,3	238,9	181,7	3,5	414,1	314,9	5,9
	9,5	150,0	113,9	2,3	250,9	190,7	3,6	435,0	330,5	6,1
	10,0	157,2	119,3	2,4	263,0	199,6	3,7	455,8	346,0	6,2
	11,0	171,6	130,0	2,5	287,1	217,6	3,9	497,6	377,1	6,5
	12,0	186,0	140,7	2,6	311,2	235,5	4,1	539,4	408,1	6,8
	13,0	200,4	151,4	2,7	335,3	253,3	4,3	581,2	439,1	7,1
	14,0	214,8	162,1	2,8	359,4	271,3	4,4	623,0	470,2	7,4
	15,0	229,2	172,9	2,9	383,5	289,2	4,6	664,8	501,4	7,6
	16,0	243,6	183,5	3,0	407,6	307,1	4,7	706,6	532,3	7,9
	17,0	258,0	194,3	3,1	431,7	325,1	4,9	748,3	563,4	8,1
	18,0	272,4	205,0	3,2	455,8	343,0	5,0	790,1	594,6	8,4
	19,0	286,8	215,8	3,3	479,9	361,0	5,2	831,9	625,8	8,6
	20,0	301,2	226,5	3,4	504,0	379,0	5,3	873,7	657,0	8,8
	21,0	315,7	237,3	3,5	528,1	397,0	5,4	915,5	688,2	9,0
	22,0	330,1	248,0	3,5	552,3	415,0	5,5	957,3	719,4	9,3
	23,0	344,5	258,8	3,6	576,4	433,1	5,7	999,1	750,7	9,5
	24,0	358,9	269,6	3,7	600,5	451,2	5,8	1040,8	782,0	9,7
	25,0	373,3	280,4	3,8	624,6	469,2	5,9	1082,6	813,4	9,9
	26,0	387,7		3,9	648,7		6,0	1124,4		10,1
	27,0	402,1		3,9	672,8		6,1	1166,2		10,2
	28,0	416,5		4,0	696,9		6,3	1208,0		10,4
	29,0	430,9		4,1	721,0		6,4	1249,8		10,6
	30,0	445,3		4,1	745,1		6,5	1291,6		10,8
	32,0	474,1		4,3	793,3		6,7	1375,1		11,2
	34,0	502,9		4,4	841,5		6,9	1458,7		11,5
	36,0	531,8		4,5	889,7		7,1	1542,3		11,8
	38,0	560,6		4,7	938,0		7,3	1625,8		12,2
	40,0	589,4		4,8	986,2		7,5	1709,4		12,5
	42,0	618,2		4,9	1034,4		7,7	1793,0		12,8
	44,0	647,0		5,0	1082,6		7,8	1876,6		13,1
	46,0	675,8		5,1	1130,8		8,0	1960,1		13,4
	48,0	704,6		5,2	1179,0		8,2	2043,7		13,7
	50,0	733,5		5,3	1227,2		8,4	2127,3		13,9
	51,0	747,9		5,4	1251,3		8,4	2169,1		14,1
	52,0	762,3		5,4	1275,4		8,5	2210,8		14,2
	53,0	776,7		5,5	1299,5		8,6	2252,6		14,4
	54,0	791,1		5,6	1323,7		8,7	2294,4		14,5
	55,0	805,5		5,6	1347,8		8,8	2336,2		14,6
	56,0	819,9		5,7	1371,9		8,8	2378,0		14,8
	57,0	834,3		5,7	1396,0		8,9	2419,8		14,9
	58,0	848,7		5,8	1420,1		9,0	2461,6		15,0
	59,0	863,1		5,8	1444,2		9,1	2503,4		15,2
	60,0	877,5		5,9	1468,3		9,2	2545,1		15,3
	61,0	891,9		5,9	1492,4		9,2	2586,9		15,4
	62,0	906,3		5,9	1516,5		9,3	2628,7		15,5
	63,0	920,8		6,0	1540,6		9,4	2670,5		15,7
	64,0	935,2		6,0	1564,7		9,5	2712,3		15,8
	65,0	949,6		6,1	1588,8		9,5	2754,1		15,9
	66,0	964,0		6,1	1612,9		9,6	2795,9		16,0
	67,0	978,4		6,2	1637,0		9,7	2837,6		16,1
	68,0	992,8		6,2	1661,1		9,7	2879,4		16,3
	69,0	1007,2		6,3	1685,2		9,8	2921,2		16,4
	70,0	1021,6		6,3	1709,4		9,9	2963,0		16,5

Coefficient of discharge α_w i.e. K_{dr} as a function of the relation between the pressures p_{a0} / p_0 of vapours and gases



$$\frac{p_{a0}}{p_0} = \frac{\text{counter pressure bar(a)}}{\text{blow-off pressure bar(a)}}$$

p_{atm} = ambient i.e. atmospheric pressure = 1,01325 bar(a)

Example to determine the coefficient of discharge α_w i.e. K_{dr} in relation to the set-pressure p_{set}

Set-pressure	Blow-off pressure
p_{set} bar(g)	p_0 bar(a)
≤ 1	p_{set} + p_{atm} + 0,1 bar
> 1	p_{set} x 1,1 + p_{atm}

For a safety valve set at = 0,5bar(g) and blowing-off into the enviroment the blow-off pressure is determined as follows:

Set-pressure	0,5	bar(g)
+ Atmospheric pressure	1,01325	bar(a)
+ permissable overpressure	0,1	bar(g)
~ Blow-off pressure	1,61	bar(a)

Consequently:

$$\frac{p_{a0}}{p_0} = \frac{1{,}01325 \text{ bar(a)}}{1{,}61 \text{ bar(a)}} = 0{,}72$$

and extracted from the chart α_w i.e. K_{dr} = 0,56 at d_0=8,0mm

Units:
bar(a) ≙ absolute pressure - pressure in relation to absolute vacuum (zero), e.g. p_{atm} = 1,01325 bar(a)
bar(g) ≙ overpressure - pressure above i.e. in relation to p_{atm} = 1,01325 bar(a)

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GO2VALVES

Pressure relief valve: Safety Valves for H2

Calculation header

Identifier	*Safety Valves for H2*

Medium selection and state

Phase	*Single phase*
Medium	*Hydrogen*
State	*Super critical*
Gas	*Gas, dry (Standard conditions)*
☐ Corrosion-resistant	

Pressures

Set pressure	pSet	*36.0*	bar(g)
☒ Overpressure	fpA	*10.0*	%
Relieving pressure	p0	*39.6*	bar(g)
Back pressure	pb	*1.5621*	bar(g)

Properties at relieving conditions

Temperature of fluid	t0	*35.0*	°C
Density of fluid	ρ	*3.122*	kg/m³
Isentropic exponent	ϰ	*1.4426*	-

Required flow capacity

○ Mass flow rate	qm	*89.882*	kg/h
◉ Volume flow rate (standard conditions)	qn	*1,000.0*	m³/h

Valve selection

Calculation standard	*ISO 4126:2016*
Valve manufacturer	*GOETZE*
Series	*461*
Material	*1.4404 / 1.4408*
Valve selection	*A0: 28.274334, DN 8 x DN 15, Type: 461*

Valve configuration

☐ Lift stopper	s,lim	mm
☐ Upstream rupture disc		

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GO2VALVES

Pressure relief valve: Safety Valves for H2

Pressure relief valve

Rated coefficient of discharge (gas/vapor)	Kdr,G		*0.68*	-
◉ Narrowest flow cross-section	A0		*28.274*	mm²
○ Narrowest flow diameter	d0		*6.0*	mm
Nominal diameter of inlet	DN1	*DN 8*		
Nominal diameter of outlet	DN2	*DN 15*		
Pressure class of inlet	PN1	*PN 63*		

Results

Required discharge coefficient for A0	Kdr,min		*0.359*	-
Required flow cross-section for Kdr	A0,min		*14.907*	mm²
Rated mass flow	qm,t		*170.48*	kg/h
Rated volume flow	qn,t		*1,896.7*	m³/h
Flow reserve	R		*89.671*	%

Outlet properties

Temperature of fluid	t2		*36.246*	°C
Operating density (t2, p2)	ϱ2		*0.20152*	kg/m³
Sound velocity (t2, p2)	cF2		*1,340.5*	m/s
Mach number	Ma2		*1.1022*	-

Application

Maximum set pressure	p,max		*60.75*	bar(g)

Feeding pipe

☐ Inlet pipeline

Discharge pipe

☐ Discharge pipe

Errors:

✖ Back pressure - pb cannot be computed reliably. Please enter Back pressure - pb manually.

Hint:

- Narrowest flow cross-section - A0 (28.27 mm^2) is at least 50% higher than Required flow cross-section for Kdr - A0,min (14.91 mm^2). If necessary, select a smaller valve.
- Due to the high flow velocity, the pressure at the valve outlet is higher than the superimposed back pressure.

Confirmation:

- The calculation of the fluid data is done thermodynamically by means of NIST-REFPROP

Missing input data:

- Missing parameter: Operating temperature - tOp
- Missing parameter: Operating pressure - pOp

Legend

- Calculated value
- Lookup value
- Errors
- Hint
- Confirmation
- Missing data

General information

Item no.	20017177
Device key	6518-C08,0-GM82-GM82-B5-024/DC-02* HA01+JH08+PX13
Item description	3/2-way-pneumatic valve 32 mm
Program	V
Net weight	0.37 KG
CE	CEXX
Statistical good	84812090

Explanation of device key

Typ (TYP_0009)	6518
Circuit function (WW)	C - 3/2-ways; normally closed; output A balanced
Orifice size (DN)	08,0 - 8,0mm (5/16")
Port connection P/R (LTA1)	GM82 - G1/4 threaded port
Port connection A/B (LTA2)	GM82 - G1/4 threaded port
Mode of actuation (BA)	B - electropneumatic / air-spring + mech. spring
Coil size (SG)	5 - 32 mm
Voltage (SP)	024 - 24 volts
Frequency (FR)	DC - DC
Power consumption (LEIS)	02 - 2 watt
Variable code 1 (VAR1)	HA01 - without manual override
Variable code 2 (VAR2)	JH08 - Connector type 2509 (235351)
Variable code 3 (VAR3)	PX13 - ATEX 3GD mechanically protected installation gas/dust atmosphere

Technical data

Pressure (bar) (min)	2
Pressure (bar) (max)	8
Medium temperature (degree C) (min)	-10
Medium temperature (degree C) (max)	50
Ambient temperature (min)	-25
Ambient temperature (max)	55
QNN value (L/MIN)	1300
Duty cycle (%)	100
Opening time (msec) (max)	20
Closing time (msec) (max)	40

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Additional information for use in the hazardous area (ATEX Directive 2014/34/EU)

For Bürkert devices with code **PX04 ATEX II 3 GD** follow the instructions in this additional information as well as the respective operating instructions concerning use in the potentially explosive area.

Devices for installation in control cabinet or housing

The control cabinet or the additional housing must satisfy the mechanical strength in accordance with EN 60079-0 and IP protection class in accordance with EN 60529 for the application area:

- Category 3G: at least protection class IP54.
- Category 3D, non-conductive dust: at least protection class IP5X.
- Category 3D, conductive dust: at least protection class IP6X.

(Basic Safety Instructions, see page 2).

Zusatzinformation für den Einsatz im Ex-Bereich (ATEX Richtlinie 2014/34/EU)

Bei Bürkert Geräten mit dem Code **PX04 ATEX II 3 GD** müssen beim Einsatz im explosionsgefährdeten Bereich zusätzlich zur jeweiligen Bedienungsanleitung die Hinweise dieser Zusatzinformation beachtet werden:

Geräte zum Einbau in Schaltschrank oder Gehäuse

Der Schaltschrank oder das Gehäuse muss die für den Einsatzbereich geforderte mechanische Festigkeit nach EN 60079-0 und IP-Schutzart nach EN 60529 erfüllen:

- Kategorie 3G: mindestens Schutzart IP54.
- Kategorie 3D, nicht leitfähige Stäube: mindestens Schutzart IP5X.
- Kategorie 3D, leitfähige Stäube: mindestens Schutzart IP6X.

(Grundlegende Sicherheitshinweise, siehe Seite 3).

Information supplémentaire concernant l'utilisation dans une zone à risque d'explosion (Directive ATEX 2014/34/UE)

Pour les appareils Bürkert avec le code **PX04 ATEX II 3 GD** vous devez, en cas d'utilisation dans des zones à risque d'explosion, respecter, en plus du manuel d'utilisation correspondant, également les indications de cette information supplémentaire.

Appareils pour montage dans une armoire électrique ou dans un boîtier

L'armoire électrique ou le boîtier supplémentaire doit satisfaire à la résistance mécanique exigée pour le domaine d'application selon EN 60079-0 et au type de protection IP selon EN 60529:

- Catégorie 3G : au moins type de protection IP54.
- Catégorie 3D, poussières non conductibles : au moins type de protection IP5X.
- Catégorie 3D, poussières conductibles : au moins type de protection IP6X.

(Consignes de sécurité fondamentales voir page 4).

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Basic Safety Instructions

DANGER!

Risk of explosion!

To avoid the risk of explosion, follow not only the basic safety instructions in the respective operating instructions, but also observe the following information concerning operation in the hazardous area:

- Installation, operation and maintenance may be performed by qualified technicians only.
- Observe the applicable safety regulations (also national safety regulations) as well as the general regulations of technology concerning installation and operation.
- Do not repair the device yourself, but replace it with an equivalent device. Repairs may be performed by the manufacturer only.
- Do not expose the device to mechanical and/or thermal stresses/influences which exceed the limits described in the operating instructions.

Observe the specifications relating to temperature class and ambient temperature on the rating plate.

Do not use the devices with gases or dust which have a lower ignition temperature than specified on the rating plate

Safety instructions for installation and maintenance

DANGER!

Risk of explosion!

To avoid the risk of explosion, observe the following information when performing installation and maintenance in the hazardous area:

- Do not open the housing of the device when hazardouse atmosphere exist.
- To avoid an electrostatic charge, wipe the housing surface with a damp cloth only.
- Use only device sockets, cable and line entries which are authorized for the particular application area and are screwed together according to the appropriate installation instructions.
- If the cable gland is pre-assembled, install it according to the installation instructions supplied by the manufacturer of the screw connection.
  Before start-up, check whether the cable gland was installed in the hazardous area as described in the appropriate installation instructions.
- Seal all cable glands which are not required with ex-approved screw plugs.
- Do not open the housing of the device for operating inside switches when hazardous atmosphere exist.
  While bringing into service no hazardous atmosphere shall exist.

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Grundlegende Sicherheitshinweise

GEFAHR!

Explosionsgefahr!

Zur Vermeidung der Explosionsgefahr muss für den Betrieb im Ex-Bereich zusätzlich zu den grundlegenden Sicherheitshinweisen in der jeweiligen Bedienungsanleitung Folgendes beachtet werden:

- Installation, Bedienung und Wartung darf nur qualifiziertes Fachpersonal durchführen.
- Die geltenden Sicherheitsvorschriften (auch nationale Sicherheitsvorschriften) sowie die allgemeinen Regeln der Technik beim Errichten und Betreiben einhalten.
- Das Gerät nicht selbst reparieren, sondern durch ein gleichwertiges Gerät ersetzen. Reparaturen darf nur der Hersteller durchführen.
- Das Gerät keinen mechanischen und/oder thermischen Beanspruchungen/Einflüssen aussetzen, welche die in der Bedienungsanleitung beschriebenen Grenzen überschreiten.

Die Angaben zu Temperaturklasse und Umgebungstemperatur auf dem Typschild beachten.

Die Geräte nicht bei Gasen bzw. Stäuben einsetzen, die eine niedrigere Zündtemperatur besitzen als auf dem Typschild angegeben.

Sicherheitshinweise für die Montage und Wartung

GEFAHR!

Explosionsgefahr!

Zur Vermeidung der Explosionsgefahr muss bei der Montage und Wartung im Ex-Bereich Folgendes beachtet werden:

- Das Gehäuse des Geräts nur öffnen, wenn keine Ex-Atmosphäre vorhanden ist.
- Zur Vermeidung elektrostatischer Aufladung die Gehäuseoberfläche nur mit einem feuchten Tuch reinigen.
- Nur Gerätesteckdosen, Kabel- und Leitungseinführungen verwenden, die für den jeweiligen Einsatzbereich zugelassen und entsprechend der dazugehörigen Montageanleitung verschraubt sind.
- Vormontierte Kabelverschraubungen entsprechend der vom Hersteller der Verschraubung mitgelieferten Montageanleitung einbauen.
  Vor der Inbetriebnahme im Ex-Bereich prüfen, ob die Kabelverschraubung wie in der dazugehörigen Montageanleitung beschrieben eingebaut wurde.
- Alle nicht benötigten Kabelverschraubungen mit Ex-zugelassenen Verschlussschrauben verschließen.
- Das Öffnen des Gehäuses, um innenliegende Schalter zu bedienen, ist innerhalb des Ex-Bereichs nicht zulässig. Während der Inbetriebnahme darf keine Ex-Atmosphäre vorhanden sein.

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Consignes de sécurité fondamentales

DANGER!

Risque d'explosion !

Afin d'éviter tout risque d'explosion, vous devez respecter, pour l'utilisation en zone à risque d'explosion, en plus des consignes de sécurité fondamentales notées dans le manuel d'utilisation correspondant, les consignes suivantes :

- L'installation, la commande et la maintenance doivent être effectuées exclusivement par un personnel spécialisé et qualifié.
- Respecter les consignes de sécurité en vigueur (y compris les consignes de sécurité nationales) ainsi que les règles techniques générales lors de la configuration et de la conduite.
- Ne jamais réparer l'appareil vous même, mais le remplacer par un appareil de même type. Seul le fabricant est habilité à effectuer les réparations.
- Ne pas exposer l'appareil à des contraintes/influences mécaniques et/ou thermiques supérieures aux limites figurant dans les instructions de service.

Respecter les indications relatives à la classe de température et à la température ambiante figurant sur la plaque signalétique.

Ne pas utiliser les appareils en présence de gaz ou de poussières présentant une température d'inflammation inférieure à celle figurant sur la plaque signalétique.

Consignes de sécurité relatives au montage et à la maintenance

DANGER!

Risque d'explosion !

Afin d'éviter tout risque d'explosion, vous devez respecter, lors du montage et de la maintenance en zone à risque d'explosion, les indications suivantes :

- Ne pas ouvrir le boîtier de l'appareil en presence d'atmosphère explosive.
- Nettoyer la surface du boîtier à l'aide d'un chiffon humide exclusivement afin d'éviter toute charge électrostatique.
- N'utiliser que des prises d'appareil, des passages de câbles et de conducteurs autorisés pour les domaines d'utilisation correspondants et vissés conformément aux instructions de montage fournies.
- Monter les raccords de câbles prémontés, le cas échéant, conformément aux instructions de montage du fabricant des raccords.
- Vérifier, avant toute mise en service en zone à risque d'explosion, que les raccords vissés ont été montés conformément à la description du manuel d'utilisation correspondant.
- Obturer tous les raccords vissés non utilisés avec des embouts de fermeture homologués Ex.
- Ne pas ouvrir le boîtier de l'appareil pour manipuler les switchs en presence d'atmosphère explosive. Faire la mise en service hors atmosphère explosive.

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bürkert
FLUID CONTROL SYSTEMS

Type 6516 – 6519

3/2, 5/2 or 5/3 way solenoid valve
3/2-, 5/2- bzw. 5/3-Wege-Magnetventil
Électrovanne 3/2, 5/2 ou 5/3 voies



Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

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1 THE OPERATING INSTRUCTIONS

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The operating instructions contain important information.

- Read the operating instructions carefully and follow the safety instructions in particular.
- The operating instructions must be available to every user.
- The liability and warranty for Type 6516 – 6519 are not applicable if the operating instructions are not followed.

1.1 Symbols

- Designates instructions for risk prevention.

→ Designates a procedure which you must carry out.

Warning of serious or fatal injuries:

DANGER!
In case of imminent danger.

WARNING!
In case of potential danger.

Warning of minor or moderately severe injuries:

CAUTION!

Warning of damage:

NOTE!

1.2 Definition of the term "device"

The term "device" used in the instructions always refers to the Type 6516 – 6519.

2 INTENDED USE

Incorrect use of the solenoid valve Type 6516 – 6519 may be a hazard to people, nearby equipment and the surrounding area.

- The device is used exclusively as 3/2, 5/2 or 5/3-way solenoid valve for the media permitted according to the data sheet of the corresponding type.
- Provided the cable plug is connected and installed correctly, e.g. Bürkert Type 2506 (for Type 6516/6517) or Type 2508 (for Type 6518/6519), the device satisfies degree of protection IP65 in accordance with DIN EN 60529 / IEC 60529.
- In a hazardous area, the device may be used only in accordance with the specification on the separate Ex type label. For the use, observe the additional information enclosed with the device with safety instructions for the EX area.
- Devices without a separate Ex type label may not be used in a potentially explosive area.
- Use according to the authorized data, operating conditions and conditions of use specified in the contract documents, the data sheet and the operating instructions.
- Correct transport, correct storage and installation as well as careful use and maintenance are essential for reliable and problem-free operation.
- Use the device only for its intended purpose.

3 BASIC SAFETY INSTRUCTIONS

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These safety instructions do not make allowance for any contingencies and events which may arise during assembly, operation and maintenance.



Danger – high pressure!

- Turn off the pressure and vent the lines before loosening lines or valves.

Risk of electric shock!

- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

Risk of injury from greatly accelerated device parts!

- Before pressurizing the valve, check that all screw connections and screw joints are tight and secure.

Risk of burns/danger of fire during long-term operation due to hot device surface!

- Keep the device away from highly flammable substances and media and do not touch with bare hands.

Risk of injury due to malfunction of valves with alternating current (AC)!

Sticking core causes coil to overheat, resulting in a malfunction.

- Monitor process to ensure flawless functioning.

To prevent injuries/damage:

- Never adjust the screws which are locked with red paint.
- Do not make any internal or external changes to the device and safeguard against unintentional actuation.
- Installation and maintenance work may be carried out only by authorized technicians with the appropriate tools.
- After an interruption in the electrical or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- Do not subject the housing to mechanical loads.
- Observe the general accepted technical rules.

3.1 Restrictions

If exporting the device, observe any existing restrictions.

4 STRUCTURE AND FUNCTION

The valves can be mounted in blocks on the modular pneumatic base rail Type MP07.

4.1 Structure of the standard designs

4.1.1 Connections

All connections are identified by numbers on the valve surface. These refer to the following functions:

Number	Function
1	Pressure inlet port
2 and 4	Outlet port
3 and 5	Exhaust port
12 and 14	Control pressure port

4.1.2 Type 6516 (3/2-way), Type 6517 (5/2-way)

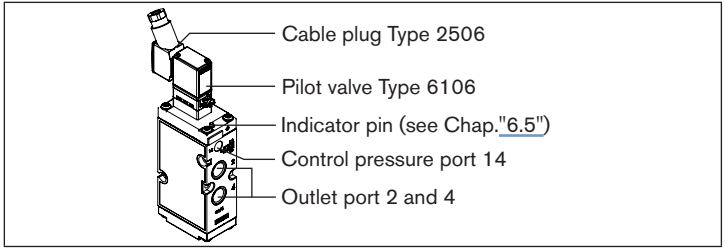


Fig. 1: Valve structure Type 6516/6517 (in the example Type 6517)

4.1.3 Type 6518 (3/2-way), Type 6519 (5/2-way)

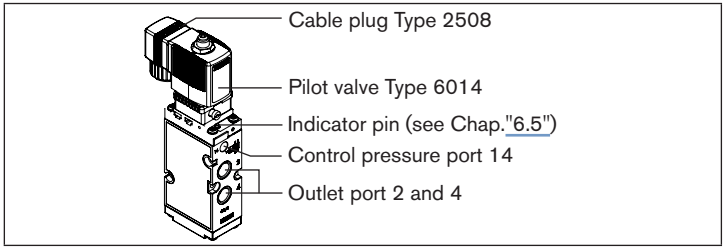


Fig. 2: Valve structure Type 6518/6519 (in the example Type 6519)

4.1.4 5/3-way function, 5/2-way function impulse

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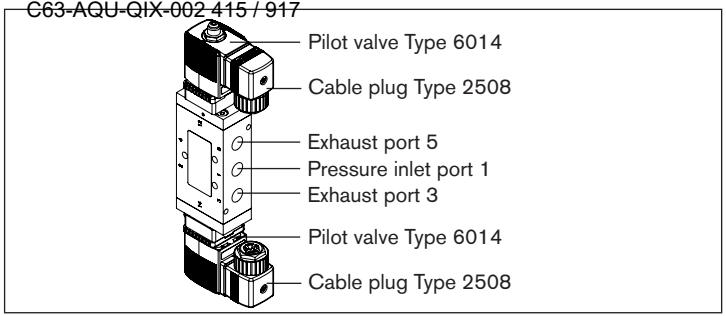


Fig. 3: Valve structure 5/3-way function, 5/2-way function impulse

4.1.5 Type 6517 and 6519 with plastic body and NAMUR flange with adapter plate

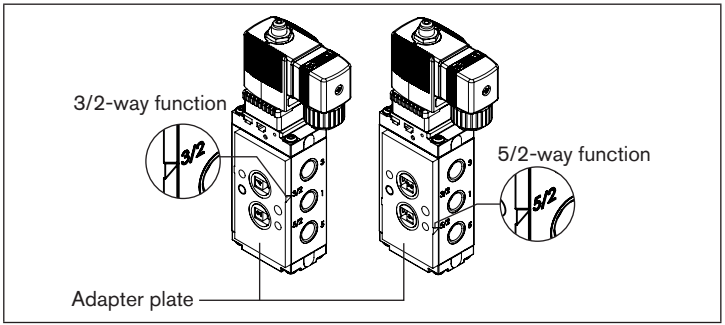


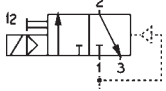
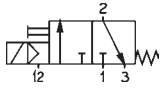
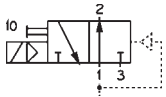
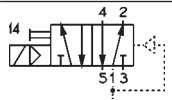
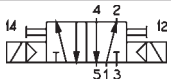
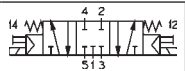
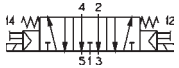
Fig. 4: Valve structure NAMUR in the example Type 6519

The valves Type 6517 and 6519 Namur with plug tabs at the side are supplied ex works, 5/2-way function. The 3/2 way function is set by turning the adapter plate 180°.

When using as 3/2-way valve, close port 3 with supplied sealing plug G1/4. When using on large actuators with fast outlet time, use a silencer instead of the sealing plug.

4.2 Operating principles

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C		**3/2-way valve** Normally inlet port 1 (P/NC) closed, outlet port 2 (A/OUT) conected with exhaust port 3 (R/NO).
C (MP07)		**3/2-way valve for vacuum*, with auxiliary control air** Normally inlet port 1 (P/NC) closed, outlet port 2 (A/OUT) conected with exhaust port 3 (R/NO).
D		**3/2-way valve** Normally inlet port 1 (P/NO) connected with outlet port 2 (B/OUT), exhaust port 3 (R/NC) closed.
H		**5/2-way valve** Normally inlet port 1 (P) connected with outlet port 2 (A), outlet port 4 (B) connected with exhaust port 5 (S), exhaust port 3 (R) closed.
Z		**5/2-way valve** Pulse version (2 coils)
L		**5/3-way valve** Middle position all port connections closed, inlet port 1, outlet port 4 and 2, vent of outlet ports to 5 respectively 3.
N		**5/3-way valve** Middle postion pressure inlet port 1 (P) closed, outlet ports 2 (A) and 4 (B) connected with exhaust ports 3 (R) respectively 5 (S).

* The vacuum generator must be connected to port 1.

5 TECHNICAL DATA

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5.1 Conformity

The solenoid valve Type 6516 – 6519 is compliant with EC directives as stated in the EC Declaration of Conformity.

5.2 Standards

The applied standards which are used to demonstrate compliance with the EC Directives are listed in the EC Prototype Examination Certificate and/or the EC Declaration of Conformity.

5.3 Type label

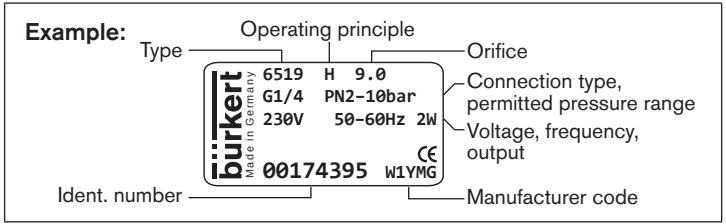


Fig. 5: Example of type label on the pilot-controlled solenoid valve Type 6519

5.4 Operating conditions

Please observe the specifications on the data sheet and on the type label.

	Types 6516 – 6519	Type 6519 for extended temperature range
Ambient temperature[1)]	–25 °C ... +55 °C	Aluminum ematalized: –40 ... + 80 °C Stainless steel: –30 ... + 80 °C
Permitted medium temp.	–10 ... +50 °C	–30 ... +80 °C
Compressed air quality	ISO 8573-1:2010, Class 7.4.4[2)]	ISO 8573-1:2010, Class 7.2.4[2)]
Permitted pressure range	Observe specifications on type label Pressure difference at least 2 bar between ports 1 and 3/5	

C63-AQU-QIX-002 418 / 917	Types 6516 – 6519	Type 6519 for extended temperature range
Degree of protection	IP65 as per DIN EN 60529 / IEC 60529 with correctly connected and fitted cable plug, e.g. Bürkert Type 2506 (Type 6516/6517) or Type 2508 (Type 6518/6519)	
Permitted media	Filtered compressed air oiled and unoiled, neutral gases	
Operating duration	Unless otherwise indicated on the type label, the solenoid system is suitable for continuous operation	

The following values must also be observed for valves with UL/UR approval:

Valve types	Fluid temperature	Ambient temperature	Fluid
6518	–10 °C...+55 °C	–10 °C...+55 °C	Air
6519			

1) *Observe temperature restrictions on account of approvals.*
2) *To prevent the expanded compressed air from freezing, its pressure dew point **must** be **at least 10 K lower than the medium temperature**.*

Important information for functional reliability during continuous operation!
If the equipment is switched off for a long period, it is recommended to activate the valves at least 1-2 per day.

Service life:
High switching frequency and high pressures reduce the service life.
The valves operate maintenance-free.

5.5 Materials

The seal materials depend on the housing materials:

Housing material	PA	AL anodized	AL ematalized	VA
Seal material	NBR, PUR	NBR	FKM, NBR	PU, NBR, FKM

5.6 External control pressure

If valves are designed for auxiliary control air, the compressed air supply must be connected to port 12 or 14 (control pressure port).
Control pressure: at least 70 % of the operating pressure to port 1 (minimum control pressure 2.5 bar)

6 ASSEMBLY

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6.1 Safety instructions

DANGER!

Risk of injury from high pressure in the system!

- Turn off the pressure and vent the lines before loosening lines or valves.

Risk of injury due to electrical shock!

- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

WARNING!

Risk of injury from greatly accelerated device parts and unconnected whiplashing compressed air hoses!

- Before pressurizing the valve, check that all screw connections and screw joints are tight and secure.

Risk of injury from improper assembly!

- Assembly may only be carried out by authorized technicians and with the appropriate tools!

Risk of injury from unintentional activation of the system and uncontrolled restart!

- Secure system against unintentional activation.
- Following assembly, ensure a controlled restart.

6.2 Installation of the pilot valve

WARNING!

Risk of injury from leaking valve.

- Ensure that the O-rings/seals are correctly seated in the valve.

Overheating, risk of fire!

Connection of the coil without pre-assembled valve will result in overheating and destroy the coil.

- Connect the coil with pre-assembled valve only.

Danger due to electrical shock if coil incorrectly installed!

- During installation ensure that the coil is situated firmly on the housing cover so that the protective conductor connection of the coil is connected to the valve housing.

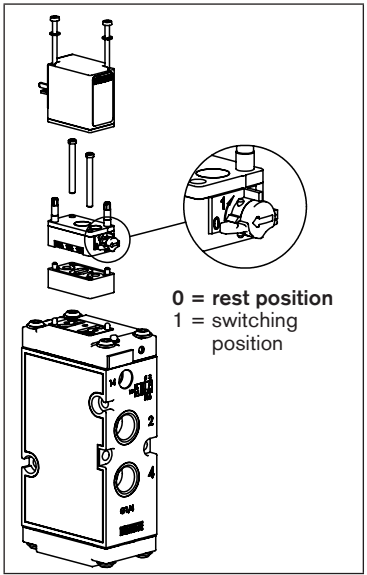
NOTE!

Caution risk of breakage!

- Do not used coil as a lever arm.

6.2.1 Installation of the pilot valve Type 6106 (for valve type 6516/6517)

C63-AQUIQX-602420517

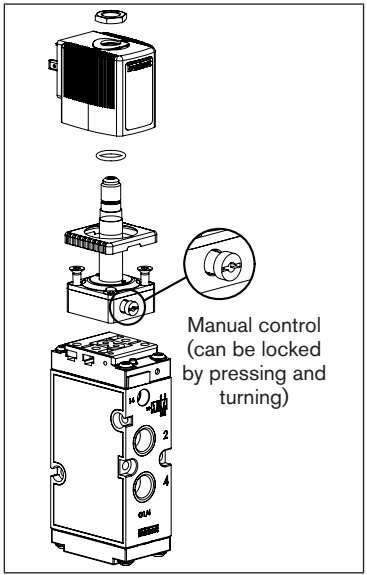


→ Installation always in the position shown; if required, turn coil by 180°.

→ Screw the housing of the pilot valve to the housing of the main valve using 2 screws. Observe tightening torque of max. 0.5 Nm.

→ Mount solenoid coil and screw down using M2 screws. Observe tightening torque of max. 0.15 Nm.

6.2.2 Installation of the pilot valve Type 6014 (for valve type 6518/6519)



→ Screw the housing of the pilot valve to the main valve. Observe tightening torque of max. 1.5 Nm.

→ Connect the coil to the core guide tube. The coil can be turned by 4 x 90° (for block assembly only 2 x 180°).

→ Screw down the coil with a nut **using an open-end wrench** (the device may be damaged if other tools are used, e.g. pliers). Observe tightening torque of max. 5 Nm.

6.3 Pneumatic connection

WARNING!

Risk of injury from greatly accelerated device parts and unconnected whiplashing compressed air hoses!

- Before pressurizing the valve, check that all screw connections and screw joints are tight and secure.

Installation position: any, preferably with solenoid system face up.

Before connecting:

→ Check whether hose lines are dirty and clean.

→ If required, install a dirt filter upstream of the valve inlet (≤ 500 µm).

Pneumatic connection:

→ Hold the device by hand **on the housing** and connect to the hose line. Do not exceed the standard screw-in depth.

→ Seal with PTFE tape or elastomer seal.

→ Observe allocation of the connections (see Chapter "4.1.1 Connections", page 4).

→ Align hose lines.

6.4 Connection of cable plug to the power supply

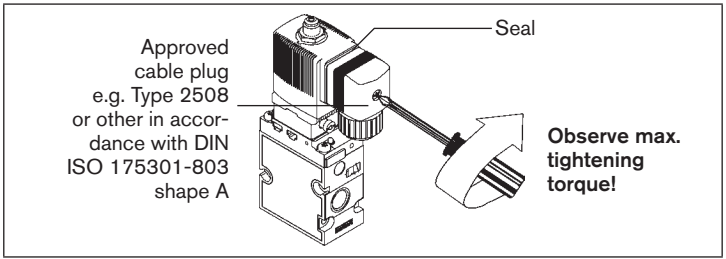
WARNING

Risk of injury due to electrical shock!

- Before reaching into the system, switch off the electrical power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

If the protective conductor contact between the coil and housing is missing, there is a danger of electric shock!

- Always connect protective conductor.
- Check electrical continuity between coil and housing.



→ Tighten cable plug (for authorized types see data sheet), observing [illegible] (see "Tab. 1").

→ Check that seal is fitted correctly.

→ Connect protective conductor and check electrical continuity between coil and housing (see "Tab. 2").

NOTE!

If the cable plug EN 175-301-803 is designed in such a way that the screw is pointing upwards, insert a seal made of a material compatible with your process under the screw head.

Note the voltage and current type as specified on the type label.

Valve type	6516/6517	6518/6519
Cable plug Type	2506	2508
Tightening torque max. (Nm)	0.3	1

Tab. 1: Maximum tightening torque of cable plug

Pesistor	Test voltage	Test current
max. 0.1 Ω	12 V	1 A

Tab. 2: Test values protective conductor function

6.5 Pneumatic position indicator

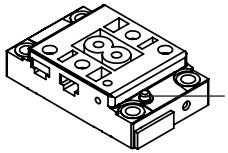


Fig. 6: Pneumatic position indicator

When the valve is switched off, the red indicator pin can be pressed in without any resistance. When the valve is actuated, the indicator pin moves out and there is perceptible resistance to pressing it in.

NOTE!

Whenever performing a function test, press in the indicator pin again.

7 DISASSEMBLY

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Disassembly is in reverse sequence to assembly.

8 MAINTENANCE, TROUBLESHOOTING

If the valve is used according to these operating instructions, the valve will operate maintenance-free.

8.1 Safety instructions

WARNING!

Risk of injury from improper maintenance!

- Maintenance may only be carried out by authorized technicians and with the appropriate tools!

Risk of injury due to electrical shock!

- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!

Danger – high pressure!

- Turn off the pressure and vent the lines before loosening lines or valves.

Risk of injury from unintentional activation of the system and uncontrolled restart!

- Secure system against unintentional activation.
- Following maintenance, ensure a controlled restart.

8.2 Malfunctions

If malfunctions occur, check whether:

- the device has been installed according to the instructions,
- the electrical and pneumatic connections are correct,
- the device is not damaged,
- all screws have been tightened,
- the voltage and pressure have been switched on,
- the pipelines are clean.

Valve does not switch

Possible causes:

- short circuit or coil interrupted,
- core or core area dirty,
- medium pressure outside the permitted pressure range.

Valve does not close

Possible causes:

- inner compartment of the valve is dirty.

9 SPARE PARTS

CAUTION!

Risk of injury and/or damage by the use of incorrect parts!

Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and the surrounding area.

▸ Use original accessories and original spare parts from Bürkert only.

9.1 Ordering spare parts

When ordering spare parts, quote the number of the spare part set (SET 1, SET 2, SET 3 – see "Fig. 7: Spare part sets", page 15) as well as the order number of your complete device.

9.2 Overview of spare part sets

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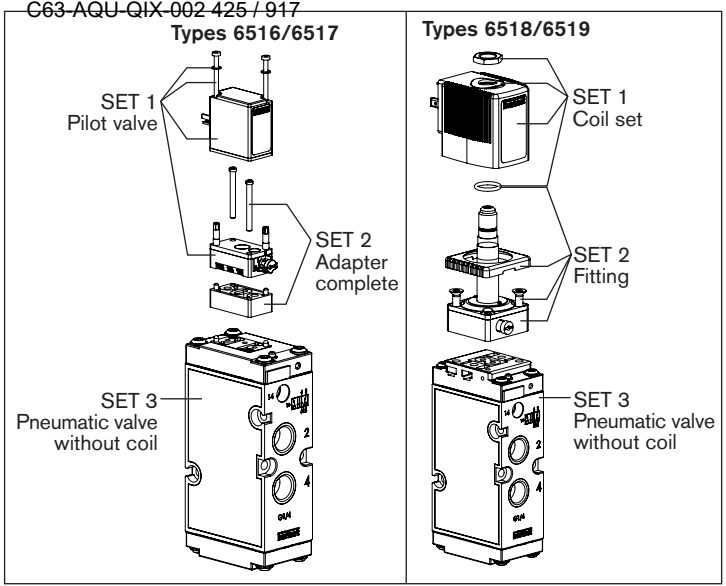


Fig. 7: Spare part sets

10 TRANSPORTATION, STORAGE, DISPOSAL

NOTE!

Transport damage!

Inadequately protected devices may be damaged during transportation.

- Protect the device against moisture and dirt in shock-resistant packaging during transportation.
- Prevent the temperature from exceeding or dropping below the permitted storage temperature.
- Protect the electrical interfaces of the coil and the pneumatic connections from damage by placing protective caps on them.

Incorrect storage may damage the device.

- Store the device in a dry and dust-free location!
- Storage temperature –40 °C ... +80 °C.

Damage to the environment caused by device components contaminated with media.

- Dispose of the device and packaging in an environmentally friendly manner!
- Observe applicable disposal and environmental regulations.

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Manuels et fiches techniques sur Internet : www.buerkert.fr

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C63-AQU-[illegible]

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FLUID CONTROL SYSTEMS

Följesedel

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E-post: kundservice@burkert.com

Följesedel	**26341394**
Datum	**05.04.2023**
Kundnr.	75000192
Vårt ordernr.	7531103581

Er Beställningsnr. IK-22/23 188-12 per 28.03.2023 från Erik Agartson

Fraktsätt:	**Direktleverans**
Leveransvillkor (INCO 2010):	DAP / Södertälje
Antal kolli:	00005
Varuleverans:	05.04.2023

Köpare
Aquagas Sweden AB
Box 1036
SE-619 23 TROSA
SCHWEDEN

Pos.	Art.nr.	Artikelbeskrivning	Antal	Levererat	Restade
10	**00350443**	3/2-way-pneumatic valve 32 mm 6518-C08,0-GM82-GM82-B5-024/UC-03 * JW10+PX65	**21 ST**	**21 ST**	**0 ST**
	Ursprungsland:	Tyskland (Baden-Württemberg)			
	Statistiskt nr.:	84812090			
	Nettovikt / ST	0,570 KG			

Sender of goods: Bürkert Werke GmbH & Co. KG - DE811207933 - VAT DE

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Bankgiro: 224-2758
För all bankinformation se baksidan!

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EU Konformitäts-erklärung	EU Declaration of Conformity	Déclaration UE de Conformité
Originaldokument	Original document	Document original

Hersteller / Manufacturer / Constructeur:

Bürkert Werke GmbH & Co. KG
Werk 10
Christian-Bürkert-Straße 13-17
74653 Ingelfingen
www.burkert.com

Hiermit erklären wir, dass das unten beschriebene Produkt in seiner Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen Harmonisierungsvorschriften der EU entspricht. Die Anhänge, die wesentlicher Bestandteil dieser Erklärung sind, enthalten weitere Angaben zur Einhaltung dieser Richtlinie(n).	We hereby declare that the product described below, in its design and construction as well as in the version that we have placed on the market, is in conformity with the relevant EU harmonization legislation. The annexes, which are an integral part of this declaration of conformity, contain further information about the conformity to this Directive(s).	Nous déclarons par la présente que le produit spécifié ci-dessous, dans son développement et sa fabrication tel que mis sur le marché par nous, est conforme à la législation d'harmonisation de l'UE applicable. Les annexes, qui font partie intégrante de cette déclaration, contiennent des informations supplémentaires sur le respect de la ou des directives.

Typ / Type / Type:

6518

Produktbezeichnung / Product Description / Appellation d'un produit:

3/2-Wege-Pneumatikventil 32 mm
3/2-way-pneumatic valve 32 mm
Electrovanne pneumatique 3/2 - 32mm

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
2014/35/EU - NSR	2014/35/EU - LVD	2014/35/UE - DBT
2011/65/EU - ROHS	2011/65/EU - ROHS	2011/65/UE - ROHS

Bei einer mit Bürkert nicht abgestimmten Änderung des Produktes verliert diese Erklärung ihre Gültigkeit.	If any unauthorized modifications are made to the product, this declaration will loose its validity.	Toute modification non autorisée apportée au produit fait perdre la validité de cette déclaration.
Eine Technische Dokumentation ist vollständig vorhanden. Die zum Produkt gehörende Betriebsanleitung in der Landessprache des Anwenders liegt vor (wenn erforderlich).	A complete technical documentation is available. The operating manual in the local language of the user is present (if necessary).	Une documentation technique com-plète est disponible. Le manuel d'utilisation du produit est présent (si nécessaire) dans la langue locale de l'utilisateur.
Diese Erklärung beinhaltet keine Zusicherung von Eigenschaften.	This declaration does not guarantee any specifications.	Cette déclaration ne garantit pas les spécifications.

Ingelfingen, 17. Januar 2023

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i.A. Gerhard Stier
Engineering/Construction/Development

i.A. Marc Schmeißer
Approval Management

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.	This Declaration of Conformity is issued under the sole responsibility of the manufacturer.	Cette déclaration de conformité est émise sous la seule responsabilité du fabricant.

ABD 1000253133 ML Version: H Status: RL (released | freigegeben) printed: 05.04.2023

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Anhang ATEX zur EU Konformitätserklärung	Annex ATEX for EU Declaration of Conformity	Annexe ATEX à la Déclaration UE de
Originaldokument	Original document	Document original

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

6518-*****-****-****-**-***/**-** (1)

(1) Variabler Code / Variable code / Variable Code:
Gilt nur in Verbindung mit / Only valid in combination with / Est uniquement valable en lien avec:
PX52-PX55

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen.	The object of the declaration described above is in conformity with Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/34/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant les appareils et les systèmes de protection destinés à être utilisés en atmosphères explosibles.
Nur gültig in Verbindung mit der EX-Kennzeichnung des Gerätes!	Only valid in combination with the EX-marking of the equipment!	Uniquement valable en liaison avec le marquage EX de l'appareil!
Das Gerät kann eingesetzt werden gemäß den auf dem Typschild und in der Betriebsanleitung angegebenen Daten.	The device can be used in accordance with the data given on the nameplate and in the operating instructions.	Le dispositif peut être utilisé conformément aux indications de la plaque signalétique et dans la notice d'utilisation.
Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden eingehalten.	The protection objectives of the low Voltage Directive 2014/35/EU are complied with.	Les objectifs de sécurité de la Directive Basse Tension 2014/35/UE ont été observés.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60079-11:2012, EN IEC 60079-0:2018		

Das genannte Produkt ist bescheinigt durch die Notifizierte Stelle:	The product is certified by the Notified Body:	Le produit est certifié par l'organisme notifié:
Name und Anschrift der Notifizierten Stelle:/ Name and Address of the notified body:/ Nom et adresse de l'organisme notifié:		
Bureau Veritas CPS Germany GmbH Businesspark A9 86842 Türkheim, Germany		
EU-Baumusterprüfbescheinigung Nr.:	EU Type Examination Certificate No.:	Attestation d'examen UE de type Non.:
EPS 18 ATEX 1 088 X, 18.06.2019		

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Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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Anhang ATEX zur EU Konformitätserklärung	Annex ATEX for EU Declaration of Conformity	Annexe ATEX à la Déclaration UE de
Originaldokument	Original document	Document original

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

6518-*****-****-****-**-***/**-** (1)

(1) Variabler Code / Variable code / Variable Code:
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Nur gültig in Verbindung mit der EX-Kennzeichnung des Gerätes!	Only valid in combination with the EX-marking of the equipment!	Uniquement valable en liaison avec le marquage EX de l'appareil!
Das Gerät kann eingesetzt werden gemäß den auf dem Typschild und in der Betriebsanleitung angegebenen Daten.	The device can be used in accordance with the data given on the nameplate and in the operating instructions.	Le dispositif peut être utilisé conformément aux indications de la plaque signalétique et dans la notice d'utilisation.
Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden eingehalten.	The protection objectives of the low Voltage Directive 2014/35/EU are complied with.	Les objectifs de sécurité de la Directive Basse Tension 2014/35/UE ont été observés.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60079-31:2014, EN IEC 60079-0:2018, EN IEC 60079-7:2015+A1:2018, EN 60079-18:2015/A1:2017		

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Name und Anschrift der Notifizierten Stelle:/ Name and Address of the notified body:/ Nom et adresse de l'organisme notifié:		
Bureau Veritas CPS Germany GmbH Businesspark A9 86842 Türkheim, Germany		
EU-Baumusterprüfbescheinigung Nr.:	EU Type Examination Certificate No.:	Attestation d'examen UE de type Non.:
EPS 18 ATEX 1 232 X, 07.11.2019		

ABD 1000253133 ML Version: H Status: RL (released | freigegeben) printed: 05.04.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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Originaldokument	Original document	Document original

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

6518-*****-****-****-**-***/**-** (1)

(1) Variabler Code / Variable code / Variable Code:
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Nur gültig in Verbindung mit der EX-Kennzeichnung des Gerätes!	Only valid in combination with the EX-marking of the equipment!	Uniquement valable en liaison avec le marquage EX de l'appareil!
Das Gerät kann eingesetzt werden gemäß den auf dem Typschild und in der Betriebsanleitung angegebenen Daten.	The device can be used in accordance with the data given on the nameplate and in the operating instructions.	Le dispositif peut être utilisé conformément aux indications de la plaque signalétique et dans la notice d'utilisation.
Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden eingehalten.	The protection objectives of the low Voltage Directive 2014/35/EU are complied with.	Les objectifs de sécurité de la Directive Basse Tension 2014/35/UE ont été observés.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60079-31:2014, EN IEC 60079-0:2018, EN IEC 60079-7:2015+A1:2018, IEC 60079-31:2022-01 (ED. 3.0)		

Das genannte Produkt ist bescheinigt durch die Notifizierte Stelle:	The product is certified by the Notified Body:	Le produit est certifié par l'organisme notifié:
Name und Anschrift der Notifizierten Stelle:/ Name and Address of the notified body:/ Nom et adresse de l'organisme notifié:		
	Bureau Veritas CPS Germany GmbH Businesspark A9 86842 Türkheim, Germany	
EU-Baumusterprüfbescheinigung Nr.:	EU Type Examination Certificate No.:	Attestation d'examen UE de type Non.:
	EPS 21 ATEX 1 234 X, 05.12.2022 Revision 1	

ABD 1000253133 ML Version: H Status: RL (released | freigegeben) printed: 05.04.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

CE

bürkert
FLUID CONTROL SYSTEMS

Anhang NSR zur EU Konformitätserklärung	Annex LVD for EU Declaration of Conformity	Annexe DBT à la Déclaration UE de
Originaldokument	Original document	Document original

2014/35/EU - NSR	2014/35/EU - LVD	2014/35/UE - DBT
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

6518-*****-****-****-**-(1)/**-**

(1) Spannungsebene / Voltage levels / Niveau de tension [V]:
NSR gilt nur, wenn Spannungsebene ≥ 50 V AC / ≥ 75 V DC und ≤ 1000 V AC / ≤ 1500 V DC
LVD only valid, if voltage level ≥ 50 V AC / ≥ 75 V DC and ≤ 1000 V AC / ≤ 1500 V DC
DBT uniquement pour les niveaux de tensions ≥ 50 V AC / ≥ 75 V DC et ≤ 1000 V AC / ≤ 1500 V DC

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt.	The object of the declaration described above is in conformity with Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/35/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant la mise à disposition sur le marché du matériel électrique destiné à être employé dans certaines limites de tension.
Die Richtlinie 2014/33/EU ist nur bei Produkten anzuwenden, die nicht in den Anwendungsbereich der ATEX-Richtlinie fallen.	Directive 2014/33/EU applies only to products that do not fall inside the scope of the ATEX Directive.	La directive 2014/33/UE s'applique uniquement aux produits qui ne relèvent pas de la directive ATEX.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60664-1:2007, EN 60335-1:2012 / A14:2019, EN 60730-1:2011, EN 60730-2-8:2002+A1:2003		

ABD 1000253133 ML Version: H Status: RL (released | freigegeben) printed: 05.04.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

CE

bürkert
FLUID CONTROL SYSTEMS

Anhang ROHS zur EU Konformitätserklärung	Annex ROHS for EU Declaration of Conformity	Annexe ROHS à la Déclaration UE de
Originaldokument	Original document	Document original

2011/65/EU - ROHS	2011/65/EU - ROHS	2011/65/UE - ROHS
	Reference in the Official Journal of the EU: L 174 dated 07.11.2011	
2017/2102/EU	Reference in the Official Journal of the EU: L 305 dated 21.11.2017	
2015/863/EU	Reference in the Official Journal of the EU: L 137 dated 04.06.2015	

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

6518-*****-****-****-**-***/**-**

Das oben beschriebene Produkt erfüllt die Vorschriften der Richtlinie 2011/65/EU und deren Ergänzungen 2017/2102/EU und 2015/863/EU. Das Produkt erfüllt die Anforderungen zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten (Liste der beschränkten Stoffe siehe Richtlinien).	The product described above complies with the provisions of Directive 2011/65/EU and its amendments 2017/2102/EU and 2015/863/EU The product complies with the requirements on the restriction of the use of certain hazardous substances in electrical and electronic equipment (for list of restricted substances see Directives).	Le produit décrit ci-dessus est conforme aux dispositions de la directive 2011/65/UE et de ses amendements 2017/2102/UE et 2015/863/UE. Le produit est conforme aux exigences relatives à la limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques (pour la liste des substances restreintes, voir les Directives).

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar): EN IEC 63000:2018	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):

ABD 1000253133 ML Version: H Status: RL (released | freigegeben) printed: 05.04.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

HY-LOK CORPORATION

Manufacturer`s Declaration

Manufacturer`s name: HY,LOK CORPORATION
Manufacturer`s address: 1467-1, Songjeong-Dong, Gangseo-Gu
Busan, 618-270
Korea

Description of product:

Tube Fittings	H200TF	Super Duplex Tube Fittings	H-200TF-SD
Fitting Din 2353	H-230CF	Clean Fittings(Weld & ZCR)	H-250CF
ZCO-Fittings	H-260CF	Instrument Thread & Weld Fittings	H-300PF
Calibration Fittings	H-CF100	Hose connectors (metric sizes)	H-CF100

Applied EU directive: 2016/34/EU
Equipment intended for use in potentially explosive atmospheres

Applied standards: EN 1127-1: 1997
Explosive atmospheres

EN 13463-1: 2001
Non-electrical equipment for potentially explosive atmospheres

Hy-Lok fittings are manufactured in accordance with ISO 9001 Quality Systems and appropriated National and International product standards.

Accordingly to a performed assessment of Hy-Lok Corporation we have determined that the product mentioned above does not have any own potentional source of ignition. As such the product is not covered by the Directive 2016/34/EU, must not be CE marked and must be used within the scope of intended use only as described in data

sheet and the operating and maintenance instructions.

Important note:
The fittings must be hooked up into the tubing system in electrically conducting manner to ensure proper grounding. The environmental neighborhood was not subject to Hy-Lok`s assessment is within the responsibility of the plants owner, designer, commissioner or user.

This declaration does not pertain to atmospheres outside of the scope on its validity, such as oxygen enriched atmospheres. When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation and maintenance are the responsibilities of the system designer and user.

HY-LOK CORPORATION

HY-LOK CORPORATION

CEO & PRESIDENT C.H. MOON

HY-LOK CORPORATION

Manufacturer`s Declaration

Manufacturer`s name: HY,LOK CORPORATION
Manufacturer`s address: 1467-1, Songjeong-Dong, Gangseo-Gu
Busan, 618-270
Korea

Description of product:

Bleed and Purge Valves	H-100BPV	700, 700H, 701, 700A, CVL Series Check Valves	H-700T
NV Series Integral Bonnet Needle Valves	H-100NV	Bellow Valves	H-BL100
Integral Block and Bleed Valves	H-100PIV	CNG Product	H-CNG100
T Series Trunnion Ball Valves	H-100TBV	CRYO Product	H-CRYO100
SV Series Integral Bonnet Needle Valves	H-101NV	Diaphragm Valves	H-DV100
102 Series Ball Valves	H-102BV	Exess Flow Valves	H-EF100
GB Series Union Bonnet Needle Valves	H-102NV	FT Micron Tee Filters	H-F100
SVH Series Union Bonnet Needle Valves	H-103NV	FI Micron Inline Filters	H-F200
105 Series High Pressure Ball Valves	H-105BV	Series Plug Valves	H-P100
110P Series Ball Valves	H-110BPTV	Q-Series Quick Connects	H-Q100
110 Series Ball Valves	H-110BV	RP-Series	H-RP100
112 Series Ball Valves	H-112BV	RV Series Relief Valves	H-RV100
115 Series Ball Valves	H-115BV	SO Series Ball Valves	H-SOBV
Manifolds & Gauge Root Valves	H-120MV	Toggle Valves	H-TG100

HY-LOK CORPORATION

Applied EU directive: 2016/34/EU
Equipment intended for use in potentially explosive atmospheres

Applied standards: EN 1127-1: 1997
Explosive atmospheres

EN 13463-1: 2001
Non-electrical equipment for potentially explosive atmospheres

The above mentioned valves are manufactured in accordance with ISO 9001 Quality Systems and appropriate National and International product standards.

Accordingly to a performed assessment of Hy-Lok Corporation we have determined that the product mentioned above does not have any own potentional source of ignition. As such the product is not covered by the Directive 2016/34/EU, must not be CE marked and must be used within the scope of intended use only as described in data sheet and the operating and maintenance instructions.

Important note:
The valves must be hooked up into the piping/tubing system in electrically conducting manner to ensure proper grounding. Since some valves provided with non-conductive handles, special system design must be considered if the use of the product is intended in hazardous areas (particular zones), environments, or use with cetain system fluids. Stem grounding and Conductive bar assessment. This assessment is within the responsibility of the plants owner, designer, commissioner or user.

This declaration does not pertain to atmospheres outside of the scope on its validity, such as oxygen enriched atmospheres. When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation and maintenance are the responsibilities of the system designer and user.

HY-LOK CORPORATION

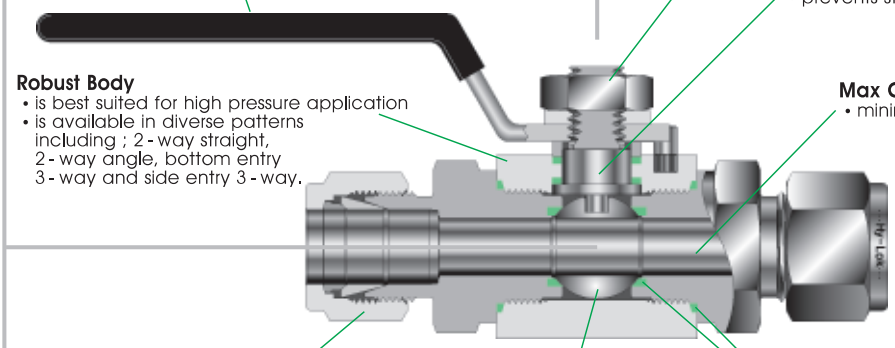
HY-LOK CORPORATION

CEO & PRESIDENT C.H. MOON

Hy-Lok 105 Series

High Pressure Ball Valves for General Service

Catalog No. H-105BV
Dec. 2012



Handle with PVC Color Coat
- allows easy and quick operation with low torque and 1/4 turn to open and close
- can be operated by pneumatic actuator.

Panel Mounting and Locking Devices
- are available as options

Internally Loaded Stem with Shoulder
- prevents stem blow - out

Robust Body
- is best suited for high pressure application
- is available in diverse patterns including ; 2 - way straight, 2 - way angle, bottom entry 3 - way and side entry 3 - way.

Max Orifice
- minimizes the pressure drop

Variety of End Connections
- include fractional / metric Hy - Lok tube fittings, male / female NPT, male / female ISO / BSP threads

Floating Ball Design
- ensures leak proof shut - off at high pressure

Seats and Packings
- are replaceable

Features

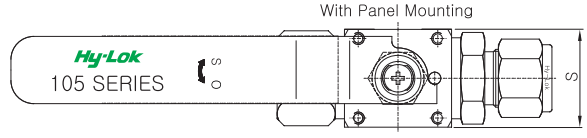
- **Pressure rating** up to 10,000 psig (690bar) @ 70°F(21°C)
- **Temperature rating** from -22°F to 265°F(-30°C to 130°C) with PVDF seat or from-65°F to 500°F (-54°C to 260°C) with PEEK seat
- **Small and compact design**
- **Materials available** in 316 stainless steel and alloy 400
- **100% factory tested.**

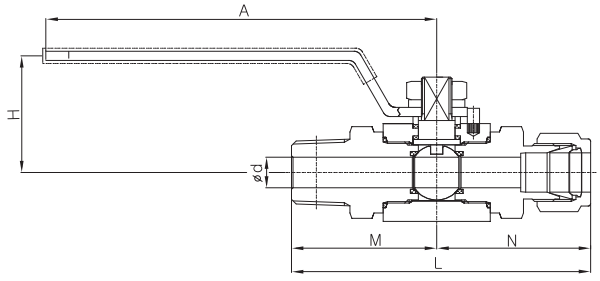
HY-LOK CORPORATION

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High Pressure Ball Valves 105 Series

2-Way





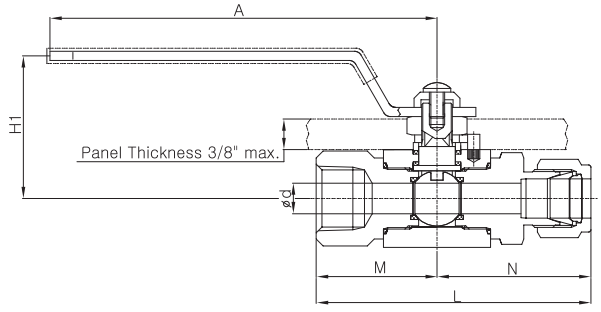


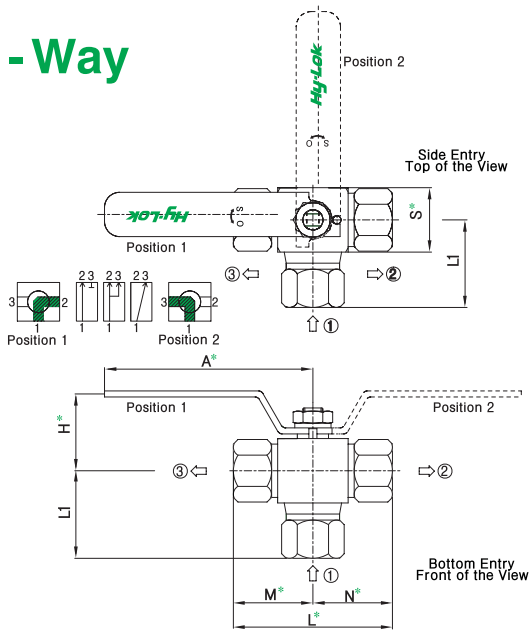
Table of Dimensions

Basic Part No.		Orifice	Cv	End Connections Inlet & Outlet	d Min.	Dimensions M	N	L	H	A	H1	S
H1B	-H-4T	10.0	1.2	1/4″ Hy-Lok	4.8	45.8	45.8	91.6	38.0	126.5	46.7	32.0
	-H-6T		3.7	3/8″ Hy-Lok	7.11	47.3	47.3	94.6				
	-H-8T		7.5	1/2″ Hy-Lok	10.0	49.8	49.8	99.6				
	-F-4N			1/4″ Female NPT		32.0	32.0	64.0				
	-F-6N			3/8″ Female NPT		35.5	35.5	71.0				
	-F-8N			1/2″ Female NPT		39.5	39.5	79.0				
	-M-4N		3.7	1/4″ Male NPT	7.11	42.7	42.7	85.4				
	-M-6N		7.2	3/8″ Male NPT	9.65	42.7	42.7	85.4				
	-M-8N		7.5	1/2″ Male NPT	10.0	47.6	47.6	95.2				
H2B	-F-8N	12.7	10.0	1/2″ Female NPT	12.7	45.0	45.0	90.0	50.8	162.0	60.6	40.0
	-F-12N			3/4″ Female NPT		45.0	45.0	90.0				
	-M-12N			3/4″ Male NPT		52.6	52.6	105.2				
	-H-10T			5/8″ Hy-Lok		55.3	55.3	110.6				
	-H-12T			3/4″ Hy-Lok		55.3	55.3	110.6				
H3B	-F-12N	19.0	30.0	3/4″ Female NPT	20.0	45.0	45.0	90.0	55.6	162.0	65.6	50.0
	-F-16N			1″ Female NPT		49.1	49.1	98.2				
	-H-12T		19.0	3/4″ Hy-Lok	15.74	58.3	58.3	116.6				
	-H-16T		30.0	1″ Hy-Lok	20.0	64.9	64.9	129.8				
	-M-12N		19.0	3/4″ Male NPT	15.74	57.6	57.6	115.2				
	-M-16N		30.0	1″ Male NPT	20.0	62.4	62.4	124.8				

All dimensions in millimeters. Dimensions shown with Hy-Lok nuts in finger-tight position, where applicable.

High Pressure Ball Valves 105 Series

3 - Way



"*"marked dimensions are the same as of 2 - way valve.

Table of Dimensions

Basic Part No.		Orifice	End Connections Inlet & Outlet	d† Min.	L1
H1B	3*H - 4T	10.0	1/4" Hy-Lok	4.8	53.3
	3*H - 6T		3/8" Hy-Lok	7.11	54.8
	3*H - 8T		1/2" Hy-Lok	10.0	54.0
	3*F - 4N		1/4" Female NPT		36.5
	3*F - 6N		3/8" Female NPT		40.0
	3*F - 8N		1/2" Female NPT		44.0
H2B	3*H - 10T	12.7	5/8" Hy-Lok	12.7	65.3
	3*H - 12T		3/4" Hy-Lok		65.3
	3*F - 8N		1/2" Female NPT		49.5
	3*F - 12N		3/4" Female NPT		55.0
H3B	3*H - 12T	19.0	3/4" Hy-Lok	15.74	69.8
	3*H - 16T		1" Hy-Lok	20.0	69.8
	3*F - 12N		3/4" Female NPT	20.0	56.5
	3*F - 16N		1" Female NPT		60.6

All dimensions in millimeters. Dimensions shown with Hy-Lok nuts in finger tight position, where applicale.
"†" See dimension table on page2
"*" See ordering information on page4

Technical Data

Materials of Construction

Description	Grade/ASTM Specification	
	Valve Body Material	
	SS316	Alloy 400
Handle	Stainless Steel with PVC Coating	
Lock Nut	Stainless Steel with Washer	
Pin	Stainless Steel	
Stem	SS316/A276	Alloy 400/B164
Stem Packing*	PTFE	
Ball*	SS316/A276	Alloy 400/B164
Seats*	PVDF (standard)	
End Connector	SS316/A276	Alloy 400/B164
End Seals*	PTFE/Viton	
Body	SS316/A479	Alloy 400/B164

Note : "*" marked are wetted parts.
Lubricant is silicone based.

Handle

- Handle is made of stainless steel with PVC coat in yellow.
- Other colors are available upon request.

Sour Gas Service

- is provided to meet NACE Standard MR - 01 - 75.

Testing

- Each valve is tested with nitrogen @ 1000psig(69bar) to max leak rate of 0.1SCCM.
- Hydrostatic shell test is performed at 1.5 times the working pressure.
- Optional tests are available upon request.

Pressure and Temperature Rating

■ H1B Types

Materials			Pressure Rating @ -65°F ~ 70°F (-54°C ~ 21°C)	Temperature Rating
Seat	Stem Packing	End Seal		
PVDF (standard)	PTFE		6,000 psig (410 bar)	-22°F~265°F (-30°C~130°C)
PCTFE				-22°F~355°F (-30°C~180°C)
PEEK			10,000 psig (690 bar)	-65°F~500°F (-54°C~260°C)

■ H2B, H3B Types

Materials			Pressure Rating @ -65°F ~ 70°F (-54°C ~ 21°C)	Temperature Rating
Seat	Stem Packing	End Seal		
PVDF (standard)	PTFE	Viton	5,000 psig (340 bar)	-10°F~375°F (-23°C~191°C)
PCTFE				
PEEK			6,000 psig (410 bar)	

Note

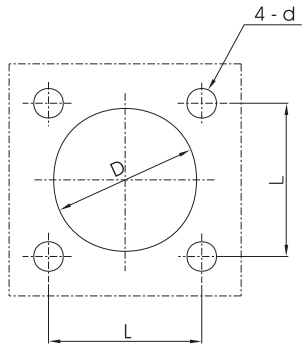
1. The above pressure rating is for 2 - way straight pattern valves. 80% of the above rating shall be applicable to 2 - way angle pattern valves and 3 - way valves.
2. The rated pressure shown above is the maximum allowable pressure to the seat. If the system requires higher pressure to test, the valve must be in open position before and during test so as not to damage the seat.
3. When valves with Hy - Lok Fitting end connections are connected to tubing, the working pressure of tubing must be considered in the calculation of total system working pressure.

High Pressure Ball Valves 105 Series

Panel Mounting

Valve Type	Orifice	d	D	L×L
H1B	10.0	5.0	30.0	26×26
H2B	12.7	5.0	38.0	34×34
H3B	19.0	5.0	38.0	44×44

All dimensions in millimeters.



Screw Holes in valves are M4 x 6mm Depth

Torque for Turning Handle (N · m)

Valve Type	Orifice	Working Pressure - psig									
		0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
H1B	10.0	1.6	1.4	1.4	1.6	2.1	2.3	2.7	2.9	3.3	3.7	4.0
H2B	12.7	3.3	2.9	3.8	4.3	5.0	5.2	5.6	-	-	-	-
H3B	19.0	3.2	3.1	4.2	6.5	8.0	8.6	9.6	-	-	-	-

Ordering Information

H1B | 3 | MH | 8N8T | PC | M | O | L | SOG | S316

Valve Type Designator
- H1B : 10.0mm Orifice
- H2B : 12.7mm Orifice
- H3B : 19.0mm Orifice

Pattern Designator*
- Nil : 2-way Straight
- A : 2-way Angle
- 3S : 3-way Side Entry
- 3B : 3-way Bottom Entry

End Connection Designator
- H : All Ends Hy-Lok Tube Fitting.
- F : All Ends Female Thread.
- M : All Ends Male Thread.

Size Designator
- NPT (ISO/BSP)

Thread(in)	1/4	3/8	1/2	3/4	1
Designator	4N(R)	6N(R)	8N(R)	12N(R)	16N(R)

- Tube

Fractional Tube	O.D.(in)	1/4	3/8	1/2	3/4	1
	Designator	4T	6T	8T	12T	16T
Metric Tube	O.D.(mm)	6	10	12	20	25
	Designator	6M	10M	12M	20M	25M

Seat Material Designator*
- Nil : PVDF (Standard)
- PC : PCTFE
- PK : PEEK

Panel Mounting Option*
- Nil : Without
- M : With

Handle Option*
- Nil : Lever(Standard)
- O : Oval Aluminum (Applicable only for H1B)

Locking Device Option*
- Nil : Without
- L : with

Sour Gas Designator*
- Nil : Without (Standard)
- SOG : NACE MR-01-75

Material Designator
- S316 : 316 Stainless Steel
- MONE : Alloy 400(Monel)

Note*: No designator is required for standard items, e.g. H1B - F - 6N - S316.

⚠CAUTION

105 Series Ball Valve shall not be used for CNG System.

■ QUALITY SYSTEM CERTIFICATES

ISO 9001
CERTIFICATE NO.GQC 212

ASME SECT Ⅲ (MO)
CERTIFICATE NO. QSC 584

SAFETY in VALVE SELECTION

Proper installation, materials compatibility, operation and maintenance of these valves are the responsibility of the user. The total system design must be taken into consideration to ensure optimal performance and safety.

■ TYPE APPROVALS (for Hy-Lok Tube Fittings)

American Bureau Shipping
CERTIFICATE NO.00-BK50288-X

Lloyd's Register
CERTIFICATE NO.01/10075

GERMANISCHER LLOYD
CERTIFICATE NO.57798-91 HH

DET NORSKE VERITAS
CERTIFICATE NO.P-9100

C63-AQU-QIX-002 442 / 917

FLOWSERVE®

Worcester Controls

Standard 3-Piece Ball Valves



Experience In Motion





The Flowserve Worcester Controls three-piece ball valve delivers rugged, high performance reliability for a range of applications, all in an easy-to-maintain design.

A variety of pipe ends, including socket weld, screwed or butt weld ends enables these valves to be adapted to fit both standard and more unusual piping specifications while the range of seat materials handles steam, chemicals, cryogenic gases, petroleum products, caustics, abrasive materials or fluids containing solids.

As you would expect, Worcester has developed and improved the Series 44/459 over the years to maintain its position as the 8-150mm valve design which others strive to equal. The 59 and 599 series full bore versions complete the range of 3-piece valves.

Wrench

Ergonomically designed for ease of operation (locking handle available)

Actuator Mounting

Conforms to ISO 5211 for ease of actuation (smaller sizes use Worcester two hole pattern)

Gland Nut

Does not need to be removed for actuator mounting thereby maintaining valve integrity

Anti-static Stem Design

Ensures electrical continuity between ball and body

Seats

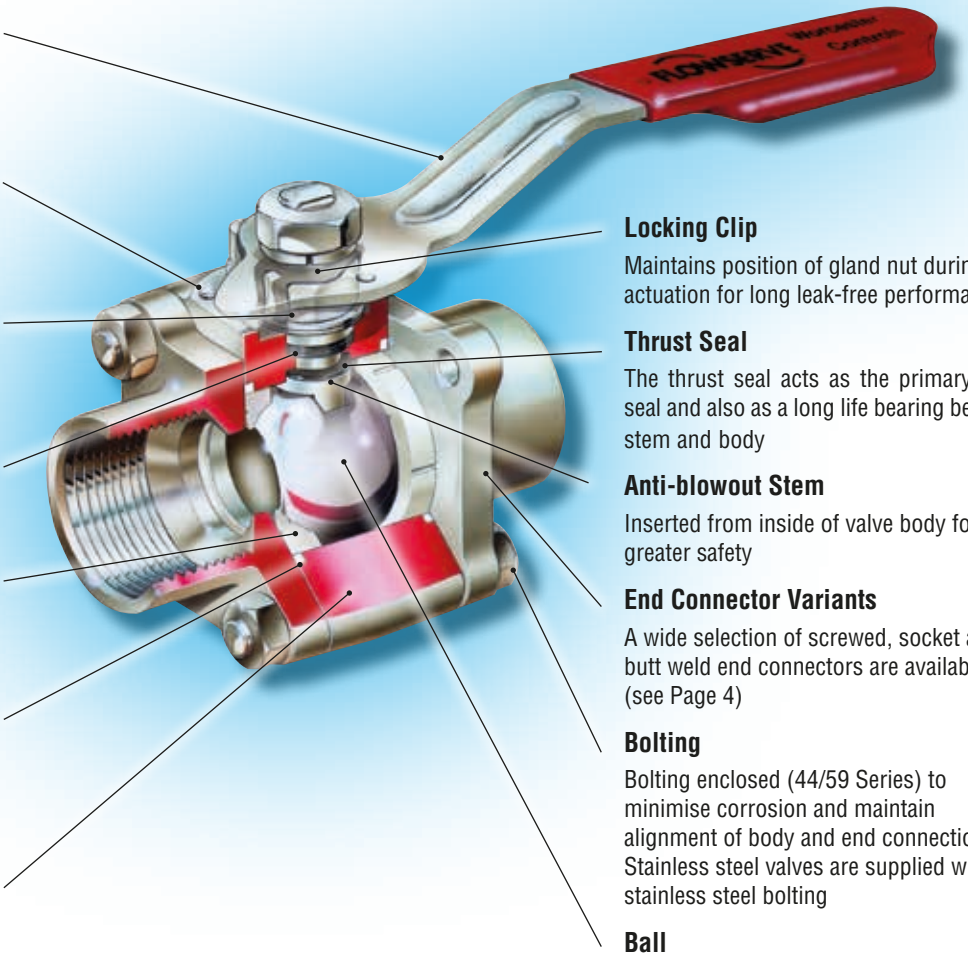
Wide range of seat materials to suit customer applications (see Pages 8 and 9)

Body Seals

PTFE as standard for media compatibility but can be interchanged for alternative applications

Materials of Construction

Cast body and end connectors in carbon or stainless steel (sizes 65mm and above are suitable for applications to -46 °C as standard)



Locking Clip

Maintains position of gland nut during actuation for long leak-free performance

Thrust Seal

The thrust seal acts as the primary stem seal and also as a long life bearing between stem and body

Anti-blowout Stem

Inserted from inside of valve body for greater safety

End Connector Variants

A wide selection of screwed, socket and butt weld end connectors are available (see Page 4)

Bolting

Bolting enclosed (44/59 Series) to minimise corrosion and maintain alignment of body and end connections. Stainless steel valves are supplied with stainless steel bolting

Ball

316 stainless steel as standard with pressure equalising hole to balance cavity pressure with line pressure when valve is open.

Standards of Compliance

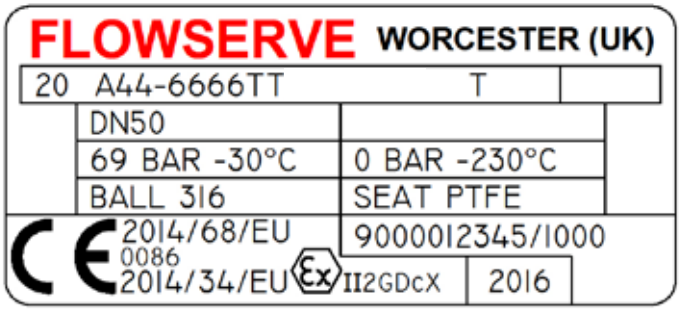
Worcester have always taken the lead when it comes to standards of compliance and the 3-piece valve is no exception, meeting all the mandatory requirements along with a number of others relating to product for use in the process industry.

PED 2014/68/EU

The Pressure Equipment Directive was introduced to ensure the safety and integrity of pressure containing equipment used within Europe. The Directive requires design files including calculations to ASME BPVC Sect. VIII, risk assessments, Product testing, Pressure containing components with 3.1 Certification along with supporting QA certification validated by a Notified Body.
CE marking for PED only applies to valves greater than DN25 nominal bore. Below that design files are still maintained but classified as SEP.

Atex 94/9/EC

The Atex Directive was established to prevent explosive atmospheres forming, prevent ignition and control the effect of explosions. Valves complying with the Atex requirement are CE marked with the standard designation. Worcester valves carry a rating Ex II2GDcX due to the anti-static devices used in the build.



SIL (Safety Integrity Level) IEC61508

Safety Integrity is now an essential part of many process plants allowing assessments to be made based on the reliability of the equipment used within it. Worcester valves have been independently reviewed and assessed and given the rating of SIL ‘SC 3’. This allows an assembly utilising a Worcester valve to carry a maximum overall rating of SIL 3 or less if other equipment has a lower rating

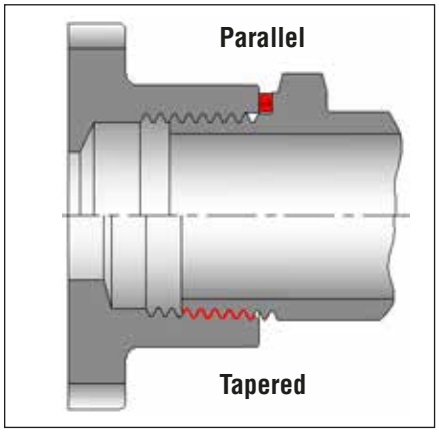
Fugitive Emission ISO15848

Introduced to ensure that product used in process plants can maintain a specified level of integrity based on service conditions. The Worcester 44 Series now has a combined class rating as follows;

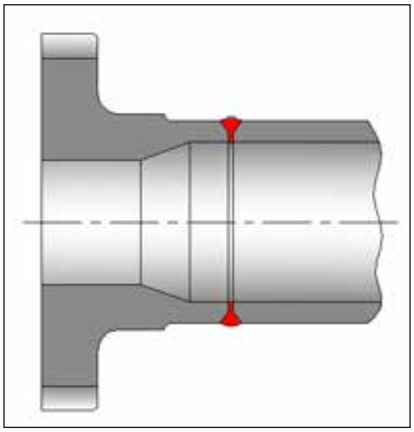
Tightness Class: BH (Helium)
Endurance Class: C01 (500 cycles)
Test Pressure: 69 Bar
Test temperature: Ambient 20 °C & 120 °C
Stem seal Adjustments (SSA): 0 (No adjustments)
ISO FE BH-C01-SSA 0-t(-29 °C to 120 °C)-69 bar

End Connector Variants

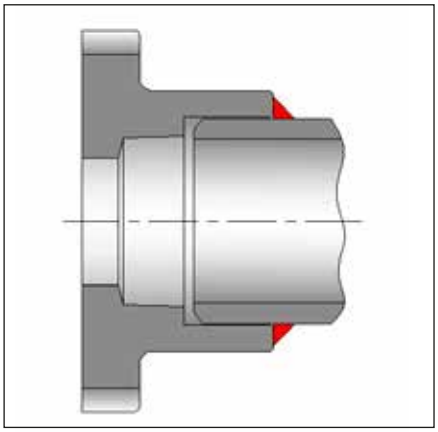
Worcester offers a wide range of end connector variants to meet international, European and regional standards. The variety of connectors is shown below with their reference standard against the Worcester 3-digit product code designation.



Threaded



Butt Weld

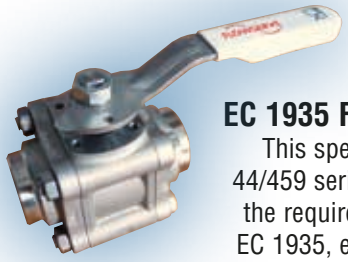


Socket Weld

Type	Code	Reference	Standard of Compliance
Threaded	SEP	BSPP / G	BS EN ISO 228-1
	SET	BSPT / Rc	BS EN ISO 10226-1 / ISO 7-1
	SEN	NPT	ASME B1.20.1
Butt Weld	BW5	Schedule 5	Pipe to BS1600, ASME B36.10/B36.19 Butt weld preparation to ASME B16.25
	BWE	Schedule 10	
	BWA	Schedule 40	
	BWC	Schedule 80	
	BW6	Schedule 160	
	BOD	Hygienic Tube	Inch series O/D pipe, 16 swg wall
	BWG	ISO Pipe (special)	ISO 4200 Series 1 O/D with Wall thickness to EN 1092-1 PN16/40
	BWJ	ISO Pipe (special)	ISO 4200 Series 1 O/D with 2.6mm Wall thickness
	BWH	ISO Pipe (special)	ISO 4200 Series 1 O/D with I/D as per valve DN size
	BWK	DIN Pipe	DIN 2463 Row 1
	BWL	DIN Pipe	DIN 11850 Row 2
	BWM	Swedish Std	SSG7837 (Pulp and Paper)
	BWR	DIN Pipe	DIN 11850 Row 1
	BX*	ISO Pipe	ISO 4200 Series 1
	BY*	ISO Pipe	ISO 4200 Series 2
	BZ*	ISO Pipe	ISO 4200 Series 3
Socket Weld	SWA	Schedule 40	Pipe to BS1600, ASME B36.10/B36.19
	SWC	Schedule 80	Pipe to BS1600, ASME B36.10/B36.19 (Not available on A44)

Alternative end connectors such as extended or Tri-clamp are available upon request.

Application Variants



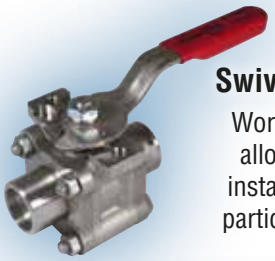
EC 1935 Food Contact Valve

This special variation of the 44/459 series fully complies with the requirements of Regulation EC 1935, enabling it to be safely installed on applications involving direct food contact.



Cryogenic Valves C44/59/459/599

The cryogenic valve is suitable for low temperature applications, including CO2, N2, Ar, O2, LNG and other liquid gases. It is available in stainless steel or brass.



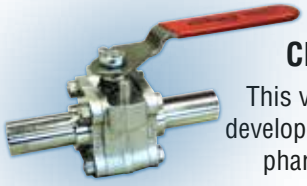
Swivel Ended Valves AS44/59

Worcester's swivel-end connector allows for simple orientation and installation of butt welded valves, particularly when long, complicated sections of pre-fabricated pipework are used.



High Integrity Valve E44

The unique dual stem sealing design of the Worcester Enviro-Safe valve makes it ideal for toxic media and high cycling applications.



Clean Valves WK70

This valve has been specifically developed for use in semi-conductor, pharmaceutical and bio-tech applications.



Control Valves V44/459

Worcester's versatile rotary V-Flow control valve offers accurate control through a range of V-ported, characterized seats, providing a compact control valve for a variety of applications (Also available in firesafe version).



High Pressure Valves 5HP44

The 5HP44 is Worcester's three-piece ball valve for high pressure hydraulic systems up to 345 Bar (5000 psi).



Steam and Thermal Fluid Valves AW44/59

Specifically designed for on/off steam applications in conditions up to 250 psi (continuous saturated steam) or 1500 psi (thermal fluids), the AW44 is available in stainless or carbon steel.



Firesafe Valves F44/59/459/599

This firesafe design is particularly suitable for hazardous areas in hydrocarbon and chemical process lines.

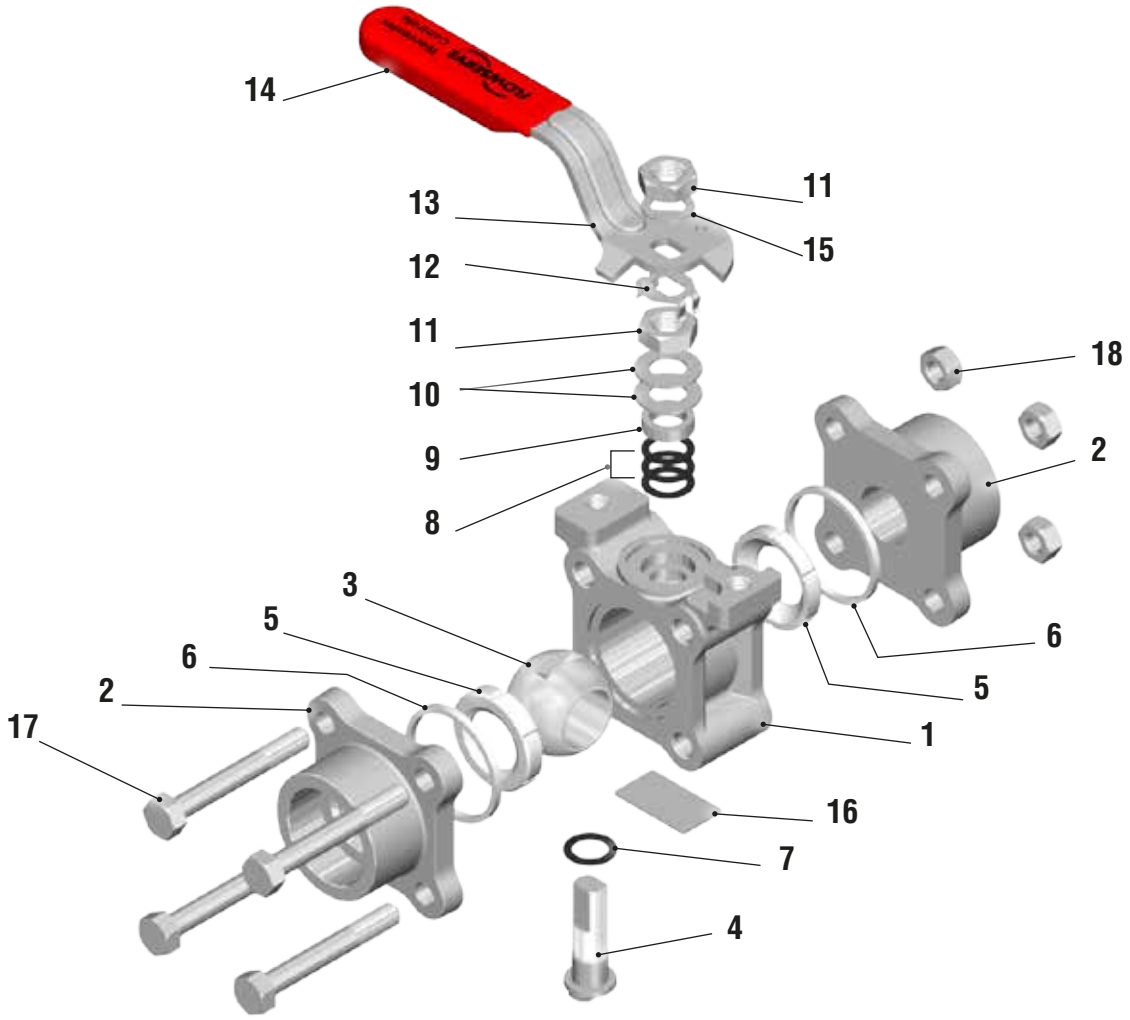


Diverter Valves 13/14

Worcester Series 13/14 range of three-way valves has been designed for diverting and mixing process media, and features a number of variants which provide a range of operational solutions. Available in bottom entry and side entry configurations

Construction

A44/A59



Item	Description	Carbon Steel	Stainless Steel
1	Body	ASTM A216 WCB UNS J03002	ASTM A351 CF8M UNS J92900
2	End Connector	ASTM A216 WCB UNS J03002	ASTM A351 CF3M UNS J92800
3	Ball	ASTM A479 316 UNS S31600 ASTM A351 CF8M UNS J92900	
4	Stem	Stainless Steel AISI Type 316	
5	Seats*	T PTFE, Virgin R PTFE, 15% Glass Filled H PTFE, 25% Glass Filled P Fluorofill (10% Glass, 15% Carbon Filled) Also Acetal, PEEK, UHMWPE & Metal Seats	
6	Body Seal*	PTFE, Virgin	
7	Stem Thrust Seal*	PTFE, 35% Carbon Filled	
8	Gland Packing*	PTFE, 35% Carbon Filled	
9	Gland Follower	Stainless Steel	
10	Disc Springs*	Stainless Steel	

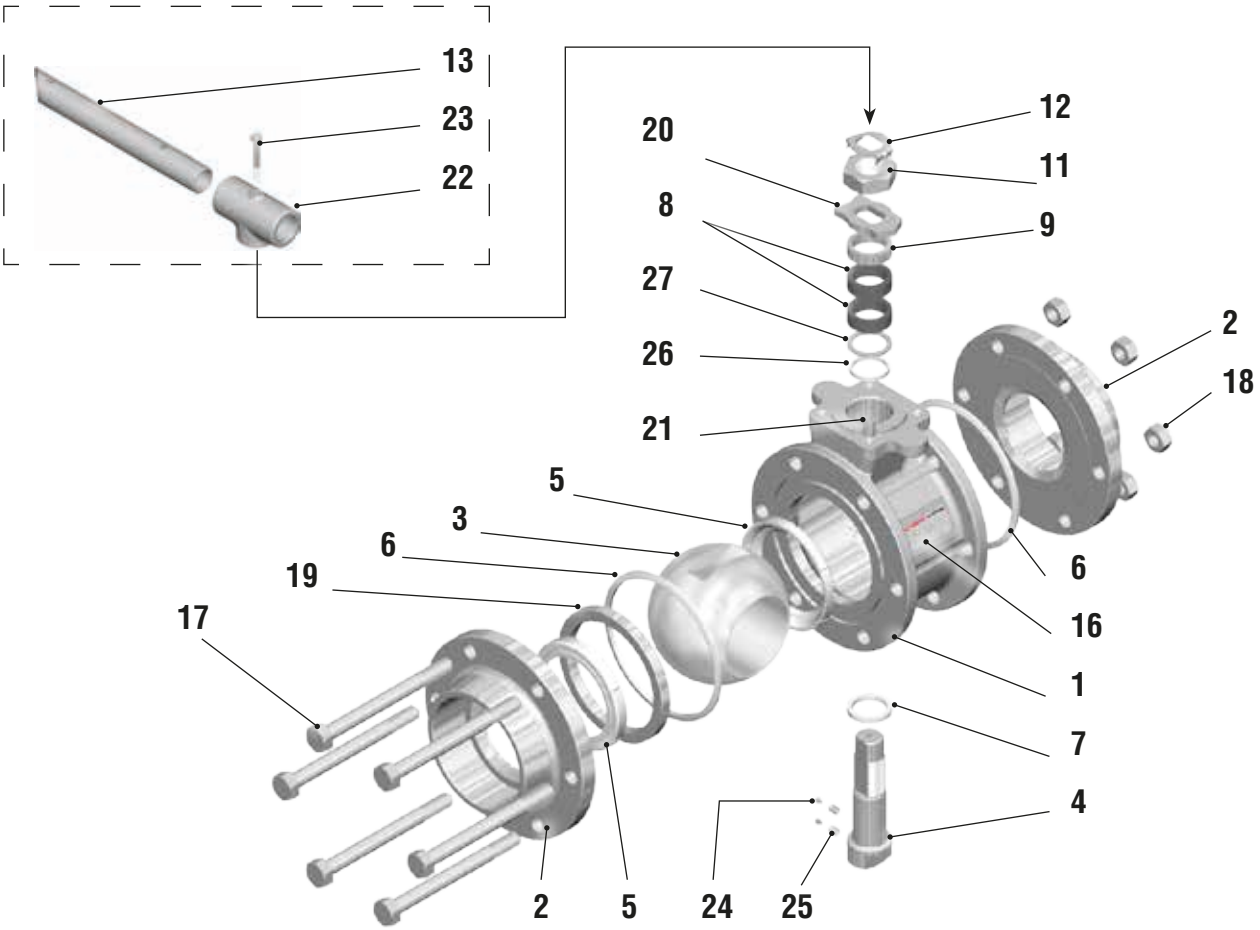
Item	Description	Carbon Steel	Stainless Steel
11	Gland/Wrench Nut*	Stainless Steel	
12	Locking Clip*	Stainless Steel	
13	Wrench	Carbon Steel	Stainless Steel
14	Wrench Sleeve	Vinyl Plastisol	
15	Spring Washer	Stainless Steel	
16	Indentification Plate	Stainless Steel	
17	Body Bolts	BS3692 Gr.8.8 ASTM A193M Gr.B7	BS EN 3506-1 A4-80 BS6105 Gr.A4-80 BS1506 Gr.MB8MX ASTM A193M Gr.B8M Cl.2
18	Body Nuts	BS3692 Gr.8 ASTM A194M Gr.2H	BS EN 3506-2 A4-80 BS6105 Gr.A4-80 BS1506 Gr.M8MX ASTM A194M Gr.8M

1 Items marked with * denote components supplied in repair kits.
2 All material grades stated are known to be correct at the time of issue but may be subject to change. Customers are advised to contact Flowserve when exact materials of construction are required.
3 Stainless steel stop pin fitted on 1¼" - 2" A44 and 1" - 1½" A59

Construction

A459/A599

Wrench kit supplied separately. To be ordered at time of valve Purchase Order.



Item	Description	Carbon Steel	Stainless Steel
1	Body	ASTM A352 LCB UNS J03003	ASTM A351 CF8M UNS J92900
2	End Connector	ASTM A352 LCB UNS J03003	ASTM A351 CF3M UNS J92800
3	Ball	Stainless Steel ASTM A351 CF8M UNS J92900	
4	Stem	Stainless Steel AISI Type 316	
5	Seats*	T PTFE, Virgin R PTFE, 15% Glass Filled H PTFE, 25% Glass Filled P Fluorofill (10% Glass, 15% Carbon Filled) Also Acetal, PEEK, UHMWPE & Metal Seats	
6	Body Seal*	PTFE, Virgin	
7	Stem Thrust Seal*	PTFE, 25% Glass Filled	
8	Gland Packing*	Graphite	
9	Gland Follower	Stainless Steel	
11	Gland/Wrench Nut*	Carbon Steel	Stainless Steel
12	Locking Clip*	Stainless Steel	
13	Wrench	Carbon Steel	

Item	Description	Carbon Steel	Stainless Steel
16	Indentification Plate	Stainless Steel	
17	Body Bolts	ASTM A193M Gr.B7 BS3692 Gr.8.8	ASTM A193M Gr.B8M Cl.2 BS EN 3506-1 A4-80 BS1506 Gr.MB8MX
18	Body Nuts	ASTM A194M Gr.2H	ASTM A194M Gr.8M
19	Seat Ring Retainer	BS3692 Gr.8 ASTM A352 LCB UNS J03003	BS EN ISO 3506-2 Gr.A4-80 BS1506 Gr.M8MX ASTM A351 CF8M UNS J92900
20	Stop Indicator	Carbon Steel	Stainless Steel
21	Stop Pin	Carbon Steel	Stainless Steel
22	Wrench Head	Cast Iron / Stainless Steel	
23	Wrench Bolt	Stainless Steel	
24	Anti-static Plunger	Stainless Steel	
25	Anti-static Spring	Stainless Steel	
26	Stem Location Ring	Stainless Steel	
27	Stem Seal (Seconday)	PTFE, Virgin	

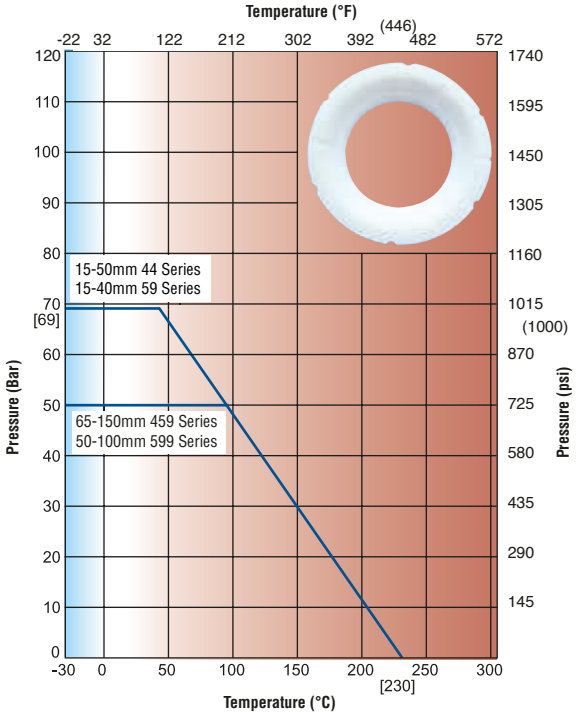
1 Items marked with * denote components supplied in repair kits.
2 Material selection may alter the valves operating pressure/temperature range. Customers are advised to contact Flowserve on ratings for special valve builds.
3 All material grades stated are known to be correct at the time of issue but may be subject to change. Customers are advised to contact Flowserve when exact materials of construction are required.

Pressure Temperature Ratings

PTFE based seats

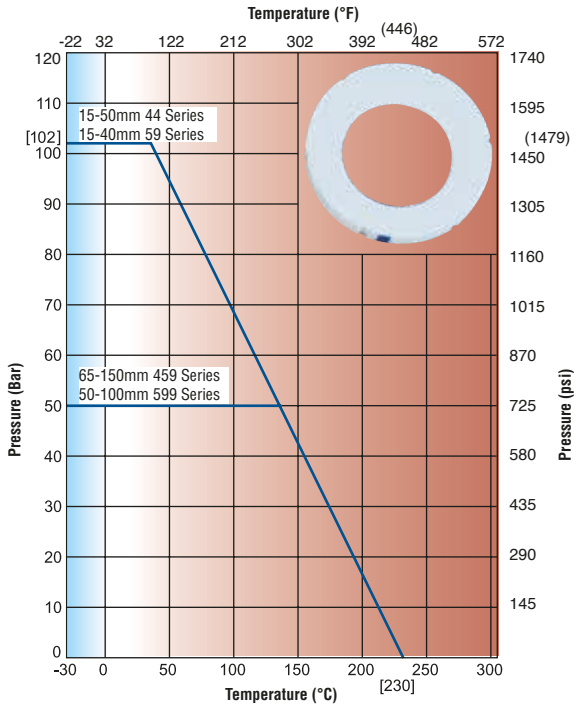
VIRGIN PTFE (T)

Virgin PTFE is the most common sealing material and is suitable for almost all media as it has excellent chemical resistance.



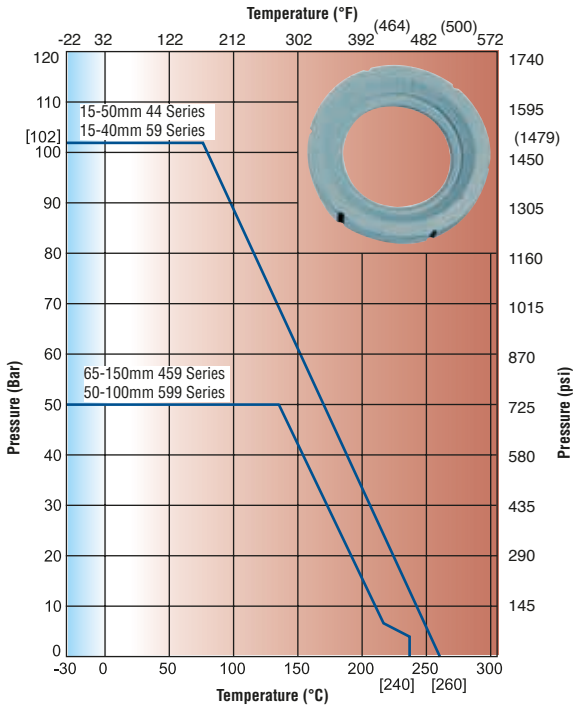
15% GLASS FILLED PTFE (R)

Glass re-inforced PTFE seats are stronger than virgin and have higher pressure/temperature ratings. Chemical resistance as per virgin PTFE.



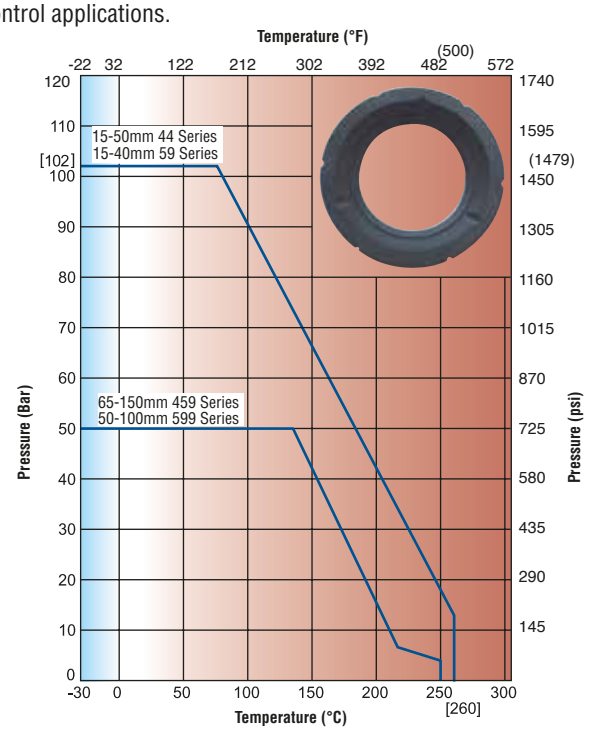
25% GLASS FILLED PTFE (H)

Glass re-inforced PTFE material offering a greater pressure / temperature capability than the R seat.



FLUOROFILL (P)

Carbon, glass and graphite filled PTFE material, an excellent seat material for steam and thermal services. Due to its high cycling capabilities, it is the recommended soft seat for modulating control applications.

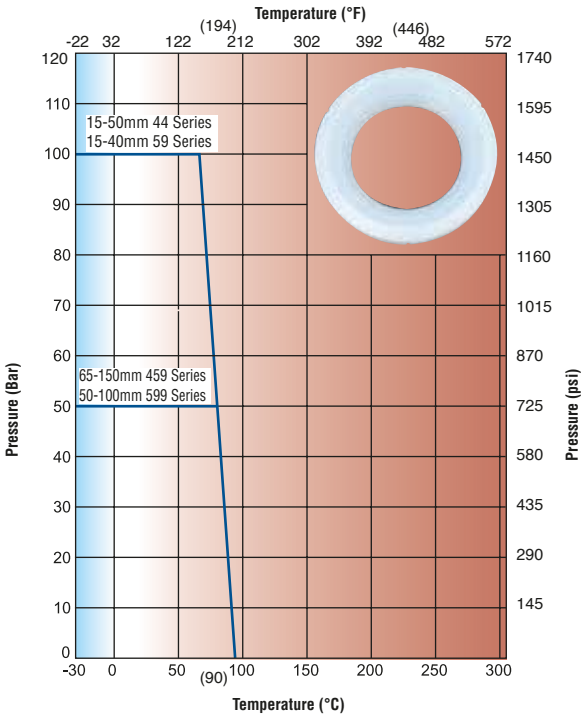


Pressure Temperature Ratings

Non PTFE seats

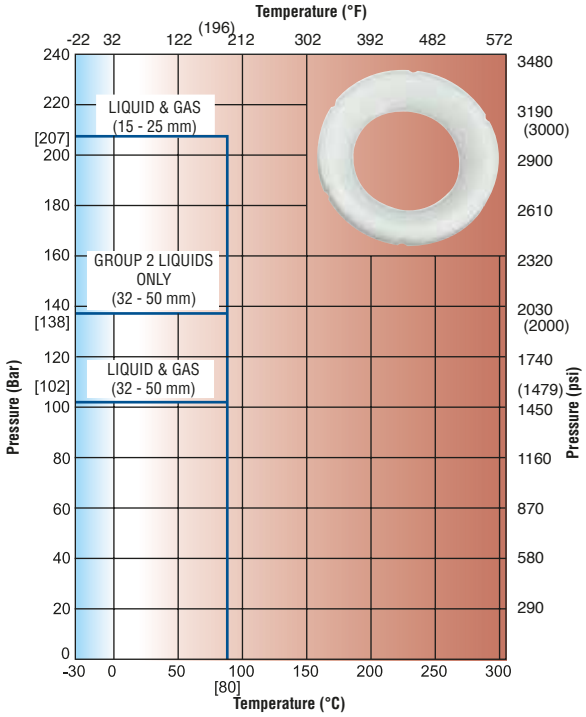
UHMWPE (U)

Ultra High Molecular Weight Polyethylene offers good performance characteristics in applications where PTFE is not suitable (for example on tobacco duty). It also has good abrasion resistance.



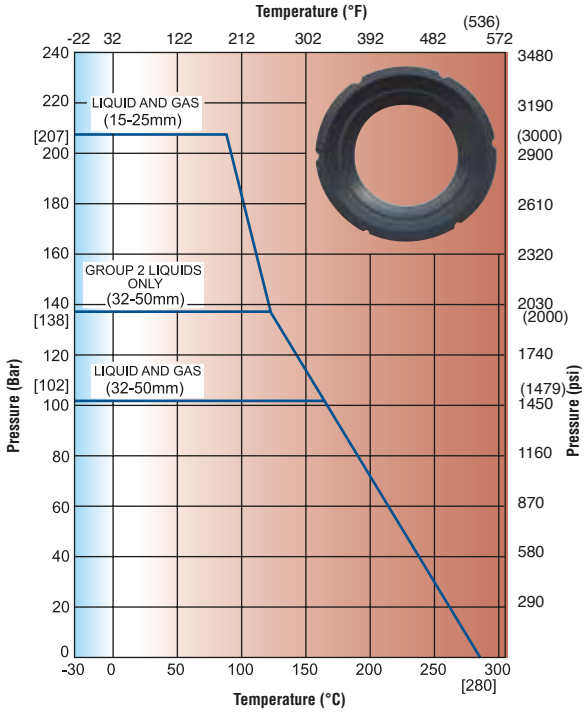
ACETAL (Y)

Machined from acetal homopolymer, these seats are capable of handling extremely high pressures.



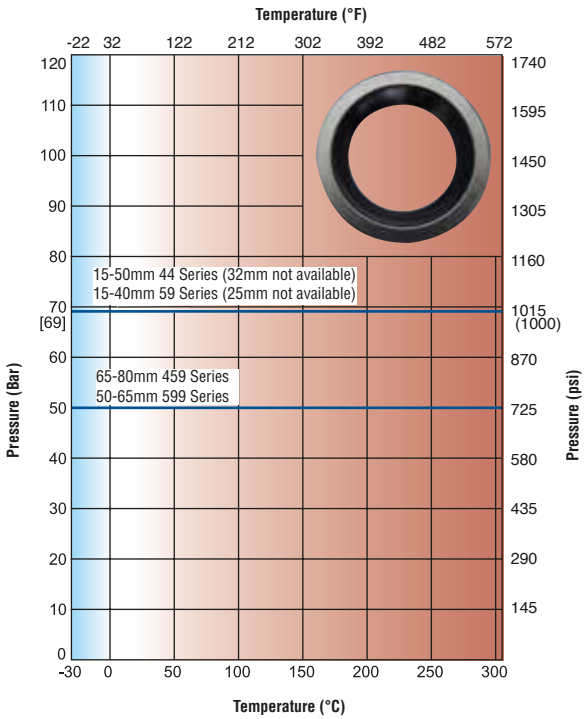
PEEK (A - DN15-25) (X - DN32-150)

PEEK is Poly Ether Ether Ketone, a material which demonstrates outstanding pressure capabilities at elevated temperatures. PEEK has excellent chemical and abrasion resistance.



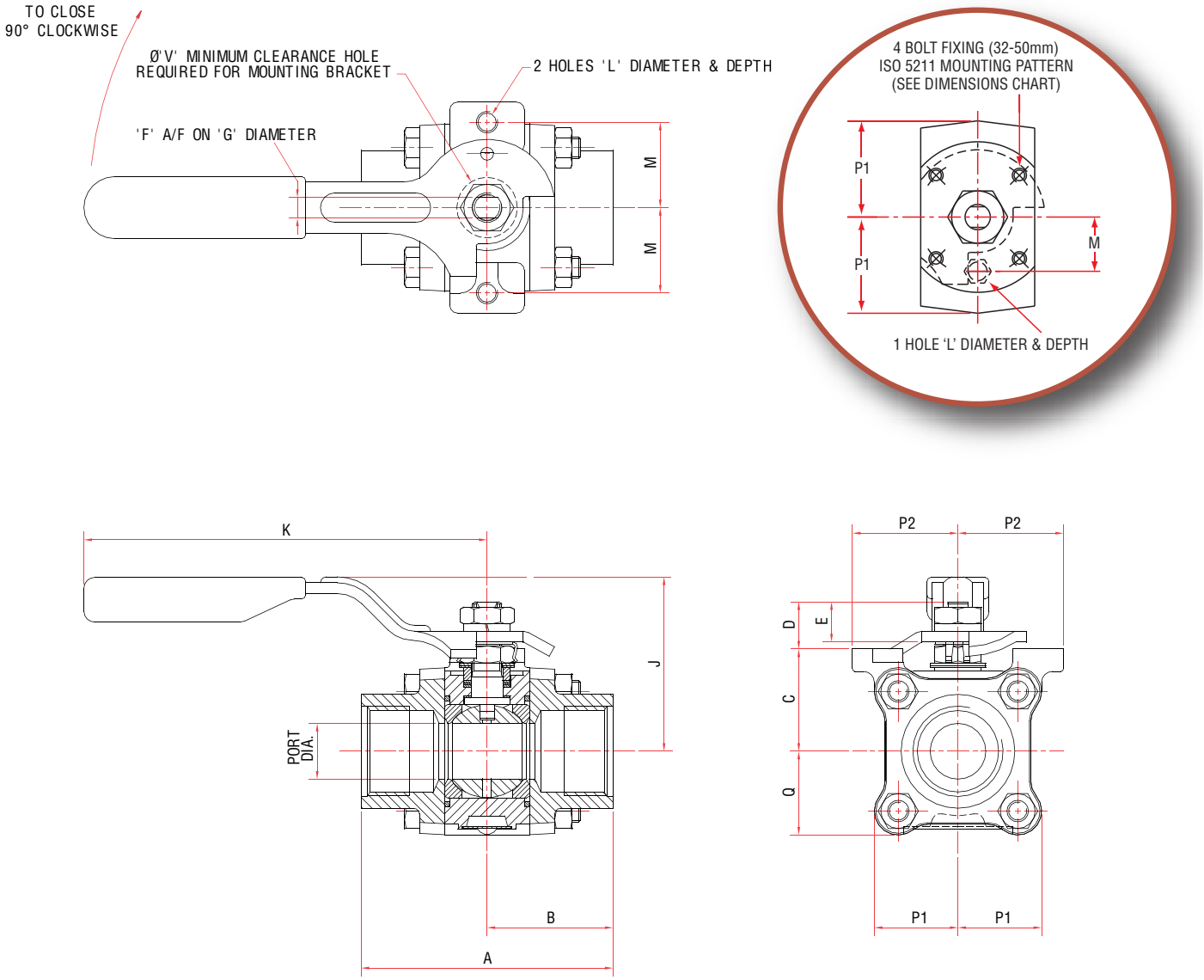
METAL – ALPHA (N) / GAMMA (G)

A 316L sintered metal seat impregnated with PTFE - Alpha (N) or graphite - Gamma (G) improves the strength and abrasion resistance of metal.



Dimensions (mm)

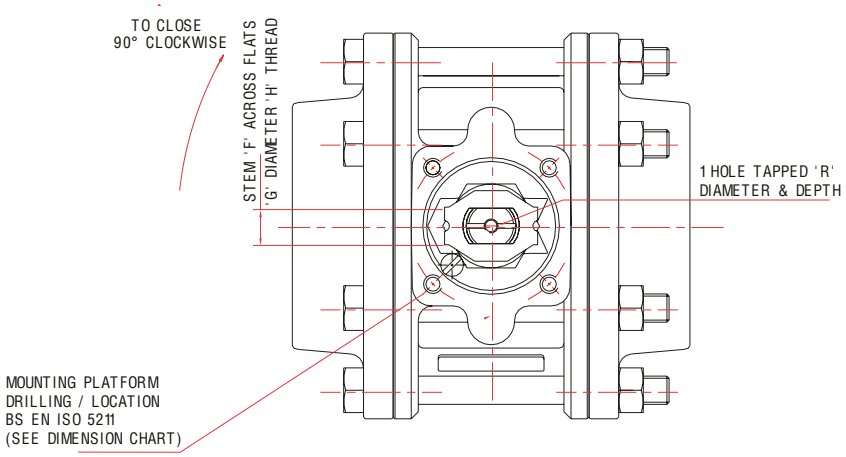
A44 8-50 mm Reduced Bore

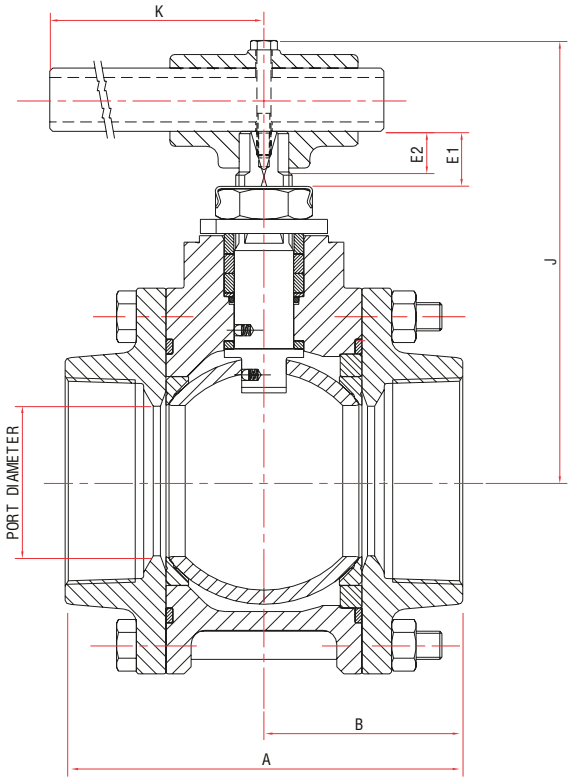


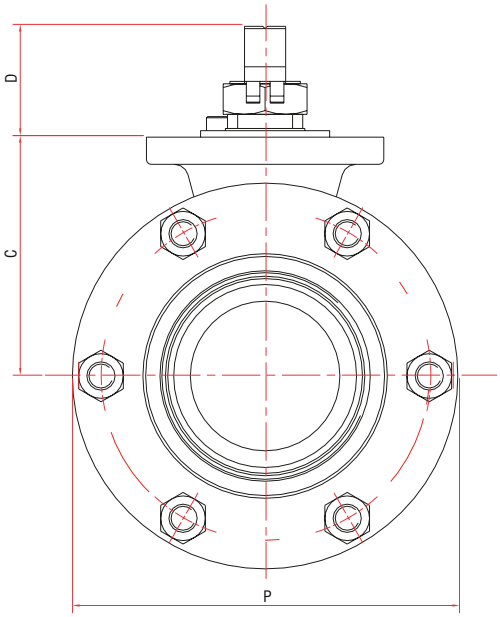
Valve Size (mm)	Port Ø Min	A	B	C	D	E	Stem		J	K	L Thread & Depth	M	P1	P2	Q	V Ø	Mounting Platform (ISO 5211)			Weight Kg
							F A/F	G Ø Thread									ISO Size	Mounting Holes	Platform Recess	
15	10.9	66.25 64.52	32.69	26.7 26.5	11.68 11.04	10.69 10.19	5.54 5.46	3/8"-24 UNF	57.9	136.0	M6 x1.0p 9.5 Min	24.0	23.8	30.4	23.8	19.5				0.7
20	14.0	71.81 70.09	35.48	29.1 28.9	11.68 11.04	10.69 10.19	5.54 5.46	3/8"-24 UNF	60.3	136.0	M6 x1.0p 9.5 Min	27.0	27.2	33.4	27.2	19.5				0.9
25	20.4	94.55 92.82	46.84	38.1 37.9	17.94 17.16	15.19 14.69	7.54 7.47	7/16"-20 UNF	64.8	149.0	M8 x1.25p 9.7 Min	31.75	32.7	40.5	32.7	22.5				1.6
32	25.1	106.90 105.17	53.02	37.10 36.85	23.74 22.91	15.19 14.69	7.54 7.47	7/16"-20 UNF	69.6	149.0	M5 x0.8p 6.0 Min	19.5	36.3		36.3	22.5	F04	4 OFF M5 x0.8p x7.5 Deep Min ON 42.0 P.C.D.	Ø 30.15/30.02 x4.29/3.52 Deep	2.2
40	31.3	115.41 113.6	57.28	44.0 43.75	29.55 28.73	18.39 17.89	8.71 8.64	9/16"-18 UNF	77.9	181.0	M6 x1.0p 7.5 Min	23.0	42.3		42.3	29.5	F05	4 OFF M6 x1.0p x8.7 Deep Min ON 50.0 P.C.D.	Ø 35.15/35.02 x4.01/3.26 Deep	3.2
50	37.7	127.94 126.21	63.54	48.75 48.50	29.55 28.73	18.39 17.89	8.71 8.64	9/16"-18 UNF	82.6	181.0	M6 x1.0p 8.7 Min	23.0	47.4		47.4	29.5	F05	4 OFF M6 x1.0p x8.7 Deep Min ON 50.0 P.C.D.	Ø 35.15/35.02 x4.01/3.26 Deep	4.3

Dimensions (mm)

A459 65-150 mm Reduced Bore



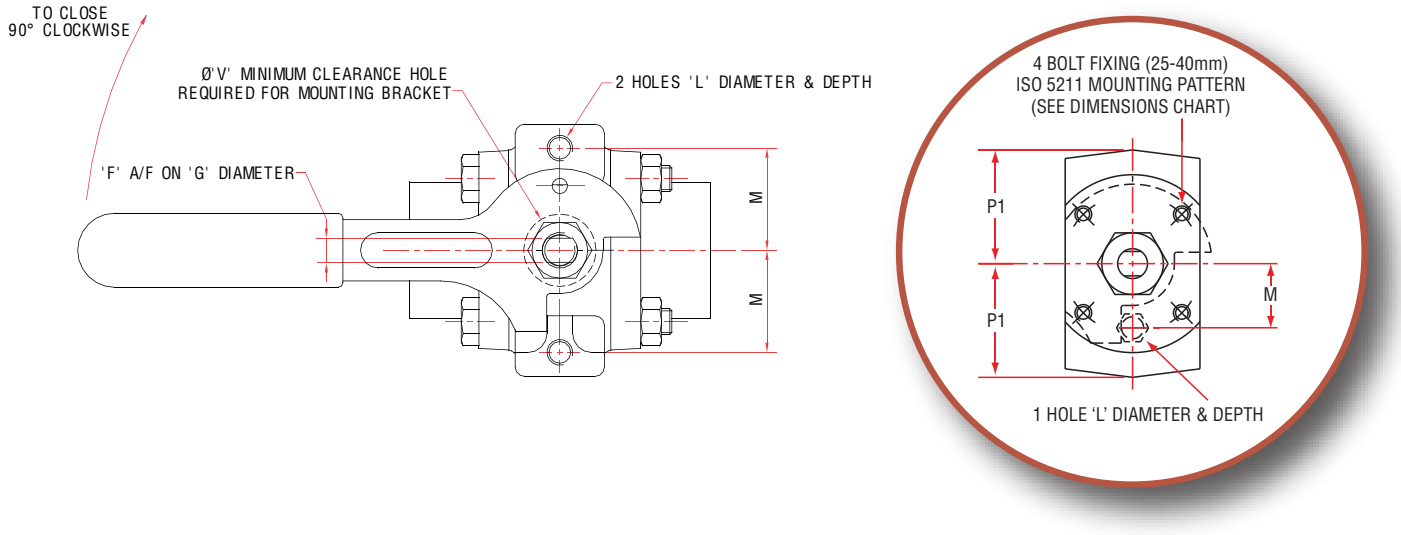


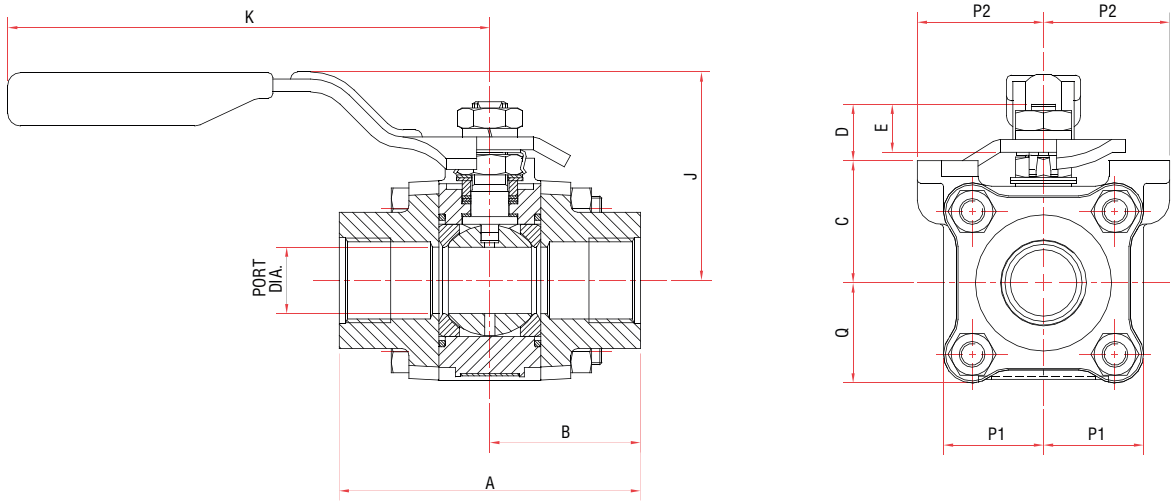


Valve Size (mm)	Port Ø Min	A	B	C	D	E1 Min	E2 Min	F A/F	Stem GØ	H Thread	J	K	P Ø	R Thread & Depth	Mounting Platform (ISO 5211)			Weight Kg
															ISO Size	Mounting Holes	Platform Recess	
65	50.8	149.74 148.11	74.46	87.57 86.87	43.83 41.50	13.15	–	14.0 13.9	–	M20 x1.5p	156.1	225.0	148.0	M6 x1.0p 10.0 MIN	F07	4 OFF M8 x1.25p ON 70.0 P.C.D.	Ø 54.97/54.90 x3.0/2.6 HIGH	9.0
80	63.55	170.04 168.31	84.59	101.90 101.10	51.10 48.44	19.37	16.80	15.1 15.0	21.2 21.0	M24 x2.0p	190.0	350.0	168.0	M6 x1.0p 12.0 MIN	F07	4 OFF M8 x1.25p ON 70.0 P.C.D.	Ø 54.97/54.90 x3.0/2.6 HIGH	13.3
100	76.2	214.67 212.94	106.9	119.90 119.10	55.70 53.04	21.67	21.00	19.3 19.2	27.2 27.0	M30 x2.0p	213.5	557.0	196.0	M6 x1.0p 12.0 MIN	F10	4 OFF M10 x1.5p ON 102.0 P.C.D.	Ø 69.97/69.85 x3.0/2.6 HIGH	23.0
150	102.0	299.26 297.54	149.20	147.10 146.30	73.05 70.39	30.27	28.20	26.6 26.5	33.2 33.0	M36 x2.0p	274.8	850.0	256.0	M8 x1.25p 12.0 MIN	F12	4 OFF M12 x1.75p ON 125.0 P.C.D.	Ø 84.97/84.85 x3.0/2.6 HIGH	51.0

Dimensions (mm)

A59 8-40 mm Full Bore

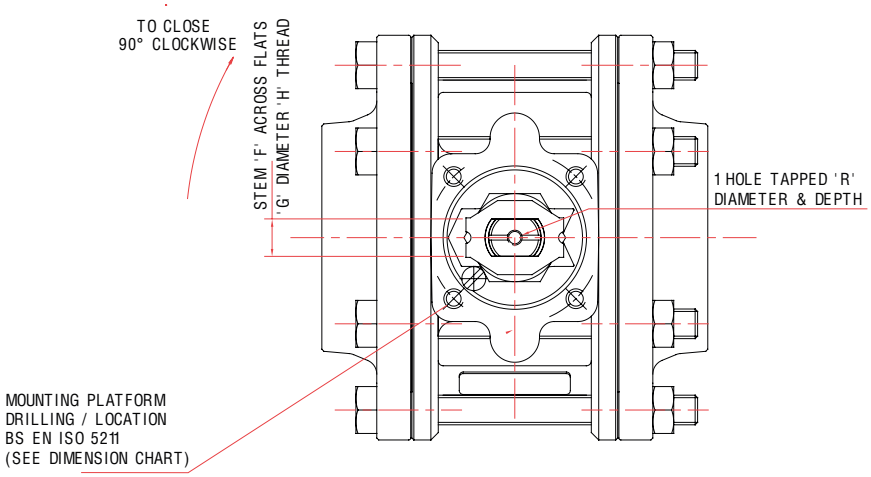


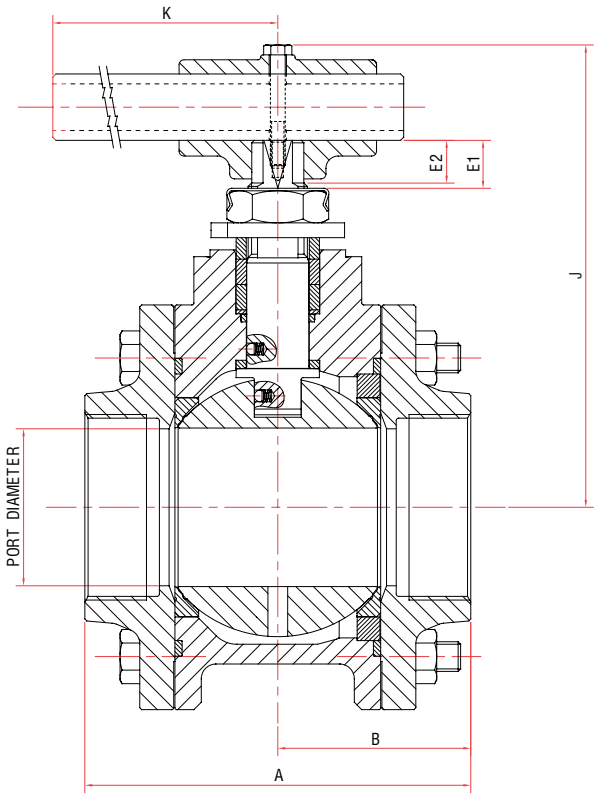


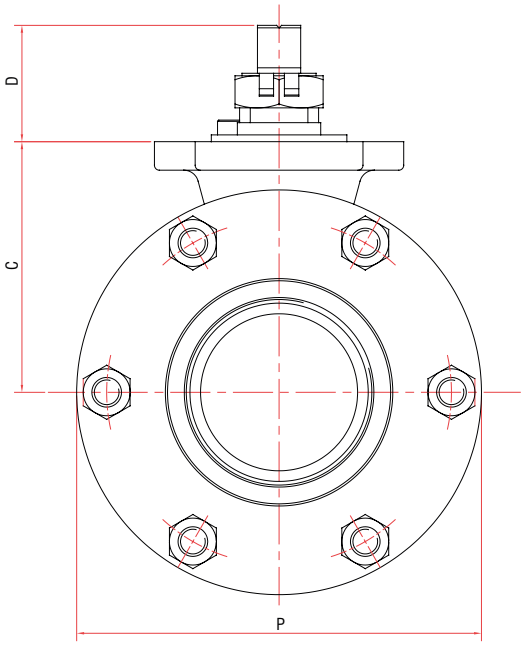
Valve Size (mm)	Port Ø Min	A	B	C	D	E	Stem		J	K	L Thread & Depth	M	P1	P2	Q	V Ø	Mounting Platform (ISO 5211)			Weight Kg
							F A/F	G Ø Thread									ISO Size	Mounting Holes	Platform Recess	
8-15	14.0	71.81 70.09	35.48	29.1 28.9	11.68 11.04	10.69 10.19	5.54 5.46	3/8"-24 UNF	60.3	136.0	M6 x1.0p 9.5 MIN	27.0	27.2	33.4	27.2	19.5				0.9
20	20.4	94.55 92.82	46.84	38.1 37.9	17.94 17.16	15.19 14.69	7.54 7.47	7/16"-20 UNF	64.8	149.0	M8 x1.25p 9.7 MIN	31.75	32.7	40.5	32.7	22.5				1.6
25	25.1	106.90 105.17	53.02	37.10 36.85	23.74 22.91	15.19 14.69	7.54 7.47	7/16"-20 UNF	69.6	149.0	M5 x0.8p 6.0 MIN	19.5	36.3		36.3	22.5	F04	4 OFF M5 x0.8p x7.5 DEEP MIN ON 42.0 P.C.D.	Ø 30.15/30.02 x4.29/3.52 DEEP	2.2
32	31.3	115.41 113.69	57.28	44.0 43.75	29.55 28.73	18.39 17.89	8.71 8.64	9/16"-18 UNF	77.9	181.0	M6 x1.0p 7.5 MIN	23.0	42.3		42.3	29.5	F05	4 OFF M6 x1.0p x8.7 DEEP MIN ON 50.0 P.C.D	Ø 35.15/35.02 x4.0/3.26 DEEP	3.2
40	37.7	127.94 126.21	63.54	48.75 48.50	29.55 28.73	18.39 17.89	8.71 8.64	9/16"-18 UNF	82.6	181.0	M6 x1.0p 8.7 MIN	23.0	47.4		47.4	29.5	F05	4 OFF M6 x1.0p x8.7 DEEP MIN ON 50.0 P.C.D.	Ø 35.15/35.02 x4.0/3.26 DEEP	4.3

Dimensions (mm)

A599 50-100 mm Full Bore







Valve Size (mm)	Port Ø Min	A	B	C	D	E1 Min	E2 Min	F A/F	Stem GØ	H Thread	J	K	P Ø	R Thread & Depth	Mounting Platform (ISO 5211)			Weight Kg
															ISO Size	Mounting Holes	Platform Recess	
50	50.8	149.74 148.11	74.46	87.57 86.87	43.83 41.50	13.15	–	14.0 13.9	–	M20 x1.5p	156.1	225.0	148.0	M6 x1.0p 10.0 MIN	F07	4 OFF M8 x1.25p ON 70.0 P.C.D	Ø 54.97/54.90 x3.0/2.6 HIGH	9.0
65	63.55	157.24 155.51	78.19	101.90 101.10	51.10 48.44	19.37	16.80	15.1 15.0	21.2 21.0	M24 x2.0p	190.0	350.0	168.0	M6 x1.0p 12.0 MIN	F07	4 OFF M8 x1.25p ON 70.0 P.C.D.	Ø 54.97/54.90 x3.0/2.6 HIGH	13.3
80	76.2	192.27 190.77	95.75	119.90 119.10	55.70 53.04	21.67	21.00	19.3 19.2	27.2 27.0	M30 x2.0p	213.5	557.0	196.0	M6 x1.0p 12.0 MIN	F10	4 OFF M10 x1.5p ON 102.0 P.C.D.	Ø 69.97/69.85 x3.0/2.6 HIGH	23.0
100	102.0	299.26 297.54	149.20	147.10 146.30	73.05 70.39	30.27	28.20	26.6 26.5	33.2 33.0	M36 x2.0p	274.8	850.0	256.0	M8 x1.25p 12.0 MIN	F12	4 OFF M12 x1.75p ON 125.0 P.C.D.	Ø 84.97/84.85 x3.0/2.6 HIGH	51.0

Technical Information

Valve Pressure and Temperature Ratings

Body / Connector Material	Temperature Range °C	Standard Material	
		44 Series	459 Series
(4) Carbon Steel	-29 to 300	●	–
(5) Low temp Carbon Steel	-46 to 300	–	●
(6) Stainless Steel	-196 to 300	●	●
Body Seal Material	**Temperature Range °C**	**Max Pressure (Bar)**	
		44 Series	**459 Series**
(T) PTFE	-50 to 260	102	50
(Z) Graphite	-196 to 300	102	50
(M) S-Gasket, 316+PTFE	-196 to 260	90	50
(G) S-Gasket, 316+Graphite	-196 to 300	90	50
(B) Buna Nitrile	-40 to 110	102*	50
(V) Viton	-20 to 250	102*	50
(E) EPDM	-50 to 125	102*	50
(S) Silicon	-65 to 200	102*	50
Seat Material	**Temperature Range °C**	**Max Pressure (Bar)**	
		44 Series	**459 Series**
(T) PTFE	-30 to 230	69	50
(R) PTFE, 15% GF	-50 to 230	102	50
(H) PTFE, 25% GF	-80 to 260	102	50
(P) PTFE, Fluorofill	-80 to 260	102	50
(A) or (X) PEEK	-80 to 280	102	50
(Y) Delrin	-80 to 80	102	50
(U) UHMWPE	-80 to 80	102	50
(N) Alpha, 316+PTFE	-80 to 300	69	50
(G) Gamma, 316+Graphite	-80 to 300	69	50

1) *The maximum pressure ratings of 44 series valves with O-ring seals and PED SEP are: DN8 to DN25 = 207 bar, DN32 to DN50 = 138 bar

2) **Note:** All 459 series seals have a limit of 250 °C max even though the body rating is 300 °C.

The valve pressure and temperature ratings are made up from a combination of the body/end connector material, seat material and body seal material. The seat ratings are shown graphically on pages 8 and 9 but they need to be used in conjunction with the maximum and minimum ratings shown opposite.

Flow Coefficients / Limiting Stem Input Torque (reduced bore)

Valve Size		Flow Coefficients		Equivalent Length of pipe		Limiting Stem Input torque Nm	
mm	in	Cv	Kv	Feet	Metres	316S16	17/4pH
8-15	¼-½	8.3	7.2	1.8	0.58	13.2	90
20	¾	13.6	11.8	5.5	1.67		
25	1	37.5	32.6	3	0.91	24.4	165
32	1¼	57	49.3	3.1	0.94		
40	1½	79.7	69.1	3.9	1.19	48.6	268
50	2	106	91.8	7.5	2.28		
65	2½	188	163	150	1.52	192	1187
80	3	435	377	7	2.13	336	1677
100	4	638	553	27	8.21	620	3540
150	6	675	585	41	12.47	1138	7758

Notes:

1. When wrench is not fitted the flats on the stem, when parallel to the pipeline axis, denote ball open
2. All 44/59 weld end valves are assembled with Buna O-ring body seals with the correct body seals supplied loose. See IOM
3. For temperatures below -50 °C consult Flowserve
4. Alternative materials are available on request. These include NAB, Duplex, Monel, Hastelloy, 254 SMO for either body, connector, ball or stem
5. Valves containing PEEK, Delrin, or Metal seats are fitted with 17/4-PH stems as standard

Product Coding

Series A44/A59

A		B			C			D				E		F						G				H
Size		Standard Variant			Series		–	Body	End	Ball	Stem	Seat	Seal	End 1			End 2			Special				Revision
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

A - Size Digits 1, 2		B - Std Variant Digits 3, 4, 5		C - Series Digits 6, 7		D - Main Parts Digits 9,10,11,12		E - Seat and Seals Digits 13,14,15,16,17		F - End Connector Variants Digits 18, 19, 20		G - Special Build Digits 21, 22, 23, 24		H - Revision Digit 25
¼"	08mm 02	Antistatic	A	44 Series	44	Brass	1	PEEK	A	Screwed NPT	SEN	Vacuum	PO43	Denotes the revision of the product
⅜"	10mm 03			59 Series	59	Carbon St.	4	Buna	B	Screwed BSPT	SET	Oxygen	Q822	
½"	15mm 05					Stainless St.	6	EPDM	E	Screwed BSPP	SEP	Tobacco	P669	
¾"	20mm 07					Special	M	Metal Gamma	G	Socket Weld Schedule 40	SWA	Ammonia	Q797	
1"	25mm 10							25% Glass PTFE	H	Socket Weld Schedule 80	SWC	Press. Relief Ball	Q190	
1¼"	32mm 12							Metal Alpha	N	Butt Weld Schedule 5	BW5	Std. de-grease	P854	
1½"	40mm 15							Fluorofill	P	Butt Weld Schedule 10	BWE	Shrouded seats	P225	
2"	50mm 20							15% Glass PTFE	R	Butt Weld Schedule 40	BWA	O-Ring build	P882	
								Virgin PTFE	T	Butt Weld Schedule 80	BWC			
								UHMWPE	U		BWG			
								Viton	V		BWK			
								PolyPeek	X		BWM			
								Delrin	Y					

Series A459/A599

A		B			C			D				E		F						G				H
Size		Standard Variant			Series			–	Body and End	Ball	Stem	Seat	Body Seal	Thrust Seal	Stem Seal	Gland Packing	End			Special				Revision
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

A - Size Digits 1, 2		B - Std Variant Digits 3, 4, 5		C - Series Digits 6, 7, 8		D - Main Parts Digits 10, 11, 12		E - Seat and Seals Digits 13,14,15,16, 17		F - End Connector Variants Digits 18, 19, 20		G - Special Build Digits 21, 22, 23, 24		H - Revision Digit 25
2"	50mm 20	Antistatic	A	459 Series	459	Carbon St.	5	PEEK	A	Screwed NPT	SEN	Vacuum	PO43	Denotes the revision of the product
2½"	65mm 25			599 Series	599	Stainless St.	6	Buna	B	Screwed BSPT	SET	Oxygen	Q822	
3"	80mm 30					Special	M	35% Carbon PTFE	C	Screwed BSPP	SEP	Tobacco	P669	
4"	100mm 40							EPDM	E	Socket Weld Schedule 40	SWA	Ammonia	Q797	
6"	150mm 60							Metal Gamma	G	Socket Weld Schedule 80	SWC	Press. Relief Ball	Q190	
								25% Glass PTFE	H	Butt Weld Schedule 5	BW5	Std. de-grease	P854	
								Metal Alpha	N	Butt Weld Schedule 10	BWE	Shrouded seats	P225	
								Fluorofill	P	Butt Weld Schedule 40	BWA	O-Ring build	P882	
								15% Glass PTFE	R	Butt Weld Schedule 80	BWC			
								Virgin PTFE	T		BWG			
								UHMWPE	U		BWK			
								Viton	V		BWM			
								PolyPeek	X					
								Delrin	Y					
								Graphite	Z					
								25% Glass PTFE	7					

Ancillaries

Flowserve can supply a range of ancillary equipment such as lockable wrenches, stem extensions, spring return handles etc.

FLOWSERVE



Flowserve Flow Control (UK)
Burrell Road
Haywards Heath
West Sussex United Kingdom RH16 1TL
Phone: +44 1444 314400
Fax: +44 1444 314401

Contact:

For more information about Flowserve Corporation, visit www.flowserve.com or call USA 1 800 225 6989

FCD WCENBR0003-02-A4 04/16

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C63-AQU-QIX-002 458 / 917

FLOWSERVE

EU DECLARATION OF CONFORMITY
WORCESTER VALVES

CE

The Technical Authority & Manufacturer,

Flowserve Flow Control GB,
Burrell Road, Haywards Heath
West Sussex, RH16 1TL, United Kingdom

Declares that the construction, manufacturing and testing of the following pressure equipment:

Product Series	13, 14, 18, 19, 22, 44, 459, 51, 52, 53, 54, 55, 56, 59, 599, 519, 529, 81, 819, 829, 859, 911
Variants	A, B, C, E, F, K, V
Type Of Equipment	Pressure Accessory, Group 1 Gas, Category III, as per Pressure Equipment Directive 2014/68/EU

is in accordance with the following EU Directives:

1. Pressure Equipment Directive 2014/68/EU

Size Range	DN32 – DN250
Pressure Rating	Flanged Valves – As per pressure classes: CL150, 300, 600; PN10, 16, 25, 40; BS10 Tables D, E, F, H 3-Piece Valves – PN102 (DN32 – DN50 Reduced Bore/DN32 – DN40 Full Bore), PN69 (DN65 Reduced Bore/DN50 Full Bore), PN50 (DN80 Reduced Bore and above/DN65 Full Bore and above)
Conformity Assessment Module	Conformity based on full quality assurance module 'H'. Certificate Number: CE 54844
Notified Body	**BSI** (Notified Body Reference Number: 0086) Kitemark Court, Davy Avenue, Milton Keynes, MK5 8PP, United Kingdom
References	BS EN ISO 9001:2008 Quality Management System: Requirements BS ISO 5351:1986 BS EN ISO 10497:2010 BS EN 1092-1:2007 + A1:2013, BS EN 12266-1:2012 BS EN 12516-3:2002, 2015 ASME BPVC Section VIII, Division 1 & 2 2015 ASME BPVC Section II, Part A, B & C 2015 ASME BPVC Section IX 2013 ASME B16.34

NOTE: All valves sized DN25 and below have been designed using the same analytical techniques referenced above, although they do not bear the CE mark as the PED does not apply.

2. ATEX Directive 2014/34/EU

Size Range	DN8 – DN300
Equipment Marking	Ⓔx **II 2 GD c IIA X**
Product Classification	Equipment Group **II**, Category **2**, Gas Zones **1** & **2** and Dust Zones **21** & **22** – **GD**, Protection **c** – constructional safety, Explosion Group **IIA**, Temperature Class **X** – Media temperature restricted
Control of Internal Production Compliance	BS EN ISO 9001:2008 BSI Certificate of Registration: FM 00707
Notified Body	**Element Materials Technology** Unit 1, Pendle Place, Skelmersdale, WN8 9PN, United Kingdom
References	BS EN 1127-1:2011, BS EN 13463-1:2009, BS EN 13463-5:2011, BS EN ISO 4414:2010, BS EN ISO 12100:2010

Authorised person for the Manufacturer within the European Union:

Signature: P Warbey

Name: Dr. Paul Warbey
Title: Engineering Manager

Date of Issue: 20th Nov 2017
Place of Issue: Haywards Heath, United Kingdom

Manufacturer's Declaration

Manufacturer's name :	Hy-Lok CORPORATION
Manufacturer's address:	97, Noksansandan 27-ro, Gangseo-Gu Busan, 618-817 Korea
Description of product:	Plug Valve Data Sheet: H-P100
Applied EU directive:	2014/34/EU Equipment intended for use in potentially explosive atmospheres
Applied standards:	EN 1127-1: 1997 Explosive atmospheres EN 13463-1: 2001 Non-electrical equipment for potentially explosive atmospheres

Plug valves are manufactured in accordance with ISO 9001 Quality System and appropriate National and International product standards.

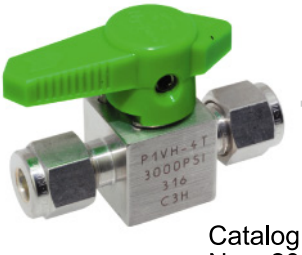
Accordingly to a performed assessment of Hy-Lok Corporation we have determined that the product mentioned above does not have any own potential source of ignition. As such the product is not covered by the Directive 2014/34/EU, must not be CE marked and must be used within the scope of intended use only as described in the data sheet and the operating and maintenance instructions.

Important note:
The valves must be hooked up into the piping/tubing system in electrically conducting manner to ensure proper grounding. Since some valves are provided with non-conductive handles, special
System design must be considered if the use of the product is intended in hazardous areas (particular zones), environments, or use with certain system fluids. Stem grounding and Conductive bar handles are available as an option. The environmental neighbourhood was not subject to Hy-Lok's assessment. This assessment is within the responsibility of the plants owner, designer, commissioner or user.

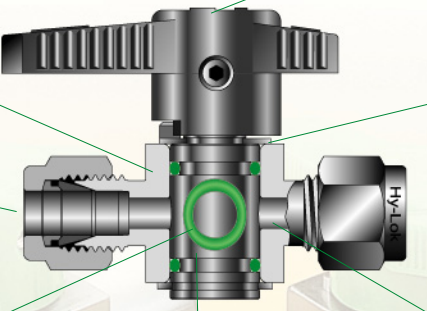
This declaration does not pertain to atmospheres outside of the scope of its validity, such as oxygen enriched atmospheres. When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation and maintenance are the responsibilities of the system designer and user.

Hy-Lok P Series

Plug Valves



Catalog No. H-P100
Nov. 2013



Rugged Body
• is machined from bar stock

Handle with Arrow
• indicates flow direction.
• allows quick operation with 1/4 turn.
• requires minimum torque.
• is available in Black(standard) and colored nylon(option).

Stainless Steel Retaining Ring
• installed in both top & bottom.
• prevents plug blow out.

Variety of End Connections
• include Hy-Lok tube fittings, Male & Female ISO theads, Male & Female NPT.

Orifice for Cv 1.4 to 7.0
• is maximized for minimum pressure drop.

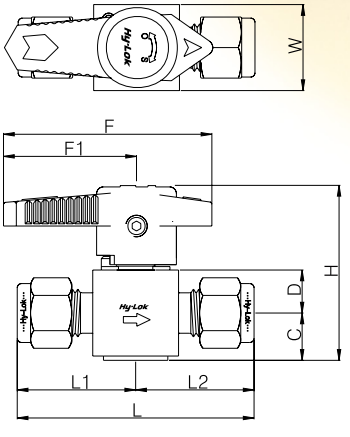
PTFE Coated Viton Seal
• is used for maximum service life.
• is replaceable.

PTFE Coated Plug
• is replaceable.
• has throtting function.

Features

- **Pressure rating** up to 3000psig(206 bar) @70°F(21°C)
- **Temperature rating** from -10°F to 400°F(-23°C to 204°C) with PTFE coated Viton Seal
- **Small and compact design**
- **Easy maintenance and cleaning**
- **Sizes** available up to 1/2" tube and pipe
- **Body materials** available in 316 stainless steel and brass
- **100% factory tested**

Table of Dimensions



Basic Part No.		Plug Orifice in (mm)	Cv	End Connection	Dimensions								
Series	Part No.			Inlet / Outlet	L	L_1	L_2	C	D	H	F	F_1	W
P1V	H - 2T	0.172 (4.4)	0.2	1/8 Hy-Lok	50.6	25.3	25.3	12.5	10	41.5	47	30	20
	M - 2N		1.0	1/8 Male NPT	39.4	19.7	19.7						
	F - 2N			1/8 Female NPT	45.2	22.6	22.6						
	H - 4T		1.4	1/4 Hy-Lok	55.2	27.6	27.6						
	MH- 4N4T			1/4 Male NPT / 1/4 Hy-Lok	51.8	24.2	27.6						
	M - 4N		0.9	1/4 Male NPT	48.4	24.2	24.2						
	F - 4N			1/4 Female NPT	53.0	26.5	26.5						
	F - 4R			1/4 Female ISO Tapered	56.0	28.0	28.0						
	MF - 4N			1/4 Male / 1/4 Female NPT	50.7	24.2	26.5						
	H - 6M		1.4	6mm Hy-Lok	55.4	27.7	27.7						
P2V	F - 4N	0.281 (7.2)	3.6	1/4 Female NPT	60.4	30.2	30.2	17.5	15	57.5	64	39	30
	H - 6T		7.0	3/8 Hy-Lok	68.4	34.2	34.2						
	H - 8T		4.0	1/2 Hy-Lok	74.0	37.0	37.0						
	M - 8N		2.3	1/2 Male NPT	68.2	34.1	34.1						
	F - 8N			1/2 Female NPT	73.2	36.6	36.6						
	F - 8R			1/2 Female ISO Tapered	79.8	39.9	39.9						
	H - 10M		5.7	10mm Hy-Lok	68.6	34.3	34.3						
	H - 12M		4.3	12mm Hy-Lok	74.2	37.1	37.1						

All dimensions in millimeters. Dimensions shown with Hy-Lok nuts in finger-tight position, where applicable.

HY-LOK CORPORATION

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Plug Valves — P Series

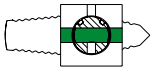
Material of Construction

Description	Material/ASTM Specification	
	316 Stainless Steel	Brass
Handle	Black Nylon Standard	
Pin	Stainless Steel	
Retaining Ring		
Plug	TP 316 / A479	Brass
	with PTFE Coated	
O-ring	FKM Standard	
Body	TP 316 / A479	Brass

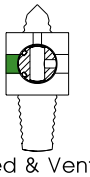
Pressure / Temperature Rating

Series	Materials	Pressure Rating @70°F(21°C)	Temperature Rating
P1V	SS316 & Brass	3000 psig (206 bar)	-10°F to 400°F (-23°C to 204°C) with PTFE coated Viton Seal.
P2V	SS316	3000 psig (206 bar)	
	Brass	2000 psig (137 bar)	

Downstream Vent



Open Condition



Closed & Vent Condition

Testing

Every Valve is factory tested for shut off at 600psig(41 bar)

Flow Rate

Ordering Number		Cv	Pressure drop Atmosphere(△p)psi					
			Air std ft³/min. 70°F(21°C)			Water U.S. gal/min. @70°F(21°C)		
Series	Part. No.		10	50	100	10	50	100
P1V	H - 2T	0.2	2.26	6.00	10.64	0.63	1.41	2.00
	M - 2N	1.0	11.30	30.01	53.20	3.16	7.07	10.00
	F - 2N		11.30	30.01	53.20	3.16	7.07	10.00
	H - 4T	1.4	15.82	42.01	74.48	4.43	9.90	14.00
	MH- 4N4T		15.82	42.01	74.48	4.43	9.90	14.00
	M - 4N	0.9	10.17	27.01	47.88	2.85	6.36	9.00
	F - 4N		10.17	27.01	47.88	2.85	6.36	9.00
	F - 4R		10.17	27.01	47.88	2.85	6.36	9.00
	MF - 4N		10.17	27.01	47.88	2.85	6.36	9.00
	H - 6M	1.4	25.99	69.02	122.36	7.27	16.26	23.00

Ordering Number		Cv	Pressure drop Atmosphere(△p)psi					
			Air std ft³/min. 70°F(21°C)			Water U.S. gal/min. @70°F(21°C)		
Series	Part. No.		10	50	100	10	50	100
P2V	F - 4N	3.6	40.68	108.03	191.51	11.38	25.46	36.00
	H - 6T	7.0	79.09	210.6	372.39	22.14	49.50	70.00
	H - 8T	4.0	45.20	120.03	212.79	12.65	28.28	40.00
	M - 8N	2.3	25.99	69.02	122.36	7.27	16.26	23.00
	F - 8N		25.99	69.02	122.36	7.27	16.26	23.00
	F - 8R		25.99	69.02	122.36	7.27	16.26	23.00
	H -10M	5.7	64.40	171.06	303.23	18.02	40.31	57.00
	H -12M	4.3	48.59	129.03	228.75	13.60	30.41	43.00

Ordering Information

P1V — MH — 4N — 4T — DV — B — S316

Series Designator
- P1V - 4.4mm Orifice
- P2V - 7.2mm Orifice

End Connection Designator
- H - Hy-Lok Tube Fitting
- M - Male Pipe Thread
- F - Female Pipe Thread
- MF - Male Pipe Thread & Female Pipe Thread
- MH - Male Pipe Thread & Hy-Lok Tube Fitting

4N: Inlet — 4T: Outlet

Size Designator

- Pipe Thread Designation NPT (ISO / BSP)

Nom. Size	1/4	3/8	1/2
Designation	4N(R)	6N(R)	8N(R)

- Tube O.D. Designation

Inch Tube	Tube O.D.	1/4	3/8	1/2
	Designation	4	6	8
Metric Tube	Tube	6mm	10mm	12mm
	Designation	6M	10M	12M

Vent Port Option *
- Nil - Without (Standard)
- DV - Downstream Vent

Handle Color Designator *
- Nil - Black(Standard)
- B - Blue
- G - Green
- R - Red
- Y - Yellow

Material Designator
- S316 - 316 Stainless Steel
- BRAS - Brass

NOTE * : No designator is required for standard. e.g. P1V - 4T - S316

03 - INSTRUMENTS AND ELECTICAL EQUIPMENT DATA SHEETS & CERTIFICATES

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres Directive 94/9/EC**

(1) # EC-TYPE EXAMINATION CERTIFICATE

(3) Number of the EC type examination certificate: **INERIS 12ATEX0030X**

(4) Equipment or protective system:

ELECTRO-PNEUMATIC POSTIONER TYPE EPL/EPR...

(5) Manufacturer: **POWER-GENEX Ltd.**

(6) Address: 44B9L, 434-9, Nonhyun-Dong, Namdong-Gui
Incheon, 405-848 KOREA

(7) This equipment or protective system and any other acceptable alternative of this one are described in the annex of this certificate and the descriptive documents quoted in this annex.

(8) INERIS, notified body and identified under number 0080, in accordance with article 9 of Council Directive 94/9/EC of the 23rd March 1994, certifies that this equipment or protective system fulfils the Essential of Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, described in annex II of the Directive.

The examinations and the tests are consigned in report No 026098/12.

(9) The respect of the Essential Health and Safety Requirements is ensured by:

- conformity with:

EN 60079-0	:	2009
EN 60079-11	:	2007
EN 13463-1	:	2009
EN 13463-5	:	2010

- specific solutions adopted by the manufacturer to meet the Essential Health and Safety Requirements described in the descriptive documents.

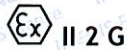
Only the entire document including annexes may be reprinted. IM1337AC

Parc Technologique Alata BP 2 F-60550 Verneuil-en-Halatte
tél + 33(0)3 44 55 66 77 fax + 33(0)3 44 55 66 99 internet www.ineris.fr
Institut national de l'environnement industriel et des risques
Etablissement public à caractère industriel et commercial - RCS Senlis B 381 984 921 - Siret 381 984 921 00019 - APE 7120B

(10) Sign X, when it is placed following the Number of the EC type examination certificate, indicates that this equipment and protective system is subjected to the special conditions for safe use, mentioned in the annex of this certificate.

(11) This EC type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system, these are not covered by this certificate.

(12) The marking of the equipment or the protective system will have to contain:



Verneuil-en-Halatte, 2012.07.18



Director of the Certifying Body,
By delegation
T. HOUEIX
Certification Officer
Certification Division

(13) # ANNEX

(14) EC TYPE EXAMINATION CERTIFICATE N°INERIS 12ATEX0030X

(15) DESCRIPTION OF THE EQUIPMENT OR THE PROTECTIVE SYSTEM

Electro-Pneumatic Positioner is a valve control device made in Aluminum and protected by intrinsic security "Ex i" and constructional safety "c" for the mechanical part.

The equipment comprises the following major parts:

- Torque motor with 4-20 mA input signal
- Pilot Valve
- Gauge
- Dome indicator (only for EPR)

The equipment gets the protection degrees IP66 according to EN 60529.

PARAMETERS RELATING TO THE SAFETY

Ui : 28V
Ii : 100mA
Pi : 1W
Ci = 0
Li = 2µH

MARKING

Marking has to be readable and indelible; it has to include the following indications:

POWER-GENEX Ltd.
Incheon, 405-848 KOREA
EPL/EPR...(*)
INERIS 12ATEX0030X
(Serial number)
(Year of construction)
Ⓔx II 2 G
Ex ia IIC T6 Ga
c IIC T6
T.Amb : -20°C to + 70°C

WARNING : POTENTIAL ELECROSTATIC CHARGING HAZARD - SEE INTRUCTIONS

WARNING : POTENTIAL ELECROSTATIC CHARGING HAZARD - SEE INTRUCTIONS

(*) The dots are replaced by a codification according to the manufacturing variations. The different types are indicated in the descriptive documents.

Marking may be carried out in the language of the country of use.

The protective system or equipment has also to carry the marking normally stipulated by its construction standards.

ROUTINE EXAMINATIONS AND TESTS

None.

(16) DESCRIPTIVE DOCUMENTS

The descriptive document quoted hereafter constitutes the technical documentation of the equipment, subject of this certificate.

- Certification file EPL/EPR dated and signed on 2011.08.30

(17) SPECIAL CONDITIONS FOR SAFE USE

For the risk of electrostatic discharge, the user will have to read the instructions.

(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

The respect of the Essential Health and Safety Requirements is ensured by:

- Conformity to the standards quoted in clause (9).
- All provisions adopted by the manufacturer and defined in the descriptive documents.

Electro-Pneumatic Positioner

EPL



Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

Features

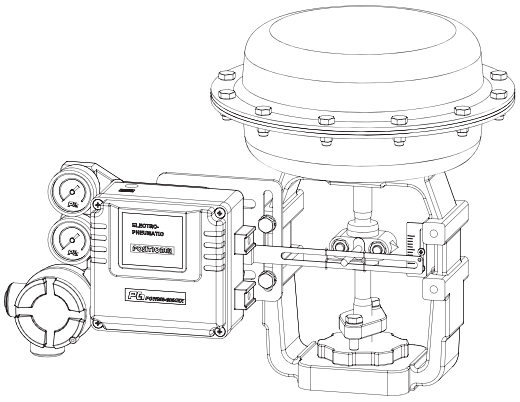
- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included
- KC-certified flameproof Ex dmb IIB+H_2 T6
- NEPSI-certified flameproof Ex dmb IIB+H_2 T6
- IECEx-certified flameproof Ex dmb IIC T6/T5
- ATEX / TR-CU-certified flameproof Ex dmb IIC T6/T5
- KC-certified flameproof Ex dmb IIC T6/T5
- IECEx-certified intrinsically safe Ex ia IIC T6
- ATEX / TR-CU-certified flameproof Ex ia IIC T6
- KC-certified intrinsically safe Ex ia IIC T6

Specifications

	EPL	
	Linear Type (Lever Feedback)	
	Single	Double
Input Signal	4~20 mA DC (Note. 1)	
Input Resistance	235±15Ω	
Air Supply	Max. 7.0 bar (100 psi) free of oil, water, and moisture	
Standard Stroke	10~80mm (Note. 2)	
Pneumatic Connections	PT(Rc) 1/4 or NPT 1/4	
Electrical Connections	PF(G) 1/2 or NPT 1/2	
Protection Class	Ex dmb IIB+H_2 T6 / Ex dmb IIC T6/T5 Ex ia IIC T6 / IP66	
Ambient Temperature	-20 ~ +70℃ (Note. 3)	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ±1.0 % F.S	Within ±1.5 % F.S
Sensitivity	Within ±0.2 % F.S	Within ±0.5 % F.S
Hysteresis	Within 1.0 % F.S	
Repeatability	Within ±0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 kgf/㎠)	
Flow Capacity	80 LPM (Sup. 1.4 kgf/㎠)	
Material	Aluminum die-cast	
Weight	3.3 kg (with terminal box) 3.0 kg (without terminal box)	

Options

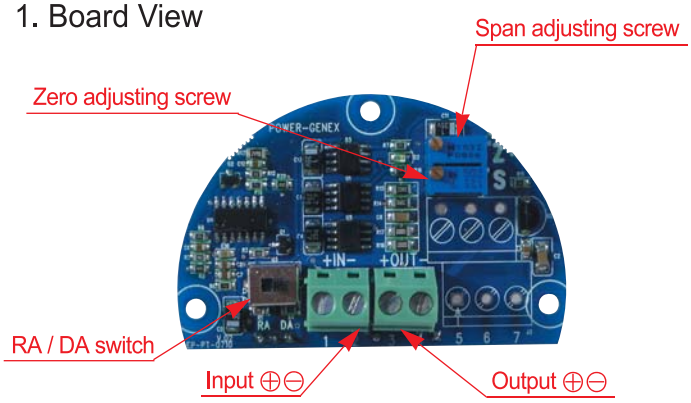
- Position transmitter (4...20 mA ouput signal)
- High temperature (+120℃)
- Low temperature (-40℃)



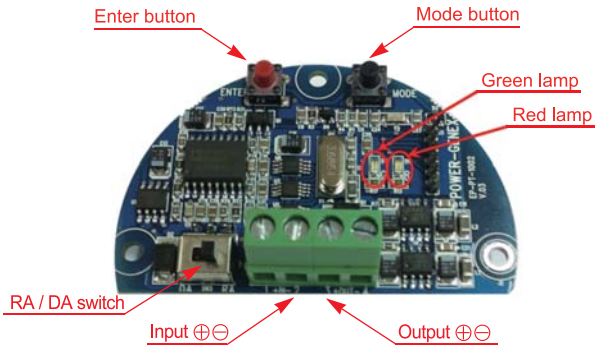
Note : 1) 1/2 spilt range is available for 4~12mA input signal or 12~20mA input signal
2) Feedback lever can be extended to stroke 80 ~ 150mm
3) Temperature option : up to +120℃ without feedback options
up to +85℃ with feedback options
up to -40℃ without feedback options

Position Transmitter Options (Built-in Type)

1. Board View

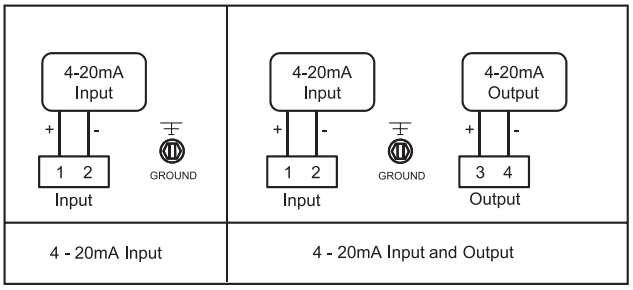


< Analog Position Transmitter >



< Smart Position Transmitter >
(Zero / Span Auto Setting)

3. Wiring Diagram

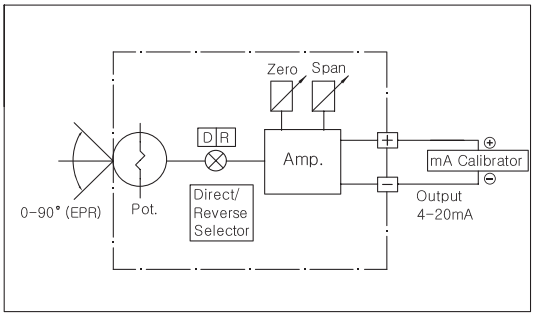


2. Position Transmitter (4-20mA output signal)

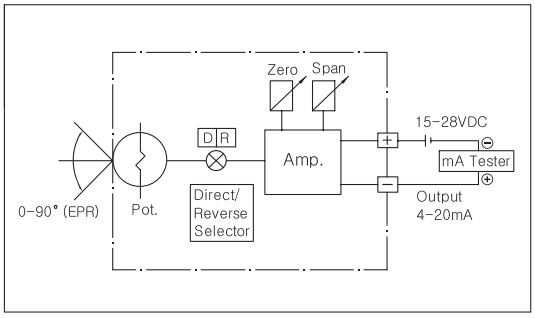
a. Specifications

Power Supply Rating	5.5 - 30 VDC loop power
Recommended Power Supply	24 VDC
Output Signal	4 - 20 mA, 2-wire
Operating Temperature	-20℃ ~ +85℃
Load Impedance	0 ~ 600 ohms
Max. Output	30 mA DC
Linearity	±1.0 %
Hysteresis	1.0 % of full scale
Repeatability	±0.5 % of full scale
Adjustment	Zero and Span in terminal box

b. with mA calibrator

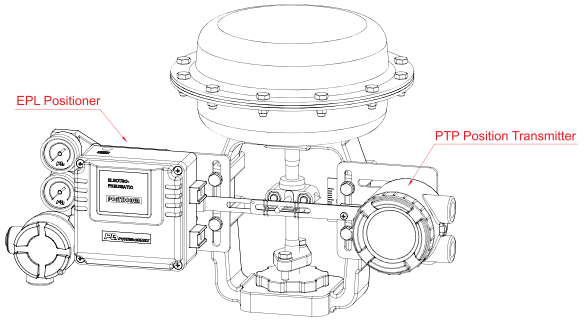


c. with multimeter

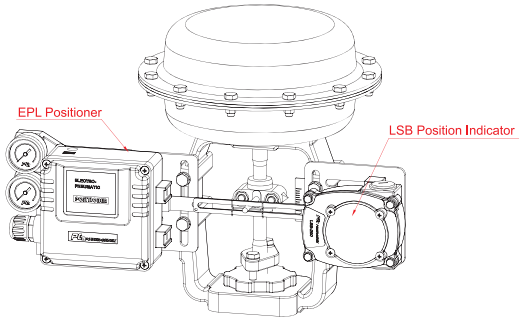


Application for Limit Switches (External Type)

1) With explosion proof PTP-L

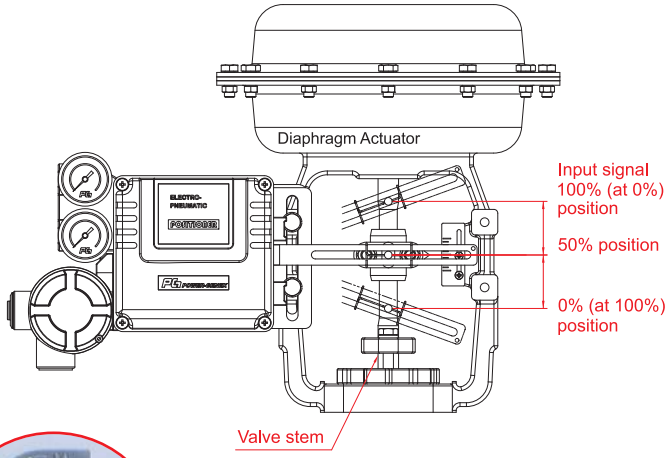


2) With non-explosion proof LSB-200

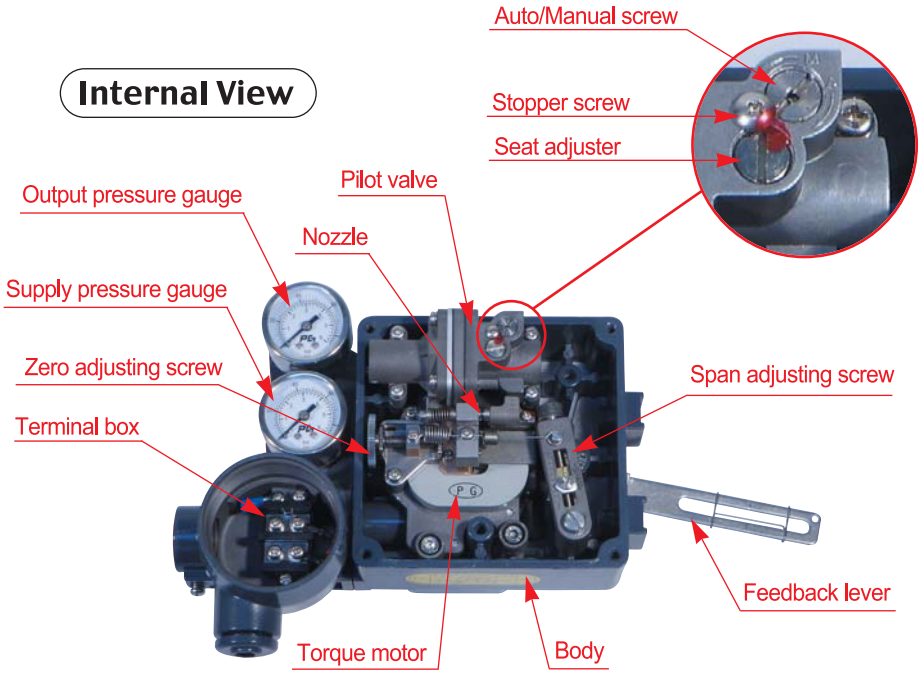


Mounting

1. Install the EPL positioner so that the angle between the valve stem and the feedback lever can be 90° at 12mA input signal (50%) as shown to the right.
2. The operating angle of the EPL feedback lever is minimum 10° to maximum 30°.

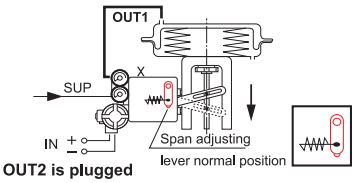
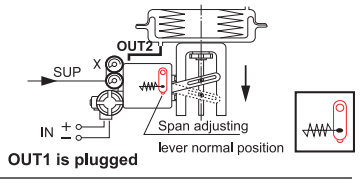
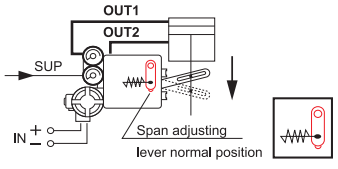


Internal View

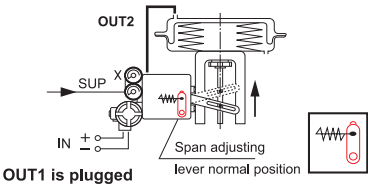
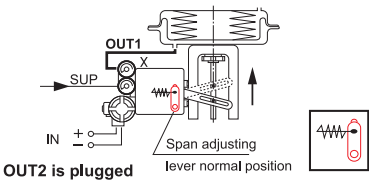
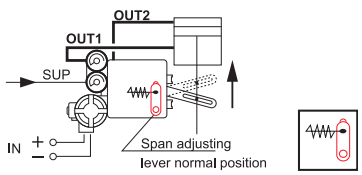


Air Connections

Direct Acting (DA)

As the input signal increases, Valve stem moves downwards Actuator : **DA** Connection : out 1	
As the input signal increases, Valve stem moves downwards Actuator : **DA** Connection : out 2	
As the input signal increases, Valve stem moves downwards	

Reverse Acting (RA)

As the input signal increases, Valve stem moves upwards Actuator : **RA** Connection : out 2	
As the input signal increases, Valve stem moves upwards Actuator : **RA** Connection : out 1	
As the input signal increases, Valve stem moves upwards	

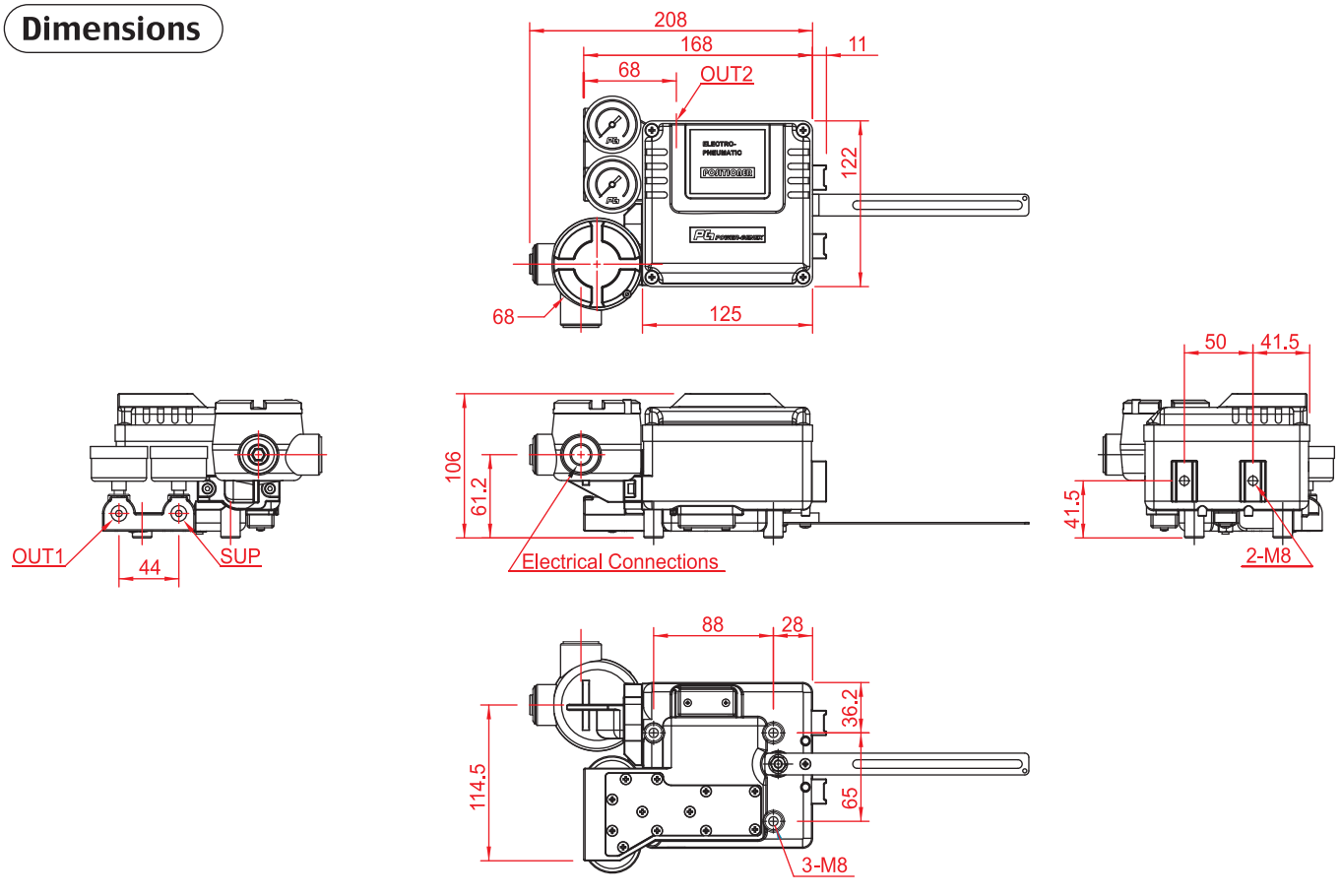
How to Order

EPL — | Protection Class | Feedback Lever | Pressure Gauge (SUP. OUT) | Pilot Valve Orifice | Position Feedback | Connection Threads | Operating Temp. | Mounting Bracket |

Description	Code
Protection Class :	F : KC / NEPSI flameproof Ex dmb IIB+H_2 T6 A : KC flameproof Ex dmb IIC T6/T5 D : IECEx / ATEX / TR-CU flameproof Ex dmb IIC T6/T5 I : IECEx / ATEX / TR-CU / KC intrinsically safe Ex ia IIC T6 W : Weatherproof to IP66
Feedback Lever :	A : Stroke 10 ~ 40mm B : Stroke 10 ~ 80mm C : Stroke 80 ~ 150mm
Presure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Pilot Valve Orifice :	S : Standard(Actuator volume over 180㎤) M : Small orifice (φ1.0 or φ0.7) (Actuator volume over 90 ~180㎤)

Description	Code
Position Feedback : (only for weatherproof type)	N : None (standard) O : Analog position transmitter (4 ~ 20mA output signal) S : Smart position transmitter (4 ~ 20mA output signal)
Connection Threads : (pneumatic - electrical)	3 : PT(Rc) 1/4 - PF(G) 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : PT(Rc) 1/4 - M20 x 1.5
Operating Temperature : (only for weatherproof type)	T : 70℃(standard) H : 120℃(without position feedback option) 85℃(with position feedback option) L : - 40℃(without position feedback option)
Mounting Bracket :	N : None L : IEC 60534-6-1

Dimensions







Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

Features

- Easy maintenance
- Precise calibration with simple SPAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- 1/2 split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design
- Stainless steel gauges standard
- Restricted pilot valve orifice kit for small actuators included
- KC-certified flameproof Ex dmb IIB+H_2 T6
- NEPSI-certified flameproof Ex dmb IIB+H_2 T6
- IECEx / KC-certified flameproof Ex dmb IIC T6/T5
- ATEX / TR-CU-certified flameproof Ex dmb IIC T6/T5
- IECEx / KC-certified intrinsically safe Ex ia IIC T6
- ATEX / TR-CU-certified flameproof Ex ia IIC T6

Options

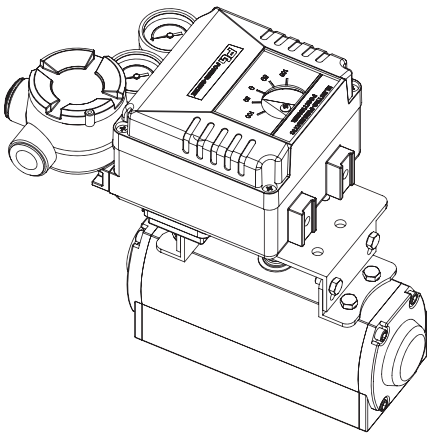
- Position transmitter (4...20 mA output signal)
- 2 x SPDT limit switch
- 2 x P&F proximity sensor NJ2-V3-N
- Visual dome indicator
- High temperature (+120℃)
- Low temperature (-40℃)

Specifications

	EPR	
	Rotary Type (Cam Feedback)	
	Single	Double
Input Signal	4~20 mA DC (Note. 1)	
Input Resistance	235±15Ω	
Air Supply	Max. 7.0 bar (100 psi) free of oil, water, and moisture	
Operating Angle	60~100° (Note. 2)	
Pneumatic Connections	PT(Rc) 1/4 or NPT 1/4	
Electrical Connections	PF(G) 1/2 or NPT 1/2	
Protection Class	Ex dmb IIB+H_2 T6 / Ex dmb IIC T6/T5 Ex ia IIC T6 / IP66	
Ambient Temperature	-20 ~ +70℃ (Note. 3)	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ±1.0 % F.S	Within ±1.5 % F.S
Sensitivity	Within ±0.5 % F.S	
Hysteresis	Within 1.0 % F.S	
Repeatability	Within ±0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 kgf/㎠)	
Flow Capacity	80 LPM (Sup. 1.4 kgf/㎠)	
Material	Aluminum die-cast	
Weight	3.5 kg (with terminal box) 3.2 kg (without terminal box)	

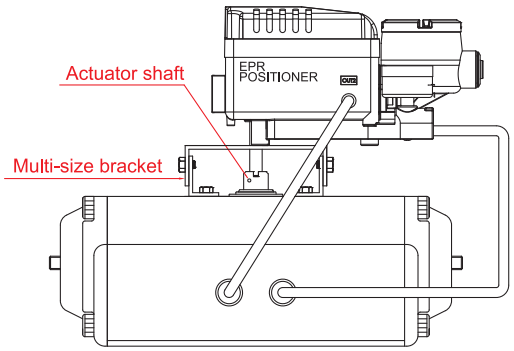


With Dome Indicator



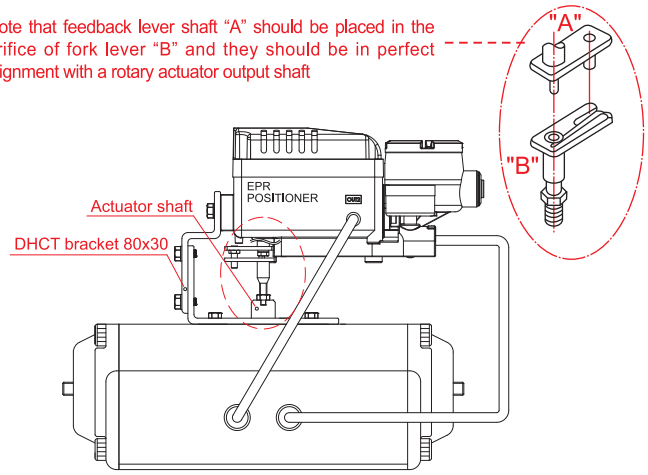
Note : 1) 1/2 spilt range is available for 4~12mA input signal or 12~20mA input signal
2) Operating angle can be adjusted to 0~60° or 0~100°
3) Temperature option : up to +120℃ without feedback options
up to +85℃ with feedback options
up to -40℃ without feedback options

Mounting



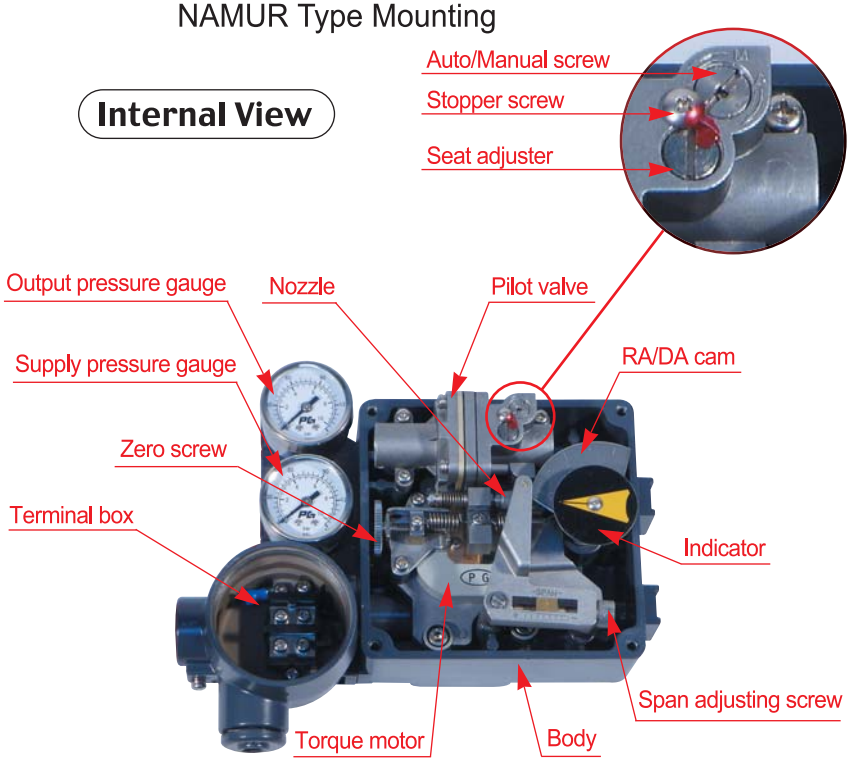
NAMUR Type Mounting

Note that feedback lever shaft "A" should be placed in the orifice of fork lever "B" and they should be in perfect alignment with a rotary actuator output shaft



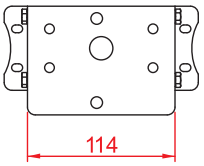
Fork Lever Type Mounting

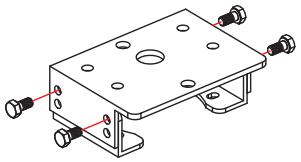
Internal View



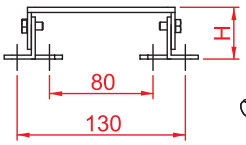
Multi-size Bracket

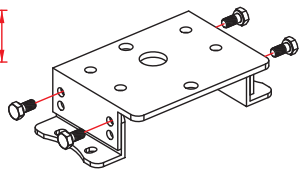
TYPE	H
80 x 30 x 20H	41
80 x 30 x 30H	51
130 x 30 x 20H	41
130 x 30 x 30H	51
130 x 30 x 50H	71





80x30x20H, 30H

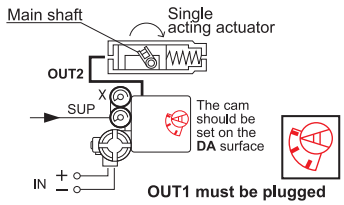
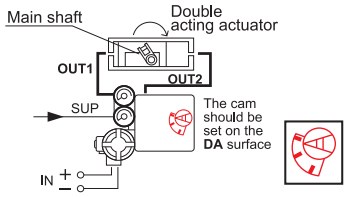




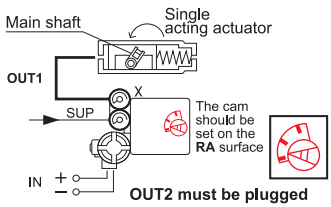
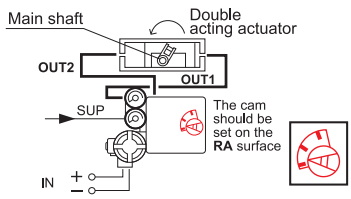
80x30x20H, 30H, 50H

Air Connections

Direct Acting (DA)

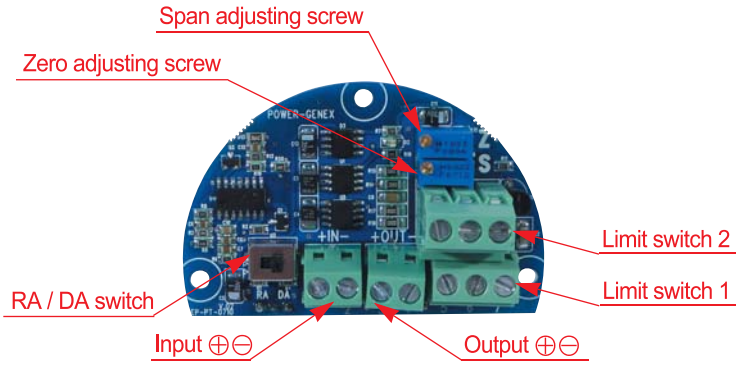
As the input signal increases, Actuator stem rotates clockwise.	
As the input signal increases, Actuator stem rotates clockwise.	

Reverse Acting (RA)

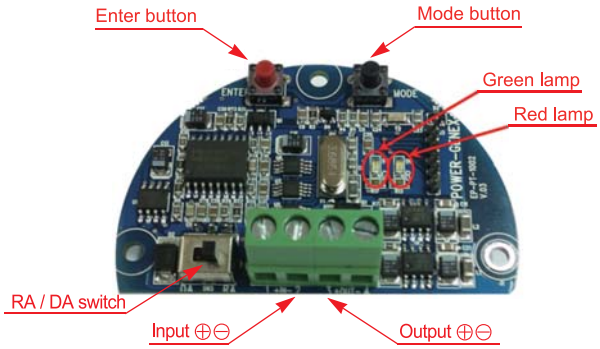
As the input signal increases, Actuator stem rotates counter clockwise.	
As the input signal increases, Actuator stem rotates counter clockwise.	

Position Transmitter Options (Built-in Type)

1. Board View

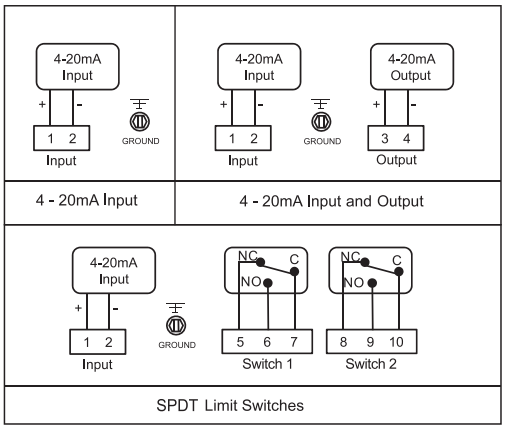


< Analog Position Transmitter & Limit Switches >



< Smart Position Transmitter >
(Zero / Span Auto Setting)

3. Wiring Diagram



4. SPDT Limit Switches

a. Specifications

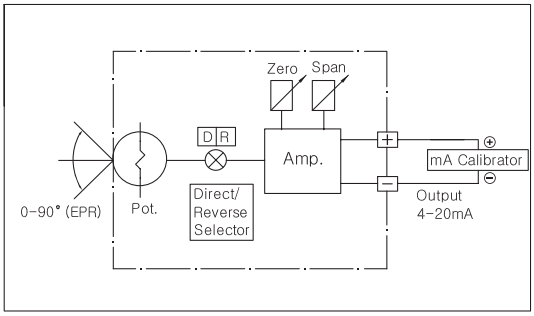
Contacts	SPDT Form C
AC Rating	16 A 1/2 HP 125/250 VAC
DC Rating	0.6 A 125 VDC / 0.3 A 250 VDC
Adjustment	Cams with set screws (L-wrench included for setting)

2. Position Transmitter (4-20mA output signal)

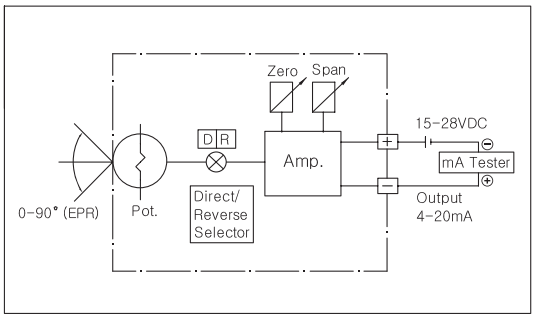
a. Specifications

Power Supply Rating	5.5 - 30 VDC loop power
Recommended Power Supply	24 VDC
Output Signal	4 - 20 mA, 2-wire
Operating Temperature	-20℃ ~ +85℃
Load Impedance	0 ~ 600 ohms
Max. Output	30 mA DC
Linearity	±1.0 %
Hysteresis	1.0 % of full scale
Repeatability	±0.5 % of full scale
Adjustment	Zero and Span in terminal box

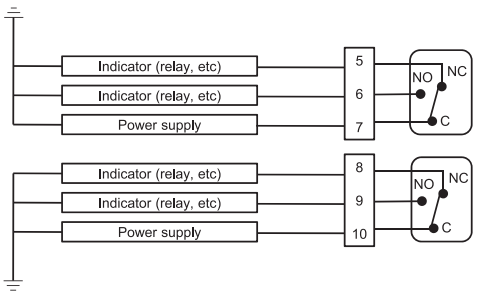
b. with mA calibrator



c. with multimeter



b. Wiring and Application



How to Order

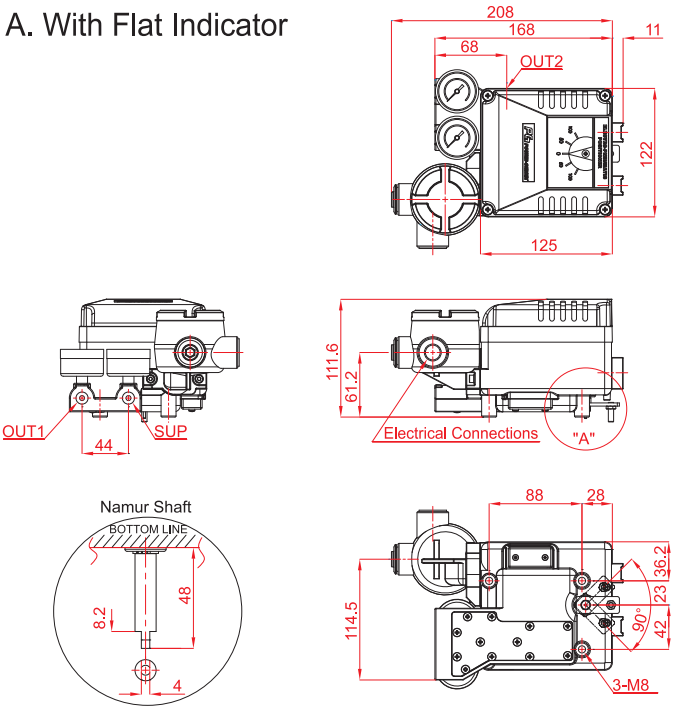
EPR— | Protection Class | Feedback Shaft | Pressure Gauge (SUP. OUT) | Pilot Valve Orifice | Position Feedback | Connection Threads | Dome Indicator | Operating Temp. | Mounting Bracket

Description	Code
Protection Class :	F : KC / NEPSI flameproof Ex dmb IIB+H_2 T6 A : KC flameproof Ex dmb IIC T6/T5 D : IECEx / ATEX / TR-CU flameproof Ex dmb IIC T6/T5 I : IECEx / ATEX / TR-CU / KC intrinsically safe Ex ia IIC T6 W : Weatherproof to IP66
Feedback Shaft :	N : NAMUR shaft (direct mounting) A : Fork lever M6 x 40L B : Fork lever other size on request
Presure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Pilot Valve Orifice :	S : Standard(Actuator volume over 180㎤) M : Small orifice (φ1.0 or φ0.7) (Actuator volume over 90 ~180㎤)
Position Feedback : (only for weatherproof type)	N : None (standard) O : Analog position transmitter (4 ~ 20mA output signal) S : Smart position transmitter (4 ~ 20mA output signal) L : 2 x SPDT limit switch P : 2 x proximity sensor P&F NJ2-V3-N M : O + L Q : O + P

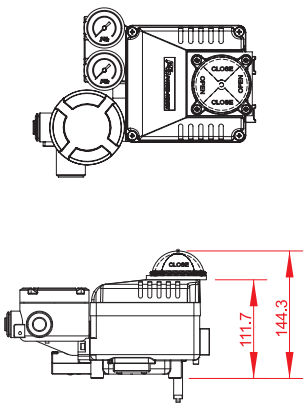
Description	Code
Connection Threads : (pneumatic - electrical)	3 : PT(Rc) 1/4 - PF(G) 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : PT(Rc) 1/4 - M20 x 1.5
Dome Indicator :	N : Flat indicator (standard) D : Dome indicator
Operating Temperature : (only for weatherproof type)	T : 70℃(standard) H : 120℃(without position feedback option) 85℃(with position feedback option) L : - 40℃(without position feedback option)
Mounting Bracket : - NAMUR Shaft type :	N : None R : Multi-size NAMUR bracket for IEC 60534-6-2 / VDI/VDE 3845 (130x30x50 bracket on request)
- Fork Lever type :	F : PG bracket 80x30 for fork lever type E : Multi-size NAMUR bracket for fork lever type (130x30x50 bracket on request)

Dimensions

A. With Flat Indicator

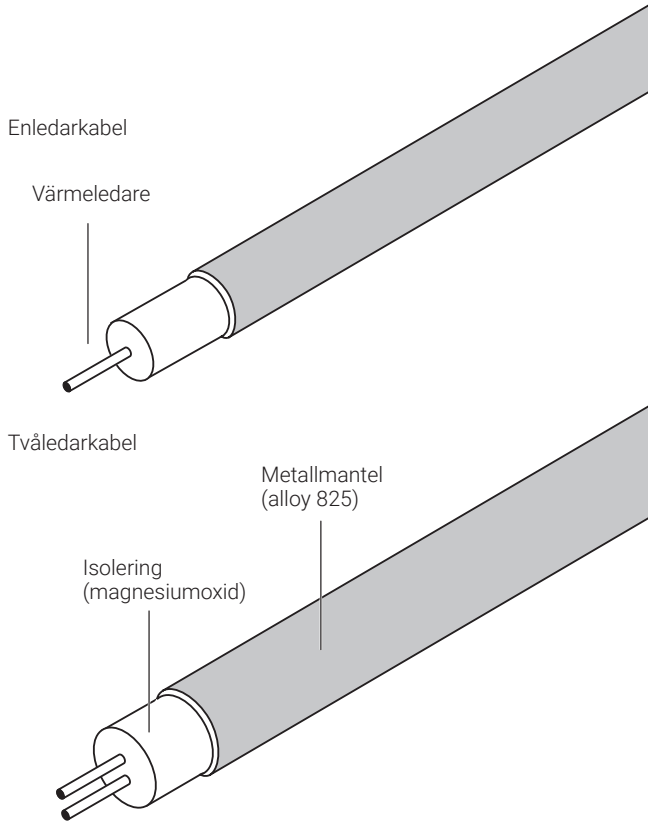


B. With Dome Indicator



HAX

MINERALISOLERAD (MI) VÄRMEKABEL AV ALLOY 825



VÄRMEKABELKONSTRUKTION

nVent RAYCHEM HAx mineralisolerade (MI) serieresistiva värmekablar med alloy 825 är lämpliga för användning i explosionsfarliga områden. De har utformats för användning i applikationer för frostskydd och varmhållning av rörledningar, tankar och annan utrustning.

MI-värmekablarna i HAx-serien erbjuder en idealisk kombination av robusthet, hög temperaturtålighet och korrosionsresistens och kan därför användas i ett stort antal applikationer för varmhållning, särskilt för applikationer med krav på höga effekter och för temperaturer som överskrider kapaciteten hos polymerisolerade (PI) serieresistiva värmekablar.

Värmekablarna kan användas för exponeringstemperaturer upp till 700°C och en typisk uteffekt upp till 270 W/m. Högre temperaturer och uteffekter är möjliga. Kontakta nVent för mer information.

HAx mineralisolerade (MI) värmekablar finns med en eller två ledare och i ett mycket brett urval av resistanser. Användningen av värmekablar med två ledare kan i hög grad reducera den totala installationskostnaden, och förenklar även installationen, särskilt när det gäller klena rör och instrumentrör.

Värmekablarna erbjuds som såväl bulkkabel som fabriksterminerade värmeenheter som är hårdlödda eller lasersvetsade. Utbudet omfattar ett komplett sortiment av komponenter för installation, anslutning och skarvning av värmekablarna.

APPLIKATION

Områdesklassificering	Explosionsfarliga områden, Zon 1 eller 2 (gas) eller Zon 21 eller 22 (damm) Ordinärt

APPROVALS

System (värmeenheter)	Baseefa 13ATEX0174X	Ex II 2G Ex eb IIC T* Gb II 2D Ex tb IIIC T*°C Db (För * se schema)
	IECEx BAS 13.0090X	Ex Ex eb IIC T* Gb Ex tb IIIC T*ºC Db (För * se schema)
	EAC Ex № ЕАЭС RU C-BE.МЮ62.B.00879/19 ООО «ПРОММАШ ТЕСТ» Omgivningstemperatur −60°C...+70°C	1Ex e IIC T* Gb X Ex tb IIIC T* Db X *: enligt design Tillverkad i Kanada, Tyskland eller Polen
Bulkkabel	Baseefa 13ATEX0173U	Ex II 2G Ex e IIC Gb
	IECEx BAS 13.0091U	Ex e IIC Gb
	EAC Ex № ЕАЭС RU C-BE.МЮ62.B.00879/19 ООО «ПРОММАШ ТЕСТ» Omgivningstemperatur: −60°C...+70°C	1Ex e IIC T* Gb X Ex tb IIIC T* Db X *: enligt design Tillverkad i Kanada eller Italien

Värmeenheterna är också godkända för dammiga miljöer. Temperaturklassificering (T-klassificering) måste fastställas med hjälp av principerna för stabiliserad konstruktion eller användning av en temperaturbegränsande anordning. Använd TraceCalc designprogramvara eller kontakta nVent

TEKNISKA DATA

Material kabelmantel	Alloy 825		
Ledarmaterial	Olika legeringar och koppar		
Max. exponeringstemperatur	550°C (lödda värmeenheter) 700°C (lasersvetsade värmeenheter) * Högre temperaturer är möjliga. Kontakta nVent för mer information.		
Min. installationstemperatur	–60°C		
Min. böjningsradie	6 x OD kabeldiameter vid –60°C		
Max. matningsspänning och effekt	Spänning (U_0/U)	Max. uteffekt*	Typ av värmekabel
	600/600 Vac	210 W/m	HAx1N enledarkabel, 600 V
	300/300 Vac	200 W/m	HAx2M tvåledarkabel, 300 V
	600/600 Vac	270 W/m	HAx2N tvåledarkabel, 600 V
		* Typiskt värde, beroende på applikation	
Läckström	3 mA /100 m (nominellt vid 20°C, 230 Vac, 50-60 Hz)		
Min. kabelavstånd	25 mm för explosionsfarliga områden		

TABELL 1: SERIERESISTIVA MI-VÄRMEKABLAR HAX2M (tvåledarkabel, 300 V)

Beställnings-referens	Nominell resistans (Ω/km vid 20°C)	Utvändig diameter (mm)	Temp. koefficient (x 10^{-3}/K)	Max. spol-längd [m]	Nom. vikt (kg/km)	Artikelnr PN
HAF2M59K	59000	4.4	0.09	387	73	32SF1180
HAF2M36K	36000	4.0	0.09	483	60	32SF1110
HAF2M29.5K	29500	4.1	0.09	459	63	32SF2900
HAF2M24.5K	24500	4.0	0.09	477	61	32SF2750
HAA2M19.7K	19700	4.1	0.09	459	63	32SA2600
HAA2M13.2K	13200	3.7	0.09	554	54	32SA2400
HAA2M10.4K	10400	4.4	0.09	389	74	32SA2318
HAA2M9000	9000	3.9	0.09	505	60	32SA2275
HAA2M6600	6600	4.3	0.09	414	73	32SA2200
HAA2M5600	5600	4.2	0.09	425	72	32SA2170
HAB2M3750	3750	4.4	0.04	390	76	32SB2114
HAB2M3000	3000	4.1	0.04	451	67	32SB3914
HAB2M2300	2300	4.3	0.04	411	74	32SB3700
HAQ2M1560	1560	4.5	0.5	376	78	32SQ3472
HAQ2M1240	1240	4.6	0.5	352	82	32SQ3374
HAQ2M965	965	4.5	0.5	368	79	32SQ3293
HAQ2M660	660	4.1	0.5	457	66	32SQ3200
HAQ2M495	495	4.3	0.5	420	73	32SQ3150
HAQ2M330	330	4.7	0.5	348	89	32SQ3100
HAP2M240	240	4.4	1.3	391	78	32SP4734
HAP2M190	190	4.5	1.3	375	82	32SP4583
HAP2M150	150	4.8	1.3	337	62	32SP4458
HAC2M105	105	4.7	3.9	349	85	32SC4324

TABELL 2: SERIERESISTIVA MI-VÄRMEKABLAR HAX2N (tvåledarkabel, 600 V)

Beställnings-referens	Nominell resistans (Ω/km vid 20°C)	Utvändig diameter (mm)	Temp. koefficient (x 10^{-3}/K)	Max. spol-längd [m]	Nom. vikt (kg/km)	Artikelnr PN
HAF2N36K	36000	4.9	0.09	312	91	62SF1110
HAF2N29.5K	29500	4.9	0.09	312	91	62SF2900
HAF2N24.5K	24500	5.2	0.09	279	103	62SF2750
HAF2N19.7K	19700	5.8	0.09	222	128	62SF2600
HAA2N13.6K	13600	6.1	0.09	204	140	62SA2414
HAA2N9000	9000	5.7	0.09	232	125	62SA2275
HAF2N6600	6600	6.2	0.09	196	149	62SF2200
HAA2N5600	5600	6.1	0.09	205	143	62SA2170
HAT2N3750	3750	5.5	0.18	254	113	62ST2115
HAB2N3000	3000	5.9	0.04	219	132	62SB3914
HAB2N2300	2300	6.7	0.04	168	174	62SB3700
HAT2N1670	1670	5.5	0.18	255	115	62ST3505
HAQ2N1240	1240	5.5	0.5	254	113	62SQ3374
HAQ2N940	940	5.6	0.5	239	121	62SQ3286
HAQ2N660	660	5.8	0.5	229	128	62SQ3200
HAQ2N495	495	5.8	0.5	229	128	62SQ3150
HAQ2N330	330	6.5	0.5	179	165	62SQ3100
HAP2N255	255	6.4	1.3	188	155	62SP4775
HAP2N185	185	6.7	1.3	171	173	62SP4561
HAP2N130	130	7.0	1.3	154	194	62SP4402
HAP2N92	92	7.4	1.3	139	219	62SP4281
HAC2N66	66	7.2	3.9	145	201	62SC4200
HAC2N43	43	7.7	3.9	128	233	62SC4130
HAC2N27	27	8.4	3.9	100	279	62SC5818
HAC2N17	17	9.2	3.9	90	343	62SC5516
HAC2N10.5	10.5	10.2	3.9	74	432	62SC5324
HAC2N6.6	6.6	12.6	3.9	48	653	62SC5204
HAC2N4.3	4.3	13.8	3.9	143	769	62SC5128

TABELL 3: SERIERESISTIVA MI-VÄRMEKABLAR HAX1N (ENLEDARKABEL, 600 V)

Beställnings-referens	Nominell resistans (Ω/km vid 20°C)	Utvändig diameter (mm)	Temp. koefficient (x 10^{-3}/K)	Max. spol-längd [m]	Nom. vikt (kg/km)	Artikelnr PN
HAA1N6565	6565	4.3	0.085	406	75	61SA2200
HAA1N5250	5250	4.1	0.085	443	66	61SA2160
HAA1N4300	4300	4.1	0.085	460	63	61SA2130
HAA1N3300	3300	4.1	0.085	460	64	61SA2100
HAA1N2800	2800	4.3	0.085	408	72	61SA3850
HAA1N2300	2300	4.1	0.085	462	64	61SA3700
HAA1N1640	1640	4.3	0.085	410	73	61SA3500
HAT1N920	920	4.3	0.18	408	72	61ST3280
HAB1N660	660	4.6	0.04	365	82	61SB3200
HAB1N500	500	4.3	0.04	412	76	61SB3150
HAQ1N390	390	4.4	0.5	384	75	61SQ3118
HAQ1N240	240	4.3	0.5	410	72	61SQ4732
HAQ1N190	190	4.4	0.5	399	75	61SQ4581
HAP1N155	155	4.3	1.3	408	72	61SP4467

Beställnings-referens	Nominell resistans (Ω/km vid 20°C)	Utvändig diameter (mm)	Temp. koefficient (x 10^{-3}/K)	Max. spol-längd [m]	Nom. vikt (kg/km)	Artikelnr PN
HAP1N120	120	4.4	1.3	394	75	61SP4366
HAP1N95	95	4.5	1.3	377	79	61SP4290
HAP1N76	76	4.4	1.3	391	78	61SP4231
HAP1N60	60	4.3	1.3	411	75	61SP4183
HAP1N48	48	4.3	1.3	412	76	61SP4145
HAP1N37	37	4.7	1.3	345	91	61SP4113
HAC1N21.3	21.3	4.7	3.9	338	89	61SC5651
HAC1N13.5	13.5	4.9	3.9	326	95	61SC5409
HAC1N8.5	8.5	5.5	3.9	259	124	61SC5258
HAC1N5.3	5.3	6.8	3.9	166	192	61SC5162
HAC1N3.3	3.3	6.4	3.9	171	185	61SC5102
HAC1N2	2.0	8.1	3.9	119	294	61SC6640

TABELL 4: REKOMMENDERADE KALLKABLAR FÖR HAX SERIERESISTIVA MI-VÄRMEKABLAR

Beställnings-referens	Mantelmaterial	Märkström (A)	Märkspänning (Vac)	Antal ledare	Design*	Kabel ytterdi-ameter (mm)	Flexledare storlek mm²	Förskruvnings-storlek
S33A	Alloy 825	33	600	1	B	5.5	3.3	M25
S55A	Alloy 825	55	600	1	B	6.4	8.4	M25
S76A	Alloy 825	76	600	1	B	8.1	13.3	M25
S123A	Alloy 825	123	600	1	B	10.2	21.1	M25
LS28A	Alloy 825	28	300	2	D or E	8.1	2.1	M25
S28A	Alloy 825	28	600	2	D or E	9	2.1	M25
S41A	Alloy 825	41	600	2	D or E	10.2	5.3	M25
S57A	Alloy 825	57	600	2	D or E	12.6	8.4	M25
S77A	Alloy 825	77	600	2	D or E	13.8	13.3	M25

* Mer information om de olika konstruktionerna av värmekablar finns i kapitlet MI-värmekablar i Teknisk Handbok (referens DOC2210)

Nickelpläterade mässingsförskruvningar är standard på alla våra värmekablar. Andra material är tillgängliga, kontakta nVent för mer information.

Kallkablar anslutna till HAx-värmekablar har en Alloy 825-mantel. Eftersom kallkabeln är utsatt för omgivningen och dess eventuella kemikalier och inte har någon yttre plastisolering som korrosionsskydd, kan den utsättas för extremt varierande korrosiva miljöer. Alloy 825-manteln ger då en förbättrad livslängd med ett överlägset korrosionsskydd mot ett stort antal förhållanden och kemikalier.

Som standard levereras alla kallkablar med M25-förskruvningar avsedda att användas tillsammans med Raychem kopplingsboxar med integrerad jordplatta.

Leveranslängd för bulkkabel beror på resistans och är begränsad av maximal spollängd som anges i tabellen ovan.

Fabriksterminerade värmekablar är begränsade till en max. vikt på 50 kg. För att säkerställa praktisk och säker hantering på plats rekommenderar vi att värmekabellängden begränsas till 25 - 30 kg. Alla resistenser är inte standardartiklar och kan vara beställningsvara. Kontakta nVent för att bekräfta leveranstid. nVent kräver användning av en 30 mA jordfelsbrytare för att ge maximal säkerhet och brandskydd. Där konstruktionen resulterar i högre läckström, är den föredragna utlösningsnivån för justerbara jordfelsbrytare 30 mA över de kapacitiva läckströmmar som specificeras av värmekabelleverantören eller alternativt nästa tillgängliga nivå för icke justerbara enheter, men max 300 mA. Alla säkerhetsaspekter måste styrkas.

TABELL 5: KEMISK RESISTENS

Legering	Maximal mantel-temp. (°C)	Beskrivning	Nominell kemisk sammansättning, % (huvudsakliga ämnen)				Hög-temperatur-tålighet (+540°C)		Korrosionsresistens									
			Nickel (+kobolt)	Järn	Krom	Övriga	Oxidering	Karbonisation	Svavelsyra	Saltsyra	Fluorvätesyra	Fosforsyra	Salpetersyra	Organisk syra	Alkalier	Salter	Havsvatten	Kloridkrackning
INCOLOY Alloy 825 nickel-järn-krom	550°C*	Utmärkt beständighet mot många korrosiva ämnen. Motstår olika typer av korrosion, reduktionssyror och oxiderande kemikalier.	42,0	30,0	21,5	Mo 3.0 Cu 2.2	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E

Från Huntington Alloys Publication 78-348-2.
Anmärkning: NR = Rekommenderas ej, A = Acceptabelt, GE = Bra till utmärkt, X = Kontrollera specifika data.
* Temperaturbegränsning baserad på värmeelementets konstruktion.
Data om korrosionsresistens beror på temperatur och koncentration.

Sverige

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nVent

nVent.com

Vår kraftfulla varumärkesportfölj:

CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER

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IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] # EC-TYPE EXAMINATION CERTIFICATE

according to Directive 94/9/EC, Annex III
(Translation)

[2] Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres, Directive 94/9/EC

[3] EC-Type Examination Certificate Number: **IBExU15ATEX1019 X**

[4] Equipment: **Heater for gases** type DHG…,
Heater for liquids type DHF… and
Heater in a solid body type DHK…

[5] Manufacturer: ELMESS Thermosystemtechnik GmbH & Co. KG

[6] Address: Nordallee 1
29525 Uelzen
GERMANY

[7] The design of the equipment mentioned under [4] and any acceptable variations thereto are specified in the schedule to this EC-Type Examination Certificate.

[8] IBExU Institut für Sicherheitstechnik GmbH, Notified Body number 0637 in accordance with article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that the equipment mentioned under [4] has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The test results are recorded in the test report IB-13-3-077/1 of 19 March 2015.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-0:2012+A11:2013, EN 60079-1:2014, EN 60079-7:2007, EN 60079-11:2012 and EN 60079-31:2014.

[10] If the sign „X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified under [17] in the schedule to this EC-Type Examination Certificate.

[11] This EC-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

[12] The marking of the equipment mentioned under [4] shall include the following:

II 2G Ex db e IIB/IIC T6…T1 Gb	or	**II 2G Ex db eb IIB/IIC T6…T1**
II 2G Ex db IIB/IIC T6…T1 Gb	or	**II 2G Ex db IIB/IIC T6…T1**
II 2G Ex db e ib IIB/IIC T6…T1 Gb	or	**II 2G Ex db eb ib IIB/IIC T6…T1**
II 2G Ex db ib IIB/IIC T6…T1 Gb	or	**II 2G Ex db ib IIB/IIC T6…T1**
II 2D Ex tb IIIC TX Db	or	**II 2D Ex tb IIIC TX**
II 2D Ex tb ib IIIC TX Db	or	**II 2D Ex tb ib IIIC TX**

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Authorised for certifications
-Explosion protection-

By order

(Dr. Wagner)

- Seal -
(ID no. 0637)

Freiberg, 19 March 2015

Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

Annex

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[13] **Annex**

[14] **to the EC-TYPE EXAMINATION CERTIFICATE IBExU15ATEX1019 X**

[15] **Description of equipment**

The Heaters for gases, liquids and in a solid body type DHG..., DHF... and DHK... serve for the direct or indirect heating of non-flammable fluids or non-explosive gases under operating conditions. They are intended for installation in containers (tank, flow pipe, machine, metal body e.g.).

The Heaters consist of a flameproof enclosure and terminal compartment in type of protection increased safety. The flameproof enclosures are made of grey cast iron or they consist of a welded construction from steel or stainless steel. The terminal compartment in type of protection increased safety may optionally be omitted at the welded enclosures. In this case the flameproof enclosure serves also as electric terminal compartment with direct cable entry.

The Heater enclosures can be complemented with suitable and certified Ex e or Ex i terminal boxes, which are fixed to a holder (i. e. pipe or clamp ring) with the heater enclosure.

Technical data:

Heaters current circuit

- Rated voltage:	max. 800 V
- Nominal voltage:	max. 690 V AC / DC
- Rated current:	max. 63 A (DH..B03, DH..B03St and DH..B03V) max. 35 A (DH..A01, DH..A02 and DH..B01)
- Connection cross-section:	max. 25 mm² (DH..B03, DH..B03St and DH..B03V) max. 6 mm² (DH..A01 , DH..A02 , DH..B01)

Control circuit

- Rated voltage:	440 V AC / 250 V DC
- Rated current:	max. 16 A
- Connection cross-section:	max. 6 mm²
- IP-Degree of protection acc. to EN 60529:	max. IP 66
- Property class of the fastening screws:	8.8
- Ambient temperature range:	-20 °C up to +40 °C (standard) -40 °C up to +60 °C (special version grey cast iron) -50 °C up to +60 °C (special version steel) -60 °C up to +60 °C (special version stainless steel)
- Max. service temperature in the enclosure:	+80 °C
- Surface temperature TX:	+80 °C up to +440 °C

Further details are specified in the operation manual as well as in the documents of the manufacturer which are part of the test report.

The respective operating parameters for the design of the Heaters have to be taken from the name plate and the supplementary documentation.

[16] **Test report**

The test results are recorded in the test report IB-13-3-077/1 of 19 March 2015. The test documents are listed in the annex to the test report.

Summary of the test results

The Heaters for gases, liquids and in a solid body type DHG..., DHF... and DHK... fulfil the requirements of explosion protection for equipment of Group II, Category 2G, type of protection flameproof enclosure „d" respectively flameproof enclosure „d" in combination with increased safety „e" and intrinsic safety „ib" and Category 2D, type of protection dust ignition protection by enclosure „tb".

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[17] **Special conditions for safe use**

- The Heater must be operated in the specified mounting position and under the specified ambient temperature conditions. It should be ensured that the heat emission is evenly distributed and not obstructed operation of the Heater.
- The Heater may only be operated in conjunction with a protective system. Function and reliability tested variations in accordance with the relevant rules and regulations are to use as safety device for temperature, flow, level etc.
- The position of the temperature sensors of the temperature limiters required for the explosion protection must include the changed operating conditions caused by a phase failure in three-phase systems.
- Heating of liquids is only allowed with enough liquid overlap. That can be fulfilling by level monitoring device or comparable protective measures.
- For flushing medium, additionally a flow monitoring device may be necessary to secure a minimum flow.
- When use in explosive dust atmospheres, adequate measures must be taken to prevent dust deposits on the heated part of the heaters.
- Repairs of the flameproof joints must be made in compliance with the constructive specifications provided by the manufacturer. A repair according to the values specified in tables 2 and 3 of EN 60079-1 is not permitted.
- The Heater is equipped as standard with cable gland by the manufacturer. The cable gland may be used only for fixed installation; the operating company has to ensure an appropriate clamping method.
- Cables specified by the manufacturer in the operating instructions have to be used in the heater design with direct Ex d cable entry (without Ex e connection box). If the supplied cable glands and cables are not being used the corresponding requirements in EN 60079-14, Paragraph 10.6.2 have to be noticed. The direct cable glands in the heater enclosure DH..A0... have to be tested with 45 bar at minimum at use in explosion group IIC and below -20 °C.
- The maximum operating temperature on ex-relevant components (seals, cable bushings, connection terminals) must not exceed 80 °C. At operation with lower ambient temperature less than -20 °C down to -60 °C the cable gland and the connection cables must be suitable for the appropriate operating temperature.
- Unused openings for cable entries must be closed durably with suitable screw plugs, which are certified for explosion protection in the corresponding type of protection.
- The special conditions contained in the respective certificate have to be noticed at use of certified components or devices in type of protection Ex i.

[18] **Essential Health and Safety Requirements**

Confirmed by compliance with standards (see [9]).

By order

Freiberg, 19 March 2015

(Dr. Wagner)

Heater

C63-AQU-QIX-002 483 / 917

Specification

Translation, Original German

ELMESS THERMO SYSTEM TECHNIK

Client	AQUACAS Sweden AB	Date	06.06.2023	Rev00
Fabric No.	23-0314 - 001 - 007	Piece	7	
Order No. / Position	02-23-0314 - 1	Client details		
Article No.	60006709			
Name	Ex-Flanged Heater	Type	**DHG81B03GG-12-T1**	

1 Degree of Protection IEC/EN 60529		IP 66				
2 Ex Marking and Type of Protection						
IEC/EN 60079		(Ex) II 2G Ex db eb IIC T1 Gb				
IEC/EN 60079-31						
EU Type Examination Certificate | IECEx Certificate		IBExU 15 ATEX 1019 X			IECEx IBE 15.0003 X	
EU Declaration of Conformity		ELM 20-003				
3 Electrical data and connection						
Power groups	E1	Complete	Group 1	Group 2	Group 3	Group 4
Rated power		12 kW				
Rated current		17,5 A				
Back up fuse		25 A				
Rated voltage		400 V 3/PE 50/60 Hz				
Specific surface load		1,3 W/cm²				
Control circuit temperature monitoring		max. 10 A; 230 V 1/N/PE 50/60 Hz				
Control circuit additional monitoring devices		----				
Anti condensation heater	E2	----				
Connection diagramm		16-1478-40				
Connection cross section power circuit		6/4 mm²				
Connection cross section control circuit		max. 6/4 mm²				
Cable entry power circuit / material		1x M25x1,5; for cable-ø 9…17 mm / PA		tightening torque: 5,5 Nm		
Cable entry power circuit / material		----				
Cable entry control circuit / material		1x M25x1,5; for cable-ø 9…17 mm / PA		tightening torque: 5,5 Nm		
Cable entry anti condensation heater / material		----				
4 Protection system						
Temperature monitoring	B1	TL = T1 - effective on heating element surface				
Isolation resp. residual current device		min. 50 Ω per voltage resp. max. 100 mA				
Flow monitoring device	B3	----				
Additional monitoring devices or sensors						
Temperature monitor, regulators	B2	TR = 20…500 °C - effective on heating element surface				
Temperature monitor, regulators	B4	----				
5 Dimensions						
Dimension sheet / drawing		08-967-20				
Installation length L		1600 mm				
Unheated length Lu		150 mm				
Temperature reduct. length Lt		250 mm				
Heating bundle diameter		98 mm				
Distance of sheets		250 mm				
Flange		EN 1092-1 / 05 / B1 / DN100 / PN63 / b=38 mm				
6 Material & Surface						
Heating elements		1.4541		metallic bright		
Cartridge pipe		----		----		
Flange		1.4541		metallic bright		
Connection enclosure		Cast iron		varnished with	Hammerschlag	
7 Operation data						
Medium / flow rate		Hydrogen		/ max. 100 m³/h i.N.		
Operating pressure		max. 45 bar g				
Working temperature		30….180 °C				
Ambient temperature / max. housing temperature		-20 ... +50 °C		/ 80 °C		
Mounting position		in aggregate, tank or container; Heater vertical; connection casing on top; cable glands at front side; H 180, V 0				
8 Design data						
Design code		PED 2014/68 EU AD 2000				
Allowable operating pressure		-0,5/+45 bar g				
Allowable temperature min. / max.		-20 / +450 °C				
Fluid group / diagramm		1 / 1				
Category / module		suitable for mounting in pressure vessels up to Category IV				
Inspection / certificate / report		TÜV / EN 10204-3.1		/ 23-0314 - 1		
9 Documentation						
Language		german	/	english	/	----
Operation manual		DH...; EH...				
10 Remarks		inclusive CCOE - certificate				
11 Internal remarks		Test pressure:	89 bar g			
Heating elements: pieces; shape; wiring; type		12 H; YP; NR 374V 42G / 1000W / 230V				
Solder / welding filler / heating elements diameter		A 314 / 2.4831 / 8,5 mm				
In charge / Project team		Mr. Kern		Mr. Drögemüller		

ELMESS
THERMO SYSTEM TECHNIK
• Elektrische Industrieheizkörper • Erhitzer
• Regel- und Steuergeräte
• Electric heaters • Control devices

Enddokumentation
Final Documentation

Hersteller/Manufacturer :	ELMESS-Thermosystemtechnik Nordallee 1 D-29525 Uelzen
Auftrags-Nr./Job No.:	02-23-0314-1
Fabrik-Nr./Fabr. No.:	23-0314-001…007
Projekt/Project :	AQUAGAS Sweden AB
Bestell-Nr./Order No.:	IK-22/23 158-3
Objekt/Object	Ex-Flanschheizkörper Ex Flanged Heater DHG81B03GG-12-T1

ELMESS THERMO SYSTEM TECHNIK

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Projekt / *Project*	:	AQUAGAS Sweden AB 15242 Södertälje SCHWEDEN
Bestell-Nr. / *P.O. No.*	:	IK-22/23 158-3
Datum / *Date*	:	Feb 16, 2023
Objekt / *Object*	:	Ex-Flanschheizkörper / *Ex Flanged Heater* Typ / *Type*: DHG81B03GG-12-T1 Fabr. N°.: 23-0314-001…007

Dokument *Document*	Dokument-Nr. *Document No.*	Blatt *Sheet*
1. Betriebsanleitung *Operating manual* - Beschreibung der Heizung / *Description of heater* - EU Konformitätserklärung / *EU Declaration of conformity* - Beschreibung des Druckgerätes / *Description of pressure equipment* - Spezifikation / *Specification* - Maßbild / *Dimension sheet* - Anschlussschaltplan / *Electrical diagram*	ELMESS	34
2. Prüfprotokoll *Test Report*	23-0314-001…007	1
3. EU Konformitätserklärung *EU Declaration of Conformity*	23-0314-001…007	1
4. Prüfbericht über die Abnahme von Druckgeräten *Final assessment report for pressure equipment*	0045/202/1204/P/00140/23/D/001(00)	2
5. CCOE Zertifikat *CCOE Certificate*	A/P/HQ/MH/104/7585	1
6. Abnahmeprüfzeugnis / *Inspection Certificate* - Flansch / *Flange* DN100 PN63	60.578	1

Betriebsanleitung / *Operating Manual*

Original Deutsch *Translation, original German*

Heizung für Flüssigkeiten, Gase und im Festkörper
mit bauseits zu prüfender Temperaturklasse
Heater for liquids, gases and solid objects
with temperature class to be tested on site

Type DH.0.M0… , DH.0.A0… , DH.0.B0… , DH.0.C1… , DH.0.L0… , EH.0…
für Kategorie 2 / *for category 2*,
NAH.0… , TDH.0… für Kategorie 3 / *for category 3.*

und mit vom Hersteller geprüfter Temperaturklasse
and with temperature class certified by the manufacturer

Type DH..M0… , DH..A0… , DH..B0… , DH..C1… , DH..L0… , EH…
für Kategorie 2 / *for category 2.*
NAH… , TDH… für Kategorie 3 / *for category 3*.

Die Betriebsanleitung besteht aus
- Beschreibung der Heizung
- EU Konformitätserklärung / Konformitätsbescheinigung
- Spezifikation
- Maßbild
- Anschlussschaltplan
- ggf. Beschreibung des Druckgerätes mit EU Konformitätserklärung

The operating manual consists of
- *Description of heater*
- *EU declaration/ attestation of conformity*
- *Specification*
- *Dimension sheet*
- *Connection diagram*
- *if applicable: Description for pressure equipment together with EU declaration of conformity*

Hersteller / *Manufacturer*:

ELMESS-Thermosystemtechnik GmbH & Co. KG
Nordallee 1
29525 Uelzen / Deutschland / *Germany*
e-Mail: et@elmess.de Tel.: +49 581 9083-0
www.elmess.de Fax: +49 581 908344

Inhalt

1. Wichtige Informationen und Warnhinweise .....
2. Aufbau und Verwendung .....
3. Bedingungen für den sicheren Betrieb der Heizung .....
4. Montage, Errichtung und Installation .....
5. Einstellungen .....
6. Wartung, Austausch von Ersatzteilen und Fehlerfall .....
7. Typschlüssel .....

1. Wichtige Informationen und Warnhinweise

Diese Betriebsanleitung muss unbedingt der eigentlichen Bedienungsperson der Heizung ausgehändigt werden. Bitte lesen Sie diese Betriebsanleitung aufmerksam durch, bevor Sie anfangen, die Heizung zu installieren bzw. anzuschließen. Berücksichtigen Sie alle sicherheitsbezogenen Punkte und Anweisungen im Text.

Zum Schutz vor Verletzungen an Personen oder Beschädigungen des Produkts stellen Sie sicher, dass Sie diese wichtigen Informationen und Warnhinweise lesen und verstehen. Verwenden Sie das Produkt niemals für etwas anderes als für den vorgesehenen Zweck.

Die Heizung und diese Betriebsanleitung sind vorgesehen für die Verwendung durch Personal, das im sicheren Umgang mit elektrischen Heizeinrichtungen erfahren ist. Unerfahrenes Personal muss vor der Verwendung des Produkts entsprechend geschult werden.

Bitte wenden Sie sich bei Unklarheit über Teile dieser Betriebsanleitung oder bezüglich Auskunft über die Heizung direkt an ELMESS-Thermosystemtechnik GmbH & Co. KG.

Stellen Sie sicher, dass Installation, Bedienung und Wartung nur von qualifiziertem Personal ausgeführt werden.

Geht diese Betriebsanleitung verloren oder wird beschädigt, wenden Sie sich an ELMESS-Thermosystem-technik GmbH & Co. KG.

Während des Betriebs können funktionsbedingt an den Oberflächen der Heizungen hohe Temperaturen auftreten. Es besteht eine Verbrennungsgefahr.
Durch bauseitige geeignete Maßnahmen ist auf die Verbrennungsgefahr, z.B. durch Warnschilder, hinzuweisen, bzw. kann die Verbrennungsgefahr durch eine zuverlässige und geeignete Dämmung der heißen Oberflächen verhindert werden.

Unbeheizte Oberflächen, z.B. Gehäuse, elektr. Anschlussräume, Gehäuseteile, Enden von Heizelementen usw. müssen in freier Konvektion mit der Umgebungsluft sein.

Um elektrische Schläge zu vermeiden, berühren Sie niemals die Ein-oder Ausgangsklemmen oder die elektrischen Komponenten im Innern der Heizung.

Stellen Sie sicher, dass die Netzversorgungsspannung für die Heizung der DIN EN 50160 insbesondere dem Kapitel 4.2.5 entspricht.

2. Aufbau und Verwendung

Die Heizung ist in explosionsgeschützter Ausführung für den Betrieb in Kategorie Ⓔx II 2 G oder 3 G bzw. 2 D oder 3 D gebaut, aber nicht zum Erwärmen von hybriden Gemischen geeignet.

Die Heizungen Typ **DH...** sind in Zündschutzart Ex d oder Ex de ausgeführt, die Heizungen Typ **EH...** in Zündschutzart Ex e. Die Heizungen Typ **NAH...** sind für Kategorie 3G, Typ **TDH...** für Kategorie 3D geeignet.

Die Heizungen Typ ***HF…** dienen zur direkten Erwärmung von betriebsmäßig nicht brennbaren **Flüssigkeiten** innerhalb der in der Spezifikation angegebenen Kategorie.

Die Heizungen Typ ***HG…** dienen zur direkten Erwärmung von betriebsmäßig nicht explosionsfähigen **Gasen** innerhalb der in der Spezifikation angegebenen Kategorie.

Die Heizungen Typ ***HK…** sind unverlierbar in einem festen Körper eingebaut und dienen zur indirekten Erwärmung von betriebsmäßig nicht brennbaren **Flüssigkeiten** oder von betriebsmäßig nicht explosionsfähigen **Gasen** innerhalb der in der Spezifikation angegebenen Kategorie.

Die Heizungen Typ ***H..41…** und ***H..42…**, ***H..81…** und ***H..82…** dienen zur Erwärmung von nicht brennbaren oder explosionsfähigen Medien in einem geschlossenen System, in dem zu keiner Zeit explosionsfähige Gase oder Stäube auftreten. Die sichtbaren oder außen liegenden Teile der Heizung, wie zum Beispiel der Flansch und das Gehäuse, können innerhalb des explosionsgefährdeten Bereiches liegen.

Die Heizung muss für die Anwendung geeignet sein und darf nur bestimmungsgemäß verwendet werden. Bei Veränderungen am Aufbau und der Konstruktion einschließlich z.B. einer Wärmedämmung, der Lackierung oder den Betriebsbedingungen sind erneute Prüfungen beim Hersteller erforderlich.

Der Typ der Heizung, die technischen Daten, die Kategorie und die Zündschutzart sind in der Spezifikation und teilweise auf dem Typschild, Anschlussschaltplan und Maßbild eingetragen.

Beschichtete Geräte dürfen nicht in der Nähe von hochaufladbaren Prozessen betrieben werden.

Externe, leitungsgebundene Wärmequellen bzw. Strahlungswärme von außen müssen am Errichtungsort und während des Betriebes ausgeschlossen werden.

Heizungen ohne geprüfte Temperaturklasse

Die Heizung Typ ***H.00…** ist ohne einen Temperaturfühler oder einen Schutztemperaturbegrenzer mit Kapillarrohrfühler ausgerüstet.

Die Heizung Typ ***H.01…** , ***H.05…** ist mit einem Temperaturfühler oder einem Schutztemperaturbegrenzer mit Kapillarrohrfühler wirksam auf Oberfläche der Heizung ausgerüstet.

Die Heizung Typ ***H.02…** ist mit einem Temperaturfühler oder einem Schutztemperaturbegrenzer mit Kapillarrohrfühler wirksam auf Mediumtemperatur ausgerüstet.

Für die Heizungen Typ ***H.0…** ist das Schutzsystem bauseits zu errichten und die Temperaturklasse bauseits durch eine benannte Stelle zu prüfen.

Heizungen mit geprüfter Temperaturklasse

Für die Heizung Typ ***HF11…** , ***HF23…** und ***HF81…** sowie ***HG11…** und ***HG81…** sowie ***HK15…** und ***HK16…**,***HK85…** und ***HK86…** besteht das Schutzsystem mindestens aus einem auf die zuverlässige Funktion beurteilten Temperaturbegrenzungssystem und einer Isolations- bzw. Fehlerstromüberwachungseinrichtung.

Für die Heizung Typ ***HF21…**, ***HF22…**, ***HF41…** und ***HF42…** besteht das Schutzsystem mindestens aus einem auf die zuverlässige Funktion beurteilten Temperaturbegrenzungssystem, einer auf die zuverlässige Funktion beurteilten Niveauüberwachungseinrichtung und einer Isolations- bzw. Fehlerstromüberwachungseinrichtung.

Für die Heizung Typ ***HF77…** besteht das Schutzsystem mindestens aus einer auf die zuverlässige Funktion beurteilten Niveauüberwachungseinrichtung und einer Isolations- bzw. Fehlerstromüberwachungseinrichtung.

Für die Heizung Typ ***HF31…** und ***HF32…** sowie ***HG31…**, ***HG32…** , ***HG41…** und ***HG42…** besteht das Schutzsystem mindestens aus einem auf die zuverlässige Funktion beurteilten Temperaturbegrenzungssystem, einer auf die zuverlässige Funktion beurteilten Strömungsüberwachungseinrichtung und einer Isolations- bzw. Fehlerstromüberwachungseinrichtung.

Für die Heizung Typ ***HF57…** , ***HF58…** und ***HF60…** sowie ***HG57…** , ***HG58…** und ***HG60…** sowie ***HK57…** , ***HK58…** und ***HK60…** besteht das Schutzsystem mindestens aus einer Isolations- bzw. Fehlerstrom-überwachungseinrichtung und einem Schutzschalter.

Der Betrieb der Heizung ist nur unter Anwendung eines auf die zuverlässige Funktion beurteilten Schutzsystems und bei Einhaltung der in der Spezifikation angegebenen technischen Daten zulässig.

Vom Hersteller eingebaute Kapillarrohrfühler mit Schaltkontakt bzw. Temperaturfühler zusammen mit einem mitgelieferten elektronischen Schutz-Temperatur-Begrenzer sind entsprechend ATEX Richtlinie geprüft und geeignet.

Alle Überwachungsgeräte müssen durch andere Schutzeinrichtungen, z.B. Sicherungen und Schaltschütze, Isolations- bzw. Fehlerstromüberwachungseinrichtungen zu einem kompletten Schutzsystem ergänzt werden. Ein Ansprechen einer oder mehrerer Schutzeinrichtungen muss direkt und zwangsweise zu einem potentialfreien Trennen der Heizung vom Netz führen.

Zusätzlich kann die Heizung mit anderen Temperaturbegrenzungs- oder Regeleinrichtungen bzw. Temperatur-messfühlern ausgerüstet sein. Dienen diese Geräte ebenfalls zur Überwachung der Heizung, sind sie in das Schutzsystem zu integrieren.

3. Bedingungen für den sicheren Betrieb der Heizung

- **Die Festlegung der Temperaturklasse bzw. der maximalen Oberflächentemperatur muss vor Inbetriebnahme unter Beachtung der örtlichen und betrieblichen Bedingungen durch den Hersteller oder eine benannte Stelle erfolgen. Für Heizungen mit geprüfter Temperaturklasse ist die Temperaturklasse bereits durch den Hersteller festgelegt.**
- Die Heizung ist nur in der vorgegebenen Gebrauchslage und in dem vorgegebenen Umgebungs-temperaturbereich zu betreiben. Beim Betrieb der Heizung ist eine ungehinderte und gleichmäßige Wärmeabgabe sicherzustellen.
- Die Heizung darf nur unter Anwendung eines Schutzsystems betrieben werden. Als Sicherheitseinrichtungen für die Temperatur, Strömung, Niveau usw. sind auf die Funktion bzw. Zuverlässigkeit zertifizierte Geräte entsprechend den einschlägigen Bestimmungen und nach RL 2014/34/EU harmonisierten Normen, z.B. der EN 50495 zu verwenden.
- Wenn kein Schutz-Temperatur-Begrenzer vom Hersteller verwendet wird, ist das Abschalten, d.h. die Trennung der Heizung vom Netz bei Überschreitung der in der Spezifikation angegebenen Temperatur in der Verantwortung des Betreibers zu realisieren.
- Die Anordnung der für den Explosionsschutz notwendigen Fühler der Temperaturbegrenzer muss die durch einen Phasenausfall bei Drehstromnetzen geänderten Betriebsbedingungen mit einschließen.
- Die Beheizung von Flüssigkeiten ist nur mit genügender Überdeckung aller beheizten Flächen zulässig. Das kann durch eine Niveauüberwachungseinrichtung oder vergleichbare Schutzmaßnahmen erfüllt werden.
- Für strömende Medien kann eine Überwachung durch einen Strömungswächter erforderlich sein, der einen Mindestdurchsatz an allen beheizten Oberflächen sicherstellt.
- Bei Einsatz im Staub-Ex-Bereich sind Staubablagerungen auf heißen Oberflächen der Heizungen durch geeignete Maßnahmen zu vermeiden, bei beschichteten Gehäusen sind hochaufladende Prozesse zu vermeiden.
- Eine Reparatur an den zünddurchschlagsicheren Spalten darf nur durch den Hersteller erfolgen. Eine Reparatur entsprechend den Werten von Tabelle 2 und 3 der IEC/EN 60079-1 ist nicht zulässig.
- Die Heizung wird vom Hersteller mit Kabel- und Leitungseinführungen für eine feste Installation bestückt. Durch den Betreiber ist eine entsprechende Zugentlastung zu gewährleisten. Bei der Ausführung mit direkter druckfester Kabel- und Leitungseinführung (ohne Ex e Anschlussraum) sind die vom Hersteller in der Betriebsanleitung festgelegten Kabel zu verwenden. Wenn die vom Hersteller gelieferten bzw. vorgeschriebenen Kabel- und Leitungseinführungen und festgelegten Kabel nicht verwendet werden, sind die Anforderungen der IEC/EN 60079-14, Abschnitt 10.6.2 zu beachten. Die direkten Kabel- und Leitungseinführungen in das Gehäuse Typ DH..A01… und DH..A02… müssen bei Verwendung innerhalb der Gasgruppe IIC und unter -20 °C mit mindestens 45 bar geprüft worden sein. Nicht verwendete Kabel- und Leitungseinführungen bzw. Öffnungen müssen entsprechend IEC/EN 60079-14 verschlossen sein.
- Bei Geräten für Kategorie M2 sind entsprechende Kabel- und Leitungseinführungen und Anschlusskabel zu verwenden, die EN 50628 ist zu beachten.
- Die maximale Betriebstemperatur an ex-relevanten Komponenten (Dichtungen, Leitungsdurchführungen, Anschlussklemmen) darf 80 °C nicht überschreiten. Bei Verwendung im verringerten Temperaturbereich von unter -20 °C bis zu -60 °C müssen die Kabel- und Leitungseinführung und die Anschlussleitung für die entsprechende Einsatztemperatur geeignet sein.
- Bei Verwendung von zertifizierten Teilen bzw. Geräten mit der Zündschutzart Ex i, sind die in dem entsprechenden Zertifikat genannten besonderen Bedingungen einzuhalten.
- Die Heizung darf niemals bei geöffnetem Gehäuse betrieben werden.
- Die Heizung ist unverlierbar und so zu montieren, dass sie gegen mechanische Beanspruchung geschützt ist.
- Die Einbindung in den äußeren Potenzialausgleich erfolgt über die Ex e Potenzialausgleichsklemme. Wenn diese nicht vorhanden ist, erfolgt der Potenzialausgleich über den Einbaustutzen, den Flansch oder die Passhülse.
- Eine eingebaute Antikondensationsheizung darf nur im Stillstand der Heizung betrieben werden.

4. Montage, Errichtung und Installation

Wird die Heizung nicht sofort errichtet und betrieben, sind die jeder Heizung beiliegenden Lagerungsvorschriften zu beachten. Besonders ist die Heizung vor eindringender Feuchtigkeit, z.B. durch den Betrieb einer Stillstandheizung, zu schützen.

Für die Errichtung und Installation ist für diese Kategorie geeignetes Material zu verwenden. Bei Außenaufstellung ist als dauerhafter Schutz gegen Witterungseinflüsse (Sonneneinstrahlung, Regen, Schnee) die Errichtung unter einem Schutzdach empfohlen.

Für die Errichtung, Installation und den Betrieb sind die jeweils gültigen Vorschriften z.B. DIN IEC 60364 zu beachten. Es gilt die Norm IEC/EN 60079-14 und in Europa die Richtlinie 1999/92/EG. In Deutschland gelten zusätzlich die Ex-Regeln der Berufsgenossenschaft Chemie, sowie die Betriebssicherheitsverordnung.

Die Aufstellung/Errichtung der Heizung muss gemäß den Angaben auf dem Maßbild und geschützt vor direkter Sonneneinstrahlung erfolgen. Besonders ist die auf dem Maßbild vorgegebene Gebrauchslage zu beachten. Flansche, ggf. Ein- und Austrittsstutzen müssen mit für den Verwendungszweck geeigneten Befestigungselementen und Dichtungen spannungsfrei und geschützt gegen mechanische Beanspruchung, ggf. unter Beachtung der Strömungsrichtung an das bauseitige Rohrsystem montiert werden.

Das druckfeste Gehäuse muss mit Schrauben der Festigkeitsklasse von mindestens 8.8 bzw. A*-70 verschlossen werden. Das Anzugsdrehmoment beträgt 10 Nm.

Der elektrische Anschluss der Heizung erfolgt im Anschlussraum im spannungslosen Zustand.

Die elektrische Installation im Ex e-Anschlussgehäuse erfolgt an den vorgesehenen Klemmen unter Einhaltung von mindestens 12 mm Luftstrecke. Dazu dient unter anderem eine mitgelieferte Abdeckplatte, die verwendet werden muss.
Wenn die Heizung kein Ex e Anschlussgehäuse hat, erfolgt die Installation direkt im druckfesten Gehäuse an den vorgesehenen Klemmen.
Das Anzugsdrehmoment für Klemmen beträgt 2 Nm.

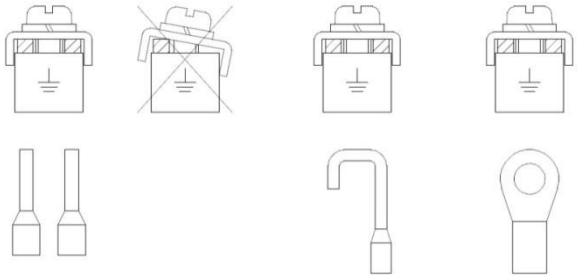
In diesem Anschlussraum erfolgt ebenfalls der Anschluss der vom Hersteller eingebauten Temperaturfühler, Kapillarrohrschaltgeräte und die Bedienung der vom Hersteller eingebauten Kapillarrohrfühler mit Schaltkontakt.

Vom Hersteller mitgelieferte Kabel- und Leitungseinführungen und bereits installierte Anschlusskabel sind zu verwenden.

Der Anschluss muss mit fest verlegten Kabeln bzw. Leitungen entsprechend harmonisierter Normen mit dem in der Spezifikation angegebenen Querschnitt erfolgen. Verwenden Sie niemals abgenutzte oder beschädigte Kabel oder Kabel ohne Schutzleiter. Bei Anwendung von mehr- oder feindrahtigen Leitungen sind Aderendhülsen zu verwenden. Die Heizung ist mit der entsprechenden Vorsicherung zu sichern.

Für jede eingeführte Leitung ist ein Schutzleiter-anschluss vorhanden. Sorgen Sie dafür, dass die Heizung von einem qualifizierten Elektriker entsprechend den gültigen Vorschriften geerdet wird.

Nicht verwendete Kabeleinführungen bzw. Öffnungen müssen entsprechend IEC/EN 60079-14 verschlossen werden.



5. Einstellungen

Die im Rahmen der thermischen Stückprüfung für die Temperaturklasse festgelegte Arbeitstemperatur der Temperaturbegrenzungseinrichtung darf nicht verändert werden.

Im Fehlerfall, z. B. bei Erreichen der Temperaturklasse, muss die Temperaturbegrenzungseinrichtung bleibend abschalten. Die Temperaturbegrenzungseinrichtung kann durch „Reset“ zurückgesetzt werden. Davor muss die Heizung um mindestens 20 K abkühlen und die Ausschaltursache muss ermittelt und beseitigt werden. Das Rücksetzen erfolgt durch kurzzeitiges Drücken des Rückstellknopfes im Anschlussgehäuse oder am mitgelieferten Schutz-Temperatur-Begrenzer. Bei Ausführung der Heizung mit einem externen Reset ist darauf zu achten, dass dieser durch die Kappe abgedeckt ist.

Der Arbeitspunkt eines Temperaturreglers ist entsprechend der Skala frei wählbar. Er sollte jedoch mindestens 10 K unterhalb des Arbeitspunktes der Temperaturbegrenzungseinrichtung liegen. Ein kurzes Abschalten des Reglers ist normal, wenn von der Umgebungstemperatur ausgehend geheizt wird. Der Temperaturregler kann im Anschlussgehäuse oder am mitgelieferten Schutz-Temperatur-Begrenzer eingestellt werden.

Der Arbeitspunkt einer erforderlichen Niveauüberwachungseinrichtung ist entsprechend dem in der Spezifikation angegebenen Wert zu justieren. Dabei ist zu berücksichtigen, dass zu jedem Zeitpunkt auch bei bewegten Flüssigkeitsoberflächen, die minimale Überdeckung aller heißen Oberflächen und Temperaturfühler sichergestellt ist.

Der Arbeitspunkt einer erforderlichen Strömungsüberwachungseinrichtung ist entsprechend dem in der Spezifikation angegebenen Wert zu justieren. Dabei ist zu berücksichtigen, dass zu jedem Zeitpunkt die minimale Strömung an allen heißen Oberflächen und an dem für die Einhaltung des Explosionsschutzes erforderlichen Temperaturfühler sichergestellt ist.

6. Wartung, Austausch von Ersatzteilen und Fehlerfall

Arbeiten, Wartungen und Reparaturen an der Heizung haben entsprechend IEC/EN 60079-17 durch fachkundiges Personal unter dessen Verantwortung zu erfolgen. Arbeiten an elektrischen Komponenten sind nur im spannungslosen Zustand und unter Tragen einer persönlichen Schutzausrüstung, z.B. Sicherheitsschuhe, Handschuhe etc., durchzuführen.

Die Wirksamkeit des Schutzsystems, das heißt die Abschaltung der Heizung bei der vorgegebenen Temperatur, ist bei der Inbetriebnahme und danach spätestens alle zwei Jahre zu prüfen. Bei ungenügender Funktion auch von einzelnen Komponenten sind diese Teile durch Original Ersatzteile auszutauschen.

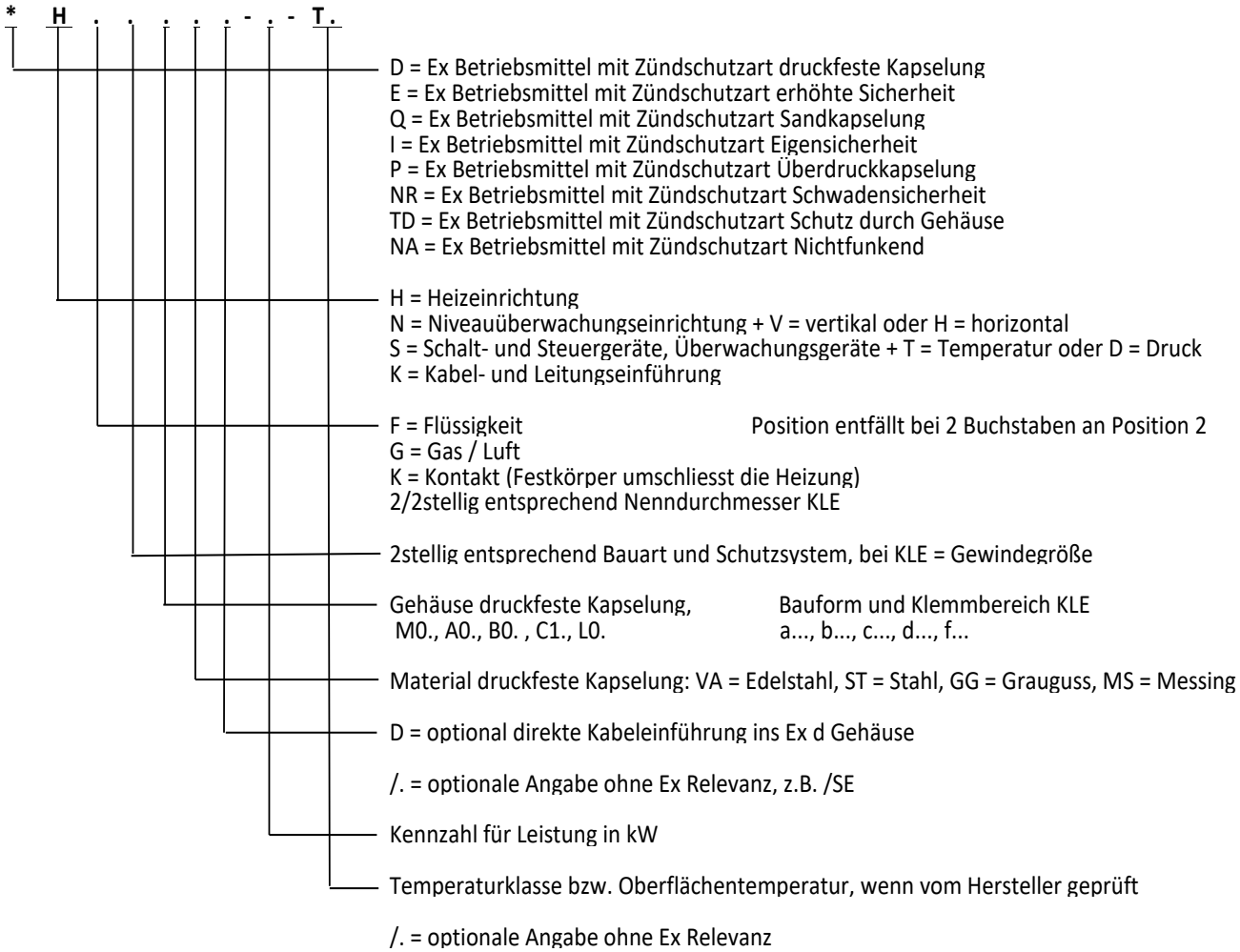
Der Heizeinsatz ist frei von Ablagerungen zu halten. Das ist in regelmäßigen Abständen zu überprüfen.

Bei der Demontage ist zu beachten, dass druckfeste Gehäuse unter einem leichten Unter- oder Überdruck stehen können.

Von außen sichtbare Beschädigungen bzw. Korrosion an Gehäuseteilen sowie an Anschlussteilen sind umgehend mit Hersteller-Originalersatzteilen durch den Hersteller oder durch fachkundiges Personal (IEC/EN 60079-19, Anhang B) unter dessen Verantwortung nach Montageanleitung zu beheben.

Im Fehlerfall oder beim Ansprechen einer Schutzeinrichtung ist die Ausfallursache zu ermitteln und zu beseitigen, ggf. ist eine Rücksprache mit dem Hersteller erforderlich.

7. Typschlüssel



Auswahltabelle am Ende des Dokumentes

Weitere Information unter www.elmess.de

Table of content

1. Important information and warning .....
2. Design and usage .....
3. Conditions for safe operation of the heater .....
4. Mounting, fitting and installation .....
5. Adjustments .....
6. Maintenance, exchange of spare parts and malfunctions .....
7. Type key .....

1. Important information and warning

This operating manual must be issued to the person actually using the heater. Please read this operating manual carefully before starting to install and/or connect the heater. Please note all points and instructions concerning safety.

To prevent injuries to persons or equipment damage, ensure that you read and understand this important information and warning. The product is to be used for its intended purpose only.

The heater and this manual are intended for use by persons with experience of working with electrical heating devices. Inexperienced persons must be trained before using the product.

Please contact ELMESS-Thermosystemtechnik GmbH & Co. KG if you have any questions on parts of this user manual or for information on the heater.

The installation, use and maintenance of the equipment must be carried out by authorised and qualified personnel only.

In the event this operating manual is damaged or lost, please contact ELMESS-Thermosystemtechnik GmbH & Co. KG.

Heater surfaces may reach high temperatures during operation, depending on use. There is a risk of burns. The customer can prevent this risk by displaying the warning signs and/or by reliable and suitable insulation of the hot surfaces.

Unheated surfaces including connection box, electrical terminal compartments, connection box components, ends of heating elements etc. must not be covered to enable heat convection.

To prevent electric shocks, never touch the input or output terminals or electrical components inside the heater.

The mains supply voltage for the heater has to comply with DIN EN 50160, in particular chapter 4.2.5.

2. Design and usage

The heater has an explosion-proof design for operation in Category Ex II 2 G or 3 G resp. 2 D or 3 D but is not suitable for heating hybrid mixtures.

Heaters type **DH...** are available in type of protection Ex d or Ex de, heaters type **EH...** in type of protection Ex e. Heaters type **NAH...** are suitable for category 3G, type **TDH...** for category 3D.

The ***HF…** type heaters are used for direct heating of non-flammable **liquids** during operation in the category indicated in the specifications.

The ***HG…** type heaters are used for direct heating of non-explosive **gases** during operation in the category indicated in the specifications.

The ***HK...** type heaters are permanently embedded in a fixed object and are used for indirect heating of non-flammable **liquids** during operation or non-explosive **gases** during operation, in the category indicated in the specifications.

The ***H..41…** and ***H..42…** and ***H..81…** and ***H..82…** type heaters are used for heating non-flammable or non-explosive media in a closed system in which explosive gases or dust can never occur. The visible or external parts of the heater, such as the flange and the casing, can be within explosion hazardous areas.

The heater must be suitable for the specified application and may only be used in a manner appropriate to its purpose. New tests at the manufacturer are required in the event of any modifications to construction and design including e.g. heat insulation, varnishing or operating conditions.

The type of heater, the technical data, the category and the type of protection are recorded in the specification and to some extent on the name plate, connection diagram and dimension sheet.

Coated devices may not be operated near high-charging processes.

External, piped heat sources or radiant heat from outside must be excluded at the installation site and during operation.

Heaters without certified temperature class

The heater type ***H.00…** is equipped without any kind of temperature sensor or limiter with capillary temperature probes.

The heater type ***H.01…** , ***H.05…** is equipped with a temperature sensor or limiter with capillary temperature probe effective on heater surface temperature.

The heater type ***H.02…** is equipped with a temperature sensor or limiter with capillary temperature probe effective on medium temperature.

For heater types ***H.0…** the protection system must be installed by the customer and the temperature class has to be tested by a Notified Body.

Heaters with certified temperature class

For heater types ***HF11…** , ***HF23…** and ***HF81…** as well as ***HG11…** and ***HG81…** as well as ***HK15…** and ***HK16…**,***HK85…** and ***HK86…** the protection system comprises of at least a temperature limiting system assessed for reliability and an isolating or fault current monitoring device.

For heater types ***HF21…**, ***HF22…**, ***HF41…** and ***HF42…** the protection system comprises at least a temperature limiting system assessed for reliability, a level monitoring system assessed for reliability and an isolating or fault current monitoring device.

For heater type ***HF77…** the protection system comprises at least a level monitoring system assessed for reliability and an isolating or fault current monitoring device.

For heater types ***HF31…** and ***HF32…** as well as ***HG31…**, ***HG32…**, ***HG41…** and ***HG42…**, the protection system comprises at least a temperature limiting system assessed for reliability, a flow monitoring device assessed for reliability and an isolating or fault current monitoring device.

For heater types ***HF57…** , ***HF58…** and ***HF60…** including ***HG57…** , ***HG58…** and ***HG60…** including ***HK57…** , ***HK58…** and ***HK60…** the protection system comprises at least an insulation and fault current monitoring device and a protective switch.

It is only permitted to operate the heater in conjunction with a safety system acknowledged to be reliable in its function and according to the conditions stated in specification.

Capillary temperature probes with a switching contact installed by the manufacturer or temperature sensors, together with a thermal cut-out, supplied with the heater, have been inspected and approved according to ATEX guidelines.

All monitoring devices must be fitted with other protection devices, e.g. fuses and relays or contactors, RCD’s, to form a complete safety system. Should one or more of the protection devices be activated, the heater must, without exception, be immediately physically disconnected from the electrical mains supply.

The heater can also be equipped with other temperature limiters or regulators, resp. temperature sensors. If these devices are also used for monitoring purposes, they should be integrated into the safety system.

3. Conditions for safe operation of the heater

- **The individual thermal test to determine the temperature class respectively maximal surface temperature is to be carried out on site before commissioning by consideration of the local and operating conditions by manufacturer or a notified body. For heaters with certified temperature class, the thermal test has been done by manufacturer.**
- The heater may only be operated in the specified mounting position and under the specified ambient temperature conditions. It should be ensured that the heat emission is evenly distributed and not obstructed during operation.
- The heater may only be operated in conjunction with a safety system. As safety devices for temperature, flow, level, etc., devices certified for function and reliability in accordance with the relevant regulations and according directive 2014/34/EU harmonized standards, e.g. of EN 50495 must be used.
- If no thermal cut-out as supplied from the manufacturer is used, it is the responsibility of the operator to assure the trip function, i.e. the disconnection of the heater from mains supply when the temperature, indicated in the specification, is exceeded.
- The position of the temperature sensors of the temperature limiters must include the changed operating conditions caused by a phase failure in a three-phase system.
- Heating of liquids is only allowed with enough liquid overlap at all heated surfaces. That can be fulfilled by a level monitoring device or comparable protective measures.
- For flowing media, a flow monitoring device may be necessary to secure a minimum flow on all heated surfaces.
- When used in explosive dust atmospheres, adequate measures must be taken to prevent dust deposits on hot surfaces of the heater, in case of coated enclosures high charging processes must be taken to prevent.
- Only the manufacturer is permitted to carry out repairs on the flame-proof gaps or openings. A repair according values of table 2 and 3 of IEC/EN 60079-1 is not permitted.
- The heater is, as manufacturer standard, equipped with cable glands for fixed installation. Cable relief has to be assured by the operator.
  Cables as specified by the manufacturer in the operating instructions have to be used for heater design with direct Ex d cable entry (without Ex e connection box). If the supplied or specified cable glands and cables are not being used, requirements of IEC EN 60079-14, paragraph 10.6.2, have to be observed. The direct cable glands in the heater enclosure DH..A01... and DH..A02… for use in gas group IIC and below -20°C have to be tested with 45 bar at minimum. Unused openings for cable entries must be closed durably with certified screw plugs according to IEC/EN 60079-14.
- Devices for erection in category M2 must have certified respectively appropriate cable glands and cables, EN 50628 must be observed.
- The maximum operating temperature on ex-relevant components (seals, cable bushings, connection terminals) must not exceed +80°C. At operation with ambient temperature less than -20°C down to -60°C, the cable gland and connecting cable must be suitable for the operating temperature.
- When using certified components or devices with type of protection Ex i, the special conditions specified in the corresponding certificate must be observed.
- The heater must never be used with open casing.
- The heater must be installed captive and in a way that it is protected against mechanical stress.
- The integration in the external potential equalisation is made via the Ex e potential equalisation terminal. If this is not available, potential equalisation is assured via the inlet connector, flange or adapter sleeve.
- A built in anti-condensation heater must only be operated if the heater is at standstill.

4. Mounting, fitting and installation

If the heater is not to be immediately fitted and operated, the storage instructions included with every heater delivery must be observed. The heater must be protected from moisture entering the device in particular, e.g. via the use of an anti-condensation heater.

Material appropriate to the category is to be used when fitting and installing the device. In case of outdoor mounting, the erection under a protective roof against weather influences (sunshine, rain, snow) is recommended.

Applicable regulations, e.g. DIN IEC 60364 must be observed when fitting, installing and operating the device. IEC/EN 60079-14 and in Europe the EC directive 1999/92/EC are applicable. Furthermore, local regulations, such as the explosion protection regulations of the Chemical Industry Employer's Liability Insurance Association and the Ordinance on Industrial Safety and Health for Germany, have to be observed.

The erection of the heater is to be done in accordance to the dimensional drawing and protected against solar radiation. Especially the specified mounting position has to be considered. Flanges, respectively in- and outlet nozzles must be mounted with suitable bolts, nuts and sealing without tension. They have to be protected against any kind of mechanical stress. If applicable, the flow direction of the piping system has to be observed.

Flameproof enclosure must be closed with screws by strength category at least 8.8 resp. A*-70. The tightening torque is 10 Nm.

The electrical connection of the heater has to be done in the connection box with the power disconnected.

The electrical installation in an Ex e connection box with type of protection increased safety must be done on the provided terminals and observing at minimum 12 mm air distance in between. The supplied cover plate has to be used.

If the heater has no Ex e connection box, the electrical installation must be done directly inside the flameproof enclosure on the provided terminals.

The tightening torque of terminals is about 2 Nm.

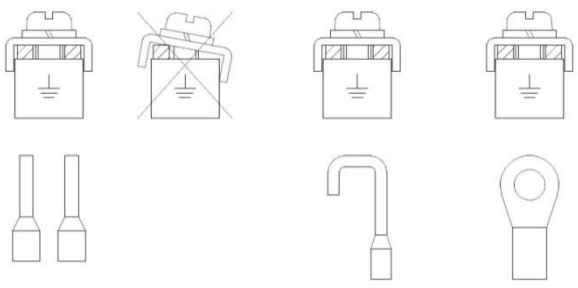
This connection box serves also for connecting the built-in temperature sensors and operation of capillary probes with switching contact.

Delivered cable glands and already installed connection cable must be used.

The connection must be made with permanently installed cables or lines in accordance with harmonized standards with the cross section specified in the specification. Never use worn or damaged cables or cables without a protective conductor. Use wire end ferrules when using multi- or fine-wire cables.

The heater must be protected with an appropriate back-up fuse.

For each cable leading in there is an earth conductor, which must be connected. Ensure that the heater is grounded by a qualified electrician, in line with applicable regulations.



Cable entries respectively open holes, which are not used, must be safely closed in accordance to IEC/EN 60079-14.

5. Adjustments

The set point for the temperature limiting system, which has been adjusted during the thermal test according to the temperature class, must not be manipulated.

In the event of a malfunction, e.g. if the temperature class is reached, the temperature limiting system has to cut off. The temperature limiting system can be reset using the "Reset" button. The heater must cool off by at least 20 K before this is done and the reason for the shut-down must be determined and remedied. The reset function can be done by a short push of the Reset button inside the heater connection box or at the separately delivered Thermal cut-out. If the heater has an external reset button, the protection cap has to be closed again after reset.

The operating value of the temperature regulator can be selected depending on the scale. It should, however, be at least 10 K below the set point of the temperature limiting system. It is perfectly normal for the regulator to shut down for a brief moment while the heater is being heated up. The temperature regulator can be adjusted inside the heater connection box or at the separately delivered Thermal cut-out.

If a level monitoring system is necessary, the operating point has to be adjusted according to the value specified in the specification. It has to be taken into account that all heated surfaces and temperature sensors have to be covered by a minimum of fluid at all times, even if the position of the fluid surface has changed.

If a flow monitoring system is necessary, the working point has to be adjusted according the value specified in the specification. It has to be taken into account that all heated surfaces and temperature sensors are submerged by a minimum of flow at all times.

6. Maintenance, exchange of spare parts and faults

Work, maintenance and repairs on the heater must be in accordance with IEC EN 60079-17 by and in responsibility of qualified personnel. All work on electrical components must be carried out with power disconnected and personal protective equipment must be worn e.g. safety shoes, gloves etc.

The effectiveness of the protective system, i.e. the shutdown of the heater at the specified temperature, must be checked during commissioning and thereafter at least every two years. If even individual components do not function properly, these parts must be replaced with original spare parts.

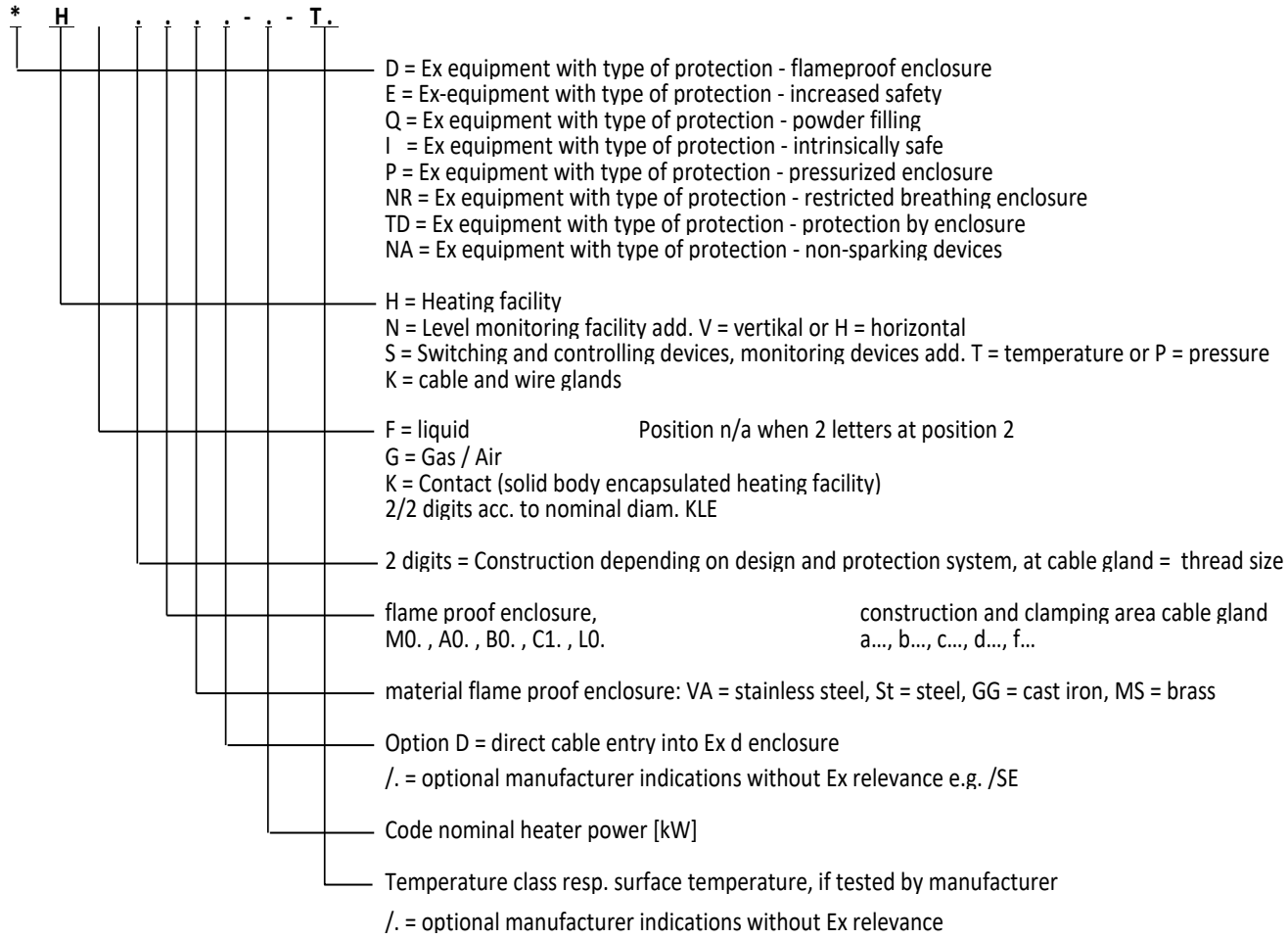
Deposits must not be allowed to build up on the heating unit. Regular checks must be carried out.

When dismantling, please note that the flameproof enclosure may be under slight positive or negative pressure.

Externally visible damage or corrosion of components of the flame proof enclosure or of connector components must be repaired immediately with original spare parts made by the manufacturer, ELMESS-Thermosystemtechnik GmbH & Co. KG, Nordallee 1, D-29525 Uelzen, Germany, or by qualified personnel (IEC EN 60079-19, app. B) at their own responsibility acc. to mounting instructions.

In the event of a fault or if a protective device responds, the cause of the failure must be determined and eliminated; if necessary, the manufacturer must be consulted.

7. Type key



Selection table at the end of the document

Further information at www.elmess.de

Auswahltabelle / Selection table

Typ type	Medium Medium			Beschreibung des Schutzsystems Description of protecting system										
	Flüssigkeit / Liquid	Gas / Gas	im Festkörper / inside Solid body		Schutzsystem bauseits zu errichten Protecting system erected on site	Oberflächentemperaturüberwachung/ Monitoring of surface temperature	Mediumtemperaturüberwachung Monitoring of medium temperature	Niveauüberwachung Level monitoring device	Strömungswächter Flow monitoring device	Temperaturüberwachung von außenliegenden Flächen Temperature monitoring of Surfaces outside	Selbstbegrenzende Heizeinrichtung Selflimiting heater	Heizung in stabilisierter Bauart Heater in stable design	
*HF0.	X				X								
*HF11	X					X							
*HF21	X					X		X					
*HF22	X						X	X					
*HF31	X					X			X				
*HF32	X						X		X				
*HF41	X					X		X					
*HF42	X						X	X		X			
*HF57	X										X		
*HF58	X										X		
*HF60	X											X	
*HF70	X							X				X	
*HF77	X							X			X		
*HG0.		X			X								
*HG11		X				X							
*HG31		X				X			X				
*HG32		X					X		X				
*HG41		X				X			X	X			
*HG42		X					X		X	X			
*HG57		X									X		
*HG58		X									X		
*HG60		X										X	
*HG81		X				X				X			
*HK0.	XX)	XX)	X		X								
*HK15	XX)	XX)	X			X							
*HK16	XX)	XX)	X			X							
*HK57	XX)	XX)	X								X		
*HK58	XX)	XX)	X								X		
*HK60	XX)	XX)	X									X	
*HK85	XX)	XX)	X			X				X			
*HK86	XX)	XX)	X			X				X			

XX) indirekte Beheizung / indirect heating

ELMESS

EU Konformitätserklärung nach Richtlinie 2014/34/EU **ELM 20 - 003**
EU Declaration of Conformity according directive 2014/34/EU

Erklärung von /*Declaration of*

ELMESS-Thermosystemtechnik GmbH & Co. KG
Nordallee 1
29525 Uelzen, Deutschland, *Germany*

www.elmess.de

Hiermit wird - in Übereinstimmung mit Anhang II der Richtlinie 2014/34/EU (L 96/309-356) und mit Anhang II der Richtlinie 2014/30/EU (L 96/79), sowie mit der Richtlinie 2011/65/EU – erklärt, dass das elektrische Gerät

Herewith we declare that - in agreement with annex II of directive 2014/34/EU (L 96/309-356) and with annex II of directive 2014/30/EU (L 96/79), as well as directive 2011/65/EU - the electrical apparatus

Heizung / *Heater*

Typ / *type* **DHG... ; EHG... ; DHF... ; EHF... ; DHK... ; EHK...**
(Erzeugnis, Typ, Beschreibung / *Good, type, description)*

in Übereinstimmung mit den Anforderungen gemäß folgenden Europäischen Normen entwickelt, hergestellt und geprüft worden ist. / *has been designed, manufactured and tested in agreement according to following European Standards*.

EN 60079-0:2019, EN 60079-1:2014, EN 60079-7:2016, EN 60079-11:2012, EN60079-31:2014, EN 50495:2010, EN 60519-2:2007, EN 61000-6-2:2005, EN 61000-6-4:2011 von / *of* CENELEC

Die geprüfte Bauart entspricht der EU-Baumusterprüfbescheinigung Nr.
The certified design is conform to EU-Type-Examination Certificate N°.

IBExU 15 ATEX 1019 X
IBExU Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, D-09599 Freiberg;
Europäische benannte Prüfstelle Nr: / *European notified body No:* 0637.

ELMESS-Thermosystemtechnik GmbH & Co. KG

ppa. Reinhard Wagner
Werksleitung / *Technical Director*

i.V. Lutz Mühe
Explosionsschutz / *Explosion Protection*

D-29525 Uelzen, 26.03.2020

Anerkennung des Qualitätssicherungssystems / *Production Quality Assessment Notification*: Bureau Veritas: 2004

Beschreibung des Druckgerätes / Description of pressure equipment

Diese Beschreibung des Druckgerätes gilt ebenso für Druckgeräteteile im Folgenden auch Druckgerät genannt.

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4. Montage

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Beschreibung des Druckgerätes / Description of pressure equipment

1. Verwendungszweck

Der bestimmungsgemäße Verwendungszweck ist die Erwärmung eines Mediums unter Beachtung der Betriebsbedingungen, die innerhalb der vorgesehenen Grenzen der beigefügten Spezifikation liegen müssen.

Das Druckgerät ist ausgelegt, gebaut und geprüft in Übereinstimmung mit dem für dieses Druckgerät geltenden Auslegungscode.

2. Lieferumfang

Druckgerät mit Prozessanschlüssen sowie dazugehörige Dokumentation (ELMESS Standard).

3. Transport und Lagerung

Das Druckgerät darf nur im drucklosen Zustand transportiert werden.

Ausnahme: Lieferung mit Stickstofffüllung

Bei der Lieferung mit Stickstofffüllung sind die Prozessanschlüsse entsprechend verschlossen und mit einem Manometer versehen. Folgende Kennzeichnung ist an dem Druckgerät anzubringen:

„Achtung! Innerer Überdruck unter 0,5 bar!“

„Achtung! Stickstofffüllung! Erstickungsgefahr! Lüften vor dem Betreten!“

Durch geeignete Anschlagmittel ist sicherzustellen, dass beim Transport keine Verformungen oder sonstige Beeinträchtigungen der Oberflächen/Dichtflächen entstehen.

Der Transport darf nur am liegenden Druckgerät an den dafür vorgesehenen Anschlagpunkten vorgenommen werden. Das Ablegen und Lagern des Behälters darf nur auf geeigneten und mitgelieferten Auflagen (Holzsättel) erfolgen. Punktförmige Belastung der Behälterwand kann zu unzulässigen Deformierungen führen. Ein Abstützen oder Anheben des Druckgerätes über Anbauteile (z. B. el. Anschlussgehäuse oder Wärmedämmungen) ist nicht zulässig.

Alle Öffnungen wie Stutzen, Flansche usw. sind mit geeigneten Mitteln zu verschließen und dürfen nur durch fachkundiges Personal entfernt werden (Achtung: Dichtflächen nicht beschädigen!).

4. Montage

4.1. Aufstellungsbedingungen

Das Druckgerät ist so aufzustellen, dass Beschäftigte oder Dritte nicht gefährdet werden. Erforderliche Schutzabstände sind entsprechend den anwendbaren nationalen gesetzlichen Bestimmungen des Aufstellungslandes einzuhalten.

Das Druckgerät ist so aufzustellen bzw. zu montieren, dass

- es für ggf. notwendige Besichtigungen und Inspektionen zugänglich ist,

- das Kessel-/ Typschild gut erkennbar ist,

- die Bedienung des Druckgerätes und seiner Ausrüstung von einem sicheren Stand aus möglich ist.

Das Druckgerät ist so zu gründen, dass

- durch die Gründung selbst,

- durch das Eigengewicht des Druckgerätes einschließlich des Betriebsmediums oder des Druckprüfungsmediums (bei einer späteren Druckprüfung) und

- durch äußere Kräfte

keine unzulässigen Verlagerungen oder Neigungen eintreten können.

Das Druckgerät muss gegen mechanische Einwirkung von außen soweit geschützt sein, dass keine Beschädigungen an dem Druckgerät zu erwarten sind.

Das Druckgerät und seine Anbauteile sind vor Eingriffen Unbefugter zu schützen.

Besteht im Brandfall die Möglichkeit des Versagens drucktragender Wandungsteile, sicherheitstechnisch relevanter Ausrüstungsteile oder tragender Bauteile (Stahlstützen, Standzargen, Tragpratzen) vom Druckgerät durch unzulässige Erwärmung, sind entsprechende Schutzmaßnahmen (Brandverhütung, Brandschutz oder Brandbekämpfungsmaßnahmen) vorzusehen.

4.2 Anschluss des Druckgerätes

Das Druckgerät ist an den vorgesehenen Stutzen und Anschlüssen anzuschließen. Zusätzliche Einleitung von Kräften, Biegemomenten oder Schwingungen an Anschlussstutzen durch Rohrleitungsanschlüsse oder ähnliches sind zu vermeiden. Schweißtechnisch herzustellende Verbindungsnähte an Stutzen sind nach gültigen und anerkannten Schweißverfahren herzustellen und zu prüfen.

Zu verwendende Dichtungen müssen für den Betriebsfall geeignet sein.

Alle Schraubenbolzen mit Muttern müssen mit den dafür vorgesehenen Anzugsmomenten angezogen werden.

Es liegt in der Verantwortung des Betreibers, die Verträglichkeit zwischen Medium und Behälter- bzw. Dichtungswerkstoff zu gewährleisten.

5. Ausrüstung des Druckgerätes mit Begrenzungseinrichtungen

Um zu verhindern, dass die zulässigen Betriebsgrenzwerte wie z.B. Druck, Temperatur, Füllstand überschritten werden, muss das Druckgerät mit folgenden Begrenzungseinrichtungen ausgerüstet werden:

5.1 Regeleinrichtungen

Geeignete, von Hand bediente oder automatisch arbeitende Regel- und Steuereinrichtungen für die Einhaltung der Betriebsparameter, wie z.B. Mess-, Steuer- und Regeleinrichtungen (MSR). Druck-, Temperatur-, Standschalter, um die Betriebsbedingungen, während des bestimmungsgemäßen Betriebes innerhalb der zulässigen Minimal-/ Maximalgrenzwerte zu halten.

5.2 Überwachungseinrichtungen

Angemessene Überwachungseinrichtungen zur Überwachung der Betriebsparameter, wie z.B. Mess-, Steuer- und Regeleinrichtungen (MSR), Messwertanzeigen, Alarmeinrichtungen, Druck-, Temperatur- und Standschalter, die angemessenes manuelles oder automatisches Eingreifen ermöglichen, Korrekturmaßnahmen auslösen und/oder für das Abfahren und Verriegeln sorgen, um das Druckgerät innerhalb zulässiger Betriebsgrenzwerte zu halten.

5.3 Sicherheitseinrichtungen

Angemessene Sicherheitseinrichtungen wie z. B. Sicherheitsventile usw. oder sicherheitsrelevante MSR-Einrichtungen, die als letzte Gefahrenabwehrmaßnahme sicherstellen, dass die zulässigen Betriebsgrenzwerte nicht überschritten werden.

6. Inbetriebnahme

Die Inbetriebnahme darf erst erfolgen, wenn das Druckgerät

- ordnungsgemäß in eine Anlage montiert und entsprechende Begrenzungseinrichtungen vorgesehen und eingestellt sind,

- gemäß seinen Aufstellungsbedingungen errichtet wurde,

- auf seinen ordnungsgemäßen Zustand hinsichtlich der Montage, den Aufstellungsbedingungen und der sicheren Funktion geprüft wurde.

Die Prüfung vor Inbetriebnahme ist durch den Betreiber der Anlage zu veranlassen und in Deutschland in Übereinstimmung nach §14 der Betriebssicherheitsverordnung durchzuführen. In anderen Aufstellungsländern sind die entsprechenden nationalen Vorschriften für die Prüfung vor Inbetriebnahme zu beachten.

7. Betrieb

7.1. Allgemeine Hinweise

Der Betreiber hat das Druckgerät mit seinen Anbauteilen durch fachkundiges und unterwiesenes Personal zu betreiben und zu überwachen, so dass Beschäftigte oder Dritte nicht gefährdet werden. Schutzzonen sind einzuhalten. Der Betreiber muss entsprechende Betriebsanweisungen erstellen, damit das Bedien- und Wartungspersonal über den Betrieb des Druckgerätes bzw. der Anlage alle notwendigen Anweisungen erhält.

Entsprechende nationale Bestimmungen des Aufstellungslandes über den Betrieb des Druckgerätes sind zu beachten. Die spezifizierten max. zulässigen Temperaturen und / oder Drücke dürfen nicht überschritten werden.

7.2. Anfahrbetrieb

Das Druckgerät ist so anzufahren, dass sich aus dem Temperaturanstieg und / oder Druckanstieg keine unzulässigen Spannungserhöhungen ergeben.

Im Anfahrbetrieb ist das Druckgerät ständig zu beobachten und auf mögliche Leckagen hin zu überprüfen.

7.3 Normalbetrieb

Druckgeräte dürfen nur betrieben werden, wenn die sicherheitstechnisch erforderlichen Ausrüstungsteile auf Dauer wirksam sind und während des Betriebes nicht außer Funktion gesetzt werden oder in ihrer bestimmungsgemäßen Wirkung geändert werden.

7.4 Außerbetriebnahme

Das Druckgerät ist so abzufahren, dass sich aus dem Temperaturabfall und / oder Druckabfall keine unzulässigen Spannungserhöhungen ergeben.

7.5 Unsachgemäße Verwendung

Ergibt sich während des Betriebes des Druckgerätes ein unmittelbarer Gefahrenzustand z.B. durch einen unvorhergesehenen Reaktionsablauf oder durch eine gefährliche Einwirkung von außen, so sind die erforderlichen Gegenmaßnahmen zu ergreifen und ggf. das Druckgerät außer Betrieb zu nehmen.

Eine besondere Prüfung des Druckgerätes ist erforderlich, wenn bei der Betriebsstörung der zulässige Druck überschritten wurde und / oder die zulässige Betriebstemperatur überschritten bzw. unterschritten wurde oder das Druckgerät bzw. seine Anbauteile beschädigt worden sind.

8. Wartung und Instandhaltung

8.1 Allgemeine Angaben

Alle erforderlichen Maßnahmen für Inspektion, Wartung und Instandsetzung sind in Übereinstimmung mit den nationalen Bestimmungen des Aufstellungslandes sowie des Herstellers durchzuführen.

8.2 Schließen und Öffnen des Druckgerätes

Druckgeräte müssen so verschlossen werden, dass alle konstruktiv vorgesehenen Verschlüsse bestimmungsgemäß verwendet werden. Dichtflächen müssen sauber und unbeschädigt sein.

Verschlussschrauben dürfen nur vorsichtig und gleichmäßig so weit angezogen werden, wie es zum Abdichten erforderlich ist. Angegebene Anzugsmomente sind einzuhalten.

An unter Druck stehenden Druckgeräten dürfen Verschlussschrauben nur von hierfür unterwiesenem Personal unter Beachtung besonderer Vorsichtsmaßnahmen nachgezogen werden.

An dem unter Druck stehenden Druckgerät dürfen die Verschlussschrauben nicht gelöst werden.

Verschlüsse und Besichtigungsöffnungen am Druckgerät dürfen erst geöffnet werden, wenn der Druckausgleich mit der Atmosphäre hergestellt ist. Der Druckausgleich mit der Atmosphäre ist nach dem Schließen der Druckzuleitung und durch Entspannen bzw. Belüften unter Beobachtung des Druckmessgerätes herzustellen. Danach sind die Verschlussschrauben derart zu lockern, dass sie den Verschlussdeckel noch halten können. Anschließend ist dieser leicht anzulüften und so weit zu lockern, dass er nicht mehr auf seinem Sitz haftet.

Ist beim Öffnen von Verschlüssen mit einer Gefährdung durch austretendes Medium zu rechnen, sind besondere Schutzmaßnahmen, z.B. persönliche Schutzausrüstung erforderlich. Das Schließen oder Öffnen des Druckgerätes ist unter hohen Temperaturen verboten.

8.3 Wartung und Inspektion

Das Druckgerät ist regelmäßig durch fachkundiges Personal so zu warten, dass es bei den aufgrund der vorhergesehenen Betriebsweise zu erwartenden mechanischen, chemischen und thermischen Beanspruchungen auf Dauer dicht bleibt.

Entsprechend den Betriebsbedingungen und Erfahrungen sind vom Betreiber durch Betriebsanweisungen die notwendigen Maßnahmen für die Wartung und Inspektion festzusetzen.

Zu den Inspektions- und Wartungsarbeiten gehören insbesondere die Überwachung und Sicherstellung der

- Dichtheit
- Aufstellungsbedingungen und Schutzzonen
- Kennzeichnung
- ordnungsgemäßen Funktionsweise der Sicherheits-, Überwachungs- und Warneinrichtungen
- ordnungsgemäßer Zustand und Funktion der Anbauteile
- Zustand der Schweißnähte
- Wanddicke bei Korrosionsbeanspruchung.

8.4 Wiederkehrende Prüfung durch zugelassene Überwachungsstellen

Der Betreiber hat das Druckgerät bei Aufstellung in Deutschland nach der BetrSichV wiederkehrend einer Prüfung auf seinen ordnungsgemäßen Zustand zu unterziehen. In anderen Aufstellungsländern sind die jeweiligen anwendbaren nationalen Bestimmungen zu beachten.

Bei der Auslegung des Druckbehälters wurde ein statischer Betrieb angenommen.

Nach AD2000 S1 (Abschnitt 1.4) dürfen beliebig viele Teillastwechsel als Schwingbreite eine Druckschwankung von 10% des Designdrucks nicht übersteigen.

Nach DIN EN 13445-3 ist die Höhe beliebig vieler Teillastwechsel gemäß Formel 5.4-2 zu bewerten.

8.5 Instandsetzung / Reparatur

Alle schadhaften Verschlusselemente z.B. abgenutzte, rissige und verbogene Schrauben, ausgebrochene oder sonst beschädigte Muttern sowie beschädigte Dichtungen dürfen nicht mehr verwendet werden und sind durch gleichartige zu ersetzen.

Instandsetzungen, die die Sicherheit des Druckgerätes beeinträchtigen können, wie Maßnahmen, die die Werkstoffeigenschaften z.B. durch Schweißen, Kalt- und Warmverformungen verändern, dürfen nur in Übereinstimmung mit den nationalen Bestimmungen des Aufstellungslandes durchgeführt werden.

Sämtliche Instandsetzungen oder Reparaturen sind ausschließlich von qualifiziertem Fachpersonal durchzuführen und ggf. von einer autorisierten Stelle überprüfen zu lassen.

9. Mitgeltende Unterlagen

Der für das Druckgerät geltende Auslegungscode.

Bei Aufstellungsland Deutschland:

Betriebssicherheitsverordnung

Technische Regeln Druckbehälter (TRB)

Andere Länder:

Entsprechende nationale Bestimmungen

Beschreibung des Druckgerätes / Description of pressure equipment

Übersetzung, Original Deutsch; Translation, original German

This description of the pressure equipment also applies to the pressure equipment parts referred to below as the pressure equipment.

Contents

1. Intended Use

2. Scope of Delivery

3. Handling and Storage

4. Mounting

4.1. Installation requirements

4.2 Connecting the pressure equipment

5. Fitting Out the Pressure Equipment with Limiters

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8. Maintenance and Upkeep

8.1 General particulars

8.2 Opening and closing the pressure equipment

8.3 Maintenance and inspection

8.4 Recurrent testing by authorized monitoring agencies

8.5 Corrective maintenance / Repairs

9. Applicable Documents

1. Intended Use

The intended use relates to heating up a medium with consideration given to the operating conditions which need to lie within the prescribed limits of the attached specification.

The pressure equipment is designed, built and tested in compliance with the design code applying to this pressure equipment.

2. Scope of Delivery

Pressure equipment with both process connections and the attendant documentation (ELMESS Standard).

3. Handling and Storage

The pressure equipment is only to be handled in a de-pressurised state.

Exception: Delivery with a nitrogen filling

In the event of a delivery with a nitrogen filling the process connections are to be securely closed and provided with a pressure gauge. The following labelling is to be attached to the pressure equipment:

"Caution! Internal gauge pressure under 0.5 bar!“

"Caution! Nitrogen filling! Risk of suffocation! Ventilate before entering!“

Suitable attachment devices are to ensure that the surfaces/sealing surfaces are not deformed or adversely impaired during handling.

Handling is only to be undertaken on the flat-lying pressure equipment at the envisaged attachment points. The vessel is only to be lowered and stored on suitable supports provided with delivery (wooden bolsters). Concentrated loading of the vessel wall may give rise to non-permitted deformations. Using add-on parts (e.g. el. terminal connection housings or thermal insulation) to prop up or lift the pressure equipment is not permitted.

All openings such as nozzles, flanges etc. are to be closed with suitable appliances and are only to be removed by personnel with the required knowledge (Note: do not damage the sealing surfaces!).

4. Mounting

4.1. Installation requirements

The pressure equipment is to be installed such that there is no danger to either those employed or third parties. Requisite safe distances are to be kept to in keeping with the applicable, national statutory requirements of the country of installation.

The pressure equipment is to be installed and or mounted such that

- it can be accessed for any required inspections and examinations

- the boiler/name plate can be readily seen

- it is possible to operate the pressure equipment and its fittings from a safe distance.

The pressure equipment is to be set down such that

- on account of the setting down itself

- on account of the intrinsic weight of the pressure equipment inclusive of the operating media or the pressure testing medium) and

- on account of external forces

no non-permitted displacements or inclinations arise

The pressure equipment needs to be protected from external mechanical action to the extent that no damage is expected at the pressure equipment.

The pressure equipment and its add-on parts are to be protected from the tampering of unauthorised persons.

Given the risk of failure of pressure-bearing wall parts, safety-relevant equipment parts or structural parts (steel girders, upright frames, supporting outriggers) of the pressure equipment due to non-permitted heating in the event of fire, then appropriate protective steps (fire prevention, fire protection or fire-fighting measures) are to be provided.

4.2 Connecting the pressure equipment

The pressure equipment is to be connected to the envisaged nozzles and connectors. Bringing in additional forces, bending moments and oscillations at connection nozzles from piping connections or the like is to be avoided. Connection welds at nozzles are to be undertaken and examined in line with the valid and accepted welding procedures.

Seals to be used must be for the operating case in point.

All stud bolts with nuts must be tightened to the tightening torques envisaged for this.

The operator is responsible for ensuring that the medium and the container or sealing substance are compatible.

5. Fitting Out the Pressure Equipment with Limiters

The pressure equipment needs to be fitted out with the following limiters to prevent the permitted operating limits such as pressure, temperature and filling level from being exceeded:

5.1 Control equipment

Suitable controlling equipment either manually or automatically operated for keeping to the operating parameters - such as instrumentation & control systems. Pressure, temperature and level switches to keep the operating conditions within the permitted minimum/maximum limits during the intended operation.

5.2 Monitoring equipment

Appropriate monitoring equipment for monitoring operating parameters such as instrumentation & control systems, measured value indicators, alarms, pressure, temperature and levels switches. They, in turn, provide for appropriate manual or automatic access, trigger corrective steps and/or ensure shut down and locking so as to keep the pressure equipment within the permitted operating limits.

5.3 Safety equipment

Suitable safety equipment such as safety valves or safety-relevant instrumentation & control equipment which - as a final step warding off hazards - ensures that the permitted operating limits are not exceeded.

6. Commissioning

Commissioning is only to be undertaken when the pressure equipment

- is properly fitted in a plant and the appropriate limiters are both provided and set

- has been set up in keeping with its conditions of installation

- has been checked as to a proper state in terms of mounting, conditions of installation and an assured function.

The plant operator is to arrange for the pre-commissioning inspection . In Germany it is to be carried out in accordance with §14 of the Operating Safety Ordinance. In other countries where installation is undertaken, a note is to be made of the national provisions for pre-commissioning inspection.

7. Operation

7.1. General pointers

Making use of competent and instructed personnel, the plant operator is to both operate and monitor the pressure equipment inclusive of its add-on parts such that those employed or thirdparties are not faced with hazards. Safety zones are to be adhered to. The plant operator needs to prepare all requisite operating instructions on the operation of the pressure equipment and/or plant for the operating and maintenance personnel

Attention is to be given to the national requirements of the country of installation in question on operating the pressure equipment. The specified max. permitted temperatures and/or pressures must not be exceeded.

7.2. Startup operation

Starting up the pressure equipment is to be such that no non-permitted stress peaks develop from the rise in temperature and/or pressure.

During startup the pressure equipment is to be constantly monitored and checked as to possible leakage.

7.3 Normal operations

Pressure equipment is only to be operated when the safety-relevant required equipment parts remain constantly effective, are not placed out of service during the operation or their intended action is not modified.

7.4 Taking out of operation

Shutting down the pressure equipment is to be such that no non-permitted stress peaks arise from the drop in temperature and/or pressure.

7.5 Incorrect use

If an immediate hazardous situation comes to light when the pressure equipment is operated - due, for instance, to an unscheduled reaction sequence or a hazardous intervention from outside - then the required counter measures are to intervene and the pressure equipment is possibly to be taken out of service.

The pressure equipment is to be subjected to a particular inspection should the permitted pressure in the event of operating trouble be exceeded and/or the permitted operating temperature be exceeded or fallen short of or damage be incurred by the pressure equipment and/or its add-on parts.

8. Maintenance and Upkeep

8.1 General particulars

All requisite steps for inspection, maintenance and corrective maintenance are to be implemented in accordance with the national specifications of the country of installation and of the manufacturer.

8.2 Opening and closing the pressure equipment

Pressure equipment is to be securely closed such that all the design-envisaged closure plugs are used as intended. Sealing surfaces must be clean and undamaged.

Screw plugs are only to be tightened both carefully and uniformly to the extent as is required for sealing purposes. The specified tightening torques are to be adhered to.

Screw plugs on pressurized pressure equipment are only to be tightened by personnel instructed to do this and with attention paid to any particular precautionary steps.

Screw plugs must not be undone on pressurized pressure equipment.

Only when the pressure is at the atmospheric pressure level are closure plugs and inspection ports to be opened. Once the pressure supply line is closed, matching the pressure to that of the atmosphere is done by de-pressurizing and /or venting. The screw plugs are then to be slackened such that they still hold the cap plug. This cap plug is then to be slightly vented and loosened such that it no longer adheres to its fitting.

Specific protective measures such as personal protective gear, are needed if a hazard is posed by fluid emerging when the closure plugs are opened. The pressure equipment must not be closed or opened under high temperatures.

8.3 Maintenance and inspection

Regular maintenance undertaken on the pressure equipment by competent personnel is to be such that it remains constantly seal-tight under the mechanical, chemical and thermal stresses and loads associated with the envisaged mode of operation.

In keeping with the operating conditions and findings made, the plant operator is to establish the required maintenance and inspection steps in the operating instructions.

In particular, inspection and maintenance includes ensuring and monitoring

- seal-tightness
- conditions of installation and safety zones
- labelling
- proper functioning of the safety, monitoring and warning equipment
- proper condition and functioning of the adds-on parts
- state of the welds
- wall thickness if subject to corrosion.

8.4 Recurrent testing by authorized monitoring agencies

According to §15 of the BetrSichV (Operating Safety Ordinance) the plant operator is to subject the pressure equipment installed in Germany to a recurrent test as to being in a proper condition. The respective national requirements are to be applied in other countries where installation has taken place.

The pressure vessel was designed, assuming static operation.

According to AD2000 S1 (section 1.4), any number of partial load changes as the vibration width must not exceed a pressure fluctuation of 10% of the design pressure.

According to DIN EN 13445-3, the height of any number of partial load changes shall be evaluated in accordance with Formula 5.4-2.

8.5 Corrective maintenance / Repairs

All faulty closure elements such as worn, cracked and bent screws, broken or otherwise damaged nuts and damaged seals must cease to be used and are to be replaced.

Corrective maintenance possibly adversely affecting the safety of the pressure equipment, such as steps which change material properties through, for instance, welding and cold and heat deformation , is only to be carried out in compliance with the national requirements of the country of installation.

Only qualified technical staff are to carry out corrective maintenance and repairs which, if need be, are to be inspected by an authorised agency.

9. Applicable Documents

The design code applying to the pressure equipment

In the case of installation in Germany:
Operating Safety Ordinance
Technical norms for pressure vessels (TRB)

In other countries:
The respective national requirements

Heizkörper
C63-AQU-QIX-002 516 / 917

Spezifikation

ELMESS THERMO SYSTEM TECHNIK

Kunde	AQUAGAS Sweden AB	Datum	06.06.2023	Rev00
Fabrik Nr.	23-0314 - 001 - 007	Anzahl	7	
Auftrag Nr. / Position	02-23-0314 - 1	Kunden Angaben		
Artikel Nr.	60006709			
Bezeichnung	Ex-Flanschheizkörper	Typ	**DHG81B03GG-12-T1**	

1 Schutzart IEC/EN 60529		IP 66				
2 Ex-Kennzeichnung Zündschutzart						
IEC/EN 60079		(Ex) II 2G Ex db eb IIC T1 Gb				
IEC/EN 60079-31						
EU-Baumusterprüfbescheinigung | IECExZertifikat		IBExU 15 ATEX 1019 X			IECEx IBE 15.0003 X	
EU Konformitätserklärung		ELM 20-003				
3 Elektrische Daten und Anschluss						
Leistungsgruppen	E1	Gesamt	Gruppe 1	Gruppe 2	Gruppe 3	Gruppe 4
Bemessungsleistung		12 kW				
Bemessungsstrom		17,5 A				
Vorsicherung		25 A				
Bemessungsspannung		400 V 3/PE 50/60 Hz				
Spezifische Oberflächenbelastung		1,3 W/cm²				
Steuerstromkreis Temperaturüberwachung		max. 10 A; 230 V 1/N/PE 50/60 Hz				
Steuerstromkreis weitere Überwachungsgeräte		----				
Antikondensationsheizung	E2	----				
Anschlussschaltplan		16-1478-40				
Anschlussquerschnitt Laststromkreis		6/4 mm²				
Anschlussquerschnitt Steuerstromkreis		max. 6/4 mm²				
Kabeleinführung Laststromkreis / Material		1x M25x1,5; für Kabel-ø 9…17 mm / PA		Anzugsdrehmoment: 5,5 Nm		
Kabeleinführung Laststromkreis / Material		----				
Kabeleinführung Steuerstromkreis / Material		1x M25x1,5; für Kabel-ø 9…17 mm / PA		Anzugsdrehmoment: 5,5 Nm		
Kabeleinführung Gehäuseheizung / Material		----				
4 Schutzsystem						
Temperaturüberwachung	B1	TB = T1 - wirksam auf Heizelementoberfläche				
Isolations- bzw. Fehlerstromüberwachung		min. 50 Ω pro Volt bzw. max. 100 mA				
Strömungsüberwachung	B3	----				
weitere Überwachungsgeräte bzw. Sensoren						
Temperatur Wächter, Regler	B2	TR = 20…500 °C - wirksam auf Heizelementoberfläche				
Temperatur Wächter, Regler	B4	----				
5 Abmessungen						
Massblatt / Zeichnung		08-967-20				
Einbaulänge L		1600 mm				
Unbeheizte Länge Lu		150 mm				
Temperaturabfall Länge Lt		250 mm				
Heizbündeldurchmesser		98 mm				
Scheibenabstand		250 mm				
Flansch		EN 1092-1 / 05 / B1 / DN100 / PN63 / b=38 mm				
6 Werkstoffe / Oberfläche						
Heizbündel		1.4541		metallisch blank		
Patronenmantel		----		----		
Flansch		1.4541		metallisch blank		
Gehäuse		EN-GJL-250		lackiert mit	Hammerschlag	
7 Betriebsdaten						
Medium / Volumenstrom		Wasserstoff		/ max. 100 m³/h i.N.		
Betriebsdruck		max. 45 bar				
Arbeitstemperatur		30….180 °C				
Umgebungstemperatur / max. Gehäuseinnentemp.		-20 ... +50 °C		/ 80 °C		
Einbau		im Aggregat, Tank oder Behälter; Heizkörper senkrecht; Anschlussgehäuse oben; Kabeleinführung seitlich nach vorn; H 180, V 0				
8 Auslegungsdaten						
Auslegungscode		DGRL 2014/68 EU AD 2000				
Maximal zulässiger Betriebsüberdruck (PS)		-0,5/+45 bar				
Zulässige Temperatur min. / max. (TS)		-20 / +450 °C				
Fluidgruppe / Diagramm		1 / 1				
Kategorie / Modul		geeignet für Einbau in Behälter Kategorie IV				
Abnahme / Zeugnis / Protokoll		TÜV / EN 10204-3.1		/ 23-0314 - 1		
9 Dokumentation						
Sprache		deutsch	/	englisch	/	----
Betriebsanleitung		DH...; EH...				
10 Bemerkungen		mit CCOE - Zertifikat				
11 Interne Angaben		Prüfdruck:	89 bar			
RHK: Anzahl Form; Schaltung; Typ		12 H; YP; NR 374V 42G / 1000W / 230V				
Lot / Schweißzusatz / RHK-ø		A 314 / 2.4831 / 8,5 mm				
Projektleiter / Sachbearbeiter		Hr. Kern		Hr. Drögemüller		

Heater
C63-AQU-QIX-002 517 / 917

Specification
Translation, Original German

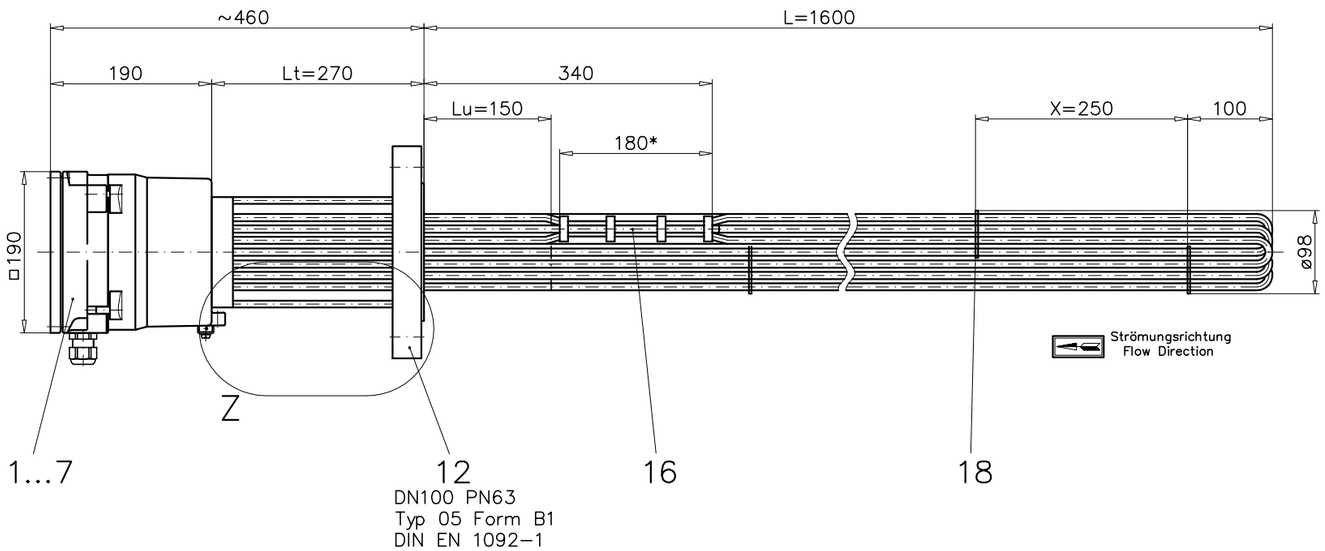
ELMESS THERMO SYSTEM TECHNIK

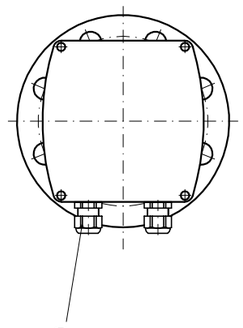
Client	AQUAGAS Sweden AB	Date	06.06.2023	Rev00
Fabric No.	23-0314 - 001 - 007	Piece	7	
Order No. / Position	02-23-0314 - 1	Client details		
Article No.	60006709			
Name	Ex-Flanged Heater	Type	**DHG81B03GG-12-T1**	

1 Degree of Protection IEC/EN 60529		IP 66				
2 Ex Marking and Type of Protection						
IEC/EN 60079		(Ex) II 2G Ex db eb IIC T1 Gb				
IEC/EN 60079-31						
EU Type Examination Certificate | IECEx Certificate		IBExU 15 ATEX 1019 X			IECEx IBE 15.0003 X	
EU Declaration of Conformity		ELM 20-003				
3 Electrical data and connection						
Power groups	E1	Complete	Group 1	Group 2	Group 3	Group 4
Rated power		12 kW				
Rated current		17,5 A				
Back up fuse		25 A				
Rated voltage		400 V 3/PE 50/60 Hz				
Specific surface load		1,3 W/cm²				
Control circuit temperature monitoring		max. 10 A; 230 V 1/N/PE 50/60 Hz				
Control circuit additional monitoring devices		----				
Anti condensation heater	E2	----				
Connection diagramm		16-1478-40				
Connection cross section power circuit		6/4 mm²				
Connection cross section control circuit		max. 6/4 mm²				
Cable entry power circuit / material		1x M25x1,5; for cable-ø 9…17 mm / PA		tightening torque: 5,5 Nm		
Cable entry power circuit / material		----				
Cable entry control circuit / material		1x M25x1,5; for cable-ø 9…17 mm / PA		tightening torque: 5,5 Nm		
Cable entry anti condensation heater / material		----				
4 Protection system						
Temperature monitoring	B1	TL = T1 - effective on heating element surface				
Isolation resp. residual current device		min. 50 Ω per voltage resp. max. 100 mA				
Flow monitoring device	B3	----				
Additional monitoring devices or sensors						
Temperature monitor, regulators	B2	TR = 20…500 °C - effective on heating element surface				
Temperature monitor, regulators	B4	----				
5 Dimensions						
Dimension sheet / drawing		08-967-20				
Installation length L		1600 mm				
Unheated length Lu		150 mm				
Temperature reduct. length Lt		250 mm				
Heating bundle diameter		98 mm				
Distance of sheets		250 mm				
Flange		EN 1092-1 / 05 / B1 / DN100 / PN63 / b=38 mm				
6 Material & Surface						
Heating elements		1.4541		metallic bright		
Cartridge pipe		----		----		
Flange		1.4541		metallic bright		
Connection enclosure		Cast iron		varnished with	Hammerschlag	
7 Operation data						
Medium / flow rate		Hydrogen		/ max. 100 m³/h i.N.		
Operating pressure		max. 45 bar g				
Working temperature		30….180 °C				
Ambient temperature / max. housing temperature		-20 ... +50 °C	/ 80 °C			
Mounting position		in aggregate, tank or container; Heater vertical; connection casing on top; cable glands at front side; H 180, V 0				
8 Design data						
Design code		PED 2014/68 EU AD 2000				
Allowable operating pressure		-0,5/+45 bar g				
Allowable temperature min. / max.		-20 / +450 °C				
Fluid group / diagramm		1 / 1				
Category / module		suitable for mounting in pressure vessels up to Category IV				
Inspection / certificate / report		TÜV / EN 10204-3.1		/ 23-0314 - 1		
9 Documentation						
Language		german	/	english	/	----
Operation manual		DH...; EH...				
10 Remarks		inclusive CCOE - certificate				
11 Internal remarks		Test pressure:	89 bar g			
Heating elements: pieces; shape; wiring; type		12 H; YP; NR 374V 42G / 1000W / 230V				
Solder / welding filler / heating elements diameter		A 314 / 2.4831 / 8,5 mm				
In charge / Project team		Mr. Kern		Mr. Drögemüller		

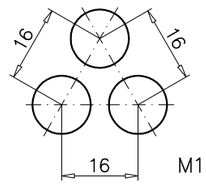
C63-AQU-QIX-002 518 / 917

* 1x Temp.–Regler/Begrenzer als Überhitzungsschutz auf Oberflächentemperatur wirksam (geklammert).
1x Temp. regulator/limiter effective on heating element surface temperature (cramped).



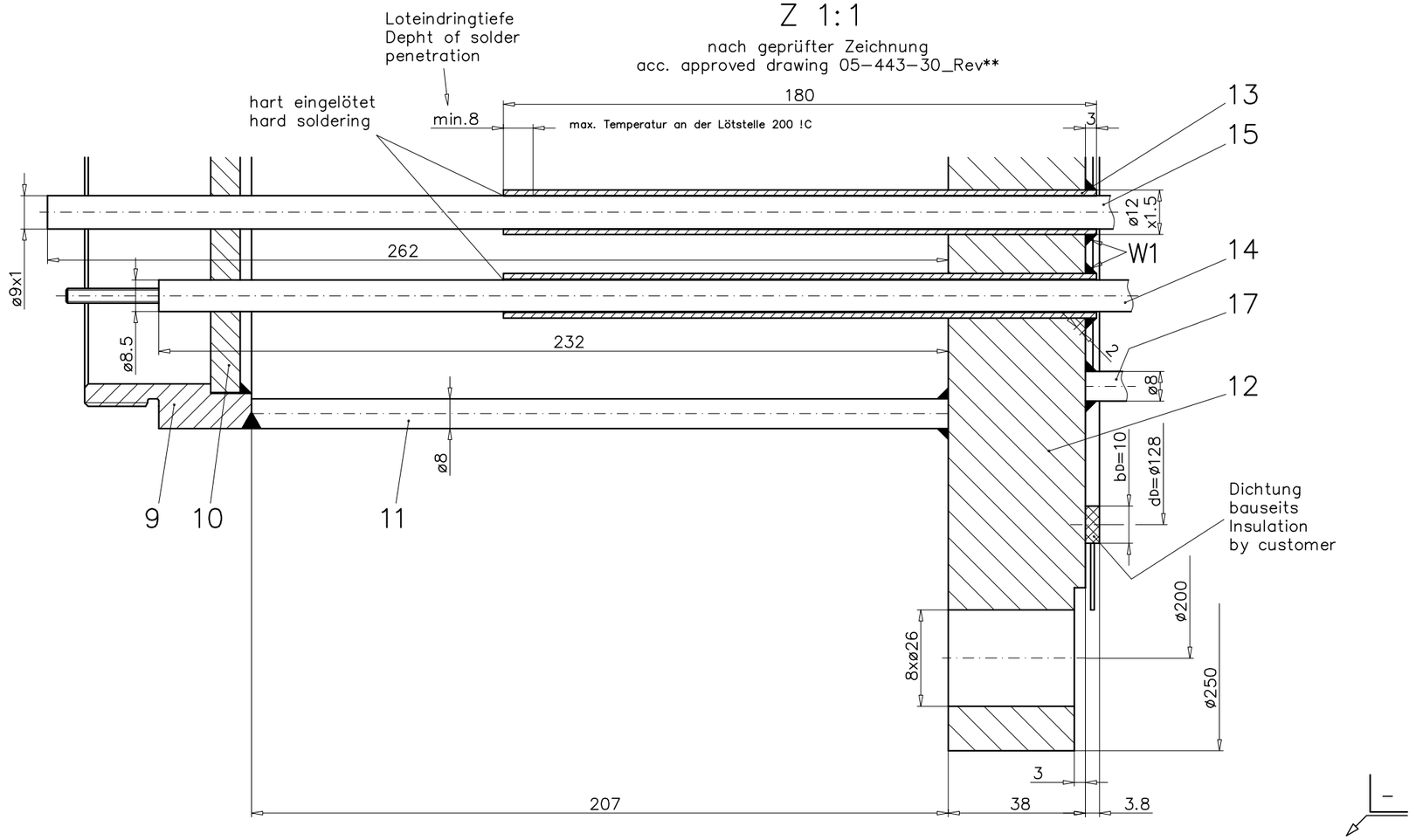


Anordnung der Rohrplattenbohrungen
Arrangement of tube plate holes



Rohrplatte voll berohrt
Tube plate complete with tubes

– alle Bohrungen ø12,2
– all holes ø12,2
– alle Bohrungen in Dreiecksanordnung (t=16)
– all holes in triangle arrangement (t=16)



Allgemeine Daten	Reference data		
Abnahme	Inspection	:	TÜV
Fabrik–Nr.	Serial.–no.	:	23–0314–001...07
Bestell–Nr.	Order–no.	:	–
Gewicht	Weight	:	~35 kg
Inhalt	Content (V)	:	– L
Baujahr	Year of construction	:	2023
Auslegungsdaten	**Design data**		
Auslegungsvorschrift	Design code	:	DGRL(PED) 2014/68/EU, AD 2000
Fluidgruppe / Diagramm	Fluid group / Diagram	:	1 / 1
Kategorie / Modul	Category / Modul	:	geeignet für Einbau in Behälter bis Kategorie IV suitable for mounting in pressure vessels up to category IV
zul. min./max. Temperatur	allow. min./max. Temp. (TS)	:	–20/+450°C
max. zul. Druck	max. allow. pressure (PS)	:	–0,5/+45 bar g
Prüfdruck	Test pressure	:	87 bar g
Medium	Fluid	:	Hydrogen, directly heated
Sicherheitsbeiwert	Safety factor	:	1,5
Abnutzungszuschlag	Corrosion allowance	:	0 mm
Elektrische Daten	**Electrical data**		
Leistung	Output	:	12 kW
Spannung	Voltage	:	400V3~ 50 Hz
Schutzart	Protection	:	(Ex) II 2G, Ex db eb IIC T1
Fertigungsangaben	**Manufacture data**		
Schweißverfahren	Type of welding	:	14*
Schweißzusatzwerkstoff	Electrode	:	Vd TÜV–Kennblatt zugelassen W = 2.4831
Schweißfaktor	Joint efficiency	:	0,85
Lötart	Type of soldering	:	hart, auf metallisch reiner Oberfläche hard on metallically clean surface
Lot	Solder	:	A 314
Schweißverfahrensprüfungen	Welding procedure approval	:	AD 2000 HP 2/1 / DIN EN ISO 15614–*
Schweißerqualifikation	Welders performance qualific.	:	AD 2000 HP 3 / ISO 9606–1
Herstellerqualifikation	Manufacture qualification	:	AD 2000 HP 0
Kaltwasserdruckprobe	Hydraulic pressure test	:	AD 2000 HP 30 (mit/with 87 barg)
Zerstörungsfreie Prüfungen	NDE	:	AD 2000 HP 5/3 –Farbeindringprüfung W1 = 100% Dye penetration test W1 = 100%
Oberflächenbehandlung	**Surface Treatment**		
Anschlußgehäuse	Casing	:	lackiert / varnished
Flansch	Flange	:	metallisch blank / metallic bright
Heineinsatz	Heating inset	:	metallisch blank / metallic bright

REVISION	Datum	Name	Geprüft	Art der Änderung
△				
△				
△	.	.	.	.

Maße ohne Toleranzangabe nach DIN ISO 2768–mK für Einzelteile / nach Q157/EN ISO 13920–C für Behälter

Ex–Flanschheizkörper/Ex–Flanged Heater

DHG81B03GG–12–T1

Maßstab 1:5 (A2)

ELMESS THERMO SYSTEM TECHNIK Nordallee 1 D – 29525 Uelzen

	2023	Tag	Name
Gezeich.		02.03.	Drögemüller
Geprüft			
Ex–Schutz			
Schweißtechn.			

Werkstoff: gem. Stückliste / acc. part list

Auftrags–Nr. 02–23–0314–1

Zeichn.–Nr. 08–967–20 REV 00

Artikelnr.: 60006709 | Ausgabe: 02.03. AD

EGB: IBExU 15 ATEX 1019 X | PrüfZchg.:

Alle Rechte gem. DIN ISO 16016 vorbehalten

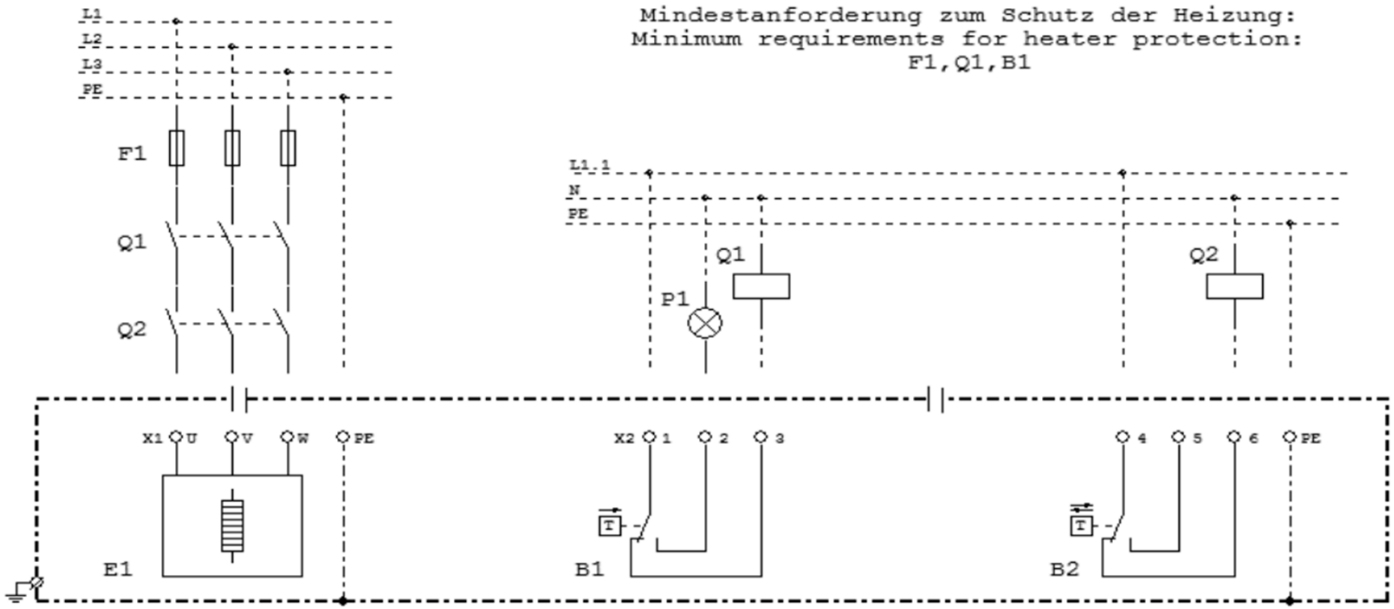
CAD\08\08–967–20_Rev00

Version 23.01.2020 Fr

alt:

Elektrische Schaltung Heizung
Electrical diagram heater

Typ / Type	DHG81B03GG-12-T1		
Bemessungsleistung / Rated power	12 kW	Auftrag Nr. / Order No.	23-0314 - 1
Bemessungsspannung / Rated voltage	400 V 3/PE 50/60 Hz	Kunde / Customer	AQUAGAS Sweden AB
Bemessungsstrom / Rated current	17,5 A	Schaltplan-Nr. / Diagram No.	16-1478-40
Vorsicherung / Back up fuse	25 A		



Ex-Flanschheizkörper

TB = T1 - wirksam auf Heizelementoberfläche

TR = 20…500 °C - wirksam auf Heizelementoberfläche

Ex-Flanged Heater

TL = T1 - effective on heating element surface

TR = 20…500 °C - effective on heating element surface

ELMESS THERMO SYSTEM TECHNIK	**Prüfprotokoll / Test Report**				Q065_Rev01

Kunde / Customer

AQUAGAS Sweden AB

Fabriknummer / Fabrication No.	***23-0314-001***	***23-0314-002***	***23-0314-003***	***23-0314-004***	***23-0314-005***	***23-0314-006***	***23-0314-007***
Auftrag Nr. / Order No.	***02-23-0314 - 1***						
Artikelnummer / Article No.	***60006709***						
Typ / Type	***DHG81B03GG-12-T1***						
Schutzart / Degree of protection	IP ***66***						
Ex-Kennzeichnung & Zündschutzart / Ex-Marking & Type of Protection EN 60079, EN 61241	(Ex) II 2G / Ex db eb IIC T1 Gb						

Technische Daten / Technical data

Stufe, Gruppe / Stage, Group	***1***	***1***	***1***	***1***	***1***	***1***	***1***
Bemessungsleistung / Nominal Power [kW]	***12***	***12***	***12***	***12***	***12***	***12***	***12***
Bemessungsspannung / Nominal voltage 50 / 60 Hz [V]	***400/3~/N/PE***	***400/3~/N/PE***	***400/3~/N/PE***	***400/3~/N/PE***	***400/3~/N/PE***	***400/3~/N/PE***	***400/3~/N/PE***
Bemessungsstrom / Nominal current [A]	***17,5***	***17,5***	***17,5***	***17,5***	***17,5***	***17,5***	***17,5***
spezifische Oberflächenbelastung / specific surface load [W/cm²]	***1,3***	***1,3***	***1,3***	***1,3***	***1,3***	***1,3***	***1,3***
Steuerstromkreis / Control circuit	***max. 10A; 230V 1N/PE 50/60 Hz***						
Gehäuseheizung / Anticondensation heater [W]; [V]	***n.a.***						

Schutzsystem / Protection system

Schutz-Temperatur-Begrenzer / Thermal cut out eBW7***			***n.a.***
Temperaturbegrenzer / Temperature limiter	B1	[°C]	***20…500 Oberfläche/surface***
Temperaturregler / Temperature regulator	B2	[°C]	***20…500 Oberfläche/surface***
Temperaturwächter / Temperature monitor			***n.a.***
Temperaturfühler / Temperature sensor			***n.a.***
Messumformer / Transmitter			***n.a.***

weitere Überwachungsgeräte, Sensoren / additional monitoring devices, sensors

Schutz-Temperatur-Begrenzer / Thermal cut out eBW7***	***n.a.***
Temperaturbegrenzer / Temperature limiter	***n.a.***
Temperaturregler / Temperature regulator	***n.a.***
Temperaturwächter / Temperature monitor	***n.a.***
Temperaturfühler / Temperature sensor	***n.a.***
Messumformer / Transmitter	***n.a.***

Einbaulage / Mounting Position

Kabeleinführung von unten / Cable entry from bottom side	***H 180***
Heizkörper senkrecht (Anschlussgehäuse oben)Heater Vertikal (Connection Box from top)	***V 0***



Grafik

Messungen / Measurements

Widerstand Heizung / Resistance Heater		[Ω]	***24,1***	***24,2***	***24,0***	***24,4***	***24,5***	***24,4***	***24,5***
Hochspannung / High voltage	***60sec.***	[V]	***1800***	***1800***	***1800***	***1800***	***1800***	***1800***	***1800***
Ableitstrom / Fault current		[mA]	***14,2***	***14,3***	***14,3***	***14,2***	***14,3***	***14,3***	***14,3***
Isolation / Isolation		[V]	***1000***	***1000***	***1000***	***1000***	***1000***	***1000***	***1000***
Isolationswiderstand / Isolation resistance		[MΩ]	***10000***	***10000***	***10000***	***10000***	***10000***	***10000***	***10000***
Einstellung Schutz-Temperatur-Begrenzer eB*6*** TB/TR Adjustment Thermal cut out eB*6*** TL/TR		[°C]	***n.a.***						
Einstellung Begrenzer / Limiter adjustment		B1 [°C]	***400***	***400***	***400***	***400***	***400***	***400***	***400***
Werkseinstellung Regler / Regulator adjustment		B2 [°C]	***300***	***300***	***300***	***300***	***300***	***300***	***300***
Werkseinstellung Wächter / Monitor adjustment			***n.a.***						
Lage heißester Punkt / Position of Hot Spot LM1		*mm*	***-***						
Temperatur heißester Punkt / Hot spot temperature		M1	***<T1***	***<T1***	***<T1***	***<T1***	***<T1***	***<T1***	***<T1***

Prüfung / Test ***31.05.2023*** durch / by ***SBo***

Prüfzeichen - Unterschrift / Test mark - Signature

S. Borchers

Elmess Thermosystemtechnik GmbH & Co. KG, Nordallee 1, 29529 Uelzen

ELMESS
THERMO SYSTEM TECHNIK

EU Konformitätserklärung
EU Declaration of Conformity

Erklärung von / *Declaration of*

ELMESS-Thermosystemtechnik GmbH & Co. KG
Nordallee 1
D-29525 Uelzen

Hiermit wird erklärt, dass das Druckgeräteteil / *We herewith declare that the pressure apparatus part*

Ex-Flanschheizkörper, Typ / *Ex-Flanged Heater, type*

DHG81B03GG-12-T1

Fabrik-Nr. / *Fabric.-No.*

23-0314-001...007

(Erzeugnis, Typ, Beschreibung / *Good, type, description)*

in Übereinstimmung mit den Anforderungen gemäß Druckgeräterichtlinie 2014/68/EU (geeignet für den Einbau in Druckbehälter bis Kategorie IV) sowie Europäischer Normen bzw. nationaler Normen entwickelt und hergestellt worden ist / *has been designed, manufactured and tested in agreement according to PED 2014/68/EU (suitable for mounting in pressure vessels up to Category IV) and European Standards resp. national Standards.*

ELMESS-Thermosystemtechnik GmbH & Co. KG
Apparate + Heizungen / - Apparatus + Heaters

Uelzen, 06.06.2023

i.V.

TÜVNORD

Prüfbericht über die Abnahme von Druckgeräten / Druckgeräteteilen

Final assessment report for pressure equipment / parts of pressure equipment

Kontakt: Contact: **IMHamburg@tuev-nord.de**	Prüfbericht-Nr.: Test report no.: **0045/202/1204/P/00140/23/D/001(00)**
Modul: Module: **G** ☐ **F** ☐ **B (Baumuster)** (Production type) ☐ **ohne** without ☒	Auftrags-Nr.: Order no.: **8121334183**
Hersteller/Inverkehrbringer: Manufacturer/ distributor: **Elmess-Thermosystemtechnik GmbH & Co. KG Nordallee 1 29525 Uelzen**	Fertigungsstätte: Manufacturing plant: **siehe Hersteller see manufacturer**

☐ **Druckbehälter** Vessel
☐ **Überhitzungsgefährdetes Druckgerät** Fired or otherwise heated pressure equipment
☐ **Druckhaltendes Ausrüstungsteil** Pressure accessories
☐ **Rohrleitung** Piping
☐ **Ausrüstungsteil mit Sicherheitsfunktion** Safety accessories
☒ **Druckgeräteteil** Part of pressure equipment

Herstell-Nr.: Manufacturing no.:	**23-0314-001 bis -007 (7 Stück)**	Herstellerzeichen: Manufacturer´s mark:	Kategorie: Category: **---**
Verwendungszweck: Application:	**Ex-Flanschheizkörper Type DHG81B03GG-12-T1**		Herstellungsjahr: Year of manufacture: **2023**

Raum Chamber		1	2	3
Min./max. zul. Druck Min./max. allowable pressure	PS [bar]	**-0,5 / +45**		
Min./max. zul. Temperatur Min./max. allowable temperature	TS [°C]	**-20 / +450**		
Volumen / Nennweite Volume / Nominal size	V/DN [L/--]	**-- / DN 100**		
Fluid Fluid		**---**		
Zul. Lastspielzahl Allowable number of load cycles		**1000**		
Druckschwankungsbreite Pressure fluctuation range	[bar]	**-0,5 / +45**		
Korrosionszuschlag Corrosion allowance	[mm]	**0,0**		

RICHTLINIE 2014/68/EU
DIRECTIVE

Prüfgrundlagen: Test specifications: ☒ AD 2000 ☐ **DIN EN 13445:2021-12** Normen: Standards: ☐

Abweichungen: Nonconformities: **keine/none**

VORLAUFENDE PRÜFUNGEN:
PREVIOUS TESTS:

EU-Baumusterprüfung
EU- type-examination

Baumuster Production type ☐ Entwurfsmuster Design type ☐

Prüfung des Entwurfs
Examination of design ☒

Notifizierte Stelle: Notified Body: **TÜV NORD Systems GmbH & Co. KG**

Adresse: Address: **Große Bahnstr. 31, 22525 Hamburg**

Zertifikat/Prüfbericht-Nr.: **0045/202/1334/P/00182/23/D/001(00)**
Certificate / report no.:

Datum: Date: **30.03.2023**

TEILBAUPRÜFUNG: **PARTIAL TESTING**: ☐
Beschreibung siehe Anlage Description see attachment ☐
Datum: Date:
Beschreibung der Teile (z.B. Pos. Nr.): Description of parts (e.g. item no.):
Inspektor: Inspector:

SCHLUSSPRÜFUNG: **FINAL INSPECTION:** ☒
Datum: Date: **29.06.2023**

Das Druckgerät/Druckgeräteteil entspricht Zeichnungs-Nr.: The pressure equipment/ part of pressure equipment conforms to drawing no.: **08-967-20 Rev. 0 vom 02.03.2023**

Änderungen: Deviations: ☐
Änderungen siehe Anlage For deviation see attachment ☐

DRUCKPRÜFUNG: **PROOF TEST**: ☒
Datum: Date: **26.04.2023**

Raum Chamber		1	2	3
Prüfdruck Test pressure	PT [bar]	**89**		
Druckmedium Fluid		**Wasser / water**		
Haltezeit Holding time	[min]	**30**		

TÜVNORD

Prüfbericht über die Abnahme von Druckgeräten / Druckgeräteteilen

Final assessment report for pressure equipment / parts of pressure equipment

Kontakt: Contact: IMHamburg@tuev-nord.de	Prüfbericht-Nr.: Test report no.: 0045/202/1204/P/00140/23/D/001(00)
Herstell-Nr.: Manufacturing no.: 23-0314-001 bis -007 (7 Stück)	

Nr.	MESSUNGEN/UNTERSUCHUNGEN/ERGEBNISSE MESSUREMENTS/EXAMINATIONS/TESTS/RESULTS	Erfüllt Fulfilled	Entfällt Not applicable	Anlage Annex	Bemerkungen Remarks
1	Werkstoffe Materials: EN-Norm ☒ PMA ☐ EAM ☐ EN-Standard	☒		☒	
2	Rückverfolgbarkeit der Werkstoffe (Zeugnisbelegung) Material traceability	☒		☒	s. Werkstoffzeugnisse see material certificates
3	Betriebliche Voraussetzungen Prerequisites of manufacturer DIN EN ISO 3834-2	☒	☐	☒	
4	Voraussetzung für nicht objektgebundene Prüfung Requirement for testing on not necessarily certain objects	☒	☐	☐	s. Nachweis gemäß HP 5/2 und HP 5/3 see verification doc. acc. to HP 5/2 and HP 5/3
5	Eignungsfeststellung Schweißzusätze Records of welding consumables	☒	☐	☒	2.4831 siehe "Herstellerordner"
6	Qualifikation des Fügepersonals Qualification of welding personnel DIN EN ISO 9606-1	☒	☐	☒	Schweißer Nr. / TNS Zert.-Nr.: Welder No./ TNS Cert.-No.: see list/
7	Qualifikation der Fügeverfahren Qualification of operating procedures DIN EN ISO 15614-1, DIN EN ISO 15607	☒	☐	☒	Zert.-Nr. TNS: see "Herstellerordner" Certificate no. TNS:
8	Arbeitsprüfungen gemäß AD 2000 HP 5/2 Production tests according to	☒	☐	☒	nicht objektgebunden not on specific objects
9	Nachweise über ZfP-Personal /Stufe 2 Records of NDT personnel/Level ☐ DIN EN 473, ☐ DIN EN ISO 9712	☐	☒	☐	objektgebunden on specific objects
10	Nachweise über zerstörungsfreie Prüfungen Records of non destructive tests.	☐	☒	☐	objektgebunden, zfP-Bericht liegt bei on specific object, NDT report enclosed
11	Wärmebehandlungsbelege Heat treatment records	☐	☒	☐	
12	Kalibrierung der Meß- und Prüfeinrichtungen Calibration of measuring and test equipment Verwendetes Manometer ☐ TNS, ☒ Hersteller Manufacturer pressure gauge used	☒	☐	☒	Kalibrierprotokoll des Herstellers Manufacturer´s calibration report Manometer Nr.:205004943 Pressure gauge no.:
13	Visuelle Prüfung / Maßprüfung Visual examination / Dimensional check	☒			
14	Kennzeichnung (Typenschild) Marking (name plate)	☒		☐	
15	Analyse d. Gefahren und Risiken (verbindlich) Analysis of hazards and risks (mandatory)	☒	☐	☐	checked during design examination
16	Betriebsanleitung hat vorgelegen (verbindlich) Operating instructions were available (mandatory)	☒	☐	☐	checked during design examination
17	Nachweise über Reparaturen Records of repairs	☐	☒	☐	
18	Konformitätserklärung / Entwurf (verbindlich) Declaration of Conformity / Draft (mandatory)	☐	☒	☐	

ERGEBNIS:
RESULT:

Die vorgenannten Prüfungen erfolgten in Übereinstimmung mit den Anforderungen der RL 2014/68/EU sowie den o.g. Prüfgrundlagen und ergaben keine Beanstandung.

The aforementioned tests were carried out in accordance with Directive 2014/68/EU as well as the aforementioned test specifications and did not result in any objections.

Kennzeichnung auf: Marking on: Fabrikschild ☐ Name plate; Flansch ☒ Flange; Behälterwand ☐ Shell; Vorgeschraubte Teile ☐ Screwed parts; ☐

Hinweise: Notes:

1. Die Prüfergebnisse beziehen sich ausschließlich auf den beschriebenen Prüfgegenstand. Eine auszugsweise Vervielfältigung des Prüfberichtes ohne schriftliche Freigabe der notifizierten Stelle ist nicht zulässig.
   All test results apply exclusively to the equipment described above. Duplication of parts of the test report is not permitted without the express written approval of the Notified Body.
2. An den Prüfgegenstand können weitere Anforderungen gestellt sein, wie z.B. Prüfungen vor Inbetriebnahme am Aufstellungsort oder die Einhaltung weiterer EU-Richtlinien.
   There may be additional requirements for example inspection before putting into service on site, or the fulfilment of further EU Directives.

Anlagen:
Attachment:
see table above

notified body TÜVNORD 0045 TÜV NORD Systems

Notifizierte Stelle für Druckgeräte
Notified body for pressure equipment

TÜVNORD

Digitally signed by Böhrnsen Jerik
Date: 2023.06.30 10:58:05 +02'00'

TÜV NORD Systems GmbH & Co. KG, Große Bahnstraße 31, 22525 Hamburg

TÜV®
Zur Verifizierung der Gültigkeit der digitalen Signatur ist die Installation des TÜV NORD GROUP Stammzertifikats notwendig.
To verify the validity of the digital signature the installation of the TÜV NORD GROUP root certificate is required.

C63-AQU-QIX-002 524 / 917

Government of India
Ministry of Commerce & Industry
Petroleum & Explosives Safety Organisation (PESO)
5th Floor, A-Block, CGO Complex, Seminary Hills,
Nagpur - 440006

E-mail : **explosives@explosives.gov.in**
Phone/Fax No : **0712 -2510248, Fax-2510577**

Approval No : A/P/HQ/MH/104/7585 (P551433) Dated : **17/05/2023**

To,

M/s. Elmess Thermosystemtechnik GmbH & Co KG,
Nordallee 1, 29525 Uelzen, Germany,Uelzen
29523 reinhard.wagner@elmess.de
GERMANY

Sub : Approval of Flame Proof Type Electrical Equipments under Petroleum Rules 2002- Regarding.

Sir(s),

Please refer to your letter No. **OIN1346392** dated **27/04/2023** on the subject.

The following Ex electrical equipment(s) manufactured by you according to **IEC 60079-0 : 2017, IEC 60079-1 : 2014-06,** standards and covered under **IBExU Institut für Sicherheitstechnik GmbH** Test reports mentioned below is/are approved for use in **Zone 1** of Gas **IIC** hazardous areas coming under the the Petroleum Rules, 2002 administered by this Organization.

Sr. No	Description	Safety Protection	Equipment reference Number	Test Agency			Drawing no
				Name	Certificate No.	Certificate Date	
1	Heater for gases type DHG... and EHG..., Heater for liquids type DHF... and EHF...and Heater in solid body type DHK... and EHK...	Ex db IIC or IIB or IIB+H2 T6.. T1 Gb	**P551433/1**	IBExU Institut für Sicherheitstechnik GmbH	IECEx IBE 15.0003X Issue No. 2	18/05/2020	As per Test Report

This Approval is granted subject to observance of the following conditions:-

1)The design and construction of the equipment shall be strictly in accordance with description, condition and drawings as mentioned in the IBExU Institut für Sicherheitstechnik GmbH Test Reports referred to above.

2)The equipment shall be used only with approved type of accessories and associated apparatus.

3)Each equipment shall be marked either by raised lettering cast integrally or by plate attached permanently to the main structure to indicate conspicuously:-
(a) Name of the manufacturer
(b) Name and number by which the equipment is identified.
(c) Number & date of the test report of the IBExU Institut für Sicherheitstechnik GmbH applicable to the equipment.
(d) Equipment reference number of this letter by which use of apparatus is approved.
(e) Protection level.

4) A certificate to the effect that the equipment has been manufactured strictly in accordance with the drawing referred to in the IBExU Institut für Sicherheitstechnik GmbH Test report and is identical with the one tested and certified at IBExU Institut für Sicherheitstechnik GmbH shall be furnished with each equipment.
5) The customer shall be supplied with a copy of this letter, an extract of the conditions and maintenence schedule, if any, recommended by IBExU Institut für Sicherheitstechnik GmbH in their test reports and copy of instructions booklet detailing operation & maintenance of the equipment so as to maintain its Flame Proof characterestics.
6) The After sales service and maintanance of subject equipment shall be looked after by your representative Absolute Expansion Engineering, Gut no.830,Near to Mahindra CIE, Ambethan, Phase-4, MIDC, Chakan, Maharashtra 410501

This approval also covers the permissible variations as approved under the IBExU Institut für Sicherheitstechnik GmbH test reports referred above. This approval is liable to be cancelled if any of the conditions of the approval is violated or not complied with . The approval may also be amended or withdrawn at any time, if considered necessary in the interest of safety.

The field performance report from actual users/your customers of the subject equipment may please be collected and furnished to this office for verification and record on annual basis.
The Approval is Valid upto **31/12/2027**

Yours faithfully,

(K. Thiagarajan)
Jt. Chief Controller of Explosives
For Chief Controller of Explosives
Nagpur

Copy to :
1. Jt. Chief Controller of Explosives, West Circle, MUMBAI
2. Absolute Expansion Engineering,Gut no.830,Near to Mahindra CIE, Ambethan, Phase-4, MIDC, Chakan, Maharashtra 410501

for Chief Controller of Explosives
Nagpur

(For more information regarding status,fees and other details please visit our website http://peso.gov.in)

This is System Generated document. Signature is not required.

Digitally signed by K THIAGARAJAN
Reason: Approval No. : A/P/HQ/MH/104/7585
Location:Nagpur [P551433]
Date:17-05-2023 18:11:17 PM

WAFFENSCHMIDT
Spezialfabrik für Edelstahlflansche

Ewald Waffenschmidt GmbH + Co. KG · Otto-Hahn-Str. 6 · D-57482 Wenden

Elmess Thermosystemtechnik
GmbH & Co.KG
Nordallee 1
29525 Uelzen

Unsere Kom.-Nr.: Our Ident. No.: 60.578

Ihre Bestellung Nr.: Your Order No.: 07-23-0720

Bestelldatum: Your Order date: 27-02-23

Tag der Lieferung: Date of Delivery: 16-03-23

Werkstoff-Nr.: Material-No.: 1.4541

Abnahmeprüfzeugnis 3.1

nach EN 10 204

Inspection Certificate 3.1

according to EN 10 204

Zerreißversuch/Kerbschlagprobe ISO-V Tensile/Impact Test ISO-V

Pos. Item No.	Stückzahl piece	Prüfgegenstand: Gesenkschmiedestücke, wärmebehandelt, allseitig gedreht. Probenlage: tangential Test Subject: Drop forging pieces, heat treated, surfaced allround. Location of specimen: tangential	Schmelze-Nr. Heat-No.	Probe-Nr. Test-No.	0,2-Grenze 0,2 limitation N/mm²	1 % Dehngrenze 1 % proof stress N/mm²	Zugfestigkeit Tensile Strenght N/mm²	Dehnung Elongation %	Einschnürung Reduction %	Kerbschlagarbeit Impact Strenght Joule
		Prüftemp.: RT falls nicht angegeben Test temp.: RT if not specified	Anforderungen:				510-			
			Requirements:		200	235	710	30		60

- 0320

Blindflansche ASME B 16.5 / Blind Flanges ASME B 16.5

2	1	BL 2.1/2" CL 150 RF	347490	12639	257	292	542	60	74	203	210	222

- 0314

Blindflansch EN 1092-1/05 / Blind Flange EN 1092-1/05

4	7	B2 DN 100 PN 63 C4 = 38 mm Dichtleiste Form "B1" gedreht	415240	12868	232	270	523	70	76	360	330	363

Analyse / Analysis

Schmelze/Heat	C	Si	Mn	P	S	Cr	Ni	Ti
347490	0,043	0,340	1,230	0,030	0,012	17,64	9,850	0,340
415240	0,049	0,320	1,250	0,031	0,001	17,12	9,760	0,560

Anforderungen/Requirements: DIN EN 10222-5 06.17; AD2000-W2,-W9,-W10
IK beständig nach Prüfung gem.:/IC resistant acc.testing to: DIN EN ISO 3651-2 Meth. A-T1
Die Teile wurden nach dem Schmieden von Lösungsglühtemp.(>1040°C) in Wasser abgeschreckt.
After forging the parts have been quenched rapidly in water from solutioning temp. (>1040°C).

MADE IN GERMANY. Vormaterial von / Prematerial from: DEW Witten (DE),DEW Witten (D)
Vormaterial von westeuropäischem Hersteller / prematerial from western european manufacturer.
Analyse laut Stahlhersteller,Erschmelzungsart: Elektro. Analysis acc. to steel mill,steelmaking proc.: electric.
Besichtigung und Ausmessung ohne Beanstandung. Visual and dimensional inspection without complaints.
Werkstoffverwechslungsprüfung: ohne Beanstandung. PMI-Test: without complaints.
Die Teile entsprechen den Anforderungen der/ The parts meet the requirements of 2011/65/EU RoHS II and REACH.
Frei von Quecksilber und radioaktiver Kontamination / Free from mercury and radioactive contamination
Unser System wurde überprüft und bestätigt nach / Our System was surveyed and certified acc. to:
AD2000 - W0 / TRD 100, DIN EN ISO 9001:2015, KTA 1401 + AVS D100/50, DGRL/PED 2014/68/EU (97/23/EG)
Diese Bescheinigung wurde maschinell erstellt und ist ohne Unterschrift gültig.
This document has been produced electronically and is valid without a signature.

Jens Wagener
(Werkssachverständiger/Expert) Datum/Date: 16.03.23

Stempel des Werkssachverständigen: (B)
Stamp of Expert:
Stempel des Lieferwerkes:
Stamp of Supplier:

ELMESS

EU Konformitätserklärung nach Richtlinie 2014/34/EU **ELM 20 - 003**
EU Declaration of Conformity according directive 2014/34/EU

Erklärung von /*Declaration of*

ELMESS-Thermosystemtechnik GmbH & Co. KG
Nordallee 1
29525 Uelzen, Deutschland, *Germany*

www.elmess.de

Hiermit wird - in Übereinstimmung mit Anhang II der Richtlinie 2014/34/EU (L 96/309-356) und mit Anhang II der Richtlinie 2014/30/EU (L 96/79), sowie mit der Richtlinie 2011/65/EU – erklärt, dass das elektrische Gerät

Herewith we declare that - in agreement with annex II of directive 2014/34/EU (L 96/309-356) and with annex II of directive 2014/30/EU (L 96/79), as well as directive 2011/65/EU - the electrical apparatus

Heizung / *Heater*

Typ / *type* **DHG... ; EHG... ; DHF... ; EHF... ; DHK... ; EHK...**
(Erzeugnis, Typ, Beschreibung / *Good, type, description)*

in Übereinstimmung mit den Anforderungen gemäß folgenden Europäischen Normen entwickelt, hergestellt und geprüft worden ist. / *has been designed, manufactured and tested in agreement according to following European Standards*.

EN 60079-0:2019, EN 60079-1:2014, EN 60079-7:2016, EN 60079-11:2012, EN60079-31:2014, EN 50495:2010, EN 60519-2:2007, EN 61000-6-2:2005, EN 61000-6-4:2011 von / *of* CENELEC

Die geprüfte Bauart entspricht der EU-Baumusterprüfbescheinigung Nr.
The certified design is conform to EU-Type-Examination Certificate N°.

IBExU 15 ATEX 1019 X
IBExU Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, D-09599 Freiberg;
Europäische benannte Prüfstelle Nr: / *European notified body No:* 0637.

ELMESS-Thermosystemtechnik GmbH & Co. KG

ppa. Reinhard Wagner
Werksleitung / *Technical Director*

i.V. Lutz Mühe
Explosionsschutz / *Explosion Protection*

D-29525 Uelzen, 26.03.2020

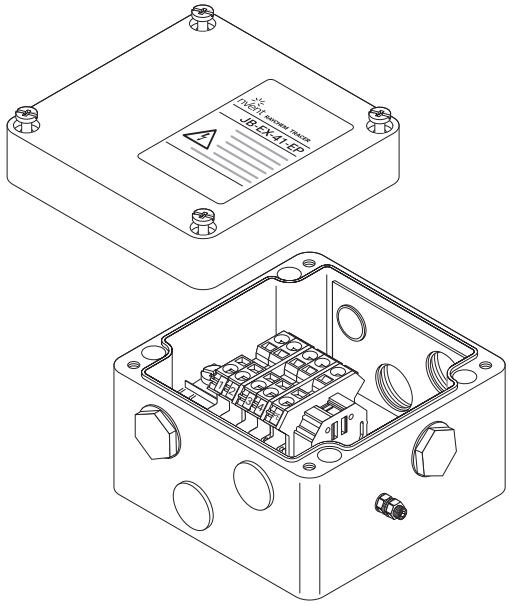
Anerkennung des Qualitätssicherungssystems / *Production Quality Assessment Notification*: Bureau Veritas: 2004

JB-EX-41-EP

CONNECT AND PROTECT

Multi purpose junction box

PRODUCT OVERVIEW



Industrial polyester junction box with earth plate for use in hazardous areas. This box can be used to make connections between power cables, heating cables and cold lead cables using M25 metallic connection kits or glands. Earthing of the connections is realized via the earth plate

Depending on the configuration of the system, the box can accommodate 6 cold lead entries and/or a power cable.

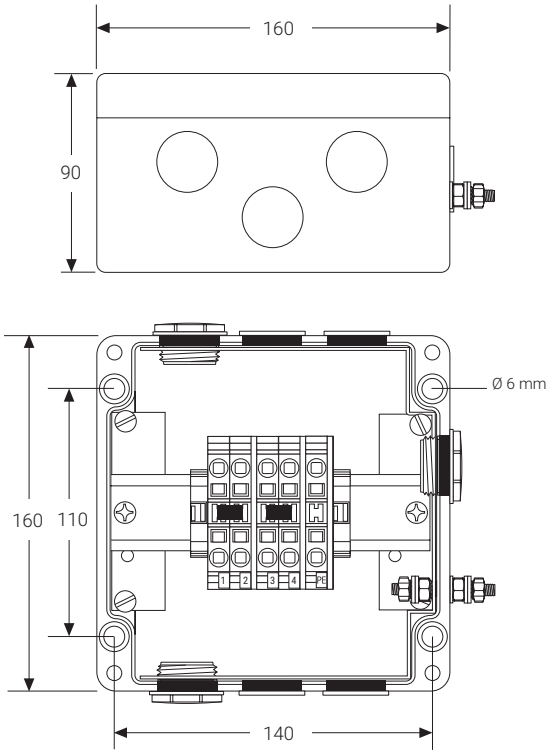
M25 connection kits have to be ordered separately or are integrated in the heating unit (eg MI heating units), depending on the type of heating cable being used. Cable connection is accomplished via DIN rail mounted spring-type terminals.

The box can be either wall or pipe mounted via the four holes moulded in the base of the box. For pipe mounting use one of the standard support bracket.

Typical use	
	Power supply box, (power) splice box, (power) tee box, marshalling box.
Entries	
	6 x M25 1 x M25
Kit contents	
	1 x junction box with terminals on DIN rail
	3 x M25 stopping plugs
	4 x M25 rain plug (temporary)

PRODUCT SPECIFICATION

Dimensions (in mm)



Materials of construction

Box & lid	Electrostatic charge-resistant glass-filled engineered polymer, black
Sealing gasket	Silicone rubber
Lid fixing screws	Stainless steel (captive)

Technical details

Ingress protection	IP66
Ambient temperature range	–55°C to +55°C

Terminals

Quantity	5 pcs, bridged per 2
Type	Spring-type
Labeling	1, 2, 3, 4, PE
Maximum conductor size	10 mm^2 (solid & stranded)
Maximum operating voltage	550 Vac
Maximum operating current	53 A

APPROVALS

For use in ordinary and hazardous area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust)

Temperature classification

T6

Product certification

Present logos of available certificates

More details about product certification, approvals and conditions of safe use are available in the installation manual at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

Order reference	JB-EX-41-EP
Part number (Weight)	1244-020506 (1.9 kg)

(*) in total no more than 7 terminals should be installed.

Accessories (to be ordered separately)

Support bracket	SB-100, SB-101, SB-130 (for fixation to cable tray)
Gland for MI cold leads	Integrated in MI heating unit or contact nVent for more information
Gland for power cable	GL-55-M25 (Polyamide) up to −55°C, 8-15 mm GL-38-M25-METAL (Ni plated brass) up to −60°C, inner diam. 10-13.5 mm, outer diam. 13.5-21 mm
Loose terminals (*)	Phase/neutral terminal: HWA-WAGO-PHASE Earth terminal: HWA-WAGO-EARTH End plate: HWA-WAGO-ENDPLATE Terminal jumper: HWA-WAGO-JUMPER

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nVent reserves the right to change specifications without notice.

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(1) EU-Baumusterprüfbescheinigung

(2) Geräte oder Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 2014/34/EU**

(3) EU-Baumusterprüfbescheinigungsnummer

PTB 20 ATEX 1008 U **Ausgabe: 1**

(4) Produkt: Integriertes Begleitheizungs-Anschlusssystem Typ JBx-100-xx-xx und T-100

(5) Hersteller: nVent Thermal Belgium LLC

(6) Anschrift: Romeinse straat 14, 3001 Leuven, Belgien

(7) Die Bauart dieses Produkts sowie die verschiedenen zulässigen Ausführungen sind in der Anlage und den darin aufgeführten Unterlagen zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Physikalisch-Technische Bundesanstalt, notifizierte Stelle Nr. 0102 gemäß Artikel 17 der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014, bescheinigt, dass dieses Produkt die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Produkten zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.

Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 21-10134 festgehalten.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN IEC 60079-0:2018; EN IEC 60079-7:2015/A1:2018-01; EN 60079-18:2015; EN 60079-31:2014

(10) Falls das Zeichen „X" hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Produkts in der Anlage zu dieser Bescheinigung hingewiesen.

(11) Diese EU-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Prüfung des festgelegten Produkts gemäß Richtlinie 2014/34/EU. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Bereitstellen auf dem Markt. Diese Anforderungen werden nicht durch diese Bescheinigung abgedeckt.

(12) Die Kennzeichnung des Produkts muss die folgenden Angaben enthalten:

II 2 G Ex eb mb IIC Gb

II 2 D Ex tb mb IIIC Db

Konformitätsbewertungsstelle, Sektor Explosionsschutz
Im Auftrag

Braunschweig, 22. März 2021

Dr.-Ing. D. Markus
Direktor und Professor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

ZSEx10100d c

EU-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EU-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(13) # Anlage

(14) **EU-Baumusterprüfbescheinigung PTB 20 ATEX 1008 U, Ausgabe: 1**

(15) Beschreibung des Produkts

Die JBx-100-xx-xx und T-100 Anschlusskasten-Serie ist ein Anschlusssystem für elektrische Begleitheizungssysteme. Die Anschlusskastenserie JBx-100-xx-xx ist in vier verschiedene Versionen unterteilt (JBS-100-xx-xx, JBM-100-xx-xx und T-100). Diese Anschlusskastenserie ist auf einem integrierten Rohrträger montiert, um elektrische Heizkabel an das Stromnetz anzuschließen oder um eine Verbindung zwischen 2 oder 3 Heizkabeln herzustellen. Die verschiedenen Modelle der Serie umfassen Optionen wie: Kästen mit einer Offshore-Platte (Erdungsplatte) und Kästen mit einem optionalen Lichtmodul. Die vierte Version der Anschlusskasten-Serie ist JBU-100-xx-xx. Diese Version hat die gleichen Eigenschaften, wird jedoch anstelle des Rohrträgers mit einer Halterung direkt an der Rohrleitung montiert.

Typ JBS-100-xx-xx
Der Anschlusskasten ist auf einem integrierten Rohrträger installiert. Im Inneren des Anschlusskastens JBS-100-xx-xx befindet sich eine DIN-Schiene auf der zertifizierte Klemmen installiert sind. Zusätzliche Klemmen können hinzugefügt werden, um den Anschluss eines externen Thermostaten zu ermöglichen. Der Anschlusskasten ist für den Anschluss eines Heizkabels an ein Stromkabel (mit oder ohne Thermostat) ausgelegt. Die Stromkabel werden im Anschlusskasten durch ein Loch in der Seitenwand des Kastens und eine zertifizierte Kabelverschraubung eingeführt.

Typ JBM-100-xx-xx
Der Anschlusskasten ist auf einem integrierten Rohrträger installiert. Der Anschlusskasten JBM-100-xx-xx ist für die Aufnahme von bis zu maximal drei Heizkabeln ausgelegt. Daher sind drei Paare von zertifizierten Klemmen vorgesehen. Gelegentlich können weitere Klemmen installiert werden, um die Verkettung der Stromversorgung zu unterstützen. Das Stromkabel wird über ein Loch in der Seitenwand des Kastens und eine zertifizierte Kabelverschraubung in den Kasten eingeführt. Für die Heizkabel ist eine zusätzliche Zugentlastung vorgesehen. Die Zugentlastung verhindert, dass die Heizkabel beim Ziehen verrutschen.

Typ JBU-100-xx-xx
Die JBU-100-xx-xx ist nicht auf einem integrierten Rohrträger installiert. Der Anschlusskasten kann auf einer stabilen Struktur wie z.B. einem Rohrgestell, einer Wand über die M6-Schrauben oder über eine optionale Halterung direkt auf dem Rohr installiert werden. Der Anschlusskasten ist so ausgelegt, dass bis zu maximal vier Heizkabel an das Stromnetz installiert werden können. Die elektrischen Verbindungen werden mit Hilfe von Klemmen hergestellt, die auf einer DIN-Schiene im Inneren des Anschlusskastens installiert sind.
Alternativ kann JBU-100-xx-xx als Verteilerkasten für Leistungs- und Steuerkabel verwendet werden. Es dürfen nur Leitungseinführungen verwendet werden, die für den Bereich entsprechend zertifiziert sind und die den Abmessungen des Kabels entsprechen.

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Anlage zur EU-Baumusterprüfbescheinigung PTB 20 ATEX 1008 U, Ausgabe: 1

Typ T-100
Der T-100 ist ein Kasten, der als Anschlusskasten (Verbindungskasten) für den Anschluss von bis zu maximal 3 Heizkabeln verwendet wird. Die Box wird auf einem Rohrständer installiert, der die Eingänge und den Schutz für die installierten Heizkabel bietet. Für die Heizkabel ist eine zusätzliche Zugentlastung vorgesehen. Die Zugentlastung verhindert, dass die Heizkabel beim Ziehen verrutschen. Die Verbindung zwischen den Leitern der Heizkabel wird über Aderendhülsen hergestellt. Nach der Installation werden die Leiter mit Schutzkappen aus temperaturbeständigem Silikon elektrisch isoliert.

Änderungen in Bezug auf vorherige Ausgaben

Aufnahme der Verwendung des selbstregulierenden Parallelheizkabels Typ HTV

Typschlüssel

JB	x	-	100	-	xx	-	xx
	1		2		3		4

1	S	JBS – zur Verbindung von einem Heizkabel
	M	JBM – zur Verbindung von bis zu max. drei Heizkabeln
	U	JBU – Universelle Verbindung
2	100	Aufrechte Installation
3	A	Version mit gewindelosen Bohrungen
	L	Version mit optionalem Lichtmodul
	E	Version mit metrischen Gewindebohrungen
	P	Version mit optionaler Offshore-Platte (Erdungsplatte)
	D	Version mit optionalem Belüftungsstopfen
4	E	Version mit metrischen Gewindebohrungen
	A	Version mit gewindelosen Bohrungen
	P	Version mit optionaler Offshore-Platte (Erdungsplatte)

Technische Daten

Umgebungstemperaturbereich	Standard Version	-55°C to +56°C
	Mit Lichtmodul	-40°C to +40°C
Max. Anzahl der Heizbänder	JBS-100-xx-xx	1
	JBM-100-xx-xx	3
	JBU-100-xx-xx	3 (4 ohne Stromkabel)
	T-100	3

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Anzahl der Anschlussklemmen*	JBS-100-xx-xx	L+N+PE
	JBM-100-xx-xx	2xL + 2xN + 2xPE
	JBU-100-xx-xx	2xL + 2xN + 2xPE
	T-100	-
Max. Kabelquerschnitt	JBS-100-xx-xx	0.5 mm² bis 10 mm²
	JBM-100-xx-xx	0.5 mm² bis 10 mm²
	JBU-100-xx-xx	0.5 mm² bis 10 mm²
	T-100	max. 3,3 mm²
Bemessungsspannung**	Abhängig vom verwendeten Heizkabeltyp	
	BTV1, QTVR1, XTV1, KTV1, HTV1	max. 120 V
	BTV2, QTVR2, XTV2, KTV2, HTV2	max. 277 V
	VPL1	max. 120 V
	VPL2	max. 230 / 254 V
	VPL4 + FHPC	max. 480 V
Bemessungsstrom	JBS-100-xx-xx	Max. 53 A
	JBM-100-xx-xx	Max. 53 A
	JBU-100-xx-xx	Max. 53 A
	T-100	Max. 40 A

* Weitere Klemmen sind zulässig, solange der Gesamtstrom durch das Gehäuse 40 A nicht übersteigt.

** abhängig von Absicherung bzw. max. zulässigem Bemessungsstrom, max. zulässiger Temperatur der zu beheizenden Oberfläche; siehe hierzu Datenblätter bzw. Betriebsanleitung des Herstellers.

Hinweise zur Herstellung

1. Die maximal zulässige Temperatur für die zu beheizende Fläche (Rohrtemperatur) ist auf der Grundlage der spezifischen Leistungsklasse, der max. zulässigen Betriebstemperatur der Heizbänder, der Nennspannung und der max. zulässigen Strombelastbarkeit zu bestimmen.
2. Anwendungen, für die wärmebeständige Zuleitungen inkl. Kabelverschraubungen aus Metall verwendet werden müssen, sind vom Hersteller anzugeben und vom Errichter/Anwender zusammenzustellen.
3. Einschränkungen bezüglich der Verwendung der Typen JBS-100-L-x, JBM-100-L-x und JBU-100-L-x (mit Kontrollleuchte) sind vom Hersteller anzugeben und vom Installateur/Benutzer zu beachten.

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Anlage zur EU-Baumusterprüfbescheinigung PTB 20 ATEX 1008 U, Ausgabe: 1

4. Die Parallelheizbänder vom Typ VPL und FHPC müssen so installiert werden, dass ihre kalten Enden außerhalb des Klemmenkastens beginnen.
5. Wenn JBU-100-xx-x mit Spannungseinspeisung installiert wird, müssen bei 40 °C < Ta < 56 °C eine ausreichende hitzebeständige Einspeisung und Metall-Verschraubungen, inkl. Dichtung, verwendet werden. Für die Metallverschraubungen inkl. Dichtung muss ein separates IECEx-Zertifikat ausgestellt und von nVent Thermal verifiziert worden sein.
6. Für Heizkabel müssen zertifizierte nVent Thermal Verschraubungen vom Typ C25-100-METAL bei 40 °C < Ta < 56 °C verwendet werden.
7. Die Ausführung des Anschlusskastens mit Belüftungsstopfen muss am Rohr aufgehängt werden, um eine einwandfreie Funktion zu gewährleisten.

(16) Prüfbericht PTB Ex 21-10134

(17) Besondere Bedingungen

Die Verwendung von alternativen Heizbändern ohne Freigabe durch den Hersteller ist nicht zulässig.

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

Erfüllt durch Übereinstimmung mit den vorgenannten Normen.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
Im Auftrag

Braunschweig, 22. März 2021

Dr.-Ing. D. Markus
Direktor und Professor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

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(1) EU-TYPE EXAMINATION CERTIFICATE
(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 20 ATEX 1008 U **Issue: 1**

(4) Product: Integrated Heat Tracing Connection System
Type JBx-100-xx-xx and T-100

(5) Manufacturer: nVent Thermal Berlgium NV

(6) Address: Romeinse straat 14, 3001 Leuven, Belgium

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 21-10134.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018; EN IEC 60079-7:2015/A1:2018-01; EN 60079-18:2015; EN 60079-31:2014

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II 2 G Ex eb mb IIC Gb

II 2 D Ex tb mb IIIC Db

Konformitätsbewertungsstelle Sektor Explosionsschutz Braunschweig, March 22, 2021
On behalf of PTB:

Dr.-Ing. D. Markus
Direktor und Professor

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In case of dispute, the German text shall prevail.

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(13) # SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 20 ATEX 1008 U, Issue: 1**

(15) Description of Product

The JBx-100-xx-xx and T-100 Connection box series is a connection system for electrical trace heating systems. The JBx-100-xx-xx Connection box series is subdivided in four different versions (JBS-100-xx-xx, JBM-100-xx-xx and T-100). This junction box series is mounted on an integrated pipe stand for the connection of electrical heating cables to the mains supply or to provide a splice between 2 or 3 heating cables. The different models of the series include options such as: boxes equipped with an offshore plate (earth plate) and boxes with an optional light module and lens. Another part of the Connection box series is JBU-100-xx-xx. This version has the same features, but is mounted directly on the pipeline with a support bracket instead of the pipe stand.

Product type JBS-100-xx-xx

The junction box is installed on an integral pipe support. Inside the JBS-100-xx-xx junction box there is installed one DIN rail on which are installed a number of certified terminals. Additional terminals can be added to allow an external thermostat to be connected. The junction box is designed to connect one heating cable to one power cable (with or without thermostat). Power cables are fed in the junction box by means of a hole in the sidewall of the box and a certified cable gland.

Product type JBM-100-xx-xx

The junction box is installed on an integral pipe support. The JBM-100-xx-xx junction box is designed to accommodate up to a maximum of three heating cables. Therefore, there are three pairs of certified terminals provided. Occasionally more terminals can be installed to support daisy chaining of the power supply. The power cable will be fed in the box via a hole in the sidewall of the box and a certified cable gland. Additional strain relief is provided for the heating cables. The strain relief is avoiding that the heating cables will slip when pulled.

Product type JBU-100-xx-xx

The JBU-100-xx-xx is not installed on an integral pipe support. The junction box can be installed on a stable structure such as a pipe rack; a wall via the M6 screws or can be installed via an optional support bracket directly on the pipe. The junction box is designed to accommodate up to a maximum of four heating cables to the mains supply. The electrical connections are established by means of terminals that are installed on a DIN rail inside the junction box.
Alternatively, the JBU type boxes can be used as a marshalling box for power and control cables. Use glands that are suitably certified for the area and that meet the dimensions of the cable.

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Product type T-100
The T-100 is a box used as a connection (Splice) box for connecting up to maximum 3 heating cables. The Box is installed on a pipe stand providing the entries and protection for the installed heating cables. Additional strain relief is provided for the heating cables. The strain relief is avoiding that the heating cables will slip when pulled. The connection between the conductors of the heating cables is established via ferrules. Once installed the conductors are electrically isolated using protective caps made out of temperature resistive silicone.

Nomenclature

JB	x	-	100		-	xx	-	xx
	1		2			3		4

1	S	JBS – for connection of one heating cable
	M	JBM – for connection of up to three heating cables.
	U	JBU – universal
2	100	Above installation
3	A	version with unthreaded holes
	L	model with optional Light module
	E	version with threaded metric holes
	P	model with optional off shore plate
	D	model with optional drain plug
4	E	version with threaded metric holes
	A	version with unthreaded holes
	P	model with optional off shore plate

Technical data

Ambient temperature range	Standard version	-55°C to +56°C
	With pilot lamp	-40°C to +40°C
Max. number of heating cables	JBS-100-xx-xx	1
	JBM-100-xx-xx	3
	JBU-100-xx-xx	3 (4 without power cable)
	T-100	3
Standard number of terminals*	JBS-100-xx-xx	L+N+PE
	JBM-100-xx-xx	2xL + 2xN + 2xPE
	JBU-100-xx-xx	2xL + 2xN + 2xPE

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	T-100	-
Max. wire cross section	JBS-100-xx-xx	0.5 mm² to 10 mm²
	JBM-100-xx-xx	0.5 mm² to 10 mm²
	JBU-100-xx-xx	0.5 mm² to 10 mm²
	T-100	max. 3.3 mm²
Rated voltage**	Depends on the heating cable type used	
	BTV1, QTVR1, XTV1, KTV1, HTV1	max. 120 V
	BTV2, QTVR2, XTV2, KTV2, HTV2	max. 277 V
	VPL1	max. 120 V
	VPL2	max. 230 / 254 V
	VPL4 + FHPC	max. 480 V
Rated current	JBS-100-xx-xx	max. 53 A
	JBM-100-xx-xx	max. 53 A
	JBU-100-xx-xx	max. 53 A
	T-100	max. 40 A

* More terminals are permitted as long as the total current trough the enclosure is not exceeding 40A

**subject to protection and max. permissible rated current, max. permissible temperature of the surface to be heated; see data sheets and operating instructions of the manufacturer.

Notes for manufacturing

1. The temperature accepted as a maximum for the surface to be heated (tube temperature) shall be determined on the basis of the specific performance category, the max. admissible operating temperature of the parallel strip heaters, the voltage rating and the max. admissible current carrying capacity.
2. Applications for which heat-resistant incoming cables incl. cable glands from metal have to be used, have to be specified by the manufacturer and must be compiled with the installer/user.
3. Restrictions regarding the use of type JBS-100-L-x, JBM-100-L-x and JBU-100-L-x (with pilot lamp) have to be specified by the manufacturer and must be complied with the installer/user.
4. The parallel strip heaters, type VPL and FHPC, have to be installed so that their cold ends start outside the terminal box.
5. If JBU-100-xx-xx with voltage infeed is installed, an adequate heat-resistant feeder and screwed metal glands, incl. gasket, must be used at 40 °C < Ta < 56 °C. For the screwed

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metal glands, incl. gasket a separate IECEx Certificate must have been issued and they must have been verified by nVent Thermal.

6. For heating cables, certified nVent Thermal glands of type C25-100-METAL must be used at 40 °C < Ta < 56 °C.
7. The version of the connection box with a drain plug must be suspended on the pipe to ensure proper function.

(16) Test Report PTB Ex 21-10134

(17) Specific conditions of use

Alternative strip heaters must not be used, unless the manufacturer's approval has been obtained.

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, March 22, 2021

D. Markus

Dr.-Ing. D. Markus
Direktor und Professor

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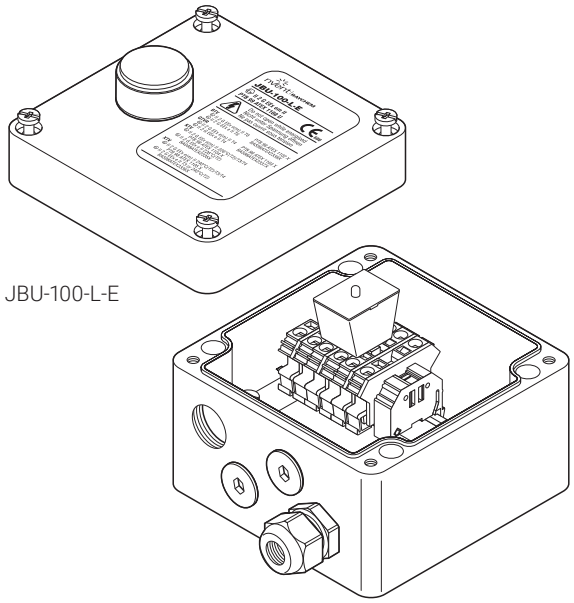
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JBU-100

CONNECT AND PROTECT

Junction box for modular system

PRODUCT OVERVIEW



JBU-100-L-E

The nVent JBU-100 kit is designed to connect power to up to three nVent RAYCHEM BTV, QTVR, XTVR, HTV or VPL industrial parallel heating cables.

Innovative Spring-type terminals provide fast installation and safe, reliable, maintenance-free operation.

The box is part of the modular component system, it allows for maximum flexibility and can be either wall or pipe mounted.

Connection kits (M25) and insulation entry kits have to be ordered separately. The box is offered in two basic versions customised to local installation practices.

All kits are also available as a lighted version (-L). These include a unique light module with a superbright green LED that simply plugs into the terminals, and a lens in the lid. This provides indication that power is available in the box.

Description

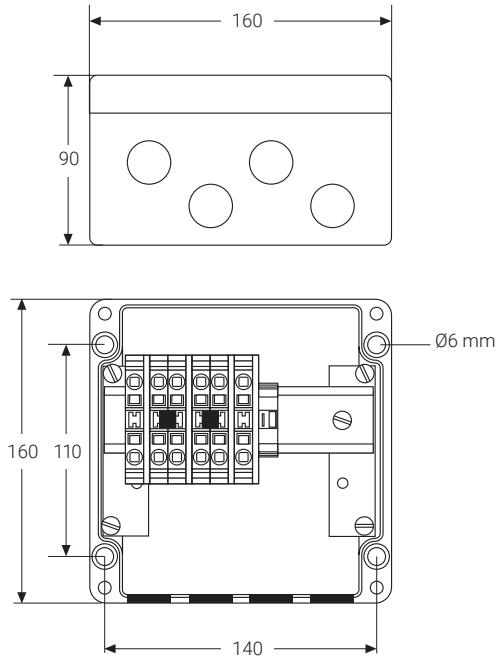
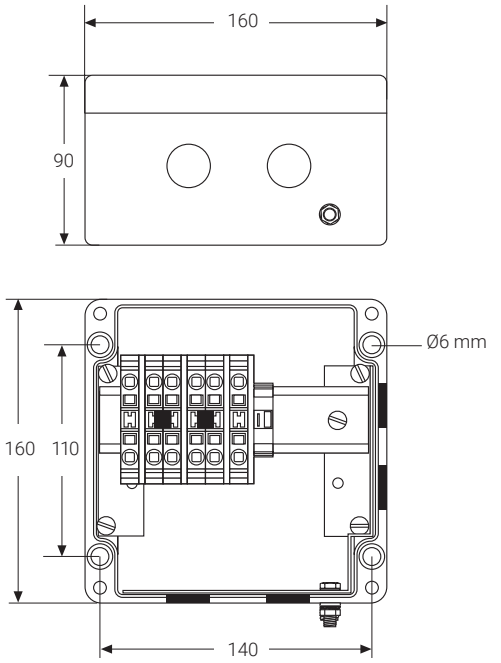
JBU-100-E JBU-100-L-E	JBU-100-EP JBU-100-L-EP
This box is certified for use in IEC regions and provides four M25 threaded entries, stopping plugs and one plastic power cable gland.	This box is certified for use in IEC regions and provides four M25 threaded entries, an earthing plate and an external earth stud. It is designed for use with armoured power cables.

Kit contents

1 junction box with terminals	1 junction box with terminals with earth plate and external earth stud
1 light module (for -L only)	1 light module (for -L only)
1 M25 gland for power cable 8-15 mm in diameter (temperature range −55°C to +70°C)	2 M25 stopping plugs
2 M25 stopping plugs	

PRODUCT SPECIFICATIONS

Dimensions (in mm)

JBU-100-E JBU-100-L-E	JBU-100-EP JBU-100-L-EP
	

Technical details

	JBU-100-E JBU-100-L-E	JBU-100-EP JBU-100-L-EP
Ingress protection	IP66	IP66
Entries	4 x M25	4 x M25
Ambient temperature range	−55°C to +56°C(1) (JBU-100-E) −40°C to +40°C (JBU-100-L-E)	−55°C to +56°C(1) (JBU-100-EP) −40°C to +40°C (JBU-100-L-EP)
Terminals	Spring-type terminals	Spring-type terminals
	2 phase, 2 neutral, 2 protective earth	2 phase, 2 neutral, 2 protective earth
Max. conductor size	10 mm^2 stranded, 10 mm^2 solid	10 mm^2 stranded, 10 mm^2 solid
Max. operation voltage	480* Vac	480* Vac
	* JBU-100-L-E and JBU-100-L-EP are limited to 277 Vac. Extra conditions for safe use apply for voltages higher than 277 Vac. Please refer to the certificate or installation instructions for full details.	
Max. current rating(2)	53 A	53 A

(1) Extra conditions for safe use apply for ambient temperatures above +40°C. Temperature resistant power cable and metal glands must be used. Please refer to the certificate or installation instructions for full details.

(2) For pipe temperature > 150°C and < 260°C and XTVR or HTV heating cables, the maximum operating current shall be reduced to maximum 20 A. Refer to heating cable specification for the maximum pipe temperature.

Materials of construction

Enclosure, lid	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel	Stainless steel
Lid gasket	Silicone rubber	Silicone rubber
Earth continuity plate	N/A	Steel, zinc plated, and blue chromated

Optional LED indicator light

Colour	Green	Green
Voltage rating	100-277 Vac	100-277 Vac
Power consumption	< 1 W	< 1 W

APPROVALS

For use in ordinary and hazardous area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust) and Class I Zone 1

Temperature classification

Temperature classification is defined by the complete system.

Product certification

More details about product certification, approvals and conditions of safe use are available in the installation manual at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

Junction box

Part Description (**)	JBU-100-E	JBU-100-EP
PN (Weight)	051976-000 (1.7 kg)	243948-000 (1.8 kg)

Junction box with light

Part Description	JBU-100-L-E	JBU-100-L-EP
PN (Weight)	069262-000 (2.1 kg)	113974-000 (2.2 kg)

Accessories

Heating cable connection kits	C25-100, C25-21, CCON25-100	C25-100, C25-21, CCON25-100, C25-100-METAL, C25-100-METAL-NP (Nickel plated brass), C25-100-METAL-SS (stainless steel)
Insulation entry kit	IEK-25-04 or IEK-25-PIPE	IEK-25-04 or IEK-25-PIPE
Power cable gland	GL-55-M25 hazardous area approved gland for cables 8-15 mm (temperature range −55°C to +70°C) GL-36-M25 hazardous area approved gland for cables 8-17.5 mm (temperature range −20°C to +70°C)	GL-38-M25-METAL (optional)
Junction box support bracket (optional)	SB-100, SB-101	SB-100, SB-101

(**) Localized versions may exist with limited approvals and different part numbers. Contact your local sales representative.

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Our powerful portfolio of brands:
CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER

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nVent reserves the right to change specifications without notice.

C63-AQU-QIX-002 543 / 917

EU Declaration of Conformity
EU Konformitätserklärung
UE Déclaration de Conformité

CE

We / Wir / Nous,

NVENT THERMAL BELGIUM N.V.

Romeinse Straat 14, 3001 Leuven, Belgium / Belgique / Belgien

Hereby declare in our sole responsibility, that the products… / Erklären in alleiniger Verantwortung, dass die Produkte… / Déclarons de notre seule responsabilité, que les produits…

Termination and connection system:
Anschluss- bzw. Verbindungssystem
Typ: Système du raccordement type: **JBx-100-xx-xx**

…which is the subject of this declaration, is in conformity with the following standard(s) or normative documents
…auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokumenten übereinstimmt
…auquel cette déclaration se rapporte, est conforme aux norme(s) ou aux documents normatifs suivants

Terms of the Directive(s) and Approval Data: Bestimmungen der Richtlinie und Zulassungsdaten Prescription de la directive et données de référence d'approbation		Title and/or No. and date of issue of the standard / Titel und/oder Nr. sowie Ausgabedatum der Norm / Titre et/ou No. ainsi que date d'émission des normes	
2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles	**EN 60079-0:2018** **IEC EN 60079-7-2015/A1:2018-1** **EN 60079-18:2015** **EN 60079-31:2014**	**+)** **+)** **+)** **+)**
EC-Type Examination Certificate / EG-Baumusterprüfbescheinigung / Attestation d'examen CE de type:		**PTB 20 ATEX 1008 U**	
Notified body / überwachende Stelle / organe de surveillance Identification no. / Identifikations Nr. / No. d'identification		SGS Fimko Oy Takomotie 8 FI-00380 Helsinki, Finland Nr./ No. 0598	
Equipment marking Die Kennzeichnung der Komponente Le marquage de láppareil		**Ex II 2G Ex eb mb IIC Gb** **Ex II 2D Ex tb mb IIIC Db** **IP66**	

+) Harmonized Standards / +) Normes Harmonisée / +) Harmonisierte Normen

The technical documentation required to demonstrate that the products meet the requirements of the above EC directives has been compiled and is available for inspection by relevant enforcement authorities.

Die technische Dokumentation, die zur Gewährleistung der Einhaltung der EG Richtlinien benötigt wird, wurde erstellt und liegt zur Überprüfung durch eine Authorisierte Stelle bereit.

La documentation technique exigée pour démontrer que les produits répondent aux exigences des directives ci-dessus de CE a été compilée et est disponible pour l'inspection par des autorités chargées de l'application appropriées.

nVent Thermal Belgium NV
Romeinsestraat 14
BE-3001 Leuven

Leuven, May 17th 2020 / Louvain 17 mai 2020

Gerry De Blick
Certification and Compliance Manager
nVent Thermal Belgium NV
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IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Ex COMPONENT CERTIFICATE

Certificate No.:	**IECEx PTB 20.0014U**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 1	Issue 0 (2020-05-27)
Date of Issue:	2021-03-22		

Applicant: **nVent Thermal Belgium N.V**
Research Park Haasrode - Zone 2
Romeinse Straat 14
B-3001 Leuven
Belgium

Ex Component: Integrated Heat Tracing Connection System Type JBx-100-xx-xx and T-100

This component is NOT intended to be used alone and requires additional consideration when incorporated into other equipment or systems for use in explosive atmospheres (refer to IEC 60079-0).

Type of Protection: **Increased Safety 'eb', Protection by Enclosure 'tb', Encapsulation 'mb'**

Marking: Ex eb mb IIC Gb

Ex tb mb IIIC Db

Approved for issue on behalf of the IECEx Certification Body: **Dr. -Ing. D. Markus**

Position: **Head of Departament "Explosion Protection in Energy Technology"**

Signature: (for printed version)

Date: 22.03.21

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 20.0014U**

Date of issue: 2021-03-22

Issue No: 1

Manufacturer: **nVent Thermal Belgium N.V**
Research Park Haasrode - Zone 2
Romeinse Straat 14
B-3001 Leuven
Belgium

Additional manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-18:2017 Explosive atmospheres - Part 18: Protection by encapsulation "m"
Edition:4.1

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
Edition:2

IEC 60079-7:2017 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
Edition:5.1

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

DE/PTB/ExTR20.0015/01

Quality Assessment Report:

GB/BAS/QAR07.0053/08

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 20.0014U**

Date of issue: 2021-03-22

Issue No: 1

Ex Component(s) covered by this certificate is described below:

The JBx-100-xx-xx and T-100 Connection box series is a connection system for electrical trace heating systems. The JBx-100-xx-xx Connection box series is subdivided in four different versions (JBS-100-xx-xx, JBM-100-xx-xx and T-100). This junction box series is mounted on an integrated pipe stand for the connection of electrical heating cables to the mains supply or to provide a splice between 2 or 3 heating cables. The different models of the series include options such as: boxes equipped with an offshore plate (earth plate) and boxes with an optional light module and lens. Another part of the Connection box series is JBU-100-xx-xx. This version has the same features, but is mounted directly on the pipeline with a support bracket instead of the pipe stand.

Technical data and nomenclature see Annex.

SCHEDULE OF LIMITATIONS:

Alternative strip heaters must not be used, unless the manufacturer's approval has been obtained.

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 20.0014U**

Date of issue: 2021-03-22

Issue No: 1

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
Inclusion of the use of the self-regulating parallel type trace heater HTV

Annex:

COCA_PTB_200014U_I1.pdf

Attachment to Certificate

IECEx PTB 20.0014U, Issue 1

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

Applicant: nVent Thermal LLC
889 Broadway
94063 Redwood City
USA

Electrical Apparatus: Integrated Heat Tracing Connection System
Type JBx-100-xx-xx and T-100

Description

The JBx-100-xx-xx and T-100 Connection box series is a connection system for electrical trace heating systems. The JBx-100-xx-xx Connection box series is subdivided in four different versions (JBS-100-xx-xx, JBM-100-xx-xx and T-100). This junction box series is mounted on an integrated pipe stand for the connection of electrical heating cables to the mains supply or to provide a splice between 2 or 3 heating cables. The different models of the series include options such as: boxes equipped with an offshore plate (earth plate) and boxes with an optional light module and lens. Another part of the Connection box series is JBU-100-xx-xx. This version has the same features, but is mounted directly on the pipeline with a support bracket instead of the pipe stand.

Product type JBS-100-xx-xx

The junction box is installed on an integral pipe support. Inside the JBS-100-xx-xx junction box there is installed one DIN rail on which are installed a number of certified terminals. Additional terminals can be added to allow an external thermostat to be connected. The junction box is designed to connect one heating cable to one power cable (with or without thermostat). Power cables are fed in the junction box by means of a hole in the sidewall of the box and a certified cable gland.

Product type JBM-100-xx-xx

The junction box is installed on an integral pipe support. The JBM-100-xx-xx junction box is designed to accommodate up to a maximum of three heating cables. Therefore, there are three pairs of certified terminals provided. Occasionally more terminals can be installed to support daisy chaining of the power supply. The power cable will be fed in the box via a hole in the sidewall of the box and a certified cable gland. Additional strain relief is provided for the heating cables. The strain relief is avoiding that the heating cables will slip when pulled.

Product type JBU-100-xx-xx

he JBU-100-xx-xx is not installed on an integral pipe support. The junction box can be installed on a stable structure such as a pipe rack; a wall via the M6 screws or can be installed via an optional support bracket directly on the pipe. The junction box is designed to accommodate up to a maximum of four heating cables to the mains supply. The electrical connections are established by means of terminals that are installed on a DIN rail inside the junction box.
Alternatively, the JBU type boxes can be used as a marshalling box for power and control cables. Use glands that are suitably certified for the area and that meet the dimensions of the cables.

Product type T-100

The T-100 is a box used as a connection (Splice) box for connecting up to maximum 3 heating cables. The Box is installed on a pipe stand providing the entries and protection for

the installed heating cables. Additional strain relief is provided for the heating cables. The strain relief is avoiding that the heating cables will slip when pulled. The connection between the conductors of the heating cables is established via ferrules. Once installed the conductors are electrically isolated using protective caps made out of temperature resistive silicone.

Technical data

Ambient temperature range	Standard version	-55°C to +56°C
	With pilot lamp	-40°C to +40°C
Max. number of heating cables	JBS-100-xx-xx	1
	JBM-100-xx-xx	3
	JBU-100-xx-xx	3 (4 without power cable)
	T-100	3
Standard number of terminals*	JBS-100-xx-xx	L+N+PE
	JBM-100-xx-xx	2xL + 2xN + 2xPE
	JBU-100-xx-xx	2xL + 2xN + 2xPE
	T-100	-
Max. wire cross section	JBS-100-xx-xx	0.5 mm² to 10 mm²
	JBM-100-xx-xx	0.5 mm² to 10 mm²
	JBU-100-xx-xx	0.5 mm² to 10 mm²
	T-100	max. 3.3 mm²
Rated voltage**	Depends on the heating cable type used	
	BTV1, QTVR1, XTV1, KTV1, HTV1	max. 120 V
	BTV2, QTVR2, XTV2, KTV2, HTV2	max. 277 V
	VPL1	max. 120 V
	VPL2	max. 230 / 254 V
	VPL4 + FHPC	max. 480 V
Rated current	JBS-100-xx-xx	max. 53 A
	JBM-100-xx-xx	max. 53 A
	JBU-100-xx-xx	max. 53 A
	T-100	max. 40 A

* More terminals are permitted as long as the total current trough the enclosure is not exceeding 40A

**subject to protection and max. permissible rated current, max. permissible temperature of the surface to be heated; see data sheets and operating instructions of the manufacturer.

Attachment to Certificate

IECEx PTB 20.0014U, Issue 1

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

Nomenclature

JB	x	-	100	-	xx	-	xx
	1		2		3		4

1	S	JBS – for connection of one heating cable
	M	JBM – for connection of up to three heating cables.
	U	JBU – universal
2	100	Above installation
3	A	version with unthreaded holes
	L	model with optional Light module
	E	version with threaded metric holes
	P	model with optional off shore plate
	D	model with optional drain plug
4	E	version with threaded metric holes
	A	version with unthreaded holes
	P	model with optional off shore plate

Notes for manufacturing

1. The temperature accepted as a maximum for the surface to be heated (tube temperature) shall be determined on the basis of the specific performance category, the max. admissible operating temperature of the parallel strip heaters, the voltage rating and the max. admissible current carrying capacity.
2. Applications for which heat-resistant incoming cables incl. cable glands from metal have to be used, have to be specified by the manufacturer and must be compiled with the installer/user.
3. Restrictions regarding the use of type JBS-100-L-xx, JBM-100-L-xx and JBU-100-L-xx (with pilot lamp) have to be specified by the manufacturer and must be complied with the installer/user.
4. The parallel strip heaters, type VPL and FHPC, have to be installed so that their cold ends start outside the terminal box.
5. If JBU-100-xx-x with voltage infeed is installed, an adequate heat-resistant feeder and screwed metal glands, incl. gasket, must be used at 40 °C < Ta < 56 °C. For the screwed metal glands, incl. gasket a separate IECEx Certificate must have been issued and they must have been verified by nVent Thermal.
6. For heating cables, certified nVent Thermal LLC glands of type C25-100-METAL must be used at 40 °C < Ta < 56 °C.
7. The version of the connection box with a drain plug must be suspended on the pipe to ensure proper function.

Schedule of Limitations

Alternative strip heaters must not be used, unless the manufacturer's approval has been obtained.

IECEx Test Report Summary

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

ExTR Ref. No.:	**DE/PTB/ExTR20.0015/01**	Page 1 of 1
ExTR Free Ref. No.:	**PEx1202000135**	Status: **Issued**
Details of change:	Inclusion of the use of the self-regulating parallel type trace heater HTV	Date of issue: **2021-03-22**
List of Standards Covered:	**IEC 60079-0:2017 Edition:7.0, IEC 60079-18:2017 Edition:4.1, IEC 60079-31:2013 Edition:2, IEC 60079-7:2017 Edition:5.1**	

Issuing ExTL: **PTB - Physikalisch-Technische Bundesanstalt (PTB)**

Endorsing ExCB: **PTB - Physikalisch-Technische Bundesanstalt (PTB)**

Manufacturer: **nVent Thermal Belgium N.V**
Research Park Haasrode - Zone 2
Romeinse Straat 14
B-3001 Leuven

Location of Manufacturer: **Belgium**

Ex Protection: **Increased Safety 'eb', Protection by Enclosure 'tb', Encapsulation 'mb'**

Ratings:

Equipment: **Integrated Heat Tracing Connection System**

Model Reference: **Type JBx-100-xx-xx and T-100**

Related IECEx Certificates:

IECEx PTB 20.0014U Issue 1

Comments:

C63-AQU-QIX-002 552 / 917

nVent

RAYCHEM

JBU-100-E
JBU-100-EP
JBU-100-L-E
JBU-100-L-EP

- EN Installation instruction
- DE Montageanleitung
- FR Instructions d'installation
- NL Installatie-instructie
- NO Installasjonsbeskrivelse
- SV Installasjonsbeskrivelse
- DA Montagevejledning
- FI Asennusohje
- IT Istruzioni di installazione
- ES Instrucciones de instalacion
- PL Instrukcja montażu
- RU Монтажная инструкция
- CZ Montážní návod
- HU Szerelési utasítás
- HR Uputstvo za montažu

JBU-100-E **JBU-100-EP** **JBU-100-L-E** **JBU-100-L-EP**	
PTB 20 ATEX 1008 U BAS21UKEX0657U	Ⓔx II 2 G Ex eb mb IIC Gb Ⓔx II 2 D Ex tb mb IIIC Db
IECEx PTB 20.0014U	Ex eb mb IIC Gb Ex tb mb IIIC Db
EAC Ex	**JBU-100-E(P):** TC RU C-BE.МЮ62.B.00054/18 Ex e IIC Gb U Ex tb IIIC Db U Ex e mb IIC Gb U Ex tb mb IIIC Db U Ta –55°C…+56°C IP66 ООО "ТехИмпорт" **JBU-100-L-E(P):** TC RU C-BE.МЮ62.B.00054/18 Ex e IIC Gb U Ex tb IIIC Db U Ex e mb IIC Gb U Ex tb mb IIIC Db U Ta –55°C…+40°C IP66 ООО "ТехИмпорт"
CCC	**Non lighted versions** (1) Ex eb IIC Gb Ex tb IIIC Db **Lighted versions** (2)**:** Ex eb mb IIC Gb Ex tb mb IIIC Db
Segurança IEx OCP 0064 INMETRO	Ex eb IIC T* Gb Ex eb mb IIC T* Gb
SP C US	**Non lighted versions** (1)**:** CL I ZN 1 AEx eb IIC T* Gb ZN 21 AEx tb IIIC T*°C Db Ex eb IIC T* Gb Ex tb IIIC T*°C Db **Lighted versions** (2)**:** CL I ZN 1 AEx eb mb IIC T* Gb ZN 21 AEx mb tb IIIC T*°C Db Ex eb mb IIC T* Gb Ex mb tb IIIC T*°C Db

* For system Temperature Code, see heating cable or design documentation./ Temperaturklasse des Systems siehe Heizband- oder Auslegungsdokumentation./ Pour le code de température du système, voir le câble chauffant ou la documentation technique./ Zie voor de Temperatuurcode van het systeem de documentatie over de verwarmingskabel of van het ontwerp./ For systemtemperaturkode, se varmekabel- eller konstruksjonsdokumentasjon./ För systemtemperaturkod, se värmekabel- eller designdokumentation/ Se i dokumentationen til varmekablet eller konstruktionen vedrørende systemets temperaturkode./ Järjestelmän lämpötilakoodi on merkitty lämmityskaapeliin tai suunnitteluasiakirjoihin./ Per il Codice Temperatura del sistema, vedere la documentazione di progetto o del cavo scaldante./ Para ver información sobre el código de temperatura, consulte la documentación del cable de calentamiento o del diseño./ Kod temperatury systemu - patrz dokumentacja przewodu grzewczego lub dokumentacja projektowa./ Для определения температурного класса истемы см. маркировку греющего кабеля или проектную документацию./ Kód teploty systému viz topný kabel nebo projektovou dokumentaci./ A rendszer hőmérsékleti kódjáért lásd a fűtőkábel- vagy a tervezési dokumentációt./ Za šifru temperature sustava, vidi grijaći kabel ili projektnu dokumentaciju.

** Specific conditions for use may apply for ATEX and IECEx./ Besondere Vorgaben für den Gebrauch in Ex-Bereichen (ATEX und IECEx)./ Des conditions spécifiques d'utilisation s' appliquent pour ATEX et IECEx./ Specifieke voorwaarden gelden voor gebruik voor ATEX en IECEx./ Spesielle vilkår for bruk gjelde for ATEX og IECEx./ Specifika förhållanden för användning vara tillämpliga för ATEX och IECEx./ Der gælde specifikke betingelser vedrørende brug for ATEX og IECEx./ ATEX ja IECEx -tiloissa voidaan joutua soveltamaan turvallisen käytön erityisehtoja./ Condizioni d'uso specifiche per ATEX e IECEx./ Se aplican condiciones específicas para su uso en zonas ATEX y IECEx./ Mieć zastosowanie szczególne warunki użytkowania dla ATEX i IECEx/ МЭК по сертификации электрооборудования для взрывоопасных сред./ Pro ATEX a IECEx vztahovat zvláštní podmínky použití./ A biztonságos használat feltételei az ATEX-re és az IECEx-re vonatkoznak./ Za ATEX i IECEx odobrenja primjenjuju se posebni uvjeti upotrebe.

(1) Non lighted versions: Unbeleuchtete Versionen/ Versions non éclairées/ Versies zonder licht/ Versjoner uten lys/ Icke-belysta versioner,/ Variant uden lys/ Versiot ilman valoa/ Versioni senza luce/ Versiones sin luz/ Wersje bez lampki sygnalizacyjnej/ Модель без подсветки/ Verze bez světla/ Világítás nélküli változatok/ Verzije bez svjetla

(2) Lighted versions: Beleuchtete Versionen /Versions éclairées/ Versies met licht/ Versjoner med lys/ Belysta versioner/ Variant med lys/ Valolliset versiot/ Versioni con luce/ Versiones con luz/ Wersje z lampką sygnalizacyjną/ Модели с подсветкой/ Verze se světlem/ Világítással rendelkező változatok/ Verzije sa svjetlom

⚠ **Warning:** The purchaser should make the manufacturer aware of any external effects or aggressive substances that the equipment may be exposed to.

⚠ **Caution:** Prolonged or repeated contact with the sealant in the core sealer may cause skin irritation. Wash hands thoroughly. Overheating or burning the sealant will produce fumes that may cause polymer fume fever. Avoid contamination of cigarettes or tobacco. Consult MSDS VEN 0033 for further information.

Specific conditions for use using ATEX or IECEx approvals:

For ambient temperatures >+40°C:

Use a power cable with continuous temperature resistance of minimum +90°C.

Use a metallic power cable gland approved for use in hazardous areas (for example GL-38-M25-METAL) and heating cable gland (C25-100-METAL).

For voltages >254 Vac and BTV, QTVR, XTV(R), KTV or HTV heating cables:

Use a power cable with continuous temperature resistance of minimum +90°C.

Use a metallic power cable gland approved for use in hazardous areas (for example GL-38-M25-METAL) and heating cable gland (C25-100-METAL).

For pipe temperature > 150°C and XTV(R), KTV or HTV heating cables, the maximum operating current shall be reduced to maximum 20 A.

Rated voltage:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Ambient temperature:	JBU-100-E(P): −55°C to +56°C** JBU-100-L-E(P): −40°C to +40°C, except when used with VPL : in that case ambient temperatures can be up to +56˚C

** Specific conditions for use may apply for ATEX and IECEx.

For proper installation, follow carefully the installation instructions of the applicable connection kits: C25-100, C25-21, C25-100-METAL or CCON25-100

Maximum pipe temperature:

Heater type	T_{max} continuous	T_{max} intermittent 1000 h cumulative	T_{max} power off
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	See tables below	–	260°C

VPL: Maximum pipe temperature in dependence of heater type and voltage

Heater Type	T_{max} pipe			
Cable	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Not allowed	

Heater Type	T_{max} pipe		
Cable	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

DEUTSCH

⚠ **Achtung:** Der Käufer sollte den Hersteller auf etwaige äußere Einwirkungen oder aggressive Substanzen, denen das Gerät ausgesetzt sein könnte, aufmerksam machen.

⚠ **Vorsicht:** Ein längerer oder wiederholter Kontakt mit der Dichtmasse der Heizelementabdichtung kann Hautirritationen auslösen. Waschen Sie Ihre Hände daher gründlich. Durch Überhitzen oder Verbrennen der Dichtmasse entstehen Dämpfe, die zu Polymerfieber führen können. Achten Sie darauf, dass Zigaretten oder Tabak nicht kontaminiert werden. Weitere Informationen können Sie dem US-Sicherheitsdatenblatt MSDS VEN 0033 entnehmen.

Besondere Vorschriften bei Verwendung in Ex-Bereichen (ATEX/IECEx):

Umgebungstemperatur > +40°C:

Netzanschlusskabel mit Dauer-Temperaturbeständigkeit von mindestens +90°C verwenden.

Für Anschlussleitung und Heizband Metallverschraubungen mit Ex-Zulassung verwenden (z. B. GL-38-M25-METAL und C25-100-METAL).

Bei Spannung > 254 V AC und Heizband-Typenreihen BTV, QTVR, XTV(R), KTV oder HTV:

Netzanschlusskabel mit Dauer-Temperaturbeständigkeit von mindestens +90°C verwenden.

Für Anschlussleitung und Heizband Metallverschraubungen mit Ex-Zulassung verwenden (z. B. GL-38-M25-METAL und C25-100-METAL).

Bei Rohrtemperaturen > 150°C sowie bei den Heizbändern XTV(R), KTV oder HTV ist der maximale Betriebsstrom auf 20 A zu begrenzen.

Bemessungsspannung:	JBU-100-E(P): 480 V AC** JBU-100-L-E(P): 277 V AC
Umgebungstemperatur:	JBU-100-E(P): −55°C bis +56°C** JBU-100-L-E(P): −40°C bis +40°C, bei Verwendung mit VPL kann die Umgebungstemperatur bis zu +56°C betragen.

** Ggf. besondere Vorgaben für den Gebrauch in Ex-Bereichen (ATEX und IECEx).

Für die ordnungsgemäße Montage folgen Sie bitte genau den Montageanleitungen der entsprechenden Anschlussgarnituren: C25-100, C25-21, C25-100-METAL bzw. CCON25-100

Maximale Rohrtemperatur:

Heizband-Typ	T_{max} dauernd	T_{max} kurzzeitig 1000 h kumulierend	T_{max} ausgeschaltet
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Vgl. die nachstehenden Tabellen	–	260°C

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Tab. 3 Maximale Rohrtemperatur abhängig von Heizbandtyp und Spannung

Heizband		T_{max} Rohr		
Typ	**208 V AC**	**230 V AC**	**254 V AC**	**277 V AC**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Nicht zulässig	

Heizband	T_{max} Rohr		
Typ	**385 V AC**	**400 V AC**	**480 V AC**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

FRANÇAIS

⚠ **Attention :** L'acheteur doit informer le fabricant de tous les effets externes ou substances agressives auxquels l'équipement peut être exposé.

⚠ **Attention :** Tout contact prolongé ou répété avec le gel contenu dans l'embout d'étanchéité peut provoquer une irritation de la peau. Se laver soigneusement les mains. La surchauffe ou la combustion du gel produira des émanations pouvant entraîner la fièvre des polymères. Éviter toute contamination des cigarettes ou du tabac. Pour de plus amples informations, consulter la fiche de données de sécurité MSDS VEN 0033.

Conditions spécifiques d'utilisation en conformité avec les certifications ATEX ou IECEx :

Pour températures ambiantes >+40°C :

Use Utiliser un câble d'alimentation avec une résistance de température constante de +90°C minimum.

Utiliser un presse-étoupe métallique du câble d'alimentation agréé pour zones explosibles (par exemple GL-38-M25-METAL) et un presse-étoupe du câble chauffant (C25-100-METAL).

Pour des tensions >254 V ca et des câbles chauffants BTV, QTVR, XTV(R), KTV ou HTV :

Utiliser un câble d'alimentation avec une résistance de température constante de +90°C minimum.

Utiliser un presse-étoupe métallique du câble d'alimentation agréé pour zones explosibles (par exemple GL-38-M25-METAL) et un presse-étoupe du câble chauffant (C25-100-METAL).

Pour une température de conduite > 150°C et des câbles chauffants XTV(R), KTV ou HTV le courant de service maximal doit être réduit à 20 A maximum.

Tension maximale :	JBU-100-E(P) : 480 V ca** JBU-100-L-E(P) : 277 V ca
Température ambiante :	JBU-100-E(P) : −55°C à +56°C** JBU-100-L-E(P) : −40°C à +40°C , sauf en cas d'utilisation avec VPL: dans ce cas, la température ambiante peut aller jusqu'à +56°C

** des conditions spécifiques d'utilisation peuvent s'appliquer pour ATEX et IECEx.

Pour que l'installation soit correcte, respecter scrupuleusement les instructions d'installation des kits de connexion applicables : C25-100, C25-21, C25-100-METAL ou CCON25-100

Température maximum de tuyauterie :

Type de câble chauffant	T_{max} constante	T_{max} intermittente 1000 h cumulées	T_{max} hors tension
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Voir tableaux ci-dessous	–	260°C

VPL : Température maximum de tuyauterie en fonction du type et de la tension du câble chauffant

Type de câble chauffant	T_{max} tuyauterie			
Câble	**208 V ca**	**230 V ca**	**254 V ca**	**277 V ca**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Non autorisé	

Type de câble chauffant	T_{max} tuyauterie		
Câble	**385 V ca**	**400 V ca**	**480 V ca**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

NEDERLANDS

⚠ **Opgelet:** De koper dient de fabrikant op de hoogte te stellen van eventuele externe effecten of agressieve stoffen waaraan de produkten kunnen worden blootgesteld.

⚠ **Waarschuwing:** Langdurig of herhaald contact met de kit in de kernafdichters kan huidirritatie veroorzaken. Was uw handen zorgvuldig. Oververhitting of verbranding van de kit produceert dampen die teflonkoorts kunnen veroorzaken. Vermijd contact met sigaretten- of tabaksrook. Raadpleeg MSDS VEN 0033 voor meer informatie.

Specifieke voorwaarden voor gebruik met ATEX- of IECEx-goedkeuring:

Voor omgevingstemperatuur > +40°C:

Gebruik een voedingskabel met continue temperatuurweerstand van minimaal +90°C. Gebruik een metalen kabelwartel die is goedgekeurd voor gevaarlijke omgevingen (bv. GL-38-M25-METAL) en een kwartel voor verwarmingskabels (C25-100-METAL).

Voor voltages > 254 Vac en BTV-, QTVR-, XTV(R)-, KTV- of HTV- verwarmingskabels:

Gebruik een voedingskabel met continue temperatuurweerstand van minimaal +90°C. Gebruik een metalen kabelwartel die is goedgekeurd voor gevaarlijke omgevingen (bv. GL-38-M25-METAL) en een kwartel voor verwarmingskabels (C25-100-METAL).

Voor pijptemperaturen > 150°C en XTV(R), KTV of HTV verwarmingskabels moet de maximale bedrijfsstroom tot maximaal 20 A worden verlaagd.

Nominale spanning:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Omgevingstemperatuur:	JBU-100-E(P): –55°C tot +56°C** JBU-100-L-E(P): –40°C tot +40°C, behalve bij gebruik met VPL: in dat geval kan de omgevingstemperatuur oplopen tot +56°C.

** Mogelijk gelden specifieke voorwaarden voor gebruik voor ATEX en IECEx.

Voor een juiste installatie moeten de installatie-instructies van de desbetreffende aansluitkit zorgvuldig worden opgevolgd: C25-100, C25-21, C25-100-METAL of CCON25-100

Maximumleidingtemperatuur:

Type verwarmingskabel	T_{max} continu	T_{max} intermittent 1000 u cumulatief	T_{max} spanningsloos
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Zie onderstaande tabellen	–	260°C

VPL: Maximumleidingtemperatuur afhankelijk van type verwarmingskabel en spanning

Type verwarmingskabel	T_{max} pijp			
Kabel	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Niet toegestaan	

Type verwarmingskabel	T_{max} pijp		
Kabel	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

NORSK

⚠ **Advarsel:** Kjøperen skal gjøre produsenten oppmerksom på eksterne påkjenninger eller aggressive stoffer som utstyret kan bli utsatt for.

⚠ **Fadvarsel:** Langvarig eller gjentatt kontakt med tettningsmassen i kabelskrittet, kan irritere huden. Ved kontakt, vask hendene grundig. Overoppheting eller brenning av tetningsmassen kan føre til røykforgiiftning. Unngå at tetningsmassen kommer på sigaretter og tobakk. Konsulter sikkerhetsdatablad VEN 0033 for nærmere informasjon.

Spesielle vilkår for bruk med ATEX- eller IECEx-godkjenning:

For omgivelsestemperaturer > +40°C:

Bruk en strømkabel med en kontinuerlig temperaturmotstand på minimum +90°C. Bruk en kabelnippel av metall som egner seg for bruk

Bruk en kabelnippel av metall som egner seg for bruk i risikoområder (for eksempel GL-38-M25-METAL) og varmekabelnippel (C25-100-METAL).

For spenninger >254 V AC og BTV-, QTVR-, XTV(R)-, KTV- eller HTV-varmekabler:

Bruk en strømkabel med en kontinuerlig temperaturmotstand på minimum +90°C. Bruk en kabelnippel av metall som egner seg for bruk i risikoområder (for eksempel GL-38-M25-METAL) og varmekabelnippel (C25-100-METAL).

For rørtemperatur> 150°C og XTV(R), KTV eller HTV varmekabler skal den maksimale driftsstrømmen reduseres til maksimalt 20 A.

Nominell spenning:	JBU-100-E(P): 480 V AC** JBU-100-L-E(P): 277 V AC
Omgivelsestemperatur:	JBU-100-E(P): −55°C til +56°C** JBU-100-L-E(P): −40 °C til +40 °C, unntatt når det brukes med VPL: i så fall kan omgivelsestemperaturen være opp til + 56°C.

** Spesielle vilkår for bruk gjelde for ATEX og IECEx.

For riktig installasjon, følg nøye installasjonsanvisningene for de aktuelle koblingssettene: C25-100, C25-21, C25-100-METAL eller CCON25-100

Maksimal rørtemperatur:

Varmekabeltype	T_{max} kontinuerlig	T_{max} kortvarig 1000 t akkumulert	T_{max} uten spenning
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Se tabellene nedenfor	–	260°C

VPL: Maksimal rørtemperatur avhengig av varmekabeltype og spenning

Varmekabel-type		T_{max} rør		
Kabel	**208 V AC**	**230 V AC**	**254 V AC**	**277 V AC**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Ikke tillatt	

Varmekabel-type	T_{max} rør		
Kabel	**385 V AC**	**400 V AC**	**480 V AC**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

⚠ **Varning:** Köparen ska göra tillverkaren medveten om extern påverkan eller aggressiva ämnen som utrustningen kan utsättas för.

⚠ **Försiktighet:** Långvarig eller upprepad kontakt med tätningsmedlet i förseglingen kan orsaka hudirritation. Tvätta händerna noga. Överhettning eller brännning av tätningsmedlet producerar rök som kan orsaka polymerröksfeber. Undvik kontaminering av cigarretter eller tobak. Se materialsäkerhetsdatablad MSDS VEN 0033 för mer information.

Specifika förhållanden för användning av ATEX- eller IECEx-godkännanden:

För omgivningstemperaturer > +40°C:

Använd en spänningskabel med en kontinuerlig temperaturresistens på minst +90°C.

Använd en metallisk spänningskabelbussning som är godkänd för användning inom riskområden (till exempel GL-38-M25-METAL) och värmekabelbussning (C25-100-METAL).

För spänningar >254 Vac och BTV-, QTVR-, XTV(R)-, KTV- eller HTV- värmekablar:

Använd en spänningskabel med en kontinuerlig temperaturresistens på minst +90°C.

Använd en metallisk spänningskabelbussning som är godkänd för användning inom riskområden (till exempel GL-38-M25-METAL) och värmekabelbussning (C25-100-METAL).

För rörtemperatur > 150°C og XTV(R)-, KTV- eller HTV- värmekablar ska den maximala driftsströmmen reduceras till maximalt 20 A.

Nominell spänning:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Omgivningstemperatur:	JBU-100-E(P): −55 till +56°C** JBU-100-L-E(P): −40 till +40°C, utom när det används med VPL: i så fall kan omgivningstemperaturen vara upp till + 56°C.

** Specifika förhållanden för användning vara tillämpliga för ATEX och IECEx.

För korrekt installation, följ noga installationsanvisningarna i de tillämpliga anslutningssatserna: C25-100, C25-21, C25-100-METAL eller CCON25-100.

Maximal rörtemperatur:

Typ av värmare	T_{max} kontinuerligt	T_{max} intermittent 1000 timmar ackumulerat	T_{max} frånslagen spänning
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Se tabeller nedan	–	260°C

CH3-Maximal rörtemperatur beroende på typ av värmare och spänning

Typ av värmare		T_{max} rör		
Kabel	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Ej tillåtet	

Typ av värmare	T_{max} rör		
Kabel	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

DANSK

⚠ **Advarsel:** Køberen skal gøre producenten opmærksom på eksterne påvirken eller aggressive stoffer, som udstyret kan udsættes for.

⚠ **Forsigtig:** Langvarig eller gentagen kontakt med tætningsmidlet kan forårsage hudirritation. Vask hænderne grundigt. Overophedning eller afbrænding af tætningsmidlet vil medføre røg, der kan forårsage polymerrøgfeber. Undgå kontaminering med cigaretter eller tobak. Konsulter MSDS VEN 0033 for at få yderligere oplysninger.

Specifikke betingelser for brug med ATEX- eller IECEx-certificeringer:

Ved omgivende temperaturer >+40°C:

Anvend et strømkabel med vedvarende temperaturbestandighed på minimum +90°C.

Anvend en strømkabelafslutning af metal, der er godkendt til brug i risikoområder (f.eks. GL-38-M25-METAL) og varmekabelafslutning (C25-100-METAL).

Til spændinger >254 Vac og BTV-, QTVR-, XTV(R)-, KTV- eller HTV-varmekabler:

Anvend et strømkabel med vedvarende temperaturbestandighed på minimum +90°C.

Anvend en strømkabelafslutning af metal, der er godkendt til brug i risikoområder (f.eks. GL-38-M25-METAL) og varmekabelafslutning (C25-100-METAL).

Ved rørstemperatur > 150°C og XTV(R), KTV eller HTV varmekabler reduceres den maksimale driftsstrøm til maksimalt 20 A.

Mærkespænding:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Omgivende temperatur:	JBU-100-E(P): −55°C til +56°C** JBU-100-L-E(P): −40°C til +40°C, undtagen når de bruges sammen med VPL: i dette tilfælde kan omgivende temperaturer være op til + 56°C.

** Der gælde specifikke betingelser vedrørende brug for ATEX og IECEx.

Følg omhyggeligt monteringsvejledningerne til de pågældende sæt for at kunne foretage korrekt montering: C25-100, C25-21, C25-100-METAL eller CCON25-100

Varmekabeltype	T_{max} kontinuerligt	T_{max} intermitterende 1000 t kumulativt	T_{max} strøm afbrudt
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Se nedenstående tabeller	–	260°C

VPL: Maksimal rørtemperatur afhængigt af varmekabeltype og spænding

Varmekabeltype		T_{max} rør		
Kabel	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Ikke tilladt	

Varmekabeltype	T_{max} rør		
Kabel	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

SUOMI

⚠ **Varoitus:** Ostajan tulisi tiedottaa valmistajalle kaikista ulkopuolisista haittatekijöistä tai agressiivisista aineista joille laitteisto voi altistua.

⚠ **Huomio:** Pitkä tai toistuva kosketus tiivisteaineeseen voi aiheuttaa ihoärsytystä. Pese kädet huolellisesti. Tiivisteaineen ylikuumeneminen tai palaminen kehittää höyryjä, jotka voivat aiheuttaa polymeerihöyrykuumeen. Varo savukkeiden tai tupakan kontaminoitumista aineella. Lisätietoja on käyttöturvallisuustiedotteessa VEN 0033.

Turvallisen käytön erityisehdot sovellettaessa ATEX- ja IECEx-hyväksyntiä:

Ympäristön lämpötilassa >+40°C:

Käytä virtakaapelia, jonka jatkuva lämpötilan kestävyys on vähintään +90°C.

Käytä metallista virtakaapelin tiivisteholkkia, joka on hyväksytty käytettäväksi vaarallisilla alueilla (esimerkiksi GL-38-M25-METAL), sekä lämmityskaapelin tiivisteholkkia (C25-100-METAL).

Koskee jännitteitä >254 Vac ja lämmityskaapeleita BTV, QTVR, XTV(R), KTV ja HTV:

Käytä virtakaapelia, jonka jatkuva lämpötilan kestävyys on vähintään +90°C.

Käytä metallista virtakaapelin tiivisteholkkia, joka on hyväksytty käytettäväksi vaarallisilla alueilla (esimerkiksi GL-38-M25-METAL), sekä lämmityskaapelin tiivisteholkkia (C25-100-METAL).

Putken lämpötilan ollessa > 150°C, XTV(R)- KTV- tai HTV-lämmityskaapeleiden enimmäisvirta saa olla maksimissaan 20 A.

Nimellisjännite:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Ympäristön lämpötila:	JBU-100-E(P): −55°C – +56°C** JBU-100-L-E(P): −40°C – +40°C, paitsi käytettynä VPL: n kanssa: tällöin ympäristölämpötila voi olla jopa + 56˚C

** ATEX ja IECEx -tiloissa voidaan joutua soveltamaan turvallisen käytön erityisehtoja.

Noudata asennuksessa huolellisesti liitäntäsarjojen asennusohjeita: C25-100, C25-21, C25-100-METAL tai CCON25-100

Putken maksimilämpötila:

Lämmitintyyppi	T_{max} jatkuva	T_{max} hetkellinen 1000 h kumulatiivinen	T_{max} virta katkaistuna
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Katso alla olevat taulukot	–	260°C

VPL: Putken maksimilämpötila lämmityslaitteen tyypin ja jännitteen mukaisesti

Lämmitintyyppi		T_{max} putki		
Kaapeli	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Ei sallittu	

Lämmitintyyppi	T_{max} putki		
Kaapeli	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

ITALIANO

⚠ **Attenzione:** L'acquirente deve informare il produttore di eventuali effetti esterni o sostanze aggressive a cui l'apparecchiatura può essere esposta.

⚠ **Attenzione:** Il contatto prolungato o ripetuto con il sigillante delle guaine può causare irritazioni cutanee. Lavarsi accuratamente le mani. Il surriscaldamento o la combustione del sigillante producono fumi che possono causare febbre da fumi di polimeri. Evitare la contaminazione di sigarette o tabacco. Per maggiori informazioni, consultare MSDS VEN 0033.

Condizioni specifiche per un utilizzo con approvazioni ATEX o IECEx:

Per temperature ambiente >+40°C:

Utilizzare un cavo di alimentazione con resistenza a temperatura continua minima di +90°C.

Utilizzare un pressacavo metallico approvato per l'uso in aree pericolose (per esempio GL-38-M25-METAL) e un pressacavo per cavo scaldante (C25-100-METAL).

Per tensioni >254 Vac e cavi scaldanti BTV, QTVR, XTV(R), KTV o HTV:

Utilizzare un cavo di alimentazione con resistenza a temperatura continua minima di +90°C.

Utilizzare un pressacavo metallico approvato per l'uso in aree pericolose (per esempio GL-38-M25-METAL) e un pressacavo per cavo scaldante (C25-100-METAL).

Per temperature delle tubazioni > 150°C e cavi riscaldanti XTV(R), KTV o HTV, la corrente massima di esercizio deve essere ridotta a un massimo di 20 A.

Tensione nominale:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Temperatura ambiente:	JBU-100-E(P): da –55°C a +56°C** JBU-100-L-E(P): da –40°C a +40°C, tranne quando usato con VPL : in questo caso la temperatura ambiente può raggiungere i +56°C.

** Condizioni d'uso specifiche per ATEX e IECEx.

Per una corretta installazione, seguire attentamente le istruzioni d'installazione dei relativi kit di connessione: C25-100, C25-21, C25-100-METAL o CCON25-100

Temperatura massima del tubo:

Tipo di cavo scaldante	T_{max} continua	T_{max} intermittente cumulativa 1000 ore	T_{max} non alimentato
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Vedi tabelle sottostanti	–	260°C

VPL: Putken maksimilämpötila lämmityslaitteen tyypin ja jännitteen mukaisesti

Tipo di cavo scaldante		T_{max} tubo		
Cavo	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Non ammesso	

Tipo di cavo scaldante	T_{max} tubo		
Cavo	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

⚠ **Atencion:** El comprador debe poner en conocimiento del fabricante los efectos externos o las sustancias agresivas a las que puede estar expuesto el equipo.

⚠ **Precaución:** El contacto prolongado o frecuente con el sellador de núcleo puede irritar la piel. Lávese bien las manos. El sobrecalentamiento o la quema de sellador genera humos que pueden provocar fiebre por vapores de polímeros. Evite la contaminación de cigarrillos o tabaco. Consulte MSDS VEN 0033 para obtener más información.

Condiciones específicas de uso utilizando certificados ATEX o IECEx:

Para temperatura ambiente >+40°C:

Utilice un cable de alimentación con resistencia térmica continua de +90°C como mínimo.

Utilice un prensaestopas de cable de alimentación metálico aprobado para su uso en zonas peligrosas (por ejemplo, GL-38-M25-METAL) y prensaestopas de cable de calentamiento (C25-100-METAL).

Para voltajes >254 V CA y cables de calentamiento BTV, QTVR, XTV(R), KTV o HTV:

Utilice un cable de alimentación con resistencia térmica continua de +90°C como mínimo.

Utilice un prensaestopas de cable de alimentación metálico aprobado para su uso en zonas peligrosas (por ejemplo, GL-38-M25-METAL) y prensaestopas de cable de calentamiento (C25-100-METAL).

Para temperaturas de tubería > 150°C y cables calefactores XTV(R), KTV o HTV, la intensidad máxima de operación debe reducirse a un máximo de 20 A.

Voltaje nominal:	JBU-100-E(P): 480 V CA** JBU-100-L-E(P): 277 V CA
Temperatura ambiente:	JBU-100-E(P): de −55°C a +56°C** JBU-100-L-E(P): de −40°C a +40°C, excepto cuando se utiliza con VPL: en este caso la temperatura ambiente puede ser de hasta +56˚C

** Se aplican condiciones específicas para su uso en zonas ATEX y IECEx.

Para una instalación correcta, siga atentamente las instrucciones de instalación de los kits de conexión correspondientes: C25-100, C25-21, C25-100-METAL o CCON25-100

Temperatura de tubo máxima:

Tipo de calentador	T_{max} continua	T_{max} intermitente acumulación de 1.000 h	T_{max} desconexión
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Consulte las tablas siguientes	–	260°C

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083-Temperatura máxima del tubo dependiendo de tipo de calentador y voltaje

Tipo de calentador		T_{max} tubo		
Cable	**208 V CA**	**230 V CA**	**254 V CA**	**277 V CA**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	No se admite	

Tipo de calentador	T_{max} tubo		
Cable	**385 V CA**	**400 V CA**	**480 V CA**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

POLSKI

⚠ **Uwaga:** Kupujący powinien poinformować producenta o wszelkich czynnikach zewnętrznych lub agresywnych substancjach, na które mogą być narażone urządzenia.

⚠ **Ostrzeżenie:** Długotrwały lub powtarzający się kontakt z preparatem uszczelniającym w uszczelniaczu rdzenia, może powodować podrażnienia skóry. Dokładnie umyć ręce. Przegrzany lub palący się preparat uszczelniający wytwarza opary, mogące wywołać gorączkę polimerową. Nie dopuszczać do skażenia papierosów lub tytoniu. Więcej informacji zawiera karta charakterystyki substancji arkusze MSDS VEN 0033.

Szczególne warunki użytkowania zgodnie z ATEX lub IECEx:

Dla temperatur otoczenia >+40˚C:

Używać przewodu zasilającego z odpornością na wysokie temperatury przy ciągłej ekspozycji wynoszącą min. +90°C.

Używać metalowego przepustu przewodu zasilającego zatwierdzonego do użytkowania w strefach niebezpiecznych (na przykład GL-38-M25-METAL) oraz przepustu przewodu grzewczego (C25-100-METAL).

Dla napięć >254 VAC oraz przewodów grzewczych BTV, QTVR, XTV(R), KTV lub HTV:

Używać przewodu zasilającego z odpornością na wysokie temperatury przy ciągłej ekspozycji wynoszącą min. +90°C.

Używać metalowego przepustu przewodu zasilającego zatwierdzonego do użytkowania w strefach niebezpiecznych (na przykład GL-38-M25-METAL) oraz przepustu przewodu grzewczego (C25-100-METAL).

W przypadku temperatury rur > 150°C oraz kabli grzejnych XTV(R), KTV lub HTV, maksymalny prąd roboczy powinien być ograniczony do maksimum 20 A.

Napięcie znamionowe:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 VAC
Temperatura otoczenia:	JBU-100-E(P): od −55°C do +56°C** JBU-100-L-E(P): od −40°C do +40°C, z wyjątkiem zastosowania z VPL : w tym przypadku temperatura otoczenia może wynosić do +56˚C.

** Mieć zastosowanie szczególne warunki użytkowania dla ATEX i IECEx.

W celu dokonania prawidłowego montażu należy postępować zgodnie z instrukcją stosowną dla danego zestawu podłączeniowego: C25-100, C25-21, C25-100-METAL lub CCON25-100

Максимальная температура рубашки:

Typ elementu grzewczego	$T_{maks.}$ - ekspozycja ciągła	$T_{maks.}$ - ekspozycja nieciągła 1000 h skumul.	$T_{maks.}$ odłączenia zasilania
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Patrz poniższe tabele	–	260°C

VPL: Maksymalna temperatura rurociągu w zależności od typu elementu grzewczego i napięcia

Typ elementu grzewczego		$T_{maks.}$ rurociągu		
Przewód	**208 VAC**	**230 VAC**	**254 VAC**	**277 VAC**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Niedozwolona	

Typ elementu grzewczego	$T_{maks.}$ rurociągu		
Przewód	**385 VAC**	**400 VAC**	**480 VAC**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

РУССКИЙ

⚠ **Предупреждение:** Покупатель должен уведомить производителя о любых внешних воздействиях или агрессивных средах, которым может подвергаться оборудование.

⚠ **Меры Предосторожности:** Продолжительное или многократное контактирование с герметиком изолирующей жилы кабеля манжеты может вызвать раздражение кожи. Тщательно мойте руки. В случае перегрева или возгорания герметик выделяет дым, который может вызвать поражение дыхательных путей. Не допускайте попадания на сигареты или в табак. Дополнительную информацию см. в сертификате безопасности материала MSDS VEN 0033.

Особые указания по использованию согласно ATEX или IECEx:

Для температур окружающей среды > +40°C:
Использовать кабель питания, имеющий постоянное сопротивление до температуры не менее +90°C.

Использовать металлические кабельные вводы для взрывоопасных зон (например, GL-38-M25-METAL) и вводы греющего кабеля (C25-100-METAL).

Для напряжений > 254 В перем. тока и греющих кабелей BTV, QTVR, XTV(R), KTV или HTV:

Использовать кабель питания, имеющий постоянное сопротивление до температуры не менее +90°C.

Использовать кабельные вводы для взрывоопасных зон (например, GL-38-M25-METAL) и вводы греющего кабеля (C25-100-METAL).

При температуре труб > 150°C и греющих кабелей XTV(R), KTV или HTV максимальный рабочий ток должен быть снижен до макс.20 A.

Номинальное напряжение:	JBU-100-E(P): 480 В перем.** JBU-100-L-E(P): 277 В перем.
Температура окр. среды:	JBU-100-E(P): от −55°C до +56°C** JBU-100-L-E(P): от −40°C до +40°C, кроме случаев использования с VPL: в этом случае температура окружающей среды может достигать +56˚C.

** ATEX, МЭК по сертификации электрооборудования для взрывоопасных сред.

При выполнении монтажа соблюдайте указания, приведенные в инструкциях для соответствующих комплектов подсоединения: C25-100, C25-21, C25-100-METAL или CCON25-100

Максимальная температура трубы:

Тип нагревателя	T_{max} постоянно	T_{max} периодически суммарно 1000 ч	T_{max} при выкл. питании
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	см. таблицу	–	260°C

VPL: Максимальная температура трубы в зависимости от типа нагревателя и напряжения

Тип нагревателя		T_{max} трубы		
Кабель	**208 В перем.**	**230 В перем.**	**254 В перем.**	**277 В перем.**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	не допускается	

Тип нагревателя	T_{max} трубы		
Кабель	**385 В перем.**	**400 В перем.**	**480 В перем.**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

СВЕДЕНИЯ О ТРАНСПОРТИРОВКЕ И ХРАНЕНИИ

Транспортировать в упаковке можно всеми видами крытых транспортных средств (автомобильным, железнодорожным, речным, авиационным и др.) в соответствии с действующими на данном виде транспорта правилами перевозок при температуре воздуха от −50°C до + 50°C. Транспортная упаковка предохраняет корпус от прямого воздействия атмосферных осадков, пыли и ударов при транспортировании.

Материалы и оборудование должны храниться в сухих и чистых закрытых помещениях при температуре от −20°C до +40°C и быть защищены от механических повреждений.

⚠ **Upozornění:** Kupující by měl informovat výrobce o jakýchkoli vnějších účincích nebo agresivních látkách, kterým může být zařízení vystaveno.

⚠ **Upozornění:** Dlouhodobý nebo opakovaný kontakt s těsnicím prostředkem v těsnění jádra může vést k podráždění pokožky. Pečlivě si umyjte ruce. Při přehřívání nebo spalování těsnicího prostředku se vytvářejí plyny, jež mohou vyvolat horečku z polymerových výparů. Dávejte pozor, aby nedošlo ke kontaminaci cigaret nebo tabáku. Více informací viz MSDS VEN 0033.

Specifické podmínky pro použití na základě schválení ATEX a IECEx:

Pro okolní teplotu >+40°C:

Použijte přívodní kabel s minimální trvalou tepelnou odolností +90°C.

Použijte kovovou průchodku přívodního kabelu schválenou pro použití v prostředích s nebezpečím výbuchu (například GL-38-M25-METAL) a průchodku topného kabelu (C25-100-METAL).

Pro napětí >254 Vac a topné kabely BTV, QTVR, XTV(R), KTV nebo HTV:

Použijte přívodní kabel s minimální trvalou tepelnou odolností +90°C.

Použijte kovovou průchodku přívodního kabelu schválenou pro použití v prostředích s nebezpečím výbuchu (například GL-38-M25-METAL) a průchodku topného kabelu (C25-100-METAL).

Pro teplotu potrubí > 150°C a topné kabely XTV(R), KTV nebo HTV se maximální provozní proud sníží na maximálně 20 A.

Jmenovité napětí:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Okolní teplota:	JBU-100-E(P): −55°C až +56°C** JBU-100-L-E(P): −40°C až +40°C, s výjimkou použití s VPL: v tomto případě mohou být okolní teploty až +56°C.

** Pro ATEX a IECEx vztahovat zvláštní podmínky použití.

Má-li být montáž správně provedena, je třeba postupovat podle montážních návodů příslušných připojovacích souprav: C25-100, C25-21, C25-100-METAL nebo CCON25-100

Maximální teplota potrubí:

Typ topného kabelu	T_{max} souvisle	T_{max} přerušovaně, celkem 1000 h	T_{max} vypnuto
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Viz tabulky níže	–	260°C

VPL: Maximální teplota potrubí v závislosti na typu topného kabelu a napětí

Typ topného kabelu		T_{max} potrubí		
Kabel	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Nepřípustné	

Typ topného kabelu	T_{max} potrubí		
Kabel	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

MAGYAR

⚠ **Figyelmeztetés:** A vevőnek tájékoztatni kell a gyártót minden olyan külső hatásról vagy agresszív anyagról, amelyek a készülék ki lehet téve.

⚠ **Figyelem:** A magtömítésben lévő tömítőanyaggal való hosszan tartó vagy ismételt érintkezés bőrirritációt okozhat.Mosson alaposan kezet A tömítőanyag túlhevülése vagy égése olyan füstöket hoz létre, amelyek polimer füst lázat okozhatnak. Kerülje a cigaretták vagy a dohány szennyeződését. További információkért forduljon az MDS VEN 0033 anyagbiztonsági adatlaphoz.

Az ATEX és az IECEx jóváhagyások használatának különleges feltételei:

+40°C-nál magasabb környezeti hőmérséklet esetén:

Minimum +90°C-os folyamatos hőmérséklet-ellenállással rendelkező hálózati tápkábelt használjon.

A hálózati tápkábelhez, illetve a fűtőkábelhez veszélyes területen való alkalmazásra jóváhagyott fém szorítóhüvelyt (például GL-38-M25-METAL), illetve szorítóhüvelyt (C25-100-METAL) használjon.

254 V-nál magasabb feszültség és BTV, QTVR, XTV(R), KTV vagy HTV fűtőkábelek esetén:

Minimum +90°C-os folyamatos hőmérséklet-ellenállással rendelkező hálózati tápkábelt használjon.

A hálózati tápkábelhez, illetve a fűtőkábelhez veszélyes területen való alkalmazásra jóváhagyott fém szorítóhüvelyt (például GL-38-M25-METAL), illetve szorítóhüvelyt (C25-100-METAL) használjon.

Csőhőmérséklet > 150°C és XTV(R), KTV vagy HTV fűtővezetékek esetén a maximális üzemi áramot legfeljebb 20 A-ra kell csökkenteni.

Névleges feszültség:	JBU-100-E(P): 480 V~** JBU-100-L-E(P): 277 V~
Környezeti hőmérséklet:	JBU-100-E(P): −55°C – +56°C** JBU-100-L-E(P): −40°C – +40°C, kivéve, ha VPL-vel használják: ebben az esetben a legmagasabb környezeti hőmérséklet + 56˚C lehet.

** A biztonságos használat feltételei az ATEX-re és az IECEx-re vonatkoznak.

A helyes szereléshez kövesse körültekintően az alkalmazásra kerülő csatlakoztató készletek szerelési utasításait: C25-100, C25-21, C25-100-METAL vagy CCON25-100

Maximális csőhőmérséklet:

Fűtőkábel típusa	T_{max} folyamatos üzemben	T_{max} szakaszos üzemben, összesen 1000 óra	T_{max} kikapcsolva
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Lásd az alábbi táblázatokat	–	260°C

Vrlo važno! Maksimalna temperatura mora biti manja od najmanje vrijednosti koja je navedena u tablici za vrstu grijaćeg kabela i napon napajanja.

Grijaći kabel	T_{max} cijevi			
Kabel	**208 V~**	**230 V~**	**254 V~**	**277 V~**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Nem megengedett	

Grijaći kabel	T_{max} cijevi		
Kabel	**385 V~**	**400 V~**	**480 V~**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

HRVATSKI

⚠ **Upozorenje:** Kupujúci by mal informovať výrobcu o akýchkoľvek vedľajších účinkoch alebo agresívnych látkach, ktorým môže byť zariadenie vystavené.

⚠ **Oprez:** Produženi ili ponovljeni kontakt s brtvenom smjesom u brtvilu jezgre može izazvati nadražaj kože. Temeljito operite ruke. Pregrijavanje ili paljenje brtvene smjese prouzročiti će dim koji može rezultirati groznicom izazvanom dimom polimera. Izbjegavajte kontaminaciju cigareta i duhana. Više informacija možete pronaći u MSDS VEN 0033.

Posebni uvjeti za upotrebu kod primjene ATEX i IECEx odobrenja:

Za okolne temperature >+40°C:

Koristiti napojni kabel konstantnog temperaturnog otpora mimalno +90°C.

Koristiti metalne kabelske uvodnice odobrene za uporabu na opasnim lokacijama (na primjer: GL-38-M25-METAL) i uvodnicu grijaćeg kabela (C25-100-METAL).

Za napone >254 Vac i BTV, QTVR, XTV(R), KTV ili HTV grijaće kabele:

Koristiti napojni kabel konstantnog temperaturnog otpora mimalno +90°C.

Koristiti metalne kabelske uvodnice odobrene za uporabu na opasnim lokacijama (na primjer: GL-38-M25-METAL) i uvodnicu grijaćeg kabela (C25-100-METAL).

Za temperaturu cjevovoda> 150°C i XTV(R), KTV ili HTV grijaće kabele, maksimalna radna struja smanjuje se na maksimalno 20 A.

Nazivni napon:	JBU-100-E(P): 480 Vac** JBU-100-L-E(P): 277 Vac
Okolna temperatura:	JBU-100-E(P): −55°C do +56°C** JBU-100-L-E(P): −40°C do +40°C, osim ako se koristi s VPL grijaćim kabelom: u tom slučaju temperatura okoline može biti i do +56˚C.

** Za ATEX i IECEx odobrenja primjenjuju se posebni uvjeti upotrebe.

Za pravilnu montažu, pažljivo slijedite upute za montažu primjenjivih

C63-AQ-QIX-00257001-17

garancija spojnice: C25-10, C25-21, C25-100-METAL ili CCON25-100

Maksimalna temperatura cijevi:

Tip grijaće trake	T_{max} trajno	T_{max} povremeno 1000 sati kumulativno	T_{max} isključeno
BTV	65°C	85°C	–
QTVR	110°C	110°C	–
XTV	121°C	250°C	–
XTVR	150°C	250°C (2000 h)	–
KTV	150°C	250°C	–
HTV	205°C	260°C (2000 h)	–
VPL	Vidi tablice dolje	–	260°C

VPL : Maksimalna temperatura cijevi ovisi o tipu grijanja i naponu

Tip grijaće trake		T_{max} cijevi		
Kabel	**208 Vac**	**230 Vac**	**254 Vac**	**277 Vac**
5VPL2-CT	235°C	230°C	225°C	225°C
10VPL2-CT	220°C	210°C	200°C	195°C
15VPL2-CT	200°C	180°C	145°C	105°C
20VPL2-CT	150°C	150°C	Nem megengedett	

Tip grijaće trake	T_{max} cijevi		
Kabel	**385 Vac**	**400 Vac**	**480 Vac**
5VPL4-CT	230°C	230°C	230°C
10VPL4-CT	215°C	215°C	205°C
15VPL4-CT	195°C	195°C	160°C
20VPL4-CT	150°C	150°C	150°C

C03:AQUAQUIX-002 575 / 917

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RAYCHEM-IM-INSTALL057-JBU100X-ML-2303

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
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(1) # EU-Baumusterprüfbescheinigung

(2) Geräte oder Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 2014/34/EU**

(3) EU-Baumusterprüfbescheinigungsnummer

PTB 01 ATEX 1016 **Ausgabe: 1**

(4) Produkt: Klemmenkasten Typ 8146/1***-* und 8146/2***-*

(5) Hersteller: R. STAHL Schaltgeräte GmbH

(6) Anschrift: Am Bahnhof 30, 74638 Waldenburg (Württ.), Deutschland

(7) Die Bauart dieses Produkts sowie die verschiedenen zulässigen Ausführungen sind in der Anlage und den darin aufgeführten Unterlagen zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Physikalisch-Technische Bundesanstalt, notifizierte Stelle Nr. 0102 gemäß Artikel 17 der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014, bescheinigt, dass dieses Produkt die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Produkten zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.

Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 21-10099 festgehalten.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit
EN IEC 60079-0:2018, EN 60079-1:2014, EN 60079-7:2015+A1:2018, EN 60079-11:2012, EN 60079-18:2015+A1:2017, EN 60079-28:2015, EN 60079-31:2014

(10) Falls das Zeichen „X" hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Produkts in der Anlage zu dieser Bescheinigung hingewiesen.

(11) Diese EU-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Prüfung des festgelegten Produkts gemäß Richtlinie 2014/34/EU. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Bereitstellen auf dem Markt. Diese Anforderungen werden nicht durch diese Bescheinigung abgedeckt.

(12) Die Kennzeichnung des Produkts muss die folgenden Angaben enthalten:

II 2 G Ex db eb ia mb op pr IIA, IIB, IIC T6, T5, T4 Gb

II 2 D Ex tb IIIC T80 °C, T95 °C, T130 °C Db

Konformitätsbewertungsstelle, Sektor Explosionsschutz
Im Auftrag

Braunschweig, 22. März 2021

Dr.-Ing. D. Markus
Direktor und Professor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

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EU-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EU-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(13) # Anlage

(14) **EU-Baumusterprüfbescheinigung PTB 01 ATEX 1016 , Ausgabe: 1**

(15) Beschreibung des Produkts

Der Klemmenkasten Typ 8146/1***-* und 8146/2***-* besteht aus einem Gehäuse aus Polyesterharz in der Zündschutzart Erhöhte Sicherheit "eb" und Schutz durch Gehäuse „tb", das mit Ex-Typ zertifizierten Flanschen ausgestattet werden kann.

Es können mehrere Klemmenkästen miteinander kombiniert werden. Der Anschluss erfolgt über Ex-Kabel- und Leitungseinführungen.

Der Klemmenkasten ist mit Klemmen für Stromkreise in der Zündschutzart Erhöhte Sicherheit "eb" oder Eigensicherheit "ia" oder Kombinationen aus beiden ausgestattet. Er kann optional mit Trennklemmen und Sicherungen ausgestattet sein. Die Komponenten für eigensichere Stromkreise sind gekennzeichnet, z. B. in hellblau.

Es können auch Bolzenklemmen mit Anschluss an Sammelschienen installiert werden.

Das Gehäuse sowie alle ein- und angebauten Komponenten sind nach ATEX-Prüfbescheinigung geprüft und bescheinigt.

Änderungen

1) Zusätzliche Ex-Komponenten zur Komponentenliste hinzugefügt
2) Normen-Update auf den neuesten ATEX Normenstand
3) Neue Zertifizierungsbetriebsanleitung

Typschlüssel

8146	/	*	*	*	*	-	*
a	/	b	c		d	-	e

a Typenreihen

b Gehäusetyp:
- 1 – Klemmenkasten Ex e (oder kombiniert Ex e und Ex i)
- 2 – Klemmenkasten Ex i

c Gehäuselänge x Breite [mm]:
- 00 – Kombination
- 03 – 112,5 x 112,5
- 04 – 170,0 x 112,5
- 24 – 227,0 x 112,5
- 05 – 170,0 x 170,0

EU-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
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Anlage zur EU-Baumusterprüfbescheinigung PTB 01 ATEX 1016 , Ausgabe: 1

06 – 227,0 x 170,0
07 – 340,5 x 170,0
B7 – 340,5 x 170,0
S7 – 340,5 x 170,0
08 – 340,5 x 340,5
09 – 681,5 x 340,5

d Gehäusehöhe [mm]:
0 – Kombination
1 – 91 (Gehäusehöhe 76 mm, Deckelhöhe 15 mm)
2 – 131 (Gehäusehöhe 76 mm, Deckelhöhe 55 mm)
3 – 150 (Gehäusehöhe 135 mm, Deckelhöhe 15 mm)
4 – 171 (Gehäusehöhe 76 mm, Deckelhöhe 95 mm)
5 – 190 (Gehäusehöhe 135 mm, Deckelhöhe 55 mm)
6 – 230 (Gehäusehöhe 135 mm, Deckelhöhe 95 mm)
7 – 104 (Gehäusehöhe 76 mm, Deckelhöhe 28 mm)

e Weitere Informationen ohne Relevanz für den Explosionsschutz

Elektrische Daten

Rated voltage*	Max 1100 V AC/DC
	Max. 750 V with bolt-type screw terminals
Rated current*	Max. 500 A
	Max. 315 A for T6 with bolt-type screw terminals
	Max. 400 A for T5 with bolt-type screw terminals
Rated cross section (conductor)*	Max. 300 mm²
	Max. 185 mm² with bolt-type screw terminals and connection with cable lugs
*) depending on terminal type and Ex components used	

Umgebungstemperaturbereich

Umgebungstemperaturbereich abhängig von der verwendeten Dichtung:

Dichtung 1 (D0075)	-60 °C bis +100 °C
Dichtung 2 (D0121)	-20 °C bis +60 °C

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Anlage zur EU-Baumusterprüfbescheinigung PTB 01 ATEX 1016 , Ausgabe: 1

Schutz durch Gehäuse nach IEC EN 60079-0, EN 60079-7 und EN 60079-31:
abhängig von den verbauten Ex-Komponenten oder Ex Geräten

Die Bemessungswerte sind Höchstwerte, die tatsächlichen elektrischen Werte werden von den eingebauten elektrischen Betriebsmitteln bestimmt. Der Hersteller legt im Rahmen dieser Grenzwerte bei Einhaltung der zutreffenden Normen und abhängig von Netzbedingungen, Betriebsart, Gebrauchskategorie usw. die endgültigen Bemessungswerte fest. Die Kennwerte der eigensicheren Stromkreise werden vom Hersteller in eigener Verantwortung festgelegt.

Der maximal zulässige Bereich der Umgebungstemperatur des Klemmenkastens kann durch die maximal zulässige Betriebstemperatur der getrennt bescheinigten Komponenten eingeschränkt werden.

Die Zusammensetzung des Zündschutzart-Kennzeichnung richtet sich nach den Zündschutzarten der jeweils verwendeten Komponenten.

(16) Prüfbericht PTB Ex 21-10099

(17) Besondere Bedingungen

Keine.

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

Erfüllt durch Übereinstimmung mit den vorgenannten Normen.

Nach Artikel 41 der Richtlinie 2014/34/EU dürfen EG-Baumusterprüfbescheinigungen nach Richtlinie 94/9/EG, die bereits vor dem Datum der Anwendung von Richtlinie 2014/34/EU (20. April 2016) bestanden, so betrachtet werden, als wenn sie bereits in Übereinstimmung mit der Richtlinie 2014/34/EU ausgestellt wurden. Mit Genehmigung der Europäischen Kommission dürfen Ergänzungen zu solchen EG-Baumusterprüfbescheinigungen und neue Ausgaben solcher Zertifikate weiterhin die vor dem 20. April 2016 ausgestellte originale Zertifikatsnummer tragen.

Konformitätsbewertungsstelle, Sektor Explosionsschutz — Braunschweig, 22. März 2021
Im Auftrag

Dr.-Ing. D. Markus
Direktor und Professor

EU-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
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(1) EU-TYPE EXAMINATION CERTIFICATE
(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 01 ATEX 1016 **Issue: 1**

(4) Product: Terminal box type 8146/1***-* und 8146/2***-*

(5) Manufacturer: R. STAHL Schaltgeräte GmbH

(6) Address: Am Bahnhof 30, 74638 Waldenburg (Württ.), Germany

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 21-10099.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018, EN 60079-1:2014, EN 60079-7:2015+A1:2018, EN 60079-11:2012, EN 60079-18:2015+A1:2017, EN 60079-28:2015, EN 60079-31:2014

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II 2 G Ex db eb ia mb op pr IIA, IIB, IIC T6, T5, T4 Gb

II 2 D Ex tb IIIC T80 °C, T95 °C, T130 °C Db

Konformitätsbewertungsstelle, Sektor Explosionsschutz Braunschweig, March 22, 2021
On behalf of PTB:

Dr.-Ing. D. Markus
Direktor und Professor

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EU-Type Examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

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(13) # SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 01 ATEX 1016 , Issue: 1**

(15) Description of Product

The Terminal Box type 8146/1***-* and 8146/2***-* consists of enclosures out of polyester resin in the type of protection Increased Safety "eb" and Protection by Enclosure “tb”, which may be provided with Ex-type certified flanges. Several boxes can be combined with each other. The connection is made by Ex-cable entries.

The Terminal Box is equipped with terminals for circuits in the type of protection Increased Safety "eb" or Intrinsic Safety "ia" or combinations of both. It may optionally be provided with isolating terminals and fuses. The components for intrinsically safe circuits are marked, e.g. in light blue.

Stud terminals connected to busbars can also be installed.

The empty enclosures as well as all mounted and attached components have been tested and certified under an ATEX examination certificate.

Changes

1) Additional Ex components added to list of components
2) Standard update to latest ATEX standards
3) New Certification Instruction

Nomenclature

8146	/	*	*	*	*	-	*
a	/	b	c		d	-	e

a Type series

b Design:
- 1 – Terminal Box Ex e (or combined Ex e and Ex i)
- 2 – Terminal Box Ex i

c Enclosure length x width [mm]:
- 00 – Combination
- 03 – 112.5 x 112.5
- 04 – 170.0 x 112.5
- 24 – 227.0 x 112.5
- 05 – 170.0 x 170.0
- 06 – 227.0 x 170.0
- 07 – 340.5 x 170.0
- B7 – 340.5 x 170.0

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 01 ATEX 1016 , Issue: 1

S7 – 340.5 x 170.0
08 – 340.5 x 340.5
09 – 681.5 x 340.5

d Enclosure height [mm]:
0 – Combination
1 – 91 (Enclosure height 76 mm, Cover height 15 mm)
2 – 131 (Enclosure height 76 mm, Cover height 55 mm)
3 – 150 (Enclosure height 135 mm, Cover height 15 mm)
4 – 171 (Enclosure height 76 mm, Cover height 95 mm)
5 – 190 (Enclosure height 135 mm, Cover height 55 mm)
6 – 230 (Enclosure height 135 mm, Cover height 95 mm)
7 – 104 (Enclosure height 76 mm, Cover height 28 mm)

e Further information without relevance to explosion protection

Electrical data

Rated voltage*	Max 1100 V AC/DC
	Max. 750 V with bolt-type screw terminals
Rated current*	Max. 500 A
	Max. 315 A for T6 with bolt-type screw terminals
	Max. 400 A for T5 with bolt-type screw terminals
Rated cross section (conductor)*	Max. 300 mm²
	Max. 185 mm² with bolt-type screw terminals and connection with cable lugs
*) depending on terminal type and Ex components used	

Ambient temperature range

Ambient temperature range dependent on the gasket:

Gasket 1 (D0075)	-60 °C to +100 °C
Gasket 2 (D00121)	-20 °C to +60 °C

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 01 ATEX 1016 , Issue: 1

Ingress protection according to IEC 60079-0, IEC 60079-7 and IEC 60079-31:
depends on the assembled Ex components or Ex equipments

The rated values are maximum values, the actual electrical values depend on the electrical equipment incorporated. Within the scope of these maximum permissible values and with due regard to the standards, the manufacturer specifies the final rated values dependent on the system conditions, mode of operation, utilization category, etc. The characteristic values of the intrinsically safe circuits are to be given by the manufacturer on his own responsibility.

The maximum permissible ambient temperature range of the terminal enclosure can be limited by the maximum permissible service temperature ranges of the separately certified components.

The composition of the type of protection marking will be based on the types of protection of components actually used.

(16) Test Report PTB Ex 21-10099

(17) Specific conditions of use

None.

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

According to Article 41 of Directive 2014/34/EU, EC-type examination certificates which have been issued according to Directive 94/9/EC prior to the date of coming into force of Directive 2014/34/EU (April 20, 2016) may be considered as if they were issued already in compliance with Directive 2014/34/EU. By permission of the European Commission supplements to such EC-type examination certificates and new issues of such certificates may continue to hold the original certificate number issued before April 20, 2016.

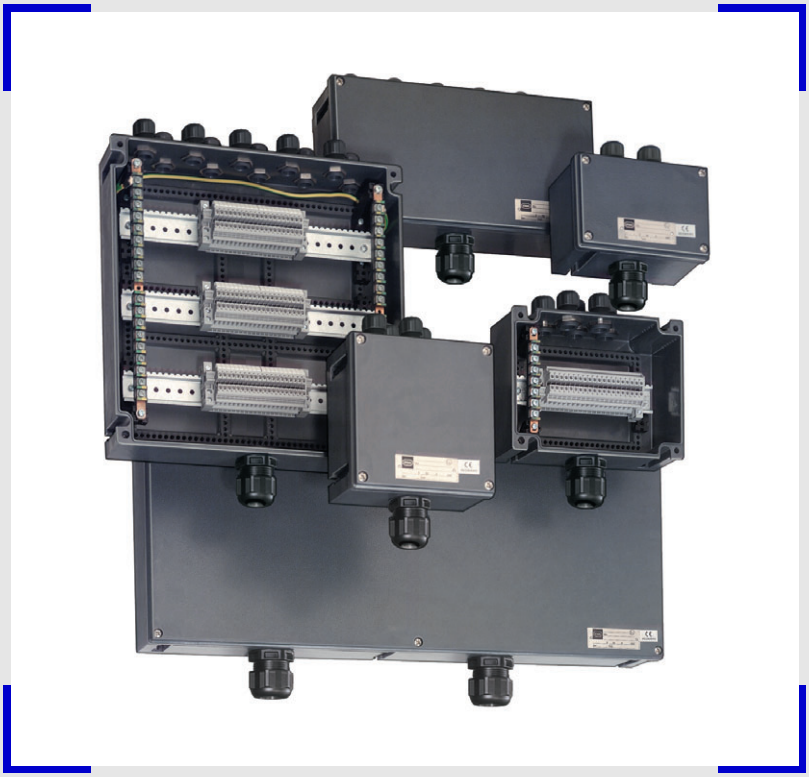
Konformitätsbewertungsstelle, Sektor Explosionsschutz — Braunschweig, March 22, 2021
On behalf of PTB:

Dr.-Ing. D. Markus
Direktor und Professor

EU-Type Examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
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Terminal Boxes
Series 8146



03098E00

- Enclosures in shock-resistant glass fibre reinforced polyester resin
- 8 basic enclosure sizes with various heights
- Fitted according to the customer's requirements
- For terminals up to max. 300 mm²
- With captive cap screws
- Degree of protection IP66

www.stahl.de

The terminal boxes of the Series 8146, made of high-quality, glass fibre reinforced polyester resin is ideally suitable for the use in rough operating conditions. Due to the reduced surface resistance, the enclosures correspond to the requirements for hazardous areas. Eight basic enclosure sizes having different heights allow the user a variety of application options. The terminal boxes are fitted to order with terminals up to a size of 300 mm². Upon request, flanges can be mounted on several sides of the enclosure.

	ATEX / IECEx					
Zone	0	1	2	20	21	22
8146/1: For use in		x	x		x	x
8146/2: For use in		x	x		x	x

	Class I (NEC 505)			(NEC 506)		
Zone	0	1	2	20	21	22
8146/1: For use in		x	x			
8146/2: For use in		*)	*)			

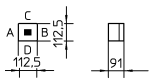
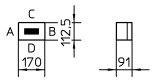
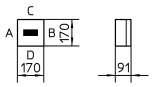
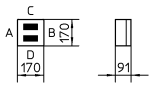
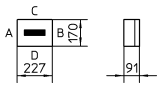
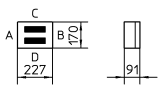
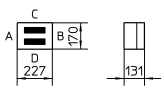
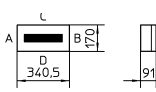
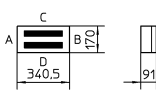
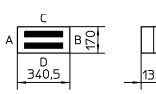
	Class I		Class II		Class III	
Division	1	2	1	2	1	2
8146/1: For use in		x		x	x	
8146/2: For use in		x		x	x	

*) Approval not required

WebCode 8146A

Terminal Boxes
Series 8146

Selection Table for terminal boxes up to max. 35 mm²

Arrangements	Max. number of terminal blocks which can be fitted: Nominal cross-section [mm²] 2.5 UK 3 N	2.5 WDU 2,5	4 MXK 4	4 UK 5 N	4 WDU 4	6 UK 6 N	6 WDU 6	10 UK 10 N	10 WDU 10	16 UK 16 N	16 WDU 16	35 UK 35	35 WDU 35	Order number	Weight [kg] without / with flange
 06021E00	6	--	--	--	--	--	--	--	--	--	--	--	--	**8146/.031**	0.64
 08830E00	14	--	12	12	--	--	--	--	--	--	--	--	--	**8146/.041**	0.81
 08829E00	19	19	16	16	16	11	12	9	9	8	--	--	--	**8146/.051**	0.85/ 0.95
 08828E00	--	--	28	--	--	--	--	--	--	--	--	--	--	**8146/.051**	1.05/ 1.15
 08827E00	27	28	23	23	24	17	17	13	14	11	--	--	--	**8146/.061**	1.06/ 1.26
 08826E00	--	--	46	--	--	--	--	--	--	--	--	--	--	**8146/.061**	1.10/ 1.30
 08825E00	--	--	46	--	--	--	--	--	--	--	--	--	--	**8146/.062**	1.50/ 1.70
 08824E00	49	51	--	41	42	31	31	24	25	20	--	--	--	**8146/.S71**	1.04/ 1.70
 08823E00	--	--	82	--	--	--	--	--	--	--	--	--	--	**8146/.S71**	1.80/ 2.20
 08822E00	--	--	82	--	--	--	--	--	--	--	--	--	--	**8146/.072**	1.90/ 2.20

Order Number Supplement:

	Version:	Ex e	**8146/1...**
		Ex i	**8146/2...**
Specify with order:	**Terminal blocks:**	Number and type	
	Cable glands:	Number, type and installation side in enclosure	
	Flanges:	Flanges can be fitted to order; please indicate the side on which they are to be fitted.	

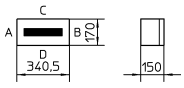
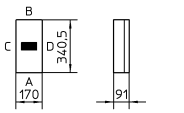
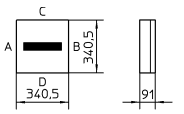
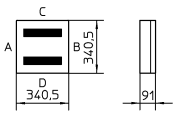
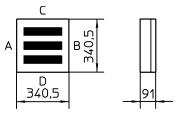
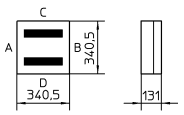
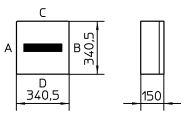
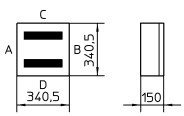
Note: The order numbers contain the enclosure with carrier rails and PE or PA rail.

Terminal boxes fitted with terminals > 35 mm² up to 300 mm² on request.

E3

Terminal Boxes
Series 8146

Selection Table for terminal boxes up to max. 35 mm²

Nominal cross-section [mm²]	Max. number of terminal blocks which can be fitted													Order number	Weight [kg]
	2.5		4			6		10		16		35			
Arrangements	UK 3 N	WDU 2,5	MXK 4	UK 5 N	WDU 4	UK 6 N	WDU 6	UK 10 N	WDU 10	UK 16 N	WDU 16	UK 35	WDU 35		without / with flange
 08821E00	49	51	41	41	42	31	31	24	25	20	20	- -	- -	**8146/.S73**	1.40/ 1.70
 08820E00	19	19	- -	16	16	11	12	9	9	8	- -	- -	- -	**8146/.071**	1.60/ 1.90
 08819E00	51	53	- -	43	44	32	33	26	26	21	- -	- -	- -	**8146/.081**	2.00/ 2.40
 08818E00	98	102	82	82	84	62	62	48	50	40	- -	- -	- -	**8146/.081**	2.40/ 2.80
 08817E00	147	153	123	123	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8146/.081**	2.80/ 3.20
 08816E00	98	102	82	82	84	62	62	48	50	40	- -	- -	- -	**8146/.082**	3.10/ 3.50
 08815E00	51	53	43	43	44	32	33	26	26	21	22	17	16	**8146/.083**	2.60/ 3.00
 08814E00	98	102	82	82	84	62	62	48	50	40	- -	- -	- -	**8146/.083**	3.00/ 3.40

Order Number Supplement:

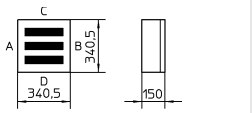
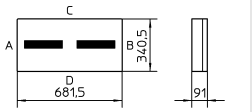
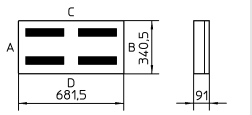
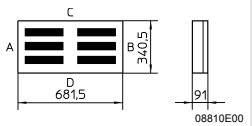
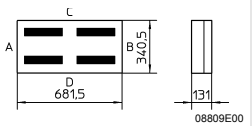
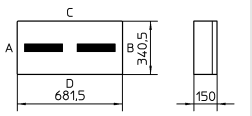
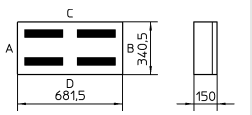
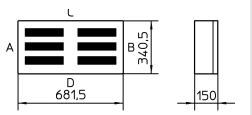
	Version:	Ex e	**8146/1...**
		Ex i	**8146/2...**
Specify with order:	**Terminal blocks:**	Number and type	
	Cable glands:	Number, type and installation side in enclosure	
	Flanges:	Flanges can be fitted to order; please indicate the side on which they are to be fitted.	

Note: The order numbers contain the enclosure with carrier rails and PE or PA rail.

Terminal boxes fitted with terminals > 35 mm² up to 300 mm² on request.

Terminal Boxes
Series 8146

Selection Table for terminal boxes up to max. 35 mm²

Arrangements	Max. number of terminal blocks which can be fitted													Order number	Weight [kg] without / with flange
Nominal cross-section [mm²]	2.5		4			6		10		16		35			
	UK 3 N	WDU 2,5	MXK 4	UK 5 N	WDU 4	UK 6 N	WDU 6	UK 10 N	WDU 10	UK 16 N	WDU 16	UK 35	WDU 35		
 08813E00	147	153	123	123	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8146/.083**	3.40/ 3.80
 08812E00	102	106	86	86	88	64	66	52	52	42	- -	- -	- -	**8146/.091**	4.00/ 4.80
 08811E00	196	204	164	164	168	124	124	96	100	80	- -	- -	- -	**8146/.091**	4.80/ 5.60
 08810E00	294	306	246	246	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8146/.091**	5.20/ 6.00
 08809E00	196	204	164	164	168	124	124	96	100	80	- -	- -	- -	**8146/.092**	6.00/ 6.80
 08808E00	102	106	86	86	88	64	66	52	52	42	44	34	32	**8146/.093**	4.60/ 5.40
 08807E00	196	204	164	164	168	124	124	96	100	80	- -	- -	- -	**8146/.093**	5.40/ 6.20
 08806E00	294	306	246	246	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8146/.093**	5.80/ 8.60

Order Number Supplement:

	Version:	Ex e	**8146/1...**
		Ex i	**8146/2...**
Specify with order:	**Terminal blocks:**	Number and type	
	Cable glands:	Number, type and installation side in enclosure	
	Flanges:	Flanges can be fitted to order; please indicate the side on which they are to be fitted.	

Note: The order numbers contain the enclosure with carrier rails and PE or PA rail.

Terminal boxes fitted with terminals > 35 mm² up to 300 mm² on request.

E3

Terminal Boxes
Series 8146

Explosion Protection	
Marking	
IECEx	
Gas explosion protection	Ex dem ia/ib [ia] IIC, IIB, IIA T6, T5
Dust explosion protection	Ex tD A21 IP66 T130 °C, T95 °C, T80 °C
Europe (ATEX)	
Gas explosion protection	Ⓔx II 2 G Ex dem ia/ib [ia] IIA, IIB, IIC T6, T5
Dust explosion protection	Ⓔx II 2 D Ex tD A21 IP66 T130 °C, T95 °C, T80 °C
Certificates	
IECEx	IECEx PTB 06.0046
Europe (ATEX)	PTB 01 ATEX 1016
Other certificates	Brazil (UI do Brasil), China (NEPSI), India (PESO), Canada (CSA), Kazakhstan (JSC), Korea (KSG), Russia (CTB), Ukraine (ISCVE), USA (UL), ship approval (GL, RS)

Technical Data		
Electrical data		
Rated operational voltage	max. 1100 V AC/ DC (abhängig vom Klemmentyp und den verwendeten Ex-Bauteilen)	
Rated operational current	max. 500 A (depending on the terminal type and the explosion protected components used)	
Environmental conditions		
Ambient temperature	Type 8146/1...-.	8146/2...-.
	T6: Ta = - 40 ... + 40 °C	T6: Ta = - 40 ... + 75 °C
	T5: Ta = - 40 ... + 55 °C	
Mechanical data		
Degree of protection	IP66	
Material		
Enclosure	Polyester resin, glass fibre reinforced, dark grey, similar to RAL 7024 Impact resistance ≥ 7 J Surface resistance ≤ 10^9 Ω Flame resistant according to IEC/EN 60695, UL 94, ASTM D635	
Gasket	Polyurethane foam	
Flanges		
Standard	In the standard design, the enclosures are supplied without flanges.	
Option	the enclosures can be fitted on one or more sides with flanges; flange material: polyester resin, glass fibre reinforced	
Cover fixing	with captive M6 stainless steel combo head screws or	
Tightening torque	according to the specifications of the terminal block manufacturers	
Terminal blocks	Rated cross section which can be used: max. 300 mm^2. The maximum number of terminals for the respective enclosure size are indicated in the EC type examination certificate.	
Assembly / Installation		
Connection	According to the order directly to the fitted components or to the terminal blocks. The rated operational voltage, the rated operational current and the rated cross section depend on the terminal type used and the explosion protected components.	

Terminal Box Fittings

Due to contact resistances at the terminals and the cables installed in the enclosure, heat can be caused. In order to ensure that the maximum temperatures of a terminal box are not exceeded, care should be taken that the current load of the circuits installed in the terminal box do not exceed certain values.

The maximum permitted number of conductors for individual terminal boxes, depending on the current load and conductor cross section, can be found in the EC Type Examination Certificate.

Terminal Boxes
Series 8146

Tables Terminal fittings, number of conductors which can be fitted depending on conductor cross-section and continous current (continuation)

Enclosure 8146/1041

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16
3						
6						
10	44					
16	15	29	114			
20	6	17	33			
25		8	18	36		
35			5	14	35	
50				2	11	29
63					3	13
80						5
100						
125						
160						

09702E02

Enclosure 8146/1051

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16
3						
6						
10	50					
16	17	33	129			
20	7	19	37			
25		9	21	41		
35			6	16	39	
50				2	13	33
63					4	15
80						5
100						
125						
160						

09703E02

Enclosure 8146/1061

Current • Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35
3								
6								
10	53							
16	18	35	137					
20	7	20	39					
25		9	22	43				
35			6	17	42			
50				2	13	35		
63					4	16	57	
80						6	18	64
100							7	17
125								6
160								
200								
225								
250								

09704E02

Enclosure 8146/1062

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35
3								
6								
10	64							
16	22	42	166					
20	9	25	48					
25		11	27	52				
35			8	20	51			
50				3	16	42		
63					5	19	69	
80						7	21	78
100							9	20
125								8
160								
200								
225								
250								

09705E02

Note: explanation of the tables page 9

Terminal Boxes
Series 8146

Tables Terminal fittings, number of conductors which can be fitted depending on conductor cross-section and continous current (continuation)

Enclosure 8146/1071 8146/1S71

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35
3								
6								
10	55							
16	19	36	142					
20	7	21	41					
25		10	23	45				
35			8	17	44			
50				2	14	36		
63					4	17	60	
80						6	18	67
100							8	17
125								7
160								
200								
225								
250								

09706E02

Enclosure 8146/1072

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35	50	70
3										
6										
10	66									
16	22	44	170							
20	9	25	49							
25		12	28	54						
35			8	21	52					
50				3	17	43				
63					5	20	71			
80						7	22	80		
100							9	21		
125								8	21	
160									7	19
200										6
225										2
250										

09707E02

Enclosure 8146/1073 8146/1S73

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35	50	70
3										
6										
10	71									
16	24	47	184							
20	10	27	53							
25		13	30	58						
35			8	22	56					
50				3	18	47				
63					6	21	77			
80						8	24	86		
100							10	22		
125								9	23	
160									8	20
200										7
225										2
250										

09708E02

Enclosure 8146/1081

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35
3								
6								
10	74							
16	25	49	192					
20	10	29	55					
25		13	31	61				
35			9	23	59			
50				3	19	49		
63					6	22	80	
80						8	25	90
100							10	23
125								9
160								
200								
225								
250								

09709E02

Note: explanation of the tables page 9

Terminal Boxes
Series 8146

Tables Terminal fittings, number of conductors which can be fitted depending on conductor cross-section and continous current (continuation)

Enclosure 8146/1082

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35	50	70
3										
6										
10	86									
16	29	57	221							
20	12	33	64							
25		15	36	70						
35			10	27	68					
50				4	22	56				
63					7	20	93			
80						10	29	104		
100							12	27		
125								11	28	
160									9	24
200										8
225										3
250										

09710E02

Enclosure 8146/1083

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35	50	70
3										
6										
10	91									
16	31	60	235							
20	13	35	68							
25		16	38	74						
35			11	29	72					
50				4	23	60				
63					8	28	99			
80						10	31	111		
100							13	29		
125								11	29	
160									10	26
200										9
225										3
250										

09711E02

Enclosure 8146/1091

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35
3								
6								
10	86							
16	29	57	222					
20	12	33	64					
25		16	36	70				
35			10	27	68			
50				4	22	56		
63					7	26	93	
80						10	29	104
100							12	27
125								11
160								
200								
225								
250								

09712E02

Note: explanation of the tables page 9

Terminal Boxes
Series 8146

Tables Terminal fittings, number of conductors which can be fitted depending on conductor cross-section and continous current (continuation)

Enclosure 8146/1092

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240
3															
6															
10	97														
16	33	64	250												
20	13	37	72												
25		18	41	79											
35			12	31	77										
50				4	25	63									
63					8	29	105								
80						11	33	117							
100							14	31							
125								12	31						
160									10	27					
200										10	24	74			
225										3	13	29			
250											7	17	36		
315												3	10	22	
400														4	15
500															2

09713E02

Enclosure 8146/1093

Current · Lead cross section [mm²]

[A]	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240
3															
6															
10	102														
16	35	68	263												
20	14	39	76												
25		18	43	83											
35			12	32	81										
50				4	26	67									
63					9	31	110								
80						12	34	123							
100							15	32							
125								13	33						
160									11	29					
200										10	25	78			
225										4	14	30			
250											7	18	38		
315												4	11	23	
400														5	16
500															2

09714E02

Explanations to the Table

Each inserted conductor and each internal connection conductor is considered a conductor. Jumpers and earth conductors are not considered.

Noncritical area (light area of table)
The light area is noncritical in terms of heating up the enclosure. Circuits classified as being in this area can be incorporated in the enclosure in any number.

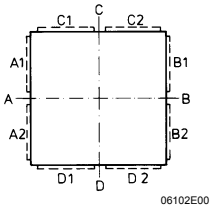
Critical area (inscribed area of table)
The inscribed area of the table shows the maximum permissible number of conductors considering the cross section of the conductor and the continuous current loading of the conductor. When using this table, simultaneous factors and load factors may be accounted for. Mixed arrangements with circuits of different cross sections and currents are possible. In this case the proportion of the load from the individual circuits should be allowed for on a percentage basis. If a terminal box is fully loaded according to the critical area of the inscribed part of the table, then any number of circuits from the noncritical, light area may be added.

Dangerous area (dark area of the table) Terminal boxes which are designed according to this area require an additional temperature-rise test.

Terminal Boxes
Series 8146

Cable Glands

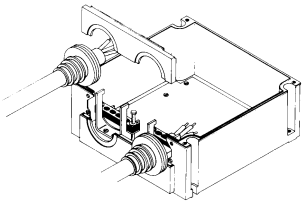
The cable glands are inserted according to the order. The respective holes are punched and the screw connections are fastened by means of counter nuts. Please indicate the entry side!



06102E00

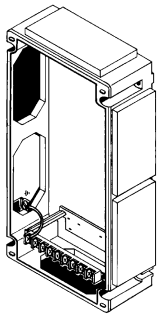
Example:
8146/.08. cable entry sides

To insert large cables into the enclosures with a height of 150 mm, cable entry plates with strain relief and rubber seals which can be cut out are available.


05409E00

Cable entry plate

For metal cable glands, adapter plates can be used.


05380E00

Earthing of the metal cable glands by means of brass plates

In the standard version, cable glands made of moulding material, Series 8161, are used.

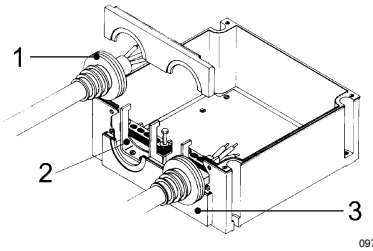
The opening of the rubber seals can be adapted easily to the diameter of the cable to be entered.

They are mounted at the inner sides of the enclosure walls. This will guarantee the connection to the internal earthing system.

Cable Entry Flange with Strain Relief for Enclosure Series 8146

Application

To insert cables with a large outside diameter into the enclosures of the Series 8146, cable entry flanges can be used. These flanges are separable so that the cables can be inserted from the front side into the flange. A rubber sleeve which is pressed firmly to the cable by means of a hose clamp is used to seal the gap between flange and cable. In the enclosure, the cables are fixed by means of strain reliefs.

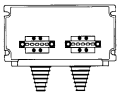


09715E00

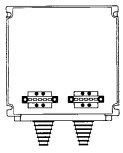
1) Rubber seal for cable entry flange
2) Strain relief
3) cable entry flange, separable

Assembly

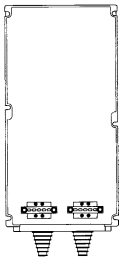
The cable entry flanges must only be mounted on the enclosure sides which point downward. The assembly is carried out in factory. The following enclosures of the Series 8146 can be fitted with cable entry flanges:


07947E00

8146/.S73


07948E00

8146/.083
8146/.085
8146/.086


07949E00

8146/.093
8146/.095

Terminal Boxes
Series 8146

Cable Entry Flange with Strain Relief for Enclosure Series 8146

Versions	Cable entry flange fitted with:		
	Rubber seals	Cable glands	Stopping plugs
	2	- -	- -
	2	1 x M20 x 1.5	1 x M25 x 1.5
	2	1 x M25 x 1.5	- -
	2	1 x M20 x 1.5	- -
	2	1 x M25 x 1.5	- -
Degree of protection	IP55		
Rubber seal	black, can be cut out for cable diameters from 20 mm to 60 mm		
Strain relief	for cable diameters 20 ... 40 mm 37 ... 64 mm		

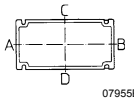
Max. Number of Mounted Cable Entries, Series 8161

Attention:

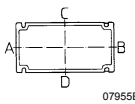
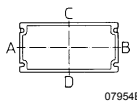
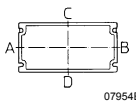
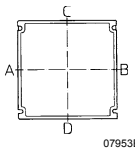
The maximum number of cable glands which can be mounted in the enclosure walls depends on the position of the components installed.

Cable gland — Enclosure size

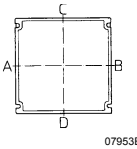
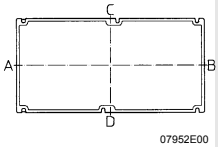
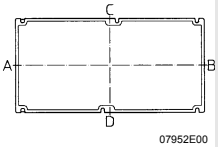

05864E00

Size	8146/.031		8146/.041		8146/.241/.242				8146/.051/.052				8146/.061/.062				8146/.071/.072			
	 07959E00		 07958E00		 03876E00				 07957E00				 07956E00				 07955E00			
	without flange		without flange		without flange		with flange		without flange		with flange		without flange		with flange		without flange		with flange	
	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D
M16 x 1.5	3	6	5	8	5	10	- -	7	6	8	- -	7	8	10	7	7	8	18	7	14
M20 x 1.5	2	2	3	5	3	7	- -	3	4	6	- -	3	6	7	3	3	6	14	3	6
M25 x 1.5	1	2	2	4	2	6	- -	3	3	5	- -	3	5	6	3	3	5	11	3	6
M32 x 1.5	1	1	1	2	1	3	- -	2	2	3	- -	2	3	3	2	2	3	6	2	4
M40 x 1.5	- -	1	1	1	1	2	- -	2	1	2	- -	2	2	2	2	2	2	4	2	4
M50 x 1.5	- -	1	1	1	1	2	- -	- -	1	1	- -	- -	1	2	- -	- -	1	3	- -	- -


05864E00

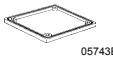
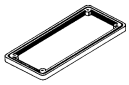
Size	8146/.073/.075				8146/.S71				8146/.S73				8146/.081/.082			
	 07955E00				 07954E00				 07954E00				 07953E00			
	without flange		with flange		without flange		with flange		without flange		with flange		without flange		with flange	
	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D
M16 x 1.5	20	45	12	32	6	20	- -	14	13	50	- -	32	18	20	14	14
M20 x 1.5	13	28	9	19	4	16	- -	6	9	32	- -	19	14	16	6	6
M25 x 1.5	10	22	6	14	3	13	- -	6	8	26	- -	14	11	13	6	6
M32 x 1.5	6	12	4	10	2	7	- -	4	4	15	- -	10	6	7	4	4
M40 x 1.5	4	8	2	5	1	5	- -	4	2	10	- -	5	4	5	4	4
M50 x 1.5	2	6	1	3	1	4	- -	- -	1	7	- -	3	3	4	- -	- -
M63 x 1.5	1	3	1	2	- -	- -	- -	- -	1	4	- -	2	- -	- -	- -	- -


05864E00

Size	8146/.083/.085/.086				8146/.091/.092				8146/.093/.095			
	 07953E00				 07952E00				 07952E00			
	without flange		with flange		without flange		with flange		without flange		with flange	
	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D	A/B	C/D
M16 x 1.5	45	50	32	32	20	38	14	28	50	91	32	64
M20 x 1.5	28	32	19	19	16	20	6	12	32	60	19	38
M25 x 1.5	22	26	14	14	13	23	6	12	26	46	14	28
M32 x 1.5	12	15	10	10	7	12	4	8	15	26	10	20
M40 x 1.5	8	10	5	5	5	9	4	8	10	18	5	10
M50 x 1.5	6	7	3	3	4	7	- -	- -	7	13	3	6
M63 x 1.5	3	4	2	2	- -	- -	- -	- -	4	6	2	4

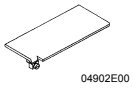
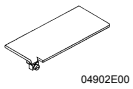
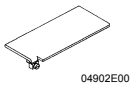
Terminal Boxes
Series 8146

Accessories and Spare Parts

Designation	Illustration	Description	Order number	Weight kg
Flange	 05742E00	Size 1 2.8 mm thick	**135978**	0.065
		Size 1 5.8 mm thick	**136032**	0.106
		can be mounted on enclosue: Enclosure side 8146/.051 /.052: C / D 8146/.061 /.062: A / B / C / D 8146/.071 /.072: A / B / C / D 8146/.S71: C / D 8146/.081 /.082: A / B / C / D 8146/.091 /.092: A / B / C / D		
	 05741E00	Size 2 2.8 mm thick	**136045**	0.160
		Size 2 5.8 mm thick	**136083**	0.317
		can be mounted on enclosue: Enclosure side 8146/.073 /.075: C / D 8146/.S73: C / D 8146/.083 /.085 /.086: A / B / C / D 8146/.093 /.095: A / B / C / D		
	 05743E00	Size 3 2.8 mm thick	**136199**	0.120
		Size 3 5.8 mm thick	**136237**	0.190
		can be mounted on enclosue: Enclosure side 8146/.073 /.075: A / B		
Frames	 04901E00	Size 0 68 x 68 mm	**136012**	0.010
		Size 1 68 x 128 mm	**135974**	0.020
		Size 2 126 x 266 mm	**136031**	0.040
		Size 3 126 x 126 mm	**136235**	0.100

Terminal Boxes
Series 8146

Accessories and Spare Parts

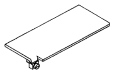
Designation	Illustration	Description			Order number	Weight kg
Brass plate 2 mm for flanges [1) 2)]	 04902E00	for flange size 1	(68 x 128 mm)		**136888**	0.040
		for flange size 2	(126 x 266 mm)		**136960**	0.220
		for flange size 3	(126 x 126 mm)		**136963**	0.120
Brass plate 3 mm for flanges [1)]	 04902E00	for flange size 1	(68 x 128 mm)		**136201**	0.200
		for flange size 2	(126 x 266 mm)		**136568**	0.100
		for flange size 3	(126 x 126 mm)		**136726**	0.320
Brass plate 2 mm for enclosure [1) 2)]	 04902E00	for enclosure		Enclosure sides		
		8146/.031 8146/.041		C / D A / B	**136940**	0.040
		8146/.041		C / D	**136945**	0.060
		8146/.051 8146/.S71	/.052	A / B A / B	**136914**	0.050
		8146/.051 8146/.061 8146/.071	/.052 /.062 /.072	C / D A / B A / B	**136921**	0.070
		8146/.061	/.062	C / D	**136933**	0.080
		8146/.071 8146/.081 8146/.091	/.072 /.082 /.092	C / D A / B C1 / D1	**136927**	0.140
		8146/.073		A / B	**136975**	0.140
		8146/.073 8146/.083 8146/.093		C / D A / B C1 / D1	**136977**	0.270
		8146/.S71 8146/.081 8146/.091	/.082 /.092	C / D C / D A / B	**136950**	0.160
		8146/.S73		A / B	**136973**	0.100
		8146/.S73 8146/.083 8146/.093		C / D C / D A / B	**136979**	0.310
		8146/.091	/.092	C2 / D2	**136957**	0.160
		8146/.093		C2 / D2	**136982**	0.310

1) For earthing metal gland parts when used in moulded plastic enclosures and plastic flanges

2)
- If the connecting cable is equipped with an armour which is larger than 6 mm^2 and which is used as earthing conductor, a brass plate with a thickness of 3 mm must be used.
- Due to the higher strain on the enclosure wall, the 3 mm brass plate has also to be used for large bell mounted glands.

Terminal Boxes
Series 8146

Accessories and Spare Parts

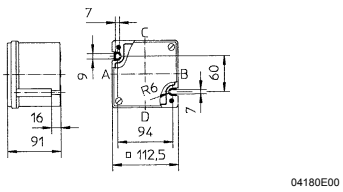
Designation	Illustration	Description		Order number	Weight kg
Brass plate 3 mm for enclosure [1]	 04902E00	for enclosure	Enclosure sides		0.000
		8146/.031 8146/.041	C / D A / B	**136395**	0.100
		8146/.041	C / D	**136403**	0.160
		8146/.041	C / D	**136635**	0.150
		8146/.051 /.052 8146/.S71	A / B A / B	**136240**	0.140
		8146/.051 /.052 8146/.061 /.062 8146/.071 /.072	C / D A / B A / B	**136283**	0.200
		8146/.051 /.052 8146/.061 /.062 8146/.071 /.072	C / D A / B A / B	**136430**	0.560
		8146/.061 /.062	C / D	**136374**	0.200
		8146/.071 /.072 8146/.081 /.082 8146/.091 /.092	C / D A / B C 1 / D1	**136313**	0.400
		8146/.071 /.072 8146/.081 /.082	C / D A / B	**136451**	0.560
		8146/.073	A / B	**136616**	0.410
		8146/.073	C / D	**136631**	0.770
		8146/.073 8146/.083 8146/.093	C / D A / B C1 / D1	**136621**	0.810
		8146/.S71 8146/.081 /.082 8146/.091 /.092	C / D C / D A / B	**136544**	0.460
		8146/.S73	A / B	**136611**	0.265
		8146/.S73 8146/.083 8146/.093	C / D C / D A / B	**136626**	0.880
Serrated lock washer	 09717E00	for M25	1 pc.	**110706**	0.009
		for M32	1 pcs.	**110707**	0.007
		for M40	1 pcs.	**110708**	0.021
		for M50	1 pcs.	**110709**	0.040
		for M63	1 pcs.	**110710**	0.060

[1] For earthing metal gland parts when used in moulded plastic enclosures and plastic flanges

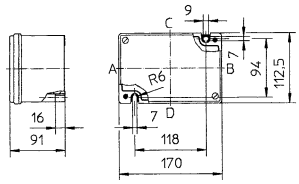
[2]
- If the connecting cable is equipped with an armour which is larger than 6 mm^2 and which is used as earthing conductor, a brass plate with a thickness of 3 mm must be used.
- Due to the higher strain on the enclosure wall, the 3 mm brass plate has also to be used for large bell mounted glands.

Terminal Boxes
Series 8146

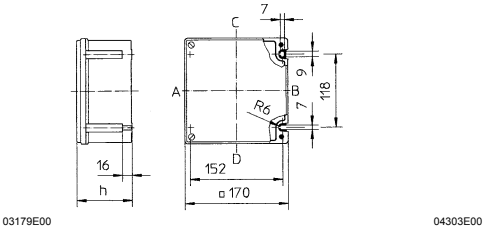
Dimensional Drawings (All Dimensions in mm) - Subject to Alterations



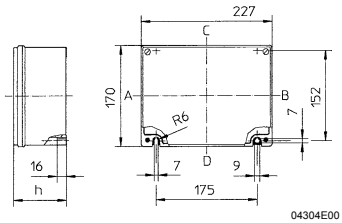
8146/.03.



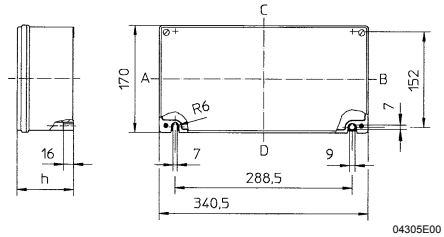
8146/.04.



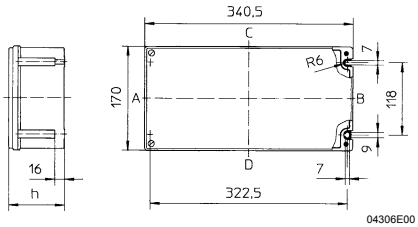
8146/.05.



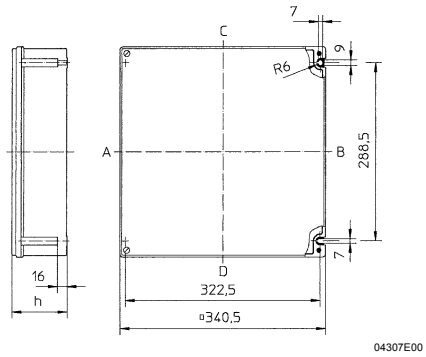
8146/.06.



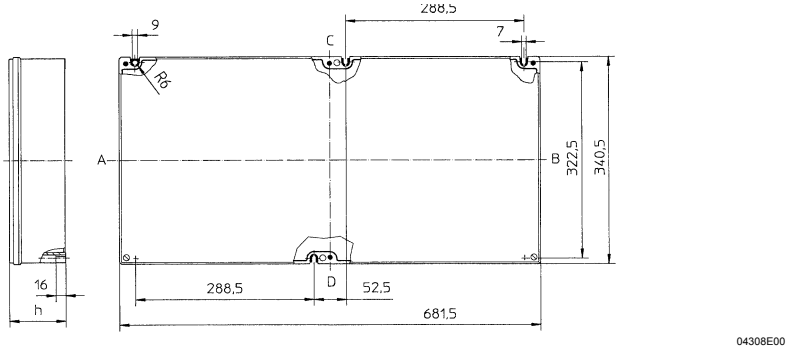
8146/.07.



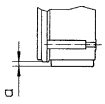
8146/.S7.



8146/.08.



8146/.09.



Flange thickness [mm]	Dim. a [mm]
2.8	7
5.8	10

Additional dimension for flange mounting

Enclosure	Enclosure height h 8146/...1 91 mm	8146/...2 131 mm	8146/...3 150 mm	8146/...5 190 mm	8146/...6 230 mm
8146/.03.	X	-	-	-	-
8146/.04.	X	-	-	-	-
8146/.05.	X	X	-	-	-
8146/.06.	X	X	-	-	-
8146/.07.	X	X	X	X	-
8146/.S7.	X	-	X	-	-
8146/.08.	X	X	X	X	X
8146/.09.	X	X	X	X	-

X ... can be supplied

We reserve the right to make alterations to the technical data, dimensions, weights, designs and products available without notice. The illustrations cannot be considered binding.

EU Konformitätserklärung
EU Declaration of Conformity
Déclaration de Conformité UE

STAHL

R. STAHL Schaltgeräte GmbH • Am Bahnhof 30 • 74638 Waldenburg, Germany
erklärt in alleiniger Verantwortung, *declares in its sole responsibility, déclare sous sa seule responsabilité,*

dass das Produkt: *that the product:* *que le produit:*	**Klemmenkästen** *Terminal Boxes* *Boîtes de jonction*
Typ(en), *type(s), type(s):*	**8146/1** **8146/2**

mit den Anforderungen der folgenden Richtlinien und Normen übereinstimmt.
is in conformity with the requirements of the following directives and standards.
est conforme aux exigences des directives et des normes suivantes.

Richtlinie(n) / *Directive(s) / Directive(s)*	**Norm(en)** / *Standard(s) / Norme(s)*
2014/34/EU **ATEX-Richtlinie** *2014/34/EU ATEX Directive* *2014/34/UE Directive ATEX*	EN IEC 60079-0:2018 EN 60079-1:2014 EN IEC 60079-7:2015 + A1:2018 EN 60079-11:2012 EN 60079-18:2015 + A1:2017 + AC:2018 EN 60079-28:2015 EN 60079-31:2014
Kennzeichnung, *marking, marquage:*	**II 2 G Ex db eb ia mb op pr IIC T6...T4 Gb** **II 2 G Ex ia IIC T6...T4 Gb** **II 2 D Ex tb IIIC T80 °C...T130 °C Db** CE 0158
EU Baumusterprüfbescheinigung: *EU Type Examination Certificate:* *Attestation d'examen UE de type:*	**PTB 01 ATEX 1016** (Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig, Germany, NB0102)
Produktnormen nach Niederspannungsrichtlinie: *Product standards according to Low Voltage Directive:* *Normes des produit pour la Directive Basse Tension:*	EN 61439-1:2011 EN 61439-2:2011
2014/30/EU **EMV-Richtlinie** *2014/30/EU EMC Directive* *2014/30/UE Directive CEM*	Nicht zutreffend nach Artikel 2, Absatz (2) d). *Not applicable according to article 2, paragraph (2) d).* *Non applicable selon l'article 2, paragraphe (2) d).*
2011/65/EU **RoHS-Richtlinie** *2011/65/EU RoHS Directive* *2011/65/UE Directive RoHS*	EN IEC 63000:2018

Waldenburg, 2021-03-01

Ort und Datum
Place and date
Lieu et date

i.V.

Holger Semrau
Leiter Entwicklung Schaltgeräte
Director R&D Switchgear
Directeur R&D Appareillage

i.V.

Jürgen Freimüller
Leiter Qualitätsmanagement
Director Quality Management
Directeur Assurance de Qualité

C63-AQU-QIX-002 600 / 917

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx PTB 06.0046 issue No.:2

Status: **Current**

Date of Issue: **2012-02-08** Page 1 of 4

Certificate history:
Issue No. 2 (2012-2-8)
Issue No. 1 (2007-9-3)
Issue No. 0 (2006-6-30)

Applicant:
R. STAHL Schaltgeräte GmbH
Am Bahnhof 30
74638 Waldenburg (Württ.)
Germany

Electrical Apparatus: **Terminal box, type 8146/1***-** and 8146/2***-****
Optional accessory:

Type of Protection: **Increased safety "e", Flameproof enclosures "d", Intrinsic safety "i", Encapsulation "m", Protection by enclosures "tb"**

Marking:
Ex d e ia ib [ia Ga] mb IIA, IIB, IIC T6, T5, T4 Gb
or
Ex db eb ia ib [ia] mb IIA, IIB, IIC T6, T5, T4
Ex tb IIIC T80 °C, T95 °C or T130 °C
or
Ex tb IIIC T80 °C, T95 °C or T130 °C

Approved for issue on behalf of the IECEx Certification Body: Dr.-Ing. Uwe Klausmeyer

Position: Head of Section "Flameproof Enclosures"

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

C63-AQU-QIX-002 601 / 917

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 06.0046

Date of Issue: **2012-02-08** Issue No.: **2**

Manufacturer: **R. STAHL Schaltgeräte GmbH**
Am Bahnhof 30
74638 Waldenburg (Württ.)
Germany

Additional Manufacturing location (s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-1 : 2007-04 Edition: 6	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-18 : 2009 Edition: 3	Explosive atmospheres Part 18: Equipment protection by encapsulation "m"
IEC 60079-31 : 2008 Edition: 1	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure 't'
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
DE/PTB/ExTR06.0061/02

Quality Assessment Report:

DE/BVS/QAR10.0002/02

C63-AQU-QIX-002 602 / 917

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 06.0046

Date of Issue: **2012-02-08** Issue No.: **2**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

Description
The terminal box of types 8146/1***-** and 8146/2***-** is a polyester-resin housing designed to type of protection Increased safety "e" and Protection by enclosure "tb". It is used to house terminals for intrinsically safe and non-intrinsically safe circuits and may optionally be provided with disconnect terminals, fuses, busbar and bolt-type screw terminals.
The intrinsically safe circuits will be marked e.g. by a special colour (light-blue) or a warning label.
Connection will be made by means of explosion-protected cable glands.
The enclosure as well as any installed and attached components have been tested and certified under a separate test certificate.

Annex
Technical data, nomenclature and notes for installation and use: See Attachment.
Tables of the maximum number of conductors depending on the cable size and permitted current: See Supplementary Sheets Issue 2.

CONDITIONS OF CERTIFICATION: NO

C63-AQU-QIX-002 603 / 917

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 06.0046

Date of Issue: **2012-02-08** Issue No.: **2**

Page 4 of 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

1) The ambient temperature is increased from -60 °C to +100 °C
2) New test according to the standards:
IEC 60079-0:2011 (Ed. 6), IEC 60079-1:2007 (Ed. 6), IEC 60079-7:2006 (Ed. 4),
IEC 60079-11:2006 (Ed. 5), IEC 60079-18:2009 (Ed. 3), IEC 60079-31:2008 (Ed. 1)
3) New marking

Annexe: Annex-IECEx PTB 06.0046-Issue 2.pdf, Supplementary_sheet_Issue 2.pdf



- For safe cable entry in Ex e and Ex i areas
- Can be used at temperatures of between -60 ... +75 °C, degree of protection IP68
- Available in Ex e and Ex i versions (Ex i version distinguished by its blue cap nut)
- Suitable for cable diameters from 1 ... 48 mm
- Versions with multi-seal inserts

WebCode **8161B**

R. STAHL's 8161/7 and 8161/8 series cable entries can be used to safely run cables into Ex e enclosures. They are suitable for cables between 1 and 48 mm in diameter. They are available for Ex e and Ex i circuits – the Ex i version can be distinguished by its blue cap nut. A stopping plug can be integrated to seal any cable entries that are not being used.

	IECEx / ATEX					
Zone	0	1	2	20	21	22
Installation in		•	•		•	•

Selection Table

Product Description Variant Ex version Colour			Cable gland For low temperature Standard thread Ex e Black				
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M16	5 – 9 mm	20 mm	22 mm	50	8161/7-M16-0905-LT	239203 ▲	0.009
M20	7 – 13 mm	24 mm	27 mm	50	8161/7-M20-1307-LT	239204 ▲	0.013
M25	10 – 17 mm	29 mm	32 mm	50	8161/7-M25-1710-LT	239205 ▲	0.019
M32	13 – 21 mm	36 mm	40 mm	25	8161/7-M32-2113-LT	239206 ▲	0.032
M40	17 – 28 mm	46 mm	51 mm	10	8161/7-M40-2817-LT	239207	0.068
M50	23 – 35 mm	55 mm	61 mm	4	8161/7-M50-3523-LT	239208	0.107
M63	34 – 48 mm	68 mm	75 mm	1	8161/7-M63-4834-LT	239209	0.155
Product Description Variant Ex version Colour			Cable gland For low temperature Standard thread Ex i Blue				
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M16	5 – 9 mm	20 mm	22 mm	50	8161/8-M16-0905-LT	239211 ▲	0.009
M20	7 – 13 mm	24 mm	27 mm	50	8161/8-M20-1307-LT	239212 ▲	0.013
M25	10 – 17 mm	29 mm	32 mm	50	8161/8-M25-1710-LT	239213 ▲	0.019
M32	13 – 21 mm	36 mm	40 mm	25	8161/8-M32-2113-LT	239214	0.032
M40	17 – 28 mm	46 mm	51 mm	10	8161/8-M40-2817-LT	239215	0.068

STAHL

Cable Glands
Series 8161/7, 8161/8

E10

Selection Table

Product Description Variant Ex version Colour		Cable gland Without reduction sealing insert Standard thread Ex e Black					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M12	3 – 6 mm	16 mm	18 mm	50	8161/7-M12-0603	239170▲	0.007
M16	5 – 9 mm	20 mm	22 mm	50	8161/7-M16-0905	239171▲	0.009
M20	7 – 13 mm	24 mm	27 mm	50	8161/7-M20-1307	239172▲	0.013
M25	10 – 17 mm	29 mm	32 mm	50	8161/7-M25-1710	239173▲	0.019
M32	13 – 21 mm	36 mm	40 mm	25	8161/7-M32-2113	239174▲	0.032
M40	17 – 28 mm	46 mm	51 mm	10	8161/7-M40-2817	239175▲	0.068
M50	23 – 35 mm	55 mm	61 mm	4	8161/7-M50-3523	239176▲	0.107
M63	34 – 48 mm	68 mm	75 mm	1	8161/7-M63-4834	239177▲	0.155
Product Description Variant Ex version Colour		Cable gland Without reduction sealing insert Standard thread Ex i Blue					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M12	3 – 6 mm	16 mm	18 mm	50	8161/8-M12-0603	239178▲	0.007
M16	5 – 9 mm	20 mm	22 mm	50	8161/8-M16-0905	239179▲	0.009
M20	7 – 13 mm	24 mm	27 mm	50	8161/8-M20-1307	239180▲	0.013
M25	10 – 17 mm	29 mm	32 mm	50	8161/8-M25-1710	239181▲	0.019
M32	13 – 21 mm	36 mm	40 mm	25	8161/8-M32-2113	239182▲	0.032
M40	17 – 28 mm	46 mm	51 mm	10	8161/8-M40-2817	239183▲	0.068
M50	23 – 35 mm	55 mm	61 mm	4	8161/8-M50-3523	239184	0.107
M63	34 – 48 mm	68 mm	75 mm	1	8161/8-M63-4834	239185	0.155
Product Description Variant Ex version Colour		Cable gland With reduction sealing insert Long thread Ex e Black					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M12	1 – 6 mm	16 mm	18 mm	50	8161/7-M12-0601-L	239186	0.007
M16	2 – 9 mm	20 mm	22 mm	50	8161/7-M16-0902-L	239187	0.009
M20	4 – 13 mm	24 mm	27 mm	50	8161/7-M20-1304-L	239188	0.013
M25	7 – 17 mm	29 mm	32 mm	50	8161/7-M25-1707-L	239189	0.019
M32	9 – 21 mm	36 mm	40 mm	25	8161/7-M32-2109-L	239190	0.032
M40	12 – 28 mm	46 mm	51 mm	10	8161/7-M40-2812-L	239191	0.068
M50	16 – 35 mm	55 mm	61 mm	4	8161/7-M50-3516-L	239192	0.107
M63	28 – 48 mm	68 mm	75 mm	1	8161/7-M63-4828-L	239193	0.155
Product Description Variant Ex version Colour		Cable gland With reduction sealing insert Long thread Ex i Blue					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M12	1 – 6 mm	16 mm	18 mm	50	8161/8-M12-0601-L	239194	0.007
M16	2 – 9 mm	20 mm	22 mm	50	8161/8-M16-0902-L	239195	0.009
M20	4 – 13 mm	24 mm	27 mm	50	8161/8-M20-1304-L	239196	0.013
M25	7 – 17 mm	29 mm	32 mm	50	8161/8-M25-1707-L	239197	0.019

Selection Table

Product Description Variant Ex version Colour		Cable gland With reduction sealing insert Long thread Ex i Blue					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M32	9 – 21 mm	36 mm	40 mm	25	8161/8-M32-2109-L	239198	0.032
M40	12 – 28 mm	46 mm	51 mm	10	8161/8-M40-2812-L	239199	0.068
M63	28 – 48 mm	68 mm	75 mm	1	8161/8-M63-4828-L	239201	0.155
Product Description Variant Ex version Colour		Cable gland With reduction sealing insert Standard thread Ex e Black					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M12	1 – 6 mm	16 mm	18 mm	50	8161/7-M12-0601	239154 ▲	0.007
M16	2 – 9 mm	20 mm	22 mm	50	8161/7-M16-0902	239155 ▲	0.009
M20	4 – 13 mm	24 mm	27 mm	50	8161/7-M20-1304	239156 ▲	0.013
M25	7 – 17 mm	29 mm	32 mm	50	8161/7-M25-1707	239157 ▲	0.019
M32	9 – 21 mm	36 mm	40 mm	25	8161/7-M32-2109	239158 ▲	0.032
M40	12 – 28 mm	46 mm	51 mm	10	8161/7-M40-2812	239159 ▲	0.068
M50	16 – 35 mm	55 mm	61 mm	4	8161/7-M50-3516	239160 ▲	0.107
M63	28 – 48 mm	68 mm	75 mm	1	8161/7-M63-4828	239161 ▲	0.155
Product Description Variant Ex version Colour		Cable gland With reduction sealing insert Standard thread Ex i Blue					
Thread size	Clamping range	Width across flats	Width across corners	Lot size	Product Type	Art. No.	Weight kg
M12	1 – 6 mm	16 mm	18 mm	50	8161/8-M12-0601	239162 ▲	0.007
M16	2 – 9 mm	20 mm	22 mm	50	8161/8-M16-0902	239163 ▲	0.009
M20	4 – 13 mm	24 mm	27 mm	50	8161/8-M20-1304	239164 ▲	0.013
M25	7 – 17 mm	29 mm	32 mm	50	8161/8-M25-1707	239165 ▲	0.019
M32	9 – 21 mm	36 mm	40 mm	25	8161/8-M32-2109	239166 ▲	0.032
M40	12 – 28 mm	46 mm	51 mm	10	8161/8-M40-2812	239167 ▲	0.068
M50	16 – 35 mm	55 mm	61 mm	4	8161/8-M50-3516	239168	0.107
M63	28 – 48 mm	68 mm	75 mm	1	8161/8-M63-4828	239169	0.155

Purchase order quantity in [pieces], the delivery quantity is automatically rounded to the lot size.

Technical Data

Explosion Protection	
IECEx gas explosion protection	Ex eb IIC Gb
IECEx dust explosion protection	Ex tb IIIC Db
ATEX gas explosion protection	Ⓔx II 2 G Ex eb IIC Gb
ATEX dust explosion protection	Ⓔx II 2 D Ex tb IIIC Db
EAC gas explosion protection	1 Ex e II Gb X
EAC dust explosion protection	Ex tb IIIC Db X
Certificates	ATEX (PTB), Brazil (ULB), EAC (LPE), IECEx (PTB), Korea (KGS)
Ambient Conditions	
Ambient temperature	15 °C ... +65 °C

E10

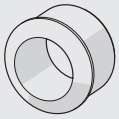
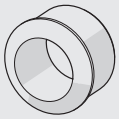
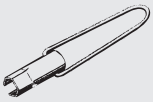
Technical Data

Ambient Conditions	
Use at the height of	< 2000 m
Mechanical Data	
Material	Polyamide, Glass fibre reinforced
Material	Polyamide
Degree of protection (IP)	IP66
Degree of protection note	IP68 at 5 bar 30 min. (IP protection according to IEC/EN 60529)
Self-extinguishing	Yes
Flame retardant	Yes
Halogen-free	Yes
Surface resistance	$\leq 10^{13}\ \Omega$

Accessories

Figure	Description		Art. No.	Weight kg
Locknut, brass nickel-plated (-60 ... +75 °C) To fasten the cable glands in through holes				
	Material: Nickel-plated brass Thread size: M12	Lot size: 100	241518 ▲	0.220
	Material: Nickel-plated brass Thread size: M16	Lot size: 100	241519 ▲	0.290
	Material: Nickel-plated brass Thread size: M20	Lot size: 100	241520 ▲	0.480
	Material: Nickel-plated brass Thread size: M25	Lot size: 100	241561 ▲	0.720
	Material: Nickel-plated brass Thread size: M32	Lot size: 50	241562 ▲	0.545
	Material: Nickel-plated brass Thread size: M40	Lot size: 50	241563 ▲	1.030
	Material: Nickel-plated brass Thread size: M50	Lot size: 25	241564 ▲	0.680
	Material: Nickel-plated brass Thread size: M63	Lot size: 10	241565	0.499
Locknut, plastic (-40 ... +75 °C) To fasten the cable glands in through holes				
	Material: Polyamide Thread size: M12	Lot size: 100	239460 ▲	0.001
	Material: Polyamide Thread size: M16	Lot size: 100	239461 ▲	0.002
	Material: Polyamide Thread size: M20	Lot size: 100	239462 ▲	0.002
	Material: Polyamide Thread size: M25	Lot size: 100	239463 ▲	0.003
	Material: Polyamide Thread size: M40	Lot size: 50	239465 ▲	0.007
	Material: Polyamide Thread size: M50	Lot size: 25	239466	0.012
	Material: Polyamide Thread size: M63	Lot size: 10	239467	0.018

Accessories

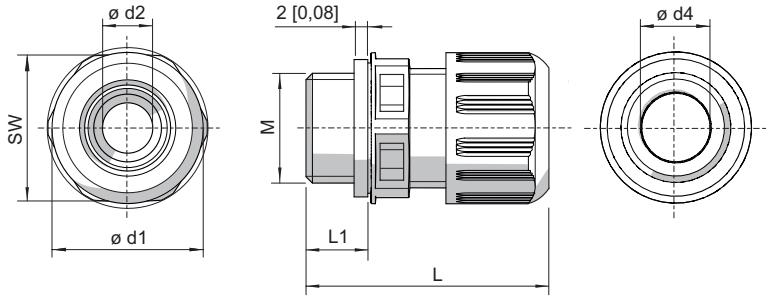
Figure	Description		Art. No.	Weight kg
Reduction sealing insert (standard), EPDM (-40 ... +75 °C) For cable glands				
	Connection thread: M12 x 1.5 Clamping range: 1 – 3 mm	Lot size: 50	239444	0.001
	Connection thread: M16 x 1.5 Clamping range: 2 – 6 mm	Lot size: 50	239445	0.001
	Connection thread: M20 x 1.5 Clamping range: 4 – 8 mm	Lot size: 50	239446	0.001
	Connection thread: M25 x 1.5 Clamping range: 7 – 12 mm	Lot size: 50	239447	0.003
	Connection thread: M32 x 1.5 Clamping range: 9 – 14 mm	Lot size: 50	239448	0.003
	Connection thread: M40 x 1.5 Clamping range: 12 – 20 mm	Lot size: 50	239449	0.007
	Connection thread: M50 x 1.5 Clamping range: 16 – 25 mm	Lot size: 50	239450	0.012
	Connection thread: M63 x 1.5 Clamping range: 28 – 38 mm	Lot size: 50	239451	0.019
Reduction sealing insert, silicone (-60 ... +75 °C) For low temperature				
	Connection thread: M16 x 1.5 Clamping range: 2 – 6 mm	Lot size: 50	239453	0.001
	Connection thread: M20 x 1.5 Clamping range: 4 – 8 mm	Lot size: 50	239454	0.001
	Connection thread: M25 x 1.5 Clamping range: 7 – 12 mm	Lot size: 50	239455	0.002
	Connection thread: M32 x 1.5 Clamping range: 9 – 14 mm	Lot size: 50	239456	0.003
	Connection thread: M40 x 1.5 Clamping range: 12 – 20 mm	Lot size: 50	239457	0.008
	Connection thread: M50 x 1.5 Clamping range: 16 – 25 mm	Lot size: 50	239458	0.015
Special key				
	Thread size: M16	Packaging unit: 1	114207	0.120
	Thread size: M20	Packaging unit: 1	114208	0.132
	Thread size: M25	Packaging unit: 1	114205	0.163
	Thread size: M32	Packaging unit: 1	114209	0.237
	Thread size: M40	Packaging unit: 1	114210	0.274

Cable Glands
Series 8161/7, 8161/8

Spare Parts

Figure	Description		Art. No.	Weight kg
Flat gasket (standard), EPDM (-40 ... +75 °C) Replacement seals for cable glands				
	For cable glands 8161/.-M12-06... Connection thread: M12 x 1.5	Lot size: 100	240245	0.001
	For cable glands 8161/.-M12-06... Connection thread: M12 x 1.5	Lot size: 50	240244	0.001
	For cable glands 8161/.-M16-09.. Connection thread: M16	Lot size: 100	222370	0.001
	For cable glands 8161/.-M16-09... Connection thread: M16	Lot size: 50	222363	0.001
	For cable glands 8161/.-M20-13 Connection thread: M20	Lot size: 100	222371	0.001
	For cable glands 8161/.-M20-13 Connection thread: M20	Lot size: 50	222364	0.001
	For cable glands 8161/.-M25-17 Connection thread: M25	Lot size: 100	222372	0.001
	For cable glands 8161/.-M25-17 Connection thread: M25	Lot size: 50	222365	0.001
	For cable glands 8161/.-M32-21 Connection thread: M32	Lot size: 100	222373	0.001
	For cable glands 8161/.-M32-21 Connection thread: M32	Lot size: 50	222366	0.001
	For cable glands 8161/.-M40-28 Connection thread: M40	Lot size: 100	222374	0.002
	For cable glands 8161/.-M40-28 Connection thread: M40	Lot size: 50	222367	0.002
	For cable glands 8161/.-M50-35 Connection thread: M50	Lot size: 100	222375	0.002
	For cable glands 8161/.-M50-35 Connection thread: M50	Lot size: 50	222368	0.002
	For cable glands 8161/.-M63-48 Connection thread: M63	Lot size: 100	222376	0.002
	For cable glands 8161/.-M63-48 Connection thread: M63	Lot size: 50	222369	0.002
Flat gasket silicone (-60 ... +75°C) Replacement seals for low temperature				
	For cable glands 8161/.-M16-09.. Connection thread: M16	Lot size: 100	240248	0.001
	For cable glands 8161/.-M20-13 Connection thread: M20	Lot size: 100	240249	0.001
	For cable glands 8161/.-M25-17 Connection thread: M25	Lot size: 100	240250	0.001
	For cable glands 8161/.-M32-21 Connection thread: M32	Lot size: 100	240251	0.001
	For cable glands 8161/.-M40-28 Connection thread: M40	Lot size: 100	240252	0.002
	For cable glands 8161/.-M50-35 Connection thread: M50	Lot size: 100	240253	0.002
	For cable glands 8161/.-M63-48 Connection thread: M63	Lot size: 100	240254	0.002

Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations



M = Thread size SW = Width across flats
L1 = Thread length L = Dimension L

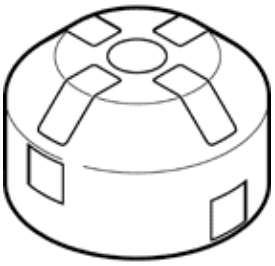
Cable glands without bend protection

Thread size	Width across flats	Dimension L	Dimension L (with long thread)	Thread length	Thread length (long thread)	Clamping range	Clamping range + reduction sealing insert	Dimension d1	Dimension d2	Dimension d4
M12	16.00 mm	29 ... 34 mm	35 ... 40 mm	9.000 mm	15.000 mm	3.00 - 6.00 mm	1.00 - 6.00 mm	18 mm	7.3 mm	6.3 mm
M16	20.00 mm	31 ... 37 mm	37 ... 43 mm	9.000 mm	15.000 mm	5.00 - 9.00 mm	2.00 - 9.00 mm	22 mm	10.3 mm	9.3 mm
M20	24.00 mm	36 ... 43 mm	41 ... 48 mm	10.000 mm	15.000 mm	7.00 - 13.00 mm	4.00 - 13.00 mm	27 mm	13.3 mm	13.3 mm
M25	29.00 mm	38 ... 46 mm	43 ... 51 mm	10.000 mm	15.000 mm	10.00 - 17.00 mm	7.00 - 17.00 mm	32 mm	17.3 mm	17.3 mm
M32	36.00 mm	42 ... 50 mm	45 ... 53 mm	12.000 mm	15.000 mm	13.00 - 21.00 mm	9.00 - 21.00 mm	40 mm	21.3 mm	21.3 mm
M40	46.00 mm	52 ... 65 mm	58 ... 71 mm	12.000 mm	18.000 mm	17.00 - 28.00 mm	12.00 - 28.00 mm	51 mm	28.3 mm	30 mm
M50	55.00 mm	59 ... 72 mm	63 ... 76 mm	14.000 mm	18.000 mm	23.00 - 35.00 mm	16.00 - 35.00 mm	61 mm	35.3 mm	40 mm
M63	68.00 mm	64 ... 78 mm	67 ... 81 mm	15.000 mm	18.000 mm	34.00 - 48.00 mm	28.00 - 48.00 mm	75 mm	48.3 mm	53 mm

Position indicator
SASF-S2-B-F-A34

Part number: 4046082

FESTO



Data sheet

Feature	Value
Rotation angle adjustment range	0 ... 90 deg
Dimensions W x L x H	Ø 65 x 40
Vibration resistance	Transport application test at severity level 2 in accordance with FN 942017-4 and EN 60068-2-6
Shock resistance	Shock test with severity level 2 in accordance with FN 942017-5 and EN 60068-2-27
Ambient temperature	-25 ... 80 °C
Product weight	55 g
Mounting type	To VDI/VDE 3845
Housing colour	Black
Materials note	Contains PWIS substances Conforms to RoHS
Material spacer	PA
Material housing	PBT PP High alloy steel, non-corrosive
Material screws	High alloy steel, non-corrosive

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Translation

(1) EC-Type-Examination Certificate

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 94/9/EC**

(3)	**Certificate Number**	**TÜV 16 ATEX 174269 X**
(4)	for the equipment:	Valve Position Sensors type SRBG-C1-N-20N-ZC-M12-EX5 and type SRBG-C1-N-20N-ZC-C2-C2-EX5
(5)	of the manufacturer:	Festo AG &Co.KG
(6)	Address:	Ruiter Straße 82, 73734 Esslingen-Berkheim
	Order number:	8000456214
	Date of issue:	2016-01-27

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(7) The design of this equipment or protective system and any acceptable variation thereto are specified in the schedule to this EC-Type-Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report No. 16 203 174269-1.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0:2012 + A11:2013 **EN 60079-11:2012**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

II 1G Ex ia IIC T6...T1 Ga

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Meyer

Hanover office, Am TÜV 1, 30519 Hannover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

**This certificate may only be reproduced without any change, schedule included.
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH**

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(13) SCHEDULE

(14) EC-Type-Examination Certificate No. TÜV 16 ATEX 174269 X

(15) Description of equipment
The Valve Position Sensors type SRBG-C1-N-20N-ZC-M12-EX5 and type SRBG-C1-N-20N-ZC-C2-C2-EX5 are used to convert the deviation into electrical signals. The device consists of up to three independent intrinsically safe powered circuits, two sensor circuits and one valve circuit.

The lowest permissible ambient temperature is -25 ° C.

Type code:
SRBG-C1-N-20N-ZC-M12-Ex5 and SRBG-C1-N-20N-ZC-C2-C2-EX5

Parameters:
Electrical parameters:

Sensor circuit
(Connection assignment see manufacturer's Instruction for use)

In type of protection intrinsic safety Ex ia IIC

Only for the connection to certified intrinsically safe circuit with the following maximum values:

Type 1: U_i = 15V
I_i = 25 mA
P_i = 34 mW
Type 2: U_i = 15V
I_i = 25 mA
P_i = 64 mW
Type 3: U_i = 15V
I_i = 52 mA
P_i = 169 mW

For applications that require devices of category 1G, the permissible ambient temperature depending on the temperature class and the intrinsically safe power supply and the internal effective capacitance resp. the internal effective inductance per type of sensor are given in the following table:

			Permissible ambient temperature								
			Type1			Type 2			Type 3		
Sensor- type	**C_i nF**	**L_i µH**	**T6**	**T5**	**T4-T1**	**T6**	**T5**	**T4-T1**	**T6**	**T5**	**T4-T1**
SRBG-C1-N-20N-ZC-M12-EX5	<100	<100	60°C	72°C	100°C	58°C	70°C	98°C	50°C	62°C	90°C
SRBG-C1-N-20N-ZC-C2-C2-EX5	<100	<100	46°C	58°C	86°C	46°C	58°C	86°C	46°C	58°C	86°C

The given values for C_i and L_i consider already a connected cable of 10m length.

Valve circuit
(Connection assignment see manufacturer's Instruction for use)

In type of protection intrinsic safety Ex ia IIC

Only for the connection to certified intrinsically safe circuit with the following maximum values:

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Schedule EC-Type Examination Certificate No. TÜV 16 ATEX 174269 X

U_i = 15V
I_i = 25 mA

The internal effective inductance $L_i \leq 20$ µH and the internal effective capacitance $C_i \leq 10$nF
The given values for C_i and L_i consider already a connected cable of 10m length.

(16) Test documents are listed in the test report No. 16 203 174269-1.

(17) Special conditions for safe use

1. The context between the type of the connected circuit, the maximum permissible ambient temperature and the temperature class as well as the effective internal reactances for the individual types of the Valve Position Sensors is given in the Electrical parameters.
2. If the Valve Position Sensors type SRBG-C1-N-20N-ZC-M12-EX5 and type SRBG-C1-N-20N-ZC-C2-C2-EX5 are operated at ambient temperatures lower than – 20°C, they have to be protected against mechanical damages by appropriate measures.
3. The device has to be installed in such a way that process-related electrostatic charges can be excluded.
4. The type SRBG-C1-N-20N-ZC-C2-C2-EX5 is being delivered without cable entry. Their connection cable shall either be installed fixed and mechanically protected or a cable pull test shall be carried out. The realization of the pull test is described in the operation instructions. Depending of the installation way a suitable cable according to type B or A as specified in EN 60079-14 must be used.
5. The maximum values of the connected intrinsically safe valve have to be taken into account.

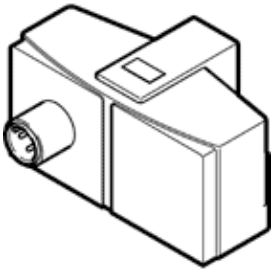
(18) Essential Health and Safety Requirements
No additional ones

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sensor box
SRBG-C1-N-20N-ZC-M12-EX5

Part number: 3568057

FESTO



Data sheet

Feature	Value
Design	Angular
Based on the standard	EN 60947-5-6 VDI/VDE 3845
Authorisation	RCM Mark c UL us (OL)
CE mark (see declaration of conformity)	to EU directive for EMC to EU directive explosion protection (ATEX)
ATEX category Gas	II 1G
Explosion ignition protection type Gas	Ex ia IIC T1...T6 Ga
Explosion-proof ambient temperature	-25°C <= Ta <= +100°C
Materials note	Contains PWIS substances Conforms to RoHS
Safety Integrity Level (SIL)	SIL 2
Measuring principle	Inductive
Ambient temperature	-25 ... 100 °C
Switch output	NAMUR
Switching element function	Normally closed contact
Max. switching frequency	3.000 Hz
Max. output current DC	3 mA
Short circuit strength	Yes
Operating voltage range DC	8,2 V
Polarity protected	for all electrical connections
Electrical input connection	Plug M12x1 4-pin
Assembly position	Any
Product weight	70 g
Materials information, housing	PBT
Screw material data	High alloy steel, non-corrosive
Operating status display	Yellow LED
Storage temperature	-40 ... 100 °C
Protection class	IP67
Shock resistance	Shock test with severity level 2 in accordance with FN 942017-5 and EN 60068-2-27
Vibration resistance	Transport application test at severity level 2 in accordance with FN 942017-4 and EN 60068-2-6
Degree of contamination	3

FESTO

4837923
2016-04-20

(DE) Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Der beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union.

(EN) This declaration of conformity is issued under the sole responsibility of the manufacturer. The object of the declaration described is in conformity with the relevant Union harmonisation legislation.

(BG) Настоящата декларация за съответствие е издадена на отговорността на производителя. Предметът на описаната декларация отговаря на съответното законодателство на Съюза за хармонизация.

(CS) Toto prohlášení o shodě se vydává na výhradní odpovědnost výrobce. Popsaný předmět prohlášení je ve shodě s příslušnými harmonizačními právními předpisy Unie.

(DA) Denne overensstemmelseserklæring udstedes på fabrikantens ansvar. Genstanden for erklæringen, som beskrevet, er i overensstemmelse med den relevante EU-harmoniseringslovgivning.

(EL) Η παρούσα δήλωση συμμόρφωσης εκδίδεται με αποκλειστική ευθύνη του κατασκευαστή. Ο περιγραφόμενος στόχος της δήλωσης είναι σύμφωνος με τη σχετική ενωσιακή νομοθεσία εναρμόνισης.

(ES) La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del fabricante. El objeto de la declaración descrita es conforme con la legislación de armonización pertinente de la Unión.

(ET) Käesolev vastavusdeklaratsioon on välja antud tootja ainuvastutusel. Kirjeldatud deklareeritav toode on kooskõlas asjaomaste liidu ühtlustamisaktidega.

(FI) Tämä vaatimustenmukaisuusvakuutus on annettu valmistajan yksinomaisella vastuulla. Kuvattu vakuutuksen kohde on asiaa koskevan unionin yhdenmukaistamislainsäädännön vaatimusten mukainen.

(FR) La présente déclaration de conformité est établie sous la seule responsabilité du fabricant. L'objet décrit de la dé-claration est conforme à la législation d'harmonisation de l'Union applicable.

(HU) Ezt a megfelelőségi nyilatkozatot a gyártó kizárólagos felelőssége mellett adják ki. Az ismertetett nyilatko-zat tárgya megfelel a vonatkozó uniós harmonizációs jogszabályoknak.

(IT) La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante. L'oggetto della dichiarazione descritto è conforme alla pertinente normativa di armonizzazione dell'Unione.

(LT) Ši atitikties deklaracija išduota tik gamintojo atsakomybe. Aprašytas deklaracijos objektas atitinka susijusius derinamuosius Sąjungos teisės aktus.

(LV) Šī atbilstības deklarācija ir izdota vienīgi uz ražotāja atbildību. Aprakstītais deklarācijas objekts atbilst attiecīgajam Savienības saskaņošanas tiesību aktam.

(NL) Deze conformiteitsverklaring wordt verstrekt onder volledige verantwoordelijkheid van de fabrikant. Het beschreven voorwerp is in overeenstemming de desbetreffende harmonisatiewetgeving van de Unie.

(PL) Niniejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta. Wymieniony przedmiot niniejszej deklaracji jest zgodny z odnośnymi wymaganiami unijnego prawodawstwa harmonizacyjnego.

(PT) A presente declaração de conformidade é emitida sob a exclusiva responsabilidade do fabricante. O objeto da declaração descrito está em conformidade com a legislação aplicável de harmonização da União.

(RO) Prezenta declarație de conformitate este emisă pe răspunderea exclusivă a producătorului. Obiectul descris al declarației este în conformitate cu legislația relevantă de armonizare a Uniunii.

(SK) Toto vyhlásenie o zhode sa vydáva na vlastnú zodpovednosť výrobcu. Uvedený predmet vyhlásenia je v zhode s príslušnými harmonizačnými právnymi predpismi Únie.

(SL) Za izdajo te izjave o skladnosti je odgovoren izključno proizvajalec. Opisani predmet izjave je v skladu z ustrezno zakonodajo Unije o harmonizaciji.

(SV) Denna försäkran om överensstämmelse utfärdas på tillverkarens eget ansvar. Föremålet för försäkran överensstämmer med den relevanta harmoniserade unionslagstiftningen.

(TR) Bu Uygunluk Belgesi tamamen üreticinin sorumluluğu altındadır. Belgede açıklanan obje, Birliğin ilgili uyum mevzuatına uygundur.

EU-Konformitätserklärung

EU Declaration of Conformity

EC Декларация за съответствие на

EU Prohlášení o shodě

EU-overensstemmelseserklæring

Δήλωση συμμόρφωσης ΕΕ

Declaración UE de conformidad

ELI vastavusdeklaratsioon

EU-vaatimustenmukaisuusvakuutus

Déclaration UE de conformité

EU megfelelőségi nyilatkozat

Dichiarazione di conformità UE

ES atitikties deklaracija

ES atbilstības deklarācija

EU- Conformiteitsverklaring

Deklaracja zgodności UE

Declaração UE de conformidade

Declaraţie UE de conformitate

EU Vyhlásenie o zhode

Izjava EU o skladnosti

EU-försäkran om Överensstämmelse

CE Uygunluk Belgesi

Festo AG & Co. KG

Ruiter Strasse 82
73734 Esslingen
Germany
www.festo.com

Stefan Maresch

Head of Global Development Support

Christian Leonhard

Head of Global Factories

FESTO

4837923
2016-04-20

Sensor Box
SRBG-C1-N-20N-ZC-M12-EX5
SRBG-C1-N-20N-ZC-C2-C2-EX5

2014/30/EU **EN 60947-5-2:2007 + A1:2012**

Sensor Box
SRBG-C1-N-20N-ZC-M12-EX5
SRBG-C1-N-20N-ZC-C2-C2-EX5

2014/34/EU **EN 60079-0:2012 + A11:2013**
EN 60079-11:2012

CE **0344 DEKRA Certification B.V., Utrechtseweg 310, NL-6812 AR Arnhem**

Ex **II 1G Ex ia IIC T6...T1 Ga**

TÜV 16 ATEX 174269 X
0044 TÜV Nord Cert GmbH, Langemarckstraße 20, 45141 Essen

Pressure gauge

stainless steel, liquid filled series 2940

case 63 mm

E 02.09.01

Ed.20.01



Application	Pressure gauge in stainless steel with liquid filling Suitable for aggressive media and environments where pulsation and vibration exist
Design	EN 837-1
Series	**2940**
WIKA model	233.50
Case size	Nominal size dim 63 mm
Accuracy	Class 1,6%
Case	Stainless steel 1.4301 with bayonet ring Option with case in stainless steel 316TI Option with epoxy- or PTFE-coating
Filling	Filling glycerine 99,7% (86,5% pressure ranges ≤ 2,5 bar) Compensating valve to vent case in pressure ranges ≤ 16 bar Option with silicone oil or glycerine for food applications
Window	Polycarbonate. Option with laminated safety glass
Pressure element	Stainless steel 316 SS
Movement	Stainless steel
Dial	Aluminium, white with black lettering
Pressure unit	Bar. Option with unit bar/Pa, bar/psi, kPa, MPa, psi
Pressure connection	G1/4” or 1/4”NPT. Option with other connections. Option with mounted restrictor
Mounting	Lower or back mount, also with back flange, front flange or triangular bezel with clamp
Ingress protection	IP 65 acc.to EN 60529/IEC 529
Pressure limitation	75% of full scale value by steady pressure 66% of full scale value by fluctuating pressure By short time pressure full scale value Option with overpressure safe 2 x full scale value
Permissible temperature	Medium temperature max +100°C Ambient temperature -20+60°C Option: Ambient temperature -40+60°C with filling silicone M50
Certificates	Certificate EN 10204 can be delivered as options Test report wetted parts EN 10204-2.2 Inspection certificate wetted parts EN 10204-3.1 Calibration certificate with 5 measuring points Calibration certificate EN 10204-3.1 or DKD-calibration
Production options	ATEX protection c with device cat 2G/2D Design acc.to NACE Sour Gas Service Design Degreased for oxygen services Silicone free design Pressure element in monel (type 263.50) Dial with colored sectors or with customer logo



2940
Lower mount



2941
Back mount



2945
Lower mount
back flange



2947
Back mount
front flange



2948
Back mount
bezel and clamp



2949
Lower mount
front flange

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WIKA
Part of your business

Pressure gauge

stainless steel, liquid filled series 2940

case 63 mm

E 02.09.01



Pressure range	Interval	Divisions
0-1 bar	0,05	20
0-1,6 bar	0,05	32
0-2,5 bar	0,1	25
0-4 bar	0,2	20
0-6 bar	0,2	30
0-10 bar	0,5	20
0-16 bar	0,5	32
0-25 bar	1,0	25
0-40 bar	2,0	20
0-60 bar	2,0	30
0-100 bar	5,0	20
0-160 bar	5,0	32
0-250 bar	10,0	25
0-400 bar	20,0	20
0-600 bar	20,0	30
0-1000 bar	50,0	20
-1/0 bar	0,05	20
-1/+1,5 bar	0,1	25
-1/+3 bar	0,2	20
-1/+5 bar	0,2	30
-1/+9 bar	0,5	20
-1/+15 bar	0,5	32
-1/+24 bar	1,0	25

Accuracy

Max permissible error 1,6%
The accuracy is expressed as a percentage of full scale range. Permissible error 1,0% will cover 0% till 100% of scale range with a reference temperature of +20°C.
Ex. Pressure range 0-10 bar has an error of ± 0,16 bar

Temperature effect
Temperature of the measuring system over or under the reference temperature +20°C will effect the accuracy with 0,4 percentage per +10°C. With a medium temperature of +40°C the accuracy will be ± 2,4%.

Alternative design

Low pressure
Pressure range < 0-0,6 bar
Pressure range from 40 mbar to 600 mbar
Type 2960 datasheet E02.16.02

Safety version
Safety version EN 837-1 (S3) with
solid baffle wall behind the dial, blow out back
Type 233.30.063 datasheet E02.10.01

With electrical contact
One or two electrical contact mounted in the case
Max- and/or minfunction
Type PGS23.100 datasheet E02.55.01

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Pressure gauge

stainless steel, liquid filled series 2940

case 63 mm

E 02.09.01

Code number case 63 mm unit Bar						
	2940	**2941**	**2945**	**2947**	**2948**	**2949**
Mounting	**Lower**	**Back**	**Back flange**	**Front flange**	**Clamp**	**Front flange**
Connection	G1/4”	G1/4”	G1/4”	G1/4”	G1/4”	G1/4”
0-1 bar	29402002	29412002	29452002	29472002	29482002	29492002
0-1,6 bar	29402003	29412003	29452003	29472003	29482003	29492003
0-2,5 bar	29402004	29412004	29452004	29472004	29482004	29492004
0-4 bar	29402006	29412006	29452006	29472006	29482006	29492006
0-6 bar	29402007	29412007	29452007	29472007	29482007	29492007
0-10 bar	29402008	29412008	29452008	29472008	29482008	29492008
0-16 bar	29402011	29412011	29452011	29472011	29482011	29492011
0-25 bar	29402013	29412013	29452013	29472013	29482013	29492013
0-40 bar	29402015	29412015	29452015	29472015	29482015	29492015
0-60 bar	29402017	29412017	29452017	29472017	29482017	29492017
0-100 bar	29402019	29412019	29452019	29472019	29482019	29492019
0-160 bar	29402020	29412020	29452020	29472020	29482020	29492020
0-250 bar	29402022	29412022	29452022	29472022	29482022	29492022
0-400 bar	29402024	29412024	29452024	29472024	29482024	29492024
0-600 bar	29402025	29412025	29452025	29472025	29482025	29492025
0-1000 bar	29402026	29412026	29452026	29472026	29482026	29492026
-1/0 bar	29402040	29412040	29452040	29472040	29482040	29492040
-1/+1,5 bar	29402066	29412066	29452066	29472066	29482066	29492066
-1/+3 bar	29402067	29412067	29452067	29472067	29482067	29492067
-1/+5 bar	29402068	2941208	29452068	29472068	29482068	29492068
-1/+9 bar	29402069	29412069	29452069	29472069	29482069	29492069
-1/+15 bar	29402071	29412071	29452071	29472069	29482071	29492071

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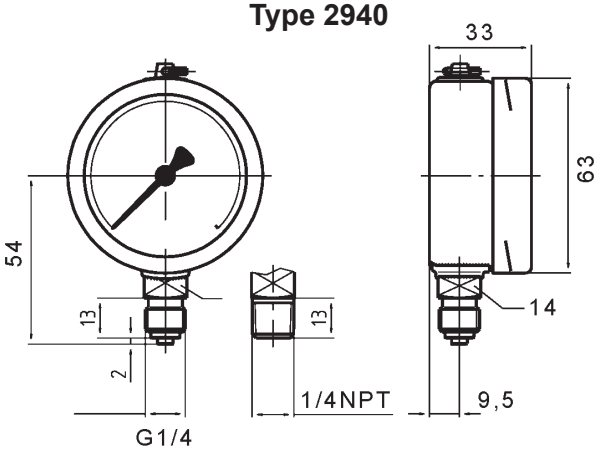
Pressure gauge

stainless steel, liquid filled series 2940

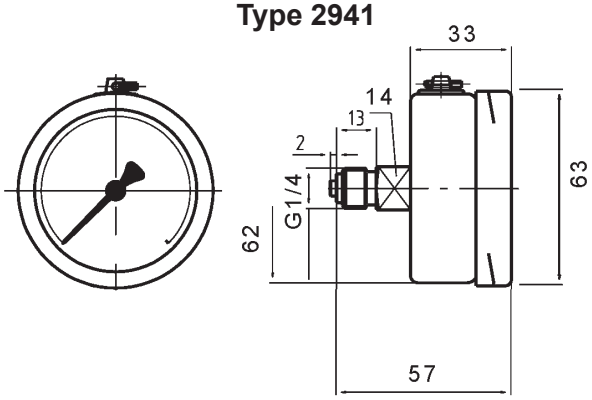
case 63 mm

E 02.09.01

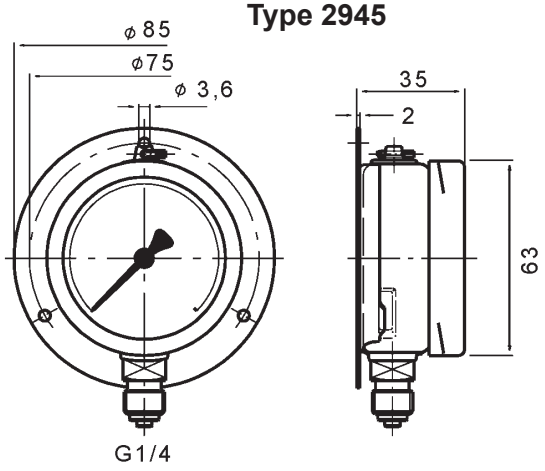
Type 2940



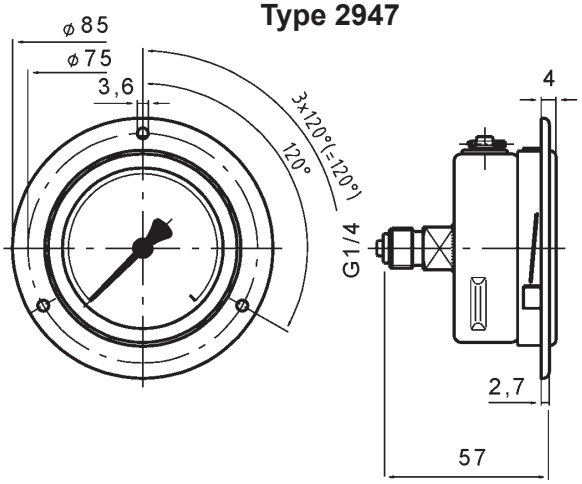
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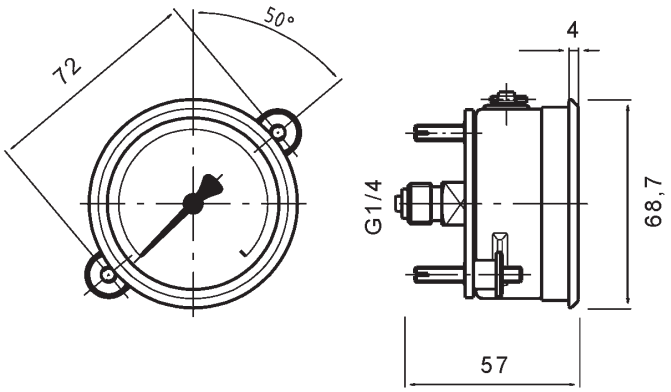
Type 2945



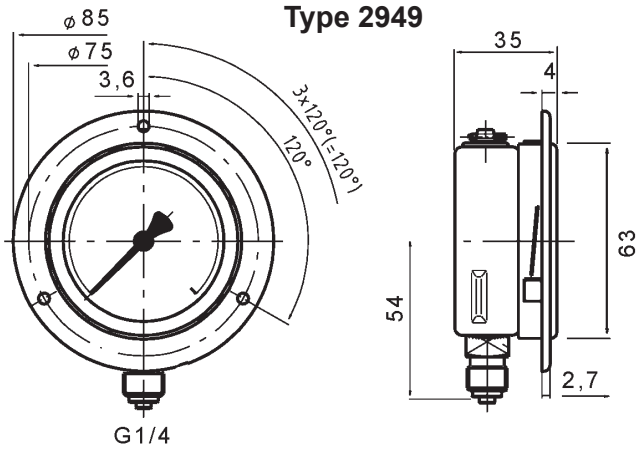
Type 2947



Type 2948



Type 2949



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Annex: EU Declaration of conformity

C63-AQU-QIX-002 622 / 917

EU-Konformitätserklärung
EU Declaration of Conformity

Dokument Nr.:
Document No.: **11564220.04**

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung:
Type Designation:

232.50.063 + option ATEX / 233.50.063 + option ATEX /
232.50.100 + option ATEX / 233.50.100 + option ATEX /
232.50.160 + option ATEX / 233.50.160 + option ATEX /
262.50.063 + option ATEX / 263.50.063 + option ATEX /
262.50.100 + option ATEX / 263.50.100 + option ATEX /
262.50.160 + option ATEX / 263.50.160 + option ATEX /

232.30.063 + option ATEX / 233.30.063 + option ATEX /
232.30.100 + option ATEX / 233.30.100 + option ATEX /
232.30.160 + option ATEX / 233.30.160 + option ATEX /
262.30.063 + option ATEX / 263.30.063 + option ATEX /
262.30.100 + option ATEX / 263.30.100 + option ATEX /
262.30.160 + option ATEX / 263.30.160 + option ATEX /

232.53.063 + option ATEX / 233.53.063 + option ATEX /
232.54.063 + option ATEX / 233.54.063 + option ATEX /
232.53.100 + option ATEX / 233.53.100 + option ATEX /
232.54.100 + option ATEX / 233.54.100 + option ATEX /

232.36.100 + option ATEX / 233.36.100 + option ATEX /
232.36.160 + option ATEX / 233.36.160 + option ATEX /

PG23LT.063 + option ATEX / PG23LT.100 + option ATEX /
PG23LT.160 + option ATEX /

PG23CP.063 + option ATEX / PG23CP.100 + option ATEX

Beschreibung:
Description:
Druckmessgerät mit Rohrfeder
Bourdon Tube Pressure Gauge

gemäß gültigem Datenblatt:
according to the valid data sheet:
PM 02.02, PM 02.04, PM 02.12, PM 02.15, PM 02.22, PM 02.24

die wesentlichen Schutzanforderungen der folgenden Richtlinien erfüllen:
comply with the essential protection requirements of the directives:

Harmonisierte Normen:
Harmonized standards:

2014/34/EU Explosionsschutz (ATEX) (1)
Explosion protection (ATEX) (1)

II 2G Ex h IIC T6...T1 Gb X	EN ISO 80079-36:2016
II 2D Ex h IIIC T85 °C...T450 °C Db X	EN ISO 80079-37:2016

(1) Modul A, interne Fertigungskontrolle. Die Dokumentation ist hinterlegt bei notifizierter Stelle TÜV NORD CERT GmbH, Essen (Nr. 0044), Aktennummer 8000550026.
Module A, internal control of production. The Documentation is deposited at notified body TÜV NORD CERT GmbH, Essen (no. 0044), reference number 8000550026.

Unterzeichnet für und im Namen von / *Signed for and on behalf of*

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 2019-05-03

i.V. A. Häfner

Alfred Häfner, Vice President
Process Instrumentation Pressure

i.V. Glombitza

Michael Glombitza, Head of Quality Management
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Kommanditgesellschaft: Sitz Klingenberg – Amtsgericht Aschaffenburg HRA 1819

Komplementärin:
WIKA International SE - Sitz Klingenberg - Amtsgericht Aschaffenburg HRB 10505
Vorstand: Alexander Wiegand
Vorsitzender des Aufsichtsrats: Dr. Max Egli

Translation

1 # EU-Type Examination Certificate

2 **Equipment intended for use in potentially explosive atmospheres Directive 2014/34/EU**

3 EU-Type Examination Certificate Number: **BVS 14 ATEX E 035 X – revision 3**

4 Product: **Pressure transmitter type IS-3**

5 Manufacturer: **WIKA Alexander Wiegand SE & Co. KG**

6 Address: **Alexander-Wiegand-Straße 30, 63911 Klingenberg, Germany**

7 This product and any acceptable variations thereto are specified in the appendix to this certificate and the documents referred to therein.

8 DEKRA Testing and Certification GmbH, Notified Body number 0158, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential Report No. BVS PP 14.2077 EU.

9 The Essential Health and Safety Requirements are assured in consideration of:

EN IEC 60079-0:2018	**General requirements**
EN 60079-11:2012	**Intrinsic Safety "i"**
EN 60079-26:2015	**Equipment with equipment protection level (EPL) Ga**

10 If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Special Conditions for Use specified in the appendix to this certificate.

11 This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12 The marking of the product shall include the following:

II 1G Ex ia IIA T4/T5/T6 Ga
II 1G Ex ia IIC T4/T5/T6 Ga
II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
II 1D Ex ia IIIB T_{200}135°C Da
II 1/2D Ex ia IIIB T_{200}135°C Da/Db
II 1D Ex ia IIIC T135°C Da
II 1/2D Ex ia IIIC T135°C Da/Db
I M1 Ex ia I Ma

This 3rd revision replaces the EU Type Examination Certificate. BVS 14 ATEX E 035 X including 2nd revision.

DEKRA Testing and Certification GmbH
Bochum, 2019-11-11

Signed: Jörg-Timm Kilisch

Managing Director

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13 **Appendix**

14 **EU-Type Examination Certificate**

BVS 14 ATEX E 035 X

15 **Product description**

15.1 **Subject and type**

Pressure transmitter type IS-3-x-xxxx-xxx-xxxxxxx-xxxxxxx-xxxx

Type code

IS-3-*-bcde-***-*******-*qrst**-****

* = not relevant to ATEX

Position	Meaning	Fittings
bc	Intended for use in	'11' = II 1G
		'12' = II 1G, I M1
		'13' = II 1G, II 1D
		'14' = II 1G, II 1D, I M1
		'21' = II 1/2G
		'22' = II 1/2G, I M1
		'23' = II 1/2G, II 1/2D
		'24' = II 1/2G, II 1/2D, I M1
d	Approvals	'1' or '3' = with approval for Ex-atmospheres
e	Type of ignition protection	'1' = Intrinsic Safety
q	Adjustability	'Z' = none
		'T' = can be set to zero/range adjustable
rs	Electrical connection	Electrical output with two letters according to Table 1 below
t	Cable material	'Z' = none
		'A' = PUR
		'B' = FEP

15.2 **Description**

The pressure transmitter of type IS-3 converts pressure into electrical current. It is intended for measuring pressures in potentially explosive atmospheres and to be connected to intrinsically safe circuits.

15.3 **Electrical parameters**

Intrinsically safe supply and signal circuit (4 - 20 mA current loop)

Parameter	Group I	Group II	Group III
Voltage U_i	DC 30 V	DC 30 V	DC 30 V
Current I_i	100 mA	100 mA	100 mA
Power P_i	800 mW	800 mW	750 / 650 / 550 mW (IIIC) 800 / 650 mW (IIIB)
Effective internal capacitance C_i -	16.5 nF + 0.2 nF/m	16.5 nF + 0.2 nF/m	16.5 nF + 0.2 nF/m
Effective internal inductance L_i -	0 µH + 2 µH/m	0 µH + 2 µH/m	0 µH + 2 µH/m

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15.4 Ambient temperature range / Assignment to device category / Temperature class

Table 1: Ambient and medium temperature range for medium temperatures ≤ 105 °C

Nomenclature	2014/34/EU (ATEX)	EPL	Group	Ambient and medium temperature range (°C)	Temperature class / Surface temperature (°C)
BAYONET CONNECTOR ACC. TO MIL-DTL-26482 not adjustable IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-****	1/2G 3G	Ga/Gb Gc	IIC	-50 ≤ T_a ≤ +60 -50 ≤ T_a ≤ +75 -50 ≤ T_a ≤ +105	T6 T5 T4
	1/2D	Da/Db	IIIB	-50 ≤ T_a ≤ +85 (800 mW) -50 ≤ T_a ≤ +95 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-50 ≤ T_a ≤ +40 (750 mW) -50 ≤ T_a ≤ +70 (650 mW) -50 ≤ T_a ≤ +100 (550 mW)	T135 °C
BAYONET CONNECTOR ACC. TO MIL-DTL-26482 adjustable IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-****	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +75 -30 ≤ T_a ≤ +105	T6 T5 T4
	1/2D	Da/Db	IIIB	-30 ≤ T_a ≤ +85 (800 mW) -30 ≤ T_a ≤ +95 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +100 (550 mW)	T135 °C
CIRCULAR CONNECTOR M16x0,75 ACC. TO IEC61076-2-106 5-PIN not adjustable IS-3-*-****-***-*******-*ZB4Z**-**** adjustable IS-3-*-****-***-*******-*TB4Z**-****	M1	Ma	I	-30 ≤ T_a ≤ +85	N/A
	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +75 -30 ≤ T_a ≤ +85	T6 T5 T4
	1/2D	Da/Db	IIIB	-30 ≤ T_a ≤ +85 (800 mW) -30 ≤ T_a ≤ +85 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +85 (550 mW)	T135 °C
CIRCULAR CONNECTOR M12x1 ACC. TO IEC61076-2-101 A-COD 4-PIN not adjustable IS-3-*-****-***-*******-*ZM2Z**-**** adjustable IS-3-*-****-***-*******-*TM2Z**-****	M1	Ma	I	-30 ≤ T_a ≤ +105	N/A
	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +75 -30 ≤ T_a ≤ +105	T6 T5 T4
	1/2D	Da/Db	IIIB	-30 ≤ T_a ≤ +85 (800 mW) -30 ≤ T_a ≤ +95 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +100 (550 mW)	T135 °C
CIRCULAR CONNECTOR 7/8-16UN 4-PIN not adjustable IS-3-*-****-***-*******-*ZM6Z**-****	M1	Ma	I	-40 ≤ T_a ≤ +70	N/A
	1/2G 3G	Ga/Gb Gc	IIC	-40 ≤ T_a ≤ +60 -40 ≤ T_a ≤ +70 -40 ≤ T_a ≤ +70	T6 T5 T4
	1/2D	Da/Db	IIIB	-40 ≤ T_a ≤ +70 (800 mW) -40 ≤ T_a ≤ +70 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-40 ≤ T_a ≤ +40 (750 mW) -40 ≤ T_a ≤ +70 (650 mW) -40 ≤ T_a ≤ +70 (550 mW)	T135 °C
ANGULAR CONNECTOR ACC. TO DIN EN175301-803-A adjustable IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-****	M1	Ma	I	-30 ≤ T_a ≤ +105	N/A
	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +75 -30 ≤ T_a ≤ +105	T6 T5 T4
	1/2D	Da/Db	IIIB	-30 ≤ T_a ≤ +85 (800 mW) -30 ≤ T_a ≤ +95 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +100 (550 mW)	T135 °C
CABLE OUTLET IP67 adjustable IS-3-*-****-***-*******-*TDPA**-****	M1	Ma	I	-30 ≤ T_a ≤ +70	N/A
	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +70 -30 ≤ T_a ≤ +70	T6 T5 T4
	1/2D	Da/Db	IIIB	-30 ≤ T_a ≤ +70 (800 mW) -30 ≤ T_a ≤ +70 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +70 (550 mW)	T135 °C
CABLE OUTLET IP68 CABLE GLAND not adjustable IS-3-*-****-***-*******-*ZXPA**-**** adjustable IS-3-*-****-***-*******-*TXPA**-****	M1	Ma	I	-30 ≤ T_a ≤ +70	N/A
	1G 1/2G 3G	Ga Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +70 -30 ≤ T_a ≤ +70	T6 T5 T4
	1D 1/2D	Da Da/Db	IIIB	-30 ≤ T_a ≤ +70 (800 mW) -30 ≤ T_a ≤ +70 (650 mW)	T_{200} 135 °C

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Nomenclature	2014/34/EU (ATEX)	EPL	Group	Ambient and medium temperature range (°C)	Temperature class / Surface temperature (°C)
	1D 1/2D	Da Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +70 (550 mW)	T135 °C
CABLE OUTLET IP68 CABLE GLAND CONDUIT 1/2NPT not adjustable IS-3-*-****-***-*******-*Z5WA**-****	M1	Ma	I	-30 ≤ T_a ≤ +70	N/A
	1G 1/2G 3G	Ga Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +70 -30 ≤ T_a ≤ +70	T6 T5 T4
	1D 1/2D	Da Da/Db	IIIB	-30 ≤ T_a ≤ +70 (800 mW) -30 ≤ T_a ≤ +70 (650 mW)	T_{200} 135 °C
	1D 1/2D	Da Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +70 (550 mW)	T135 °C
CABLE OUTLET IP68 (CONTINUOUS USE IN MEDIUM) PUR not adjustable IS-3-*-****-***-*******-*ZDCA**-****	M1	Ma	I	-30 ≤ T_a ≤ +70	N/A
	1G	Ga	IIA	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +70 -30 ≤ T_a ≤ +70	T6 T5 T4
	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +70 -30 ≤ T_a ≤ +70	T6 T5 T4
	1D 1/2D	Da Da/Db	IIIB	-30 ≤ T_a ≤ +70 (800 mW) -30 ≤ T_a ≤ +70 (650 mW)	T_{200} 135 °C
	1D 1/2D	Da Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +70 (550 mW)	T135 °C
CABLE OUTLET IP68 (CONTINUOUS USE IN MEDIUM) FEP not adjustable IS-3-*-****-***-*******-*ZDCB**-****	M1	Ma	I	-30 ≤ T_a ≤ +95	N/A
	1G	Ga	IIA	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +75 -30 ≤ T_a ≤ +95	T6 T5 T4
	1/2G 3G	Ga/Gb Gc	IIC	-30 ≤ T_a ≤ +60 -30 ≤ T_a ≤ +75 -30 ≤ T_a ≤ +95	T6 T5 T4
	1D 1/2D	Da Da/Db	IIIB	-30 ≤ T_a ≤ +85 (800 mW) -30 ≤ T_a ≤ +95 (650 mW)	T_{200} 135 °C
	1D 1/2D	Da Da/Db	IIIC	-30 ≤ T_a ≤ +40 (750 mW) -30 ≤ T_a ≤ +70 (650 mW) -30 ≤ T_a ≤ +95 (550 mW)	T135 °C
FIELD CASE, CABLE GLAND BRASS NICKEL-PLATED IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** FIELD CASE, CABLE GLAND STAINLESS STEEL IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** FIELD CASE, CONDUIT IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****	M1	Ma	I	-50 ≤ T_a ≤ +105	N/A
	1/2G 3G	Ga/GbG c	IIC	-50 ≤ T_a ≤ +60 -50 ≤ T_a ≤ +75 -50 ≤ T_a ≤ +105	T6 T5 T4
	1/2D	Da/Db	IIIB	-50 ≤ T_a ≤ +85 (800 mW) -50 ≤ T_a ≤ +95 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-50 ≤ T_a ≤ +40 (750 mW) -50 ≤ T_a ≤ +70 (650 mW) -50 ≤ T_a ≤ +100 (550 mW)	T135 °C
FIELD CASE, CABLE GLAND PLASTIC IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	M1	Ma	I	-20 ≤ T_a ≤ +85	N/A
	1/2G 3G	Ga/Gb Gc	IIC	-20 ≤ T_a ≤ +60 -20 ≤ T_a ≤ +75 -20 ≤ T_a ≤ +85	T6 T5 T4
	1/2D	Da/Db	IIIB	-20 ≤ T_a ≤ +85 (800 mW) -20 ≤ T_a ≤ +85 (650 mW)	T_{200} 135 °C
	1/2D	Da/Db	IIIC	-20 ≤ T_a ≤ +40 (750 mW) -20 ≤ T_a ≤ +70 (650 mW) -20 ≤ T_a ≤ +85 (550 mW)	T135 °C

N/A = "not applicable"

Optional cooling elements are provided for medium temperature ranges 105 °C < T_{med} ≤ 200 °C.

The following tables show the maximum medium temperatures at the corresponding ambient temperatures for the respective temperature classes.
The minimum ambient and medium temperatures from table 1 "Ambient and medium temperature range for medium temperatures ≤ 105 °C" remain valid.

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Table 2: Maximum medium and ambient temperature depending on the temperature class when using cooling elements with pressure channel as process connection suitable for medium temperatures 105 °C < T_{med} ≤ 200 °C for Group II (gas atmosphere).

Temperature class	T2	T3				T4		
T (medium,max) / ° C	200	195	175	155	135	130	110	105
Model	T(ambient,max) / ° C							
Circular connector M12x1 IS-3-*-****-***-*******-*TM2Z**-**** IS-3-*-****-***-*******-*ZM2Z**-**** Bayonet connector IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-**** IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-**** Angular connector DIN EN175301-803-A IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-**** Field case, cable gland brass nickel-plated IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** Field case, cable gland stainless steel IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** Field case, conduit IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****	40	45	55	70	85	85	100	105
Cable outlet IP68 (continuous use in medium) FEP IS-3-*-****-***-*******-*ZDCB**-****	40	45	55	70	85	85	85	85
Circular connector M16x0,75 IS-3-*-****-***-*******-*TB4Z**-**** IS-3-*-****-***-*******-*ZB4Z**-**** Field case, cable gland plastic IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	40	45	55	70	70	70	70	70
Circular connector 7/8-16UN IS-3-*-****-***-*******-*ZM6Z**-**** Cable outlets PUR cable IS-3-*-****-***-*******-*TDPA**-**** IS-3-*-****-***-*******-*ZXPA**-**** IS-3-*-****-***-*******-*TXPA**-**** IS-3-*-****-***-*******-*Z5WA**-**** IS-3-*-****-***-*******-*ZDCA**-****	40	45	50	50	50	50	50	50

Table 3: Maximum medium and ambient temperature as a function of power P_i for Group IIIB (dust atmosphere) when using cooling elements with pressure channel as process connection suitable for medium temperatures 105 °C < T_{med} ≤ 135 °C

Power P_i:	800 mW				650 mW			
Group:	IIIB							
Surface Temperature	T_{200} 135 °C							
T (medium,max) / ° C	135	130	110	105	135	130	110	105
Model			T(ambient,max) / ° C					
Circular connector M12x1 IS-3-*-****-***-*******-*TM2Z**-**** IS-3-*-****-***-*******-*ZM2Z**-****	70	70	70	70	75	80	85	85

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Bayonet connector IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-**** IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-**** Angular connector DIN EN175301-803-A IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-**** Field case, cable gland brass nickel-plated IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** Field case, cable gland stainless steel IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** Field case, conduit IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****								
Cable outlet IP68 (continuous use in medium) FEP IS-3-*-****-***-*******-*ZDCB**-****	70	70	70	70	75	80	85	85
Circular connector M16x0,75 IS-3-*-****-***-*******-*TB4Z**-**** IS-3-*-****-***-*******-*ZB4Z**-**** Field case, cable gland plastic IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	70	70	70	70	70	70	70	70
Circular connector 7/8-16UN IS-3-*-****-***-*******-*ZM6Z**-**** Cable outlets PUR cable IS-3-*-****-***-*******-*TDPA**-**** IS-3-*-****-***-*******-*ZXPA**-**** IS-3-*-****-***-*******-*TXPA**-**** IS-3-*-****-***-*******-*Z5WA**-**** IS-3-*-****-***-*******-*ZDCA**-****	50	50	50	50	50	50	50	50

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Table 4: Maximum medium and ambient temperature as a function of the power P_i for Group IIIC (dust atmosphere) when using cooling elements with pressure channel as process connection suitable for medium temperatures 105 °C < T_{med} ≤ 135 °C

Power P_i:	750 mW				650 mW				550 mW			
Group:	IIIC											
Surface Temperature	135 °C											
T (medium,max) / ° C	135	130	110	105	135	130	110	105	135	130	110	105
Model	T(ambient,max) / ° C											
Circular connector M12x1 IS-3-*-****-***-*******-*TM2Z**-**** IS-3-*-****-***-*******-*ZM2Z**-**** Bayonet connector IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-**** IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-**** Angular connector DIN EN175301-803-A IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-**** Field case, cable gland brass nickel-plated IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** Field case, cable gland stainless steel IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** Field case, conduit IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****	0	0	0	0	50	50	50	50	75	80	95	95
Cable outlet IP68 (continuous use in medium) FEP IS-3-*-****-***-*******-*ZDCB**-****	0	0	0	0	50	50	50	50	75	80	85	85
Circular connector M16x0,75 IS-3-*-****-***-*******-*TB4Z**-**** IS-3-*-****-***-*******-*ZB4Z**-**** Field case, cable gland plastic IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	0	0	0	0	50	50	50	50	70	70	70	70
Circular connector 7/8-16UN IS-3-*-****-***-*******-*ZM6Z**-**** Cable outlets PUR cable IS-3-*-****-***-*******-*TDPA**-**** IS-3-*-****-***-*******-*ZXPA**-**** IS-3-*-****-***-*******-*TXPA**-**** IS-3-*-****-***-*******-*Z5WA**-**** IS-3-*-****-***-*******-*ZDCA**-****	0	0	0	0	50	50	50	50	50	50	50	50

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Table 5: Maximum medium and ambient temperature depending on the temperature class when using cooling elements with front flush process connection suitable for medium temperatures 105 °C < T_{med} ≤ 150 °C for Group II (gas atmosphere)

Temperature class	T3		T4		
T (medium,max) / ° C	150	135	130	110	105
Model	T(ambient,max) / ° C				
Circular connector M12x1 IS-3-*-****-***-*******-*TM2Z**-**** IS-3-*-****-***-*******-*ZM2Z**-**** Bayonet connector IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-**** IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-**** Angular connector DIN EN175301-803-A IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-**** Field case, cable gland brass nickel-plated IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** Field case, cable gland stainless steel IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** Field case, conduit IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****	20	50	55	95	105
Cable outlet IP68 (continuous use in medium) FEP IS-3-*-****-***-*******-*ZDCB**-****	20	50	55	85	85
Circular connector M16x0,75 IS-3-*-****-***-*******-*TB4Z**-**** IS-3-*-****-***-*******-*ZB4Z**-**** Field case, cable gland plastic IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	20	50	55	70	70
Circular connector 7/8-16UN IS-3-*-****-***-*******-*ZM6Z**-**** Cable outlets PUR cable IS-3-*-****-***-*******-*TDPA**-**** IS-3-*-****-***-*******-*ZXPA**-**** IS-3-*-****-***-*******-*TXPA**-**** IS-3-*-****-***-*******-*Z5WA**-**** IS-3-*-****-***-*******-*ZDCA**-****	20	50	50	50	50

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Table 6: Maximum medium and ambient temperature as a function of power P_i for Group IIIB (dust atmosphere) when using cooling elements with front flush process connection suitable for medium temperatures 105 °C < T_{med} ≤ 135 °C

Power P_i:	800 mW				650 mW			
Group:	IIIB							
Surface Temperature	T_{200} 135 °C							
T (medium,max) / ° C	135	130	110	105	135	130	110	105
Model			T(ambient,max) / ° C					
Circular connector M12x1 IS-3-*-****-***-*******-*TM2Z**-**** IS-3-*-****-***-*******-*ZM2Z**-**** Bayonet connector IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-**** IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-**** Angular connector DIN EN175301-803-A IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-**** Field case, cable gland brass nickel-plated IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** Field case, cable gland stainless steel IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** Field case, conduit IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****	35	45	75	75	35	45	90	90
Cable outlet IP68 (continuous use in medium) FEP IS-3-*-****-***-*******-*ZDCB**-****	35	45	75	75	35	45	90	90
Circular connector M16x0,75 IS-3-*-****-***-*******-*TB4Z**-**** IS-3-*-****-***-*******-*ZB4Z**-**** Field case, cable gland plastic IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	35	45	75	75	35	45	75	75
Circular connector 7/8-16UN IS-3-*-****-***-*******-*ZM6Z**-**** Cable outlets PUR cable IS-3-*-****-***-*******-*TDPA**-**** IS-3-*-****-***-*******-*ZXPA**-**** IS-3-*-****-***-*******-*TXPA**-**** IS-3-*-****-***-*******-*Z5WA**-**** IS-3-*-****-***-*******-*ZDCA**-****	35	45	55	55	35	45	55	55

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Table 7: Maximum medium and ambient temperature as a function of power P_i for Group IIIC (dust atmosphere) when using cooling elements with front flush process connection suitable for medium temperatures 105 °C < T_{med} ≤ 135 °C

Power P_i:	750 mW				650 mW				550 mW			
Group:	IIIC											
Surface Temperature	135 °C											
T (medium,max) / ° C	135	130	110	105	135	130	110	105	135	130	110	105
Model	T(ambient,max) / ° C											
Circular connector M12x1 IS-3-*-****-***-*******-*TM2Z**-**** IS-3-*-****-***-*******-*ZM2Z**-**** Bayonet connector IS-3-*-****-***-*******-*ZO5Z**-**** IS-3-*-****-***-*******-*ZO6Z**-**** IS-3-*-****-***-*******-*TO5Z**-**** IS-3-*-****-***-*******-*TO6Z**-**** Angular connector DIN EN175301-803-A IS-3-*-****-***-*******-*TA3Z**-**** IS-3-*-****-***-*******-*TAWZ**-**** IS-3-*-****-***-*******-*TAVZ**-**** Field case, cable gland brass nickel-plated IS-3-*-****-***-*******-*TFHZ**-**** IS-3-*-****-***-*******-*TFKZ**-**** Field case, cable gland stainless steel IS-3-*-****-***-*******-*TFCZ**-**** IS-3-*-****-***-*******-*TFDZ**-**** Field case, conduit IS-3-*-****-***-*******-*TFSZ**-**** IS-3-*-****-***-*******-*TFTZ**-**** IS-3-*-****-***-*******-*TFLZ**-**** IS-3-*-****-***-*******-*TFMZ**-****	15	15	15	15	35	45	55	55	35	45	90	95
Cable outlet IP68 (continuous use in medium) FEP IS-3-*-****-***-*******-*ZDCB**-****	15	15	15	15	35	45	55	55	35	45	90	90
Circular connector M16x0,75 IS-3-*-****-***-*******-*TB4Z**-**** IS-3-*-****-***-*******-*ZB4Z**-**** Field case, cable gland plastic IS-3-*-****-***-*******-*TFAZ**-**** IS-3-*-****-***-*******-*TFBZ**-****	15	15	15	15	35	45	55	55	35	45	75	75
Circular connector 7/8-16UN IS-3-*-****-***-*******-*ZM6Z**-**** Cable outlets PUR cable IS-3-*-****-***-*******-*TDPA**-**** IS-3-*-****-***-*******-*ZXPA**-**** IS-3-*-****-***-*******-*TXPA**-**** IS-3-*-****-***-*******-*Z5WA**-**** IS-3-*-****-***-*******-*ZDCA**-****	15	15	15	15	35	45	55	55	35	45	55	55

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16 **Report Number**

BVS PP 14.2077 EU, as of 2019-11-11

17 **Special Conditions for Use**

When used in areas which require Category 1G equipment, the pressure transmitter has to be wall-mounted in such a way that degrees of IP67 are ensured in compliance with EN 60529.

When used in areas which require Category 1D equipment, the pressure transmitter has to be wall-mounted in such a way that degree of IP6X is ensured in compliance with EN 60529.

The technical information provided by the manufacturer regarding the avoidance of mechanical hazards as well as the use of the pressure transmitter in conjunction with aggressive or corrosive media has to be adhered to.

When using the pressure transmitters in areas which require Category 1 equipment, the screen of the connecting cable needs to be integrated into the equipotential bonding of the equipment.

When used in areas which require Category 1G equipment, the cable gland has to be designed in such a way that degrees of IP67 are ensured in compliance with EN 60529.

When used in areas which require Category 1D equipment, the cable gland has to be designed in such a way that degree of IP6X is ensured in compliance with EN 60529.

The measuring of process media with temperatures exceeding the values of the measuring media temperature ranges stated in Table 1 above is only permitted if special cooling necks are used. However, the permitted surface temperature values, which apply to this range due to the defined temperature classes, shall not be exceeded.

18 **Essential Health and Safety Requirements**

The Essential Health and Safety Requirements are covered by the standards listed under item 9.

19 **Drawings and Documents**

Drawings and documents are listed in the confidential report.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA Testing and Certification GmbH
Bochum, 2019-11-11
BVS-Alh/Mu A 20190779

Managing Director

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Pressure transmitter
For applications in hazardous areas
Model IS-3

WIKA data sheet PE 81.58

for further approvals
see page 10

Applications

- Chemical, petrochemical industry
- Oil, natural gas
- Machine building

Special features

- Measuring ranges from 0 ... 0.1 to 0 ... 6,000 bar (0 ... 3 to 0 ... 15,000 psi)
- Approved for use in hazardous areas, e.g. ATEX, IECEx, FM and CSA
- Suitable for SIL 2 per IEC 61508/IEC 61511



Pressure transmitter model IS-3
Fig. left: With angular connector and flush process connection
Fig. centre: High-pressure version
Fig. right: With field case

Description

For the highest demands
The pressure transmitters of the IS-3 series have been specifically designed for the highest industrial requirements in hazardous areas and feature the common approvals, such as ATEX, IECEx, FM and CSA, as well as a SIL rating per IEC 61508 / IEC 61511 for use in the process industry.

The model IS-3 pressure transmitter is available with measuring ranges up to 6,000 bar and is suitable for applications ranging from general machine building to high-pressure applications.

Design
All wetted parts are manufactured from stainless steel and are fully welded. Internal sealing elements are completely avoided, so that the unit can be used with almost all media. The robust case is also made of stainless steel and provides a minimum ingress protection of IP65. IP68 versions are also available.

The process connections with flush diaphragm are particularly suitable for the measurement of viscous and contaminated media and ensure trouble-free pressure measurement at all times.

The optional field case of the model IS-3 enables operation in extreme environmental conditions and is resistant to acids, bases, oils and solvents. Via the field case connection integrated into the case's head, the electrical cabling can be installed quickly and easily.

Voltage supply
It is recommended that the intrinsically safe variants of the IS-3 series are powered via a suitable repeater power supply. An ideal voltage supply is offered by the intrinsically safe repeater power supply model IS Barrier, see “Accessories”.

WIKA
Part of your business

Measuring ranges

Gauge pressure							
bar	0 ... 0.1	0 ... 0.16	0 ... 0.25	0 ... 0.4	0 ... 0.6	0 ... 1	0 ... 1.6
	0 ... 2.5	0 ... 4	0 ... 6	0 ... 10	0 ... 16	0 ... 25	0 ... 40
	0 ... 60	0 ... 100	0 ...160	0 ... 250	0 ... 400	0 ... 600	0 ... 1,000 [1]
	1,600 [1] [2]	2,500 [1] [2]	4,000 [1] [2]	5,000 [1] [2]	6,000 [1] [2]		
psi	0 ... 3	0 ... 5	0 ... 10	0 ... 15	0 ... 20	0 ... 25	0 ... 30
	0 ... 50	0 ... 60	0 ... 100	0 ... 150	0 ... 160	0 ... 200	0 ... 250
	0 ... 300	0 ... 400	0 ... 500	0 ... 600	0 ... 750	0 ... 800	0 ... 1,000
	0 ... 1,500	0 ... 2,000	0 ... 3,000	0 ... 4,000	0 ... 5,000	0 ... 6,000	0 ... 7,500
	0 ... 8,000	0 ... 10,000 [1]	0 ... 15,000 [1]				

1) Only for instruments without flush process connection.
2) Only for instruments with ignition protection type Ex i. Not for instruments with SIL 2.

Absolute pressure							
bar	0 ... 0.25	0 ... 0.4	0 ... 0.6	0 ... 1	0 ... 1.6	0 ... 2.5	0 ... 4
	0 ... 6	0 ... 10	0 ... 16	0 ... 25			
psi	0 ... 5	0 ... 10	0 ... 15	0 ... 30	0 ... 60	0 ... 100	0 ... 160
	0 ... 200	0 ... 300					

Vacuum and +/- measuring ranges					
bar	-1 ... 0	-1 ... +0.6	-1 ... +1.5	-1 ... +3	-1 ... +5
	-1 ... +9	-1 ... +15	-1 ... +24		
psi	-15 inHg ... 0	-30 inHg ... 0	-30 inHg ... 15	-30 inHg ... 30	-30 inHg ... 60
	-30 inHg ... 100	-30 inHg ... 160	-30 inHg ... 200	-30 inHg ... 300	

Other measuring ranges on request.

Overload safety
The overpressure limit is based on the sensor element used. Depending on the selected process connection and sealing, restrictions in overload safety can result.
A higher overpressure limit will result in a higher temperature error.

Measuring ranges ≤ 25 bar (≤ 400 psi): 3-fold
Measuring ranges 40 ... 600 bar (500 ... 8,000 psi): 2-fold [1]
Measuring ranges ≥ 1,000 bar (≥ 10,000 psi): 1.15-fold

1) 1.7-fold overload safety with 1,000 psi, 1,500 psi, 4,000 psi and 6,000 psi

Output signal

Analogue signal
4 ... 20 mA

Permissible load in Ω
Model IS-3:
≤ (power supply - 10 V) / 0.02 A - (cable length in m x 0.14 Ω)

Model IS-3 with field case:
≤ (power supply - 11 V) / 0.02 A

For the test circuit signal of the IS-3 model with field case a load of ≤ 15 Ω applies

Voltage supply

Power supply U+
Model IS-3: DC 10 ... 30 V
Model IS-3 with field case: DC 11 ... 30 V

Supply and signal circuit for ignition protection type Ex i
Voltage: Ui = DC 30 V
Current: Ii = 100 mA
Power: Pi = 800 mW (for group III 750/650/550 mW)

Effective internal capacitance (version with non-detachable cable connection)
Ci ≤ 16.5 nF
Ci ≤ 16.5 nF + 0.2 nF/m

Effective internal inductance (version with non-detachable cable connection)
Li = 0 µH
Li = 0 µH + 2 µH/m

Reference conditions (per IEC 61298-1)

Temperature
15 ... 25 °C (59 ... 77 °F)

Atmospheric pressure
860 … 1,060 mbar (86 … 106 kPa/12.5 … 15.4 psig)

Humidity
45 ... 75 % r. h. (non-condensing)

Mounting position
Calibrated in vertical mounting position with process connection facing downwards.

Power supply
DC 24 V

Time response

Settling time
≤ 2 ms
≤ 10 ms for medium temperatures below -30 °C (-22 °F)

Accuracy specifications

Accuracy at reference conditions

Accuracy	
Standard	≤ ±0.50 % of span
Option	≤ ±0.25 % of span [1)]

1) Only for measuring ranges ≥ 0.25 bar (3 psi) and ≤ 1,000 bar (15,000 psi)

Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measured error per IEC 61298-2).

Non-linearity (IEC 61298-2)
≤ ±0.2 % of span BFSL

Non-repeatability
< 0.1 % of span

Mean temperature coefficient of zero point (0 ... 80 °C/32 ... 176 °F)
Measuring range ≤ 0.25 bar: ≤ ±0.4 % of span/10 K
Measuring range > 0.25 bar: ≤ ±0.2 % of span/10 K

Mean temperature coefficient of span (0 ... 80 °C/32 ... 176 °F)
≤ ±0.2 % of span/10 K

Long-term stability at reference conditions
≤ ±0.2 % of span/year

Adjustability of zero point and span
Adjustment is made using potentiometers inside the instrument.
Zero point: ±5 %
Span: ±5 %

Process connections

Process connections, standard

Standard	Thread size	Max. nominal pressure	Overload safety
EN 837	G ¼ B	1,000 bar (14,500 psi)	1,400 bar (20,300 psi)
	G ½ B	1,000 bar (14,500 psi)	1,800 bar (26,100 psi)
	G ⅜ B	1,000 bar (14,500 psi)	1,400 bar (20,300 psi)
DIN 3852-E	G ¼ A	600 bar (8,700 psi)	600 bar (8,700 psi)
	G ½ A	600 bar (8,700 psi)	600 bar (8,700 psi)
ANSI/ASME B1.20.1	¼ NPT	1,000 bar (14,500 psi)	1,500 bar (21,700 psi)
	½ NPT	1,000 bar (14,500 psi)	1,500 bar (21,700 psi)
SAE J514 E	7/16-20 UNF BOSS	600 bar (8,700 psi)	600 bar (8,700 psi)
	9/16-18 UNF BOSS	600 bar (8,700 psi)	600 bar (8,700 psi)
DIN 16288	M20 x 1.5	1,000 bar (14,500 psi)	1,800 bar (26,100 psi)
ISO 7	R ¼	1,000 bar (14,500 psi)	1,600 bar (23,200 psi)
	R ⅜	1,000 bar (14,500 psi)	1,400 bar (20,300 psi)
JIS B7505-76	G ¼ B	1,000 bar (14,500 psi)	1,000 bar (14,500 psi)
-	G ½ B male / G ¼ female	1,000 bar (14,500 psi)	1,400 bar (20,300 psi)
	M20 x 1.5 female with sealing cone [1]	6,000 bar	15,000 bar
	M16 x 1.5 female with sealing cone [1]	6,000 bar	10,000 bar
	9/16-18 UNF female F250-C [1]	6,000 bar	10,000 bar
	G ½ B flush	600 bar (8,700 psi)	600 bar (8,700 psi)
	G 1 B flush	1.6 bar (20 psi)	10 bar (145 psi)
	G 1 B flush, hygienic	25 bar (350 psi)	50 bar (725 psi)

1) Not available for psi measuring ranges.

Process connections for the optional medium temperatures (see page 6)

Standard	Thread size	Max. nominal pressure	Overload safety
EN 837	G ¼ B	400 bar (5,800 psi)	800 bar (11,600 psi)
	G ½ B	400 bar (5,800 psi)	800 bar (11,600 psi)
DIN 3852-E	G ¼ A	400 bar (5,800 psi)	600 bar (8,700 psi)
ANSI/ASME B1.20.1	½ NPT	400 bar (5,800 psi)	800 bar (11,600 psi)
ISO 7	R ¼	400 bar (5,800 psi)	800 bar (11,600 psi)
-	G ½ B flush	600 bar (8,700 psi) [1]	600 bar (8,700 psi) [1]
	G 1 B flush	1.6 bar (20 psi)	10 bar (145 psi)
	G 1 B flush, hygienic	25 bar (350 psi)	50 bar (725 psi)

1) Restrictions depending on sealing material, see table “Sealing material restrictions for G ½ B flush process connection“

Sealings

Process connection	Material	
	Standard	Option
EN 837	Copper	Stainless steel
DIN 3852-E	NBR [1]	FKM/FPM [2]
SAE J514 E	NBR [1]	FKM/FPM [2]
G ½ B flush	NBR [4]	FKM/FPM [4], FFKM [4], EPDM [3]
G 1 B flush	NBR [1]	FKM/FPM [2], EPDM [3]
G 1 B flush, hygienic	EPDM [3]	-

1) Permissible temperature range: -20 ... +100 °C (-4 ... +212 °F)
2) Permissible temperature range: -15 ... +200 °C (5 ... 392 °F)
3) Permissible temperature range: -40 ... +150 °C (-40 ... +302 °F)
4) See table “Sealing material restrictions for G ½ B flush process connection”

Except for sealings for process connections per EN 837 the sealings listed under “Standard” are included in the delivery.

Sealing material restrictions for G ½ B flush process connection

Material	Overload safety	
	T= -20 ... +80 °C (-4 ... +176 °F)	T= -20 ... +150 °C (-4 ... +302 °F)
NBR	1,200 bar (17,400 psi)	N/A
FKM/FPM	1,200 bar (17,400 psi)	600 bar (8,700 psi)
FFKM	1,200 bar (17,400 psi)	1,200 bar (17,400 psi)
EPDM	800 bar (11,600 psi)	400 bar (5,800 psi)

T= Ambient temperature
N/A = Not applicable

Electrical connections

Available connections
see “Dimensions in mm”

For ignition protection type Ex nA
- Circular connector M16 x 0.75 IEC 61076-2-106
- Cable outlet IP67 with protection cap
- Cable outlet IP68 (permanent use in the medium)

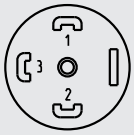
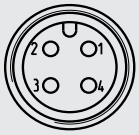
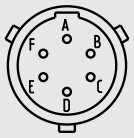
For ignition protection type Ex tc
- Cable outlet IP67 with protection cap
- Cable outlet IP68 (permanent use in the medium)

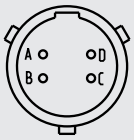
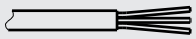
For measuring ranges > 1,000 bar
- Angular connector DIN EN 175301-803 A
- Circular connector M12 x 1 IEC 61076-2-101 A-COD
- Cable outlet IP67
- Field case

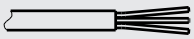
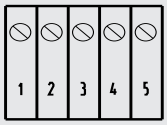
Reverse polarity protection
U_+ vs. U-

Insulation voltage
DC 500 V

Specifications

	Angular connector DIN EN 175301-803 A		Circular connector M12 x 1 IEC 61076-2-101 A-COD (4-pin)		Bayonet connector MIL-DTL-26482 (6-pin)	
Connection diagram						
Assignment (2-wire)	U+ = 1	U- = 2	U+ = 1	U- = 3	U+ = A	U- = B
Cable shield						
Wire cross-section	max. 1.5 mm²					
Cable diameter	6 ... 8 mm Ship approval: 10 ... 14 mm					

	Bayonet connector MIL-DTL-26482 (4-pin)		Circular connector M16 x 0.75 IEC 61076-2-106 (5-pin)		All cable outlets	
Connection diagram						
Assignment (2-wire)	U+ = A	U- = B	U+ = 3	U- = 1	U+ = brown (BN)	U- = green (GN)
Cable shield					grey (GY)	
Wire cross-section					0.5 mm²	
Cable diameter					6.8 mm 7.5 mm (variants for permanent use in the medium)	

	Cable outlet IP67 with protection cap		Field case			
Connection diagram						
Assignment (2-wire)	U+ = brown (BN)	U- = blue (BU)	U+ = 1	U- = 2	Test+ = 3	Test- = 4
Cable shield	Braid		5			
Wire cross-section	0.34 mm²		max. 1.5 mm²			
Cable diameter	5.5 mm		Cable gland Nickel-plated brass: 7 ... 13 mm Stainless steel: 8 ... 15 mm Plastic: 6.5 ... 12 mm			

Legend

U+	Positive power supply terminal
U-	Negative power supply terminal
S+	analogue output
Test+	Positive test connection
Test-	Negative test connection

Operating conditions

Ingress protection (per IEC 60529)
The ingress protection depends on the respective electrical connection.
The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

IP65
- Angular connector DIN EN 175301-803 A

IP67
- Circular connector M12 x 1 IEC 61076-2-101 A-COD
- Circular connector M16 x 0.75 IEC 61076-2-106
- Cable outlet IP67
- Cable outlet IP67 with protection cap (precondition: avoidance of water accumulation in the protection cap)
- Bayonet connector MIL-DTL-26482

IP68
- Cable outlet IP68 cable gland (72 h / 300 mbar)
- Cable outlet IP68 (permanent use in the medium, max. pressure 2 bar)

IP69K
- Field case

Ignition protection types ATEX/IECEx
- II 1G Ex ia IIA T4/T5/T6 Ga
- II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
- II 3G Ex ic IIC T4/T5/T6 Gc
- II 1D Ex ia IIIC T135 °C Da
- II 1/2D Ex ia IIIC T135 °C Da/Db
- I M1 Ex ia I Ma
- II 3G Ex nA IIC T4/T5/T6 Gc
- II 3D Ex tc IIIC T90 °C Dc

Ignition protection types for other approvals, see “Approvals”

Vibration resistance
(per IEC 60068-2-6, vibration under resonance)
- Model IS-3: 20 g
- Model IS-3 with field case and cable outlet IP67 with protection cap: 10 g
- Measuring ranges > 1,000 bar and optional medium temperature ranges: 5 g
- Field case with optional medium temperature range: 2 g

Shock resistance
(per IEC 60068-2-27, mechanical shock)
- Model IS-3: 1,000 g
- Model IS-3 with field case: 600 g
- Measuring ranges > 1,000 bar, optional medium temperature ranges and cable outlet IP67 with protection cap: 100 g
- Field case with optional medium temperature range: 50 g

Permissible temperature ranges for operation in accordance with the data sheet specifications (for ignition protection type Ex i)

Medium	
Standard	-20 ... +80 °C (-4 ... +176 °F)
Option 1	-20 ... +150 °C (-4 ... +302 °F) (only for flush process connections and measuring ranges ≤ 600 bar)
Option 2	-40 ... +150 °C (-40 ... +302 °F) (only for process connections with pressure port and measuring ranges ≤ 400 bar)
Option 3	-40 ... +200 °C (-40 ... +392 °F) (only for process connections with pressure port and measuring ranges ≤ 400 bar)
Oxygen	-20 ... +60 °C (-4 ... +140 °F)

- Ambient: -20 ... +80 °C (-4 ... +176 °F)
  - Cable outlet IP68 (permanent use in the medium), PUR cable: -15 ... +70 °C (5 ... 158 °F)
  - Cable outlet IP68 (permanent use in the medium), FEP cable: -15 ... +80 °C (5 ... 176 °F)
- Storage: -20 ... +80 °C (-4 ... +176 °F)

Permissible temperature ranges for operation in accordance with the data sheet specifications (for ignition protection types Ex nA and Ex tc)

- Medium: -15 ... +70 °C (5 ... +158 °F) (with oxygen -15 ... +60 °C (5 ... +140 °F))
- Ambient: -15 ... +70 °C (5 ... +158 °F)
- Storage: -15 ... +70 °C (5 ... +158 °F)

Maximum ambient and medium temperatures for safe operation, for medium temperatures ≤ 105 °C (≤ 221 °F) (for ignition protection type Ex i)

Category	EPL	Group	Ambient and medium temperatures	Temperature class / surface temperature
1/2G 3G	Ga/Gb Gc	IIC	-20 °C ≤ Ta ≤ +60 °C (-4 °F ≤ Ta ≤ +140 °F) -20 °C ≤ Ta ≤ +70 °C (-4 °F ≤ Ta ≤ +158 °F) -20 °C ≤ Ta ≤ +70 °C (-4 °F ≤ Ta ≤ +158 °F)	T6 T5 T4

Maximum ambient and medium temperatures for safe operation, for process connections with pressure port and medium temperatures >105 °C (> 221 °F) (for ignition protection type Ex i)

Temperature class	Max. medium temperature	Max. ambient temperature
T2	200 °C (392 °F)	40 °C (104 °F)
T3	195 °C (383 °F)	45 °C (113 °F)
	175 °C (347 °F)	50 °C (122 °F)
	155 °C (311 °F)	50 °C (122 °F)
	135 °C (275 °F)	50 °C (122 °F)
T4	130 °C (266 °F)	50 °C (122 °F)
	110 °C (230 °F)	50 °C (122 °F)
	105 °C (221 °F)	50 °C (122 °F)

Maximum ambient and medium temperatures for safe operation, for flush process connections and medium temperatures >105 °C (> 221 °F) (for ignition protection type Ex i)

Temperature class	Max. medium temperature	Max. ambient temperature
T3	150 °C (302 °F)	20 °C (68 °F)
	135 °C (275 °F)	50 °C (122 °F)
T4	130 °C (266 °F)	50 °C (122 °F)
	110 °C (230 °F)	50 °C (122 °F)
	105 °C (221 °F)	50 °C (122 °F)

Maximum ambient and medium temperatures (for ignition protection types Ex nA and Ex tc)

Category	EPL	Group	Ambient and medium temperatures	Temperature class / surface temperature
3G	Gc	IIC	-15 °C ≤ Ta ≤ +55 °C (5 °F ≤ Ta ≤ +131 °F) -15 °C ≤ Ta ≤ +70 °C (5 °F ≤ Ta ≤ +158 °F) -15 °C ≤ Ta ≤ +70 °C (5 °F ≤ Ta ≤ +158 °F)	T6 T5 T4
3D	Dc	IIIC	-15 °C ≤ Ta ≤ +70 °C (5 °F ≤ Ta ≤ +158 °F)	T90 °C

The exact differentiation of EPLs and temperature ranges for safe operation is given in the operating instructions.

Materials

The materials used meet the requirements of the RoHS directive 2011/65/EU, with the exception of the following instrument variants:

- Electrical connection via bayonet connector
- Measuring ranges > 1,000 bar

Wetted parts

- Measuring ranges ≤ 25 bar and ≤ 400 psi, process connection G ½ B flush and G 1 B flush: 316Ti
- Measuring ranges ≥ 40 ... ≤ 1,000 bar and ≥ 500 ... ≤ 15,000 psi: 316Ti and S13800
- Measuring ranges > 1,000 bar: S13800
- Process connection G 1 B flush, hygienic: 316L
- Measuring ranges ≤ 25 bar and ≤ 400 psi with process connection with pressure port for optional medium temperature range: 316L and 316Ti
- Measuring ranges > 25 bar and > 400 psi with process connection with pressure port for optional medium temperature range: 316L, 316Ti and S13800

For sealing materials see “Process connections”
Where the medium is hydrogen, contact the manufacturer.

Non-wetted parts

- Case: Stainless steel
- Angular connector DIN EN 175301-803 A: PA6
- Circular connector M12 x 1 adjustable: PA6, stainless steel
- Circular connector M12 x 1 not adjustable: Stainless steel
- Circular connector M16 x 0.75 adjustable: PA6, stainless steel, Zn nickel-plated
- Circular connector M16 x 0.75 not adjustable: Stainless steel, Zn nickel-plated
- Bayonet connector adjustable: PA6, stainless steel, Al cadmium-plated
- Bayonet connector not adjustable: Stainless steel, Al cadmium-plated
- Cable outlet IP67: PA6, stainless steel, nickel-plated brass
- Cable outlet IP67 with protection cap: Stainless steel, PA66/6-FR
- Cable outlet IP68 cable gland: Stainless steel, nickel-plated brass
- Cable outlet IP68: Stainless steel
- Field case: Stainless steel, nickel-plated brass / stainless steel / PA
- Internal pressure transmission medium

- No oxygen version:	Synthetic oil
- Oxygen version:	Halocarbon oil
- Instruments with measuring range > 25 bar (400 psi):	Dry measuring cell

Approvals

Logo	Description	Country
CE Ex	**EU declaration of conformity** ■ EMC directive, EN 61326 emission (group 1, class B) and immunity (industrial application) During interference consider an increased measuring deviation of up to 1 %. ■ Pressure equipment directive, PS > 200 bar; module A, pressure accessory ■ RoHS directive ■ ATEX directive Hazardous areas - Ex i Zone 0 gas [II 1G Ex ia IIA T4/T5/T6 Ga] [II 1G Ex ia IIC T4/T5/T6 Ga] Zone 1 mounting to zone 0 gas [II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb] Zone 2 gas [II 3G Ex ic IIC T4/T5/T6 Gc X] Zone 20 dust [II 1D Ex ia IIIC T135 °C Da] Zone 21 mounting to zone 20 dust [II 1/2D Ex ia IIIC T135 °C Da/Db] Mining [I M1 Ex ia I Ma] - Ex n Zone 2 gas [II 3G Ex nA IIC T4/T5/T6 Gc X] - Ex t Zone 22 dust [II 3D Ex tc IIIC T90 °C Dc X]	European Union

Logo	Description	Country
	IECEx Hazardous areas - Ex i Zone 0 gas [II Ex ia IIA T4/T5/T6 Ga] [II Ex ia IIC T4/T5/T6 Ga] Zone 1 mounting to zone 0 gas [II Ex ia IIC T4/T5/T6 Ga/Gb] Zone 2 gas [II Ex ic IIC T4/T5/T6 Gc X] Zone 20 dust [II Ex ia IIIC T135 °C Da] Zone 21 mounting to zone 20 dust [II Ex ia IIIC T135 °C Da/Db] Mining [I Ex ia I Ma] - Ex n Zone 2 gas [II Ex nA IIC T4/T5/T6 Gc X] - Ex t Zone 22 dust [II Ex tc IIIC T90 °C Dc X]	International
	EAC ■ EMC directive ■ Hazardous areas (see approval)	Eurasian Economic Community
	FM Hazardous areas (see approval)	USA
	CSA ■ Safety (e.g. electr. safety, overpressure, ...) ■ Hazardous areas (see approval)	USA and Canada
-	**MTSCHS** Permission for commissioning	Kazakhstan
	UkrSEPRO Metrology, measurement technology	Ukraine
	INMETRO ■ Metrology, measurement technology ■ Hazardous areas (see approval)	Brazil
	NEPSI Hazardous areas (see approval)	China
-	**PESO** ■ Hazardous areas (see approval)	India
	3-A Sanitary Standard This instrument is 3-A marked, based on a third party verification for conformance to the 3-A standard.	USA
	GL Ships, shipbuilding (e.g. offshore)	International

Manufacturer’s information and certificates

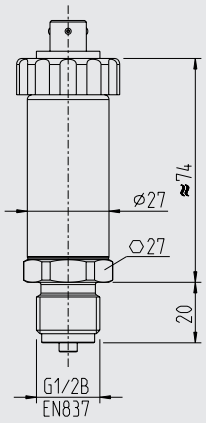
Logo	Description
	SIL 2, functional safety
-	MTTF: >100 years
-	China RoHS directive

Approvals and certificates, see website

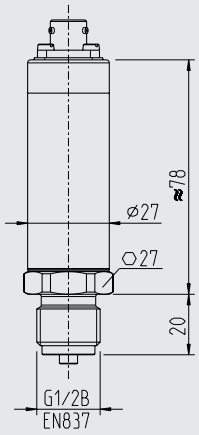
Dimensions in mm

Pressure transmitter

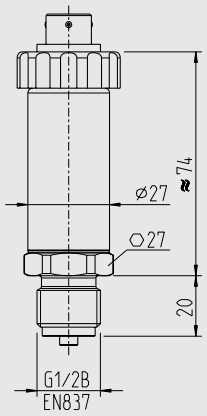
Bayonet connector
MIL-DTL-26482
(4-pin) adjustable



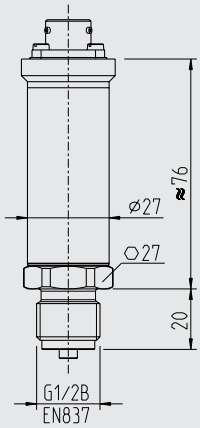
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MIL-DTL-26482
(4-pin) not adjustable



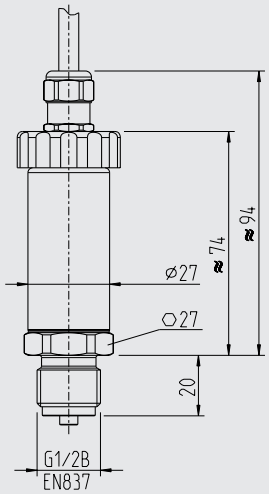
Bayonet connector
MIL-DTL-26482
(6-pin) adjustable



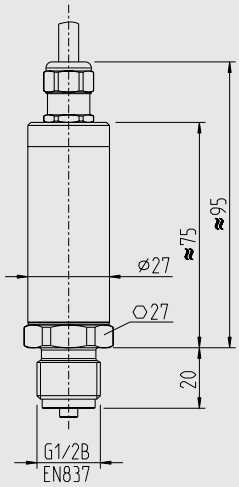
Bayonet connector
MIL-DTL-26482
(6-pin) not adjustable



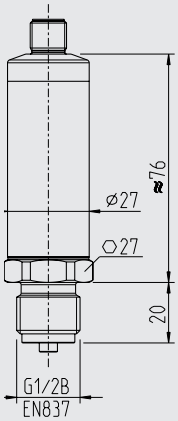
Cable outlet IP67
adjustable



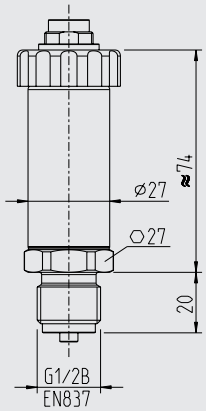
Cable outlet IP68
Cable gland
not adjustable



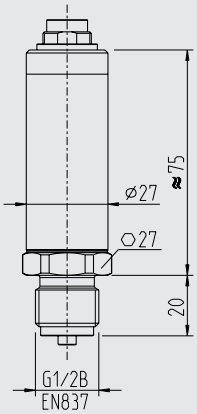
Circular connector M12 x 1
IEC 61076-2-101 A-COD
(4-pin) not adjustable



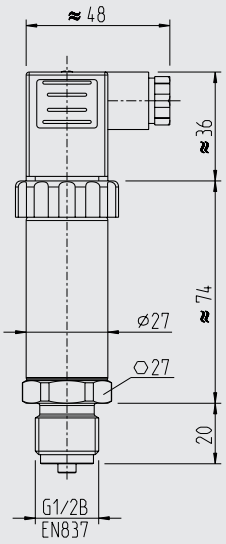
Circular connector M16 x 0.75
IEC 61076-2-106
(5-pin) adjustable



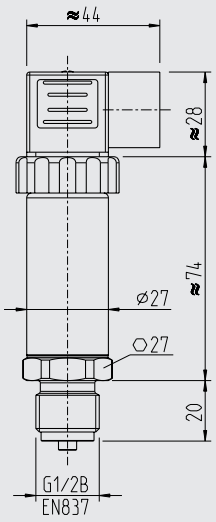
Circular connector M16 x 0.75
IEC 61076-2-106
(5-pin) not adjustable



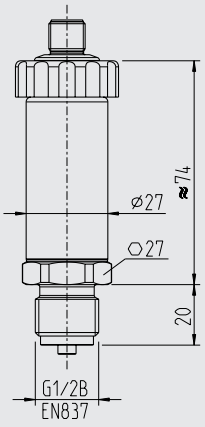
Angular connector
DIN EN 175301-803 A PG 9
adjustable



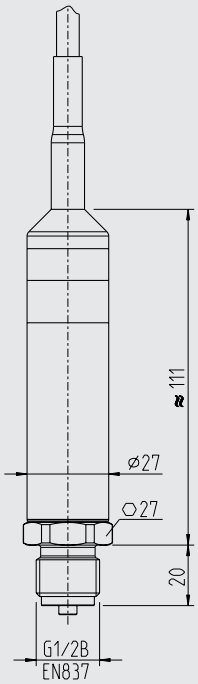
Angular connector
DIN EN 175301-803 A ½ NPT
adjustable



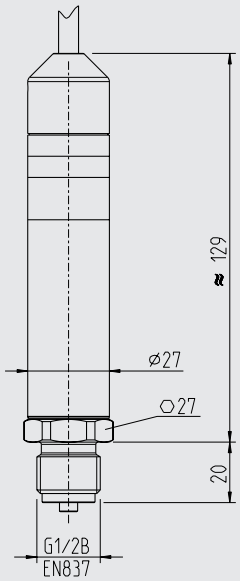
Circular connector M12 x 1
IEC 61076-2-101 A-COD (4-pin)
adjustable



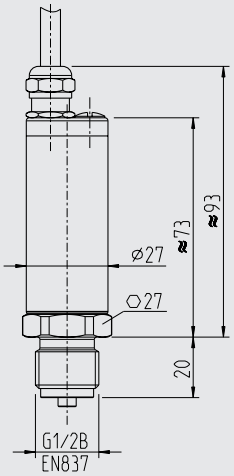
Cable outlet IP68 PUR
(permanent use in the medium)
not adjustable



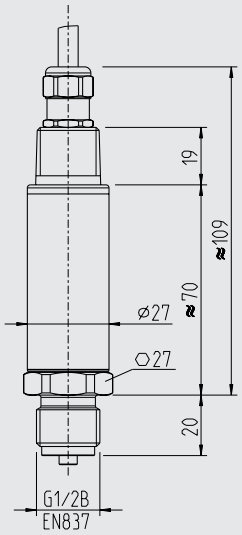
Cable outlet IP68 FEP
(permanent use in the medium)
not adjustable



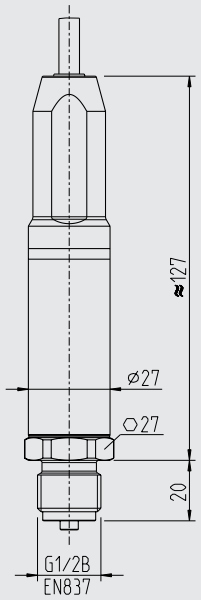
Cable outlet IP68
Cable gland
adjustable



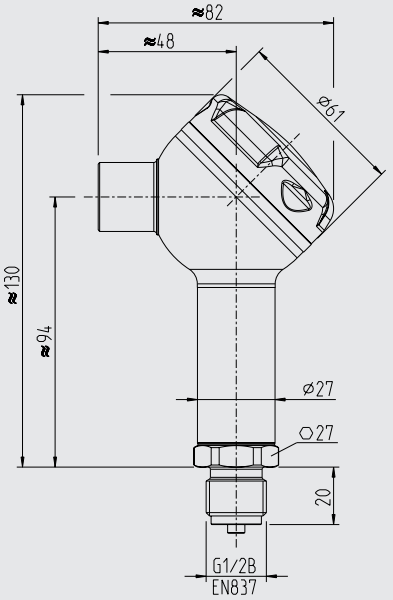
Cable outlet IP68
Cable gland conduit ½ NPT
not adjustable



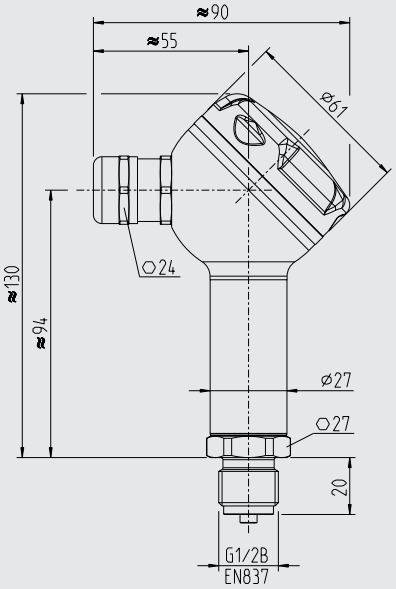
Cable outlet IP67 with protection cap
not adjustable



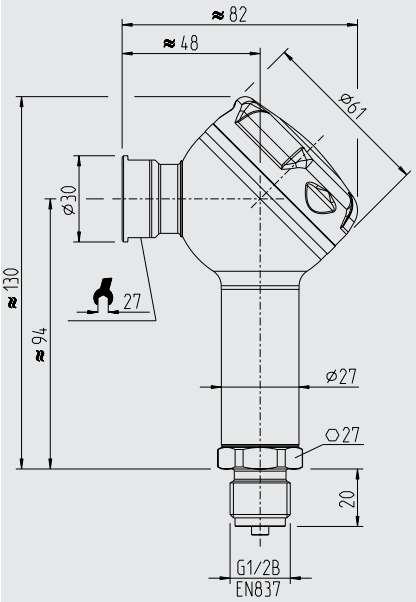
Field case
Conduit ½ NPT-I
adjustable



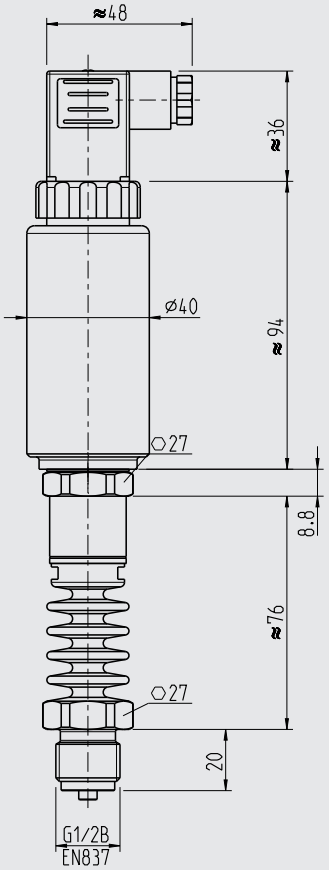
Field case
Cable gland
adjustable



Field case
Conduit M20 x 1.5-I
adjustable

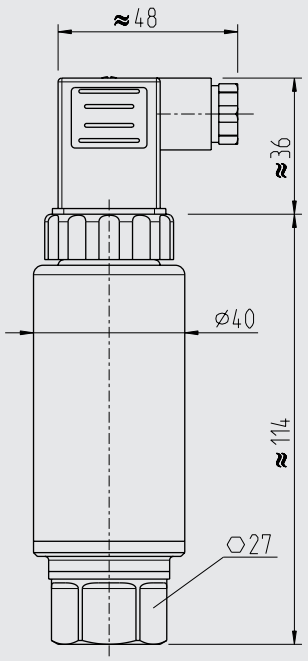


IS-3 for optional medium temperature ranges -40 ... +150 °C (-40 ... 302 °F) and -40 ... +200 °C (-40 ... +392 °F)

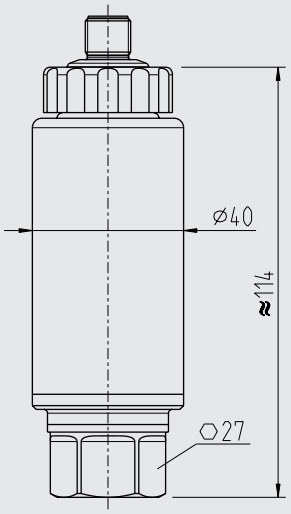


Pressure transmitters in high-pressure version

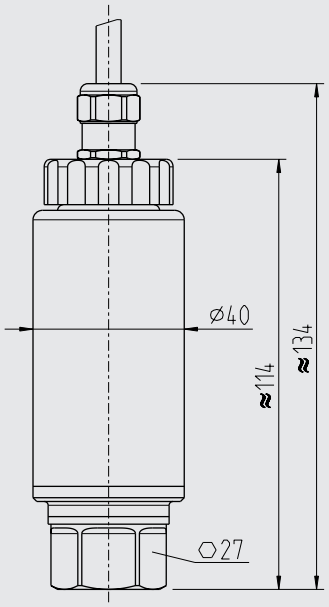
Angular connector
DIN EN 175301-803 A PG 9
adjustable



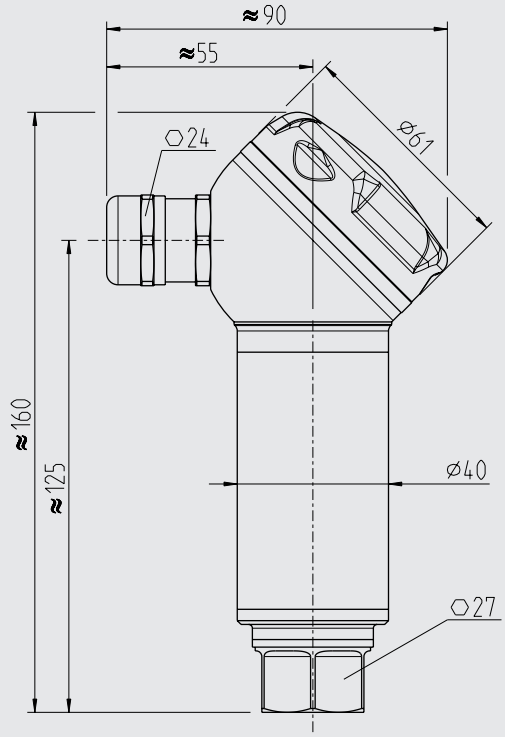
Circular connector M12 x 1
IEC 61076-2-101 A-COD (4-pin)
adjustable



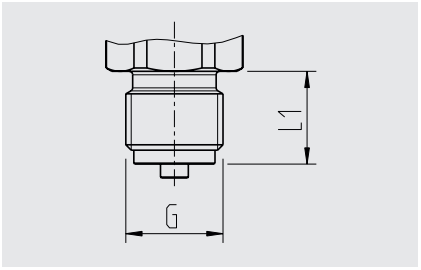
Cable outlet IP67
adjustable



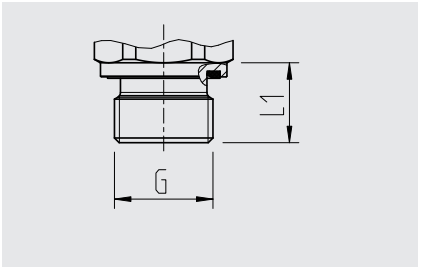
Field case
Cable gland
adjustable



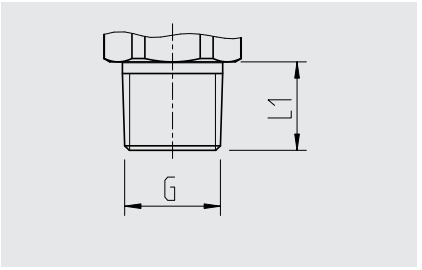
Process connections



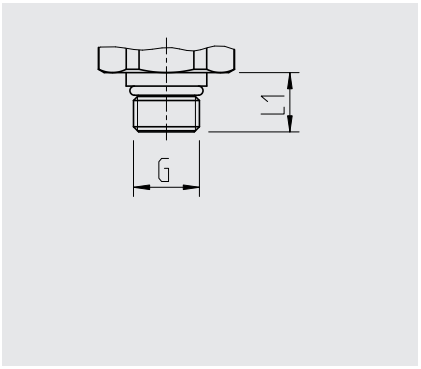
G	L1
G ¼ B EN 837	13
G ½ B EN 837	20
G ⅜ B EN 837	16
M20 x 1.5 DIN 16288	20



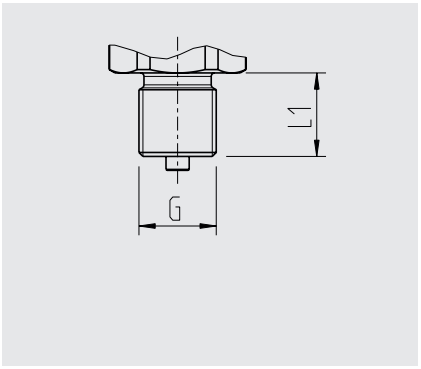
G	L1
G ¼ A DIN 3852-E	14
G ½ A DIN 3852-E	17



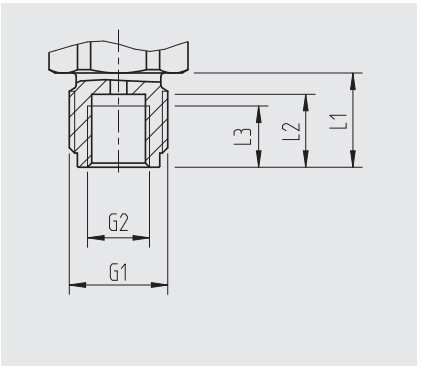
G	L1
¼ NPT	13
½ NPT	19
R ¼	13
R ⅜	15



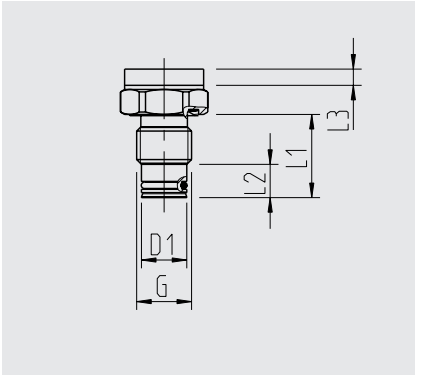
G	L1
7/16-20 UNF BOSS	12.06
9/16-18 UNF BOSS	12.85



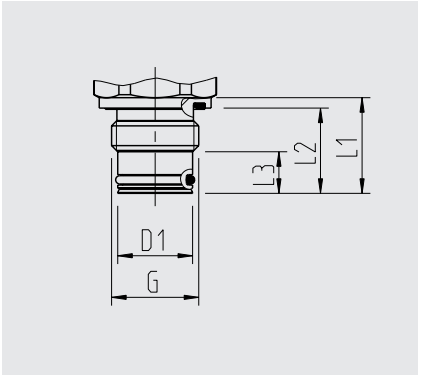
G	L1
G ¼ B JIS B 7505-76	16



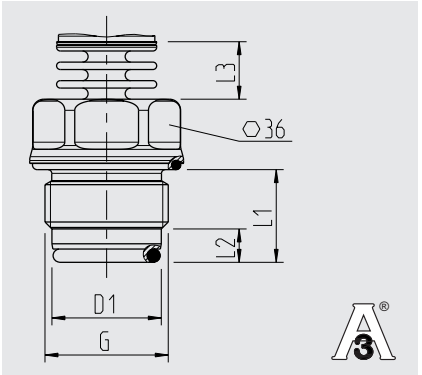
G1	G2	L1	L2	L3
G ½ B	G ¼	20	15.5	13



G	L1	L2	L3	D1
G ½ B	23	20.5	10	18



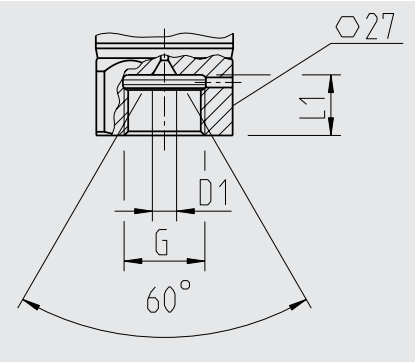
G	L1	L2	L3	D1
G 1 B	23	20.5	10	30



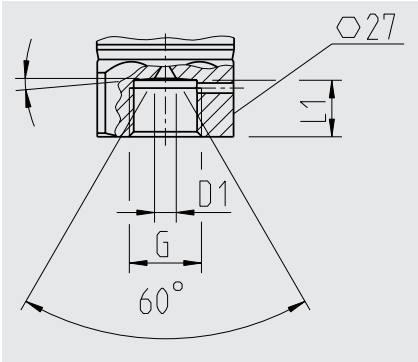
G	L1	L2	L3	D1
G 1 B hygienic	25	9	15.5	29.5

Surface roughness of wetted metallic parts, Ra ≤ 0.76 µm

Process connections for measuring ranges > 1,000 bar



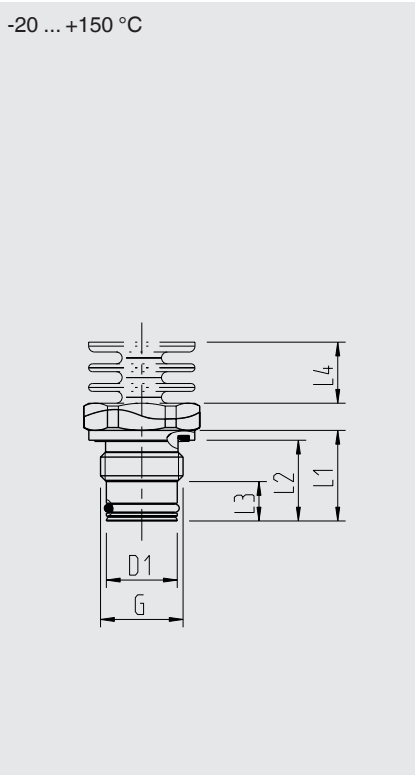
G	L1	D1
M16 x 1.5	12	4.8
M20 x 1.5	15	4.8



G	L1	D1
9/16-18 UNF F250-C	11.2	4.3

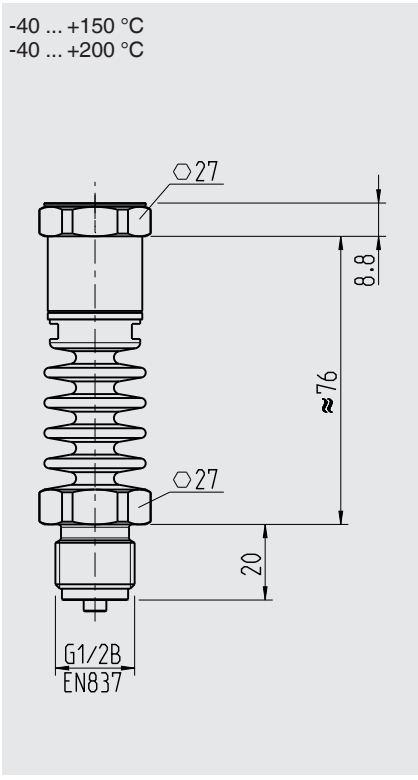
Process connections for optional medium temperature ranges

-20 ... +150 °C



G	L1	L2	L3	L4	D1
G ½ B	23	20.5	10	15.5	18
G 1 B	23	20.5	10	15.5	30

-40 ... +150 °C
-40 ... +200 °C



G	L1	L2
G ½ B	20	71

For information on tapped holes and welding sockets, see Technical information IN 00.14 at www.wika.com.

Accessories and spare parts

Mating connector (for ignition protection type Ex i)

Designation	Order number
Angular connector DIN EN 175301-803 A	
■ with cable gland, metric, with 2 m moulded cable	11225793
■ with cable gland, metric, with 5 m moulded cable	11250186
Circular connector M12 x 1	
■ angled version, 4-pin, IP67, for self-assembly	2421270
■ straight version, 4-pin, IP67, for self-assembly	2421262

Sealings for mating connectors

Description	Order number	
	Blue (WIKA)	Brown (neutral)
Angular connector DIN EN 175301-803 A	1576240	11437902

Sealings for process connection

Process connection	Order number			
	Copper	Stainless steel	NBR	FKM
G ¼ B EN 837	11250810	11250844	-	-
G ½ B EN 837	11250861	11251042	-	-
M20 x 1.5 DIN 16288	11250861	11251042		
G ¼ A DIN 3852-E	-	-	1537857	1576534
G ½ A DIN 3852-E	-	-	1039067	1039075

Repeater power supply

Description	Order number
Repeater power supply model IS Barrier	14117118

Welding socket

Description	Order number
Welding socket for G ½ B flush	1192299
Welding socket for G 1 B flush	1192264
Welding socket for G 1 B hygienic flush	14145179
Welding socket for G 1 B hygienic flush with leak-control channel Fulfils the 3-A Sanitary Standards	14145183

Ordering information

Model / Measuring range / Accuracy / Process connection / Sealing / Electrical connection / Temperature range of medium

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The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

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info@wika.de
www.wika.de

EU-Konformitätserklärung
EU Declaration of Conformity

Dokument Nr.:
Document No.: **14103799.06**

Wir erklären in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
We declare under our sole responsibility that the CE marked products

Typenbezeichnung:
Type Designation: **IS-3-*-1 (1), IS-3-*-2 (2), IS-3-*-3 (3)**

Beschreibung:
***Description*:** **Druckmessumformer für Anwendungen in explosionsgefährdeten Bereichen**
Pressure transmitter for applications in hazardous areas

gemäß gültigem Datenblatt:
according to the valid data sheet: PE 81.58

die wesentlichen Schutzanforderungen der folgenden Richtlinien erfüllen: *comply with the essential protection requirements of the directives:*		Harmonisierte Normen: *Harmonized standards:*
2011/65/EU	Gefährliche Stoffe (RoHS) *Hazardous substances (RoHS)*	EN 50581:2012
2014/68/EU	Druckgeräterichtlinie (DGRL) (4) *Pressure Equipment Directive (PED) (4)*	
2014/30/EU	Elektromagnetische Verträglichkeit (EMV) *Electromagnetic Compatibility (EMC)*	EN 61326-1:2013 EN 61326-2-3:2013
2014/34/EU	Explosionsschutz (ATEX) *Explosion protection (ATEX)*	

		Zertifiziert nach / *Certified to*
Ex	II 1G Ex ia IIA T4/T5/T6 Ga (1) II 1G Ex ia IIC T4/T5/T6 Ga (1) II 1D Ex ia IIIC T135 °C Da (1) II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb (2) II 1/2 D Ex ia IIIC T135 °C Da/Db (2) I M1 Ex ia I Ma (1), (2)	EN 60079-0:2012 + A11:2013 EN 60079-11:2012 EN 60079-26:2007 Entspricht auch / *Also complies with* EN 60079-26:2015
Ex	II 3G Ex ic IIC T4/T5/T6 Gc X (3)	EN 60079-0:2012 + A11:2013 EN 60079-11:2012
Ex	II 3G Ex nA IIC T4/T5/T6 Gc X (3)	EN 60079-0:2012 + A11:2013 EN 60079-15:2010
Ex	II 3D Ex tc IIIC T90 °C Dc X (3)	EN 60079-0:2012 + A11:2013 EN 60079-31:2014

(1), (2) EG-Baumusterprüfbescheinigung BVS 14 ATEX E 035 X von DEKRA EXAM GmbH, D-44809 Bochum (Reg.-Nr. 0158)
EC type examination certificate BVS 14 ATEX E 035 X from DEKRA EXAM GmbH, D-44809 Bochum (Reg. no. 0158)

(3) Interne Fertigungskontrolle, das Zeichen "X" hinter der Zündschutzart weist darauf hin, dass die besonderen Bedingungen für die sichere Anwendung des Produktes in der Betriebsanleitung durch den Anwender zu beachten sind.
Internal control of production, the sign "X" placed after the type of protection indicates that the Special Conditions for Safe Use in the user manual shall be considered by the user.

(4) PS ≥ 200 bar; Modul A, druckhaltendes Ausrüstungsteil
PS ≥ 200 bar; Module A, pressure accessory

Unterzeichnet für und im Namen von / *Signed for and on behalf of*

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 2018-01-26

Fokko Stuke, Director Operations
Electronic Products – Industrial Instrumentation

Steffen Schlesiona, Director Quality Management
Industrial Instrumentation

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www.wika.de

Kommanditgesellschaft: Sitz Klingenberg – Amtsgericht Aschaffenburg HRA 1819
Komplementärin: WIKA Verwaltungs SE & Co. KG – Sitz Klingenberg – Amtsgericht Aschaffenburg HRA 4685

Komplementärin:
WIKA International SE - Sitz Klingenberg - Amtsgericht Aschaffenburg HRB 10505
Vorstand: Alexander Wiegand
Vorsitzender des Aufsichtsrats: Dr. Max Egli

CE

bürkert
FLUID CONTROL SYSTEMS

EU Konformitäts-erklärung	EU Declaration of Conformity	Déclaration UE de Conformité
Originaldokument	Original document	Document original

Hersteller / Manufacturer / Constructeur:

Bürkert Werke GmbH & Co. KG
Werk 10
Christian-Bürkert-Straße 13-17
74653 Ingelfingen
www.burkert.com

Hiermit erklären wir, dass das unten beschriebene Produkt in seiner Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen Harmonisierungsvorschriften der EU entspricht. Die Anhänge, die wesentlicher Bestandteil dieser Erklärung sind, enthalten weitere Angaben zur Einhaltung dieser Richtlinie(n).	We hereby declare that the product described below, in its design and construction as well as in the version that we have placed on the market, is in conformity with the relevant EU harmonization legislation. The annexes, which are an integral part of this declaration of conformity, contain further information about the conformity to this Directive(s).	Nous déclarons par la présente que le produit spécifié ci-dessous, dans son développement et sa fabrication tel que mis sur le marché par nous, est conforme à la législation d'harmonisation de l'UE applicable. Les annexes, qui font partie intégrante de cette déclaration, contiennent des informations supplémentaires sur le respect de la ou des directives.

Typ / Type / Type:

AC10

Produktbezeichnung / Product Description / Appellation d'un produit:

Spule kpl.
Coil
Bobine

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
2014/30/EU - EMV	2014/30/EU - EMC	2014/30/UE - CEM
2014/35/EU - NSR	2014/35/EU - LVD	2014/35/UE - DBT
2011/65/EU - ROHS	2011/65/EU - ROHS	2011/65/UE - ROHS

Bei einer mit Bürkert nicht abgestimmten Änderung des Produktes verliert diese Erklärung ihre Gültigkeit.	If any unauthorized modifications are made to the product, this declaration will loose its validity.	Toute modification non autorisée apportée au produit fait perdre la validité de cette déclaration.
Eine Technische Dokumentation ist vollständig vorhanden. Die zum Produkt gehörende Betriebsanleitung in der Landessprache des Anwenders liegt vor (wenn erforderlich).	A complete technical documentation is available. The operating manual in the local language of the user is present (if necessary).	Une documentation technique com-plète est disponible. Le manuel d'utilisation du produit est présent (si nécessaire) dans la langue locale de l'utilisateur.
Diese Erklärung beinhaltet keine Zusicherung von Eigenschaften.	This declaration does not guarantee any specifications.	Cette déclaration ne garantit pas les spécifications.

Ingelfingen, 21. April 2023

Dieses Dokument wurde digital erstellt und unterschrieben und ist ohne handschriftliche Unterschrift gültig.
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i.A. Michael Baumann
Engineering/Construction/Development

i.A. Marc Schmeißer
Approval Management

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.	This Declaration of Conformity is issued under the sole responsibility of the manufacturer.	Cette déclaration de conformité est émise sous la seule responsabilité du fabricant.

CE

bürkert
FLUID CONTROL SYSTEMS

Anhang ATEX zur EU Konformitätserklärung	Annex ATEX for EU Declaration of Conformity	Annexe ATEX à la Déclaration UE de
Originaldokument	Original document	Document original

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de spécification produit):

AC10-**-*-**** (1)

(1) Variabler Code / Variable code / Variable Code:
Gilt nur in Verbindung mit / Only valid in combination with / Est uniquement valable en lien avec: PX80

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen.	The object of the declaration described above is in conformity with Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/34/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant les appareils et les systèmes de protection destinés à être utilisés en atmosphères explosibles.
Nur gültig in Verbindung mit der EX-Kennzeichnung des Gerätes!	Only valid in combination with the EX-marking of the equipment!	Uniquement valable en liaison avec le marquage EX de l'appareil!
Das Gerät kann eingesetzt werden gemäß den auf dem Typschild und in der Betriebsanleitung angegebenen Daten.	The device can be used in accordance with the data given on the nameplate and in the operating instructions.	Le dispositif peut être utilisé conformément aux indications de la plaque signalétique et dans la notice d'utilisation.
Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden eingehalten.	The protection objectives of the low Voltage Directive 2014/35/EU are complied with.	Les objectifs de sécurité de la Directive Basse Tension 2014/35/UE ont été observés.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60079-31:2014, EN IEC 60079-0:2018, EN IEC 60079-7:2015+A1:2018		

Das genannte Produkt ist bescheinigt durch die Notifizierte Stelle:	The product is certified by the Notified Body:	Le produit est certifié par l'organisme notifié:
Name und Anschrift der Notifizierten Stelle:/ Name and Address of the notified body:/ Nom et adresse de l'organisme notifié:		
Bureau Veritas CPS Germany GmbH Businesspark 86842 Türkheim, Germany		
EU-Baumusterprüfbescheinigung Nr.:	EU Type Examination Certificate No.:	Attestation d'examen UE de type Non.:
EPS 21 ATEX 1 234 X, 05.12.2022		

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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FLUID CONTROL SYSTEMS

Anhang ATEX zur EU Konformitätserklärung	Annex ATEX for EU Declaration of Conformity	Annexe ATEX à la Déclaration UE de
Originaldokument	Original document	Document original

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de spécification produit):

AC10-**-*-**** (1)

(1) Variabler Code / Variable code / Variable Code:
Gilt nur in Verbindung mit / Only valid in combination with / Est uniquement valable en lien avec: PX58 bis PX66

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen.	The object of the declaration described above is in conformity with Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/34/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant les appareils et les systèmes de protection destinés à être utilisés en atmosphères explosibles.
Nur gültig in Verbindung mit der EX-Kennzeichnung des Gerätes!	Only valid in combination with the EX-marking of the equipment!	Uniquement valable en liaison avec le marquage EX de l'appareil!
Das Gerät kann eingesetzt werden gemäß den auf dem Typschild und in der Betriebsanleitung angegebenen Daten.	The device can be used in accordance with the data given on the nameplate and in the operating instructions.	Le dispositif peut être utilisé conformément aux indications de la plaque signalétique et dans la notice d'utilisation.
Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden eingehalten.	The protection objectives of the low Voltage Directive 2014/35/EU are complied with.	Les objectifs de sécurité de la Directive Basse Tension 2014/35/UE ont été observés.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60079-31:2014, EN IEC 60079-0:2018, EN IEC 60079-7:2015+A1:2018, EN 60079-18:2015/A1:2017		

Das genannte Produkt ist bescheinigt durch die Notifizierte Stelle:	The product is certified by the Notified Body:	Le produit est certifié par l'organisme notifié:
Name und Anschrift der Notifizierten Stelle:/ Name and Address of the notified body:/ Nom et adresse de l'organisme notifié:		
Bureau Veritas CPS Germany GmbH Businesspark A9 86842 Türkheim, Germany		
EU-Baumusterprüfbescheinigung Nr.:	EU Type Examination Certificate No.:	Attestation d'examen UE de type Non.:
EPS 18 ATEX 1232 X, 07.11.2019		

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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FLUID CONTROL SYSTEMS

Anhang ATEX zur EU Konformitätserklärung	Annex ATEX for EU Declaration of Conformity	Annexe ATEX à la Déclaration UE de
Originaldokument	Original document	Document original

2014/34/EU - ATEX	2014/34/EU - ATEX	2014/34/UE - ATEX
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de spécification produit):

AC10-**-*-**** (1)

(1) Variabler Code / Variable code / Variable Code:
Gilt nur in Verbindung mit / Only valid in combination with / Est uniquement valable en lien avec: PX52 bis PX55

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen.	The object of the declaration described above is in conformity with Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/34/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant les appareils et les systèmes de protection destinés à être utilisés en atmosphères explosibles.
Nur gültig in Verbindung mit der EX-Kennzeichnung des Gerätes!	Only valid in combination with the EX-marking of the equipment!	Uniquement valable en liaison avec le marquage EX de l'appareil!
Das Gerät kann eingesetzt werden gemäß den auf dem Typschild und in der Betriebsanleitung angegebenen Daten.	The device can be used in accordance with the data given on the nameplate and in the operating instructions.	Le dispositif peut être utilisé conformément aux indications de la plaque signalétique et dans la notice d'utilisation.
Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU wurden eingehalten.	The protection objectives of the low Voltage Directive 2014/35/EU are complied with.	Les objectifs de sécurité de la Directive Basse Tension 2014/35/UE ont été observés.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 60079-11:2012, EN IEC 60079-0:2018		

Das genannte Produkt ist bescheinigt durch die Notifizierte Stelle:	The product is certified by the Notified Body:	Le produit est certifié par l'organisme notifié:
Name und Anschrift der Notifizierten Stelle:/ Name and Address of the notified body:/ Nom et adresse de l'organisme notifié:		
Bureau Veritas CPS Germany GmbH Businesspark A9 86842 Türkheim, Germany		
EU-Baumusterprüfbescheinigung Nr.:	EU Type Examination Certificate No.:	Attestation d'examen UE de type Non.:
EPS 18 ATEX 1 088 X, 18.06.2019		

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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Anhang EMV zur EU Konformitätserklärung	Annex EMC for EU Declaration of Conformity	Annexe CEM à la Déclaration UE de
Originaldokument	Original document	Document original

2014/30/EU - EMV	2014/30/EU - EMC	2014/30/UE - CEM
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

AC10-**-*-****

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit.	The object of the declaration described above is in conformity with Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/30/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant la compatibilité électromagnétique.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar):	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):
EN 61000-6-3:2007+A1:2011, EN 55011:2016+A1:2017, EN 61000-6-1:2007, EN 61000-6-2:2019, EN 61000-6-4:2019		

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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Anhang NSR zur EU Konformitätserklärung	Annex LVD for EU Declaration of Conformity	Annexe DBT à la Déclaration UE de
Originaldokument	Original document	Document original

2014/35/EU - NSR	2014/35/EU - LVD	2014/35/UE - DBT
Reference in the Official Journal of the EU: L 96 dated 29.3.2014		

Typ / Type / Type (Geräteschlüssel / product specification key / clé de produit):

AC10-**-*-****(1)

(1) Spannungsebene / Voltage levels / Niveau de tension [V]:
NSR gilt nur, wenn Spannungsebene ≥ 50 V AC / ≥ 75 V DC und ≤ 1000 V AC / ≤ 1500 V DC
LVD only valid, if voltage level ≥ 50 V AC / ≥ 75 V DC and ≤ 1000 V AC / ≤ 1500 V DC
DBT uniquement pour les niveaux de tensions ≥ 50 V AC / ≥ 75 V DC et ≤ 1000 V AC / ≤ 1500 V DC

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt.	The object of the declaration described above is in conformity with Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.	L'objet de la déclaration décrit ci-dessus est conforme à la directive 2014/35/UE du Parlement européen et du Conseil du 26 février 2014 relative à l'harmonisation des législations des États membres concernant la mise à disposition sur le marché du matériel électrique destiné à être employé dans certaines limites de tension.
Die Richtlinie 2014/33/EU ist nur bei Produkten anzuwenden, die nicht in den Anwendungsbereich der ATEX-Richtlinie fallen.	Directive 2014/33/EU applies only to products that do not fall inside the scope of the ATEX Directive.	La directive 2014/33/UE s'applique uniquement aux produits qui ne relèvent pas de la directive ATEX.

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar): EN 60664-1:2007, DIN VDE 0580:2011	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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Anhang ROHS zur EU Konformitätserklärung	Annex ROHS for EU Declaration of Conformity	Annexe ROHS à la Déclaration UE de
Originaldokument	Original document	Document original

2011/65/EU - ROHS	2011/65/EU - ROHS	2011/65/UE - ROHS
	Reference in the Official Journal of the EU: L 174 dated 07.11.2011	
2017/2102/EU	Reference in the Official Journal of the EU: L 305 dated 21.11.2017	
2015/863/EU	Reference in the Official Journal of the EU: L 137 dated 04.06.2015	

Typ / Type / Type (Geräteschlüssel / product specification key / clé de spécification produit):

AC10-**-*-NNNN

Das oben beschriebene Produkt erfüllt die Vorschriften der Richtlinie 2011/65/EU und deren Ergänzungen 2017/2102/EU und 2015/863/EU. Das Produkt erfüllt die Anforderungen zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten (Liste der beschränkten Stoffe siehe Richtlinien).	The product described above complies with the provisions of Directive 2011/65/EU and its amendments 2017/2102/EU and 2015/863/EU The product complies with the requirements on the restriction of the use of certain hazardous substances in electrical and electronic equipment (for list of restricted substances see Directives).	Le produit décrit ci-dessus est conforme aux dispositions de la directive 2011/65/UE et de ses amendements 2017/2102/UE et 2015/863/UE. Le produit est conforme aux exigences relatives à la limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques (pour la liste des substances restreintes, voir les Directives).

Für die Bewertung wurden folgende Normen herangezogen (wenn anwendbar): EN IEC 63000:2018	For evaluation of the conformity, the following standards were consulted (if applicable):	Pour l'évaluation de la conformité, les normes suivantes ont été utilisées (le cas échéant):

ABD 1000373568 ML Version: I Status: RL (released | freigegeben) printed: 12.10.2023

Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten	The instructions for safety and installation of the enclosed product documentation have to be observed.	Les consignes de sécurité et d'installation décrites dans la documentation fournie avec le produit doivent être respectées.

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EPS 21 ATEX 1 234 X, IECEx EPS 21.0078X/UL E504714

Solenoid coil Type AC10
with cable plug Type 2509 or Type 2513

Device with II 3G/D Ex approval
and Hazardous Locations Zone 2/22 and Class I, II, III Div 2 Listing



c UL us LISTED

Ex

Operating Instructions

MAN 1000556528 EN Version: CStatus: RL (released | freigegeben) printed: 13.04.2023

We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous réserve de modifications techniques.

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Operating Instructions 2304/02_EU-ML_00815422 / Original DE

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1 OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions in a location which is easily accessible to every user, and make them available to every new owner of the device.

Important safety information!

- Carefully read these instructions.
- Above all, observe the safety instructions, intended use and operating conditions.
- People who work on the device must read and understand these instructions.

1.1 Terms and abbreviations

The terms and abbreviations in these instructions represent the following definitions:

Device/system	Type AC10 solenoid in connection with Type 2509 or Type 2513 cable plug
Ex area	Potentially explosive atmosphere
Ex approval	Approval for potentially explosive atmosphere
Hazardous Locations	Explosion protection area USA/CA

1.2 Symbols

The following symbols are used in these instructions.

DANGER!

Warns of an immediate danger.

- Failure to observe these instructions will result in death or serious injuries.

WARNING!

Warns of a potentially hazardous situation.

- Failure to observe these instructions may result in serious injuries or death.

CAUTION!

Warns of a potential danger.

- Failure to observe these instructions may result in moderate or minor injuries.

NOTE!

Warns of damage!

Important tips and recommendations.

Refers to information in these operating instructions or in other documentation.

- Highlights instructions to avoid a danger.

→ Highlights a procedure which you must carry out.

2 INTENDED USE

Improper use of the Type AC10 solenoid may be dangerous to people, nearby equipment and the environment.

The Type AC10 solenoid is used to operate valves that control gaseous or liquid media.

- A valve operated with the Type AC10 solenoid is to be used exclusively with the permissible media specified in the data sheet and for use in explosion group IIC, category 3G and/or explosion group IIIC, category 3D and temperature class T4 (see details on the type label for the Ex area).
- The solenoid may only be used for the applications specified in chapter „5 Operational conditions of the devices“ and in connection with the Type 2509 or Type 2513 cable plugs available from Bürkert.
  Variants with UL listing are only authorised for Type 2509 cable plugs.
- Prerequisites for safe and trouble-free operation of the device are proper transport, storage and installation as well as careful operation and maintenance. Any other or additional use is not considered part of the **intended use**. Bürkert will not be liable for any damage resulting from this. The user alone bears the risk.
- Only use the device as intended.

2.1 Ex approval

The explosion protect approval is only valid if you use the modules and components authorised by Bürkert as described in these operating instructions. The Type AC10 solenoid with Type 2509 or Type 2513 cable plug may be used only in combination with the additional components approved by Bürkert, otherwise the explosion protection approval is terminated. In the event of unauthorised changes to the device, modules or components, the explosion protection approval is also void. The EU type approval test certificate and the following IECEx certificates have been issued by:

Bureau Veritas
Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim

Type AC10 solenoid with Type 2509 or Type 2513 cable plug	EPS 21 ATEX 1 234 X II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T135°C Dc IECEX EPS 21.0078X Ex ec IIC T4 Gc Ex tc IIIC T135°C Dc

Production will be audited by:

CE 102
PTB (Physikalisch Technische Bundesanstalt - German Federal Metrology Institute)
Bundesallee 100
38116 Braunschweig, Germany

You can find the EU type approval test certificate online at:
country.burkert.com

2.2 UL approval

The UL approval is only valid if you use the modules and components authorised by Bürkert as described in these operating instructions. The Type AC10 solenoid with Type 2509 cable plug may be used only in combination with the additional components approved by Bürkert, otherwise the UL approval will be terminated. In the event of unauthorised changes to the device, modules or components, the UL approval is also void.

The UL certificate was issued by:

UL LLC 333 Pfingsten Road Northbrook IL 60062-2096 USA

Type AC10 solenoid with Type 2509 cable plug	E504714

Production will be audited by:

UL LLC 333 Pfingsten Road Northbrook IL 60062-2096 USA

2.3 Applied Standards for Hazardous Locations Zone 2/22 and Class I, II, III Div. 2 Listing

USL - U.S. Listed certification in accordance with UL 429 and

UL 60079-0	EXPLOSIVE ATMOSPHERES - PART 0: EQUIPMENT - GENERAL REQUIREMENTS	Edition 7 - Revision Date 04/15/2020
UL 60079-7	STANDARD FOR EXPLOSIVE ATMOSPHERES - PART 7: EQUIPMENT PROTECTION BY INCREASED SAFETY ‘‘E’’	Edition 5 - Revision Date 2017/04/21
UL 60079-31	EXPLOSIVE ATMOSPHERES - PART 31: EQUIPMENT DUST IGNITION PROTECTION BY ENCLOSURE “T”	Edition 2 - Issue Date 2015/06/12

CNL - Canada Listed certification in accordance with CSA C22.2 NO. 139 and

CSA C22.2 No 60079-0	EXPLOSIVE ATMOSPHERES - PART 0: EQUIPMENT - GENERAL REQUIREMENTS	Edition 4 – Issue Date 02/2019
CSA C22.2 No 60079-7	STANDARD FOR EXPLOSIVE ATMOSPHERES - PART 7: EQUIPMENT PROTECTION BY INCREASED SAFETY ''E''	Edition 2 - Issue Date 2016/10/01
CSA C22.2 No 60079-31	EXPLOSIVE ATMOSPHERES - PART 31: EQUIPMENT DUST IGNITION PROTECTION BY ENCLOSURE "T"	Edition 2 - Issue Date 2015/10/01

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not take into account any unforeseen circumstances and events which occur during installation, operation and maintenance.

The operator is responsible for observing the location-specific safety regulations, also with reference to personnel.

Risk of injury due to high pressure in the system or device.

- Before working on the system or device, switch off the pressure and ventilate or empty the lines.

Risk of injury due to electric shock.

- Before working on the system or device, switch off the power supply and secure against reactivation.
- Observe the applicable accident prevention and safety regulations for electrical devices.

Risk of burns or fire from hot device surfaces due to prolonged operation.

The solenoid can become very hot during continuous operation.

- Keep the device away from highly flammable substances and media and do not touch with bare hands.

Risk of explosion.

Solenoids and valve bodies form a closed system after installation. When used in a potentially explosive atmosphere, there is a risk of explosion when the system is opened while in operation.

- Do not dismantle or open the system during operation.

Risk of explosion due to electrostatic discharge.

If there is a sudden discharge of electrostatically charged devices or people, there is a risk of explosion in the Ex area.

- Use suitable measures to ensure that electrostatic charges cannot occur in the Ex area.
- The device must not be used in areas with processes that generate heavy charges, involve automated grinding or cutting, the spraying of electrons (e.g. near electrostatic painting equipment) or generate pneumatically propelled dust.
- Clean the device surface by gently wiping it with a damp or anti-static cloth only.

To avoid the risk of explosions, the following must be observed in the Ex area:

- Information about temperature class, ambient temperature, degree of protection and voltage on the type label for the Ex area.
- Installation, operation and maintenance may only be performed by qualified personnel.
- Observe applicable safety regulations (as well as national safety regulations), as well as the general rules for the technology during setup and operation.
- Repairs may only be carried out by the manufacturer.
- Do not subject the device to mechanical and/or thermal stresses which exceed the limits described in the operating instructions.
- Do not disconnect connector while circuit is live.

General hazardous situations.

To prevent injuries, observe the following:

- Secure the device or system against unintentional activation.
- Note the flow direction when installing.
- Following an interruption in the power supply, ensure that the process is restarted in a controlled manner.
- Do not use the device as a lever when screwing the valve into the line.

4 GENERAL NOTES

4.1 Contact addresses

Germany

Bürkert Fluid Control Systems
Sales Centre
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
E-mail: info@buerkert.com

International

The contact addresses can be found on the back pages of the printed operating instructions.

They are also available online at: country.burkert.com

4.2 Warranty

A precondition for the warranty is that the Type AC10 solenoid is used as intended in consideration of the specified application conditions.

4.3 Information on the Internet

Operating instructions and data sheets for Bürkert products can be found online at: country.burkert.com

5 OPERATIONAL CONDITIONS OF THE DEVICES

5.1 Special conditions

- Only use the device in an area which has pollution degree 2 at least, as defined in IEC 60664-1.
- Ensure that the transient protection has been set to a value which does not exceed 140% of the rated peak voltage value on the supply connections of the device.
- Use the device only in a mounting position that is not subject to mechanical stress.

Installation advice

The information for the authorised ambient temperature concerns the single installation of the solenoids. If multiple solenoids are installed in one valve block:

- Prevent mutual heating by using a suitable distance.

WARNING!

Hazard due to electrostatic discharge.

If there is a sudden discharge of electrostatically charged devices or people, there is a risk of explosion in the Ex area.

- Use suitable measures to ensure that electrostatic charges cannot occur in the Ex area.
- The device must not be used in areas with processes that generate heavy charges, involve automated grinding or cutting, the spraying of electrons (e.g. near electrostatic painting equipment) or generate pneumatically propelled dust.
- Clean the device surface by gently wiping it with a **damp** or **anti-static cloth** only.

5.2 Operating conditions

The valve fulfils a cooling function for the solenoid.
The solenoid must not be operated without a valve. The valve body must meet the following prerequisites:

- Material
  Metal (brass, aluminium, stainless steel) or polyamide
- Minimum dimensions
  32 mm x 32 mm x 10 mm

A larger valve body with better thermal conductivity may be used at any time.

Solenoids intended for single installation must not be used for block installation.

5.3 Operating temperature range

Pay attention to the operating temperature range for each type listed in the electrical data.

6 TECHNICAL DATA

6.1 Safety instructions

DANGER!

Risk of explosion.

If the technical safety information and values listed on the type label are not observed and complied with, dangerous situations could occur.

- Observe the degree of protection and temperature class for operating the device.

Exceeding the voltage stated on the type label is a technical safety risk that can cause the device to overheat.

- Do not connect the device to voltage higher than the one specified on the type label.

6.2 Standards and directives

The device complies with the relevant EU harmonisation legislation. In addition, the device also complies with the requirements of the laws of the United Kingdom.

The harmonised standards that have been applied for the conformity assessment procedure are listed in the current version of the EU Declaration of Conformity/UK Declaration of Conformity.

6.3 Type label for Ex area

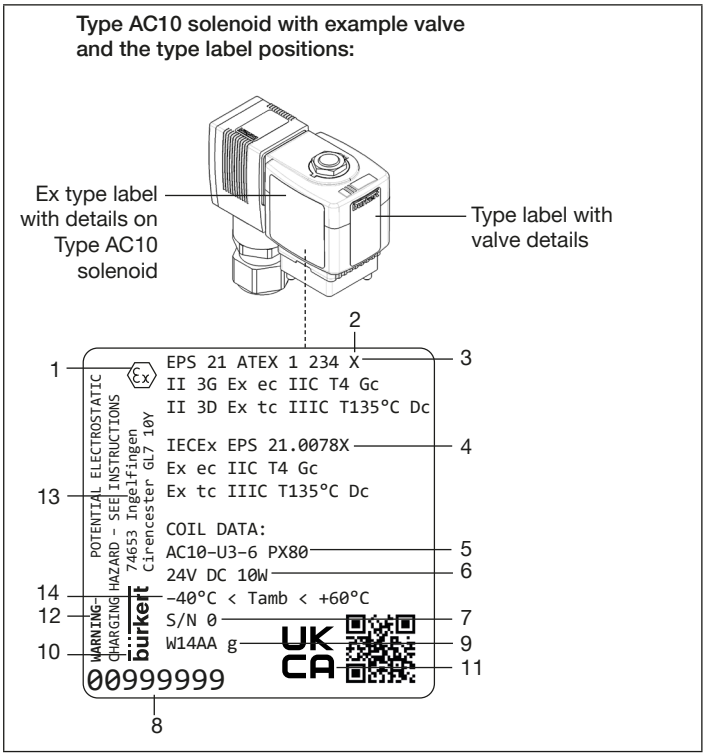
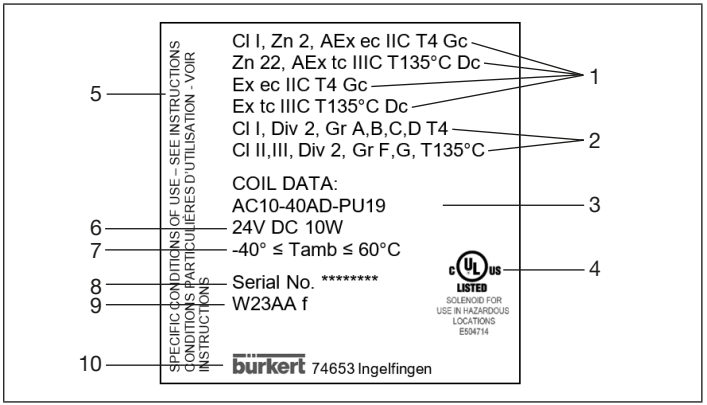


Fig. 1: Location and description of the Ex type label

Item	Description	Details
1	Ex logo	
2	Information on special operating conditions	X
3	ATEX, identification of the Ex protection for the solenoid	EPS 21 ATEX 1 234 X II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T135°C Dc
4	IECEx, identification of the Ex protection for the solenoid	IECEx EPS 21.0078X Ex ec IIC T4 Gc Ex tc IIIC T135°C Dc
5	Type designation	AC10-U3-6 PX80
6	Nominal voltage, nominal power	24V DC 10W
7	Serial number	S/N 0
8	ID number	00999999
9	Date of manufacture	W14AA
10	Manufacturer's logo	
11	UKCA logo	
12	Warning	
13	Address	
14	Ambient temperature	–40°C <Tamb < +60°C

Tab. 1: Description of the Ex type label details

6.4 Type label for the USA/CA Hazardous Locations area



Item	Description	Details
1	Ex labelling in accordance with zone concept (US and CA separately)	Cl I, Zn 2, AEx ec IIC T4 Gc Zn 22, AEx tc IIIC T135°C Dc Ex ec IIC T4 Gc Ex tc IIIC T135°C Dc
2	Ex labelling in accordance with division concept (US and CA together)	Cl I, Div 2, Gr A,B,C,D T4 Cl II,III, Div 2, Gr F,G, T135°C
3	Type code (abbreviated)	AC10-40AD-PU19
4	Certificate issuer's label	
5	Reference to operating instructions re. "Special operating conditions" (EN and FR)	
6	Nominal data (voltage, frequency, output)	24V DC 10W
7	Ambient temperature	-40° ≤ Tamb ≤ 60°C
8	Serial number	Serial No. ********
9	Key for producing plant, date of manufacture, materials	W23AA f
10	Manufacturer's logo and address details	

Tab. 2: Description of type label details for USA/CA Hazardous Locations area

6.5 Electrical data for solenoids

Code	Structural width [mm]	Temperature class	Ambient temperature range [°C]	Nominal voltage [V]	Nominal power [W]
PX80	40	T4	–40...+60	12/24	2...10

7 INSTALLATION AND DISASSEMBLY

DANGER!

Risk of injury due to high pressure in the system or device.

- Before working on the system or device, switch off the pressure and ventilate or empty the lines.

Risk of injury due to electric shock.

- Before working on the system or device, switch off the power supply and secure against reactivation.
- Observe the applicable accident prevention and safety regulations for electrical devices.

Risk of burns or fire from hot device surfaces due to prolonged operation.

- Keep the device away from highly flammable substances and media and do not touch with bare hands.

Danger of short circuit due to damaged connection cables.

- Solenoid connection cables must be attached firmly and protected from damage.

Risk of explosion.

Solenoids and valve bodies form a closed system after installation. When used in a potentially explosive atmosphere, there is a risk of explosion when the system is opened while in operation.

- Do not dismantle or open the system during operation.
- Before connecting the cable plug ensure that all contacts as well as the terminal room are clean and dry.

DANGER!

Risk of explosion due to electrostatic discharge.

If there is a sudden discharge of electrostatically charged devices or people, there is a risk of explosion in the Ex area.

- Use suitable measures to ensure that electrostatic charges cannot occur in the Ex area.
- The device must not be used in areas with processes that generate heavy charges, involve automated grinding or cutting, the spraying of electrons (e.g. near electrostatic painting equipment) or generate pneumatically propelled dust.
- Clean the surface of the solenoid valve by gently wiping it with a damp or anti-static cloth only.

WARNING!

Risk of injury due to improper installation.

- Installation may be carried out by trained technicians only with the appropriate tools.
- Secure the system against unintentional activation.
- Ensure a controlled restart after installation.

7.1 Installing the cable plug

An exact description of the installation can be found in the operating instructions for the cable plug attached to each cable plug and/or online at: country.burkert.com via searching for 2509 or 2513.

Type of Approval	Applicable Manual of Cable Plug
ATEX + IECEx	Type 2513 or 2509
ATEX + IECEx + UL Haz Loc	Type 2509

7.2 Electrical connection

DANGER!

Risk of injury due to electric shock.

- Before reaching into the system, switch off the power supply and secure against reactivation.
- Observe the applicable accident prevention and safety regulations for electrical devices.

If there is no electrical contact between the metal valve components and the protective conductor of the solenoid, there is a risk of electric shock.

- Always connect the protective conductor.
- Check electrical continuity between the protective conductor of the solenoid and the core guide tube of the valve.

7.3 Disassembly

DANGER!

Risk of injury due to high pressure in the system or device.

- Before working on the system or device, switch off the pressure and ventilate or empty the lines.

Risk of injury due to electric shock.

- Before working on the system or device, switch off the power supply and secure against reactivation.
- Observe the applicable accident prevention and safety regulations for electrical devices.

WARNING!

Risk of injury due to improper disassembly.

- Disassembly must be performed only by trained personnel using suitable tools.

Risk of injury due to medium leaking out of loose connections.

- Carefully seal connection lines.

→ Disconnect electrical connection.

→ Disconnect valve body from the pipeline.

8 START-UP

WARNING!

Risk of injury due to improper operation.

Improper operation may result in injuries as well as damage to the device and the area around it.

- Before start-up, ensure that the operating personnel are aware of and have completely understood the contents of the operating instructions.
- The safety instructions must be followed and the device used only as intended.
- Only adequately trained personnel may start up the system or device.

Before start-up, ensure that

→ the device is installed according to regulations,

→ the connection has been properly made,

→ the device is not damaged,

→ all screws have been tightened.

9 MAINTENANCE, REPAIRS, TROUBLESHOOTING

9.1 Maintenance

The Type AC10 solenoid is maintenance-free if the operating conditions described in the instructions are observed.

9.2 Repair

DANGER!

Risk of injury due to improper repair.

The safety and function of the Type AC10 solenoid and the accompanying solenoid valve can only be guaranteed after a repair if the repairs were done by the manufacturer.

- **Only** have the device repaired by the manufacturer.

9.3 Troubleshooting

In the case of malfunction, ensure that

→ the device is installed according to regulations,

→ the connection has been properly made,

→ the device is not damaged,

→ voltage and pressure have been applied,

→ the pipelines are free,

→ all screws have been tightened.

10 TRANSPORT, STORAGE, PACKAGING

NOTE!

Transport damage.

Inadequately protected devices may be damaged during transport.

- Use shock-resistant packaging to protect the device against moisture and dirt during transport.
- Avoid exceeding or falling below the permitted storage temperature.

Incorrect storage may damage the device.

Permitted storage temperature –40 … +60 °C.

- Store the device in a dry and dust-free location.

Environmentally friendly disposal



- Follow national regulations regarding disposal and the environment.
- Collect electrical and electronic devices separately and dispose of them as special waste.

Further information country.burkert.com.

bürkert
FLUID CONTROL SYSTEMS

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DATA SHEET

Type 6518

bürkert
FLUID CONTROL SYSTEMS









Servo-assisted 3/2-way Solenoid Valve for pneumatics

- High flow-rate capacity
- Reduced power consumption
- Single or manifold mounting
- Standard, Ex mb, Ex eb mb and Ex ia versions
- Threaded port G ¼" and NPT ¼"

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with



Type 2507 ▸
Cable plug, form B according to industry standard



Type 2516 ▸
Cable plug, form C according to DIN EN 175301-803



Type 2518 ▸
Cable plug, form A according to DIN EN 175301-803



Type 2030 ▸
Pneumatically operated 2/2-way diaphragm valve CLASSIC with plastic valve body



Type 1087 ▸
Timer, form A according to DIN EN 175301-803

Type description

The Type 6518 is a servo-assisted 3/2-way valve and the Type 6519 is a 5/2 or 5/3-way valve. Together, they form a product line. The valves can be used individually or in blocks. The valves work without a continuous air consumption and are used for the pneumatic control of double or single-acting actuators. The use of high quality materials makes it possible to use these valves in the open air and under chemical atmospheres. The product line contains units with Ex-Approvals and NAMUR flange interface. Valves with circuit function C, D and H monostable are certified acc. IEC 61508 as SIL2.

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Visit product website ▸

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1. General technical data

Product properties	
Dimensions	Detailed information can be found in chapter “5. Dimensions” on page 7.
Material	
Body	Polyamide, reinforced glass-fibre
Threaded bushing	Brass (stainless steel on request)
Seal	NBR and PUR
Manual override	Standard
Nominal diameter	DN 8
Performance data	
Switching time [1.)]	
Opening	Pressure build-up 0…10 %
Closing	Pressure reduction 100…90 %
Compressed air quality	ISO 8573-1:2010, class 7.4.4 [2.)]
Nominal operating mode	100 % continuous operation
Medium data	
Operating medium	Neutral medium, e.g. lubricated or non-lubricated compressed air
Process/Port connection & communication	
Pneumatic connection	Supply ports 1, 3, 5: Threaded G ¼, NPT ¼ Working ports 2, 4: Threaded G ¼, NPT ¼
Electrical connection	Plug form A acc. to DIN EN 175301-803 Plug form B acc. to DIN EN 175301-803 Plug form C acc. to DIN EN 175301-803
Product accessories	
Cable plug Type 2518 – form A (standard)	Detailed information can be found in chapter “Cable plug Type 2518, form A according to DIN EN 175301-803” on page 19.
Cable plug Type 2507 – form B (standard)	Detailed information can be found in chapter “Cable plug Type 2507, form B according to industry standard” on page 20.
Cable plug Type 2516 – form C (standard)	Detailed information can be found in chapter “Cable plug Type 2516, form C according to DIN EN 175301-803” on page 20.
Cable plug Type 2513 – form A for the EX area cat. 3	Detailed information can be found in chapter “Cable plug Type 2513, form A according to DIN EN 175301-803” on page 19.
Approvals and certificates	
Degree of protection	IP65 with cable plug
Environment and installation	
Installation position	Any, preferably actuator face up

1.) Measurement at 6 bar and +20 °C at the valve outlet

2.) To prevent freezing of the expanded compressed air, the pressure dew point must be at least 10 K lower than the temperature of the medium.

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2. Product versions

2.1. Standard version





Note:
For general technical data, see **"1. General technical data" on page 3**.

Type 6518 is a pilot operated 3/2-way valve (normally closed or open). The valve width of 32 mm allows high flow rates. The valves can be used individually or in blocks.

Product properties	Coil size 24.5 mm	Coil size 32 mm
Switching time		
Opening	20 ms	20 ms
Closing	40 ms	40 ms
Weight	212 g	384 g
Electrical data		
Operating voltage	24 V DC	24 V DC 24/ 110/ 230 V/ 50…60 Hz
Power consumption		
Inrush	–	AC: 11 VA AC: 6/2 VA/W
Hold	DC: 1.7 W	DC: 2 W
Medium data		
Medium temperature	-10 °C…+55 °C	-10 °C…+55 °C
Process/Port connection & communication		
Electrical connection	Plug form B acc. to DIN EN 175301-803 Plug form C acc. to DIN EN 175301-803	Plug form A acc. to DIN EN 175301-803
Environment and installation		
Ambient temperature	-25 °C…+55 °C	-25 °C…+55 °C

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2.2. Ex mb- und Ex eb mb version





Note:

- Ex mb (with moulded cable) or Ex eb mb (with terminal box)
- The maximum medium temperature may never exceed the permissible temperature class (T4 135 °C, T5 100 °C, T6 85 °C) minus 5K.

The approval Ex m is achieved by the mounting of an approved push-over coil. The cable connection and the cable are non-detachable and sealed together with the valve. The valves can be used individually or in blocks.

Product properties	
Switching time	
Opening	20 ms
Closing	50 ms
Weight	600 g
Electrical data	
Operating voltage	24/ 110/ 230 V/UC
Voltage tolerance	+10 %
Medium data	
Medium temperature	-10 °C…+55 °C
Process/Port connection & communication	
Electrical connection	3 m cable, moulded Terminal box (without fuse)
Approvals and certificates	
Ignition protection class (ATEX and IECEx)	
Coil with cable	EPS 18 ATEX 1232 X / IECEx EPS 18.0110X II 2G Ex mb IIC T5 Gb II 2D Ex mb IIIC T95 °C Db
Coil with terminal box	EPS 18 ATEX 1232 X / IECEx EPS 18.0110X II 2G Ex eb mb IIC T5 Gb II 2D Ex mb tb IIIC T95 °C Db
Environment and installation	
Ambient temperature	-25 °C…+50 °C

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2.3. Ex i version



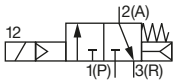
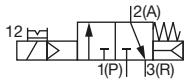
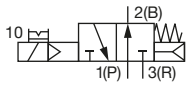
Note:

- The maximum medium temperature may never exceed the permissible temperature class (T4 135 °C, T5 100 °C, T6 85 °C) minus 5K.
- The units may only be used in potentially explosive atmospheres in the manner approved by the admission board, i.e. the permissible maximum electrical values must be observed.
- The valve is intended for operation on 24 V DC outputs via the intermediate switching of a corresponding intrinsically-safe operating resource (isolating module or barrier).

The intrinsically-safe Type 6518 Ex i valve consist of an intrinsically-safe pilot control and a pneumatic amplifier. The diaphragm-controlled valve seats work with very low friction, ensuring reliable switching of the valve, even after long shut-down periods.

Product properties		
Switching time		
Opening	75 ms	
Closing	115 ms	
Weight	580 g	
Electrical data		
Function values for switching function valve	**At +20 °C**	**At +55 °C**
Minimum switching current	29 mA	29 mA
Nominal resistance coil	310 Ω	360 Ω
Minimum terminal voltage	9.0 V	10.4 V
Conformity specifications		
Ui	35 V	
Ii	0.9 A	
Pi	1.1 W	
Medium data		
Medium temperature	-10 °C...+55 °C	
Process/Port connection & communication		
Electrical connection	Cable plug Type 2518, form A acc. to DIN EN 175301-803. Detailed information can be found in chapter **"Cable plug Type 2518, form A according to DIN EN 175301-803" on page 19**.	
Approvals and certificates		
Approvals	EPS 18 ATEX 1 088 / IECEx EPS 18.0038 X II 2G Ex ia IIC T6 Gb II 2D Ex ia IIIC T135 °C Db	
Environment and installation		
Ambient temperature	-25 °C...+55 °C	

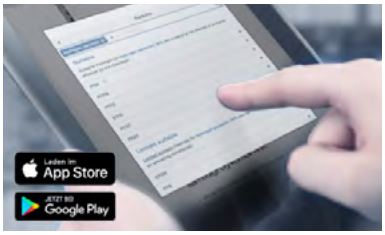
3. Circuit functions

Circuit functions	Description
	**Circuit function C (CF C)** 3/2-way solenoid valve Servo-controlled Normally closed
	**Circuit function C (CF C)** 3/2-way solenoid valve Servo-controlled, with manual override Normally closed
	**Circuit function D (CF D)** 3/2-way solenoid valve Servo-controlled, with manual override Normally open

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4. Materials

4.1. Bürkert resistApp



Bürkert resistApp – Chemical Resistance Chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

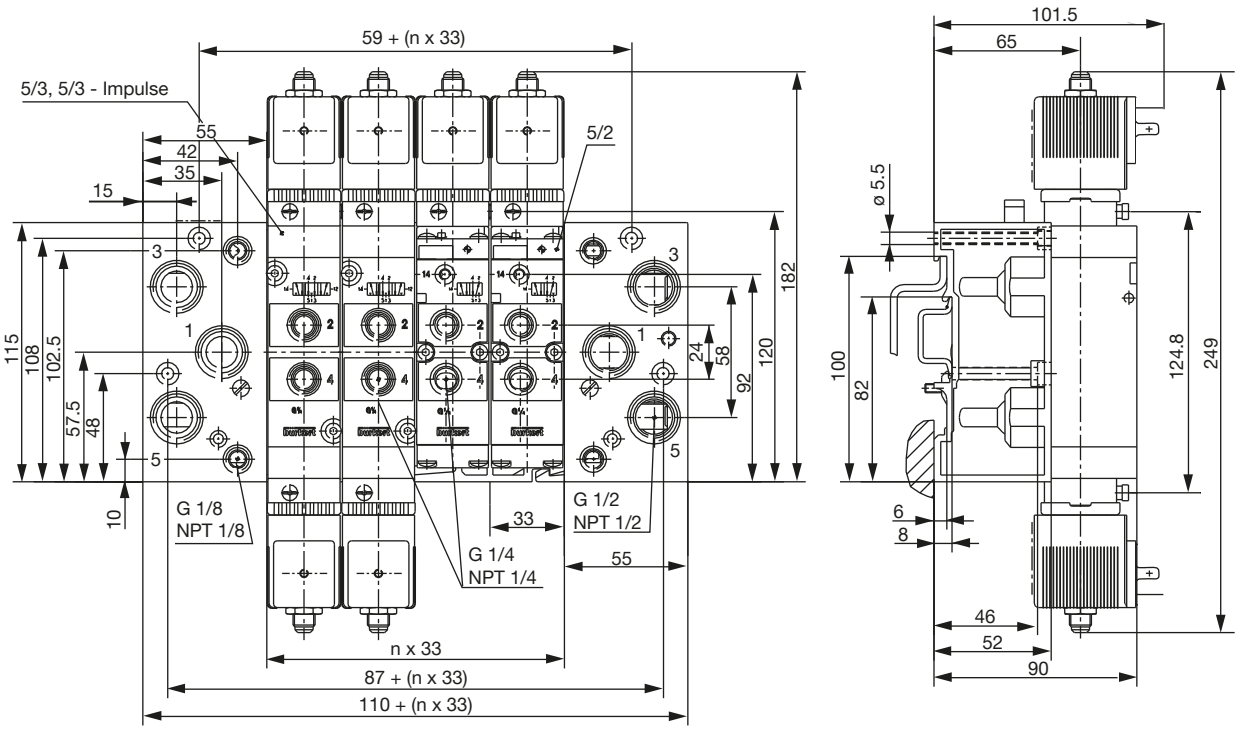
Start Chemical Resistance Check

5. Dimensions

5.1. Pneumatic module Type MP07

Note:

- Dimensions in mm
- n = no. of valves, maximum 12
- Block mounting on wall or with DIN rail 50022 or 50023
- Valve mounting on the pneumatic modules Type MP07 by means of included M4 screws

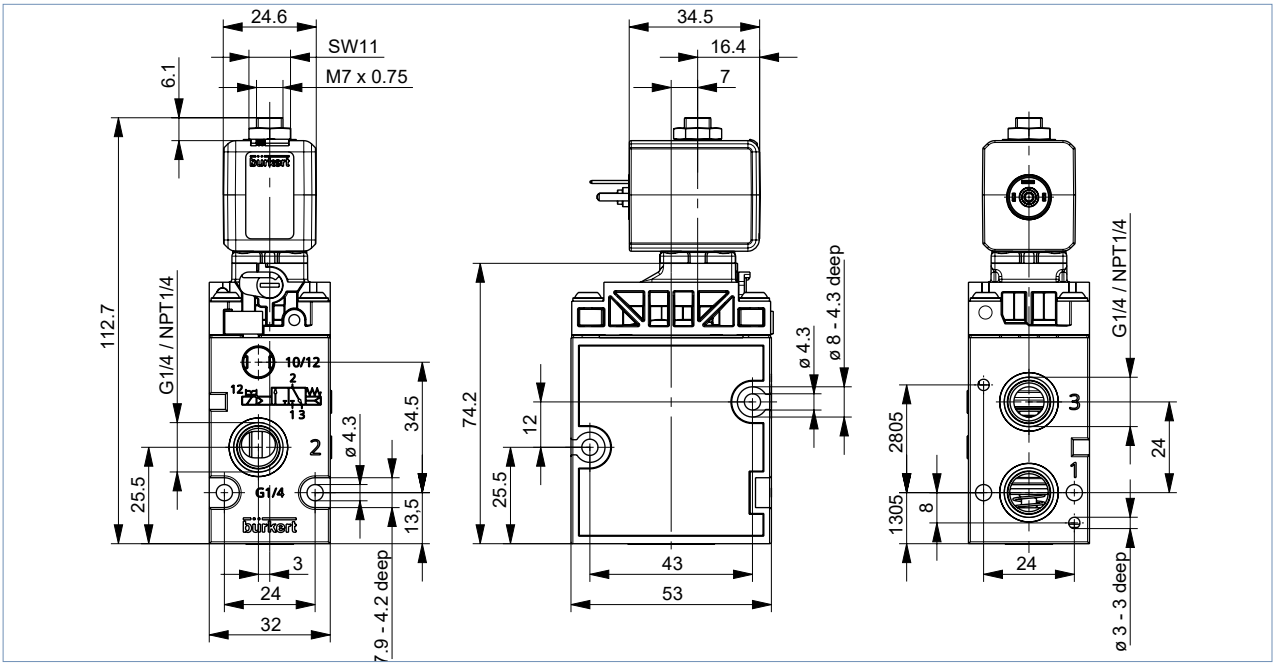


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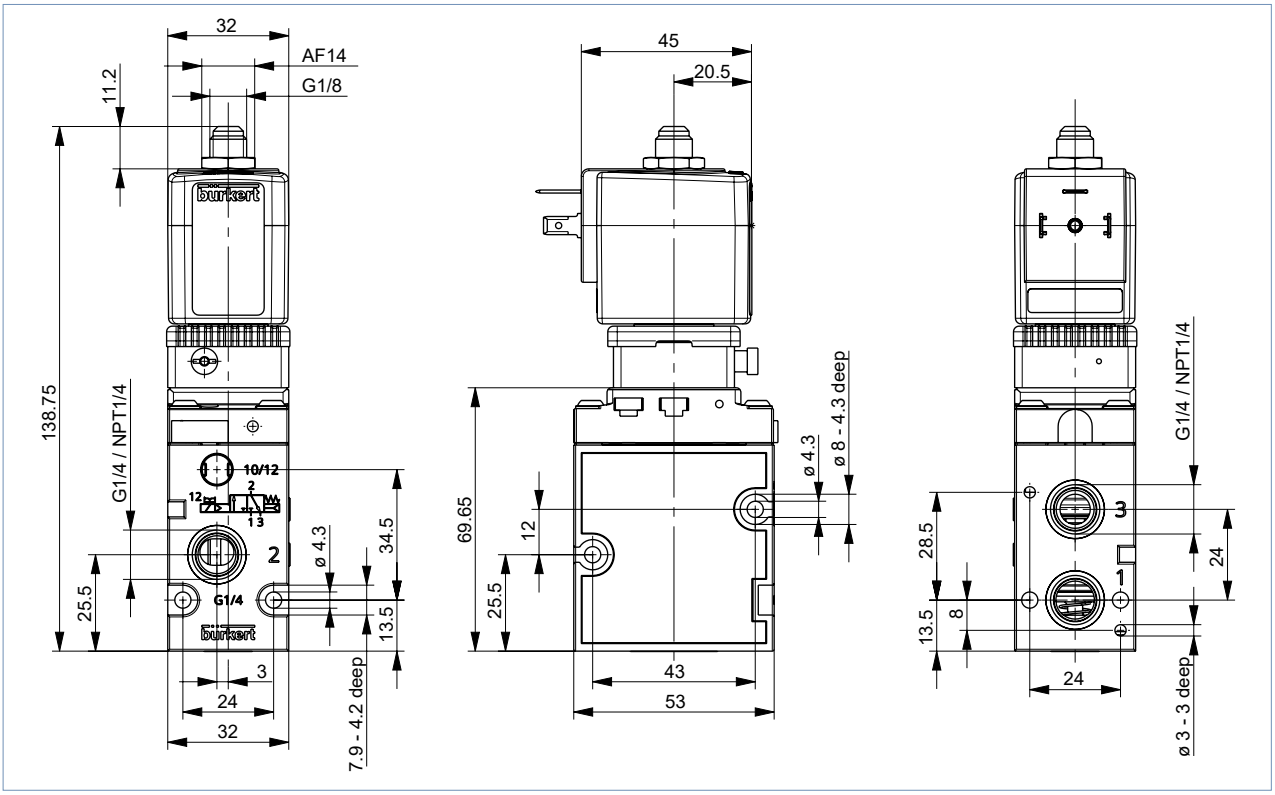
5.2. Standard version 3/2-way valve, circuit function C and D

Note:
Dimensions in mm

With plug form B or C



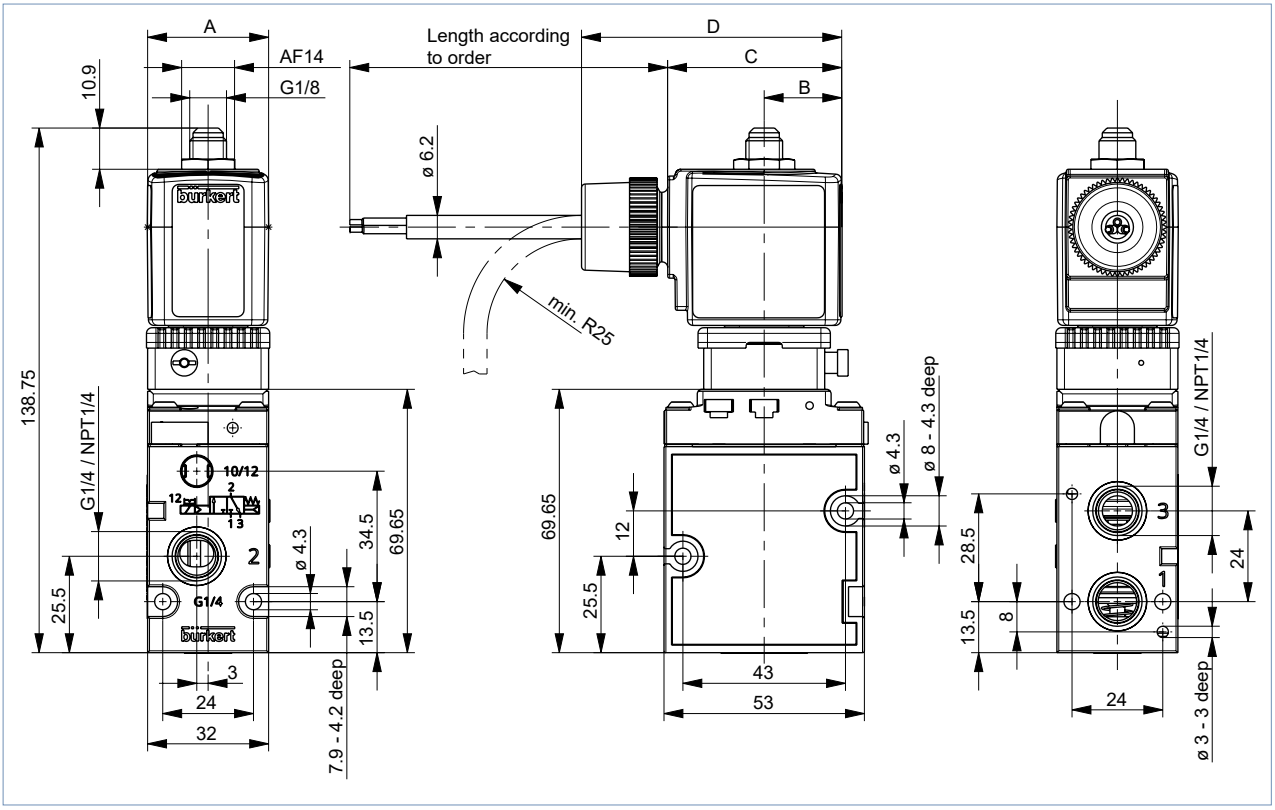
With plug form A



5.3. Ex mb-/eb mb- version 3/2-way valve, circuit function C and D

With moulded cable (3 m long) (Ex mb)

Note:
Dimensions in mm



With terminal box (Ex eb mb)

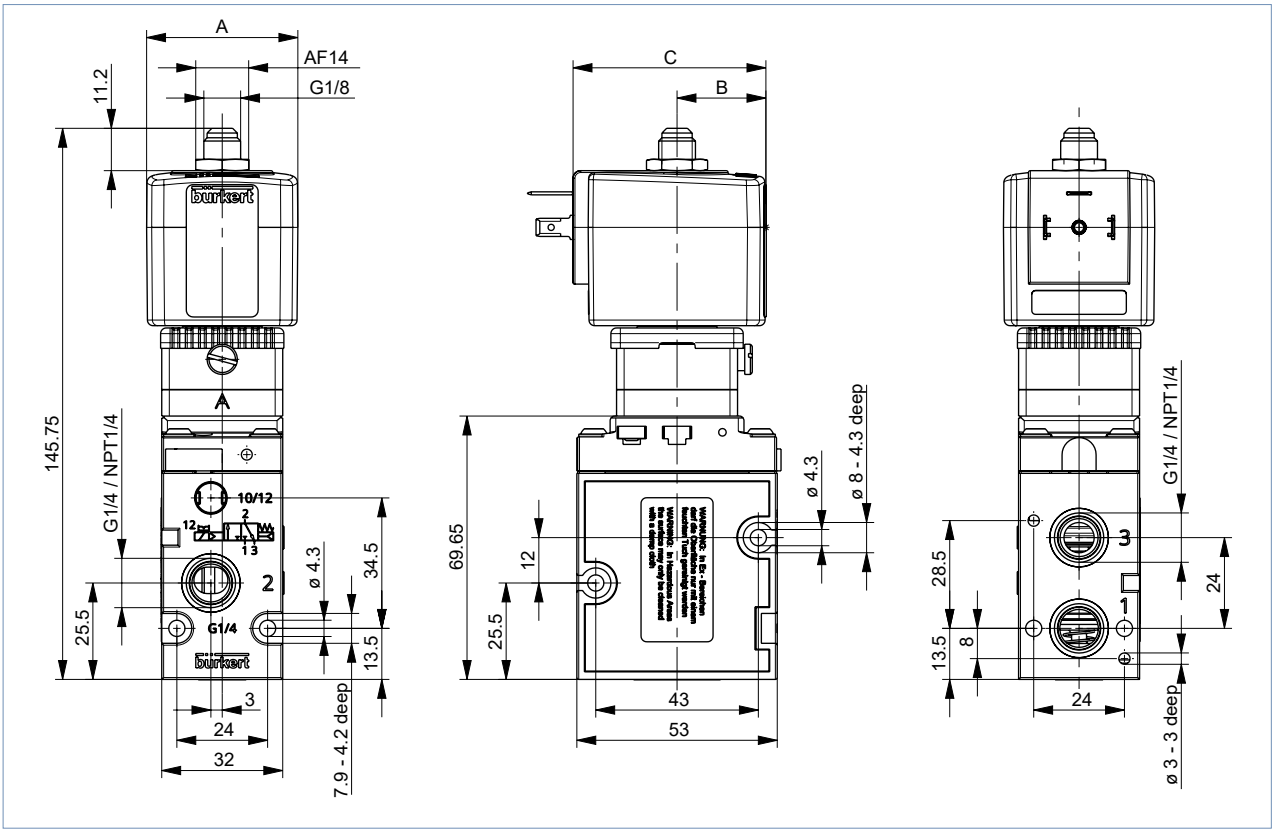
Note:

- The dimensions of the housing are identical to the version with molded cable.
- For the coil dimensions, see chapter **"5.5. ATEX version cable coil and terminal box" on page 11**.

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5.4. Ex i version 3/2-way valve, circuit function C

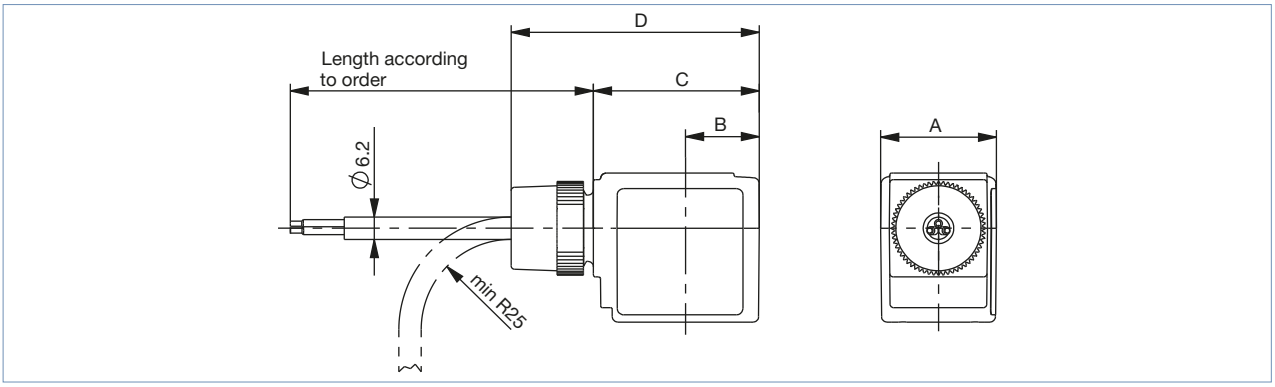
Note:
Dimensions in mm

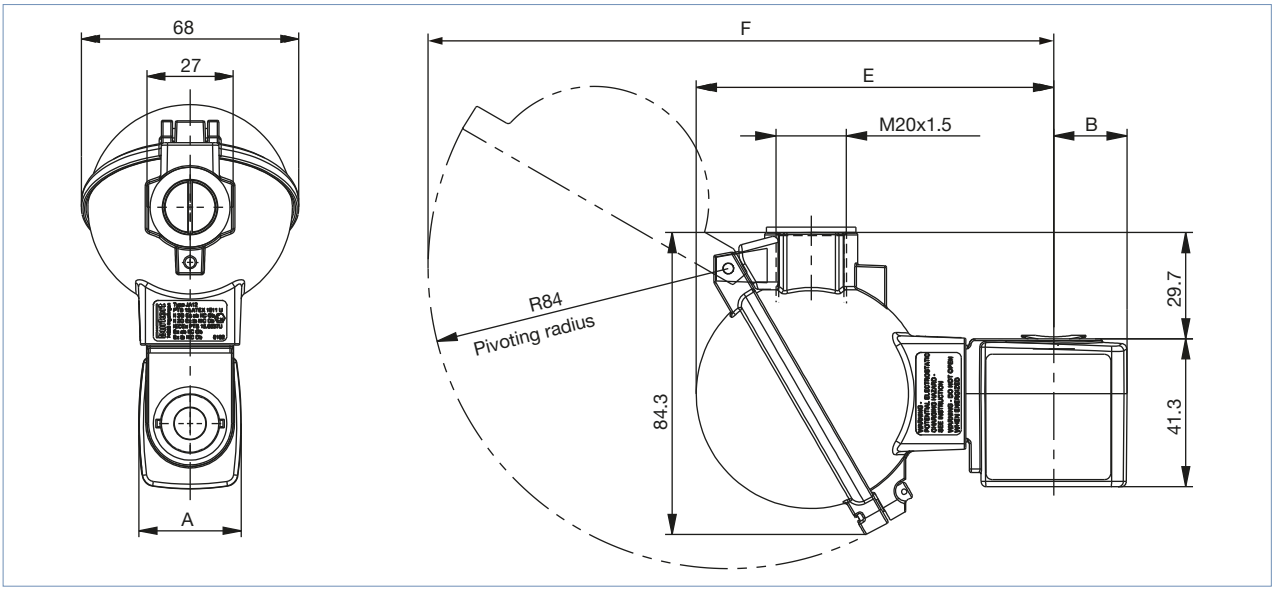


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5.5. ATEX version cable coil and terminal box

Note:
Dimensions in mm





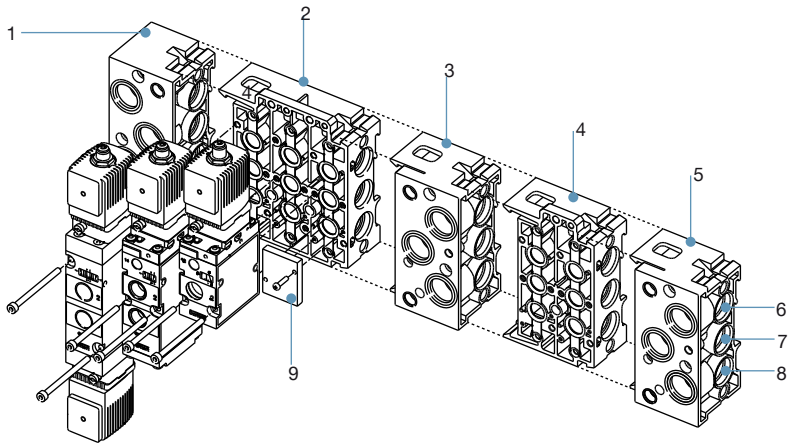
Coil size	A	B	C	D	E	F
5	32	20.5	46	66.8	99.8	174.7
6	40	23.5	52	74.8	102.8	177.7

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6. Product design and assembly

6.1. Block construction

Note:
Single modules or pre-mounted blocks are available.



No.	Element
1	Connector module left
2	Basic module 3-fold
3	intermediate supply module: supply channel pushed through for additional pressure supply or Connector module, right: supply channel closed off, there by several operational pressures possible in a single block
4	Basic module 2-fold
5	Connector module right
6	Supply port: 3(R)
7	Supply port: 1(P)
8	Supply port: 5(S)
9	Covering plate for 3/2-way valve (to cover unused connections)

Note:
Valves with Ex i coil or Ex versions with terminal boxes are not suitable for block mounting.

Ordering example Type 6518 with pneumatic module Type MP07		
Unit	**Version**	**Article no.**
1	Connector module right, G ½	635331
1	Basic module 2-fold universal (for 3/2-, 5/2- and 5/3-way)	635319
1	Basic module 3-fold universal (for 3/2-, 5/2- and 5/3-way)	635343
1	Connector module left, G ½	635324
5	Valves 6518	132475

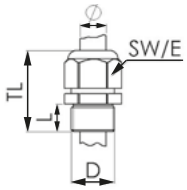
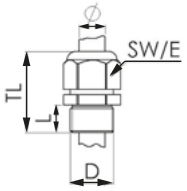
Version	**Article no.**
Connector module right, G ½	635331
Intermediate supply module	637505
Basic module 2-fold universal (for 3/2-, 5/2- and 5/3-way)	635319
Basic module 3-fold universal (for 3/2-, 5/2- and 5/3-way)	635343
Connector module left, G ½	635324
Covering plate for 5/2-way and 5/3-way (to cover unused valve positions)	635335
Covering plate for 3/2-way (to cover unused connections)	635337

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7. Product accessories

7.1. Cable glands for ATEX/IECEx terminal box

Note:
A cable gland in polyamide version is included in the delivery. A nickel-plated brass version can be ordered at a surcharge, see **"Cable glands for ATEX/IECEx terminal box" on page 21**.

Description	Ex approvals		Dimensions	
	Certification	Identification		
Ex cable gland, Brass, nickel-plated, 6…13 mm 	PTB 04 ATEX 1112 X, IECEx PTB 13.0027X	II 2 G Ex e IIC Gb, II 2 D Ex tb IIIC Db IP68		TL 29…37 mm L 6 mm D 20 mm SW 24 mm E 27 mm
Ex cable gland, Polyamide, 7…13 mm 	PTB 13 ATEX 1015 X, IECEx PTB 13.0034X	II 2 G Ex e IIC Gb, II 2 D Ex tb IIIC Db IP68		TL 36…45 mm L 10 mm D 20 mm SW 24 mm E 28 mm

7.2. Special tool to turn the terminal box

Note:
This special tool is not supplied with the valve, see**"Cable glands for ATEX/IECEx terminal box" on page 21**.

Description	Components of the set
Set SC02-AC10 	• Special wrench • Service manual

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8. Ordering information

8.1. Bürkert eShop



Bürkert eShop – Easy ordering and fast delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

Order online now

8.2. Bürkert product filter



Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements? Use the Bürkert product filter and find suitable articles for your application quickly and easily.

Try out our product filter

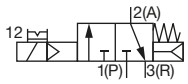
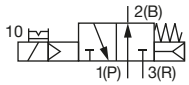
DTS 1000011064 EN Version: F Status: RL (released | freigegeben | validé) printed: 11.09.2023

8.3. Ordering chart standard version

With plug form A

Note:

- Please note that the cable plug must be ordered separately.
- See **"Cable plug Type 2513, form A according to DIN EN 175301-803" on page 19** or separate data sheet for **Type 2513** ▶.
- See **"Cable plug Type 2518, form A according to DIN EN 175301-803" on page 19** or separate data sheet for **Type 2518** ▶.
- Further variants without manual override available on request.

Circuit function	Orifice	Seal material Body	Q_{Nn}-value air[1]	Pressure range[2]	Electrical connection	Nominal power	Voltage/ Frequency	Article no.	
	[mm]		[l/min]	[bar]		[W]	[V/Hz]	G ¼	NPT ¼
CF C 3/2-way solenoid valve Servo-controlled, with manual override Normally closed 	8.0	NBR and PUR (Polyamide)	1300	2…10	Form A	2	024/DC	132457	132725
							024/50…60	132458	o. r.
							110/50…60	132459	o. r.
							230/50…60	132460	o. r.
CF D 3/2-way solenoid valve Servo-controlled, with manual override Normally open 	8.0	NBR and PUR (Polyamide)	1300	2…10	Form A	2	024/DC	132461	o. r.
							024/50…60	132462	o. r.
							110/50…60	132463	o. r.
							230/50…60	132464	o. r.

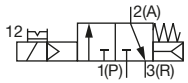
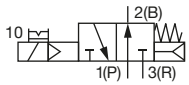
1.) Measurement at 6 bar and +20 °C at valve inlet and 1 bar pressure difference
2.) Pressure data: Overpressure to atmospheric pressure
o. r. = on request

DTS 1000011064 EN Version: F Status: RL (released | freigegeben | validé) printed: 11.09.2023

With plug form B

Note:

- Please note that the cable plug must be ordered separately.
- See **"Cable plug Type 2507, form B according to industry standard" on page 20** or separate data sheet for **Type 2507** ▸.
- Further variants without manual override available on request.

Circuit function	Orifice [mm]	Seal material Body	Q_{Nn}-value air[1] [l/min]	Pressure range[2] [bar]	Electrical connection	Nominal power [W]	Voltage/ Frequency [V/Hz]	Article no. G ¼	Article no. NPT ¼
CF C 3/2-way solenoid valve Servo-controlled, with manual override Normally closed  	8.0	NBR and PUR (Polyamide)	1300	2…10	Form B	1.7	024/DC	20053701	20053702
							024/50	o. r.	o. r.
							024/60	o. r.	o. r.
							110/50	o. r.	o. r.
							120/60	o. r.	o. r.
							230/50	o. r.	o. r.
							240/60	o. r.	o. r.
CF D 3/2-way solenoid valve Servo-controlled, with manual override Normally open  	8.0	NBR and PUR (Polyamide)	1300	2…10	Form B	1.7	024/DC	o. r.	o. r.
							024/50	o. r.	o. r.
							024/60	o. r.	o. r.
							110/50	o. r.	o. r.
							120/60	o. r.	o. r.
							230/50	o. r.	o. r.
							240/60	o. r.	o. r.

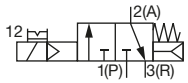
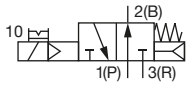
1.) Measurement at 6 bar and +20 °C at valve inlet and 1 bar pressure difference
2.) Pressure data: Overpressure to atmospheric pressure
o. r. = on request

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With plug form C

Note:

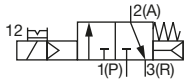
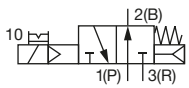
- Please note that the cable plug must be ordered separately.
- See **"Cable plug Type 2516, form C according to DIN EN 175301-803" on page 20** or separate data sheet for **Type 2516** ▶.
- Further variants without manual override available on request.

Circuit function	Orifice	Seal material Body	Q_{Nn}-value air[1]	Pressure range[2]	Electrical connection	Nominal power	Voltage/ Frequency	Article no.	
	[mm]		[l/min]	[bar]		[W]	[V/Hz]	G ¼	NPT ¼
CF C 3/2-way solenoid valve Servo-controlled, with manual override Normally closed 	8.0	NBR and PUR (Polyamide)	1300	2…10	Form C	1.7	024/DC	20053699	20053700
							024/50	o. r.	o. r.
							024/60	o. r.	o. r.
							110/50	o. r.	o. r.
							120/60	o. r.	o. r.
							230/50	o. r.	o. r.
							240/60	o. r.	o. r.
CF D 3/2-way solenoid valve Servo-controlled, with manual override Normally open 	8.0	NBR and PUR (Polyamide)	1300	2…10	Form C	1.7	024/DC	o. r.	o. r.
							024/50	o. r.	o. r.
							024/60	o. r.	o. r.
							110/50	o. r.	o. r.
							120/60	o. r.	o. r.
							230/50	o. r.	o. r.
							240/60	o. r.	o. r.

1.) Measurement at 6 bar and +20 °C at valve inlet and 1 bar pressure difference
2.) Pressure data: Overpressure to atmospheric pressure
o. r. = on request

8.4. Ordering chart Ex mb version (with moulded cable)

Note:
Further variants without manual override available on request.

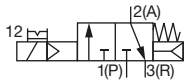
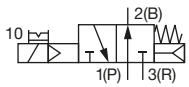
Circuit function	Orifice	Seal material Body	Q_{Nn}-value air[1]	Pressure range[2]	Nominal power	Voltage/ Frequency	Article no.	
	[mm]		[l/min]	[bar]	[W]	[V/Hz]	G ¼	NPT ¼
CF C 3/2-way solenoid valve Servo-controlled, with manual override Normally closed 	8.0	NBR and PUR (Polyamide)	1300	2…10	3	024/UC	350443	o. r.
						110/UC	350449	o. r.
						230/UC	350451	o. r.
CF D 3/2-way solenoid valve Servo-controlled, with manual override Normally open 	8.0	NBR and PUR (Polyamide)	1300	2…10	3	024/UC	350452	o. r.
						110/UC	o. r.	o. r.
						230/UC	o. r.	o. r.

1.) Measurement at 6 bar and +20 °C at valve inlet and 1 bar pressure difference
2.) Pressure data: Overpressure to atmospheric pressure
o. r. = on request

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8.5. Ordering chart Ex eb mb version (with terminal box)

Note:
Further variants without manual override available on request.

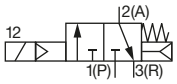
Circuit function	Orifice	Seal material Body	Q_{Nn}-value air[1]	Pressure range[2]	Nominal power	Voltage/ Frequency	Article no.	
	[mm]		[l/min]	[bar]	[W]	[V/Hz]	G ¼	NPT ¼
CF C 3/2-way solenoid valve Servo-controlled, with manual override Normally closed 	8.0	NBR and PUR (Polyamide)	1300	2…10	3	024/UC	350446	o. r.
						110/UC	350450	o. r.
						230/UC	368752	o. r.
CF D 3/2-way solenoid valve Servo-controlled, with manual override Normally open 	8.0	NBR and PUR (Polyamide)	1300	2…10	3	024/UC	o. r.	o. r.
						110/UC	20009771	o. r.
						230/UC	20015790	o. r.

1.) Measurement at 6 bar and +20 °C at valve inlet and 1 bar pressure difference
2.) Pressure data: Overpressure to atmospheric pressure
o. r. = on request

8.6. Ordering chart Ex i version (310 Ohm)

Note:

- Please note that the cable plug must be ordered separately, see **"Cable plug Type 2518, form A according to DIN EN 175301-803" on page 19** or separate data sheet for **Type 2518** ▶.
- Further variants with manual override available on request.
- Further variants with 481 Ohm available on request.

Circuit function	Orifice	Seal material Body	Q_{Nn}-value air[1]	Pressure range[2]	Body material pilot valve	Material threaded bushing Material threaded bushing	Article no.	
	[mm]		[l/min]	[bar]			G ¼	NPT ¼
CF C 3/2-way solenoid valve Servo-controlled Normally closed 	8.0	NBR and PUR (Polyamide)	1300	2…10	Stainless steel 1.4305	Stainless steel	20000908	20000931
						Brass, nickel plated	20000913	o. r.

1.) Measurement at 6 bar and +20 °C at valve inlet and 1 bar pressure difference
2.) Pressure data: Overpressure to atmospheric pressure
o. r. = on request

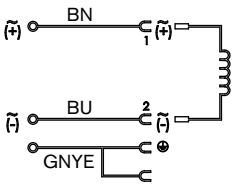
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8.7. Ordering chart accessories

Cable plug Type 2513, form A according to DIN EN 175301-803

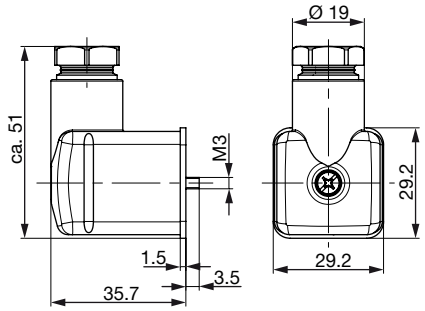
Note:

- Cable plug Type 2513 meets the requirements of ATEX category 3 GD when assembled with a Bürkert solenoid valve.
- For more information on the cable plug, see data sheet **Type 2513** ▶.

Cable plug	Circuit diagram	Cable length [mm]	Article no.
		12000	260893
		5000	260892
		3000	260891
		300	260890

Cable plug Type 2518, form A according to DIN EN 175301-803

Note:
For further versions see data sheet **Type 2518** ▶.

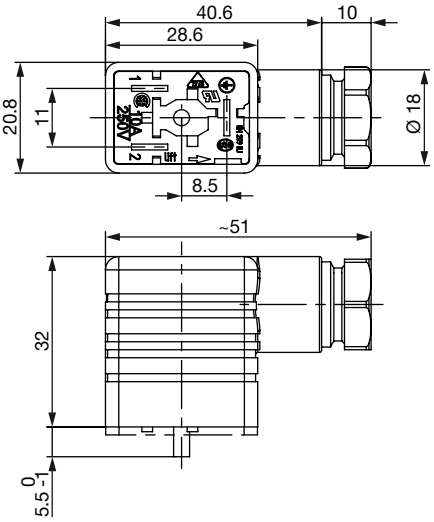
Cable plug	Dimensions	Version	Voltage	Article no.
		Without circuitry (AC/DC)	0…250 V AC/DC	314802
		With LED (AC/DC)	12…24 V AC/DC	314812
		With LED and varistor (AC/DC)	12…24 V AC/DC	314820
		With rectifier, LED and varistor	12…24 V AC/DC	314816

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Cable plug Type 2507, form B according to industry standard

Note:

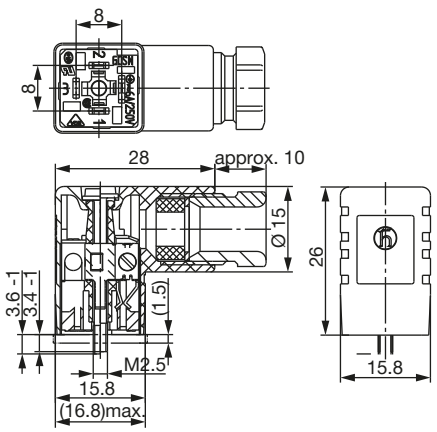
- Delivery of cable plug includes a flat seal and a fixing screw.
- For further versions see data sheet **Type 2507 ▸.**

Cable plug	Dimensions	Version	Voltage	Article no.
		Without circuitry (standard)	2…250 V AC/DC	423845
		With LED	24 V AC/DC	423849
		With LED and free-wheeling diode	12…24 V AC/DC	423851
		With rectifier, LED and varistor	12…24 V AC/DC	423853

Cable plug Type 2516, form C according to DIN EN 175301-803

Note:

- Delivery of cable plug includes a flat seal and a fixing screw.
- For further versions see data sheet **Type 2516 ▸.**

Cable plug	Dimensions	Version	Voltage	Article no.
		Without circuitry	0…250 V AC/DC	303141
		With LED	12…24 V AC/DC	303145
		With LED and varistor	12…24 V AC/DC	303148
		With rectifier, LED and varistor	12…24 V AC/DC	303142

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Cable glands for ATEX/IECEx terminal box

Note:

- A cable gland in polyamide version is included in the delivery. A nickel-plated brass version can be ordered at surcharge.
- For more information on Ex cable glands, see “7.1. Cable glands for ATEX/IECEx terminal box” on page 13.
- For more information on Special wrench see “7.2. Special tool to turn the terminal box” on page 13.

Description	Article no.
Ex cable gland, brass, nickelplated, 6…13 mm[1.)]	773278
Ex cable gland, polyamide, 7…13 mm[1.)]	773277
Set SC02-AC10: Special wrench[2.)] incl. service manual	293488

1.) Cable diameter
2.) Not included in the scope of delivery of the valve

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Métrologie environnementale Recherche - Analyses Essais - Expertises

VARIATION

EC TYPE EXAMINATION CERTIFICATE N^{R} ISSeP08ATEX016X/1

(14) Equipment or protective system:
Temperature, pressure and level switches

(15) Object of the variation:
To permit the certificate updating following the last editions of the Standards in force
EN 60079-0 : 2012 (IEC 60079-0 : 2011)
EN 60079-11 : 2012 (IEC 60079-11 : 2011)
EN 60079-26 : 2007 (IEC 60079-26 : 2006)

Electrical parameters: Unchanged

Eventual prescriptions: Unchanged

(16) Report n^{r}: 13001 of 12.02.2013

Composed in total of 24 pages, completed with the following documents:

- "Operating Instructions Level Switche type UNS"
- "Operating Instructions Single/Dual Metal Diaphragm Pressure Switches Type D1S/D2S and D1X/D2X"
- "Operating Instructions Single/Dual Metal Diaphragm Pressure Switches D1T/D2T Single/Dual Metal Differential Pressure Switches DPD1T/DPD2T"
- "Operating Instructions Metal Diaphragm Pressure Switches D1T/D2T and DPD1T/DPD2T"
- "Operating Instructions Single/Dual Bourdon Tube Pressure Switches BS/BT/BX"
- "Operating Instructions Diaphragm Seal Piston Pressure Switches type E1S/E1H/P1H/P1X/MSPS"
- "Operating Instructions Compact Pressure Switches Type Series 8000"
- "Operating Instructions Compact Pressure Switches Type X1T.../XTM.../XTK..."
- "Operating Instructions Compact Pressure Switches Type KD1.../KLK.../KLM..."
- "Operating Instructions Compact Pressure Switches Type 9671X/9681X/9692X"
- "Operating Instructions Mechanical Temperature Switches Type MTH/TH/TX/MLH/LH/LX"
- "Operating Instructions Limit Switch for Bypass Level Indicator GK03"
- "Operating Instructions Flow monitor Type BFS-10 N / N-Air and Flow monitor Type BFS-10-O / O-Air"
- "Operating Instructions Flow monitor Type BFS-20 O and Flow monitor Type BFS-20-OL"
- "Operating Instructions Flow monitor Type BFS-30 N / L and Flow monitor Type BFS-30-O"
- "Operating Instructions Flow monitor Type BFS-40 N and Flow monitor Type BFS-40-O"

This document may not be used without the original certificate

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VARIATION

EC TYPE EXAMINATION CERTIFICATE N^{R} ISSeP08ATEX016X/1

(16) - The drawings

Number	Rev.	Date	Description
918-0437	E	24.01.2013	-V- Typenschild Ex ia G Zul. II 1 G, Ex ia IIC T6 Ga
918-0438	H	24.01.2013	-V- Typenschild Ex ia GD Zul. II 1 GD, Ex ia IIC T6 Ga, Ex ia IIIC T100°C Da
918-0440	E	24.01.2013	-V- Typenschild Ex ia G Zul. II 1 G, Ex ia IIB T6 Ga
918-0441	D	24.01.2013	-V- Typenschild Ex ia GD Zul. II 1 GD, Ex ia IIB T6 Ga, Ex ia IIIC T100°C Da
918-0461	D	24.01.2013	-V- Typenschild BFS-EXI 40x37 auf 918-0296
918-0462	A	24.01.2013	-V- Typenschild EXI Temp O88 T1X/L1X
918-0500	A	24.01.2013	-V- Typenschild EXI Temp O80 T2X
918-0517	A	24.01.2013	-V- Typenschild EXI Druck O80 D.X/B.X
918-0571	C	24.01.2013	-V- Typenschild Ex ia GD Zul. 40x37 Temperatur EXI
918-0727	-	28.01.2013	-V- Typenschild Ex ia G Zul. II 1 G, Ex ia IIB T6 Ga

(17) Special conditions for safe use: Unchanged

(18) Essential Health and Safety Requirements: Covered by the Standards listed in (9)

Colfontaine, 22.02.2013

INSTITUT SCIENTIFIQUE DE SERVICE PUBLIC
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Métrologie environnementale
Recherche - Analyses
Essais - Expertises

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(1)

EC TYPE EXAMINATION CERTIFICATE

(2) **Equipment or protective system intended for use in potentially explosive atmospheres Directive 94/9/EC**

(3) EC type examination certificate number: **ISSeP08ATEX016X**

(4) Equipment or protective system:
Temperature, pressure and level switches.

(5) Applicant – Manufacturer – ~~Authorized representative in the Community~~:
BARKSDALE GmbH

(6) Address: Dorn-Assenheimer Str. 27
D – 61203 REICHELSHEIM

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) ISSeP, notified body n^{r} 492 in accordance with article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in annex II to the Directive.

The examination and test results are recorded in confidential report n^{r} 07148.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006 (CEI 60079-0 : 2004)
EN 60079-11 : 2007 (CEI 60079-11 : 2006)
EN 60079-26 : 2004 (CEI 60079-26 : 2004)
EN 61241-0 : 2006 (CEI 61241-0 : 2004 + corrigendum 2005)
EN 61241-11 : 2006 (CEI 61241-11 : 2005 + corrigendum 2006)

(10) If the symbol "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified equipement or protective system in accordance to the Directive 94/9/EC. Further requirements of this Directive may apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following indications:
Ex II 1 G Ex ia II C T6 – Ex ia II B T6
Ex II 1 GD Ex iaD 20 T100

Colfontaine, the 02.04.2008

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Lambert Marcel,
Director.

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RÉGION WALLONNE

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(13) **SCHEDULE**

(14) **EC TYPE EXAMINATION CERTIFICATE N^{R} ISSeP08ATEX016X**

(15) Description of the equipment or protective system:
Temperature, pressure and level switches.

The possible and admissible variations are the following :

- Level switches:

UNS-Ms 1/8--BN25, UNS-VA 1/8--VA27, UNS-Ms 1/4--BN30, UNS-VA 1/4--VA52, UNS-Ms 3/8--BN30, UNS-VA 3/8--VA52, Bilge Guard, UNS-1000-VA/Ms-BN, UNS-1000-VA/Ms-VA, UNS1000-G/X, UNS1000-VA--VA44, UNS-2000-S, UNS2000 VA/Ms-BN, UNS2000 VA/Ms-VA, UNS2100-VA/MS-VA et UNS Bilge Switch

- Option : all level switches of the type UNS can be equipped with a bimetallic switch acting with temperature. In the type number, is added the –TP –extension.
- The floats can be in stainless steel, in Burna-N or in other plastic materials such as PP, PE, PVC, PTFE or PA.

- Pressure switches:

D1T, D2T, B1T, B2T, P1H, P1X, KLM/KLK---K, KLM/KLK---S1, E1H---GE12, E1H---PLS, E1S, XTM, X1T, XTK, B1X, B2X, D1X, D2X, MSPS, DPD1T, DPD2T, 9671X, 9681X, 9692X, « compact X » series and 8000 series.

- Temperature switches:

MT1H, T2H, ML1H, L2H, T1X, T2X, L1X, TH, TX and T9692X.

- Flow switch

BFS

- By-pass switch

GK03-EXI

Electrical parameters
Ui = 28 V
Ii = 110 mA
Ci = 40 pF
Li = 4 µH

Routine tests :
The manufacturer shall make the routine verifications and tests necessary to ensure that the electrical apparatus produced complies with the specification submitted to the testing station together with the prototype or sample (CEI 60079 : clause 27).
Eventual prescriptions : Tamb : -40°C to +75°C
IP6X

(16) Report n^{r} 07148 of 28.02.2008
Composed in total of 39 pages, completed by the following descriptive documents :
- "Operating Instructions Metal Diaphragm Pressure Switches D1S/D2S and D1X/D2X"
- "Operating Instructions Single/Dual Metal Diaphragm Pressure Switches D1T/D2T Single/Dual Metal Differential pressure switch DPD1T/DPD2T"
- "Operating Instructions Single/Dual Bourdon Tube Pressure Switches BS/BT/BX"
- "Operating Instructions Diaphragm Seal Piston Pressure Switches type E1S/E1H/P1H/P1X/MSPS"
- "Operating Instructions Compact Pressure Switches Type Series 8000"
- "Operating Instructions Compact Pressure Switches Type X1T…/XTM…/XTK…"
- "Operating Instructions Compact Pressure Switches Type KD1…/KLK…/KLM…"
- "Operating Instructions Compact Pressure Switches Type 9671X/9681X/9692X"
- "Operating Instructions Mechanical Temperature Switches Type MTH/TH/TX/MLH/LH/LX"
- "Operating Instructions for Level Switches"
- "Operating Instructions for Bypass Level Indicator"
- "Operating Instructions Flow monitor Type BFS-40 N and Flow monitor Type BFS-40-O"

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The drawings:

Number	Rev.	Date	Pages	Description
D1T-150	H	18.03.1997	2	Pressure Switch - Diaphragm Single Setting
D2T-150	M	12.10.1992	2	Pressure Switch - Diaphragm Dual Setting
930-0102	-	29.08.2007		Sales drawing D1T/D2T pressure and vacuum Switch
B2T-12SS-CS	A	29.10.2006		Spcl. Press. Switch – Bourdon Tube
B2T-32SS-CS	A	29.10.2007		Spcl. Press. Switch – Bourdon Tube
B2T-48SS-CS	B	29.10.2006		Spcl. Press. Switch – Bourdon Tube
B2T-65SS-CS	C	29.10.2006		Spcl. Press. Switch – Bourdon Tube
B2T-72SS-CS	A	29.10.2006		Spcl. Press. Switch – Bourdon Tube
922-0309	A	08.12.2003		Zusammenbauzeichnung Bourdonrohrschalter 04
E1H	AH	09.09.1999	2	Pressure Switch, Econ-o-trol single setting
903-0094	A	14.02.2007		Gehäuse E1H
903-0174	B	28.09.2005		Deckel E1H
E1S	AA	19.01.2000		Pressure Switch, Econ-o-trol single setting
MSPS-100	K	09.06.1999		Pressure Switch Single Setting
P1H	N	29.11.1994		Pressure Switch - Piston Single Set
P1H-1600	D	18.02.1985		Pressure Switch – Piston Single Set
923-1571	-	31.08.2007	2	Serie 8000
922-0072	B	12.03.2004		Zusammenbauzeichnung Kolbendruckschalter X1T
922-0213	D	04.04.2006		Zusammenbauzeichnung XTM-…-G1-S1-1
923-0542	B	20.10.2005		XTK-…-G1-S1
922-0544	B	10.09.2004		Zusammenbauzeichnung KLM
922-0018	E	11.09.2004		Zusammenbauzeichnung KLM-..-..-K2-1[..2]
930-0103	-	29.08.2007		Sales Drawing DPD1T/DPD2T
DPD2T-80	K	03.06.1999	2	Pressure Difference Switch, Diaphragm Dual Setting
B1X	B	09.10.2006		Pressure Switch - Bourdon Tube Single Setting
B2X	B	09.10.2006		Pressure Switch - Bourdon Tube Dual Setting
D1X	A	17.03.2004		Pressure Switch - Diaphragm Single Setting
D2X	A	17.03.2004		Pressure Switch - Diaphragm Dual Setting
C9671X	N	03.03.2005		Compact Vacuum Switch, Vacuum
C9681X	N	03.03.2005		Compact Pressure Switch, Low Pressure
C9692X	T	03.03.2005		Compact Pressure Switch, High Pressure
923-1532	-	22.02.2007		Compact pressure switch 9681X/9692X
P1X	Q	18.12.1997	2	Pressure Switch, Piston Single Setting
P1X 1600	G	16.12.1992		Pressure Switch, Piston Single Setting
MT1H-25	K	04.10.1993	2	Temperature Switch - Single Setting
T2H-25	J	16.02.1993	2	Temperature Switch, Dual Setting
ML1H-20	G	07.05.1997	2	Temperature Switch-local Mount
L2H-20	E	06.04.1988	2	Temperature Switch - Local Mount Dual Setting
T1X-25	D	12.11.1986	2	Temperature Switch - Single Setting
T2X	A	03.06.2004	2	Temperature Switch - Dual Setting
L1X	A	03.06.2004	2	Temperature Switch - Single Setting Local Mnt
TH-Q10	G	25.08.2006		Temperature Switch
TX-Q10	E	21.03.2006		Temperature Switch
T9692X	-	07.04.2007	2	Temperature switch single Setting
923-1107	C	18.07.2007		Datenblatt UNS-Ms 1/8-Kx-BN25/3
923-1119	A	18.07.2007		Datenblatt UNS-VA 1/8-Kx-VA27/1(2)
923-1133	B	18.07.2007		Datenblatt UNS-Ms1/4-Kx-BN30/1(2)
923-1128	A	18.07.2007		Datenblatt UNS-VA1/4-Kx-VA52/1(2)
923-1116	C	18.07.2007		Datenblatt UNS-Ms3/8-Kx-BN30/1(2)

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EC TYPE EXAMINATION CERTIFICATE N^{R} ISSeP08ATEX016X

923-1112	B	18.07.2007		Datenblatt UNS-VA3/8-Kx-VA52/1(2)
922-0774	A	19.07.2007		Übersichtszeichnung Standard UNS1000 VA/Ms
14-1.512.1	1	29.08.1995		Schwimmerschalter Float Chamber UNS1000-G/X
12-1.426.1	1	28.09.1994		Schwimmerschalter UNS1000-VA/FL4-KL12
922-0871	B	19.07.2007		Übersichtszeichnung Standard UNS2000 VA/Ms
923-1261	A	19.07.2007		Datenblatt UNS2100-EX-…
923-1232	B	19.07.2007		Datenblatt Reedeinsatz
923-1231	C	19.07.2007		Datenblatt UNS…
923-1384	-	09.11.2005		Limit Switch GK03-EXI
13- 1. 187. 2	2	23.01.1996		Schwimmerschalter Float switch Type: UNS2000-S
923-1086	A	18.07.2007		Datenblatt Bilge Guard Standard
923-1398	B	22.08.2006		Datenblatt UNS-Bilgenschalter
923-1414	-	22.05.2006		Datenblatt UNS-Bilgenschalter
923-1265	B	19.07.2007		Datenblatt BFS
918-0529		22.11.2007		Typenschild Allgemein Ex II 1 GD, Ex ia IIB T6
918-0530		22.11.2007		Typenschild Allgemein Ex II 1 GD, Ex ia IIC T6
918-0531		22.11.2007		Typenschild Allgemein Ex II 1 G, Ex ia IIC T6
918-0532		22.11.2007		Typenschild Allgemein Ex II 1 G, Ex ia IIB T6

(17) Special conditions for safe use :

Symbol X.

- The following models are coded Ex ia IIB T6 : E1S, MSPS, KLM/KLK…S1, XTM, X1T, XTK, UNS-Ms 1/8 - - BN25, UNS-Ms 1/4 - - BN30, UNS-Ms 3/8 - - BN30, Bilge Guard, UNS-1000-VA/Ms-BN, UNS2000 VA/Ms-BN, UNS Bilge Switch (with Buna float), 8XXX-PL1-XX, 8XXX-PL4-XX, UNS-2000-S-VA----BN, UNS-2000-S-VA----PE and BFS as well as level switches having a plastic material float (PP, PE, PVC, PTFE or PA)

- For the model E1H…PLS, all precautions shall be taken during their use in category 1 (zones 0) zones in order to avoid all ignition of the explosive atmosphere by electrostatic hazards. Furthermore, this model is also coded Ex ia IIB T6.

- The other models are coded Ex ia IIC T6

- For the models with –TP- extension, the temperature switch shall be supplied by a separte associated apparatus

- The following models can be use only in gas atmospheres (dust atmospheres not allowed): E1H---GE12, E1H---PLS

- The models E1S and MSPS shall be installed in an additional enclosure. The ingress protection of this enclosure shall be at least IP6X when using these models in dust atmosphere.

- The cable entries shall be of a certified type and kept the IP6X degree when using in Dust atmosphere. They are not a part of this certificate.

- The models having a light alloy enclosure or part of enclosure shall be protected against all impact or friction which can ignite the explosive atmosphere.

- The metallic enclosures shall be connected to earth.

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EC TYPE EXAMINATION CERTIFICATE N^{R} ISSeP08ATEX016X

(18) Essential Health and Safety Requirements: covered by the Standards listed in (9).

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Mechanical temperature switches ML1H

Local mount type



Features

- Local mount type single switch
- Explosion proof housing
- Terminal clip and set point adjustment in °C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 13
- Optional:
  - Disconnection with manual reset, G (RD)-micro switch
  - Adjustable hysteresis (switch-back difference), S-micro switch
- Thermowell in stainless steel and brass 3/4" NPT male thread
- Option thermowell: W = Brass WS = Stainless steel SS316Ti, 1.4571
- Approvals: Ex ia, UL, CSA, SIL2 (IEC 61508)

Adjustment ranges

-45 °C...+24 °C to +66 °C...+232 °C

Applications

Temperature monitoring in machine and machine tool industry, shipbuilding, power plants, antifreeze, heating systems, compressor monitoring

Technical Data

Housing material:	Die-cast aluminium, anodized
Process connection:	Standard 1/2" NPT male, option W/ WS 3/4" NPT male
Temperature sensor material:	Standard: brass / copper, version S: stainless steel (SS304 / 1.4301) for pressure values refer to table in chap. Accessories
Electrical values:	All models are equipped with SPDT contacts
Micro switch type:	H, M, GH, GM, S, G (RD)
Electrical connection:	1/2" NPT female, internal screw terminal, cable gland in PA, for cable size 6...12 mm is included
Protection class:	IP65, NEMA 4 / 13

Set point adjustment:	Turn adjustment knob clockwise to increase the actuation point
Standards:	The equipment is in conformity with the following harmonised European standards: EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
Intrinsic safety:	The switches are also suitable for intrinsically safe applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: Umax = 28 V Imax = 50 mA
Approvals:	Ex ia, UL, CSA
Weight:	1.0 kg approx.

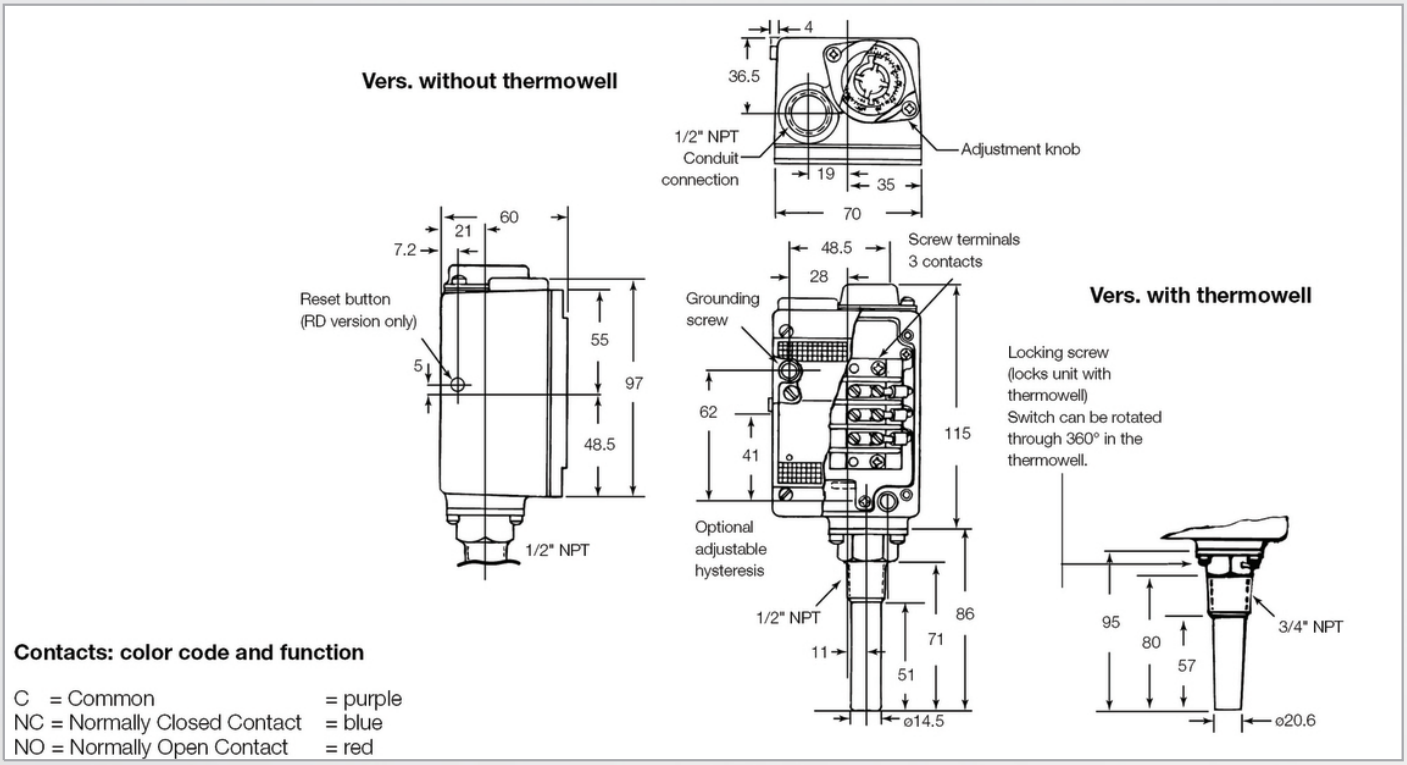
Adjustment ranges

Codeadjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch			
			H, GH	M, GM	S	G (RD)
						2.8...manual
201	-73 ... +121	-45... +24	0.5... 1.6	1.7... 3.3	3.3... 11.2	
202	-73 ... +121	-9... +60	0.5... 1.6	1.7... 3.3	3.3... 11.2	
203	-73 ... +121	+24... +93	0.5... 1.6	1.7... 3.3	3.3... 11.2	
204	-73 ... +121	-45... +93	0.5... 1.6	1.7... 3.3	3.3... 11.2	
351	-73 ... +205	+38... +107	0.5... 1.6	1.7... 3.3	3.3... 11.2	
354	-73 ... +205	+38... +177	0.5... 1.6	1.7... 3.3	3.3... 11.2	
454	-18 ... +260	+66... +232	1.6... 3.3	3.3... 5.0	5.5... 16.8	

* Dependent on medium

Mechanical temperature switches ML1H

Dimensions (mm / *inch*)



Contacts: color code and function

C = Common	= purple
NC = Normally Closed Contact	= blue
NO = Normally Open Contact	= red

Electrical Ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. Load A	Res.load A	Volt DC	Ind load A	Res. Load A	Comments
H	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	6 to 28	0.50	0.5	Small hysteresis; High AC / low DC loads
M	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	12 24 250	5.00 1.00 0.25	15.0 2.0 0.4	Medium hysteresis; High AC and DC loads
GH	Micro switch with gold contacts for low voltage and low current	125	1	1	24	1.00	1.00	Small hysteresis
GM		30	0.1	0.1	30	0.10	0.1	Medium hysteresis
S	Micro switch with silver contacts	480	15	15	125	0.05	0.4	Adjustable hysteresis
G	Micro switch with silver contacts	480	10	10	125	0.4	0.75	Manual reset (RD)

Hermetically sealed micro switch (HML1H) on request

Sensor material / Options

Sensor material		Options 1		Options 2	
---	Brass/copper	W	Thermowell of brass	RD	Manual reset
S	Stainless steel	WS	Thermowell of SS (1.4571, SS316 Ti)	EXI	for intrinsically safe application, Ex ia

Order Code

Example for order number

Type		Micro switch		Code Adjustment range		Sensor length*		Option 1		Option 2
ML1H	-	GH	-	202	-	S	-	WS	-	EXI

* Brass/cooper, option: S = Stainless steel

Your order number

ML1H	-		-		-		-		-	

Approval data for type MTH, TH, TX, MLH, LH, LX

*Type of protection "**i**" intrinsic safety*

Approval:	II 1 GD	Ex ia IIC T6 Ga Ex ia IIIC T100°C Da
Certificate no.:	ISSeP08ATEX016X/1	
Permissible ambient temperature:	-40 °C … +75 °C	
Electrical data for intrinsically safe application:	Ui = 28V	Ii = 50 mA
	Ci = 40 pF	Li = 4 µH
Standards applied:	IEC 60079-0 : 2011, IEC 60079-11 : 2011, IEC 60079-26 : 2006	

Approval data for type TX, LX

*Type of protection "**d**" explosion-proof enclosure*

Approval:	II 2 G	Ex db IIC T6 Gb
	II 2 D	Ex tb IIIC T80 °C Db IP66 -40 °C ≤ Tamb ≤ +75 °C
Certificate no.:	ISSeP08ATEX024X/3	
Standards applied:	EN 60079-0: 2012+A11:2013 EN 60079-1: 2014 EN 60079-31: 2014	

Operating life time

The switches are designed for an operating life time of at least 1 million cycles when used under normal design criteria.

Operating Instructions

Mechanical Temperature Switches Type MTH/TH/TX/MLH/LH/LX



Operating Instructions

1 Intended Applications
2 Safety Instructions
3 Standards
4 Warranty/Guaranty
5 Transport/Storage
6 Installation/Commissioning
7 Maintenance/Cleaning
8 Technical Data

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email: info@barksdale.de
Internet: www.barksdale.de

Art. No.: 923-0183
Index J, 16.03.2019

Specifications are subject to changes without notice!

Intended Applications

The temperature switches are specifically applied for monitoring and controlling of operations using maximum or minimum temperatures. A microswitch triggers an electrical signal when minimum or maximum temperatures are reached.

⚠	**DANGER**
The switch may only be used in the specified fields of application (see type label). The temperature has to be within the specified ranges, the pressure values and the electrical rating must not exceed the values specified. Observe also the applicable national safety instructions for assembly, commissioning and operation of the switch. The switch is not designed to be used as the only safety relevant element in pressurized systems according to DGR 97/23/EC.	

Safety Instructions

The safety instructions are intended to protect the user from dangerous situations and/or material damage.

In the operating instructions the seriousness of the potential risk is designated by the following signal words:

⚠	**DANGER**
Refers to imminent danger to men. Nonobservance may result in fatal injuries.	

⚠	**WARNING**
Refers to a recognizable danger. Nonobservance may result in fatal injuries, and destroy the equipment or plant parts.	

⚠	**CAUTION**
Refers to a danger. Nonobservance may result in light injuries and material damage to the equipment and/or to the plant.	

☞	**IMPORTANT**
Refers to important information essential to the user.	

Disposal

The equipment must be disposed of correctly in accordance with the local regulations for electric/electronic equipment.

The equipment must not be disposed of with the household garbage!

Standards

The standards applied during development, manufacture and configuration are listed in the CE conformity and manufacturer's declaration.

Warranty/Guaranty

Warranty

Our scope of delivery and services is governed by the legal warranties and warranty periods.

Terms of guaranty

We guaranty for function and material of the single / dual temperature switch under normal operating and maintenance conditions in accordance with the statutory provisions.

Loss of guaranty

The agreed guaranty period will expire in case of:

changes or modifications to the housing/switch/fitting
incorrect use,
incorrect installation or
incorrect handling or operation contrary to the provisions of these operating instructions.

No liability is assumed for any damage resulting therefrom, or any consequential damage.

Transport/Storage

⚠	**CAUTION**
Severe shock and vibrations should be avoided during transport. Storage should be dry and clean.	

Installation/Commissioning

DANGER

Only install or uninstall the switch when deenergized (electrically and hydraulically/pneumatically).

Process connection and electrical connection must be carried out by trained or instructed personnel according to state-of-the-art standards.

The switch must only be installed in systems where the maximum temperature T_{max} is not exceeded (see type label).

WARNING

Be aware of the fact that in case of operation with higher temperatures the casing surface may become very hot!

Ambient temperature range: –40… +75 °C; max. pressure at sensor: 21 bar

WARNING

In case the temperature falls below or exceeds the permissible temperature limits specified for the sensor and the permissible ambient temperature, the function of the temperature switch can no longer be guaranteed and the temperature switch may be damaged.

Check the operation of the switch regularly. If the switch does not work properly, stop operation immediately!

CAUTION

All standard temperature switches are supplied with cable glands, the explosion-proof switches with threaded plugs covering the electrical connection entry.

These must be removed to install the approved cable gland of your choice.
The capillary system must be installed with care avoiding sharp bends.
Provide protection against damage where needed.

IMPORTANT

The temperature sensing element can be used up to 21 bar. In case of pressures higher than 21 bar the temperature sensing element must be provided with a thermowell suitable for the respective application.

All temperature switches are tested for proper functioning before they leave the factory.

Contact Protection

The micro switches used are normally suitable for both direct and alternating current operation. Inductive, capacitive and lamp loads may, however, considerably reduce the life expectancy of a micro switch and, under extreme circumstances, even damage the contacts.

Depending on the application spark suppression and current limiting is recommended (see succeeding figures).

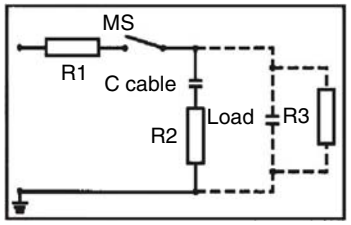


Fig. 1: Protection in case of capacitive loads R1: Protection against starting current rushes R2,R3: Protection against high discharge currents

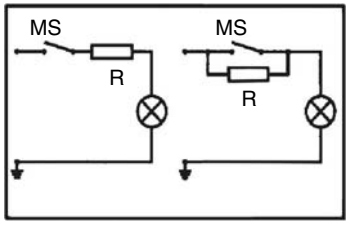


Fig. 2: Lamp load provided with resistance in parallel or series connection to switch of condensators

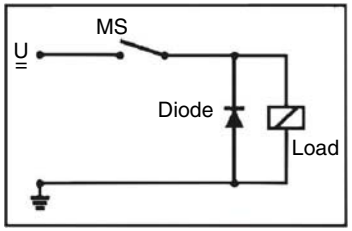


Fig. 3: Protection in case of continuous current and inductive load by recovery diode

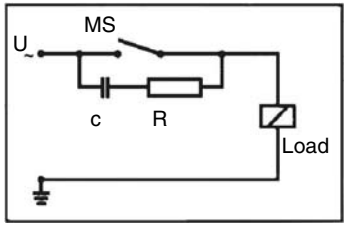


Fig. 4: Protection in case of alternating current and inductive load by RC-link

Set point adjustment

IMPORTANT

Factory-Provided: pressure (temperature) switch point setting
We confirm for pressure (temperature) switches that have been factory set the setting will be detailed on the label name plate.

Warranty is not applicable for any changes that may occur due to transportation or installation. For critical applications we recommend the setting is checked and re-set if cecessary after installation and wirding of the pressure (temperature) switch.

In temperature switches, the liquid expands in the sensing element (capillary) when the temperature changes. Due to the expansion the microswitch is actuated.

Upon delivery of the product, the set points are likely to be found in the middle of the adjustable range. On request, fix set points may be adjusted by our factory. In this event, the point will be indicated on the type plate or any separate plate, i = increasing, d = decreasing.

The set point is adjusted by turning the adjustment knob (see figure 7…12).

☞	**IMPORTANT**
In some cases the corresponding housing cover must be removed in order to reach the adjustment knob.	

Heat the temperature switch to the desired switching temperature.

Turn the adjustment knob to actuate the microswitch.

☞	**IMPORTANT**
Please consult the wiring diagram for the contact status at state of rest (see Fig. 5).	

Precise adjustment of set point to actuate on increasing temperature

Connect a control unit (lamp, buzzer, etc.) to 1 (C) and 4 (NO). When the unit is connected correctly and the sensor temperature is higher than the temperature adjusted on the scale, the buzzer or lamp is **not** activated.

Adjust the desired switch point with the help of the scale and via the adjustment knob.

Watch the switch point while the temperature is rising (about 2°C/minute). The control unit is activated when the switch point is reached.

If necessary, readjust the set temperature by some degrees (by means of the scale the temperature can be adjusted with an accuracy of 3…5 % of the scale value).

Precise adjustment of set point to actuate on decreasing temperature

Connect a control unit (lamp, buzzer, etc.) to 1 (C) and 2 (NC). When the unit is connected correctly and the sensor temperature is higher than the temperature adjusted on the scale, the buzzer or lamp is activated.

Adjust the desired switch point with the help of the scale and via the adjustment knob.

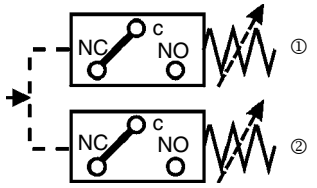
Increase the temperature (about 2°C/minute) until the control unit is deactivated.

Watch the point at which the control unit is activated again while the temperature is falling. This is the set switch point.

If necessary, readjust the set temperature by some degrees (by means of the scale the temperature can be adjusted with an accuracy of 3…5 % of the scale value).

☞	**IMPORTANT**
Adjustment of several set points is performed for each set point as specified above. Due to the sluggishness of the capillary system switching delays may occur in case of rapid temperature changes (>2 °C/Minute).	

Wiring Code for all Types (Contact status at atm. pressure)



Power circuit ①	**Power circuit ②**
C = purple	C = brown
NC = blue	NC = orange
NO = red	NO = black

Circuit ① = lower contact (low)

Circuit ② = upper contact (high)

Fig. 5 Wiring Code

Use in Hazardous Locations

The weather-proof standard temperature switches must not be used for hazardous locations.

Depending on the application we offer two versions for hazardous locations:

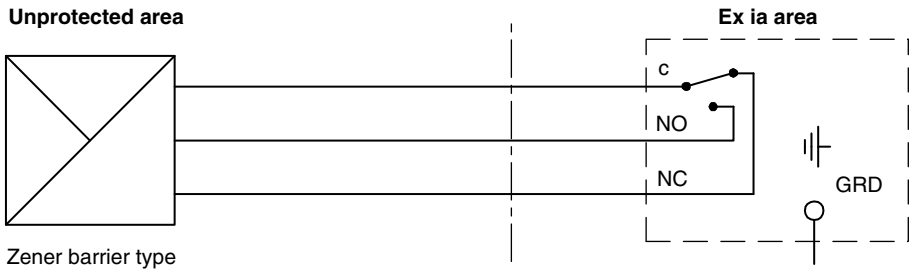
An intrinsically safe version Ex ia IIC T6 with certificate no.ISSeP08ATEX016X for all standard temperature switches
and the special temperature switch versions T1X, T2X and L1X for Ex db IIC T6 Gb;
Ex tb IIIC T80°C Db IP66 explosion-proof applications with certificate no. ISSeP08ATEX024X.

Both versions are suitable for gas and dust applications and approved for Ex II G or D in accordance with the ATEX 2014/34/EU regulations.

The intrinsically safe versions must be operated with an approved switch amplifier (see Fig. 6).

The switches with explosion-proof enclosure can be wired via conduit connection or cable gland with Ex approval. The switches may only be used in accordance with the instructions and provisions of the declaration of conformity.

⚠	**WARNING**
With option Ex i: The models having light-alloy (aluminium) enclosures or enclosure parts must be protected against all impact or friction which can ignite the explosive atmosphere.	



Zener barrier type
Switch amplifier NAMUR

Fig. 6: Operation of temperature switches in intrinsically safe areas

Maintenance/Cleaning

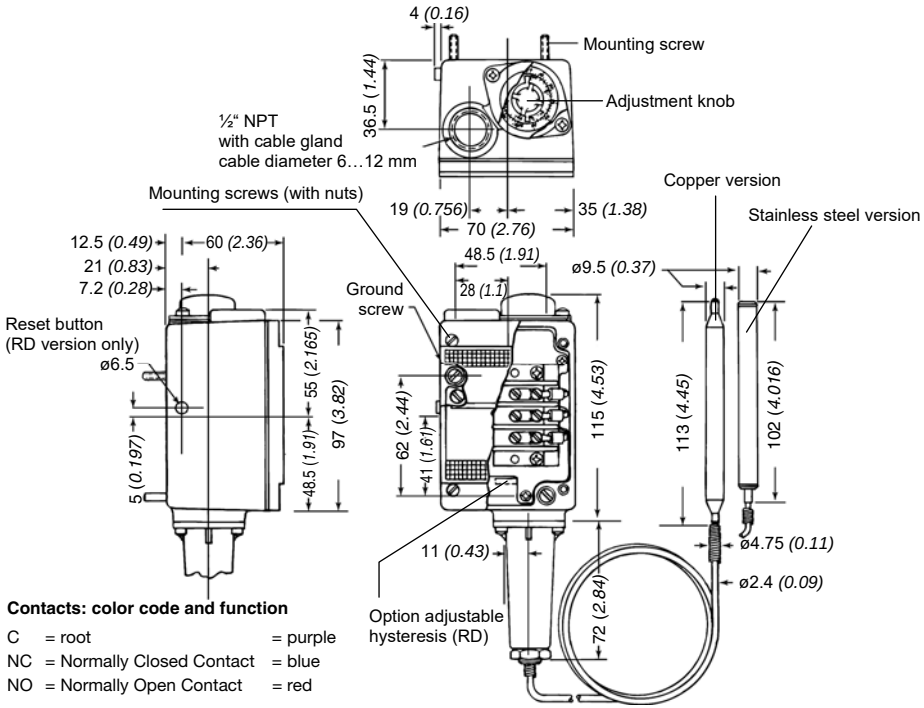
Maintenance

The pressure switch is maintenance free. Checking the set points lies within the discretion of the user. The usual preventive maintenance work in accordance with the PED and ATEX guidelines must always be carried out.

Technical Data

See data sheet

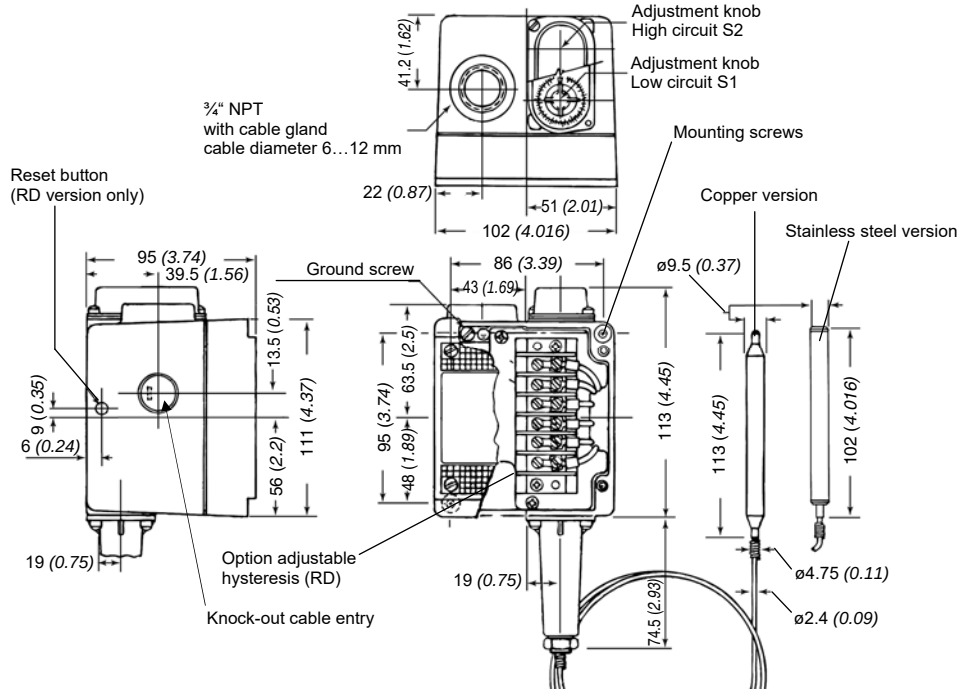
Dimensions in mm *(inch)*



Contacts: color code and function

C	= root	= purple
NC	= Normally Closed Contact	= blue
NO	= Normally Open Contact	= red

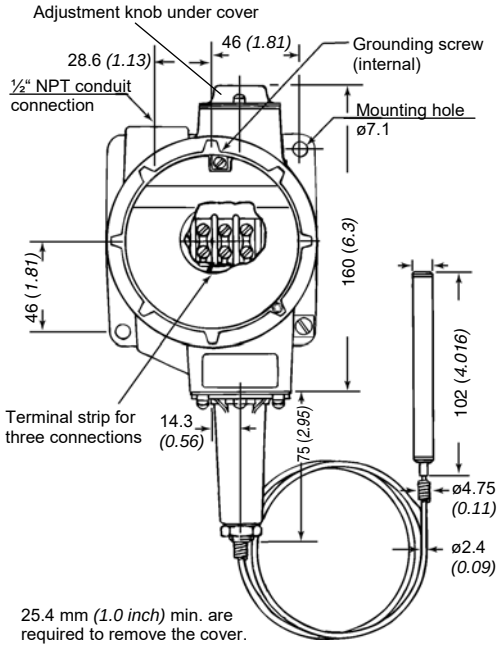
Fig. 7: Temperature switch type MT1H-…



Contacts: color code and function

		Lower contacts	Upper contacts
C	=root	= purple	C = brown
NC	=Normally Closed Contact	= blue	NC = orange
NO	=Normally Open Contact	= red	NO = yellow

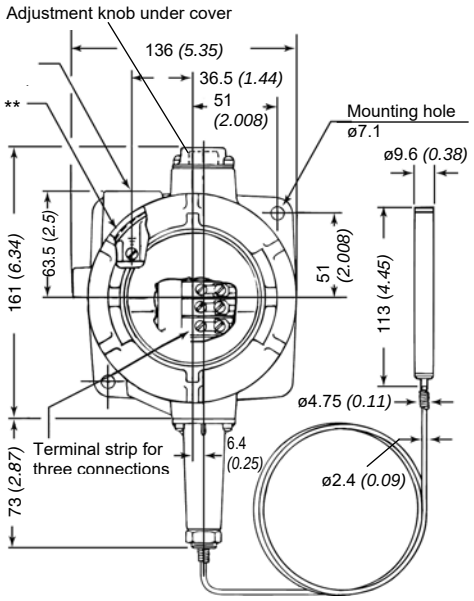
Fig. 8: Temperature switch type T2H-…



Contacts: color code and function

		Lower contacts	Upper contacts		
C	= root	= purple	C	= brown	
NC	= Normally Closed Contact	= blue	NC	= orange	
NO	= Normally Open Contact	= red	NO	= yellow	

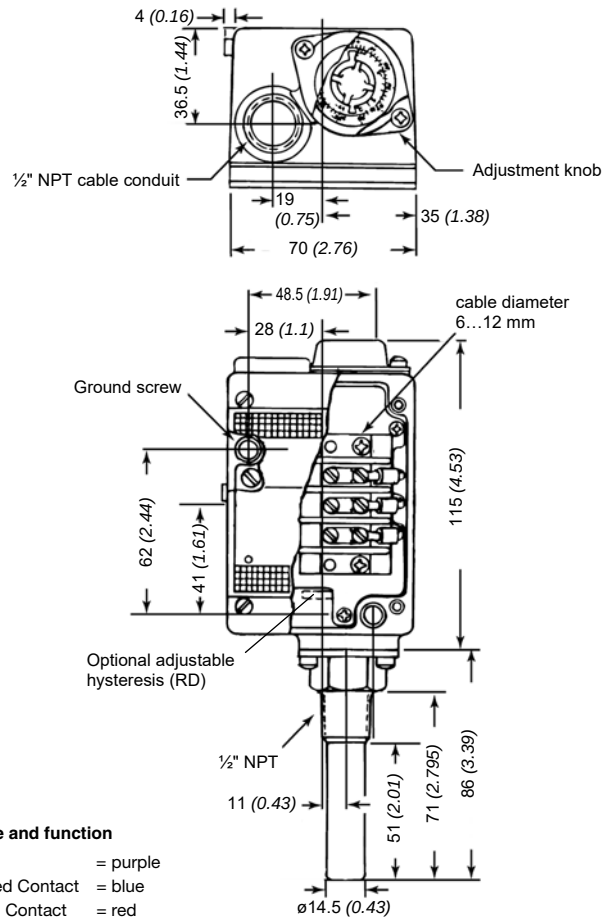
Fig. 9: Temperature switch type T1X-…/ T1X-Ex…



Contacts: color code and function

		Lower contacts	Upper contacts		
C	= root	= purple	C	= brown	
NC	= Normally Closed Contact	= blue	NC	= orange	
NO	= Normally Open Contact	= red	NO	= yellow	

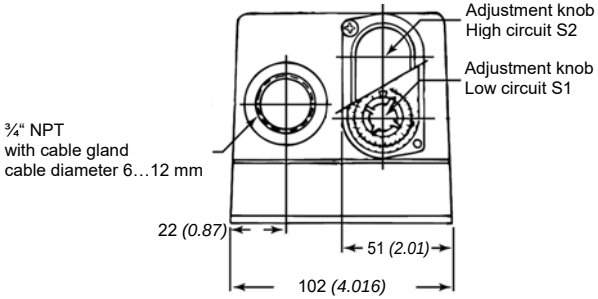
Fig. 10: Temperature switch type T2X-…

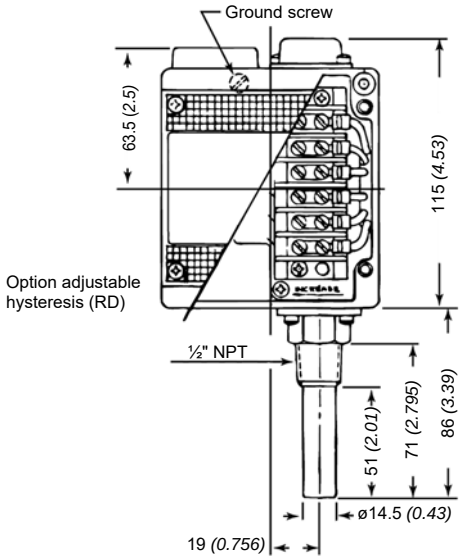


Contacts: color code and function

C	= root	= purple
NC	= Normally Closed Contact	= blue
NO	= Normally Open Contact	= red

Fig. 11: Temperature switch type ML1H-…





Contacts: color code and function

		Lower contacts	Upper contacts	
C	= root	= purple	C	= brown
NC	= Normally Closed Contact	= blue	NC	= orange
NO	= Normally Open Contact	= red	NO	= yellow

Fig. 12: Temperature switch type L2H-…

Barksdale
CONTROL PRODUCTS

Electrical Ratings

Micro switch	Special Characteristics	Volt AC 50/60 Hz	Ind. Load A	Res. Load A	Volt DC	Ind. Load A	Res. Load A	Notes
H	Microswitch with silver contacts	125 250 480	10 10 3	10 10 3	6 to 24	0,50	0,5	Small hysteresis; high AC / low DC loads
M	Microswitch with silver contacts	125 250 480	10 10 3	10 10 3	12 24 250	5,00 1,00 0,25	15,0 2,0 0,4	Medium hysteresis; high AC and DC loads
GH*	Microswitch with gold plated contacts for low voltage and low current	125	1	1	24	1,00	1,00	Small hysteresis
GM*		30	0.1	0.1	30	0,10	0,10	Medium hysteresis
S	Microswitch with silver contacts	125 250 480	15 15 15	15 15 15	12 24 250	10,00 5,00 0,03	15,0 6,0 0,2	Adjustable hysteresis
J	Microswitch - sealed - with silver contacts	125 250 480	10 10 3	10 10 3	6 to 24	0,50	0,5	Small hysteresis
G…RD	Microswitch with silver contacts	125 250 480	10 10 10	10 10 10	12 24 250	15,00 10,00 0,20	15,0 15,0 0,3	Manual reset

We recommend gold plated contacts for all intrinsically safe and other applications with low voltage/power.

☞	**IMPORTANT**
Data only valid for application in non-explosive atmosphere. We recommend to use a prefuse of the maximum current rating from the table above according to the load switched.	

Operation pressure:

Housing: –40 °C… +75 °C, except temperature code 454, 601, 603

Sensor: See table „*Measuring Ranges“,* „Max. temperature at sensor“

Temperature switch with remote sensor

Measuring Ranges

Order code	Max. temperature at sensor [°C]	Adjustment range [°C]
154	-73… +93	-45… +66
251	-73… +149	+10… +121
351	-73… +205	+66… +177
601	-18… +343	+149… +227
603	-18… +343	+160… +316

Reset values

Order code	Adjustment range [°C]	Approximate hysteresis of different types of microswitches									
		GH, H		J		M		S adjustable from	to	G*
154	-45… +66	0.55	1.1	0.55	1.7	1.1	2.2	2.2	8.2	2.8
251	+10… +121	0.55	1.1	0.55	1.7	1.1	2.2	2.2	8.2	2.8
351	+66… +177	0.55	1.1	0.55	1.7	1.1	2.2	2.2	8.2	2.8
601	+149… +227	1,10…	2,2	1,60…	2,8	2,2…	3,3	3,8…	13,8	2,8
603	+160… +316	1,10…	2,2	1,60…	2,8	2,2…	3,3	3,8…	13,8	2,8

* can be reset

☞	**IMPORTANT**
The values given are for use in liquids. For gaseous media hysteresis will be approx. double the values.	

Local mount temperature switches

Measuring Ranges

Order code	Max. temperature at sensor [°C]	Adjustment range [°C]
201	-73… +121	-45… +24
202	-73… +121	-9… +60
203	-73… +121	+24… +93
351	-73… +205	+38… +107
204	-73… +121	-45… +93
354	-73… +205	+38… +177
454	-18… +260	+66… +232

Reset values

Order code	Adjustment range [°C]	Approximate hysteresis of different types of microswitches									
		GH, H		J		M, GM		S adjustable from		G*
201…354	-45… +177	0.55	1.6	0.55	2.2	1.7	3.3	3.8	11.0	2.8
454	+66… +232	1.60	3.3	2.20	3.8	3.3	5.0	5.5	16.5	2.8

* can be reset

☞	**IMPORTANT**
The values given are for use in liquids. For gaseous media hysteresis will be approx. double the values.	

Operatio pressure:

Without thermowell: Max. 21 bar (max. 300 psi)

With thermowell: See table „Pressure-/Temperature rating

Pressure / Temperature rating (values in bar)

Thermowell material	Temperature01 in °C				
	+22	+94	+210	+320	+430
Brass	350	295	70	0	0
Steel	365	350	335	320	245
Stainless steel	490	435	390	380	365

Barksdale
CONTROL PRODUCTS

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EU-Declaration of Conformity

ISSeP 08 ATEX 016X/1

We hereby declare in our sole responsibility, that the

Product(s):
Temperature switches

Type(s):
MT1H, T2H, L2H, T1X, T2X, L1X, TH, ML1H, Tx and T9692x

which are subject of this declaration, are in conformity with the following standards or normative documents.
2014/34/EU: Equipment and protective systems intended for use in potentially explosive atmosphere.

EN 60079-0 : 2012
EN 60079-11 : 2012

The conformity is not influenced by the introduction of the harmonized standard:

EN 60079-0 : 2018

Our Quality Management System DIN EN ISO 9001 : 2015 is approved and monitored by TÜV Hessen GmbH and we are certified according to 2014/34/EU by

TÜV NORD CERT GmbH & Co.KG, Am Tüv 1,
D- 30519 Hannover.

Approval no.:TÜV 08 ATEX 554512 Q

No. of notified body: CE 0044

Document No.: 923-1258 Rev.: J 20/108

Barksdale GmbH

Michael Weileder
Managing Director

EU- Konformitätserklärung

ISSeP 08 ATEX 016X/1

Wir erklären in alleiniger Verantwortung, dass die

Produkt(e):
Temperatur Schalter

Type(s):
MT1H, T2H, L2H, T1X, T2X, L1X, TH, ML1H, Tx und T9692x

auf die sich diese Erklärung bezieht, mit den folgenden Normen oder normativen Dokumenten übereinstimmen.
2014/34/EU: Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen.

EN 60079-0 : 2012
EN 60079-11 : 2012

Die Konformität wird durch die Einführung der neuen harmonisierten Norm nicht beeinflusst:

EN 60079-0 : 2018

Wir haben ein Qualitätsmanagementsystem gemäß DIN EN ISO 9001: 2015, welches durch den TÜV Hessen GmbH überpüft wird und sind zertifiziert nach 2014/34/EU durch den TÜV NORD CERT GmbH & Co.KG, Am Tüv 1, D- 30519 Hannover.

Zertifikatsnummer: TÜV 08 ATEX 554512 Q

Nummer der benannten Stelle: CE 0044

Dokument Nr.: 923-1258 Rev.: J 20/108

Reichelsheim, 2020-05-07

Pascal Choquet
Engineering Manager

Failure Modes, Effects and Diagnostic Analysis

Project:
Temperature switches ML1H / L1X, MT1H / T1X, L2H and T2H / T2X

Customer:
Barksdale GmbH
Reichelsheim
Germany

Contract No.: Barksdale 11/05-020

Report No.: Barksdale 11/05-020 R002

Version V1, Revision R1, December 2011

Jan Hettenbach

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Management summary

This report summarizes the results of the hardware assessment carried out on the temperature switches ML1H / L1X, MT1H / T1X, L2H and T2H / T2X. Table 1 gives an overview of the different versions that belong to the considered temperature switches.

The mechanical assessment consists of a Failure Modes, Effects and Diagnostics Analysis (FMEDA). A FMEDA is one of the steps taken to achieve functional safety assessment of a device per IEC 61508. From the FMEDA, failure rates are determined and consequently the Safe Failure Fraction (SFF) is calculated for the device. For full assessment purposes all requirements of IEC 61508 must be considered.

Table 1: Version overview [1]

Type	Comment
MLH / L1X	Single temperature switch, Ex i approval, L1X additional with Explosion proof housing and Ex d approval
MT1H / T1X	Single temperature switch with remote sensor, Ex i approval, T1X additional with Explosion proof housing and Ex d approval
L2H	Dual temperature switch, Ex i approval
T2H / T2X	Dual temperature switch, Terminal clip integrated, Ex i approval, T2X additional with Explosion proof housing and Ex d approval,

For safety applications only the described versions of the temperature switches have been considered. All other possible variants and configurations are not covered by this report.

Barksdale GmbH and *exida* together did a quantitative analysis of the temperature switches ML1H / L1X, MT1H / T1X, L2H and T2H / T2X to calculate the failure rates using *exida's* experienced-based data compilation for the different mechanical components.

The temperature switches ML1H / L1X, MT1H / T1X, L2H and T2H / T2X are classified as Type A[2] elements according to IEC 61508, having a hardware fault tolerance of 0.

All types can be used as monitoring devices which are switching at increasing temperature (max) or decreasing temperature (min).

The failure rates listed in this report do not include failures due to wear-out of any components. They reflect random failures and include failures due to external events, such as unexpected use, see section 4.2.3.

The failure rates according to IEC 61508:2010 2nd edition for the temperature switches ML1H / L1X, MT1H / T1X, L2H and T2H / T2X are listed in the following tables.

[1] All versions are available in several temperature ranges and switching contact materials (gold or silver). The listed versions are representative for the type series.

[2] Type A element: "Non-complex" element (all failure modes are well defined); for details see 7.4.4.1.2 of IEC 61508-2.

Table 2: Summary – IEC 61508:2010 failure rates[3] for increasing temperature detection

All types are with Ex i approval, L1X, T1X and T2X additional with Ex d approval.

	Failure rates (in FIT) according to *exida* Profile 2			
Failure category	**ML1H / L1X**	**MT1H / T1X**	**L2H**	**T2H / T2X**
Fail Safe Detected (λ_{SD})	**0**	**0**	**0**	**0**
Fail Safe Undetected (λ_{SU})	**139**	**139**	**265**	**265**
Fail Dangerous Detected (λ_{DD}) [4]	**0**	**0**	**27**	**27**
Fail Dangerous Undetected (λ_{DU})	**72**	**89**	**45**	**62**
Fail Annunciation Undetected (λ_{AU}) [5]	0	0	30	30
No effect	77	85	91	99
No part	0	0	0	0
Total failure rate (safety function)	**211**	**228**	**337**	**354**
SFF	**65%**	**60%**	**86%**	**82%**
SIL AC [6]	**SIL2**	**SIL2**	**SIL2**	**SIL2**

[3] It is assumed that practical fault insertion tests can demonstrate the correctness of the failure effects assumed during the FMEDAs.

[4] The device does not contain any internal diagnostics. The DD failures result from the fact that the redundant switch is considered to be a safety measure for the primary switch providing a DC of 90% by considering a common cause factor of 10%.

[5] The AU failures result from the fact that the redundant switch is considered to be a safety measure and therefore is contributing to the "annunciation" failure category.

[6] SIL AC (architectural constraints) means that the calculated values are within the range for hardware architectural constraints for the corresponding SIL. For full assessment purposes all requirements of IEC 61508 must be considered.

Table 3: Summary – IEC 61508:2010 failure rates[7] for decreasing temperature detection

All types are with Ex i approval, L1X, T1X and T2X additional with Ex d approval.

	Failure rates (in FIT) according to *exida* Profile 2			
Failure category	**ML1H / L1X**	**MT1H / T1X**	**L2H**	**T2H / T2X**
Fail Safe Detected (λ_{SD})	**0**	**0**	**0**	**0**
Fail Safe Undetected (λ_{SU})	**146**	**161**	**266**	**281**
Fail Dangerous Detected (λ_{DD}) [8]	**0**	**0**	**32**	**32**
Fail Dangerous Undetected (λ_{DU})	**65**	**67**	**33**	**35**
Fail Annunciation Undetected (λ_{AU})[9]	0	0	36	36
No effect	77	85	91	99
No part	0	0	0	0
Total failure rate (safety function)	**211**	**228**	**331**	**348**
SFF	**69%**	**70%**	**90%**	**89%**
SIL AC [10]	**SIL2**	**SIL2**	**SIL3**	**SIL2**

The failure rates are valid for the useful life of the considered temperature switches ML1H / L1X, MT1H / T1X, L2H and T2H / T2X (see Appendix 2) when operating as defined in the considered scenarios.

[7] It is assumed that practical fault insertion tests can demonstrate the correctness of the failure effects assumed during the FMEDAs.

[8] The device does not contain any internal diagnostics. The DD failures result from the fact that the redundant switch is considered to be a safety measure for the primary switch providing a DC of 90% by considering a common cause factor of 10%.

[9] The AU failures result from the fact that the redundant switch is considered to be a safety measure and therefore is contributing to the "annunciation" failure category.

[10] SIL AC (architectural constraints) means that the calculated values are within the range for hardware architectural constraints for the corresponding SIL. For full assessment purposes all requirements of IEC 61508 must be considered.

C63-AQU-QIX-002 722/k917

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Internet: www.jumousa.com

Push-in RTD Temperature Probe with Connecting Cable



- **Temperature range from -50 to +400 °C**
- **As single or double RTD temperature probe**
- **In 2-wire, 3-wire or 4-wire-circuit**
- **Connecting cable PVC, silicone, PTFE, metal braiding**

Push-in RTD temperature probes are mainly used for measuring temperature in liquids and gasses. The application areas, among others, are the air conditioning and refrigeration industry, in the construction of heating systems/furnaces/equipment, and in laboratory technology.
Depending on the version, the connection cables are suitable for dry or moist rooms with a temperature range between -50 to +400 °C. The connecting cable transition points are strain-relieved. An anti-kink protection is available as an option.
A Pt100 temperature sensing element according to DIN EN 60751, class b in 2-wire circuit is used as a measuring insert by default – versions with Pt500 or Pt1000 are also possible. The connection is also available in 3-wire and 4-wire circuits as an option.

Technical data

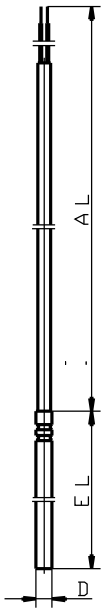
Connection	Cable ends stripped bare, with ferrules available with push-on contacts or multi-pole plug connector
Connecting cable	PVC, ambient temperature -5 to +80 °C (+105 °C) PUR, ambient temperature -5 (+5) to +105 °C Silicone, ambient temperature -50 to +180 °C PTFE, ambient temperature -50 to +260 °C Metal braiding, ambient temperature -50 to +260 °C (+350 °C / +400 °C)
Protection tube	Stainless steel 1.4571, Ø 3 mm, Ø 4 mm, Ø 5 mm, Ø 5.2 mm, Ø 6 mm, and Ø 8 mm
Measuring insert	Pt100 temperature sensing element, DIN EN 60751, class B, 2-wire circuit
Response times	In water 0.4 m/s / in air 3.0 m/s Ø 6 mm: water $t_{0.5}$ approx. 4 s, $t_{0.9}$ approx. 10 s / in air $t_{0.5}$ approx. 32 s, $t_{0.9}$ approx. 98 s Ø 8 mm: water $t_{0.5}$ approx. 7 s, $t_{0.9}$ approx. 18 s / in air $t_{0.5}$ approx. 50 s, $t_{0.9}$ approx. 140 s
Accessories	For pipe screw connections and flanges refer to data sheet 909750

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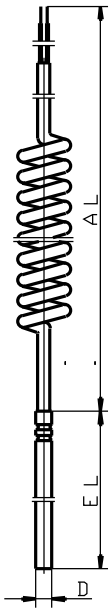
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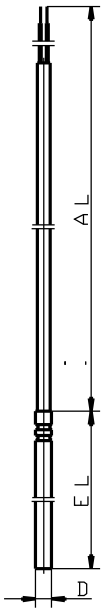
Dimensions



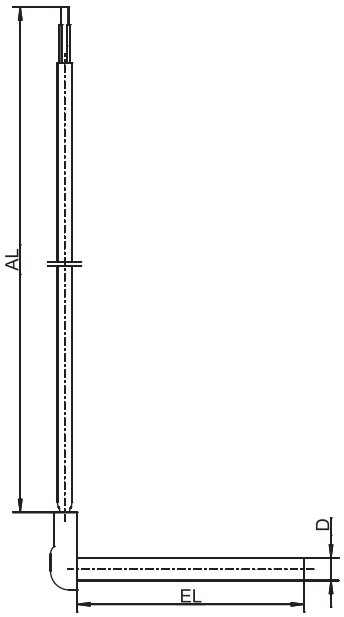
Basic type 902150/10



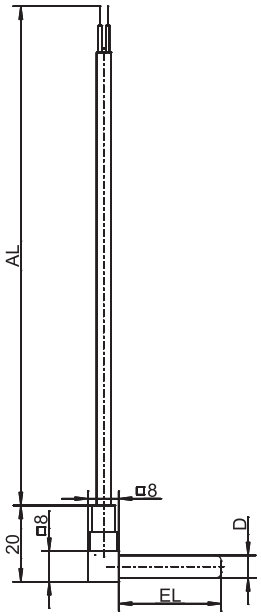
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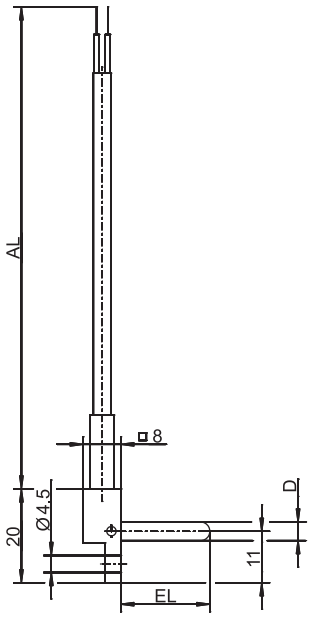
Basic type 902150/30



Basic type 902150/40



Basic type 902150/42



Basic type 902150/44

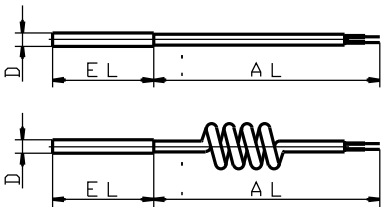
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Order details: Push-in RTD temperature probe with connecting cable

			(1)	**Basic type**
		902150/10		Push-in RTD temperature probe with connecting cable, single-section protection tube made of stainless steel
		902150/20		Push-in RTD temperature probe with spiral connecting cable, single-section protection tube made of stainless steel
			(2)	**Operating temperature in °C/connecting cable**
x		378		-50 to +180 °C / silicone
x		386		-50 to +260 °C / PTFE
x		388		-50 to +260 °C / metal braiding
x		402		-50 to +400 °C / metal braiding
x		724		-5 to +80 °C / PVC
x	x	730		-5 to +105 °C / PVC or PUR
x		912		5 to +105 °C / PUR (only with 1× Pt100 in 2-wire circuit)
			(3)	**Measuring insert**
x		1001		1× Pt 100 in 3-wire-circuit
x	x	1003		1× Pt 100 in 2-wire circuit
x		1011		1× Pt 100 in 4-wire circuit
x		2001		2× Pt 100 in 3-wire-circuit
x		2003		2× Pt 100 in 2-wire circuit
			(4)	**Tolerance class according to DIN EN 60751**
x	x	1		Class B (standard)
x	x	2		Class A
			(5)	**Protection tube diameter D in mm**
x		3		Ø 3 mm (only as 1× Pt100 in 2-wire circuit with PTFE connecting cable)
x		4		Ø 4 mm (only as 1× Pt100 in 2-wire circuit with silicone, PTFE connecting cable, or metal braid)
x		5		Ø 5 mm
x		5.2		Ø 5.2 mm
x	x	6		Ø 6 mm
			(6)	**Insertion length EL in mm**
x		30		30 mm (standard with D 3 mm and D 4 mm)
x		45		45 mm (standard with D 5 mm and D 5.2 mm)
x	x	50		50 mm (not for D < 6 mm)
x		60		60 mm (not for D < 6 mm)
			(7)	**Connecting cable end**
x	x	03		Blank connection wires
x	x	11		Ferrules (standard)
x	x	13		Push-on contact 6.3
x	x	80		Multi-pole plug connector (specify type in plain text)
			(8)	**Connecting cable length AL in mm (AL 500 to 500,000 mm for basic type 902150/10)**
	x	1100		1,100 mm (effective)
x		1500		1,500 mm
x		2500		2,500 mm
x		...		Please specify in plain text (500 mm steps)
			(9)	**Extra codes**
x	x	000		Without extra code
x		315		Strain relief spring
x		316		Strain-relief spring hose
x	x	317		Shielded connecting cable
x		858		Waterproof, protection type IP65 (only for EL 60 mm with PUR or silicone connecting cable)



	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
Order code		-		-		-		-		-		-		-		/		, ...[1]
Order example	902150/10	-	378	-	1001	-	1	-	6	-	50	-	11	-	2500	/	000	

[1] List extra codes in sequence, separated by commas.

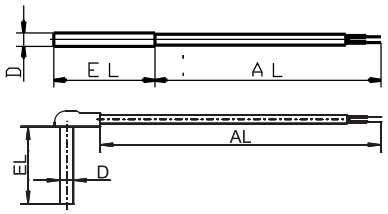
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Order details: Push-in RTD temperature probe with connecting cable

			(1)	**Basic type**
		902150/30		Push-in RTD temperature probe with connecting cable, multi-part protection tube (welded) made of stainless steel
		902150/40		Push-in RTD temperature probe with connecting cable, multi-part protection tube right-angled (welded) made of stainless steel
			(2)	**Operating temperature in °C / connecting cable**
x		378		-50 to +180 °C / silicone
x		386		-50 to +260 °C / PTFE
x		388		-50 to +260 °C / metal braiding
	x	397		-50 to +350 °C / metal braiding
x		402		-50 to +400 °C / metal braiding
x		724		-5 to +80 °C / PVC
x		912		5 to +105 °C / PUR (only with 1× Pt100 in 2-wire circuit)
			(3)	**Measuring insert**
x		1001		1× Pt 100 in 3-wire-circuit
x	x	1003		1× Pt 100 in 2-wire circuit
x		1011		1× Pt 100 in 4-wire circuit
x		2001		2× Pt 100 in 3-wire-circuit
x	x	2003		2× Pt 100 in 2-wire circuit
			(4)	**Tolerance class according to DIN EN 60751**
x	x	1		Class B (standard)
x	x	2		Class A
			(5)	**Protection tube diameter D in mm**
x	x	6		Ø 6 mm
x		8		Ø 8 mm
			(6)	**Insertion length EL in mm (EL 50 to 500 mm)**
x	x	50		50 mm
x	x	60		60 mm
x	x	100		100 mm
x	x	150		150 mm
x	x	200		200 mm
x	x	...		Please specify in plain text (50 mm steps)
			(7)	**Connecting cable end**
x	x	03		Blank connection wires
x	x	11		Ferrules (standard)
x	x	13		Push-on contact 6.3
x	x	80		Multi-pole connector (specify type in plain text)
			(8)	**Connecting cable length AL in mm (500 to 500,000 mm)**
x	x	2500		2,500 mm
x	x	...		Please specify in plain text (500 mm steps)
			(9)	**Extra codes**
x		000		Without extra code
x		310		Protection tube offset
x		315		Strain relief spring
x		316		Strain-relief spring hose
x	x	317		Shielded connecting cable



	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
Order code		-		-		-		-		-		-		-		/		, ...[1]
Order example	902150/30	-	378	-	1001	-	1	-	6	-	50	-	11	-	2500	/	000	

[1] List extra codes in sequence, separated by commas.

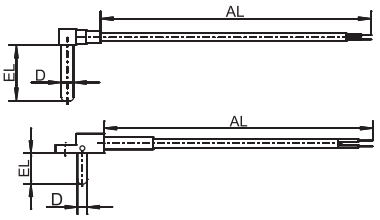
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Order details: Push-in RTD temperature probe with connecting cable

			(1)	**Basic type**
		902150/42		Push-in RTD temperature probe with connecting cable, single-section protection tube right-angled made of stainless steel
		902150/44		Push-in RTD temperature probe with connecting cable and mounting borehole, single-section protection tube right-angled made of stainless steel
			(2)	**Operating temperature in °C / connecting cable**
x	x	388		-50 to +260 °C / metal braiding
			(3)	**Measuring insert**
x	x	1003		1× Pt 100 in 2-wire circuit
x		1011		1× Pt 100 in 4-wire circuit
x		2003		2× Pt 100 in 2-wire circuit
			(4)	**Tolerance class according to DIN EN 60751**
x	x	1		Class B (standard)
x	x	2		Class A
			(5)	**Protection tube diameter D in mm**
	x	4		Ø 4 mm
x		6		Ø 6 mm
			(6)	**Insertion length EL in mm**
	x	9		9 mm
	x	12		12 mm
x		20		20 mm
x		50		50 mm
			(7)	**Connecting cable end**
x	x	03		Blank connection wires
x	x	11		Ferrules (standard)
x	x	13		Push-on contact 6.3
x	x	80		Multi-pole connector (specify type in plain text)
			(8)	**Connecting cable length AL in mm (500 to 500,000 mm)**
x	x	2500		2,500 mm
x	x	...		Please specify in plain text (500 mm steps)
			(9)	**Extra codes**
x	x	000		Without extra code
x	x	315		Strain relief spring
x	x	317		Shielded connecting cable



	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
Order code		-		-		-		-		-		-		-		/		, ...[1]
Order example	902150/42	-	388	-	1003	-	1	-	6	-	20	-	03	-	2500	/	000	

[1] List extra codes in sequence, separated by commas.

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Stock versions

(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	Part no.
902150/10	-	378	-	1003	-	1	-	5.2	-	45	-	11	-	2500	/	000	00326037
902150/10	-	378	-	1003	-	1	-	6	-	50	-	11	-	2500	/	000	00389771
902150/10	-	378	-	1003	-	1	-	6	-	50	-	11	-	1500	/	000	00085313
902150/10	-	378	-	1001	-	1	-	6	-	50	-	11	-	2500	/	000	00392513
902150/10	-	378	-	1003	-	1	-	6	-	60	-	11	-	2500	/	858	00492541
902150/10	-	402	-	1003	-	1	-	6	-	50	-	11	-	1500	/	317	00085311
902150/10	-	724	-	1003	-	1	-	6	-	50	-	11	-	2500	/	000	00059085
902150/10	-	724	-	1003	-	1	-	6	-	50	-	11	-	1500	/	000	00085315
902150/10	-	730	-	1003	-	1	-	6	-	50	-	11	-	1500	/	000	00085316
902150/10	-	730	-	1003	-	1	-	6	-	60	-	11	-	2500	/	858	00492539
902150/20	-	730	-	1003	-	1	-	6	-	50	-	11	-	1100	/	000	00065495
902150/30	-	388	-	1003	-	1	-	6	-	50	-	11	-	2500	/	315.317	00055718
902150/30	-	388	-	1003	-	1	-	6	-	100	-	11	-	2500	/	315.317	00055719
902150/30	-	388	-	1001	-	1	-	6	-	50	-	11	-	2500	/	315.317	00065451
902150/30	-	388	-	1001	-	1	-	6	-	100	-	11	-	2500	/	315.317	00065453
902150/30	-	402	-	1001	-	1	-	6	-	150	-	11	-	2500	/	315.317	00549701
902150/40	-	397	-	1003	-	1	-	6	-	60	-	11	-	2500	/	317	00055715

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JUMO

More than sensors + automation

CERTIFICATE OF CONFORMITY

We, JUMO GmbH & Co. KG

Moritz-Juchheim-Str. 1

36039 Fulda

GERMANY

do declare in our own responsibility, that the product

Push-in RTD Temperature Probe with Connecting Cable
Type: 902150

does conform with the technical data stated

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Fulda, 17.08.2021 Group Manager Sales Sensors, Oliver Hohmann

Encs.
data sheet 902150

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AQUAGAS SWEDEN AB

Date: 2022-06-20

To whom it may concern

Verification as simple apparatus for JUMO PT100 sensor 90.2150/30

Based on EN 60079-14 :2014, chapter 16.4 a) the "PT100 element" supplied from Jumo, part number "90.2150/30" can be used as a simple apparatus.

Remarks EN 60079-11 :2012, chapter 5. 7
the type "90.2150/30" contains no voltage limiting and/or current limiting and/or protective devices (See vendor documentation).
the type "90.2150/30" contain no devices to increase the available voltage and available current.(see vendor documentation).

The sensor of type "90.2150/30" is installed in a closed 6mm Cr/Ni tube of 90mm length in such a way that it maintains the integrity of the isolation from earth according to EN60079-14 :2014 chapter 16.4
.
The surface area of the "90.2150/30" sensor is 1725 mm
According to EN 60079-0:2009, chapter 16.4 table 4 devices with a surface >1 000 mm2 and a maximum power dissipation of Pi=1000mW, could be classified in T4 with T ambient max 80°C
The sensor is installed in an area with max 40°C ambient temperature.

The values Ci and Li of the "90.2150/30" are negligible.
Therefore the classification for the "90.2150/30" is :
EPL Ga, llC, Pi= 1000mW, temperature class T4 T ambient max 80°C

Yours sincerely
AQUAGAS Sweden AB
Per Agartson

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C63-AQU-QIX-002-730/L917

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Surface RTD Temperature Probes



- For temperatures between -50 and +260 °C
- With protection fittings made from various materials
- For round and flat surfaces
- Simple and quick installation
- Low thermal mass
- Good thermal transfer from the measuring point to the sensor

Surface RTD temperature probes are the preferred choice for measuring temperatures on closed pipe systems and/or other round or flat surfaces. The probes can be installed with ease using tightening bands or cable ties so there is no need for mechanical modification of the measuring location. The basic types 902550/10 and 902550/11 which are provided with a hole for screw-fitting to any surface (such as heating plates) are the exception.

The indirect method of temperature measurement avoids disruption of the medium flow. Additionally, the operating life of the RTD temperature probe is not shortened by the effects of either pressure or chemicals.

The low thermal mass of the probe means that it has very little influence on the measured object. Heat-conducting paste is available to improve heat transfer. Large differences in temperature between the measurement medium and the surrounding environment will influence the measurement. In such cases, we recommend additional insulation.

The measuring insert is fitted as standard with a Pt100 temperature sensor according to DIN EN 60751, class B in a two-wire circuit; versions with Pt500 or Pt1000 are also available.

The product range is rounded off by a pipe contact probe with a large cable socket (basic type 902554/44). This is available with an analog transmitter as an optional extra.

Technical data

Connection	Available as tin-plated cable ends, with ferrules, with plug-in sleeves, or multi-pole plug connectors
Connecting cable	Silicone, ambient temperature -50 to +180 °C PTFE, ambient temperature -190 to +260 °C Kapton, ambient temperature -50 to +260 °C
Cable socket	Basic type 902554/41 and 902554/42 plastic housing: PC, color: silver-gray/blue Basic type 902554/44 plastic housing: PC, color: white Connection via screw terminals, basic type 902554/44 if transmitter not selected available with spring-cage terminals as optional extra
Protection tube	Stainless steel 1.4571, aluminum, plastic
Measuring insert	Pt100 temperature sensor, DIN EN 60751, class B, two-wire circuit
Transmitter	For basic type 902554/44 analog transmitter as optional extra, 4 to 20 mA or 0 to 10 V

Approvals / approval marks

Safety Integrity Level SIL QUALIFIED

Performance Level PL QUALIFIED

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Internet: www.jumousa.com

Transmitter

	Output 4 to 20 mA	Output 0 to 10 V
Input		
Measurement input	Pt100 (DIN EN 60751)	Pt100 (DIN EN 60751)
Sensor current	≤ 0.5 mA	≤ 0.5 mA
Sampling rate	Permanent measurement due to analog signal path	Permanent measurement due to analog signal path
Measuring circuit monitoring		
Underrange	Dropping to ≤ 3.6 mA	0 V
Overrange	Increasing to ≥ 22 to < 28 mA (typical 24 mA)	Increasing to ≥ 11 to < 14 V (typical 12 V)
Probe short circuit	≤ 3.6 mA	0 V
Probe/cable break	≥ 22 to < 28 mA (typical 24 mA)	≥ 11 to < 14 V (typical 12 V)
Output		
Output signal	Load-independent direct current: 4 to 20 mA	Direct voltage: 0 to 10 V
Transmission behavior	Temperature-linear	Temperature-linear
Transmission accuracy	≤ ±0.1 %	≤ ±0.2 %
Attenuation of the residual ripple of a voltage supply of 24 V, amplitude 10 V/50 Hz, burden 470 Ω/load 10 MΩ	37 dB	40 dB
Burden (Rb)	Rb = (Ub - 7.5 V) ÷ 22 mA	-
Burden influence	≤ ±0.02 %/100 Ω[a]	-
Load / load influence	-	≥ 10 kΩ/≤ ±0.1 %
Setting time for temperature changes	≤ 10 ms	≤ 10 ms
Calibration conditions	DC 24 V/approx. 22 °C	DC 24 V/approx. 22 °C
Calibration accuracy	≤ ±0.2 %[a,b] or ≤ ±0.2 K	≤ ±0.2 %[a,b] or ≤ ±0.2 K
Overall accuracy, sensor/calibration	±0.4 K (typical) at 20 °C/24 V voltage supply	±0.4 K (typical) at 20 °C/24 V voltage supply
Voltage supply		
Voltage supply (Ub)	DC 7.5 to 30 V	DC 15 to 30 V
Reverse voltage protection	Yes	Yes
Voltage supply influence	≤ ±0.01 %/V deviation from 24 V[a]	≤ ±0.01 %/V deviation from 24 V[a]
Environmental influences		
Operating temperature range	-40 to + 85 °C	-40 to + 85 °C
Storage temperature range	-40 to +100 °C	-40 to +100 °C
Temperature influence	≤ ±0.01 %/K deviation from 22 °C[a]	≤ ±0.01 %/K deviation from 22 °C[a]
Resistance to climatic conditions similar to DIN EN 60654 class C1	Relative humidity ≤ 95 % annual average, no condensation	Relative humidity ≤ 95 % annual average, no condensation
EMC interference emission/immunity	EN 61326 class B, industrial requirements	EN 61326 class B, industrial requirements

[a] All specifications refer to the measuring range end value of 20 mA.
[b] The higher value is valid.

Approvals / approval marks

Approval mark	Test facility	Certificate / certification number	Inspection basis	Valid for
SIL QUALIFIED PL QUALIFIED	-	-	-	Extra code 058 in conjunction with declaration of manufacturer

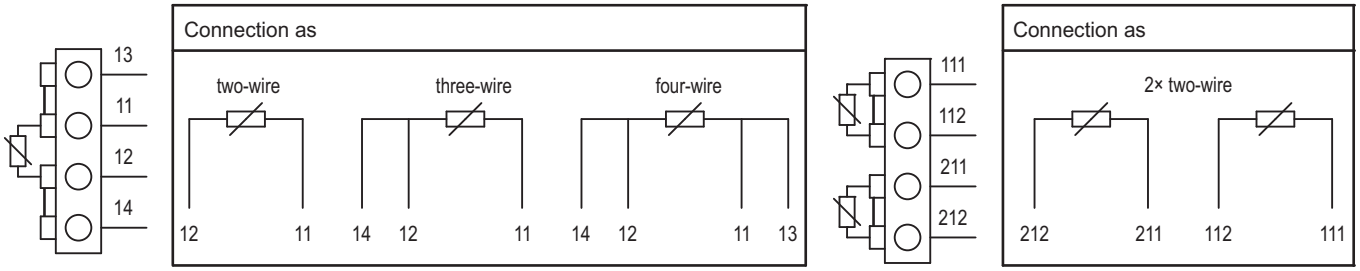
JUMO GmbH & Co. KG
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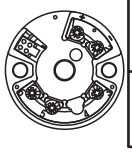
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Connection diagram

Standard versions



Transmitter for basic type 902554/44



Output 4 to 20 mA

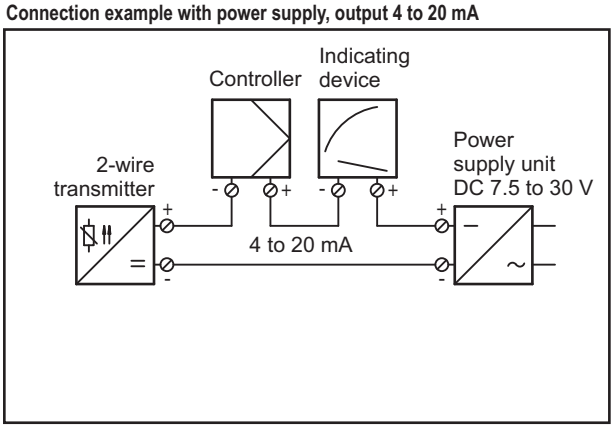
Connection for		Terminal assignment		
	Voltage supply DC 7.5 to 30 V	+ 1 - 2	$R_B = \frac{U_b - 7.5\ V}{22\ mA}$ R_B = Burden resistance U_b = Voltage supply	1 2 + -
	Current output 4 to 20 mA			

Output 0 to 10 V

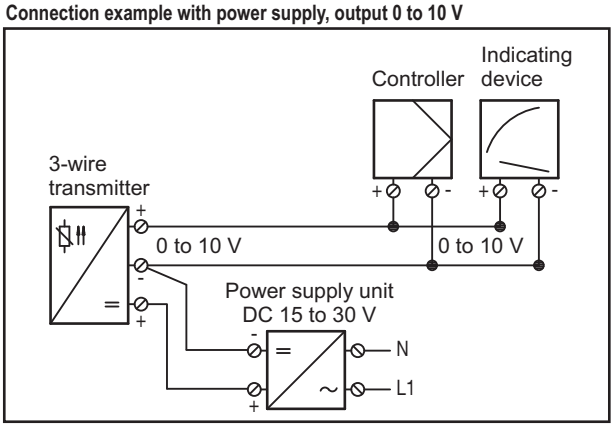
Connection for		Terminal assignment		
	Voltage supply DC 15 to 30 V	+ 1 - 2	Load ≥ 10 kΩ	1 2 3 + - +
	Voltage output 0 to 10 V	- 2 + 3		

Connection examples

Connection example with power supply, output 4 to 20 mA



Connection example with power supply, output 0 to 10 V

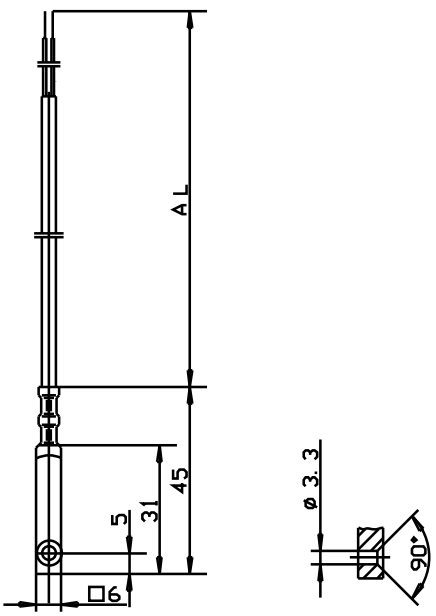


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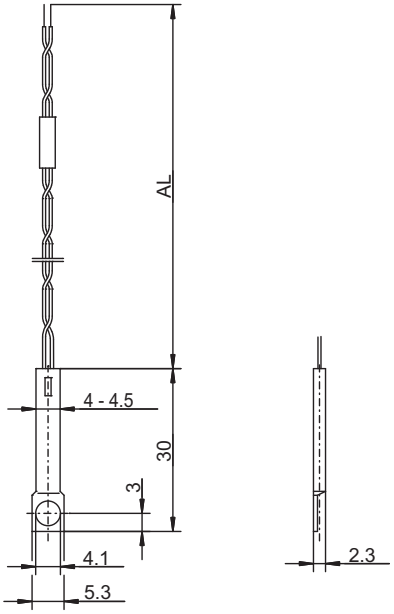
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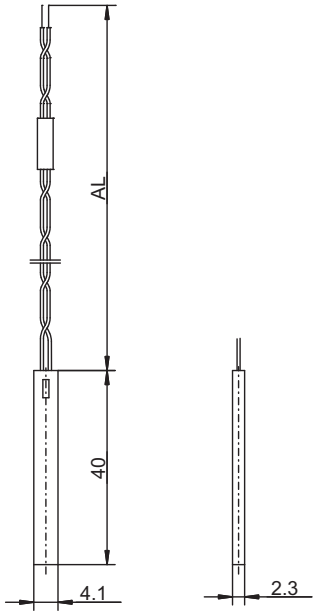
Dimensions



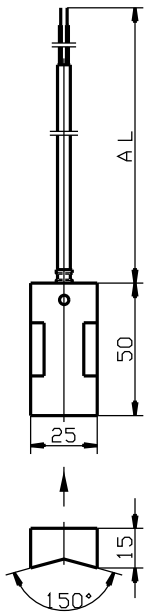
Basic type 902550/10



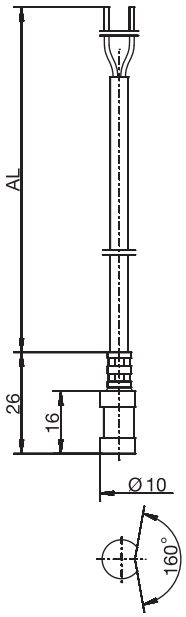
Basic type 902550/11



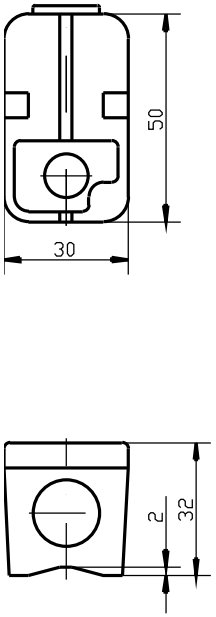
Basic type 902550/20



Basic type 902550/30



Basic type 902550/31

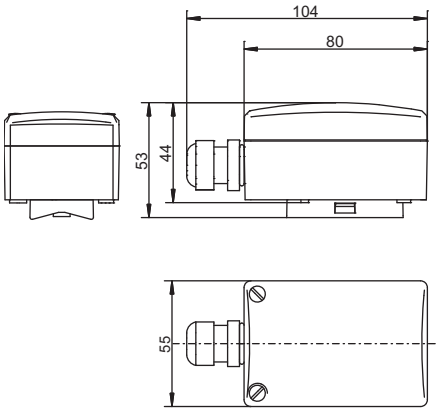


Basic type 902554/41
Basic type 902554/42

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Basic type 902554/44

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Order details

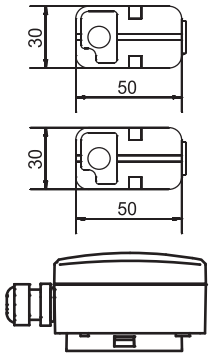
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				(1)	**Basic type**
			902554/41		Surface RTD temperature probe for cylindrical surfaces (pipes) protection type IP54, incl. installation kit
			902554/42		Surface RTD temperature probe for flat surfaces, protection type IP54
			902554/44		Surface RTD temperature probe for cylindrical surfaces (pipes), protection type IP65, incl. installation kit
				(2)	**Operating temperature in °C**
		x	361		-50 to +90 °C
x	x		365		-50 to +120 °C
		x	474		-40 to +80 °C (measuring range only in conjunction with extra code 330 or 333)
		x	573		-30 to +90 °C
				(3)	**Measuring insert**
x	x	x	1003		1× Pt100 in two-wire circuit
x	x	x	1004		1× Pt500 in two-wire circuit
x	x	x	1005		1× Pt1000 in two-wire circuit
x	x	x	1009		1× Ni1000 in two-wire circuit
		x	1619		1× KTY81-110 in two-wire circuit
x	x	x	1622		1× KTY81-122 in two-wire circuit
		x	1654		1× LM235 Z
		x	1728		1× NTC 1 kOhm
				(4)	**Tolerance class according to DIN EN 60751**
x	x	x	0		Technical data Ni/NTC/KTY/LM235 Z
x		x	1		Class B (standard)
x		x	2		Class A
		x	3		Class AA
				(5)	**Extra codes**
x	x	x	000		none
x	x	x	058		SIL and PL-compatible
		x	242		Conductor connection via spring-cage terminals (not in conjunction with transmitter)
		x	330		1× analog transmitter, output 4 to 20 mA[a] (in conjunction with Pt100), data sheet 707030
		x	333		1× analog transmitter, output 0 to 10 V[a] (in conjunction with Pt100), data sheet 707030
x	x		404		Protection type IP65 (cable fitting M16 × 1.5)



[a] Specify measuring range (deviating measuring range) in plain text.

	(1)		(2)		(3)		(4)		(5)	
Order code		-		-		-		/		,...[a]
Order example	902554/41	-	365	-	1003	-	1	/	000	

[a] List extra codes in sequence, separated by commas.

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Stock versions

Order code	Part no.
902550/10-386-1003-1-11-2500/000	00306774
902550/11-386-1003-1-11-2500/000	00065548
902550/20-386-1003-1-11-2500/000	00065547
902550/30-378-1003-1-11-2500/315	00065531
902550/31-730-1003-1-11-2500/000	00506998
902550/31-378-1003-1-11-2500/000	00507000
902550/31-378-1005-1-11-2500/000	00507006
902554/41-365-1003-1/000	00378669
902554/41-365-1003-1/404	00376703

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Internet: www.jumo.net

More than sensors + automation

EU-Konformitätserklärung

EU declaration of conformity / Déclaration UE de conformité

Dokument-Nr.
Document No. / Document n°.
CE 834

Hersteller
Manufacturer / Etabli par
JUMO GmbH & Co. KG

Anschrift
Address / Adresse
Moritz-Juchheim-Straße 1, 36039 Fulda, Germany

Produkt
Product / Produit

Name *Name / Nom*	**Typ** *Type / Type*	**Typenblatt-Nr.** *Data sheet no. / N° Document d'identification*
Anlege-Widerstandsthermometer	902550	902550

Wir erklären in alleiniger Verantwortung, dass das bezeichnete Produkt die Anforderungen der Europäischen Richtlinien erfüllt.

We hereby declare in sole responsibility that the designated product fulfills the requirements of the European Directives.

Nous déclare sous notre seule responsabilité que le produit remplit les Directives Européennes.

Richtlinie 1
Directive / Directive

Name
Name / Nom
EMC

Fundstelle
Reference / Référence
2014/30/EU

Bemerkung
Comment / Remarque

Datum der Erstanbringung des CE-Zeichens auf dem Produkt
Date of first application of the CE mark to the product / Date de 1ère application du sigle sur le produit
2017

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Angewendete Normen/Spezifikationen

Standards/Specifications applied / Normes/Spécifications appliquées

Fundstelle *Reference / Référence*	**Ausgabe** *Edition / Édition*	**Bemerkung** *Comment / Remarque*
EN 61326-1	2013	
EN 61326-2-3	2013	

Gültig für Typ

Valid for Type / Valable pour le type

902550/...

Allgemeine Bemerkungen

General remarks / Observations générales

For all types with extra codes 330, 331, 333, 334, 335, 336, 337, 550, 551, 859, 866, 867 . 868 or 869

Richtlinie 2

Directive / Directive

Name
Name / Nom
RoHS

Fundstelle
Reference / Référence
2011/65/EU

Bemerkung
Comment / Remarque

Datum der Erstanbringung des CE-Zeichens auf dem Produkt
Date of first application of the CE mark to the product / Date de 1ère application du sigle sur le produit
2017

Angewendete Normen/Spezifikationen

Standards/Specifications applied / Normes/Spécifications appliquées

Fundstelle *Reference / Référence*	**Ausgabe** *Edition / Édition*	**Bemerkung** *Comment / Remarque*
VDK Umweltrelevante Aspekte bei der Produktentwicklung und -gestaltung	V1	

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More than sensors + automation

Gültig für Typ

Valid for Type / Valable pour le type

902550/...

Allgemeine Bemerkungen

General remarks / Observations générales

For all types with extra codes 330, 331, 333, 334, 335, 336, 337, 550, 551, 859, 866, 867 . 868 or 869

Aussteller
Issued by / Etabli par

JUMO GmbH & Co. KG

Ort, Datum
Place, date / Lieu, date

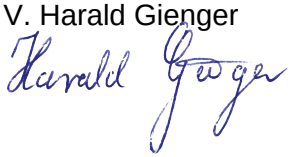
Fulda, 2019-06-06

Rechtsverbindliche Unterschriften
Legally binding signatures /
Signatures juridiquement valable

Bereichsleiter Vertrieb Inland / Globales Produkt- und Branchenmanagement
ppa. Dimitrios Charisiadis



Qualitätsbeauftragter und Leiter Qualitätswesen
i. V. Harald Gienger



Date: 2022-06-20

To whom it may concern

Verification as simple apparatus for JUMO PT100 sensor 90.2550/10

Based on EN 60079-14 :2014, chapter 16.4 a) the "PT100 element" supplied from Jumo, part number "90.2250/10" can be used as a simple apparatus.

Remarks EN 60079-11 :2012, chapter 5. 7
the type "90.2550/10" contains no voltage limiting and/or current limiting and/or protective devices (See vendor documentation).
the type "90.2550/10" contain no devices to increase the available voltage and available current.(see vendor documentation).

The sensor of type "90.2550/10" is installed in a closed 6 mm aluminum body of 31mm length in such a way that it maintains the integrity of the isolation from earth according to EN60079-14 :2014 chapter 16.4
.
The surface area of the "90.2550/10" sensor is 650 mm2
According to EN 60079-0:2009, chapter 16.4 table 4 devices with a surface between 20mm2 and 1000mm2 and a maximum power dissipation of Pi=1000mW, could be classified in T4 with T ambient max 80°C
The sensor is installed in an area with max 40°C ambient temperature.

The values Ci and Li of the "90.2550/10" are negligible.
Therefore the classification for the "90.2550/10" is :
EPL Ga, llC, Pi= 1000mW, temperature class T4 T ambient max 80°C

Yours sincerely
AQUAGAS Sweden AB
Per Agartson

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Sweden

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VAT. No. SE556563726001

CERTIFICATE

(1) EC-Type Examination

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **KEMA 03ATEX1535 X** Issue Number: **4**

(4) Equipment: **2-Wire Programmable Transmitter Type 5333B, Type 5333C and Type 5333D**

(5) Manufacturer: **PR electronics A/S**

(6) Address: **Lerbakken 10, 8410 Rønde, Denmark**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) DEKRA Certification B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report no. 214371900/2.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2012 **EN 60079-11 : 2012** **EN 60079-26 : 2007**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 1 G Ex ia IIC T4...T6 Ga
II 1 D Ex ia IIIC Da
II 1 M Ex ia I Ma

This certificate is issued on 21 Augustus 2013 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

DEKRA Certification B.V.

R. Schuller
Certification Manager

PRODUCTS RvA C 001

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DEKRA

(13) # SCHEDULE

(14) **to EC-Type Examination Certificate KEMA 03ATEX1535 X** Issue No. **4**

(15) **Description**

The 2-Wire Programmable Transmitter, Type 5333B, Type 5333C and Type 5333D, suitable for mounting in an enclosure form B according to DIN 43729, is used to convert the temperature measurement signal of a resistive temperature sensor into a 4 ... 20 mA current signal with digital communication.

The relation between temperature class and temperature class is as follows:
T4 (Ta -40 to +85 °C),
T5 (Ta -40 to +60 °C),
T6 (Ta -40 to +60 °C).

For explosive dust atmospheres, the surface temperature of the outer enclosure is 20 K above the ambient temperature.

Electrical data

Supply / output circuit (terminals 1 and 2):
in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC and Ex ia I, only for connection to a certified intrinsically safe circuit, with the following maximum values:
U_i = 30 V; I_i = 120 mA; P_i = 0,84 W; C_i = 1 nF; L_i = 10 µH.

Sensor circuit (terminals 3, 4 and 6):
in type of protection intrinsic safety Ex ia IIC, Ex ia IIIC and Ex ia I, with the following maximum values:
U_o = 30 V; I_o = 8 mA; P_o = 60 mW; C_o = 66 nF; L_o = 35 mH.

Installation instructions

The instructions provided with the equipment shall be followed in detail to assure safe operation.

(16) **Test Report**

No. 214371900/2.

(17) **Special conditions for safe use**

If the transmitter is installed in an explosive atmosphere requiring the use of equipment of category 1 G, 1 M or 2 M, and if the enclosure is made of aluminum, if must be installed such, that ignition sources due to impact and friction sparks are excluded.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 214371900/2.

PERFORMANCE MADE SMARTER



2-wire programmable transmitter

5333D

- RTD or Ohm input
- High measurement accuracy
- 3-wire connection
- Programmable sensor error value
- For DIN form B sensor head mounting

Application

- Linearized temperature measurement with Pt100...Pt1000 or Ni100...Ni1000 sensor.
- Conversion of linear resistance variation to a standard analog current signal, for instance from valves or Ohmic level sensors.

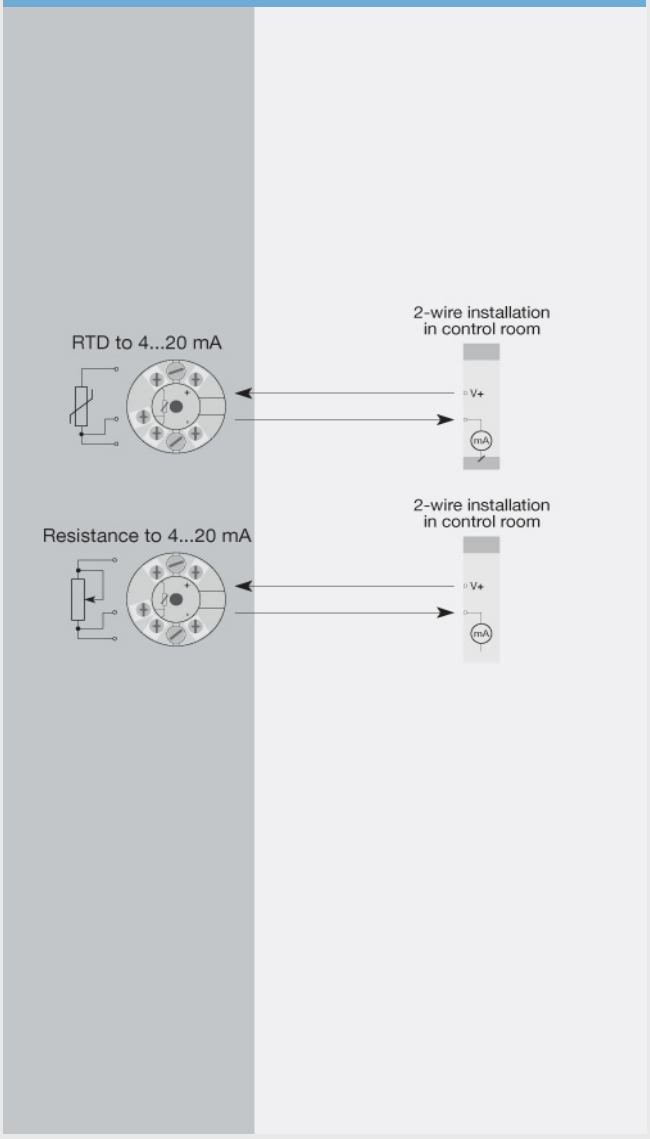
Technical characteristics

- Within a few seconds the user can program PR5333D to measure temperatures within all RTD ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 3-wire connection.

Mounting / installation

- For DIN form B sensor head mounting.

Connections



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Order:

Type
5333D

Environmental Conditions

Specifications range	-40°C to +85°C
Calibration temperature	20...28°C
Relative humidity	< 95% RH (non-cond.)
Protection degree (encl./terminal)	IP68 / IP00

Mechanical specifications

Dimensions	Ø 44 x 20.2 mm
Weight approx.	50 g
Wire size	1 x 1.5 mm^2 stranded wire
Screw terminal torque	0.4 Nm
Vibration	IEC 60068-2-6 : 2007
Vibration: 2...25 Hz	±1.6 mm
Vibration: 25...100 Hz	±4 g

Common specifications

Supply

Supply voltage	8.0...30 VDC

Response time

Response time (programmable)	0.33...60 s
Internal consumption	25 mW…0.8 W
Voltage drop	8.0 VDC
Warm-up time	5 min.
Programming	Loop Link
Signal / noise ratio	Min. 60 dB
Accuracy	Better than 0.1% of selected range
Signal dynamics, input	19 bit
Signal dynamics, output	16 bit
Effect of supply voltage change	< 0.005% of span / VDC
EMC immunity influence	< ±0.5% of span

Input specifications

Common input specifications

Max. offset	50% of selected max. value

RTD input

RTD type	Pt100, Ni100, lin. R
Cable resistance per wire (max.)	10 Ω
Sensor current	> 0.2 mA, < 0.4 mA
Effect of sensor cable resistance (3-wire)	< 0.002 Ω / Ω
Sensor error detection	Yes

Linear resistance input

Linear resistance min....max	0 Ω...10000 Ω

Output specifications

Current output

Signal range	4…20 mA
Min. signal range	16 mA
Load (@ current output)	≤ (Vsupply - 8) / 0.023 [Ω]
Load stability	≤0.01% of span / 100 Ω
Sensor error indication	Programmable 3.5…23 mA
NAMUR NE 43 Upscale/Downscale	23 mA / 3.5 mA

Common output specifications

Updating time	135 ms
*of span	= of the presently selected range

Observed authority requirements

EMC	2014/30/EU

Approvals

ATEX 2014/34/EU	KEMA 03ATEX1535 X
IECEx	DEK 13.0036X
FM	2D5A7
CSA	1125003
INMETRO	DEKRA 13.0002 X
CCOE	P337392/2
EAC	TR-CU 020/2011
EAC Ex TR-CU 012/2011	RU C-DK.GB08.V.00410
DNV Marine	Stand. f. Certific. No. 2.4

EU DECLARATION OF CONFORMITY

(5333DoC_106)

As manufacturer

PR electronics A/S, Lerbakken 10, DK-8410 Rønde

hereby declares that the following product:

Type: **5333**
Name: **2-wire programmable transmitter**
From serial no.: **211809511**

is in conformity with the following directives and standards:

The EMC Directive 2014/30/EU and later amendments:

EN 61326-1 : 2013

Immunity test requirements for equipment intended to be used in an industrial electromagnetic environment. For specification of the acceptable EMC performance level, refer to the electrical specifications for the device.

The ATEX Directive 2014/34/EU and later amendments:

EN IEC 60079-0 : 2018, EN 60079-7 : 2015 + A1 : 2018, EN 60079-11 : 2012 and EN 60079-15 : 2010
ATEX certificate: DEKRA 20ATEX0106 X (5333A)
ATEX certificate: DEKRA 20ATEX0105 X (5333D)

ATEX notified body (type approval)

DEKRA Certification B.V.
Meander 1051, 6825 MJ Arnhem
P.O. Box 5185, 6802 ED Arnhem
The Netherlands

The RoHS2 Directive 2011/65/EU and later amendments

EN 50581 : 2012

Notified body 0344

DEKRA Certification B.V.
Meander 1051, 6825 MJ Arnhem
P.O. Box 5185, 6802 ED Arnhem
The Netherlands

Rønde, 11 October 2021

Stig Lindemann, CTO
Manufacturer's signature

F20.1/2020-08-13/HGA

04 - HANDLING OPERATING MAINTENANCE INSTRUCTIONS

Lifting Instruction

Project Information

Project Name	**C63 Offshore**
Project Number	A-23/24 140
Equipment Description	DEDR 500/36
Weight of Equipment	Approx. 1400 kg
Number of Lifting Eyes	4 (2 on each support)
Prepared By	Kasim Aytekin

Table of Contents

1. **General Safety Precautions**
2. **Equipment and Lifting Gear Requirements**
3. **Lifting Procedure**
   3.1 Pre-Lift Inspection
   3.2 Rigging the Equipment
   3.3 Lifting and Positioning
   3.4 Load Transport and Set Down
4. **Post-Lift Inspection**
5. **Emergency Procedures**

1. General Safety Precautions

- Ensure all personnel involved are trained and authorized for lifting operations.
- Use appropriate personal protective equipment (PPE) such as safety helmets, gloves, and steel-toe boots.
- Ensure the lifting equipment (crane, hoists, shackles, slings) is certified and has the capacity to handle the load.
- Inspect the equipment and lifting accessories before starting the operation.
- Confirm that the load is balanced, stable, and securely fastened.
- Establish clear and agreed-upon communication signals between the operator and spotters.

2. Equipment and Lifting Gear Requirements

- **Crane/Hoist**: Use a crane or hoist with sufficient lifting capacity, providing a safety margin above the total load to be lifted.
- **Lifting Shackles**: Ensure that shackles are appropriately rated for the load applied to each lifting point. Select shackles based on the specific load distribution.
- **Lifting Slings**: Use wire rope or synthetic slings rated for the total load, ensuring proper sling length to achieve a safe lifting angle.
- **Spreader Bar (optional)**: A spreader bar may be used to evenly distribute the load across multiple lifting points and prevent lateral forces on the lifting eyes.

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3. Lifting Procedure

Step 1: Rigging the Equipment

- Attach lifting shackles to each lifting eye, ensuring all shackles are rated appropriately for the load.
- Secure the slings to the shackles without twisting or damaging them.
- If using a spreader bar, connect the slings to the spreader bar first to maintain safe lifting angles.
- Double-check all connections to ensure the load is evenly distributed across the lifting eyes.

Step 2: Lifting and Positioning

- Slowly lift the equipment a few centimeters off the ground to verify the load's balance and stability.
- Ensure that the load is evenly distributed across all lifting points before lifting further.
- Continue lifting gradually, avoiding sudden movements, and maintain control over the load at all times.
- Have a designated spotter guide the operator and monitor clearances throughout the lifting process.

Step 3: Load Transport and Set Down

- Keep the load close to the ground during transport to reduce risks of swinging or instability.
- Move the equipment to the designated location, ensuring personnel stay clear of the load.
- Lower the load gently and evenly to prevent tipping or damage to the equipment.
- Once in position, release tension from the slings and disconnect them from the lifting eyes.

4. Post-Lift Inspection

- After the lift, inspect all lifting eyes and supports for any damage or deformation.

5. Emergency Procedures

- In case of any issues during the lift (such as load instability or equipment malfunction), stop the lift immediately.
- Ensure all personnel are clear of the load.
- Lower the load to a safe position if possible and assess the situation before resuming the lift.

Issued: 2024-01-30
Rev.0

Doc. Nr.:	HANDLING INSTRUCTIONS
Customer	ELOGEN
Purchase Order No.	BC0006223
Unit Serial No.	A-23/24 140
Site location	OFFSHORE NETHERLANDS
Project manager:	Christian Jaspers christian.jaspers@aquagas.se

HANDLING INSTRUCTIONS
Applicable for DEDR 500/36 Offshore version

This AQUAGAS Deoxo-Dryer is a skid-mounted process unit that operates under pressure.
It is delivered “ready-for-use”, pressure and function tested, pre-filled with catalyst and desiccant material at the manufacturer’s workshop.

Proper preservation, handling and transportation are essential for a correct trouble-free start-up and operation at the site.

The non-observance of these instructions may result in defaults occurring such as but not limited to:

- bending of piping resulting in leaking or even weld rupture
- damage to the insulation material and jacketing
- damage to instruments or electrical components
- corrosion
- degradation of reactive materials

Inappropriate preservation, transportation or handling may affect the manufacturer’s warranty.

In case of any incident occurring, please contact AQUAGAS immediately for advice.

Issued: 2024-01-30
Rev.0

1. Preservation and transportation

As a standard, AQUAGAS delivers its units FCA Workshop, Södertälje, Sweden.
This means that the loading onto the truck of the customer's forwarding agent is done by and under responsibility of AQUAGAS. Loading onto inappropriate means of transport will be rejected.

AQUAGAS Deoxo-Dryers are designed to be handled and transported in an **upright vertical position**.

For transport, the skid-mounted unit shall be installed on a wooden pallet – and fixed to it with 4 bolts (diameter 12 mm) using the existing anchoring bolts' holes in the frame. See picture 1.



Picture 1

For transport by truck, the palletised skid will be reinforced with a wooden frame and wrapped with a plastic film for protection against dust or moisture. See picture 2.



Picture 2

Moving of the unit for loading and unloading from the truck, and for installation inside a container if this is required, **shall be done preferably using a forklift truck and using the pallet** functions.
Please consider the warning labels on the packaging before handling.

Permanent exposure of the unit/pallet to water during transport or intermediate storage must be avoided as it will affect the mechanical quality of the box/pallet.

WARNING: If the unit has been delivered with Nitrogen filling (Option), the opening of flanges or connections must be avoided during transport and storage in order to avoid humidity ingression by ambient air. If flange connections with elastagraph gaskets (one-time use) have been opened, these gaskets must be replaced.

WARNING: Be aware of the high centre of gravity and slim width design of the skidded unit. Secure and stabilise with rope slings (steel cable must be avoided) if needed.

2. Handling at site for installation

Upon arrival at site, it is advisable to inspect the equipment for any damages that may have occurred during transport. Perforations of the plastic wrapping, damages to the wooden frame or box may indicate that equipment has been hit during the transport.
If any features are altered, please document with pictures and report.

When Nitrogen filling is included, please do not open the process flanges if a longer storage at site is expected. When opening the flange connections, please beware of nitrogen slight overpressure (0,1 bar) inside and of choking danger. Open in a ventilated place.

Once the wooden support pallet (and fixing bolts) have been removed, please use the four (4) dedicated forklift lugs on the skid frame. Always make sure that the forks are **engaging all four (4) lugs** before lifting and moving.

When access with a forklift truck is not possible and lifting is performed with a crane, exclusively use the four (4) lifting lugs on the top frame. Use rope slings attached to the bottom forklift lugs to avoid swinging during crane operation.

WARNING: When using slings for stabilizing the unit during handling, only connect to the base steel frame and do NOT connect the slings to the insulating jackets, piping, or any other components.

Once installed in its final position, secure the skid with the dedicated four (4) holes for anchoring bolts. In addition, the skid has two fixation points at the top back side for anchoring to the wall of the container – this will avoid risk of tipping over during handling of the container.

05 - INSTRUMENT AND VALVE LIST

AQUAGAS SWEDEN AB

DEDR 500/36 Instrument list & Electrical parts

Reference to P&ID 20230440 Rev.3

Issued: 2024-01-19
Revision:0

PLC INPUTS AND ACCESSORIES						
TAG NO.	**DESCRIPTION**	**INFO**	**IDENTIFICATION**	**MANUFACTURER**	**SIGNAL TYPE**	**SIGNAL RANGE**
TT 60.1	Deoxo Tower, surface TT.	Temperature sensor Transmitter	PT100 90.2550 Ref. 00380207 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
TT 60.2	Deoxo Trace heater, surface TT.	Temperature sensor Transmitter	PT100 90.2550 Ref. 00380207 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
TT 61.1	Deoxo Tower, gas outlet TT.	Temperature sensor Transmitter	PT100 90.2150 Ref.00415733 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
TT 64.5	Dryer Tower A, bottom TT.	Temperature sensor Transmitter	PT100 90.2150 Ref.00415733 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
TT 64.6	Dryer Tower A, top TT.	Temperature sensor Transmitter	PT100 90.2150 Ref.00415733 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
TT 64.7	Dryer Tower B, bottom TT.	Temperature sensor Transmitter	PT100 90.2150 Ref.00415733 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
TT 64.8	Dryer Tower B, top TT.	Temperature sensor Transmitter	PT100 90.2150 Ref.00415733 5333D	Jumo PR Electronics	Analog	0-300°C / 4-20 mA
GS 64.1.1	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	1=Valve open, 0=Valve closed
GS 64.1.2	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	1=Valve open, 0=Valve closed
GS 64.1.3	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	1=Valve open, 0=Valve closed
GS 64.1.4	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	1=Valve open, 0=Valve closed
GS 64.2	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	1=Valve open, 0=Valve closed
GS 64.3	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	1=Valve open, 0=Valve closed
GS 64-T2	Electrical limit switch	Sensor Indicator	SRBG-C1-N-20N-ZCM12-EX5 SASF-S2-BF-A34	Festo	Digital	0=Valve open, 1=Valve closed
PT 64.1	Pressure sensor condensate	Pressure transmitter	2088G3S22B2K1Q4	Rosemount	Analog	4-20 mA
PI 64.1	Pressure gauge outlet	Pressure indicator	WIKA 2940 Ø63 ATEX	WIKA	Indicator	0-60 bar(g)

TS(TC) 64.1	Regen. heater TC	Temperature control	part of heater effective on heating element surface	Elmess	Digital	1=OK, 0=Not OK
TS 64.2	Regen. heater over heating TS	Temperature switch	part of heater effective on heating element surface	Elmess	Digital	<400℃/ 1=OK, 0=Not OK
TS 64.3	Gas downstream Regen. Heater TS	Temperature switch	ML1H-H454S-EXI	Barksdale	Digital	<200 ℃ / 1=OK,0=Not OK
TS 64.4	Hydrogen gas outlet TS.	Temperature switch	ML1H-H203S-EXI	Barksdale	Digital	<60 ℃ / 1=OK,0=Not OK
64-V1	Pilot air solenoid valve	Solenoid valve Solenoid coil	MFH-3-1/8-EX VACF-B-K1-1-5-Ex4 M	Festo	Digital	1=Valve open, 0=Valve closed
64-V2	Pilot air solenoid valve	Solenoid valve Solenoid coil	MFH-3-1/8-EX VACF-B-K1-1-5-Ex4 M	Festo	Digital	1=Valve open, 0=Valve closed
64-V3	Pilot air solenoid valve	Solenoid valve Solenoid coil	MFH-3-1/8-EX VACF-B-K1-1-5-Ex4 M	Festo	Digital	1=Valve open, 0=Valve closed
64-V8	Pilot air solenoid valve	Solenoid valve Solenoid coil	MFH-3-1/8-EX VACF-B-K1-1-5-Ex4 M	Festo	Digital	1=Valve open, 0=Valve closed
64-V12	Pilot air solenoid valve	Solenoid valve Solenoid coil	MFH-3-1/8-EX VACF-B-K1-1-5-Ex4 M	Festo	Digital	1=Valve open, 0=Valve closed
64-V17	Pilot air solenoid valve	Solenoid valve Solenoid coil	MFH-3-1/8-EX VACF-B-K1-1-5-Ex4 M	Festo	Digital	1=Valve open, 0=Valve closed
FC 64.1	Control of regeneration gas flow	Electro Pneumatic Positioner	EPR-IN2SN4NTR,Exia IIC T6	PG Power Genex	Analog	0-100% / 4-20 mA
JB 1	Terminal box Solenoid coils	Interconnection terminal box	Junction box 8146/1051 Cable glands 8161/7 black	Stahl Stahl	Exe	N/A
JB 1.1	Terminal box for trace heater	Interconnection terminal box	Junction box JB-EX-40-EP Cable glands 8161/7 black	nVent Raychem Stahl	Exe	N/A
JB 2	Terminal box Exi instruments	Interconnection terminal box	Junction box 8146/2S73 Cable glands 8161/8 blue	Stahl Stahl	Exi	N/A
JB 3	Terminal box regen. Heater	Interconnection terminal box	Top part of regen. heater	Elmess	EXe/Exd	N/A
HE 61.1	Deoxo trace heater	3 kW , 230 V	HAQ2N660	nVent	1 pc	HAQ
HE 64.1	Dryer regeneration heater	6 kW, 400 V - 3 ph	DHG81B03GG-6-T1	Elmess	1 pc	N/A

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AQUAGAS SWEDEN AB

DEDR 500/36 Mechanical parts list
Reference to P&ID 20230440 Rev.3

Issued: 2024-02-06
Revision:1

MECHANICAL PARTS						
TAG NO.	**DESCRIPTION**	**INFO**	**IDENTIFICATION**	**MANUFACTURER**	**QTY**	**NOTE**
Vessels & others						
61	Deoxidizer 61	Deoxo Vessel Catalyst	GYP-2430131 DSL2	Giemant-Pirazol ANCO	1 pc 54 kg	DG-GYP-243013-01
64A	Dryer 64A	Vessel Desiccant	GYP-2430132 Sorbead WS 2050	Giemant-Pirazol BASF	1 pc 30 kg	DG-GYP-243013-01
64B	Dryer 64B	Vessel Desiccant	GYP-2430133 Sorbead WS 2050	Giemant-Pirazol BASF	1 pc 30 kg	DG-GYP-243013-01
64-T1	Gas cooler	Gas/Water Heat Exchanger	Dual vessels with spiral pipe	AQUAGAS	1 pc	Dwg 21220210
HE 64.1	Housing pipe for Regen. Heater HE 64.1	Housing pipe DN100 PN40	GYP-2430134	Giemant-Pirazol	1 pc	DG-GYP-243013-02
64-T4	Ejector	Ejector	DR 500/36 Ejector DN20 PN100	AQUAGAS	1 pc	Dwg 20240060
Automatic Valves						
64-V4.1	H2 main valve gas outlet tower A	2-way valve Actuator Double Acting	A44-6666RT BWJ APM2DA	Worcester Sirca	1 pc	DN20 PTFE/Viton
64-V4.2	H2 main valve gas outlet tower B	2-way valve Actuator Double Acting	A44-6666RT BWJ APM2DA	Worcester Sirca	1 pc	DN20 PTFE/Viton
64-V4.3	H2 main valve reg. gas tower A	2-way valve (high temperature) Actuator Double Acting	A44-6666PV BWJ APM2DA	Worcester Sirca	1 pc	DN20 Fluorofill/Viton
64-V4.4	H2 main valve reg. gas tower B	2-way valve (high temperature) Actuator Double Acting	A44-6666PV BWJ APM2DA	Worcester Sirca	1 pc	DN20 Fluorofill/Viton
64-V5	H2 main valve reg. gas heater	2-way valve Actuator Spring Loaded (NC)	A44-6666RT BWJ APM2SR (NC)	Worcester Sirca	1 pc	DN20 PTFE/Viton
64-V6	H2 main valve gas inlet	2-way valve Actuator Spring Loaded (NO)	A44-6666RT BWJ APM2SR (NO)	Worcester Sirca	1 pc	DN20 PTFE/Viton
64-V7	H2 main valve cooling cycle	2-way valve (high temperature) Actuator Spring Loaded (NC)	A44-6666PV BWJ APM2SR (NC)	Worcester Sirca	1 pc	DN20 Fluorofill/Viton
64-V31	Condensate valve direction Deoxo	3-way valve Actuator Spring Loaded	SAH1B3S-H-8M-PK-M-WH C15-SR-1B2 EX IIC	Hy-Lok 105 Habonim	1 pc	8 mm
64-V13	Condensate valve direction tower A/B	3-way valve Actuator Spring Loaded	SAH1B3S-H-8M-PK-M-WH C15-SR-1B2 EX IIC	Hy-Lok 105 Habonim	1 pc	8 mm
64-T2	Condensate valve condensate outlet	2-way valve Actuator Spring Loaded (NC)	SAH1B-H-8M-PK-M-WH C15-SR-1B2 EX IIC	Hy-Lok 105 Habonim	1 pc	8 mm
Manual Valves						
61-V1	Manual drain valve condensate	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
61-V2	Manual shut-off valve condensate	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
61-V3	Manual drain valve condensate	Plug valve	P1V-H-8M-S316	Hy-Lok P series	1 pc	8 mm
64-V9	Shut off valve Pressure indicator	Plug valve	P1V-H-6M-S316	Hy-Lok P series	1 pc	6 mm
64-V10	Manual drain valve condensate	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
64-V11	Manual drain valve condensate	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
64-V14	Regulating valve reg. gas	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
64-V14.1	Regeneration fine-tuning	Needle valve	NV2H-8M-R	Hy- Lok	1 pc	8 mm
64-V15	Manual shut-off valve condensate	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
64-V16	Manual shut-off valve condensate	2-way valve	A44-6666RT BWJ	Worcester	1 pc	DN20 PTFE/Viton
64-V32	Manual drain valve condensate	Plug valve	P1V-H-8M-S316	Hy-Lok P series	1 pc	8 mm
64-V33	Manual drain valve condensate	Plug valve	P1V-H-8M-S316	Hy-Lok P series	1 pc	8 mm
Orifices						
R Ø1.0 mm	Condensate orifice	Calibrated tube	Orifice tube R Ø1.0 mm	AQUAGAS	1 pc	1.0 mm
R Ø1.2 mm	Condensate orifice	Calibrated tube	Orifice tube R Ø1.2 mm	AQUAGAS	1 pc	1.2 mm
Filters						

61-F1.1	Condensate filter Deoxo	Y-Strainer	Y611 - 0124/08-3/4" - 1 mm	Bonomi	1 pc	3/4" (DN20) PN55
61-F1.2	Condensate filter Deoxo	Strainer	FTH-8M-50	Hy-Lok	1 pc	with insert AD Allmekano 0,5 mm
64-F1.1	Condensate filter Tower A	Y-Strainer	Y611 - 0124/08-3/4" - 1 mm	Bonomi	1 pc	3/4" (DN20) PN55
64-F2.1	Condensate filter Tower B	Y-Strainer	Y611 - 0124/08-3/4" - 1 mm	Bonomi	1 pc	3/4" (DN20) PN55
64-F1.2	Condensate filter Tower A	Strainer	FTH-8M-50	Hy-Lok	1 pc	with insert AD Allmekano 0,5 mm
64-F2.2	Condensate filter Tower B	Strainer	FTH-8M-50	Hy-Lok	1 pc	with insert AD Allmekano 0,5 mm
66	Filter housing	Particle filter gas outlet	SS235.521	Classic Filters	1 pc	3/4" NPT with drain 1/4" NPT
--	Filter element	Particle filter gas outlet	25.178.5S	Classic Filters	1 pc	2 micron / Viton seal
Pressure Safety Valves						
PSV-64.1	Pressure safety valve hydrogen	36 bar(g) setting, Stainless Steel	461tGFO-8m/f-08/15 PTFE	Goetze	1 pc	male inlet DN8 /female outlet DN15
PSV-64.2	Pressure safety valve hydrogen	36 bar(g) setting, Stainless Steel	461tGFO-8m/f-08/15 PTFE	Goetze	1 pc	male inlet DN8 /female outlet DN15
PSV-64.3	Pressure safety valve water	6 bar(g) setting, Brass	861tGFO-15m/f-15/15 PTFE	Goetze	1 pc	male inlet DN15 /female outlet DN15

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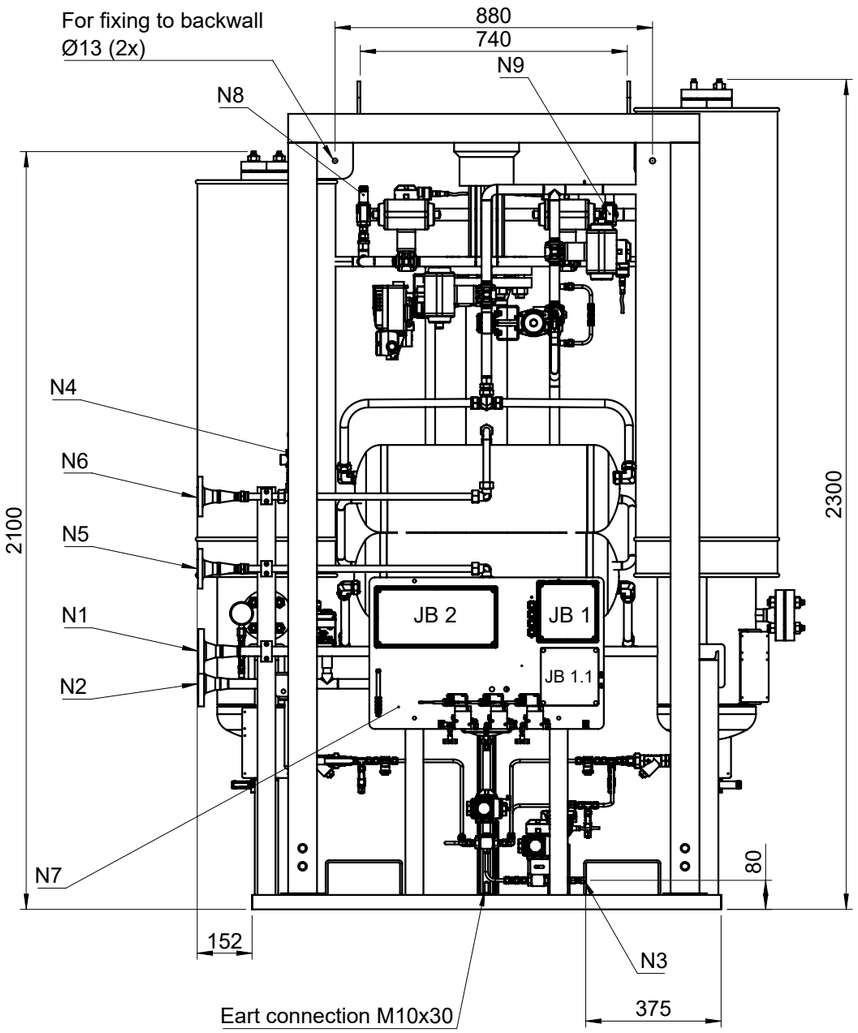
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152 42 Södertälje

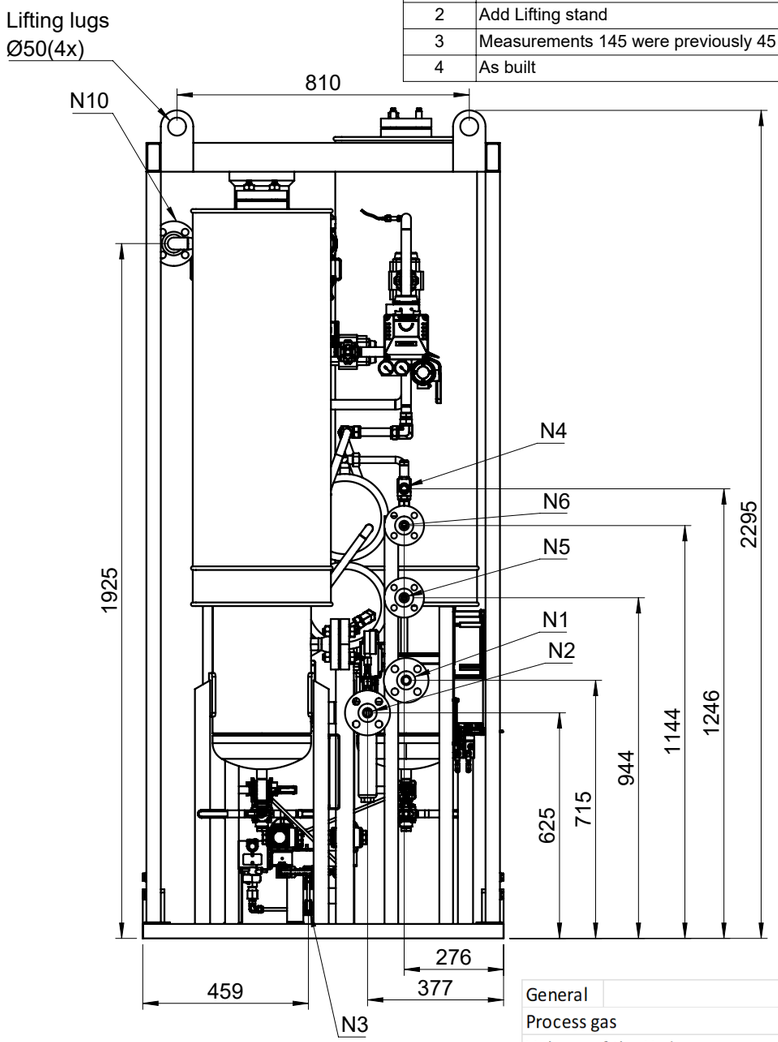
Phone: +46 (0)8 554 204 70
info@aquagas.se
www.aquagas.se

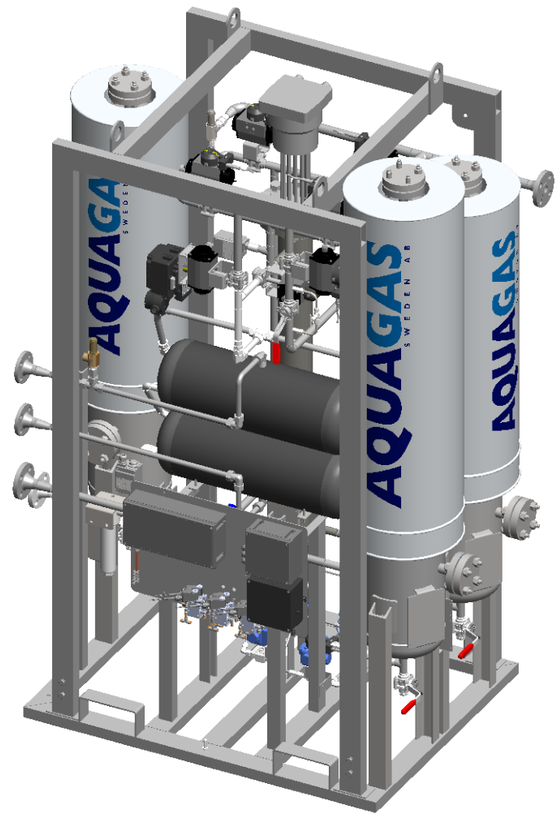
Org. No. 556563-7260
VAT.No.SE556563726001

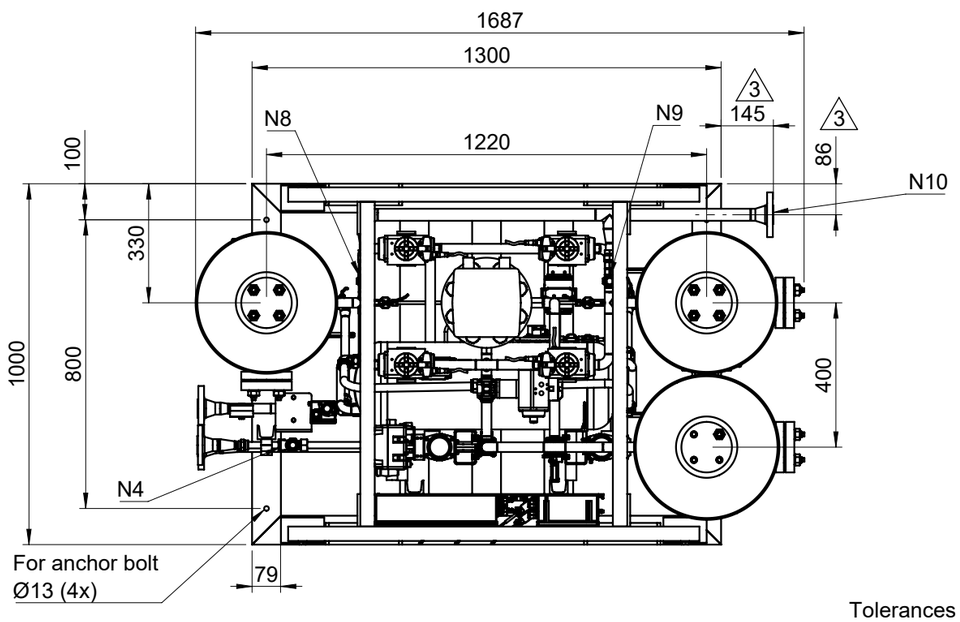
06 - GENERAL ARRANGEMENT DRAWING

Revision	Changed from	Date	Sign
1	Add PSV on C.W	2023-11-10	TLj
2	Add Lifting stand	2024-01-31	TLj
3	Measurements 145 were previously 45 and 86 were previously 72. Electrical sheet lowered 250mm.	2024-04-23	TLj
4	As built	2024-08-26	TLj









General					
Process gas		Hydrogen			
Volume of the Hydrogenprocess		240	litres	approx.	
Weight	empty	1400	kg	approx.	
Weight	filled w/Cat.+Desiccant	1520	kg	approx.	
Connections / Interfaces					
Tag	Function	Type	Characteristics	Material	Code
N1	H2 gas inlet	Flange	R 1" Class 300	A105	ASME B16.5
N2	H2 gas outlet	Flange	R 1" Class 300	316L	ASME B16.5
N3	Condensate outlet	HyLok Coupling	Ø 8 mm	316L	
N4	PSV on C.W.	Female threaded	G 1/2"	Brass	
N5	C.W. inlet	Flange	R 1" Class 150	A105	ASME B16.5
N6	C.W. outlet	Flange	R 1" Class 150	A105	ASME B16.5
N7	Instrument Air/Nitrogen	Connector for Plastic Hose	Ø 6 mm	Antistatic PU	
N8	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N9	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N10	PSV to Vent	Flange	R 1" Class 300	A105	ASME B16.5

Tolerances for indicated measures +/- 15 mm

Name
DEDR-500/36 Offshore
GA Drawing As built

View placement

Date 2023-06-07 | Constr. TLj

QAApproval:

QAAppDate:

Filename 21231804

Scale 1:17

Material

Drawing no. 21231800

Rev. 4

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07 - P&I DIAGRAM

No.	Qty.	Modified from	Date	Intr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

N7 Φ6mm Instrument air or Nitrogen

TO CP 64-V17 | TO CP 64-V8 | TO CP 64-V3 | TO CP 64-V2 | TO CP 64-V1 | TO CP 64-V12

TSA HH 64.4 / TS 64.4 ≤60°C

PI 64.1 / 64-V9

AQUAGAS | Customer

Flange 1", 300Lbs ASME B16.5, 316L

N2 Hydrogen

N10 Vent

Flange 1", 300Lbs ASME B16.5, A105

66 Particle filter 5µm

N8 PSV 64.1 36bar

N9 PSV 64.2 36bar

64-V4.1 | 64-V4.2 | 64-V4.3 | 64-V4.4

GSA LL/HH 64.1.1 / GS 64.1.1 Open=I

GSA LL/HH 64.1.2 / GS 64.1.2 Open=I

GSA LL/HH 64.1.3 / GS 64.1.3 Open=I

GSA LL/HH 64.1.4 / GS 64.1.4 Open=I

TSA HH 64.6 / TA L/H 64.6 / TC 64.6 / TI 64.6 / TT 64.6

TT 64.8 / TI 64.8 / TC 64.8 / TA L/H 64.8 / TSA HH 64.8

TSA HH 64.2 / TS 64.2

TS 64.3 / TSA HH 64.3 ≤200°C

Heater HE64.1

TS(TC) 64.1

64-V14 | 64-V14.1

64-V5

64-V7

GSA LL/HH 64.3 / GS 64.3 Open=I

FC 64.1 4-20mA

64-T4

FO 64-V6

GSA LL/HH 64.2 / GS 64.2 Open=I

TSA HH 64.5 / TA L/H 64.5 / TC 64.5 / TI 64.5 / TT 64.5

64A Dryer

64B Dryer

TT 64.7 / TI 64.7 / TC 64.7 / TA L/H 64.7 / TSA HH 64.7

64-V15 | 64-V10

64-V16 | 64-V11

64-T1

G 3/4" PSV-64.3 6bar

Discharge N4

TSA LL/HH 60.1 / TA L/H 60.1 / TC 60.1 / TI 60.1 / TT 60.1

TSA LL/HH 60.2 / TA L/H 60.2 / TC 60.2 / TI 60.2 / TT 60.2

TT 61.1 / TI 61.1 / TC 61.1 / TA H 61.1 / TSA HH 61.1

*Note 1

61 Deoxidizer

Trace heater cable HE61.1

Hydrogen N1

Flange 1", 300Lbs ASME B16.5 A105

61-V2 | 61-V1

CW N6 | CW N5

Flange 1", 150Lbs ASME B16.5 A105

Customer | AQUAGAS

61-F1.1 | 61-F1.2 | 61-V3

64-F1.1 1mm | 64-F1.2 0,5mm

64-V13 OA OB

64-F2.2 0,5mm | 64-F2.1 1mm | 64-V33

O-Deoxo | O-Dryer

64-V31 (R-Φ1,0mm)

64-V32

64-T2

PSA LL/HH 64.1 | PA L/H 64.1 | PT 64.1

GS 64-T2 Closed=I | GSA LL/HH 64-T2

(R-Φ1,2mm) AQUAGAS

Pipe coupling Φ8mm Hy-Loc N3

Customer

*Note 1: Flange to fill/drain desiccant/catalyst.

– – – – = Customer scope of supply

Pos. No.	Qty.	Designation	Material	Dimension	Remark
Design. RE	Drawn RE	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of

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DEDR-500/36 OffShore
P&I Diagram

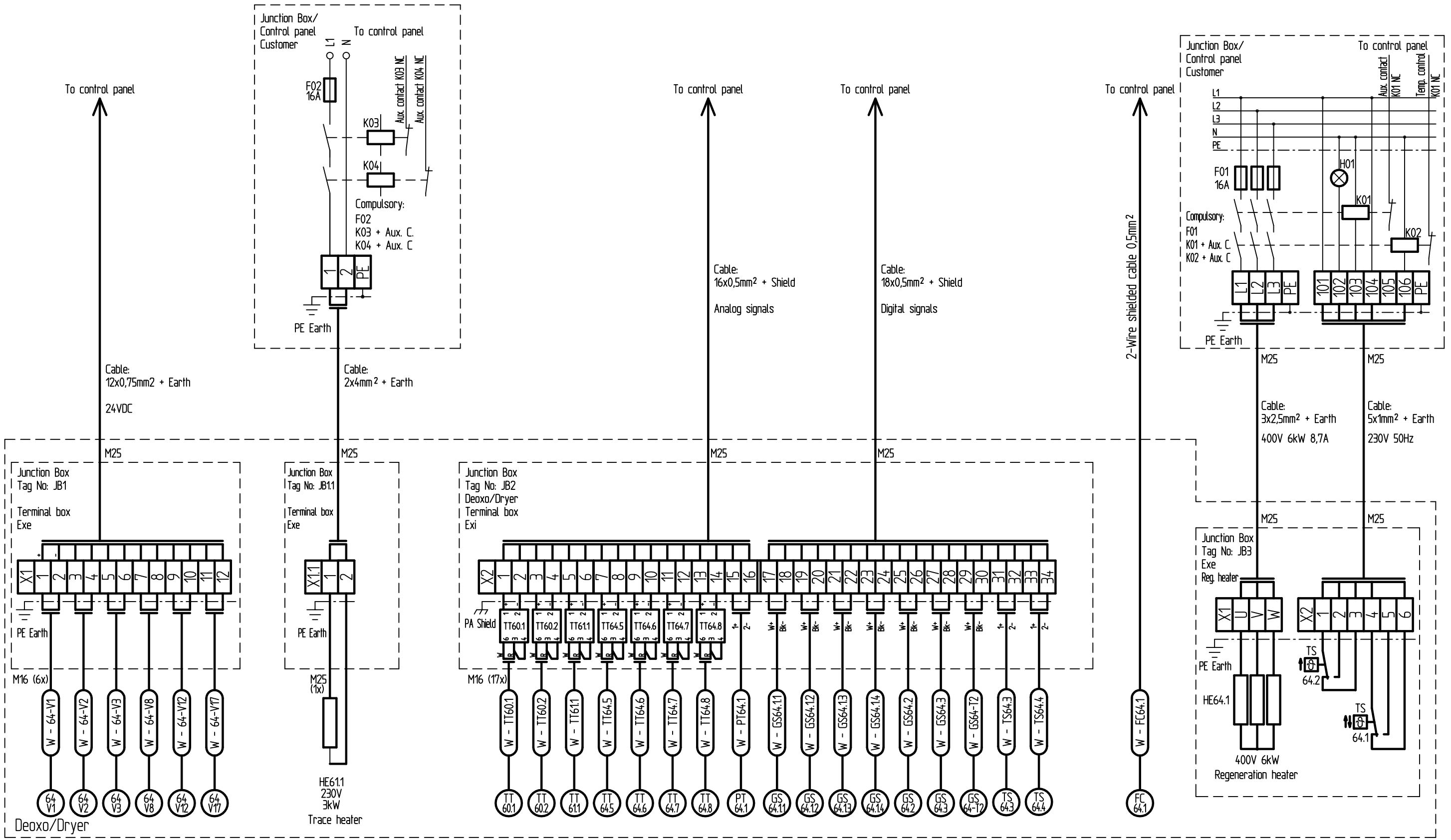
Filename 20230443.dwg | Date 23-07-03

Drawing no. 20230440

C63-AQU-QIX-002 762 / 917
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08 - ELECTRICAL CONTROL TERMINAL DIAGRAM

No.	Qty.	Modified from	Date	Intr.	Appr.



Pos. No.	Qty.	Designation	Material	Dimension	Remark

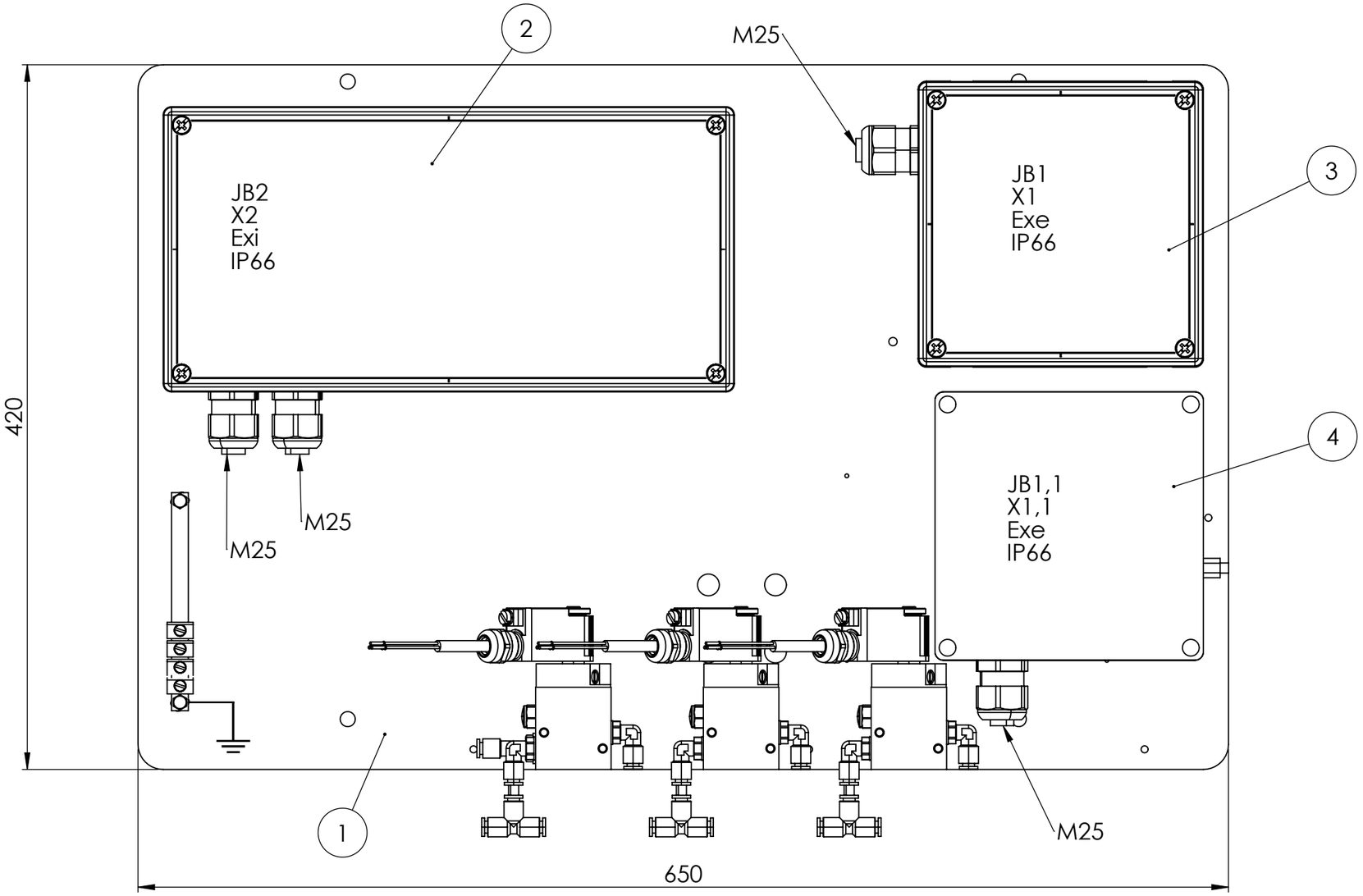
Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
RE	RE							

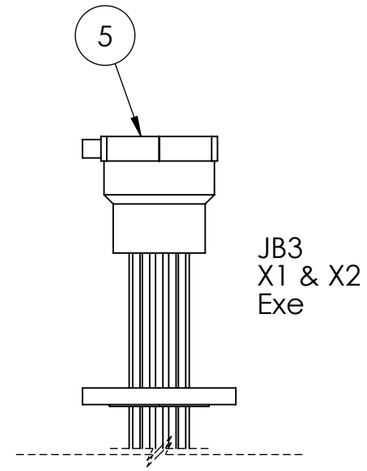
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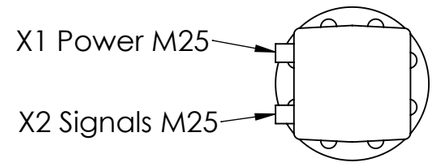
DEDR-500/36 Offshore
Wiring Diagram

Filename 20240040.dwg
Date 24-01-17
Drawing no. 20240040

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ITEM NO.	QTY.	Description	PART NUMBER	Dim	Material
5	1	Heater	HE61.1		Metal
4	1	Multi Purpose Junction Box	JB-EX-40-EP	160x160x90	Polymer
3	1	Terminal Boxe	8146-_051	170x170x91	Polyester resin
2	1	Terminal Boxe	8146-_s71	340,5x170x91	Polyester resin
1	1	DEDR-500/36 Cubicle plate	21231980		S235JRG2

Name

DEDR-500/36 Electrical panel & connections

View placement

Date 2024-09-02 | Constr. TLj

QAApproval:

QAAppDate:

Filename 21241070

Scale 1:3

Material

Drawing no. 21241070

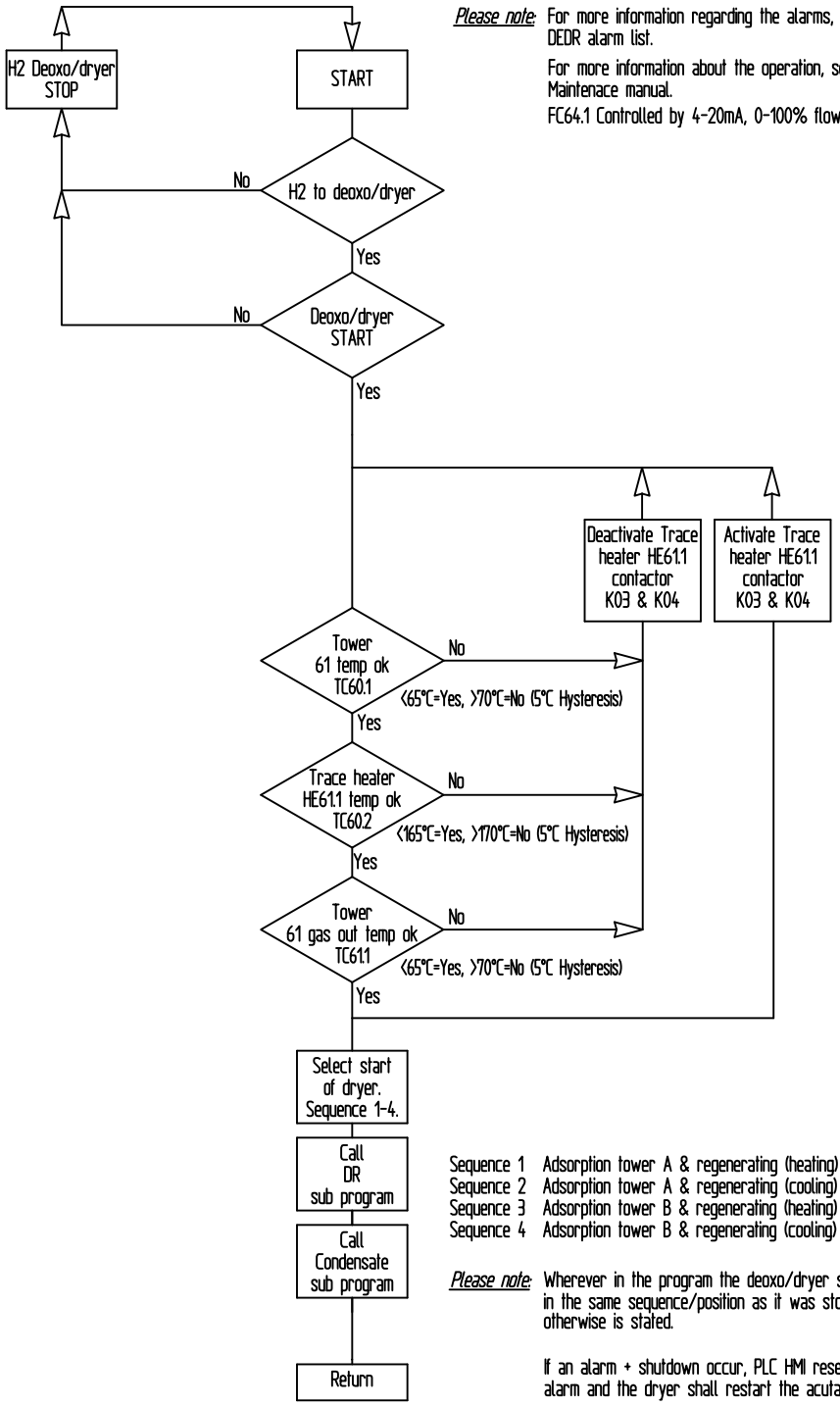
Rev.

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09 - CONTROL LOGIC INSTRUCTION FOR PROGRAMMING PLC

No.	Qty.	Modified from	Date	Intr.	Appr.



Please note: For more information regarding the alarms, and compulsory alams see DEDR alarm list.

For more information about the operation, see Operation and Maintenace manual.

FC64.1 Controlled by 4-20mA, 0-100% flow capacity input = 4-20 mA.

Sequence 1 Adsorption tower A & regenerating (heating) tower B.
Sequence 2 Adsorption tower A & regenerating (cooling) tower B.
Sequence 3 Adsorption tower B & regenerating (heating) tower A.
Sequence 4 Adsorption tower B & regenerating (cooling) tower A.

Please note: Wherever in the program the deoxo/dryer stopped it shall restart in the same sequence/position as it was stopped in unless otherwise is stated.

If an alarm + shutdown occur, PLC HMI reset button shall relase the alarm and the dryer shall restart the acutal sequence.

During stand-by, stop, safety critical stop etc. contol valves and contactors should be deactivated:

64-V1	64-V8
64-V2	64-V12
64-V3	64-V17

K01	K04
K02	K05
K03	K06

Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
EA	RE							

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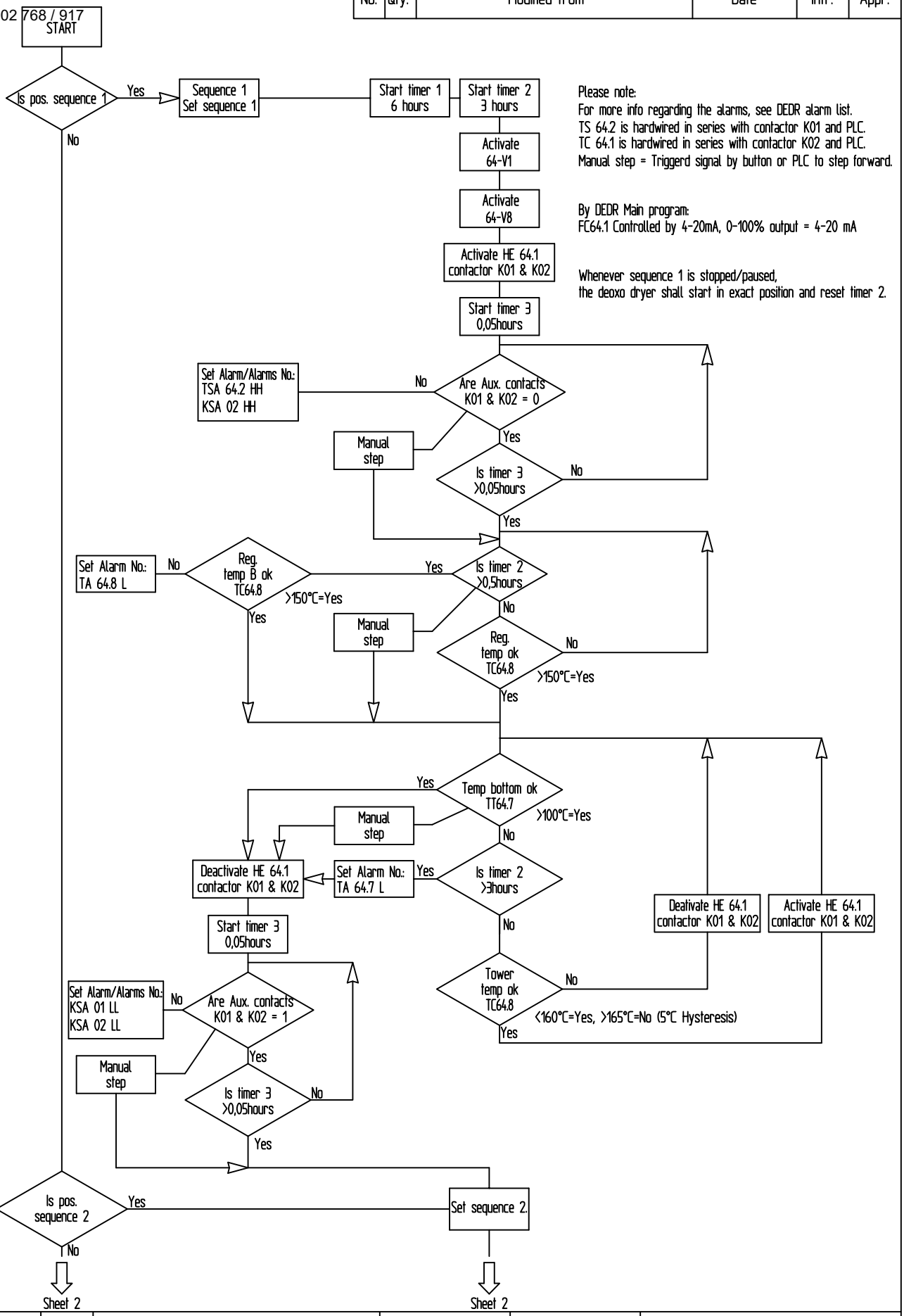
DEDR-500/36
Main program deoxo/dryer

Filename 20240070.dwg
Date 24-01-25
Drawing no. 20240070

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C63-AQU-QIX-002 768 / 917

No.	Qty.	Modified from	Date	Intr.	Appr.



Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
EA	RE							

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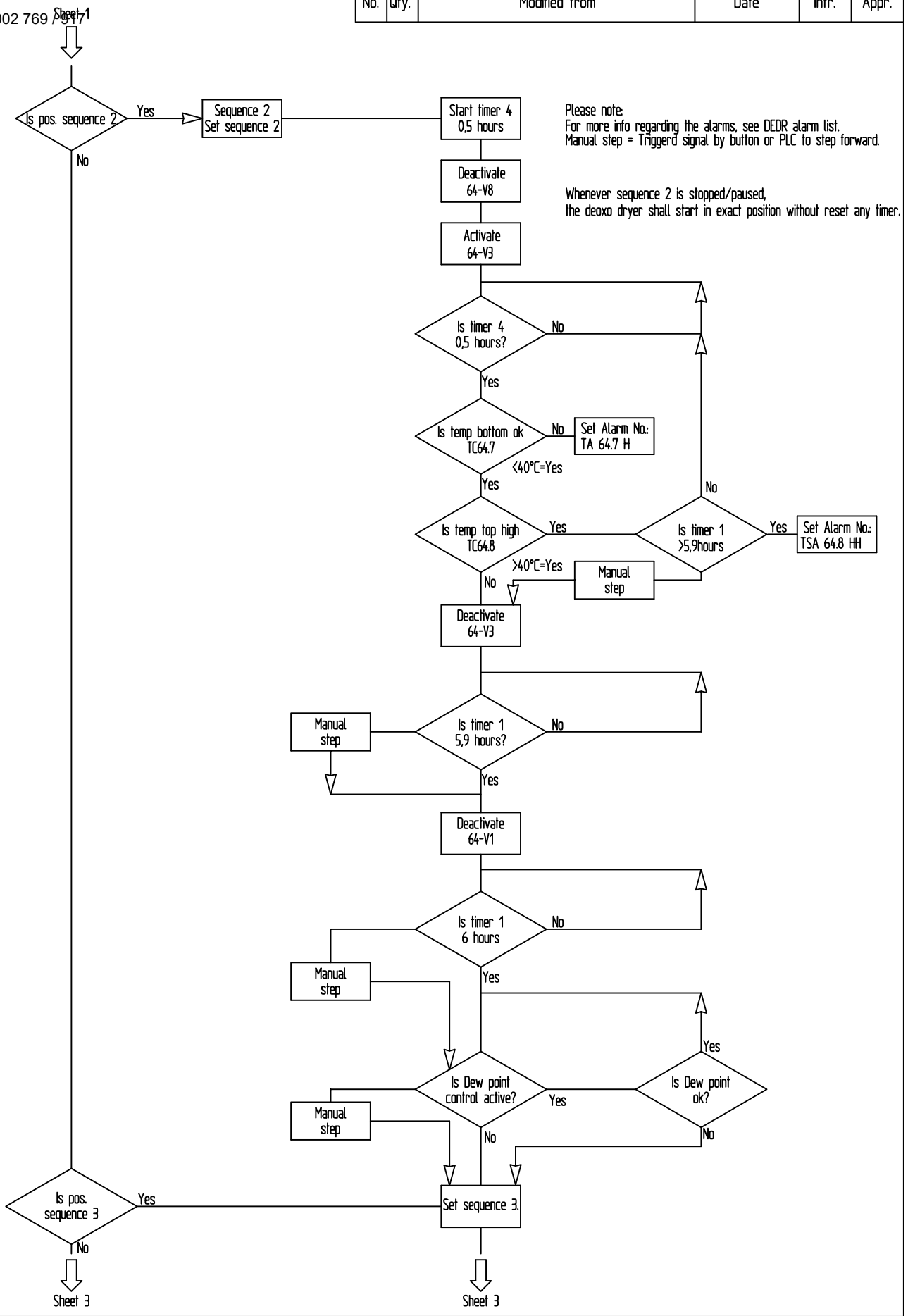
DEDR-500/36 Sheet 1 (4)
Sub program dryer

Filename 20240080.dwg
Date 24-01-25
Drawing no. 20240080

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C63-AQU-QIX-002 769 / 917

No.	Qty.	Modified from	Date	Intr.	Appr.



Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
EA	RE							

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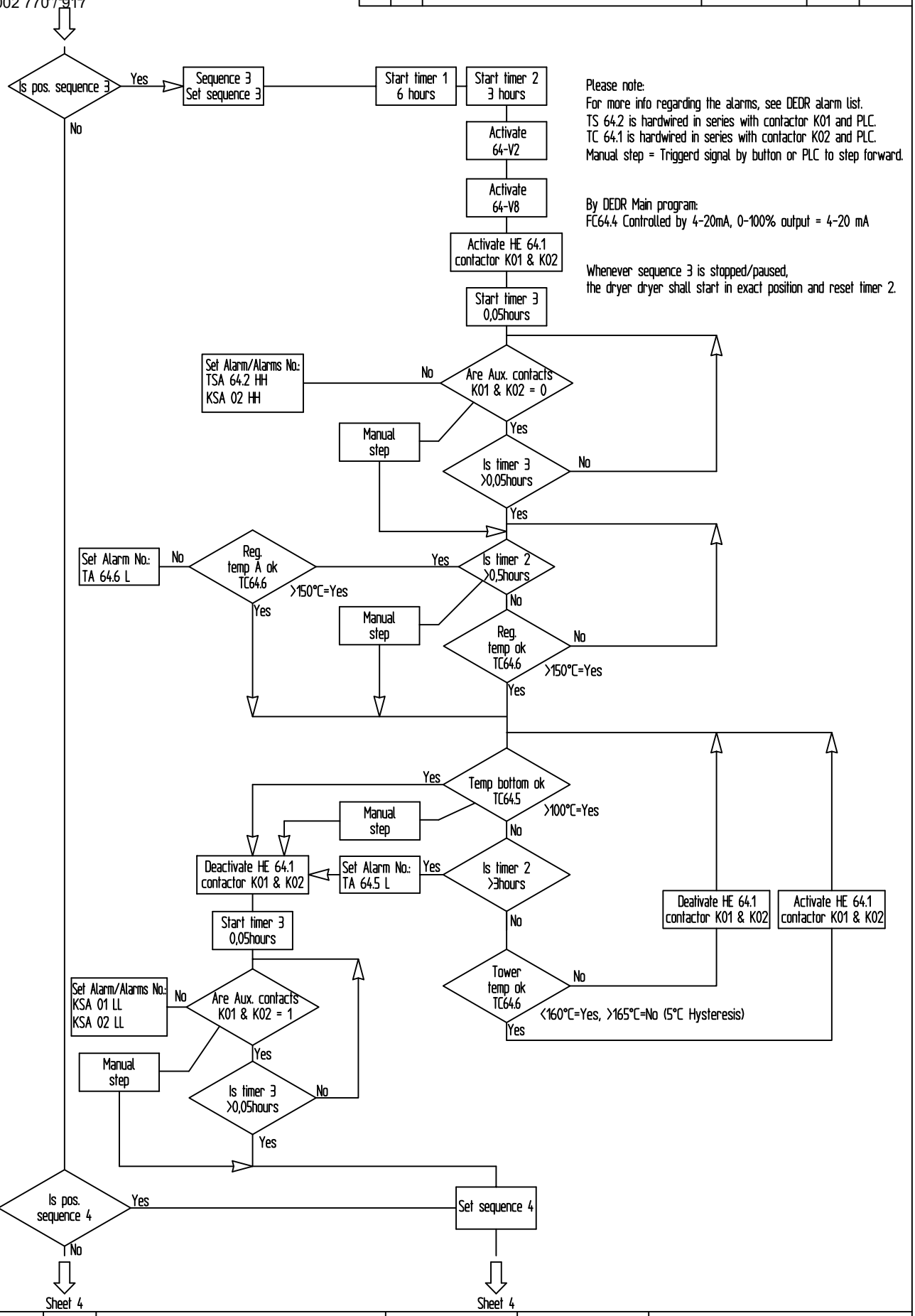
DEDR-500/36 Sheet 2 (4)
Sub program dryer

Filename	Date
20240090.dwg	24-01-25

Drawing no. 20240090

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No.	Qty.	Modified from	Date	Intr.	Appr.



Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
EA	RE							

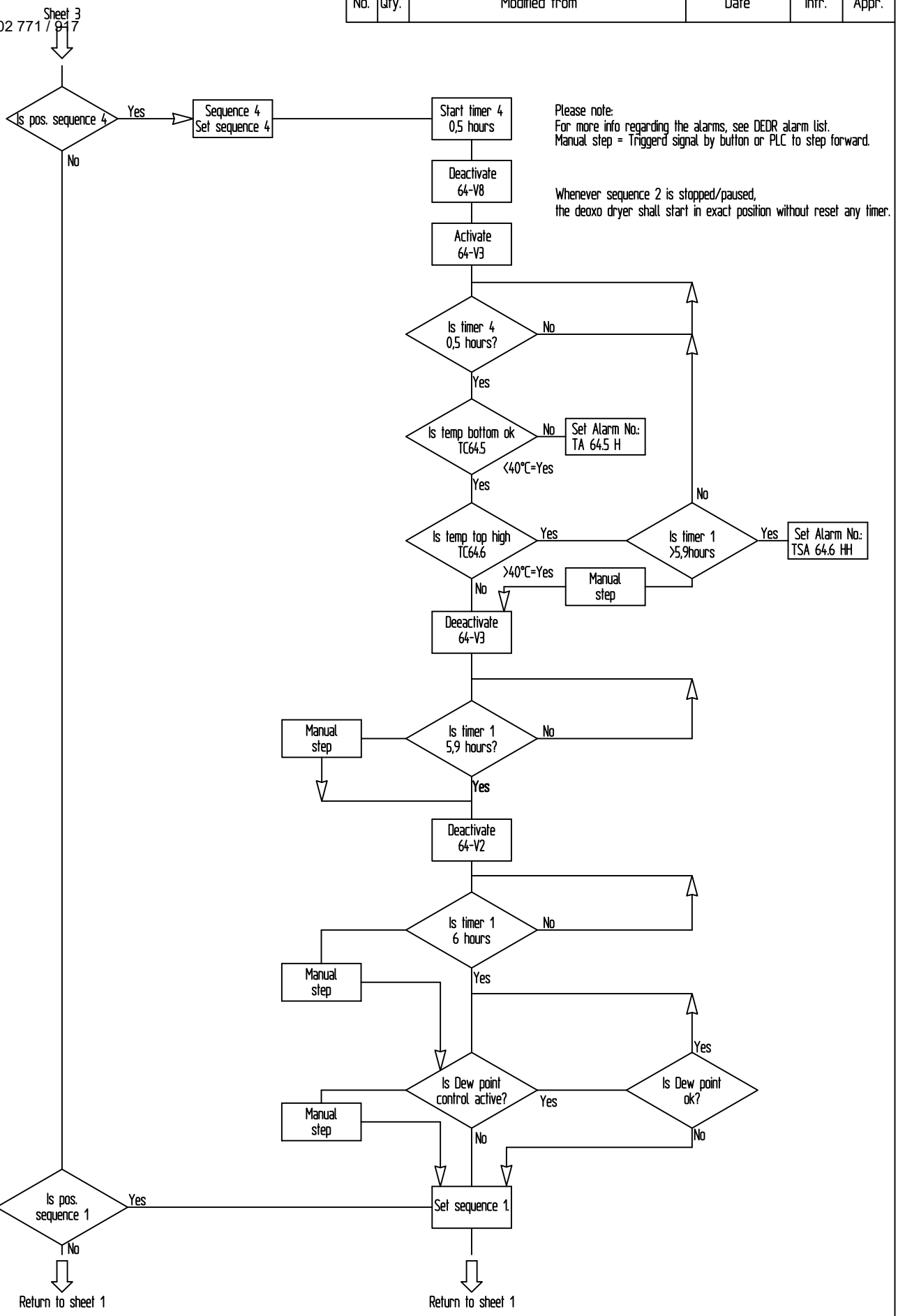
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DEDR-500/36 Sheet 3 (4)
Sub program dryer

Filename 20240100.dwg
Date 24-01-25
Drawing no. 20240100

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No.	Qty.	Modified from	Date	Intr.	Appr.



Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
EA	RE							

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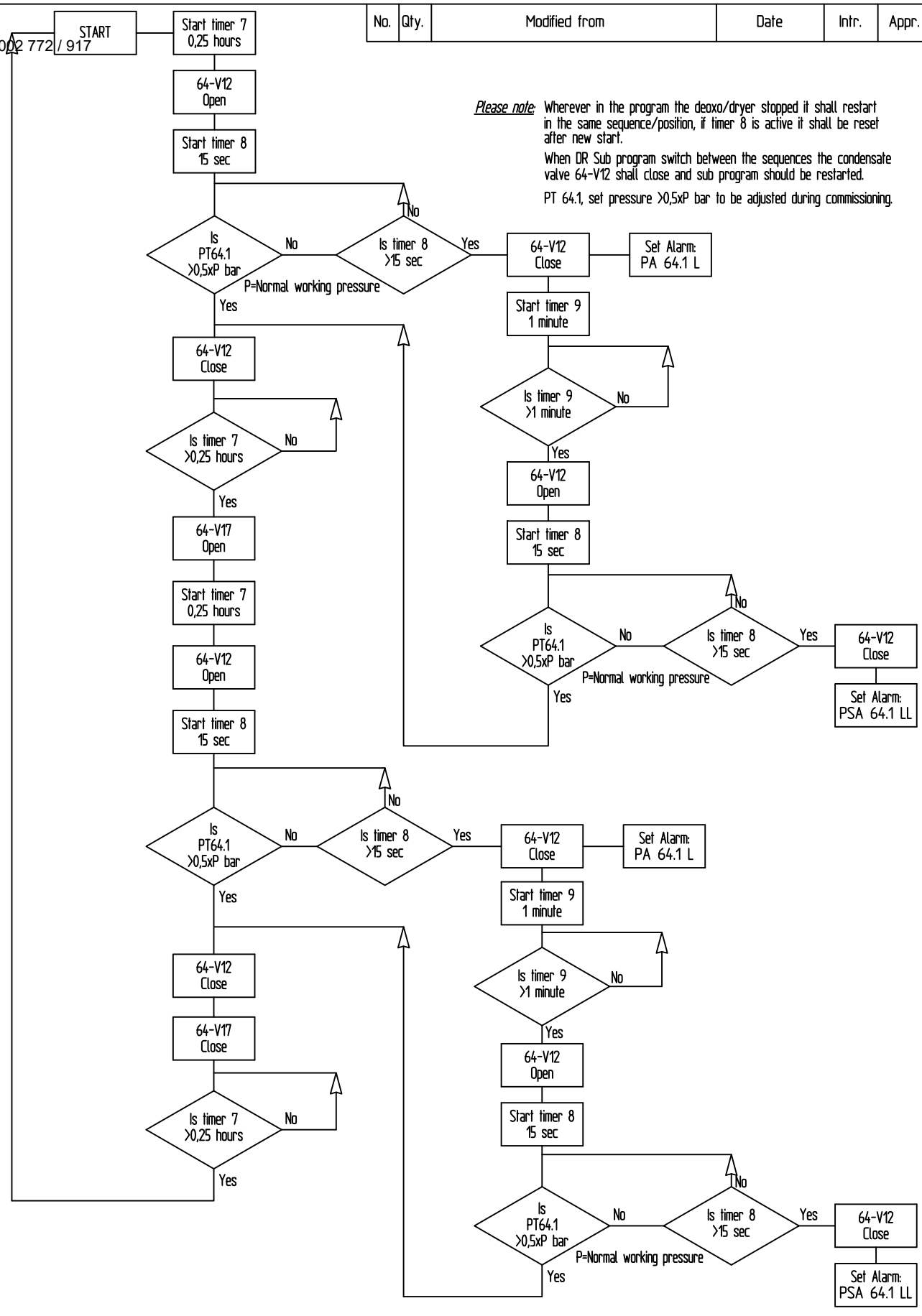
DEDR-500/36 Sheet 4 (4)
Sub program dryer

Filename	Date
20240110.dwg	24-01-25

Drawing no. 20240110

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No.	Qty.	Modified from	Date	Intr.	Appr.



Please note: Wherever in the program the deoxo/dryer stopped it shall restart in the same sequence/position, if timer 8 is active it shall be reset after new start.

When DR Sub program switch between the sequences the condensate valve 64-V12 shall close and sub program should be restarted.

PT 64.1, set pressure >0,5xP bar to be adjusted during commissioning.

Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
EA	RE							

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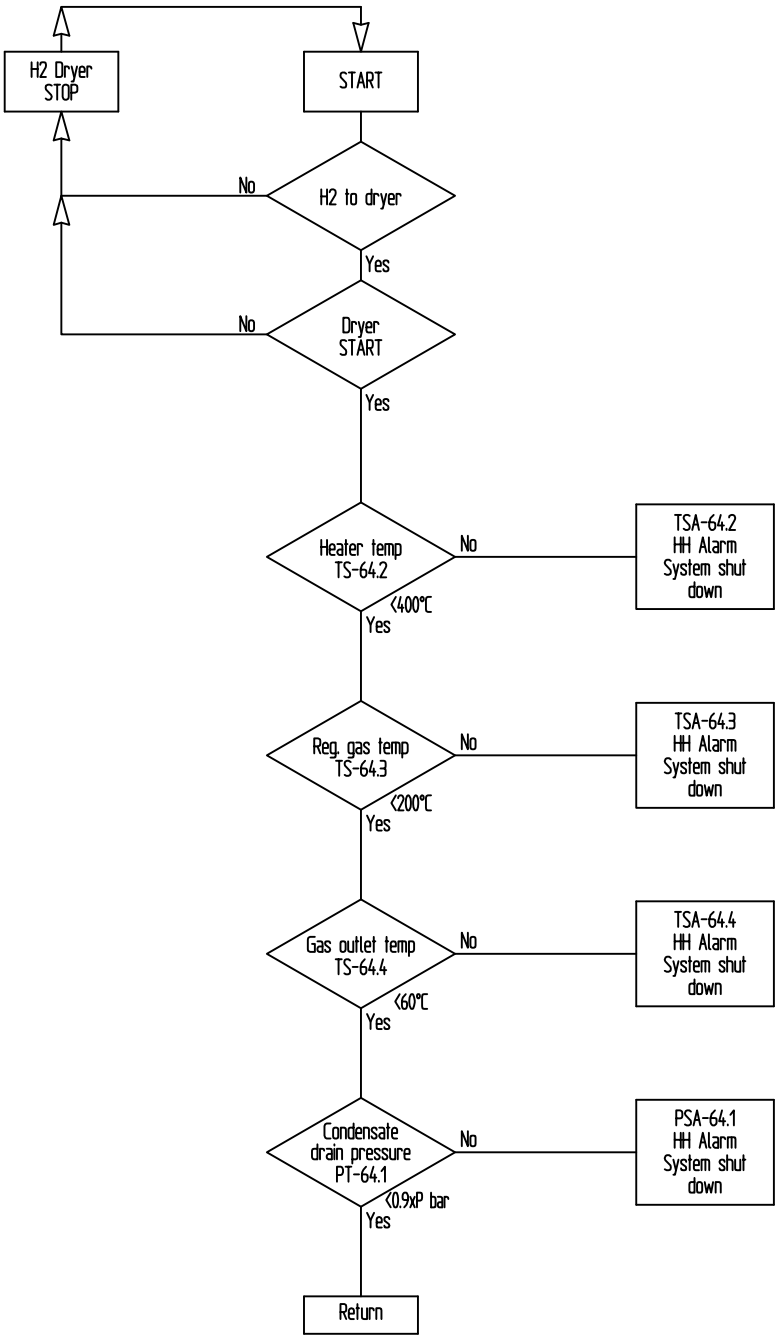
DEDR-500/36
Condensate sub-program

Filename	Date
20240120.dwg	24-01-25

Drawing no. 20240120

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No.	Qty.	Modified from	Date	Intr.	Appr.



Pos. No.	Qty.	Designation	Material	Dimension	Remark

Design.	Drawn	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
CJ	RE							

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DEDR-500/36
Safety switch-off

Filename 20240130.dwg
Date 24-01-25
Drawing no. 20240130

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10 - FAT AND FUNCTIONAL TESTS

APPENDIX FAT DEDR 500/36 A-23/24 140 Rev.1

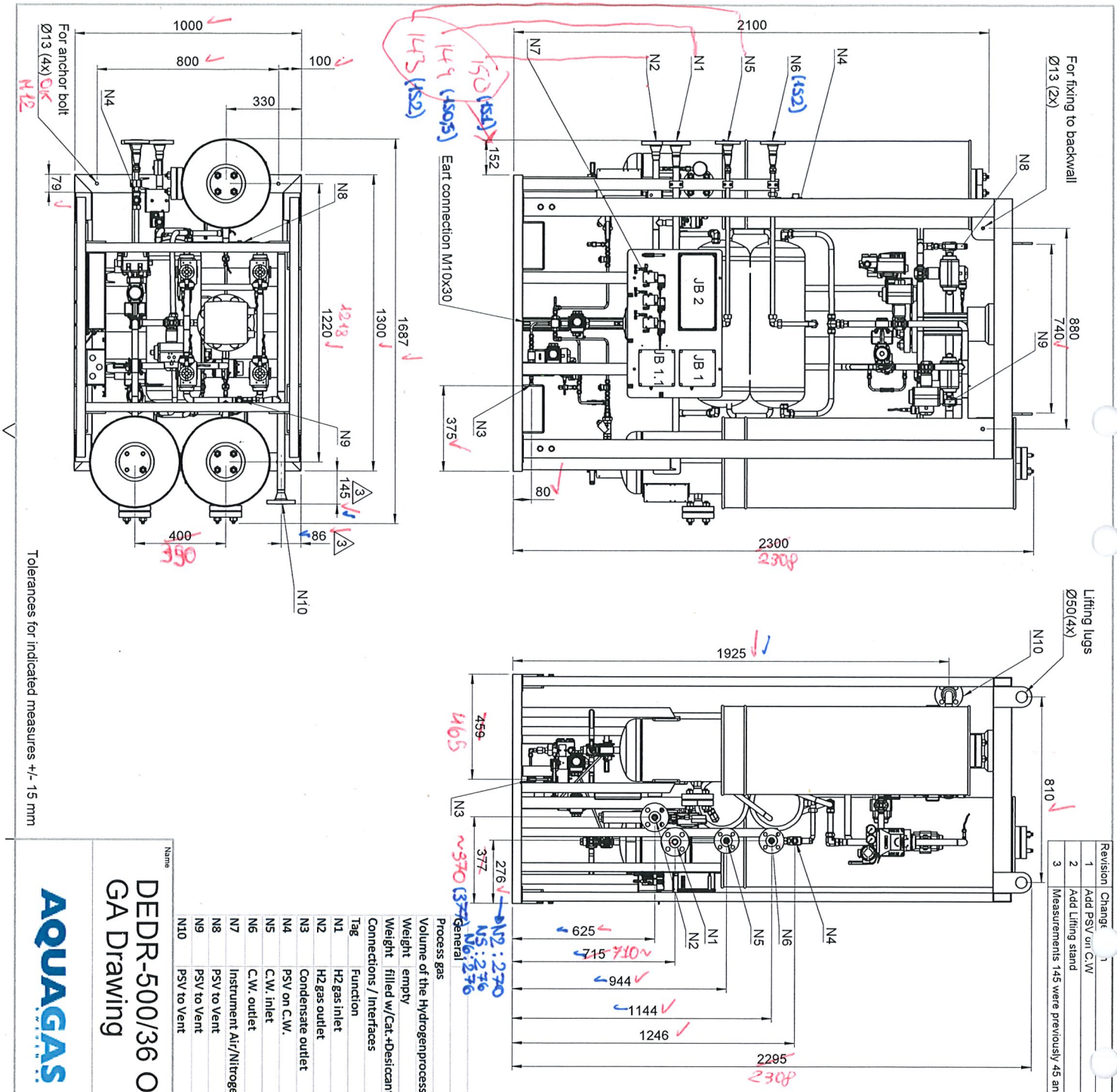
Punch list:

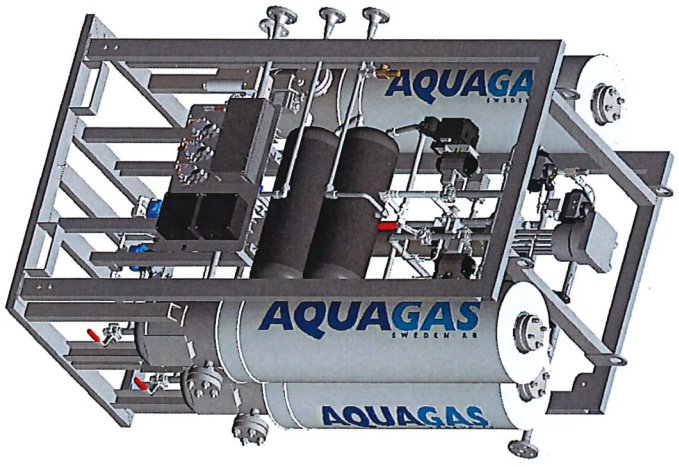
Cert. of pin bolts	Incl. in Final documentation
Plastic plugs for lifting structure	Corrected
Pictures of PSV's	Corrected, sent by email to Hassan Hammami
ATEX documentation of cable glands	Incl. in Final documentation
ATEX documentation of cables	Incl. in Final documentation
ATEX documentation of instrumentation	Incl. in Final documentation
Separation of blue, black, white cables in cable trays	Accepted as is.
Precaution sticker on back side	Corrected
DoC for coolers	Included in PED documentation
Vent line outlet flange	Accepted, built according to design pressure.
Painting documentation	Incl. in Final documentation
BOM PED	Incl. in Final documentation
BOM ATEX	Incl. in Final documentation
Spare cable glands	Available as spare parts
Touch up painting	Corrected
As built drawings	Incl. in Final documentation
Interface connections painted, not able to verify at FAT	Accepted. Already verified at Weld assembly inspection.

Note 1* An as built GA drawing will be created according to final measurements during FAT.

Note 2* Investigation of possibility to use cable sizing according to AQUAGAS recommendations. In other case, AQUAGAS to quote for rebuild of connection box.

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Tolerances for indicated measures +/- 15 mm

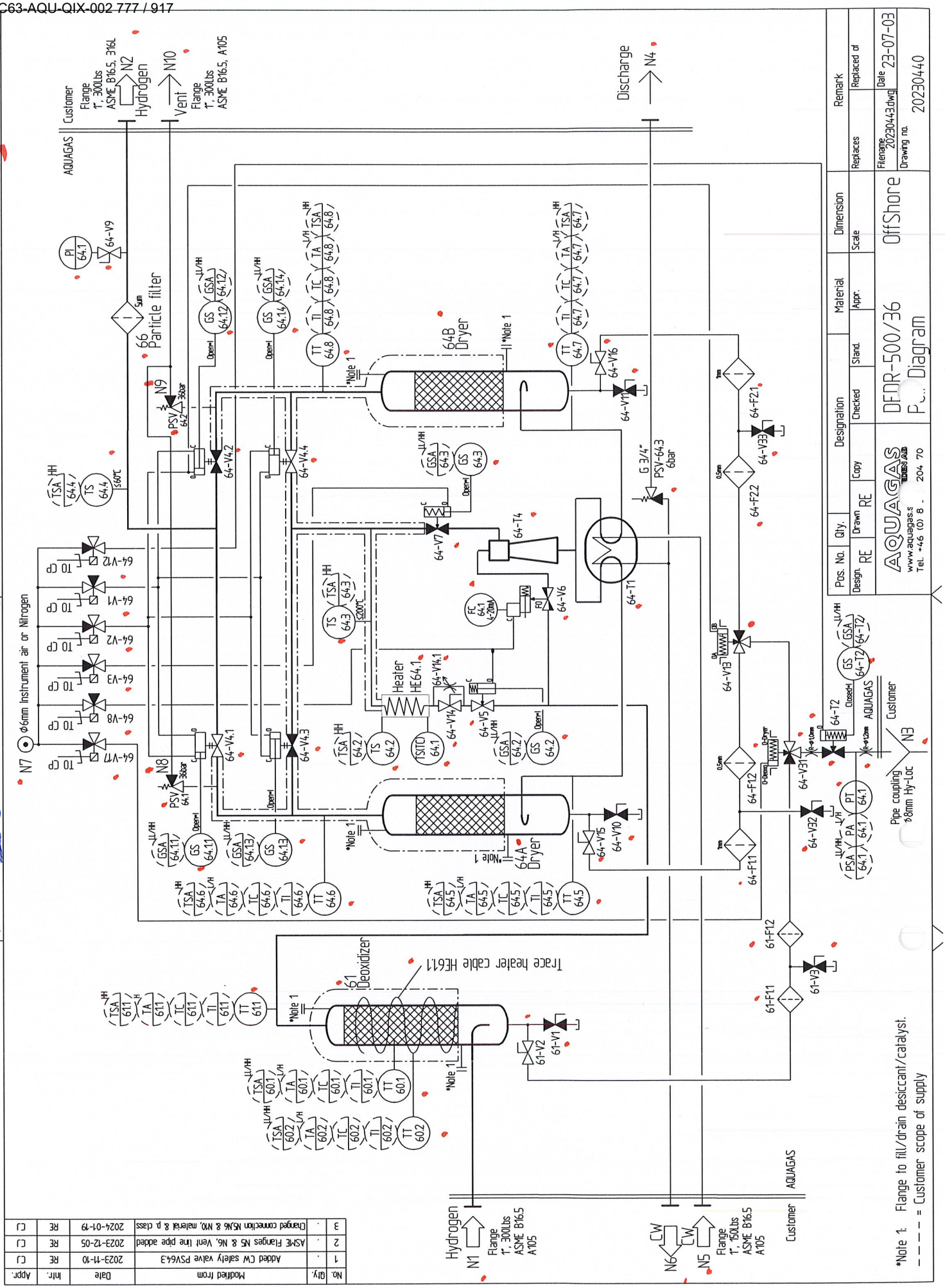
Revision	Change	Date	Sign
1	Add PSV on C.W	2023-11-10	TLj
2	Add Lifting stand	2024-01-31	TLj
3	Measurements 145 were previously 45 and 86 were previously 72. Electrical sheet lowered 250mm.	2024-04-23	TLj

Process gas		Hydrogen	
Volume of the Hydrogenprocess		240 litres	approx.
Weight empty		1400 kg	approx.
Weight filled w/Cat.+Desiccant		1520 kg	approx.
Connections / Interfaces			
Tag	Function	Type	Characteristics	Material	Code
N1	H2 gas inlet	Flange	R 1" Class 300	A105	ASME B16.5
N2	H2 gas outlet	Flange	R 1" Class 300	316L	ASME B16.5
N3	Condensate outlet	HyLok Coupling	Ø 8 mm	316L	
N4	PSV on C.W.	Female threaded	G 1/2"	Brass	
N5	C.W. inlet	Flange	R 1" Class 150	A105	ASME B16.5
N6	C.W. outlet	Flange	R 1" Class 150	A105	ASME B16.5
N7	Instrument Air/Nitrogen	Connector for Plastic Hose	Ø 6 mm	Antistatic PU	
N8	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N9	PSV to Vent	Female threaded	G 1/2"	1,4404	EN ISO 228
N10	PSV to Vent	Flange	R 1" Class 300	A105	ASME B16.5

Name			
DEDR-500/36 Offshore GA Drawing			
AQUAGAS SWEDEN AB	Material	View placement:	QA Approval:
		Date: 2023-06-07 Constr: TLj	QA Appr Date:
		Filename: 21231803	
21231800		Drawing no.	Scale: 1:17
			Rev.: 3

: : Tag ok

A - 23124 140



No.	Qty.	Modified from	Date	Intr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

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FACTORY ACCEPTANCE TEST

Inspected object	Deoxo dryer DEDR 500/36
Pressure vessel No.	A: GYP-2430132, B: GYP-2430133, DE: GYP-2430131
Customer Order No.	BC0006223
Aquagas order No.	A-23/24 140
Manufacturer	AQUAGAS Sweden AB
P&ID nr. (Appendix A)	20230440 rev. 3
GA drawing nr. (Appendix B)	21231800 rev. 3
Electrical drawing nr. (Appendix C)	20240040

Check points	Result	Remark / Setpoint
Build and dimensions		
With P&ID nr. acc. to above, check build and tags	√	Dryer must correspond to P&ID.
With dimensional drawing nr. acc. to above, check all dimensions. * Note 1	√	Dryer must correspond to dimensional drawing.
With Electrical drawing verify amount/size of cable glands and number of terminals installed. * Note 2	√	Dryer must correspond to electrical drawing.
All bottom drain points have plugs; Tower A, B, DE, heater pipe and condensate.	√	At delivery
Check all instruments for ATEX or IECEX approval according to spec.	√	PT, FC, HE, TS *
Electrical test		
Insulation test trace heater, HE61.1	∞ MΩ	Min 1 M Ω Max: ∞ M Ω
Insulation test trace heater, HE61.2	N/A	Min 1 M Ω Max: ∞ M Ω
Insulation test regeneration heater HE64.1	√	Min: 1 M Ω Max: ∞ M Ω ∞ MΩ
Resistance over trace heater on HE61.1	~~53,3 Ω~~	L1-0 16,5 Ω
Resistance over trace heater on HE61.2	N/A	L1-0
Resistance over regeneration heater HE64.1	53,3 Ω	L1-L2, L1-L3, L2-L3 or L-0
Continuity over temperature switch, TS-64.2	√	On/Off at 20°C, test with continuity (pin 3 & 4).
Set point for TS-64.2 is according to spec.	√	Set value 280°C
Maximum temp. of reg heater	√	Maximum T1: 440°C
Note down type of heater	√	DHG81B03GG-6-T1, 6 kW
Continuity over temperature switch, TS-64.3	√	Test continuity (pin "Common" & "NC"). Should give signal
Set point for TS-64.3 is according to spec.	√	Set value 200°C
Continuity over temperature switch, TS-64.4	√	Test continuity (pin "Common" & "NC"). Should give signal
Set point for TS-64.4 is according to spec.	√	Set value 60°C

Grounding cables attached on all solenoid valves, ~~level switch~~, ~~level sensor~~, heater, ~~dew point sensor~~ and positioner	V	Ground cable present on all EX-d/e devices.
All Ex-i cables have blue markings	V	Check both ends.
Functional test		**Use reference list where applicable**
Instruments wired through zenerbarriers should have LF option on.	N/A	Check DIP switch under cover of zenerbarrier. Typically model 9170. Only wired channels should be on.
Solenoid valves acc. to electrical drawing.	V	On/off electrical with test instrument. Check corresponding valve movement.
Function of all pneumatic valves, check P&ID for reference	V	Checked open/close with pilot air. Valve axle location should correspond to actuator indicator.
Function of all manually operated valves, check P&ID for reference	V	Checked open/close. Manually, no resistance should be felt.
Function of all electrical limit switches, check P&ID for reference	V	On/off electrical with test instrument. Signal acc. to P&ID
Function of temperature control by positioner	V	4mA=Closed 12mA=25% Open 20mA=80% Open Use loop calibrator
Function of all temperature sensors PT100, check P&ID for reference	5,20-5,23mA @23°C	Programmed at supplier 0-300°C. Max deviation between all readings is 0,7 mA (differentiate between low mount sensors and high mount sensors). Note down min/max mA or Ω @ RT Use loop calibrator Or Use test equipment for PLC node, note down temperatures. +
Function of temperature sensors PT100 under insulation of DE vessel	V	Connect power (max 2300W to the trace heating cable acc. To electrical drawing. Temperature of sensor attached to trace heating cable should rise followed by sensor attached on vessel. Note down according to previous test. +
Position of temperature sensors must correspond to P&ID	V	Use heat gun or body heat to confirm that the sensors are installed in the correct location. Use P&ID and electrical drawing as reference. +
Function of pressure transmitter PT-64.1	12,9 V @ 31 Bar	Check signal at pressure. Analog 4-20mA. Use loop calibrator. Or Use test equipment for PLC node, note down pressure and signal value

Check if pressure transmitter has appropriate approval, CE/ATEX or UL/IECEx marking	√	Check specification of dryer and should be CE/ATEX for Europe ~~and UL/IECEx for US and ASME vessel countries.~~
Function of Dew point transmitter MT-64.1	N/A	Check signal at pressure. Analog 4-20mA. Use loop calibrator. Or Use test equipment for PLC node, note down dew point temperature.
Note down type of dew point sensor	N/A	
Note down type of pressure transmitter	√	2088 G3S22B2K1
Condensate System test		
Test condensate trap valves 64-V13 (controlled by 64-V2), 64-31 (controlled by 64-V17). Open valve: 64-T2 (controlled by 64-V12).	√	Open/close with air, Change tower with 3-way valve and repeat. Change to tower DE with the other 3-way valve and repeat. Isolate units not in use in all steps. + 5
Level Switch LS-64-1-1-2	N/A	Check signal with and without water. Digital 1/0.
Level sensor LIT-64-1-1-1	N/A	Check signal with and without water. Analog 4-20mA.
Condensate valves ~~64-V10~~, ~~64-V11~~ in open position. 61-V2 V15 V16	√	Confirm open position. +
Test condensate traps 64-T2, 64-T3	N/A	Open with water/close when empty.
Safety valve(s)		
Check correct opening pressure PSV 64.1, PSV 64.2	√	36 bar, check opening pressure marking on valve.
Check correct opening pressure PSV 64.3	√	6 bar, check opening pressure marking on valve.
Leak test		
Pressurised and isolated unit to atmosphere and detect leaks at nozzles, fittings, and valves.	Start 20 End 20 √	20 bar (g) for 1 hour with air. Detect leaks with leak detecting spray. Note: If applicable, open condensate valve and block outlet. +
Pressurised and isolated unit to atmosphere and detect leaks at nozzles, fittings, and valves.	Start 31 End 31 √	31.1 Gas mix with ~20% helium + ~80% compressed air/nitrogen for 1 hour. Detect leaks with Helium leak detector. Start by filling helium. Start depressurized. +
Pressurised and isolated HEX water side to atmosphere and detect leaks at nozzles, fittings, and valves.	Start 5 End 5 √	5 bar (g) for 1 hour with air. Detect leaks with leak detecting spray. +

Check all fittings with wrench and gap-inspection tool	✓	When approved, draw a line with dedicated green marker to indicate position of the nut on the coupling.	+
Visual			
Ground label attached on grounding point(s) on skid	✓		
Logo, tower designation stickers, warning stickers (all towers and heater) and trace heating warning label attached on system	✓	A, B, DE, Precaution Heat, Trace Heating cable warning.	+
Label attached on instrument air line connections	✓	Label with solenoid valve that should be connected to the port.	
Label attached on 3-way valves which tower is in condensate drain operation attached on system.	✓	A, B, DE, DR	
Labels for all nozzles according to dim. drawing attached on piping.	✓	Media, Flow direction arrow and designator (N1, N2, N3…)	
Photos taken of all components	✓	Machine type plate, pressure vessel plates and all 4 sides.	+
Machine and vessel nameplates attached. Vessel nameplates should be stamped.	✓	All pressure vessels and machine type plate attached.	
Filling			
Tower A&B filled with drying agent acc. to specification	✓	60 kg/each	
Tower DE filled with deoxo agent acc. to specification	✓	100 kg DSL2 Fill Before delivery	+
Condensate 3-way valves have seals	N/A	Check that 8mm connections have bonded seals (tredo) installed.	
Cleaning inspections			
Visual inspection of vessels, piping and nozzles. Internal and external	✓		
Cleaning of all surfaces with air	✓		
Other			
Bypass valve pre-set	✓	Set to approx. 3 turns, ~50%	
Thermowell coupling tightened for all temperature transmitters	✓	Approx. 1/8 turn, check by pulling on sensor. Make sure transmitter is seated before tightening.	+
Cover for position sensor puck screw attached.	✓	Mount after all tests have passed.	
Confirm that T-filters have the correct insert	✓	Mesh screen 0,5 mm, not 50µm filter. See marking on filter housing	
Note down all serial numbers in below list	✓		+

Temporary checks 2024		
Check Habonim actuators for IIC marking	✓	If IIB then take photo of serial number and send to Project manager with project nr.
Check if Hy-lok valves have lock washer installed on axlenut	✓	

Serial number list

Equipment tag	Serial number	Description
61	GYP-2430131	Deoxo vessel
64A	GYP-2430132	Dryer vessel A
64B	GYP-2430133	Dryer vessel B
Vessel HE 64.1	GYP-2430134	Heater vessel
64-T1A	N/A	HEX Cooler
64-T1B	N/A	HEX Cooler
HE 61.1	24-182 2643 01	Trace heater DE vessel
HE 61.2	N/A	Trace heater DE vessel
HE 61.3	N/A	Trace heater condens.
HE 64.1	24-0450-001	Regeneration heater
TS 64.3	WN10261.2/ 001	Temp. switch 200°C
TS 64.4	WN10261.1/ 001	Temp. switch 60°C
PT 64.1	23SHPJ0219217	Pressure transmitter
FC 64.1	23092296	Flow Control
66	68305	Particle filter
PSV 64.1	1001206460 ✓	Safety valve on H2
PSV 64.2	1001206459 ✓	Safety valve on H2
PSV 64.3	1001218536 ✓	Safety valve on CW

Reference list for instrumentation values

Instrument	Analogue mA	Resistance Ω	Physical value
TT (min/max @ RT*)	5,00-5,17	107-109	RT is usually around 19-22 °C
PT (min/max @ pressure)	11,54-11.97	N/A	26-27,5 bar (g)
MT (min/max @ pressure/flow)	13,33-17,33	N/A	0 to -30 °C dew point
HX/HE (min/max @ RT) 4,5kW	N/A	11,1-11,7	*RT is usually around 19-22 °C
HX/HE (min/max @ RT) 2,0kW	N/A	26,0-26,6	*RT is usually around 19-22 °C

Punch list

Tag nr. or explain location/equipment	Notes/Remarks/Missing component	Corrected or accepted
	See appendix	

Södertälje 2024-08-267
Technician: Victor Järnström
Approved by: Rasim Aytein
Approved by customer:
Accepted with comments Hassan HAMMAMI

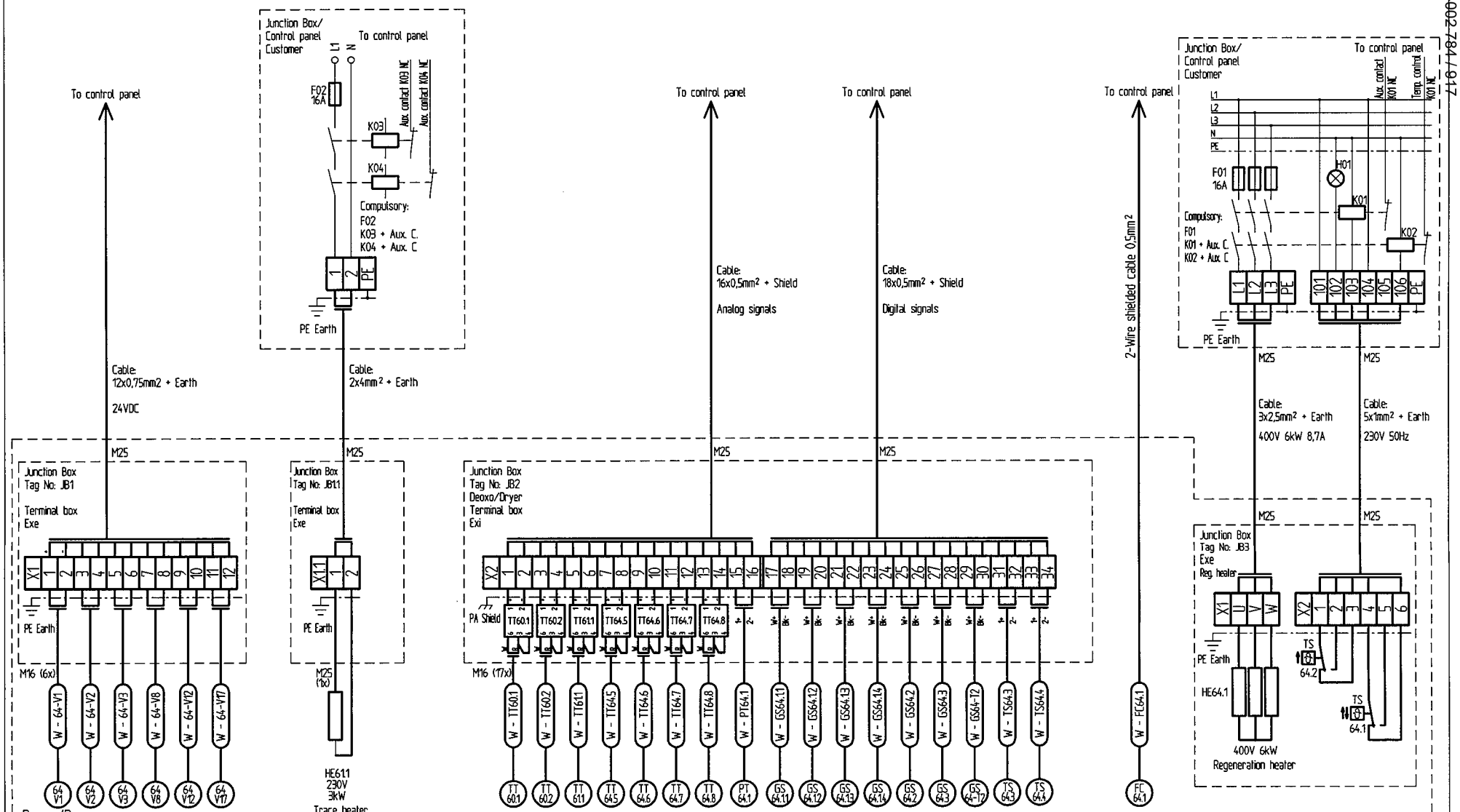
Signatures
witnessed by MANUEL ROSSI - witnessed

All check points will be performed by AQUAGAS, marked with a "+". The rest of the check-points were witnessed by the customer & customers customer

A-23124 140

No.	Qty.	Modified from	Date	Intr.	Appr.

This document is our property and shall not without our permission be altered, copied, used for manufacturing or communicated to any other person or company.



Pos. No.	Qty.	Designation	Material	Dimension	Remark
Design. RE	Drawn RE	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of

AQUAGAS DENMARK
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DFNR-500/36
W[illegible]ng Diagram

Offshore

Filename 20240040.dwg
Date 24-01-17
Drawing no. 20240040

C93-AQU-QIX-002-781/1017

11 - CE-MARKING WITH CERTIFICATE OF CONFORMITY

Issued: 2024-10-01
Rev: 0

Declaration of conformity (CE)

AQUAGAS Sweden AB, declare, the product:
Hydrogen deoxo dryer type DEDR 500/36 serial no.: A-23/24 140

Unit drawing no. 21231800 Rev.4 consisting of the following pressure vessels:

Pressure vessel	Vessel Serial No.	Category / Module
DE Vessel	GYP-2430131	IV / G
DR Vessel A and B	GYP-2430132, GYP-2430133	IV / G
Heater Pipe	GYP-2430134	III / G

There is an EC module G design examination for the pressure vessels above. For the other pressure containing devices there is a monitoring agreement for inspection in accordance with directive 2014/68/EU, module A2.

The examination and monitoring are performed by TÜV Thüringen e.V. NoBo 0090. and Kiwa Sweden AB NoBo 0409. The internal piping and coolers are according to category SEP. The design and manufacturing follow above references, although they do not bear the CE mark as the PED does not apply.

Bought-in products (see separate declaration): Electrical heaters, Valves and instruments.
All parts are CE-marked and installed on a skid. As no control system is in scope of the delivery, manufacturer cannot categorize the unit as a PED assembly. This is in responsibility by buyer or user.

The product which this declaration is referring to is in compliance with the essential Protection requirements of the directives and harmonized standards:

2014/34/EU ATEX Directive (ATEX)
EN 60079-0:2012+A11:2013
EN 60079-1-7-11-14-18
EN/ISO 80079-36:2016
EN 1127-1:2011
EN 13463-1:2009

2014/30/EU EMC Directive (EMC)
IEC 61000-6-2:2016
IEC 61000-6-4:2011
EN 61326-2-3:2013

2014/35/EU Low Voltage Directive (LVD)
EN 62395-1:2013

2014/68/EU Pressure Equipment Directive (PED)
EN 13445
EN 13480

Manufacturer: AQUAGAS Sweden AB



Södertälje, 2024-10-01, Erik Agartson
(Place, date, name and signature)

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12 - ALARM AND TROUBLE SHOOTING LIST

AQUAGAS SWEDEN AB

DEDR 500/36 Trouble Shooting List
Project A-23/24 140 ELOGEN
Issued: 2024-01-23

PLC ALARMS

ALARM NO.	INSTRUMENT TAG NO.	ALARM TYPE	SET-POINT	TIME DELAY	ALARM MESSAGE	ACTIVATION	TROUBLE SHOOTING:
FSA 64.1	FC 64.1	Warning + Shutdown	No 4-20 mA	0	FC 64.1 No signal	Always	Check output signal, wiring and PLC I/O for FC 64.1
FSA 64.1 LL	FC 64.1	Warning + Shutdown	<5,16 mA	0	Gas inlet flow too low	Always	Check upstream flowrate
TSA 60.1	TT 60.1	Warning + Shutdown	No 4-20 mA	0	TT 60.1 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 60.1
TA 60.1 H	TT 60.1	Warning	>200°C	0	Deoxo Tower 61, surface temp. high	Always	Check oxygen inlet content <1.0%, Check set-point/function/installation of TC60.1, TC60.2 and function of contactors K03 & K04.
TSA 60.1 HH	TT 60.1	Warning + Shutdown	>250°C	0	Deoxo Tower 61, surface temp. too high	Always	Check oxygen inlet content <1.0%, Check set-point/function/installation of TC60.1, TC60.2 and function of contactors K03 & K04.
TA 60.1 L	TT 60.1	Warning	<50°C	1,0h	Deoxo Tower 61, surface temp. low	Always	Check resistance over the trace heater HE61.1, Check set-point/function/installation of TC60.1, TC60.2 and function of contactors K03 & K04.
TSA 60.1 LL	TT 60.1	Warning + Shutdown	<40°C	1,0h	Deoxo Tower 61, surface temp. too low	Always	Check resistance over the trace heater HE61.1, Check set-point/function/installation of TC60.1, TC60.2 and function of contactors K03 & K04.
TSA 60.2	TT 60.2	Warning + Shutdown	No 4-20 mA	0	TT 60.2 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 60.2
TA 60.2 H	TT 60.2	Warning	>220°C	0	Deoxo Trace heater HE 61.1, temp. high	Always	Check oxygen inlet content <1.0%, Check set-point/function/installation of TC60.1 and TC60.2 and function of contactors K03 & K04
TSA 60.2 HH	TT 60.2	Warning + Shutdown	>250°C	0	Deoxo Trace heater HE 61.1, temp. too high	Always	Check oxygen inlet content <1.0%, Check set-point/function/installation of TC60.1 and TC60.2 and function of contactors K03 & K04
TA 60.2 L	TT 60.2	Warning	<70°C	1,0h	Deoxo Trace heater HE 61.1, temp. Low	Always	Check resistance over the trace heater HE61.1, Check set-point/function/installation of TC60.1 and TC60.2 and function of contactors K03 & K04
TSA 60.2 LL	TT 60.2	Warning + Shutdown	<50°C	1,0h	Deoxo Trace heater HE 61.1, temp. too low	Always	Check resistance over the trace heater HE61.1, Check set-point/function/installation of TC60.1 and TC60.2 and function of contactors K03 & K04
TSA 61.1	TT 61.1	Warning + Shutdown	No 4-20 mA	0	TT 61.1 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 61.1
TA 61.1 H	TT 61.1	Warning	>200°C	0	Deoxo Tower 61, gas outlet temp. high	Always	Check oxygen inlet content <1.0%, Check set-point/function/installation of TC60.1, TC60.2 and function of contactors K03 & K04.
TSA 61.1 HH	TT 61.1	Warning + Shutdown	>250°C	0	Deoxo Tower 61, gas outlet temp. too high	Always	Check oxygen inlet content <1.0%, Check set-point/function/installation of TC60.1, TC60.2 and function of contactors K03 & K04.
KSA K03 LL	K03	Warning + Shutdown	K03 Aux. Contact = 0	5 seconds	Deoxo Trace heater HE 61.1, K03 Not activated	K03 activated	Check function of contactor K03
KSA K03 HH	K03	Warning + Shutdown	K03 Aux. Contact = 1	5 seconds	Deoxo Trace heater HE 61.1, K03 Not deactivated	K03 deactivated	Check function of contactor K03
KSA K04 LL	K04	Warning + Shutdown	K04 Aux. Contact = 0	5 seconds	Deoxo Trace heater HE 61.1, K04 Not activated	K04 activated	Check function of contactor K04
KSA K04 HH	K04	Warning + Shutdown	K04 Aux. Contact = 1	5 seconds	Deoxo Trace heater HE 61.1, K04 Not deactivated	K04 deactivated	Check function of contactor K04
TSA 64.5	TT 64.5	Warning + Shutdown	No 4-20 mA	0	TT 64.5 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 64.5
TA 64.5 H R	TT 64.5	Warning	>120°C	0	Dryer Tower 64A, bottom reg. temp. high	DR Sequence 3 & 4	Check control logic PLC software DR Sequence 3 & 4, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TSA 64.5 HH R	TT 64.5	Warning + Shutdown	>150°C	0	Dryer Tower 64A, bottom reg. temp. too high	DR Sequence 3 & 4	Check control logic PLC software DR Sequence 3 & 4, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2

TA 64.5 H A	TT 64.5	Warning	>45°C	0	Dryer Tower 64A, bottom ads. temp. high	DR Sequence 1 & 2	Check cooling water inlet flow and temperature against specification.
TSA 64.5 HH A	TT 64.5	Warning + Shutdown	>50°C	0	Dryer Tower 64A, bottom ads. temp. too high	DR Sequence 1 & 2	Check cooling water inlet flow and temperature against specification.
TA 64.5 L	TT 64.5	Warning	<100°C	0	Dryer Tower 64A, regeneration temp. bottom low	Set alarm DR Sequence 3	Check flowrate into dryer (minimum 20% of designed capacity). Check set-points and operation according DR Sequence 3. If further assistance contact AQUAGAS.
TA 64.5 H	TT 64.5	Warning	> 40°C	0	Dryer Tower 64A, cooling flow low	Set alarm DR Sequence 4	Check flowrate into dryer (minimum 20% of designed capacity). Clean ejector 64-T4. Drain water manually, if > 1 litre clean condensate system, for more info see Alarm PA 64.1 L.
TSA 64.6	TT 64.6	Warning + Shutdown	No 4-20 mA	0	TT 64.6 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 64.6
TA 64.6 H R	TT 64.6	Warning	>200°C	0	Dryer Tower 64A, top reg. temp. high	DR Sequence 3 & 4	Check control logic PLC software DR Sequence 3 & 4, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TSA 64.6 HH R	TT 64.6	Warning + Shutdown	>250°C	0	Dryer Tower 64A, top reg. temp. too high	DR Sequence 3 & 4	Check control logic PLC software DR Sequence 3 & 4, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TA 64.6 H A	TT 64.6	Warning	>45°C	0	Dryer Tower 64A, top ads. temp. high	DR Sequence 1 & 2	Check cooling water inlet flow and temperature against specification. Check for dew point peak during DR Sequence 1 = internal leakage in valves 64-V4.3
TSA 64.6 HH A	TT 64.6	Warning + Shutdown	>50°C	0	Dryer Tower 64A, top ads. temp. too high	DR Sequence 1 & 2	Check cooling water inlet flow and temperature against specification. Check for dew point peak during DR Sequence 1 = internal leakage in valves 64-V4.3
TA 64.6 L	TT 64.6	Warning	< 150°C	0	Dryer Tower 64A, regeneration temp. top low	Set alarm DR Sequence 3	Check flowrate into dryer (minimum 20% of designed capacity). Check set-points and operation according DR Sequence 3. If further assistance contact AQUAGAS.
TSA 64.6 HH C	TT 64.6	Warning + Shutdown	>40°C	0	Dryer Tower 64A, cooling flow too low	Set alarm DR Sequence 4	Check flowrate into dryer (minimum 20% of designed capacity). Clean ejector 64-T4. Drain water manually, if > 1 litre clean condensate system, for more info see Alarm PA 64.1 L.
TSA 64.7	TT 64.7	Warning + Shutdown	No 4-20 mA	0	TT 64.7 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 64.7
TA 64.7 H R	TT 64.7	Warning	>120°C	0	Dryer Tower 64B, bottom reg. temp. high	DR Sequence 1 & 2	Check control logic PLC software DR Sequence 1 & 2, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TSA 64.7 HH R	TT 64.7	Warning + Shutdown	>150°C	0	Dryer Tower 64B, bottom reg. temp. too high	DR Sequence 1 & 2	Check control logic PLC software DR Sequence 1 & 2, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TA 64.7 H A	TT 64.7	Warning	>45°C	0	Dryer Tower 64B, bottom ads. temp. high	DR Sequence 3 & 4	Check cooling water inlet flow and temperature against specification. Check for dew point peak during DR Sequence 3 = internal leakage in valves 64-V4.4
TSA 64.7 HH A	TT 64.7	Warning + Shutdown	>50°C	0	Dryer Tower 64B, bottom ads. temp. too high	DR Sequence 3 & 4	Check cooling water inlet flow and temperature against specification. Check for dew point peak during DR Sequence 3 = internal leakage in valves 64-V4.4
TA 64.7 L	TT 64.7	Warning	<100°C	0	Dryer Tower 64B, regeneration temp. bottom low	Set alarm DR Sequence 1	Check flowrate into dryer (minimum 20% of designed capacity). Check set-points and operation according DR Sequence 1. If further assistance contact AQUAGAS.
TA 64.7 H	TT 64.7	Warning	> 40°C	0	Dryer Tower 64B, bottom cooling flow low	Set alarm DR Sequence 2	Check flowrate into dryer (minimum 20% of designed capacity). Clean ejector 64-T4. Drain water manually, if > 1 litre clean condensate system, for more info see Alarm PA 64.1 L.
TSA 64.8	TT 64.8	Warning + Shutdown	No 4-20 mA	0	TT 64.8 No signal	Always	Check sensor, transmitter, wiring and PLC I/O for TT 64.8
TA 64.8 H R	TT 64.8	Warning	>200°C	0	Dryer Tower 64B, top reg. temp. high	DR Sequence 1 & 2	Check control logic PLC software DR Sequence 1 & 2, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TSA 64.8 HH R	TT 64.8	Warning + Shutdown	>250°C	0	Dryer Tower 64B, top reg. temp. too high	DR Sequence 1 & 2	Check control logic PLC software DR Sequence 1 & 2, function of contactors K01 & K02 and set-point/function of TC 64.1 (280°C) & TS 64.2
TA 64.8 H A	TT 64.8	Warning	>45°C	0	Dryer Tower 64B, top ads. temp. high	DR Sequence 3 & 4	Check cooling water inlet flow and temperature against specification. Check for dew point peak during DR Sequence 1 = internal leakage in valves 64-V4.3
TSA 64.8 HH A	TT 64.8	Warning + Shutdown	>50°C	0	Dryer Tower 64B, top ads. temp. too high	DR Sequence 3 & 4	Check cooling water inlet flow and temperature against specification. Check for dew point peak during DR Sequence 1 = internal leakage in valves 64-V4.3
TA 64.8 L	TT 64.8	Warning	<150°C	0	Dryer Tower 64B, regeneration temp. top low	Set alarm DR Sequence 1	Check flowrate into dryer (minimum 20% of designed capacity). Check set-points and operation according DR Sequence 1. If further assistance contact AQUAGAS.

TSA 64.8 HH C	TT 64.8	Warning + Shutdown	>40°C	0	Dryer Tower 64B, cooling flow too low	Set alarm DR Sequence 2	Check flowrate into dryer (minimum 20% of designed capacity). Clean ejector 64-T4. Drain water manually, if > 1 litre clean condensate system, for more info see Alarm PA 64.1 L.
GSA 64.1.1 LL	GS 64.1.1	Warning + Shutdown	0	5 seconds	Valve 64-V4.1 Not open	64-V1 activated	Check function of GS 64.1.1 and valve 64-V4.1. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V1
GSA 64.1.1 HH	GS 64.1.1	Warning + Shutdown	1	5 seconds	Valve 64-V4.1 Not closed	64-V2 activated	Check function of GS 64.1.1 and valve 64-V4.1. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V2
GSA 64.1.2 LL	GS 64.1.2	Warning + Shutdown	0	5 seconds	Valve 64-V4.2 Not open	64-V2 activated	Check function of GS 64.1.2 and valve 64-V4.2. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V2
GSA 64.1.2 HH	GS 64.1.2	Warning + Shutdown	1	5 seconds	Valve 64-V4.2 Not closed	64-V1 activated	Check function of GS 64.1.2 and valve 64-V4.2. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V1
GSA 64.1.3 LL	GS 64.1.3	Warning + Shutdown	0	5 seconds	Valve 64-V4.3 Not open	64-V2 activated	Check function of GS 64.1.3 and valve 64-V4.3. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V2
GSA 64.1.3 HH	GS 64.1.3	Warning + Shutdown	1	5 seconds	Valve 64-V4.3 Not closed	64-V1 activated	Check function of GS 64.1.3 and valve 64-V4.3. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V1
GSA 64.1.4 LL	GS 64.1.4	Warning + Shutdown	0	5 seconds	Valve 64-V4.4 Not open	64-V1 activated	Check function of GS 64.1.4 and valve 64-V4.4. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V1
GSA 64.1.4 HH	GS 64.1.4	Warning + Shutdown	1	5 seconds	Valve 64-V4.4 Not closed	64-V2 activated	Check function of GS 64.1.4 and valve 64-V4.4. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V2
GSA 64.2 LL	GS 64.2	Warning + Shutdown	0	5 seconds	Valve 64-V5 Not open	64-V8 activated or 64-V3 deactivated	Check function of GS 64.2 and valve 64-V5. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V8
GSA 64.2 HH	GS 64.2	Warning + Shutdown	1	5 seconds	Valve 64-V5 Not closed	64-V3 activated	Check function of GS 64.2 and valve 64-V5. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V3
GSA 64.3 LL	GS 64.3	Warning + Shutdown	0	5 seconds	Valve 64-V7 Not open	64-V3 activated or 64-V8 deactivated	Check function of GS 64.3 and valve 64-V7. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V3
GSA 64.3 HH	GS 64.3	Warning + Shutdown	1	5 seconds	Valve 64-V7 Not closed	64-V8 activated	Check function of GS 64.3 and valve 64-V7. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V8
GSA 64-T2 LL	GS 64.T2	Warning + Shutdown	0	5 seconds	Valve 64-T2 Not closed	64-V12 inactivated	Check function of GS 64-T2 and valve 64-T2. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V12
GSA 64-T2 HH	GS 64.T2	Warning + Shutdown	1	5 seconds	Valve 64-T2 Not open	64-V12 activated	Check function of GS 64-T2 and valve 64-T2. Check voltage supply (24 VDC), pneumatic pressure supply (5-8 bar(g)) and possible freezing in 64-V12
TSA 64.2 HH	TS 64.2	Warning + Shutdown	>400°C	0	Dryer heater HE 64.1, surface temperature too high	Always	Check function of contactor K01 & K02 and setting point of TC 64.1. If TSA 64.2 HH is released, a manual reset is needed in HE 64.1 heater head. Please note: the reason released TS 64.2 must be concluded and fixed before new start.
KSA K01 LL	K01	Warning + Shutdown	K02 Aux. Contact = 0	5 seconds	Dryer heater HE 64.1, K02 Not activated	K01 activated	Check function of contactor K01 and function and set-point of TC 64.1. If TC 64.1 has a set-point of >200°C it must be replaced before new start.
KSA K01 HH	K01	Warning + Shutdown	K01 Aux. Contact = 1	5 seconds	Dryer heater HE 64.1, K01 Not deactivated	K01 deactivated	Check function of contactor K01.
KSA K02 LL	K02	Warning + Shutdown	K02 Aux. Contact = 0	5 seconds	Dryer heater HE 64.1, K02 Not activated	K02 activated	Check function of contactor K02 and function and set-point of TC 64.1. If TC 64.1 have a set-point of >200°C it must be replaced before new start.
KSA K02 HH	K02	Warning + Shutdown	K02 Aux. Contact = 1	5 seconds	Dryer heater HE 64.1, K02 Not deactivated	K02 deactivated	Check function of contactor K02.
TSA 64.3 HH	TS 64.3	Warning + Shutdown	> 200°C	0	Gas Temp. after Heater HE64.1 too high	Always	Check control logic PLC software DR Sequence 3 & 4, Check function of contactors K01 & K02 and set-point/function of TC64.1 (240°C)
TSA 64.4 HH	TS 64.4	Warning + Shutdown	> 60°C	0	Product Gas Temp. at unit outlet too high	Always	Check Cooling Water flow and temperature, If OK, check valves 64-V4.1, 64-V4.2, 64-V4.3 and 64-V4.4 for leakage

PSA 64.1	PT 64.1	Warning + Shutdown	No 4-20 mA	0	PT 64.1 No signal	Always activated	Check sensor, transmitter, wiring and PLC I/O for PT 64.1
PA 64.1 L	PT 64.1	Warning	See condensate sub program	0	Condensate, PT 64.1 set-point not reached.	Set alarm Condensate	Clean condensate filters 61-F1.2, 64-F1.2 & 64-F2.2. Please note: clean the filter element + the inlet/outlet of the filter housing. If not OK, clean filter 61-F1.1, 64-1.1 & 64-F2.1. If not OK check condensate valve operation. Check and clean orifices before and after PT 64.1.
PSA 64.1 LL	PT 64.1	Warning + Shutdown	See condensate sub program	0	Condensate, PT 64.1 set-point not reached.	Set alarm Condensate	Clean condensate filters 61-F1.2, 64-F1.2 & 64-F2.2. Please note: clean the filter element + the inlet/outlet of the filter housing. If not OK, clean filter 61-F1.1, 64-1.1 & 64-F2.1. If not OK check condensate valve operation. Check and clean orifices before and after PT 64.1.
PSA 64.1 HH	PT 64.1	Warning + Shutdown	< 1x operating pressure	0	Condensate pressure too high.	Set alarm Condensate	Check valve 64-T2 for malfunction or leakage.

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13 - SPARE PARTS LIST

AQUAGAS SWEDEN AB

DEDR 500/36 Spare parts list

Reference to P&ID 20230440 Rev.3

Prices - valid only 2 months after date of issue - Delivery EXW Södertälje

Issued: 2024-02-06

Revision:0

TAG NO.	DESCRIPTION	IDENTIFICATION	MANUFACTURER	UNIT PRICE (EUR)	RECOMMENDED QUANTITY
Instruments					
TT 60.1, TT 60.2, TT 60.3	Temperature Sensor For surface contact Type PT100 Range 0-300°C	PT100 90.2550 Ref. 00380207	Jumo		
TT 61.1, TT 64.5, TT 64.6, TT 64.7, TT 64.8	Temperature Sensor For Thermowell Type PT100 Range 0-300°C	PT100 90.2150 Ref.00415733	Jumo		
TT 60.1, TT 60.2, TT 60.3, TT 61.1, TT 64.5, TT 64.6, TT 64.7, TT 64.8	Temperature Transmitter + Clip Analog signal : 4-20 mA	5333D + 8421	PR Electronics	196.00	1 pc
GS 64.1.1, GS 64.1.2, GS 64.1.3, GS 64.1.4 GS 64.2, GS 64.3, GS 64-T2	Sensor Electrical limit switch	SRBG-C1-N-20N-ZCM12-EX5	Festo	133.00	1 pc
GS 64.1.1, GS 64.1.2, GS 64.1.3, GS 64.1.4 GS 64.2, GS 64.3, GS 64-T2	Indicator Electrical limit switch	SASF-S2-BF-A34	Festo	16.00	1 pc
PT 64.1	Pressure transmitter Analog signal : 4-20 mA	2088G3S22B2K1Q4	Rosemount	1,207.00	1 pc
PI 64.1	Pressure indicator gauge	WIKA 2940 Ø63mm ATEX Range: 0-60 bar(g)	WIKA		
TS 64.3	Temperature switch Setting: <200 ℃	ML1H-H454S-EXI Sensor temp. Range -18 ... +260 ℃	Barksdale		
TS 64.4	Temperature switch Setting: <60 ℃	ML1H-H203S-EXI Sensor temp. Range -73 ... +121 ℃	Barksdale		
Solenoid valves					
64-V1, 64-V2, 64-V3, 64-V8, 64-V12, 64-V17	Solenoid valve	MFH-3-1/8-EX	Festo	116.00	1 pc
64-V1, 64-V2, 64-V3, 64-V8, 64-V12, 64-V17	Solenoid coil	VACF-B-K1-1-5-Ex4 M	Festo	129.00	1 pc
Flow control					
FC 64.1	Electro Pneumatic Positioner Analog signal : 4-20 mA	EPR-IN2SN4NTR,Exia IIC T6	PG Power Genex		

Heater elements					
HE 61.1	Deoxo trace heater	HAQ2N660, 3 kW , 230 V	nVent		
HE 64.1	Dryer regeneration heater	DHG81B03GG-6-T1 6 kW, 400 V - 3 ph	Elmess		
Chemicals					
Vessel 61 Filling material	Deoxo Catalyst	DSL2	ANCO	310 €/kg	54 kg after 5 years
Vessel 64A/64B Filling material	Desiccant	Sorbead WS 2050	BASF	20 €/kg	2x 30 kg after 5 years
Automatic Valves					
64-V4.1, 64-V4.2, 64-V5, 64-V6, 64-V14	2-way ball valve	A44-6666RT BWJ DN20 PCTFE/Viton	Worcester	660.00	1 pc incl. Material Cert.
64-V4.1, 64-V4.2, 64-V5, 64-V6, 64-V14	Maintenance kit PTFE/Viton for 2-way ball valve	A44-ARK44-RV DN20 PCTFE/Viton	Worcester	72.00	5 pc
64-V4.3, 64-V4.4, 64-V7	2-way valve (high temperature)	A44-6666PV BWJ DN20 Fluorofill/Viton	Worcester	884.00	1 pc incl. Material Cert.
64-V4.3, 64-V4.4, 64-V7	Maintenance kit Polyfill/Viton for 2-way ball valve	A44-ARK44-PV DN20 Polyfill/Viton	Worcester	144.00	3 pc
64-V4.1, 64-V4.2, 64-V4.3, 64-V4.4	Pneumatic Actuator Double Acting	APM2DA	Sirca (Fagerberg)		
64-V5, 64-V7	Pneumatic Actuator Spring Loaded (Normally Closed)	APM2SR (NC)	Sirca (Fagerberg)		
64-V6	Pneumatic Actuator Spring Loaded (Normally Open)	APM2SR (NO)	Sirca (Fagerberg)		
64-V31, 64-V13	3-way valve for 8 mm tube	SAH1B3S-H-8M-PK-M-WH, Series 105	Hy-Lok	285.00	1 pc
64-T2	2-way valve for 8 mm tube	SAH1B-H-8M-PK-M-WH, Series 105	Hy-Lok	207.00	1 pc
64-V31, 64-V13, 64-T2	Pneumatic Actuator Spring Loaded (NC)	C15-SR-1B2 EX IIC	Habonim	295.00	1 pc
Manual Valves					
61-V1, 61-V2, 64-V10, 64-V11, 64-V15, 64-V16	2-way ball valve	A44-6666RV BWJ DN20 PCTFE/Viton	Worcester	660.00	1 pc incl. Material Cert.
61-V1, 61-V2, 64-V10, 64-V11, 64-V15, 64-V16	Maintenance kit PTFE/Viton for 2-way ball valve	A44-ARK44-RT DN20 PCTFE/Viton	Worcester	72.00	6 pc
61-V3, 64-V32, 64-V-33	Plug valve for 8 mm tube	P1V-H-8M-S316, Series P	Hy- Lok	95.00	1 pc
64-V9	Plug valve for 6 mm tube	P1V-H-6M-S316, Series P	Hy- Lok	87.00	1 pc
64-V14.1	Needle valve for 8 mm tube	NV2H-8M-R , Series NV	Hy- Lok	98.00	1 pc
Orifices					
R Ø1.0 mm	Calibrated orifice tube	Orifice tube R Ø1.0 mm	AQUAGAS		
R Ø1.2 mm	Calibrated orifice tube	Orifice tube R Ø1.2 mm	AQUAGAS		
Filter					
61-F1.1	Condensate Y-strainer	Insert for Y611 - 0124/08-3/4" - 1 mm	Bonomi	76.00	
61-F1.2	Condensate filter	Insert for HyLok FTH-8M-50 modif.0,5mm	AD Allmecano	40.00	
66	Filter element for Particle filter	25.178.5S, 2 micron + Viton seal o'ring	Classic Filters	200.00	Box of 10 pc
Pressure Safety Valves					
PSV-64.1, PSV-64.2	Pressure safety valve	461tGFO-8m/f-08/15 PTFE 36 bar(g) setting	Goetze		
PSV-64.3	Pressure safety valve	861tGFO-15m/f-15/15 PTFE 6 bar(g) setting	Goetze		
Gaskets					

For DE and DR Vessels filling/emptying	Elastagraph Gasket (carbon)	DN25 PN100 tickness 2,2mm	Densiq	60.00	6 pc
For Heater HE 64.1	Elastagraph Gasket (carbon)	DN100 PN63 tickness 2,2mm	Densiq	95.00	1 pc

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14 - HELIUM LEAK TEST

nolek
- Leak Testing -

CALIBRATION CERTIFICATE
SNIFFIT

CERTIFICATE NUMBER
18380
INSTRUMENT S/N:
401

CUSTOMER
[redacted]

SERIAL NUMBER ON SENSOR	
S/N:	Description:
288-12d/426	Helium sensor

TEST EQUIPMENT USED

Description:	Model:	S/N:
Calibrated helium test leak [1]	FV4110	FC20001617
Helium leak detector	HLT-560	40105770

AS FOUND DATA

HLT-560 Currently measured data: (mbarl/s)	SniffIT Low sensitivity: Q_X	SniffIT High sensitivity: Q_N	Deviation Max Allowed/Actual	Results
$4,7 \times 10^{-4}$	$5,0 \times 10^{-5}$		$3,0 \times 10^{-5}/0,3 \times 10^{-4}$	Pass
$6,7 \times 10^{-5}$		$6,3 \times 10^{-4}$	$1,5 \times 10^{-4}/0,4 \times 10^{-5}$	Pass

CALIBRATON DATA

HLT-560 Currently measured data: (mbarl/s)	SniffIT Low sensitivity: Q_X	SniffIT High sensitivity: Q_N	Deviation Max Allowed/Actual	Results
$0,0 \times 10^{-4}$	$0,0 \times 10^{-5}$		$3,0 \times 10^{-5}/0,0 \times 10^{-4}$	N/A
$0,0 \times 10^{-5}$		$0,0 \times 10^{-4}$	$1,5 \times 10^{-4}/0,0 \times 10^{-5}$	N/A

ENVIROMENT

Temperature:
23°C

APPROVAL

Date: (YYYY-MM-DD)	Location:	Signature:
2023-05-26	Norsborg	



Mikael Hansen

Recommended interval for calibration is one year.

[1] This calibration was performed by comparison to a primary standard, which is directly traceable to helium test leak FV4110 - 2.0e 10 -4 FC20001617.

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nolek
- Leak Testing -

SniffIT X1®

OPERATOR'S MANUAL



Due to our continuing program of product improvements specifications are subject to change without notice.

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General Information

Manufacturer

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Website: www.nolek.com

SniffIT X1® – Product Introduction

SniffIT X1® is fully digitalized with a screen that shows both quantitative numeric measurement values as well as graphical leak indications.

SniffIT X1® utilizes temperature, pressure, and humidity sensors to ensure accurate measurements and a high level of sensitivity.

The instrument can log and store large amounts of measurement data. By attaching the sniffer to a computer via USB, data can easily be transferred. Software upgrades are available through Nolek's website and are easy to install by connecting the SniffIT X1® to the computer.

Warning! Do not use the sniffer to sniff in liquid. It can destroy the internal sensor and will affect the warranty.

Technical Data

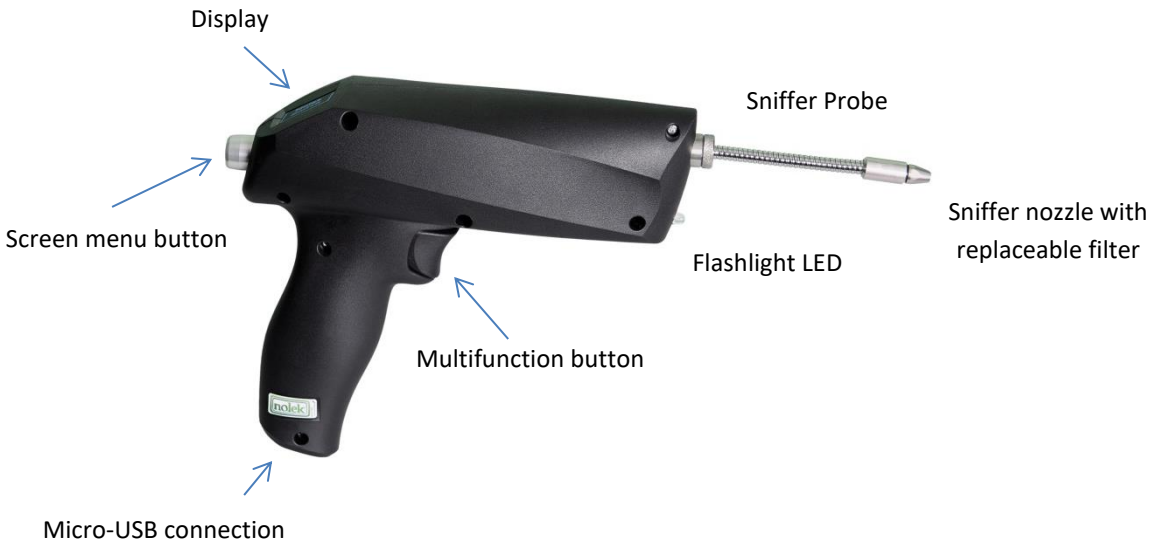
Technical Data - SniffIT X1®	
Battery capacity	8 hours
Charging time	4 hours
Dimension H*B*D	149x238x55 mm
Weight	320 gram
Detectable gases	Helium
Detect leaks greater than	$1{,}00\times10^{-4}$ mbarl/s
Accuracy	± 20% of reading or min ± $3{,}00\times10^{-4}$ mbarl/s
Available units	mbarl/s
Response time	<0.5 seconds
Recovery time	<1 seconds
Operating temperature	10-40°C
Storage temperature	-10°C to 60°C
Humidity	85% RH NC
Input voltage	5 V(dc)
Input current	500 mA max
Signal presentation	Numeric and bar graph, OLED Display
Alarm level	Yes
Audio and vibration alarm	Yes
Logging possibilities	Yes
Auto zero	Yes
Probe lengths	50mm and 350mm
Wrist strap	Yes
USB charger	Yes
Two extra filter	Yes
Language	English, Swedish
Package	weather protected case included
Calibration certificate	Yes
Certificates	CE, FCC
Warranty	1-year

Operate the SniffIT X1®

SniffIT X1® has six main menus. Five main menus are available for the daily use: "Shut down", "Measure", "Settings", "Info" and "Language". To enter the menu "Settings", a password is required.

The sixth menu, "Service", is protected by a password and is for Nolek service staff only.

SniffIT X1®- overview



Screen menu button

Press the screen menu button and hold to turn the SniffIT X1® on. In the menu "Shut down", press the screen menu button and hold for 9 seconds to turn the SniffIT X1® off.

To switch between the menus: turn the Screen menu button to choose menu and press on the button to enter the menu. Press and hold the button to leave the menu.

Note! If the SniffIT X1® should need a restart, this can be performed by pressing the Screen menu button and hold for more than 9 seconds.

Display

The display is an OLED screen and presents the result of the leak detection as a graph or as numeric values.

Multifunction button

Performs three different functions during measurement:

- Press the multifunction button quick to zero the measurement and perform background compensation. Release the button after zeroing to normal operation.
- Double click on the multifunction button to stop logging at the current location and start logging at the next measuring place.
  Note! For this function to work "Graph" or "Numeric" must be chosen in the "Measure log" menu and log values must be specified in the "Settings" menu.

- Press and hold the multifunction button to activate or deactivate the LED headlight.
  Note! For this function to work, "LED" mode must be set to "Toggle" in "Settings" menu.

Micro-USB Connection

Charging - Plug in any standard USB charger to charge the instrument.

Log - Connect the SniffIT X1® to a computer between measurements and export the compiled measurement data. The data is presented in txt-format but is also Excel compatible.

Note! Make sure that the "log" functions are deactivated when the SniffIT X1® is connected to the computer.

The Menus

Table 1 below shows the menus for the SniffIT X1®:

Shut down	Measure	Settings	Service	Info	Language
	Measure	LED		System data	English
	Measure log	RTC		System data	Swedish
		USB Mode		Alarms	
		Auto off time			
		HLrange			
		Calib			
		Leak unit			
		Gas type			
		Log			
		Password			
		Vibrate			
		Sound			
		RejValue			
		Auto Zero			
		Config			



Note! For more accurate results it is recommended to rest the SniffIT X1® in measuring mode for approximately 10 minutes in the test environment before starting the testing. This way the sniffer can adapt to the ambient conditions.

Menu: Shut down

Switch on the SniffIT X1® by pressing and holding the Screen menu button until the Nolek logo shows up. In the menu "Shut down", press the Screen menu button and hold for 9 seconds to turn the SniffIT X1® off.

Menu: Measure

Measure

This menu is the one to use for performing the leak detection. The result of the leak detection can be presented either as a graph or as a numeric value for SniffIT X1®.

To perform leak detection: Start the SniffIT X1® and let it adapt to the room's ambient conditions for 10 minutes before sniffing. Choose the menu "Graphic" or "Numeric" mode in "Measure" menu. Hold the sniffer nozzle away from the test object and press the multifunction button shortly to perform background compensation ("zero"). Then move the nozzle to the test object. The left of the display should now show a low green bar graph or a value with a "<" symbol in front.

Sweep the SniffIT X1® nozzle along the object. In case of a leakage the display will show an increasing bar graph colored yellow and red or a number larger than the number displayed after the "<" symbol. It is also possible to get an audible and/or vibration for indicating a leak rate above a pre-set alarm limit as well. To enable these functions, go to submenus "Sound" and "Vibration" in "Settings". The leak rate value set in "Settings/RejValue" acts as a trigger to the alarm indicators. See more in chapter RejValue.



The left sample shows the SniffIT X1 ® display in numeric **L**ow sensitivity mode. The actual leak rate reading shown is less than $1{,}0\times10^{-4}$ mbarl/s. The sample image on the right shows the SniffIT X1® display in graphic **H**igh sensitivity measurement mode and it is showing a small leakage close to the lower measurement range limit.

If there is a decrease or increase in background gas concentration, this will be shown on the graphical display as a decrease or increase of signal even though the sniffer isn't held against the test object. Press the multifunction button to zero the instrument. Now only the green field will be shown on the display as the background is compensated. On the numerical display, the result of zeroing the instrument is shown as the lowest number of leak rate (= the highest sensitivity).

The H or L in the header of the display tells whether the measuring is performed in the high or low sensitivity range. Press the screen menu button quickly to change from H to L range and vice versa. In the header the battery status is shown as well.

Measure Log

SniffIT X1® Digital Pro has a log function (Graphic and/or Numeric log) which stores the measuring data. The stored data can be collected from the USB memory by a connection between the SniffIT X1's Micro USB connection and a computer. In the "Settings" submenu "Log", the conditions such as number of measuring points, filename and maximum time for measurement are specified.

When in the menu Graphic or Numeric log, a number will be shown in the head of the display. This number represents the number of the actual measuring point. The specified name for the current measurement is shown on the screen until the measurement begins with a double click on the multifunction button. The measurement continues for as long time as specified in the "Settings" menu. It is possible to cancel the measurement and start the next earlier by double clicking on the multifunction button.

The data from the USB is presented in txt-format. In the document, the following will be stated in the following order (without titles):

Filename – Type – Time – Value – Reject Value– Rejected

"Filename", "Type" and "Time" is described under the heading "Menu: Settings" in this manual.
"Value" is the leak value, shown in the chosen unit.
"Reject value" is the alarm limit, stated in the Settings submenu "Reject Value".
"Rejected" shows the result of the measurement. 0 means an approved object, while 1 means that the rejected value is reached and that the object is leaking.

There will be one file created for each filename. If a new filename is stated, a new file will be created. If an old stored name is repeated, the old file will be resumed. In each file there will be a new row added for each measurement.

Menu: Settings

The menu "Settings" is only available with a password. The default menu access password is "000". The submenus here will be introduced individually.

LED

If the leak detection is going to be conducted in narrow and dark areas, the LED-light can be switched on by choosing "5 minutes" in the menu "LED". The lamp will then be on for 5 minutes. To switch the light off, choose "OFF" in the LED-menu.

Another way to turn the LED-light on/off is to press the multifunction button and hold until the light is on/off. This mode can be set by selecting "Toggle" in "LED" menu. The light will be on until the user presses and holds on the multifunction button again.

RTC

RTC stands for "Real-Time Clock". This is for adjusting the time and date settings.

USB Mode

"USB Disk" setting is selected by default. In this mode the SniffIT X1® acts as a mass storage device when connected to a computer. This way the user manual is accessible as it were stored on an internal USB memory.

"USB VCP" setting is an unavailable feature.

Auto off time

Using the integrated accelerometer after the set time (minutes) the SniffIT X1® will shut itself down to save battery. Setting this value to "0" disables the function.

HLrange

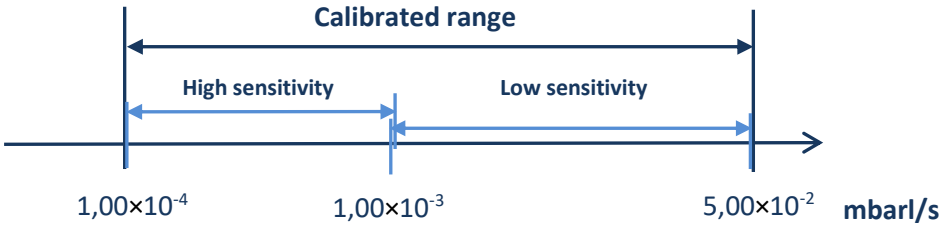
The SniffIT X1® unit has two different sensitivity ranges. One is called the **H**igh sensitivity range, suitable to detect low leak rates, the other is the **L**ow sensitivity range, suitable to detect high leak rates.

Basic operation of the unit is as follows: The unit is turned on. It is recommended to wait 10 minutes before starting the measurements so the unit can adapt to the ambient conditions. Go to Measurement mode and select **H**igh sensitivity. Navigate the sniffer probe close to the tested object and move it along the objects surface. If a leakage is detected, the visible information is displayed on the bar graph and a Leak rate/time graph. If the leak rate is higher than the upper limit of the high sensitivity range then the edge of the display turns blinking red, audio and vibrating feedback alarms turn on (if enabled). At this event the operator should switch to the low sensitivity mode to be able to pinpoint the leak location precisely.

The high and low sensitivity ranges are defined as windows over the complete measurement range of the unit. The detectable range spans from $1{,}0\times10^{-4}$ to $5{,}0\times10^{-2}$ mbarl/s. In the menu point "Settings/HLrange" the operator can define two windows over this range. High Min and High Max defines the bottom and top of the high sensitivity window respectively. Low Min and Low Max defines the bottom and top of the low sensitivity window respectively. The two windows cannot overlap, which means Low Min can never be a lower value than High Max.

1. Choose the submenu "HLrange".
2. Choose "High_Min". Enter the desired minimum value, for example $1{,}00\times10^{-4}$, by turning the Screen menu button until 1,00e-04 is shown on the display. Press and hold the Screen menu button to store value and leave the submenu.
   Choose "High_Max". Enter the desired maximum value, for example $5{,}00\times10^{-4}$, by turning the Screen menu button until 5.00e-04 is shown on the display. Press and hold the Screen menu button to store value and leave the submenu.

3. Choose "Low_Min". Enter the desired minimum value, for example $1{,}00\times10^{-3}$, by turning the Screen menu button until 1,00e-03 is shown on the display. Press and hold the Screen menu button to store value and leave the submenu.
   Choose "Low_Max". Enter the desired maximum value, for example $5{,}00\times10^{-3}$, by turning the Screen menu button until 5,00e-03 is shown on the display. Press and hold the Screen menu button to store value and leave the submenu.



1 - Settings range for HLrange

The factory default settings are as follows:

- Low Max: 5,00E-02 mbarl/s (1 000 000 u/M)
- Low Min: 1,01E-03 mbarl/s (20 000 u/M)
- High Max: 1,01E-03 mbarl/s (20 000 u/M)
- High Min: 1,00E-04 mbarl/s (0 u/M)

Calib
Unavailable function.

Leak unit
In the menu "Leak unit", the user chooses the desired unit. Supported units are:

- mbarl/s (millibar liters per second)

Gas type
Unavailable function.

Log
In this menu users can specify the conditions for storage of data from the measurements. Detailed description is available in section "Menu: Measure". There are four available options:

N:	Specify the chosen number of measuring points. 1-9 pcs.
Filename:	Name each of the measuring points, up to 9 detection places.
Time:	Specify the maximum time (1-180 seconds) for measurement at each measuring point. The chosen time limit is valid for all the measuring points. **Note!** When measuring, it is possible to terminate the ongoing measurement and go to the next measuring point by double clicking on the multifunction button.
Type:	Choose to record all measuring values or to record only the peak value.

Password
Define a new password for accessing the "Settings" menu. The password must be of 3 digits. The default menu access password is "000".

Vibrate
Enables (Vibrator On) or disables (Vibrator Off) vibrating alarm when the detected leak rate exceeds the pre-set rejection value of "RejValue" menu.

Sound
Enables ("Enable / Sound On") or disables ("Enable / Sound Off") audible alarm when the detected leak rate exceeds the pre-set rejection value of "RejValue" menu. The volume can be adjusted in percentage.

RejValue
The operator can set the alarm limit in this menu. If the detected leak rate exceeds the set value visible an audible and/or vibrating alarm (if enabled) is triggered.

Auto Zero
Auto Zero function is designed to perform the zeroing of the SniffIT X1® automatically during measuring. This function must only be enabled if the operator is aware of the nature of the leakages to be found.

The leak signal can be interpreted as an impulse. The impulse has a rising and a falling edge and rising time and falling time accordingly. Usually, the rising and falling time is defined as how much time passes between the amplitude of the impulse rises from 10% of the logical high level to 90% of the logical high level.

The Auto Zero function enables the instrument to activate the zeroing autonomously if the rising time and the falling time of the leak signals are short enough. If the detected leakage is low and the leakage generates a slow rise (long rising time) in the leak rate readings (low impulse amplitude) than it could be interpreted as a disturbance in the background value and Auto Zero could trigger zeroing and effectively suppress it. That is, Auto Zero hides the real leakage from the operator. Enabling Auto Zero is only recommended if the expected leakages are big enough to generate impulse-like leak rate signals. Auto Zero function is disabled by default as it could be a source of false positive test tests (no leakage detected due to signal suppression).

Config
All settings can be saved to the internal memory in a .txt file. This file can be transferred to the computer as a back-up and can be useful to restore all settings in the unlikely case of data loss or after a firmware upgrade.
To export the setting to the internal memory select "SD Store".
To load saved settings from the internal memory select "SD Load".

Menu: Service
This menu is for Nolek service personnel only.

Menu: Info

On the first page information is available about the SniffIT X1® 's current firmware version, serial number, pre-set date, and time. Battery charge is displayed in volts.

On the second page the tracer gas and the leak rate unit are displayed that was used to calibrate the unit in the factory.

Menu: Language

Available languages are:

- English
- Swedish

Software Update

Nolek will continuously release software updates. To update your SniffIT X1®, first select menu "Settings" – "Config" – "SD Store" to save current device settings.

Connect the SniffIT X1® to a computer via the micro-USB connection on the sniffer to the USB connection on the computer. Use the cable for the charger. After connecting the SniffIT X1® to the computer, the computer will automatically open, or you must open the SniffIT X1® device folder. Select subfolder "app" then "load".

To retrieve the new firmware, visit our support web site at:
http://www.nolek.com/sniffitupdate

Copy the downloaded firmware file in the "load" folder and delete old file. Use your operating system's "Safely remove mass storage device" function to disconnect SniffIT X1® from the computer.

Disconnect the USB cable and shut down your SniffIT X1®. Then, restart it while at the same time pressing the multifunction button. Select "update" on the menu screen of the SniffIT X1®. When the update procedure is completed press and hold the Screen menu button to return to the Update menu.

Shut down SniffIT X1®. After powering up the unit again the new firmware version will be loaded and the SniffIT X1® can now be used again.

Operator's Manual Update

Nolek will continuously release Operators Manual Updates. To update the SniffIT X1® with the latest manual, first connect the SniffIT X1® to a computer via the micro-USB connection on the sniffer to the USB connection on the computer. Use the cable for the charger.

After connecting your SniffIT X1® to the computer, the computer will automatically open, or you must open the SniffIT X1® device folder. In the folder first select "manual". Copy the downloaded manual file in the "manual" folder and delete the old one.

To retrieve the new user manual, visit our support web site at:
http://www.nolek.com/sniffitupdate

Table of version changes

Version	Updates	Date
220920	- "Table of changes" heading added. - Sensitivity ranges updated: ○ Low Min: 9,48E-04 mbarl/s (previously 1,0E-04) ○ High Max: 9,48E-04 mbarl/s (previously 1,0E-04) ○ High Min: 1,00E-04 mbarl/s (previously 1,0E-05) - "Measure" column in Table 1 updated. - Illustration of settings for HLrange updated. - Minor layout and formatting changes.	2022-09-20
201017	- Technical data: ○ Hydrogen removed as detectable gas. - Sensitivity ranges updated: ○ Low Min: 1,01E-03 mbarl/s (previously 9,48E-04) ○ High max: 1,01E-03 mbarl/s (previously 9,48E-04) - Gas type updated: ○ Text changed to "Unavailable function" (earlier "helium or hydrogen). - Minor layout and formatting changes.	2022-10-17

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15 - RISK ANALYSIS & HAZOP

AQUAGAS SWEDEN AB

Deoxo and Dryer type: DEDR 500/36
Customer: ELOGEN
Project: A-23/24 140

HAZOP Cause & Effect
Issued: 2024-01-23
Rev: 0

HAZOP RISK CATEGORY MATRIX

LIKELYHOOD	CONSEQUENCE					RISK ASSEMENT
	No injury	First Aid	Medical Need	Permant Disability	Death	
Certain (A)	1A	2A	3A	4A	5A	1 LAYER OF PROTECTION
Likely (B)	1B	2B	3B	4B	5B	2 LAYERS OF PROTECTION
Possible (C)	1C	2C	3C	4C	5C	2 LAYERS OF PROTECTION + SIL CLASSIFICATION
Unlikey (D)	1D	2D	3D	4D	5D	RISK NOT ACCEPTABLE
Rare (E)	1E	2E	3E	4E	5E	

DEDR Tag. Element	Cause	Consequences	Preventive measurements / safeguards	Remark	HAZOP Risk category (without preventive measurements / safeguards)	Notes
DEVIATION: NO FLOW OR LOW FLOW (< 10% of nominal)						
Deoxo tower 61	No or low H2 inlet flow.	Temperature increase if trace heater HE 61.1 in operation. 571 °C = ignition temperature for hydrogen	Trace heater HE 61.1 temperature controlled by TT 60.1 and TT 60.2. Warning + Shutdown if TSA 60.1 HH or TSA 60.2 HH is reached.		3D	
Trace heater HE 61.1	No or low H2 inlet flow.	Temperature increase if trace heater HE 61.1 in operation. 571 °C = ignition temperature for hydrogen	Trace heater HE 61.1 temperature controlled by TT 60.2 . Warning + Shutdown if TSA 60.2 HH is reached.		3E	
Heater HE 64.1	No or low H2 flow during regeneration heating	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH.	Elmess heater 81 series are designed to operate at 0% flow.	3D	
Ejector 64-T4	No or low H2 inlet flow.	None			1E	Valve 64-V6 is normally open and controlled by 4-20 mA input
Heat exchanger 64-T1	No or low H2 inlet flow.	None			1D	
Dryer tower 64A	No or low H2 inlet flow.	None			1D	
Dryer tower 64B	No or low H2 inlet flow.	None			1D	
Condensate system	No or low H2 inlet flow.	None			1C	
Particle filter 66	No or low H2 inlet flow.	None			1C	
DEVIATION NO PNEUMATIC/INSTRUMENT AIR OR NITROGEN						
Deoxo tower 61	None	None	Dryer goes in to fail safe mode: Valve 64-V5 closed, 64-V6 open, 64-V7 closed and valve 64-V4.1-V4.4 stay in position.		1E	
Trace heater HE 61.1	None	None	Dryer goes in to fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		1E	
Heater HE 64.1	Regeneration (heating). Temperature increase.	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TC 64.1 and TS 64.2. Warning + Shutdown TSA 64.2 HH	Elmess heater 81 series are designed to operate at 0% flow.	3D	Risk of temperature increase in heater.
Ejector 64-T4	None	None	Dryer goes in to fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		1E	
Heat exchanger 64-T1	None	None	Dryer goes into fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		1E	
Dryer tower 64A	None	None	Dryer goes into fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		3E	Risk of temperature increase in vessel.
Dryer tower 64B	None	None	Dryer goes into fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		3E	Risk of temperature increase in vessel.
Condensate system	None	None	Dryer goes into fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		1E	Water will be built up in deoxo/dryer towers. Is not considered as safety risk. But strongly recommended to be avoided.
Particle filter 66	None	None	Dryer goes into fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position.		1E	
DEVIATION NO C.W. FLOW						
Heater HE 64.1	During regeneration (heating).	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH. Warning + Shutdown TSA 64.6 HH (Tower 64A) / TSA 64.8 HH (Tower 64B).		3D	
Ejector 64-T4	None	None			1E	
Heat exchanger 64-T1	No C.W. flow	Reduced or no capacity.	TA/TSA 64.5 and TA/TSA 64.6 (Adsorption Tower 64A) or TA/TSA 64.7 and TA/TSA 64.8 (Adsorption Tower B)	High temperature will lead to warning + shutdown.	1E	
Dryer tower 64A	No C.W. flow	Temperature increase on inlet TT 64.5.	TA/TSA 64.5 and TA/TSA 64.6	High temperature will lead to warning + shutdown.	3E	High temperture is a risk but unlikely.
Dryer tower 64B	No C.W. flow	Temperature increase on inlet TT 64.7.	TA/TSA 64.7 and TA/TSA 64.8	High temperature will lead to warning + shutdown.	3E	High temperture is a risk but unlikely.
Condensate system	Increased condensate temperature	None	TA/TSA 64.5 (Tower 64A) AND TA/TSA 64.7 (Tower B)	High temperature will lead to warning + shutdown.	1E	
Particle filter 66	Increased gas temperature	Increased downstream temperature, >100°C Wear/damage of filter insert.	Warning + Shutdown TSA 64.4 HH when temperature >60°C.		1E	
DEVIATION MANUAL VALVES IN WRONG POSITION						
Deoxo tower 61	None	None			N/A	
Trace heater HE 61.1	None	None			N/A	
Heater HE 64.1	Regeneration (heating). Temperature increase. Valve 64-V14 not open = no flow	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Warning + Shutdown GSA 64.3 LL. Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH.	Elmess heater 81 series are designed to operate at 0% flow.	3D	
Ejector 64-T4	None	None			N/A	
Heat exchanger 64-T1	None	None			N/A	
Dryer tower 64A	None	None			N/A	

Dryer tower 64B	None	None			N/A	
Condensate system	None	None			N/A	Water will be built up in deoxo/dryer towers. Is not considered as safety risk. But strongly recommended to be avoided.
Particle filter 66	None	None			N/A	Wear/damage of internal materals is not considered as safety risk. But strongly recommended to be avoided.
Manual valve 61-V2 in closed position	Water build up in 61 Deoxidizer	Catalysts will get wet and loose it´s capacity to make oxygen react with hydrogen into water.			1E	
Manual valve 64-V15/16 in closed position	Water build up in 64 A/B Dryer	Desiccants will get wet and loose it´s capacity to adsorb moisture.	Dew point measurement (not included) will lead to Warning + shutdown		1E	Dew Point measuerement = Customer supply
DEVIATION HIGH FLOW						
Deoxo tower 61	Too high gas velocity upstream DEDR.	Lifting of catalysts in deoxo leads to wear/damage of catalysts.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.
Trace heater HE 61.1	Too high gas velocity upstream DEDR.	Reduced heating capacity, might lead to condensation in Deoxo tower 61.	Trace heater HE 61.1 temperature controlled by TT 60.2 . Warning + Shutdown if TSA 60.1 LL or TSA 60.2 LL.	Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Heater HE 64.1	Too high gas velocity upstream DEDR.	Reduced heating temperature.	Reduced heating temperature will lead to Warning TA 64.6/8 and/or TA 64.5/7.	Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Ejector 64-T4	Too high gas velocity upstream DEDR.	Pressure drop in system.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Heat exchanger 64-T1	Too high gas velocity upstream DEDR.	Reduced cooling capacity in Heat exchanger 64-T1.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Dryer tower 64A	Too high gas velocity upstream DEDR.	Lifting of desiccants in dryer leads to wear/damage of desiccants.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.
Dryer tower 64B	Too high gas velocity upstream DEDR.	Lifting of desiccants in dryer leads to wear/damage of desiccants.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.
Condensate system	Too high gas velocity upstream DEDR.	None		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Particle filter 66	Too high gas velocity upstream DEDR.	Wear/damage of filter insert.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.
DEVIATION REVERSE FLOW						
Deoxo tower 61	Back pressure flow	Dusting/particles of catalysts goes upstream system.		Customer to secure no reverse flow.	1E	Particles from DEDR can go into H2 source which might lead to severe damage of an electrolyzer.
Trace heater HE 61.1	Back pressure flow	None			3D	It´s unlikey that a back flow will lead to a temperature increase.
Heater HE 64.1	Regeneration (heating). Reverse flow.	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH.	Elmess heater 81 series are designed to operate at 0% flow.	3E	
Ejector 64-T4	None	None			1E	
Heat exchanger 64-T1	None	None			1E	
Dryer tower 64A	Back pressure flow	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH.	Elmess heater 81 series are designed to operate at 0% flow.	3E	
Dryer tower 64B	Back pressure flow	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH.	Elmess heater 81 series are designed to operate at 0% flow.	3E	
Condensate system	None	None			1E	
Particle filter 66	Back pressure flow	None			1E	
MISDIRECT FLOW						
Inceased outlet temperature due to leakage in valves 64-V4.1 or 64-V4.2	Temperature increase	Temperature increase on outlet	Warning + Shutdown at TSA 64.4 HH.	Calculations shows that mixing of gas will give maximum 80°C at worst case scenario.	1E	
DEVIATION LOW PRESSURE/ VACUUM						
Deoxo tower 61	Too high gas velocity through DEDR.	Lifting of catalysts in deoxo leads to wear/damage of catalysts.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.
Trace heater HE 61.1	Too high gas velocity through DEDR.	Reduced heating capacity, might lead to condensation in Deoxo tower 61.	Trace heater HE 61.1 / HE 61.2 temperature controlled by TT 60.1 and TT 60.2 / TT 60.3. Warning + Shutdown TSA 60.1 HH and TSA 60.2 HH.	Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Heater HE 64.1	Only during regeneration (heating).	Reduced heating temperature.	Reduced heating temperature will lead to Warning TA 64.6/8 and/or TA 64.5/7.	Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Ejector 64-T4	Too high gas velocity through DEDR.	Pressure drop in system.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	

Heat exchanger 64-T1	Too high gas velocity through DEDR.	Reduced cooling capacity in Heat exchangers 64-T1.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Dryer tower 64A	Too high gas velocity through DEDR.	Lifting of desiccants in dryer leads to wear/damage of desiccants.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Dryer tower 64B	Too high gas velocity through DEDR.	Lifting of desiccants in dryer leads to wear/damage of desiccants.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Condensate system	Too high gas velocity through DEDR.	None		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	
Particle filter 66	Too high gas velocity through DEDR.	Wear/damage of filter insert.		Customer to control flowrate and minimum working pressure according to DEDR specification.	1C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.
Vacuum	Risk for oxygen ingress due to leakage from atmosphere into the system	Increased oxygen concentrationin system can lead to potential internal explosion	Pressure vessels are calculated for vacuum -1 bar(g)	Customer to secure that vacuum cannot occur.	3C	

DEVIATION HIGH PRESSURE						
Deoxo tower 61	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	
Trace heater HE 61.1	None	None			1C	Not a pressurized part.
Heater HE 64.1	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	
Ejector 64-T4	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	
Heat exchanger 64-T1	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	1C	Gas side Cooler has design pressure >100 bar
Heat exchanger 64-T1	High pressure cooling lines	Wear/damage. Hydrogen leakage into cooling water system.	Safet valve PSV 64.3 on the cooling water system.		1C	
Dryer tower 64A	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	
Dryer tower 64B	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	
Condensate system	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	
Particle filter 66	High pressure upstream DEDR	Wear/damage.	Pressure safety valves PSV 64.1 / PSV 64.2 are installed.	Customer to secure that upstream pressure don´t exceed design pressre.	3C	Wear/damage of internal materals is not considered as safety risk. But a strongly recommended to be avoided.

DEVIATION LOW GAS INLET TEMPERATURE						
Deoxo tower 61	None	Temperture goes below design temperature -20°C	Warning + Shutdown TSA 61.1 LL.	User to control inlet temperature according to specification.	1E	
Trace heater HE 61.1	None	None			N/A	
Heater HE 64.1	None	None			N/A	
Ejector 64-T4	None	None			N/A	
Heat exchanger 64-T1	None	None			N/A	
Dryer tower 64A	None	Temperture goes below design temperature -20°C	Warning + Shutdown TSA 64.5 LL.	User to control inlet temperature according to specification.	1E	
Dryer tower 64B	None	Temperture goes below design temperature -20°C	Warning + Shutdown TSA 64.7 LL.	User to control inlet temperature according to specification.	1E	
Condensate system	None	None			N/A	
Particle filter 66	None	None			N/A	

DEVIATION HIGH INLET TEMPERATURE						
Deoxo tower 61	Internal and outlet temperature increase	Temperature increase in Deoxo Tower 61.	Warning + Shutdown TSA 60.1 HH and TSA 61.1 HH.	User to control inlet temperature according to specification.	1E	
Trace heater HE 61.1	Temperature increase	Temperature increase of trace heater HE 61.1.	Trace heater HE 61.1 temperature controlled by TT 60.1 and TT 60.2 . Warning + Shutdown TSA 60.1 HH, TSA 60.2 HH and TSA 61.1 HH.	User to control inlet temperature according to specification.	3E	High inlet temperature will not affect the trace heating cable rapidly.
Heater HE 64.1	Regeneration (heating). Temperature increase.	Temperature increase if heater HE 64.1 in operation. 571 °C = ignition temperature for hydrogen	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH. Warning + Shutdown TSA 64.6 HH (Tower 64A) / TSA 64.8 HH (Tower 64B).	User to control inlet temperature according to specification.	3D	
Ejector 64-T4	None	None			1E	
Heat exchanger 64-T1	Inlet temperature increase	Outlet temperature increase	Warning + Shutdown TSA 64.5 HH (Tower 64A) and/or TSA64.7 HH (Tower 64B).	User to control inlet temperature according to specification.	1E	
Pressure increase because of heating effect of gas	Temperarure increase	Pressure increase	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH. Warning + Shutdown TSA 64.6 HH (Tower 64A) / TSA 64.8 HH (Tower 64B). Safety valves PSV 64.1 / PSV 64.2 installed.		3D	
Dryer tower 64A	Inlet temperature increase	Temperature increase on inlet TT 64.5.	Warning + Shutdown TSA 64.5 HH and TSA 64.6 HH.	User to control inlet temperature according to specification.	3E	

Dryer tower 64B	Inlet temperature increase	Temperature increase on inlet TT 64.7.	Warning + Shutdown TSA 64.7 HH and TSA 64.8 HH.	User to control inlet temperature according to specification.	3E	
Condensate system	Condensate temperature increase	None	Warning + Shutdown TSA 64.5 HH (Tower 64A) and TSA 64.7 HH (Tower 64B).	User to control inlet temperature according to specification.	1E	
Particle filter 66	Gas temperature increase	Increased downstream temperature, >100°C Wear/damage of filter insert.	Warning + Shutdown TSA 64.4 HH.	User to control inlet temperature according to specification.	1E	

DEVIATION HIGH O2 CONTENT						
Deoxo tower 61	Internal and outlet temperature increase	Temperature increase in Deoxo Tower 61.	TSA 60.1 and TSA 61.1.	User to control inlet O2 content according to specification (max 500 ppmv).	3E	0.1% O2 in H2 gives a temperature rise of 16°C
Trace heater HE 61.1	Temperature increase	Temperature increase of trace heater HE 61.1.	Trace heater HE 61.1 temperature controlled by TT 60.1 and TT 60.2 . Warning + Shutdown TSA 60.1 HH, TSA 60.2 HH and TSA 61.1 HH.	User to control inlet O2 content according to specification (max 500 ppmv).	3E	
Heater HE 64.1	Regeneration (heating). Temperature increase.	Temperature increase of heater HE 64.1. Gas temperature >440°C lead to possible ignition.	Heater HE 64.1 temperature controlled by TS(TC) 64.1 and TS 64.2. Warning + Shutdown at TSA 64.2 HH. Warning + Shutdown at TSA 64.3 HH. . Warning + Shutdown TSA 64.6 HH (Tower 64A) / TSA 64.8 HH (Tower 64B).	User to control inlet O2 content according to specification (max 500 ppmv).	3D	
Ejector 64-T4	None	None			1E	
Heat exchanger 64-T1	Gas inlet temperature increase	Outlet temperature increase	Warning + Shutdown TSA 64.5 HH or TSA64.7 HH.	User to control inlet O2 content according to specification (max 500 ppmv).	1E	
Dryer tower 64A	Inlet temperature increase	Temperature increase on inlet TT 64.5.	Warning + Shutdown TSA 64.5 HH and TSA 64.6 HH.	User to control inlet O2 content according to specification (max 500 ppmv).	3E	
Dryer tower 64B	Inlet temperature increase	Temperature increase on inlet TT 64.7.	Warning + Shutdown TSA 64.7 HH and TSA 64.8 HH.	User to control inlet O2 content according to specification (max 500 ppmv).	3E	
Condensate system	Condensate temperature increase	Condensate water starts to boil	Warning + Shutdown TSA 64.5 HH (Tower 64A) and TSA 64.7 HH (Tower 64B).	User to control inlet O2 content according to specification (max 500 ppmv).	1E	
Particle filter 66	Gas temperature increase	Increased downstream temperature, >100°C Wear/damage of filter insert.	Warning + Shutdown TSA 64.4 HH.	User to control inlet O2 content according to specification (max 500 ppmv).	1E	

GENERAL FINDINGS APPLICABLE TO ALL ELEMENTS						
No power supply	Power Loss	Dryer turns off	Dryer goes into fail safe mode: Valve 64-V5 close, 64-V6 open, 64-V7 close and valve 64-V4.1-V4.4 stay in position. Heaters turns off.	Always restart in the same sequence/position as before stop.	1B	Condensate circuit heat tracing ineffective: risk of freezing if negative ambient temperature..
Condensation valve failure	Condensation valve 64-T2 failure	Hydrogen is vented through the condensation line.	GSA 64-T2 closed. Dryer goes in to fail safe mode. ID 1 mm orrifice to reduce hydrogen flow. Warning+ shutdown PSA 64.1 HH.	Possible hydrogen in condensation line to be routed so that it´s vented to atmosphere by customer/user.	1B	
Clogged or failure in condensation system	Dirt/debris in the condensation water	Water in Tower 61, 64A and/or 64B	Warning+ shutdown TSA 64.5/7 LL. Warning+ shutdown PSA 64.1 LL.	If any part upstream PT 64.1 is clogged PT 64.1 will not reach sufficient pressure during condensation which will lead to Warning + shutdown PSA 64.1.	1B	Regeneration will not be sufficient which will result in Warning + shutdown. Outlet requirements (oxygen and moisture) will not be met and result in Warning + shutdown.
Instrument failure	Wire break or instrument failure	Warning+ shutdown	All instruments to have a Warning + shutdown if the instrument output is out of range (4-20 mA)		1B	
HE 61.1 or HE 64.1 contactor failure	Contactor stuck in on/active position	HE 61.1 and HE64.1 temperature increase. Gas temperature 571°C = equal to ignition temperature for hydrogen.	Electrical installation with 2 contactors in series and with Aux contacts.		3E	Compulsory to have protection for the contactors.
Blockage downstream DEDR.	Blockage/failure downstream	Pressure increase in DEDR	Pressure safety valve upstream DEDR. Safety valves PSV 64.1 / PSV 64.2 are installed.		3E	

Risk analysis for DEDR 500/36

1. Assumptions

The risk analysis concerns an AQUAGAS Hydrogen gas deoxo-DEDR, type DEDR 500/36.

The Manufacturer will supply the control logic for the functions of the DEDR.
The interfaces are the unit's junction boxes where the Customer connects the power supply and signal cables to and from the PLC. The Customer shall provide and program the PLC to be able to start/stop and operate the DEDR, considering all safety shut-down functions.
There should be a 2-way hard-wired emergency stop signal between DEDR's electrical enclosure and the Customer's main electrical enclosure.

The Customer will install the DEDR and interconnect it with the upstream and downstream equipment. The power supply is done by the Customer.

The ambient temperature may vary between +0°C and +40°C.
The equipment will be installed inside a building or container.

The unit is equipped with pressure safety valves on the process gas circuit as well as on the cooling water circuit. It is the Customer's scope and responsibility to connect the outlet of all the safety valves to an appropriate and safe drainage & venting line.

It is assumed that the Customer is aware of all risks related to handling and reactivity of hydrogen as well as dangers related to nitrogen (inertisation & instruments) and shall design and equip with peripheral equipment at the site location accordingly.

2. Risk mitigation of the DEDR and its function.

2.1 Design features

The DEDR is designed to purify and dry compressed Hydrogen gas through removal of the oxygen impurities by a catalytic reaction (max. 1% vol. O2) and subsequently remove the water content by adsorption over a desiccant material.

All process line components are made of carbon steel or stainless steel in conformity with the applicable codes & standards.

The unit is designed for continuous operation and consists of one Deoxo (DE) Tower and two Dryer (DR) towers.
The DE tower is filled with a catalyst, type DSL2 of ANCO, composed of alumina beads coated with palladium. The downstream DR towers will adsorb moisture from the gas, one in active mode while the other will be reactivated.
The DR towers are filled with desiccant material type Sorbead WS 2050 from BASF.
The MSDS of the above materials have been submitted.

Changeover of drying towers will take place automatically.
During operation, all vessels are under pressure.
The unit is designed for 20.000 cyclic loads.

The automatic valves are opened or closed by pneumatic actuators which are operated by solenoid valves controlled from the Customer's PLC.
Electric limit switches check the position (open or closed) of the concerned valves. Critical actuators are spring loaded in order to put them in fail-safe position in case of instrument air or power supply failure.

Condensate water is generated and drained through the automatic condensation system. It is secured with a pressure transmitter. Reaching of the setting point HH will lead to the immediate shutdown of the unit so as to mitigate a break-through of process gas into the condensate drainage. As a breakthrough of hydrogen could nevertheless happen in case of leakage /failure of the drain valve 64-T2, the Customer should design and equip his drainage system accordingly. The condensate line is equipped with a 1mm diameter orifice which shall limit the amount of hydrogen that could go into the drainage in case of 64-T2 failure.

Two temperature switches, in addition of the one integrated in the regeneration heater, are installed for protection against overheating.

The unit is equipped with three (3) pressure safety valves respectively installed on the gas process side (2 pieces – setting 36 bar(g)) and on the C.W. circuit (1 piece – setting pressure 6 bar(g)). The safe discharge of the water or gas in case of opening of this safety valve is the scope of the Customer.

There are no rotating parts in the design, and no risks associated with such items. This minimizes wear& tear and risks due to failure or disfunction.

The DEDR is equipped with the necessary instruments and safety features to deal with the risks related to its operation at normal conditions. The design is 1oo1.

2.2 Operation

Please refer to the unit's Operation and Maintenance Manual.

3. Identifying potential hazards for the DEDR.

- **Mechanical** risks related to the pressure vessels such as leakage, propagation of cracks, corrosion or fatigue have been eliminated by applying the European Directive on Pressure Equipment (PED, 2014/68/EU).

- **Zone classification**, the DEDR unit is installed indoors in Zone 2. ATEX certified components are used where applicable.

- **Site installation**
  A free area of approx. 1,5 meter and ambient natural air circulation are expected in front of the DEDR skid. The skid frame can be fixed by anchoring bolts to the floor as well as to the container wall. As Hydrogen is lighter than air, appropriate roof venting shall be installed by the Customer. Risks related to leakage of instrument nitrogen shall be considered by the Customer.

- **Hydrogen hazards**
  Hydrogen reacts with the oxygen in the air or can lead to embrittlement of certain metals/alloys. This may lead to fire/combustion or cracking under pressure. Appropriate metals/alloys have been used by AQUAGAS for manufacturing the DEDR unit. Customer or user shall apply proper purging procedures, like flushing with nitrogen when required during commissioning, operation and maintenance of the plant. Appropriate air circulation shall be possible to avoid choking risks during the usage of nitrogen.

Risk screening check list for pressure vessels according to PED

Hazard source	Reference document	Note
Loads and environment		
Internal pressure	Welding Drawing	
Ambient temperature	Instruction manual	
Operation temperature	Welding Drawing	
Weight of content in operation	N/A	
Weight of content when testing	N/A	
Traffic loads	N/A	
Wind loads	N/A	
Earth quake loads	N/A	
Snow loads	N/A	
Forces and moment, foundation	N/A	
Forces and moment, piping	N/A	
Test pressure	Welding Drawing	
Cyclic loads, temperature, pressure	Welding Drawing	
Vibrations	N/A	
Stability, knuckling	N/A	
Unstable fluids	N/A	
Other loads	N/A	
Environment and material selection		
Corrosion	Calculation	
Ageing	N/A	
Erosion	N/A	
Creeping	N/A	
Stress corrosion related crack propagation	N/A	
Other mechanisms	N/A	
Toughness and ductility	N/A	
Non-ductile materials	N/A	
	N/A	
Execution		
Provisions for visual examination	Welding Drawing	
Provisions for NDT in operation	N/A	
Provisions for replacement of wear parts	N/A	
Provisions for cleaning	N/A	
Functional requirements on safety components	N/A	
Marking	N/A	
Manufacturing and testing		
Preparation of components for assembly	WPS	
Permanent joining (welding etc)	WPS	
Heat treatment	N/A	
NDT after manufacturing	Certified	
Traceability of materials	EN 10204-3.1 certificate	
Requirements on safety equipment	N/A	
Final examination	Notified Body	
Assembly	Self certified	

16 - PICTURES PUNCH LIST AFTER FAT




JB-1.1



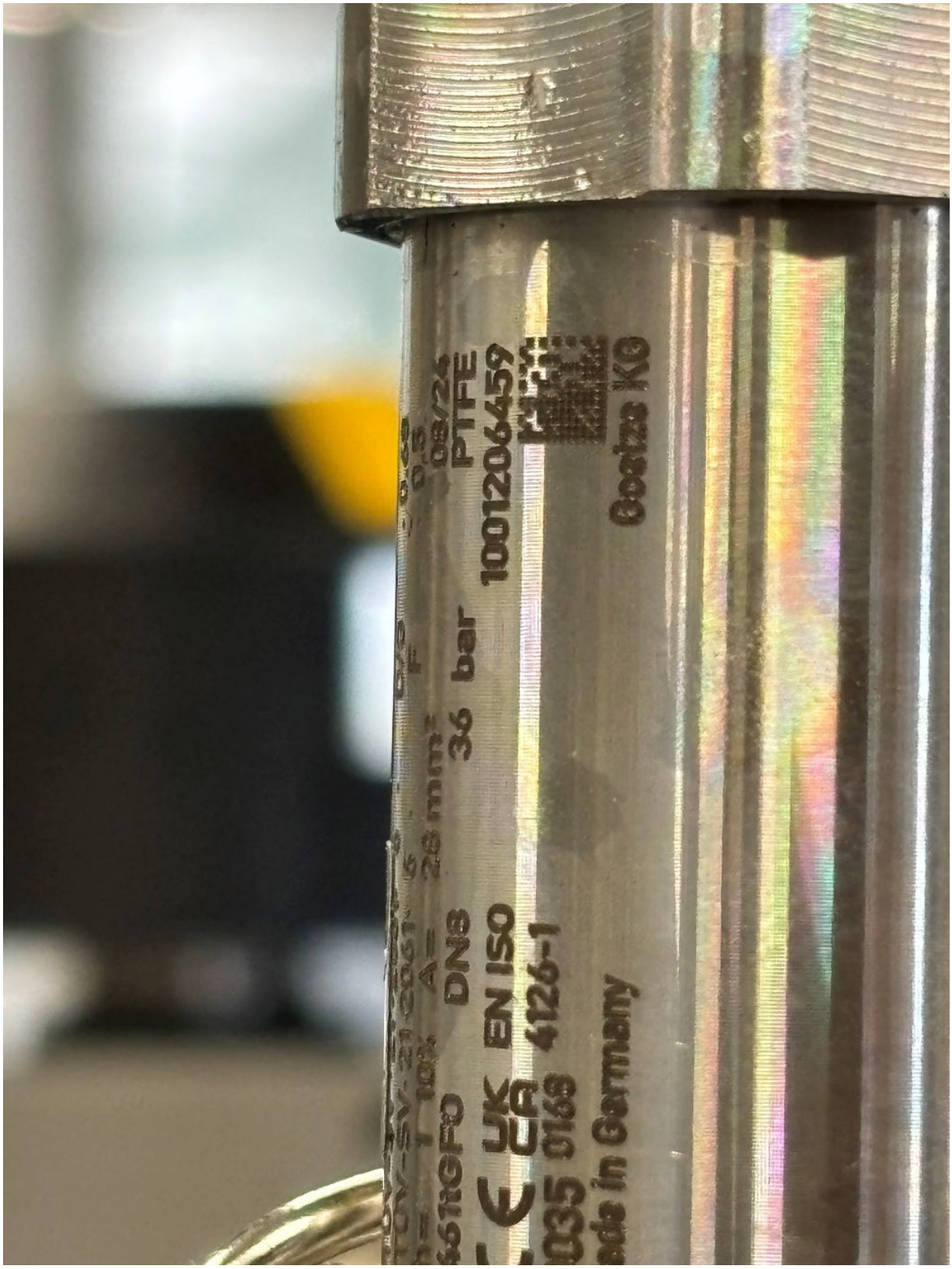





PRECAUTION
HEAT!
PRECAUTION
HEAT!


HYLOK
H1B3S-H8MPKM
8M TUBE
8000PSI PEEK
316/L ENL


TÜV-SV-21.2061 10
F 0,47
08/24
PTFE
10012185536
Zone 1
Zone 2


08/24
PTFE
1001204459
Gestra AG
36 bar
DN8
EN ISO
4126-1
Made in Germany


PTFE
EN ISO
CNS
bar


PSV
64.2
PSV
N9
Ex


TÜV-SV-21-2061- 6 . D/G . 0,03
TÜV-SV-212061- 6 . F . 0,5
h= 1 10% A= 29 mm² 09/24
451IIGFO DN8 36 bar PTFE
UK EN ISO
CA
0035 0149 4126-1
Made in Germany
10012304450
Goetze KG
PSV


PSV
64.1


Zone 21
Zone 22
PSV
N8
PSV
64.1

17 - INSPECTION AND TEST PLAN

17.1 - Material Certificates

This document is electronically reproduced and is identical to the original. This certificate has been checked and approved by QC department.

0032917	Project: Day-To-Day			Client: AQUAGAS SWEDEN AB		
Order no.	**Item no.**	**Client Art. code**	**LOT No**	**Heat code**	**QTY**	**Description**
IK-23/24 140-22	3			279903.S	2,00	FLANGE-WN 1" 150 RF SCH-40 ASTM A105 ASME B16.5

SFF Scandinavian Fittings & Flanges Sweden
VERIFIED TRUE COPY OF ORIGINAL

CERTIFICATO N. / CERTIFICATE N. CER022453 | VS. ORDINE / YOUR ORDER 82092 (STOCK) | DATA / DATE 31/03/2023

DATA / DATE 21/11/2023 | CODE/CUSTOMER ITEM /58

GN ITEM	Q.tà Q.ty	S/A	DESCRIZIONE / DESCRIPTION (1) MATERIALE / MATERIAL	N°COLATA / HEAT N° PROVA / TEST N°	ACCIAIERIA STEELMILL
58	15	S	1 150 WN RF A105N T 40 B1 F ASTM A105-21	279903.S 1031857	A.B.S. ACC.BERTOLI S AFAU SPA

RICHIESTE CLIENTE

ANALISI CHIMICA / CHEMICAL ANALYSIS

	B %	C %	Ca %	Cr %	Cu %	Mn %	Mo %	N %	Ni %	P %	S %	Si %	V %					
L	0,0001	0,1500	0,0015	0,1300	0,2300	1,2200	0,0400	0,0076	0,1200	0,0110	0,0030	0,2300	0,0110					
C	0,0001	0,1430	0,0015	0,1200	0,2210	1,2000	0,0440	0,0076	0,1080	0,0090	0,0030	0,2560	0,0150					
																F_FL	F_04	F_03
L																0,4129	0,5310	0,1700
C																0,4007	0,5080	0,1640

NOTE / NOTES
F_03=Chromium + Molybdenum
F_04=Copper + Nickel + Chromium + Molybdenum + Vanadium
F_FL=Carbon Equivalent (Long Formula)

CARATTERISTICHE MECCANICHE / MECHANICAL PROPERTIES

TRAZIONE / TENSILE

	POSITION	DIAMETRO DIAMETER [mm]	SEZIONE AREA [mm²]	LUNGHEZZA LENGTH [mm]	TEMP. TEMP. [°C]	ROTTURA TENSILE [Mpa]	SNERVAMENTO YIELD [Mpa]	ALL. ELONG [%]	CONTR. REDUCT. [%]	DUREZZA HARDNESS [HBW]	Note
S		12.5	122,7	50	20	485	250	22	30	0 - 187	
O		12.5	122,7	50	20	527	329	30	70	157 - 159	

RESILIENZA / CHARPY TEST

	POSITION	TIPO TYPE	DIM SIZE [mm]	TEMP. TEMP. [°C]	VALORI VALUES [J]	LATERAL EXPANSION [mm]	SHEAR AREA [%]	Note
S								
O								

TRATTAMENTI TERMICI / HEAT TREATMENTS

Normalized at 920 dgr.C (+/-14 Dgr.C).
Soak Time of 1 hour per 25mm thickness, with a minimum soak time of 1 hour.
Material cooled in still air after normalization

Note (1)

FINITURE / ROUGHNESS
F - Stock finish 125-250µinch

STANDARD
B1 - ASME B16.5-2020 Inch STD

Legenda:
L = ANALISI COLATA / LADLE ANALYSIS
C = ANALISI DI PRODOTTO / CHECK ANALYSIS

NOTE / NOTES
Material According to NACE MR-01-75 / ISO 15156
Material according to PED 14/68/EU Annex I Section 4.3.

C63-AQU-QIX-002 840 / 917

ACCIAIERIE BERTOLI SAFAU
ABSOLUTE STEEL QUALITY

ACCIAIERIE BERTOLI SAFAU SpA
Via Buttrio n.28 - Frazione Cargnacco - 33050 Pozzuolo del Friuli (UD)
Tel. +39 0432 613211 - Fax +39 0432 613209 - www.absacciai.it

CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	353542 / 1
Data	30.01.2023
COLATA N. Heat-Coulée-Schmelze	279903
Pag.	1 / 2

CLIENTE Customer-Client-Besteller	OFF. NICOLA GALPERTI & FIGLIO SPA	ORDINE Order-Commande-Bestellung	POG220582
PROFILO Shape-Section-Profili	HOT ROLLED ROUND BARS , 80 MM -	STATO DI FORNITURA SupplyCondition-Etat de livraison	UNTREATED
ACCIAIO Steel-Acier-Stahl	A350 LF2/A105/A694 F52	COMESSA/POS Sales Order/Pos.	1090281/20
		MATERIALE CLIENTE Customer Material Code	RAWBAR00002751

CAPITOLATO ABS: Technical Specification: ABS

CAPITOLATO DI ANALISI: Material Specification: OFF.GALPERTI MPS N.1 R.08 21/03/2022

CAPITOLATO DI FORNITURA: Technical Delivery Requirements: OFF.GALPERTI IO45 REV.4 09.07.2021

COMPOSIZIONE CHIMICA DI COLATA %

CAST ANALYSIS % - COMPOSITION CHIMIQUE DE COULEE % - SCHMELZE CHEMISCHE ANALYSE %

	C	Mn	Si	P	S	Cr	Ni	Mo	Al (T)	Cu	Sn	Ti
Min	0,130	1,15	0,15						0,020			
Max	0,180	1,25	0,30	0,020	0,012	0,20	0,40	0,08	0,060	0,30	0,100	0,0500
Colata/Heat	0,150	1,22	0,23	0,011	0,003	0,13	0,12	0,04	0,025	0,23	0,010	0,0027
	B (T)	V	Nb	As	Ca	Sb	Co	O/ppm	H/ppm	N/ppm	C EQ. LONG FORMULA	Cr+Mo
Min		0,010									0,400	
Max	0,0005	0,030	0,020	0,100	0,0050	0,100	0,300	19,00	2,00		0,430	0,32
Colata/Heat	0,0001	0,011	0,003	0,006	0,0015	0,001	0,011	7,00	1,10	76	0,413	0,17
	Cr+Ni+Mo+Cu											
Min												
Max	1,00											
Colata/Heat	0,52											

ANALYSIS TOLERANCE ASTM A961

ALLUMINIUM FULLY KILLED STEEL

CARATT. MECCANICHE

MECHANICAL PROPERTIES - CARACTERISTIQUES MECANIQUE - MECHANISCHE EIGSNSCHAFTER

TENSILE/IMPACT TEST ON REFERENCE

TRATTAMENTO TERMICO HEAT TREATMENT

NORMALIZATION

TRAZIONE

TENSILE TEST

	TS LONG.	E%4D LONG.	R.A. LONG.	YS 0,2% LONG.
Min	485Mpa	22%	30%	360Mpa
Max	655Mpa			
Colata/Heat	514Mpa	31,5%	65%	369Mpa

RESILIENZE

IMPACT TEST

	KV -50°C Long	KV -50°C Long	KV -50°C Long	KV -50°C Average Long
Min	40J	40J	40J	50J
Max				
Colata/Heat	159J	167J	175J	167J

DUREZZE

HARDNESS

	SAMPLES HARDNESS
Min	
Max	197HB
Colata/Heat	149HB

GRANO

GRAIN - GRAIN - KORNGROSSE

AUSTENITIC GRAIN : STANDARD ASTM E112

AUSTENITIC GRAIN: METHOD MC QUAID

TEMPERATURE AUSTENITIC GRAIN 920 °C

AUSTENITIC GRAIN SIZE 9

Q. A. Elena Dei

STATUS
☒ APPROVED
☐ NOT APPROVED

~~C63 AQU QIX 002 841 / 917~~

ACCIAIERIE BERTOLI SAFAU
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CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	353542 / 1
Data	30.01.2023
COLATA N. Heat-Coulée-Schmelze	279903
Pag.	2 / 2

ALTRE PROVE

OTHER TESTS - AUTRES ESSAIS - SONSTIGE PRUFUNGEN

MACRO ETCHING C 1
MACRO ETCHING R 1
MACRO ETCHING S 1
MACRO ETCHING: STANDARD ACC. TO ASTM E381

NOTE

INTERNAL DEFECT METHOD UT 100%
ANTIMIX 100 %
R/R = 11
TEST CERTIFICATE ISSUED ACCORDING TO: EN 10204/3.1
FINE GRAIN STEEL .
ELECTRIC ARC FURNACE STEEL .
VACUUM DEGASSED STEEL .
COUNTRY OF ORIGIN : ITALY
- Material free from lead, mercury, cadmium and hexavalent chromium (dir. 2000/53/CE - dir. 2011/65/UE as amended)
- Material with radioactivity not exceeding 0,1Bq/g (d.lgs. 230/1995 as amended)

CONTROLLO QUALITA'

QUALITY CONTROL - CONTROLE DE QUALITE - QUALITATSSTEILE

Company with a management system certified by IGQ to
ISO 9001 and IATF 16949

Verif.:Omar Tonetti

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) – Via Enrico Fermi, 46
C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
Stabilimento-UfficiAmministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) – Via Trivio Fuentes, 4, Tel. 0344-97200
Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

Certificate of Material Compliance
N° CERT: CO-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Certificate of Material Compliance

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405
Material Certificates: See attached List:

Items Description

Items (Q.ty): 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Declaration

We hereby certify that all items supplied for the above purchase order meet all requirements of the applicable specifications of manufacture, the purchase order item descriptions, purchase specifications and purchase order requirements. We certify that all applicable heat treatments, chemical analysis, mechanical tests, non destructive examinations, welding procedures, etc., as required in the purchase order, were performed and that the results were in accordance with the requirements of the purchase order. We certify that all required analysis and tests were performed on final production parts, or on specimens which were representative in all respects, of the final production part. We certify that all the instruments used for all the mesurements are properly calibrated according to our internal procedure P07.

Material according to: NACE MR-0175/ISO 15156-2

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
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C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
Stabilimento-UfficiAmministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) – Via Trivio Fuentes, 4, Tel. 0344-97200
Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

The Original

Dimensional and Visual Inspection Report
N° CERT: VD-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Dimensional and Visual Inspection Report

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier: OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405

Items Description / Result

Items (Q.ty) : 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Result: Satisfactory

According to: ASME B16.5-2020 Inch STD

THE FOLLOWING OPERATION HAVE BEEN WITNESSED BY INTERNAL INSPECTOR:

v DIMENSIONAL AND VISUAL INSPECTION

v EXTERNAL VISUAL CHECK

v VISUAL ROUGHNESS CONTROL ON FACING

v MARKING

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

SFF Scandinavian Fittings & Flanges Sweden
VERIFIED TRUE COPY OF ORIGINAL

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) *- Via Enrico Fermi, 46*
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Stabilimento - Uffici Amministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) *– Via Trivio Fuentes, 4*
Tel. 0344-97200 - Fax 0344-97210
E-mail : galperti@galperti.com - www.galperti.com

The Original

SPETT.LE / MESSRS
SCANDINAVIAN FITTINGS & FLANGES AB
LARJESTATIONSGATA 12
GOTEBORG S-415 25
Sweden

CERTIFICATO DI COLLAUDO EN10204
TEST CERTIFICATE EN10204

3.1

NS ORDINE / INTERNAL JOB **S10230405**

CERTIFICATO N. / CERTIFICATE N. CER022453
DATA / DATE 21/11/2023

VS. ORDINE / YOUR ORDER 82092 (STOCK)
CODE/CUSTOMER ITEM /58

DATA / DATE 31/03/2023

GN ITEM	Q.tà Q.ty	S/ A	DESCRIZIONE / DESCRIPTION (1) MATERIALE / MATERIAL	N°COLATA / HEAT N° PROVA / TEST N°	ACCIAIERIA STEELMILL
58	15	S	1 150 WN RF A105N T 40 B1 F ASTM A105-21	279903.S 1031857	A.B.S. ACC.BERTOLI S AFAU SPA

RICHIESTE CLIENTE

ANALISI CHIMICA / CHEMICAL ANALYSIS

	B %	C %	Ca %	Cr %	Cu %	Mn %	Mo %	N %	Ni %	P %	S %	Si %	V %					
L	0,0001	0,1500	0,0015	0,1300	0,2300	1,2200	0,0400	0,0076	0,1200	0,0110	0,0030	0,2300	0,0110					
C	0,0001	0,1430	0,0015	0,1200	0,2210	1,2000	0,0440	0,0076	0,1080	0,0090	0,0030	0,2560	0,0150					
																F_FL	F_04	F_03
L																0,4129	0,5310	0,1700
C																0,4007	0,5080	0,1640

NOTE / NOTES F_03=Chromium + Molybdenum
F_04=Copper + Nickel + Chromium + Molybdenum + Vanadium
F_FL=Carbon Equivalent (Long Formula)

CARATTERISTICHE MECCANICHE / MECHANICAL PROPERTIES

TRAZIONE / TENSILE

	POSITION	DIAMETRO DIAMETER [mm]	SEZIONE AREA [mm²]	LUNGHEZZA LENGTH [mm]	TEMP. TEMP. [°C]	ROTTURA TENSILE [Mpa]	SNERVAMENTO YIELD [Mpa]	ALL. ELONG [%]	CONTR. REDUCT. [%]	DUREZZA HARDNESS [HBW]	Note
S		12.5	122,7	50	20	485	250	22	30	0 - 187	
O		12.5	122,7	50	20	527	329	30	70	157 - 159	

RESILIENZA / CHARPY TEST

	POSITION	TIPO TYPE	DIM SIZE [mm]	TEMP. TEMP. [°C]	VALORI VALUES [J]	LATERAL EXPANSION [mm]	SHEAR AREA [%]	Note
S								
O								

TRATTAMENTI TERMICI / HEAT TREATMENTS

Normalized at 920 dgr.C (+/-14 Dgr.C).
Soak Time of 1 hour per 25mm thickness, with a minimum soak time of 1 hour.
Material cooled in still air after normalization

Note (1)

FINITURE / ROUGHNESS
F - Stock finish 125-250µinch

STANDARD
B1 - ASME B16.5-2020 Inch STD

Legenda:
L = ANALISI COLATA / LADLE ANALYSIS
C = ANALISI DI PRODOTTO / CHECK ANALYSIS
S = STANDARD
O = OTTENUTE / OBTAINED
S/A=SALDO(BALANCE) / ACCONTO(ADVANCE)

NOTE / NOTES
Material According to NACE MR-01-75 / ISO 15156
Material according to PED 14/68/EU Annex I Section 4.3.
Material according to MDS: SFF-C004 Rev.1

MARCHIO DI FABBRICA TRADE MARK	DATA COLLAUDO INT. INT. INSPECT DATE 21/11/2023	COLLAUDATORE INT. INT. INSPECTOR Samuele De Simoni	ENTE UFFICIALE DI COLLAUDO INSPECTION AUTHORITY

This document is electronically reproduced and is identical to the original. This certificate has been checked and approved by QC department.
Client: AQUAGAS SWEDEN AB
Project: Day-To-Day
Order no. 0032917
Item no. 3
Client Art. code
LOT No
Heat code 279903.S
QTY 2.00
Description FLANGE-WN 1" 150 RF SCH-40 ASTM A105 ASME B16.5
C03-AQU-QIX-002844 / 917
IK-23241140-22

~~C63 AQU QIX 002 845 / 017~~

ACCIAIERIE BERTOLI SAFAU
ABSOLUTE STEEL QUALITY

ACCIAIERIE BERTOLI SAFAU SpA
Via Buttrio n.28 - Frazione Cargnacco - 33050 Pozzuolo del Friuli (UD)
Tel. +39 0432 613211 - Fax +39 0432 613209 - www.absacciai.it

CERTIFICATO DI COLLAUDO

Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	353542 / 1
Data	30.01.2023
COLATA N. Heat-Coulée-Schmelze	279903
Pag.	1 / 2

CLIENTE Customer-Client-Besteller	OFF. NICOLA GALPERTI & FIGLIO SPA	ORDINE Order-Commande-Bestellung	POG220582
PROFILO Shape-Section-Profili	HOT ROLLED ROUND BARS , 80 MM -	STATO DI FORNITURA SupplyCondition-Etat de livraison	UNTREATED
ACCIAIO Steel-Acier-Stahl	A350 LF2/A105/A694 F52	COMESSA/POS Sales Order/Pos.	1090281/20
		MATERIALE CLIENTE Customer Material Code	RAWBAR00002751

CAPITOLATO ABS: Technical Specification: ABS

CAPITOLATO DI ANALISI: Material Specification: OFF.GALPERTI MPS N.1 R.08 21/03/2022

CAPITOLATO DI FORNITURA: Technical Delivery Requirements: OFF.GALPERTI IO45 REV.4 09.07.2021

COMPOSIZIONE CHIMICA DI COLATA %

CAST ANALYSIS % - COMPOSITION CHIMIQUE DE COULEE % - SCHMELZE CHEMISCHE ANALYSE %

	C	Mn	Si	P	S	Cr	Ni	Mo	Al (T)	Cu	Sn	Ti
Min	0,130	1,15	0,15						0,020			
Max	0,180	1,25	0,30	0,020	0,012	0,20	0,40	0,08	0,060	0,30	0,100	0,0500
Colata/Heat	0,150	1,22	0,23	0,011	0,003	0,13	0,12	0,04	0,025	0,23	0,010	0,0027
	B (T)	V	Nb	As	Ca	Sb	Co	O/ppm	H/ppm	N/ppm	C EQ. LONG FORMULA	Cr+Mo
Min		0,010									0,400	
Max	0,0005	0,030	0,020	0,100	0,0050	0,100	0,300	19,00	2,00		0,430	0,32
Colata/Heat	0,0001	0,011	0,003	0,006	0,0015	0,001	0,011	7,00	1,10	76	0,413	0,17
	Cr+Ni+Mo+Cu											
Min												
Max	1,00											
Colata/Heat	0,52											

ANALYSIS TOLERANCE ASTM A961

ALLUMINIUM FULLY KILLED STEEL

CARATT. MECCANICHE

MECHANICAL PROPERTIES - CARACTERISTIQUES MECANIQUE - MECHANISCHE EIGSNSCHAFTER

TENSILE/IMPACT TEST ON REFERENCE

TRATTAMENTO TERMICO HEAT TREATMENT

NORMALIZATION

TRAZIONE

TENSILE TEST

	TS LONG.	E%4D LONG.	R.A. LONG.	YS 0,2% LONG.								
Min	485Mpa	22%	30%	360Mpa								
Max	655Mpa											
Colata/Heat	514Mpa	31,5%	65%	369Mpa								

RESILIENZE

IMPACT TEST

	KV -50°C Long	KV -50°C Long	KV -50°C Long	KV -50°C Average Long								
Min	40J	40J	40J	50J								
Max												
Colata/Heat	159J	167J	175J	167J								

DUREZZE

HARDNESS

	SAMPLES HARDNESS					
Min						
Max	197HB					
Colata/Heat	149HB					

GRANO

GRAIN - GRAIN - KORNGROSSE

AUSTENITIC GRAIN : STANDARD ASTM E112

AUSTENITIC GRAIN: METHOD MC QUAID

TEMPERATURE AUSTENITIC GRAIN 920 °C

AUSTENITIC GRAIN SIZE 9

Q. A. Elena Dei

STATUS
X APPROVED
☐ NOT APPROVED

ACCIAIERIE BERTOLI SAFAU
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Inspection Certificate 3.1/Certificat de reception 3.1/
Abnahmeprufzeugnis 3.1

N.	353542 / 1
Data	30.01.2023
COLATA N. Heat-Coulée-Schmelze	279903
Pag.	2 / 2

ALTRE PROVE

OTHER TESTS - AUTRES ESSAIS - SONSTIGE PRUFUNGEN

MACRO ETCHING C 1
MACRO ETCHING R 1
MACRO ETCHING S 1
MACRO ETCHING: STANDARD ACC. TO ASTM E381

NOTE

INTERNAL DEFECT METHOD UT 100%
ANTIMIX 100 %
R/R = 11
TEST CERTIFICATE ISSUED ACCORDING TO: EN 10204/3.1
FINE GRAIN STEEL .
ELECTRIC ARC FURNACE STEEL .
VACUUM DEGASSED STEEL .
COUNTRY OF ORIGIN : ITALY
- Material free from lead, mercury, cadmium and hexavalent chromium (dir. 2000/53/CE - dir. 2011/65/UE as amended)
- Material with radioactivity not exceeding 0,1Bq/g (d.lgs. 230/1995 as amended)

CONTROLLO QUALITA'

QUALITY CONTROL - CONTROLE DE QUALITE - QUALITATSSTEILE

Company with a management system certified by IGQ to
ISO 9001 and IATF 16949

Verif.:Omar Tonetti

The Original

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) – Via Enrico Fermi, 46
C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
Stabilimento-UfficiAmministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) – Via Trivio Fuentes, 4, Tel. 0344-97200
Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

Certificate of Material Compliance
N° CERT: CO-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Certificate of Material Compliance

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405
Material Certificates: See attached List:

Items Description

Items (Q.ty): 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Declaration

We hereby certify that all items supplied for the above purchase order meet all requirements of the applicable specifications of manufacture, the purchase order item descriptions, purchase specifications and purchase order requirements. We certify that all applicable heat treatments, chemical analysis, mechanical tests, non destructive examinations, welding procedures, etc., as required in the purchase order, were performed and that the results were in accordance with the requirements of the purchase order. We certify that all required analysis and tests were performed on final production parts, or on specimens which were representative in all respects, of the final production part. We certify that all the instruments used for all the mesurements are properly calibrated according to our internal procedure P07.

Material according to: NACE MR-0175/ISO 15156-2

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
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Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

The Original

Dimensional and Visual Inspection Report
N° CERT: VD-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Dimensional and Visual Inspection Report

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier: OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405

Items Description / Result

Items (Q.ty) : 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Result: Satisfactory

According to: ASME B16.5-2020 Inch STD

THE FOLLOWING OPERATION HAVE BEEN WITNESSED BY INTERNAL INSPECTOR:

v DIMENSIONAL AND VISUAL INSPECTION

v EXTERNAL VISUAL CHECK

v VISUAL ROUGHNESS CONTROL ON FACING

v MARKING

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

SFF Scandinavian Fittings & Flanges Sweden
VERIFIED TRUE COPY OF ORIGINAL

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) *- Via Enrico Fermi, 46*
C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
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Tel. 0344-97200 - Fax 0344-97210
E-mail : galperti@galperti.com - www.galperti.com

The Original

SPETT.LE / MESSRS
SCANDINAVIAN FITTINGS & FLANGES AB
LARJESTATIONSGATA 12
GOTEBORG S-415 25
Sweden

CERTIFICATO DI COLLAUDO / TEST CERTIFICATE	EN10204 / EN10204	3.1	NS ORDINE / INTERNAL JOB: S10230405

CERTIFICATO N. / CERTIFICATE N. CER022447
DATA / DATE 21/11/2023
VS. ORDINE / YOUR ORDER 82092 (STOCK)
DATA / DATE 31/03/2023
CODE/CUSTOMER ITEM /63

GN ITEM	Q.tà Q.ty	S/A	DESCRIZIONE / DESCRIPTION (1) MATERIALE / MATERIAL	N°COLATA / HEAT N° PROVA / TEST N°	ACCIAIERIA STEELMILL
63	10	S	1 300 WN RF A105N T 40 B1 F ASTM A105-21	278983.V 1031846	ACCIAIERIE VENETE S.P.A.

RICHIESTE CLIENTE

ANALISI CHIMICA / CHEMICAL ANALYSIS

	B %	C %	Ca %	Cr %	Cu %	Mn %	Mo %	N %	Ni %	P %	S %	Si %	V %					
L	0,0002	0,1750	0,0008	0,1080	0,1870	1,2060	0,0310	0,0086	0,1410	0,0110	0,0090	0,2180	0,0190					
C	0,0002	0,1680	0,0008	0,1140	0,1730	1,2070	0,0410	0,0086	0,1340	0,0070	0,0040	0,1940	0,0140					
																F_FL	F_04	F_03
L																0,4295	0,4860	0,1390
C																0,4234	0,4760	0,1550

NOTE / NOTES
F_03=Chromium + Molybdenum
F_04=Copper + Nickel + Chromium + Molybdenum + Vanadium
F_FL=Carbon Equivalent (Long Formula)

CARATTERISTICHE MECCANICHE / MECHANICAL PROPERTIES

TRAZIONE / TENSILE

POSITION	DIAMETRO DIAMETER [mm]	SEZIONE AREA [mm²]	LUNGHEZZA LENGTH [mm]	TEMP. TEMP. [°C]	ROTTURA TENSILE [Mpa]	SNERVAMENTO YIELD [Mpa]	ALL. ELONG [%]	CONTR. REDUCT. [%]	DUREZZA HARDNESS [HBW]	Note
S	12.5	122,7	50	20	485	250	22	30	0 - 187	
O	12.5	122,7	50	20	509	310	27	70,3	159 - 157	

RESILIENZA / CHARPY TEST

POSITION	TIPO TYPE	DIM SIZE [mm]	TEMP. TEMP. [°C]	VALORI VALUES [J]	LATERAL EXPANSION [mm]	SHEAR AREA [%]	Note
S							
O							

TRATTAMENTI TERMICI / HEAT TREATMENTS

Normalized at 920 dgr.C (+/-14 Dgr.C).
Soak Time of 1 hour per 25mm thickness, with a minimum soak time of 1 hour.
Material cooled in still air after normalization

Note (1)

FINITURE / ROUGHNESS
F - Stock finish 125-250µinch

STANDARD
B1 - ASME B16.5-2020 Inch STD

Legenda:
L = ANALISI COLATA / LADLE ANALYSIS
C = ANALISI DI PRODOTTO / CHECK ANALYSIS
S = STANDARD
O = OTTENUTE / OBTAINED
S/A=SALDO(BALANCE) / ACCONTO(ADVANCE)

NOTE / NOTES
Material According to NACE MR-01-75 / ISO 15156
Material according to PED 14/68/EU Annex I Section 4.3.
Material according to MDS: SFF-C004 Rev.1

MARCHIO DI FABBRICA / TRADE MARK	DATA COLLAUDO INT. / INT. INSPECT DATE	COLLAUDATORE INT. / INT. INSPECTOR	ENTE UFFICIALE DI COLLAUDO / INSPECTION AUTHORITY
	21/11/2023	Samuele De Simoni	

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Client: AQUAGAS SWEDEN AB
Project: Day-To-Day
Order no. 0032918
Item no. 1
LOT No
Client Art. code
Heat code 278983.V
QTY 2.00
Description FLANGE-WN 1" 300 RF SCH-40 ASTM A105 ASME B16.5
IK-23-21-140-22
C03-AQU-QIX-002849 / 917

C63-AQU-QIX-002 850 / 917

ACCIAIERIE VENETE SPA

CERTIFICATO DI COLLAUDO – MILL'S TEST CERTIFICATE
CERTIFICAT D'ESSAI – ABNAHMEPRÜFZEUGNIS
EN 10204 3.1

N° 516094
DATE:28/05/2021

Acciaierie Venete Spa C.S. € 63.000.000,00 i.v C.F. e P.IVA 00224180281
R.I di Trento 00224180281 V.A.T. N° IT 00224180281
Sede Legale: 38051 Borgo Valsugana (TN) Via Puisle, 4 - Italy
Direzione/Amministrazione: 35127 Padova Z.I. Sud - Riviera Francia, 9 - Italy Tel. 049 828.28.20 (r.a.)
Azienda con sistema di gestione per la qualità certificato da IGQ secondo ISO 9001 e IATF 16949

CLIENTE
CUSTOMER
CLIENT
KUNDE

ORDINE CLIENTE - PURCHASE ORDER
COMMANDE CLIENT - KUNDENAUFTRAG
AC21000106

ORDINE - ORDER
COMMANDE - AUFTRAG
123896 / 10

ARTICOLO (ACCIAIO)- ITEM (STEEL) - ITEM (ACIER) - ARTIKEL (STAHL)

PROFILO - PROFILE
PROFIL - ABMESSUNG: **TONDO 90 mm**

STATO DI FORNITURA- DELIVERY CONDITION
CONDITION DE LIVRAISON – LIEFERZUSTAND: **NATURALE**

STATO DI ESECUZIONE - STATE OF EXECUTION
ETAT DE L'ÉXECUTION - AUSFÜHRUNG: **LAMINATO RULLATO**

COLATA - HEAT - COULEE - SCHMELZE: **278983**

MARCA ACCIAIO - STEEL GRADE - MARQUE ACIER - STAHLGÜTE: **A105/A350LF2**

NORMA - SPECIFICATION - NORME - NORM
ASTM A105: A350FL2

BLUMO - BLOOM
BLOOM - KNÜPPEL

RIDUZIONE - REDUCTION
REDUCTION - UMFORMUNGSGRAD

STAB. SPEDIZIONE: PADOVA (Riviera Francia)

COMPOSIZIONE CHIMICA (%) - CHEMICAL COMPOSITION (%) - COMPOSITION CHIMIQUE (%) - CHEMISCHE ZUSAMMENSETZUNG (%)

C 0.1750 Si 0.2180 Mn 1.2060 P 0.0110 S 0.0090 Cu 0.1870 Cr 0.1080 Ni 0.1410 Sn 0.0090 Al 0.0260 As 0.0040 Mo 0.0310
V 0.0190 Ti 0.0170 B 0.0002 Nb 0.0120 Zr 0.0010 Ca 0.0008 Sb 0.0019

CR+MO=0.139; NI+CR+MO+V+CU=0.486

ANALISI GAS - GAS ANALYSIS - ANALYSE GAZ - GAS ANALYSE
H_2= 1.3 (ppm) | O_2= 18 (ppm) | N_2= 86 (ppm) 0.0086 (%)

CEV= 0,429% CEV=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15
D.I. (ASTM A255)

FUSIONE: FORNO ELETTRICO (EAF) - ELABORAZIONE FUORI FORNO: AFFINAZIONE (LF) - COLAGGIO: COLATA CONTINUA (CC)

CARATTERISTICHE MECCANICHE - MECHANICAL PROPERTIES
CARACTERISTIQUES MECANIQUES-MECHANISCHE EIGENSCHAFTEN

TRAZIONE-TENSILE TESTING-TRACTION-ZUGVERSUCH ASTM A370
RESILIENZA - IMPACT TEST - RESILIENCE - ZÄHIGKEIT ASTM E23
DUREZZA - HARDNESS - DURETE - HÄRTE

PROVINO - SAMPLE / EPROUVETTE - MUSTER	mm	STATO - CONDITION / ETAT - ZUSTAND	TRATTAMENTO TERMICO - HEAT TREATMENT / TRAITMENT THERMIQUE - WÄRMEBEHANDLUNG			Rm MPa	Re MPa	A %	Z %	TIPO - TYPE - TYPE - ART KV °C	J	J	J	Mean J
COLATA - HEAT / COULEE-SCHMELZE	25	NORMALIZZATO	900°C	ARIA		610	410	32	55	-46	90	88	86	88
VALORI ALLO STATO DI FORNITURA - VALUES IN DELIVERY CONDITION - WERTE IM LIEFERZUSTAND ▶														

THE PRODUCT COMPLIES WITH THE REQUIREMENTS OF THE EUROPEAN DIRECTIVE 2000/53/EC

RADIOACTIVITY MEETS SPECIFICATION 2013/59/EURATOM <= [0,10] Bq/g

TEMPRABILITA' - HARDENABILITY
TREMPABILITE - HÄRTBARKEIT

GRANO - GRAIN
GRAIN - KORNGRÖSSE
EN ISO 643
AUSTENITICO
6 - 8

INCLUSIONI NON METALLICHE- NON METALLIC INCLUSIONS - INCLUSIONS NON METALLIQUES - NICHTMETALLISCHE EINSCHLÜSSE
ASTM E45

A (SS)		B (OA)		C (OS)		D (OG)	
Thin	Heavy	Thin	Heavy	Thin	Heavy	Thin	Heavy
1.0	0.5	2.0	1.0	0.0	0.0	1.0	1.0

UNI 3244 / SEP 1570
K 4 (OXIDE) = 6
K (SULFIDE) =
K (TOTAL) =

MACRO - MACROETCHING
MACRO - MAKRO ÄTZUNG

MACROINCLUSIONI - MACROINCLUSIONS
MACRO INCLUSIONS - MAKRO EINSCHLÜSSE

CONTROLLO ANTIMESCOLAMENTO - ANTIMIXING CONTROL
CONTROLE ANTIMELANGE - VERWECHSLUNGSPRÜFUNG 100%

ENTI COLLAUDATORI - INSPECTION AUTHORITIES
SERVICE D'ESSAI - ABNAHMEBEHÖRDE

NOTE – NOTES – NOTES - ANMERKUNGEN
CONTRTOLLI UT INTERNO EN10308 CLASSE 3 100%
CONTROLLI SPERFICIALI EN 10221 CLASSE C 100%

Q. A.
STATUS
X APPROVED
NOT APPROVED

CONTROLLO QUALITA' - QUALITY CONTROL - CONTROLE QUALITE - QUALITÄTSTELLE
Fornasiero I.
SERVIZIO QUALITA'

CERTIFICATO CONFORME AL CAPITOLATO E SPECIFICHE DI RIFERIMENTO - *CERTIFICATE IN COMPLIANCE WITH THE SPECIFICATION AND ITS REFERENCES-CERTIFICAT EN ACCOMPLIANCE AVEC LE CAHIER DES CHARGES ET SES REFERENCES-ZERTIFIKAT IN ÜBEREINSTIMMUNG MIT DER SPEZIFIKATION UND DESSEN BEZUGE*

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) – Via Enrico Fermi, 46
C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
Stabilimento-UfficiAmministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) – Via Trivio Fuentes, 4, Tel. 0344-97200
Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

Certificate of Material Compliance
N° CERT: CO-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Certificate of Material Compliance

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405
Material Certificates: See attached List:

Items Description

Items (Q.ty): 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Declaration

We hereby certify that all items supplied for the above purchase order meet all requirements of the applicable specifications of manufacture, the purchase order item descriptions, purchase specifications and purchase order requirements. We certify that all applicable heat treatments, chemical analysis, mechanical tests, non destructive examinations, welding procedures, etc., as required in the purchase order, were performed and that the results were in accordance with the requirements of the purchase order. We certify that all required analysis and tests were performed on final production parts, or on specimens which were representative in all respects, of the final production part. We certify that all the instruments used for all the mesurements are properly calibrated according to our internal procedure P07.

Material according to: NACE MR-0175/ISO 15156-2

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
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Stabilimento-UfficiAmministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) – Via Trivio Fuentes, 4, Tel. 0344-97200
Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

The Original

Dimensional and Visual Inspection Report
N° CERT: VD-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Dimensional and Visual Inspection Report

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier: OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405

Items Description / Result

Items (Q.ty) : 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Result: Satisfactory
According to: ASME B16.5-2020 Inch STD

THE FOLLOWING OPERATION HAVE BEEN WITNESSED BY INTERNAL INSPECTOR:

v DIMENSIONAL AND VISUAL INSPECTION

v EXTERNAL VISUAL CHECK

v VISUAL ROUGHNESS CONTROL ON FACING

v MARKING

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

SFF Scandinavian Fittings & Flanges Sweden
VERIFIED TRUE COPY OF ORIGINAL

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) *- Via Enrico Fermi, 46*
C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
Stabilimento - Uffici Amministrativi / Workshop - Warehouse - Offices - Mailing address:
22010 GERA LARIO (CO) *– Via Trivio Fuentes, 4*
Tel. 0344-97200 - Fax 0344-97210
E-mail : galperti@galperti.com - www.galperti.com

The Original

SPETT.LE / MESSRS
SCANDINAVIAN FITTINGS & FLANGES AB
LARJESTATIONSGATA 12
GOTEBORG S-415 25
Sweden

CERTIFICATO DI COLLAUDO / TEST CERTIFICATE	EN10204 / EN10204	3.1	NS ORDINE / INTERNAL JOB: S10230405

CERTIFICATO N. / CERTIFICATE N. CER022447
DATA / DATE 21/11/2023
VS. ORDINE / YOUR ORDER 82092 (STOCK)
DATA / DATE 31/03/2023
CODE/CUSTOMER ITEM /63

GN ITEM	Q.tà Q.ty	S/A	DESCRIZIONE / DESCRIPTION (1) MATERIALE / MATERIAL	N°COLATA / HEAT N° PROVA / TEST N°	ACCIAIERIA STEELMILL
63	10	S	1 300 WN RF A105N T 40 B1 F ASTM A105-21	278983.V 1031846	ACCIAIERIE VENETE S.P.A.

RICHIESTE CLIENTE

ANALISI CHIMICA / CHEMICAL ANALYSIS

	B %	C %	Ca %	Cr %	Cu %	Mn %	Mo %	N %	Ni %	P %	S %	Si %	V %					
L	0,0002	0,1750	0,0008	0,1080	0,1870	1,2060	0,0310	0,0086	0,1410	0,0110	0,0090	0,2180	0,0190					
C	0,0002	0,1680	0,0008	0,1140	0,1730	1,2070	0,0410	0,0086	0,1340	0,0070	0,0040	0,1940	0,0140					
																F_FL	F_04	F_03
L																0,4295	0,4860	0,1390
C																0,4234	0,4760	0,1550

NOTE / NOTES
F_03=Chromium + Molybdenum
F_04=Copper + Nickel + Chromium + Molybdenum + Vanadium
F_FL=Carbon Equivalent (Long Formula)

CARATTERISTICHE MECCANICHE / MECHANICAL PROPERTIES

TRAZIONE / TENSILE

POSITION	DIAMETRO DIAMETER [mm]	SEZIONE AREA [mm²]	LUNGHEZZA LENGTH [mm]	TEMP. TEMP. [°C]	ROTTURA TENSILE [Mpa]	SNERVAMENTO YIELD [Mpa]	ALL. ELONG [%]	CONTR. REDUCT. [%]	DUREZZA HARDNESS [HBW]	Note
S	12.5	122,7	50	20	485	250	22	30	0 - 187	
O	12.5	122,7	50	20	509	310	27	70,3	159 - 157	

RESILIENZA / CHARPY TEST

POSITION	TIPO TYPE	DIM SIZE [mm]	TEMP. TEMP. [°C]	VALORI VALUES [J]	LATERAL EXPANSION [mm]	SHEAR AREA [%]	Note
S							
O							

TRATTAMENTI TERMICI / HEAT TREATMENTS

Normalized at 920 dgr.C (+/-14 Dgr.C).
Soak Time of 1 hour per 25mm thickness, with a minimum soak time of 1 hour.
Material cooled in still air after normalization

Note (1)

FINITURE / ROUGHNESS
F - Stock finish 125-250µinch

STANDARD
B1 - ASME B16.5-2020 Inch STD

Legenda:
L = ANALISI COLATA / LADLE ANALYSIS
C = ANALISI DI PRODOTTO / CHECK ANALYSIS
S = STANDARD
O = OTTENUTE / OBTAINED
S/A=SALDO(BALANCE) / ACCONTO(ADVANCE)

NOTE / NOTES
Material According to NACE MR-01-75 / ISO 15156
Material according to PED 14/68/EU Annex I Section 4.3.
Material according to MDS: SFF-C004 Rev.1

MARCHIO DI FABBRICA / TRADE MARK	DATA COLLAUDO INT. / INT. INSPECT DATE	COLLAUDATORE INT. / INT. INSPECTOR	ENTE UFFICIALE DI COLLAUDO / INSPECTION AUTHORITY
	21/11/2023	Samuele De Simoni	

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Project: Day-To-Day
Client: AQUAGAS SWEDEN AB
Order no. 0032918
Item no. 1
LOT No
Client Art. code
Heat code 278983.V
QTY 2.00
Description FLANGE-WN 1" 300 RF SCH-40 ASTM A105 ASME B16.5
IK-23-24-140-22
C03-AQU-QIX-002853 / 917

ACCIAIERIE VENETE SPA

CERTIFICATO DI COLLAUDO – MILL'S TEST CERTIFICATE
CERTIFICAT D'ESSAI – ABNAHMEPRÜFZEUGNIS
EN 10204 3.1

N° 516094

DATE:28/05/2021

Acciaierie Venete Spa C.S. € 63.000.000,00 i.v C.F. e P.IVA 00224180281
R.I di Trento 00224180281 V.A.T. N° IT 00224180281
Sede Legale: 38051 Borgo Valsugana (TN) Via Puisle, 4 - Italy
Direzione/Amministrazione: 35127 Padova Z.I. Sud - Riviera Francia, 9 - Italy Tel. 049 828.28.20 (r.a.)
Azienda con sistema di gestione per la qualità certificato da IGQ secondo ISO 9001 e IATF 16949

CLIENTE
CUSTOMER
CLIENT
KUNDE

ORDINE CLIENTE - PURCHASE ORDER
COMMANDE CLIENT - KUNDENAUFTRAG
AC21000106

ORDINE - ORDER
COMMANDE - AUFTRAG
123896 / 10

ARTICOLO (ACCIAIO)- ITEM (STEEL) - ITEM (ACIER) - ARTIKEL (STAHL)

PROFILO - PROFILE
PROFIL - ABMESSUNG: **TONDO 90 mm**

STATO DI FORNITURA- DELIVERY CONDITION
CONDITION DE LIVRAISON – LIEFERZUSTAND: **NATURALE**

STATO DI ESECUZIONE - STATE OF EXECUTION
ETAT DE L'ÉXECUTION - AUSFÜHRUNG: **LAMINATO RULLATO**

COLATA - HEAT - COULEE - SCHMELZE: **278983**

MARCA ACCIAIO - STEEL GRADE - MARQUE ACIER - STAHLGÜTE: **A105/A350LF2**

NORMA - SPECIFICATION - NORME - NORM: ASTM A105: A350FL2

BLUMO - BLOOM
BLOOM - KNÜPPEL

RIDUZIONE - REDUCTION
REDUCTION - UMFORMUNGSGRAD

STAB. SPEDIZIONE: PADOVA (Riviera Francia)

COMPOSIZIONE CHIMICA (%) - CHEMICAL COMPOSITION (%) - COMPOSITION CHIMIQUE (%) - CHEMISCHE ZUSAMMENSETZUNG (%)

C 0.1750 Si 0.2180 Mn 1.2060 P 0.0110 S 0.0090 Cu 0.1870 Cr 0.1080 Ni 0.1410 Sn 0.0090 Al 0.0260 As 0.0040 Mo 0.0310
V 0.0190 Ti 0.0170 B 0.0002 Nb 0.0120 Zr 0.0010 Ca 0.0008 Sb 0.0019

CR+MO=0.139; NI+CR+MO+V+CU=0.486

ANALISI GAS - GAS ANALYSIS - ANALYSE GAZ - GAS ANALYSE
H_2= 1.3 (ppm) | O_2= 18 (ppm) | N_2= 86 (ppm) 0.0086 (%)

CEV= 0,429% CEV=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15

D.I. (ASTM A255)

FUSIONE: FORNO ELETTRICO (EAF) - ELABORAZIONE FUORI FORNO: AFFINAZIONE (LF) - COLAGGIO: COLATA CONTINUA (CC)

CARATTERISTICHE MECCANICHE - MECHANICAL PROPERTIES
CARACTERISTIQUES MECANIQUES-MECHANISCHE EIGENSCHAFTEN

TRAZIONE-TENSILE TESTING-TRACTION-ZUGVERSUCH **ASTM A370**

RESILIENZA - IMPACT TEST - RESILIENCE - ZÄHIGKEIT **ASTM E23**

DUREZZA - HARDNESS - DURETE - HÄRTE

PROVINO - SAMPLE EPROUVETTE - MUSTER	mm	STATO - CONDITION ETAT - ZUSTAND	TRATTAMENTO TERMICO - HEAT TREATMENT TRAITMENT TERMIQUE - WÄRMEBEHANDLUNG			Rm MPa	Re MPa	A %	Z %	TIPO - TYPE - TYPE - ART	KV °C	KV J	KV J	KV J	Mean J	
COLATA - HEAT COULEE-SCHMELZE	25	NORMALIZZATO	900°C	ARIA		610	410	32	55	-46	90	88	86	88		
VALORI ALLO STATO DI FORNITURA - VALUES IN DELIVERY CONDITION - WERTE IM LIEFERZUSTAND ▶																

THE PRODUCT COMPLIES WITH THE REQUIREMENTS OF THE EUROPEAN DIRECTIVE 2000/53/EC

RADIOACTIVITY MEETS SPECIFICATION 2013/59/EURATOM <= [0,10] Bq/g

TEMPRABILITA' - HARDENABILITY
TREMPABILITE - HÄRTBARKEIT

GRANO - GRAIN
GRAIN - KORNGRÖSSE
EN ISO 643
AUSTENITICO
6 - 8

INCLUSIONI NON METALLICHE- NON METALLIC INCLUSIONS - INCLUSIONS NON METALLIQUES - NICHTMETALLISCHE EINSCHLÜSSE
ASTM E45

A (SS)		B (OA)		C (OS)		D (OG)	
Thin	Heavy	Thin	Heavy	Thin	Heavy	Thin	Heavy
1.0	0.5	2.0	1.0	0.0	0.0	1.0	1.0

UNI 3244 / SEP 1570
K 4 (OXIDE) = 6
K (SULFIDE) =
K (TOTAL) =

MACRO - MACROETCHING
MACRO - MAKRO ÄTZUNG

MACROINCLUSIONI - MACROINCLUSIONS
MACRO INCLUSIONS - MAKRO EINSCHLÜSSE

CONTROLLO ANTIMESCOLAMENTO - ANTIMIXING CONTROL
CONTROLE ANTIMELANGE - VERWECHSLUNGSPRÜFUNG 100%

ENTI COLLAUDATORI - INSPECTION AUTHORITIES
SERVICE D'ESSAI - ABNAHMEBEHÖRDE

NOTE – NOTES – NOTES - ANMERKUNGEN
CONTRTOLLI UT INTERNO EN10308 CLASSE 3 100%
CONTROLLI SPERFICIALI EN 10221 CLASSE C 100%

Q. A.
STATUS
X APPROVED
NOT APPROVED

CONTROLLO QUALITA' - QUALITY CONTROL - CONTROLE QUALITE - QUALITÄTSTELLE
Fornasiero I.
SERVIZIO QUALITA'

CERTIFICATO CONFORME AL CAPITOLATO E SPECIFICHE DI RIFERIMENTO - *CERTIFICATE IN COMPLIANCE WITH THE SPECIFICATION AND ITS REFERENCES-CERTIFICAT EN ACCOMPLIANCE AVEC LE CAHIER DES CHARGES ET SES REFERENCES-ZERTIFIKAT IN ÜBEREINSTIMMUNG MIT DER SPEZIFIKATION UND DESSEN BEZUGE*

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
23824 DERVIO (LC) – Via Enrico Fermi, 46
C.C.I.A.A. Lecco n.00205990138 - R.E.A.79815 - C.F. e P.IVA IT00205990138
Stabilimento-UfficiAmministrativi / Workshop - Warehouse - Offices - Mailing address:
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Stabilimento - Laboratorio / Workshop - Laboratory
23016 CERCINO (SO) – Via Mulada, 4, Tel. 0342-680443
E-mail: galperti@galperti.com - www.galperti.com

Certificate of Material Compliance
N° CERT: CO-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Certificate of Material Compliance

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405
Material Certificates: See attached List:

Items Description

Items (Q.ty): 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Declaration

We hereby certify that all items supplied for the above purchase order meet all requirements of the applicable specifications of manufacture, the purchase order item descriptions, purchase specifications and purchase order requirements. We certify that all applicable heat treatments, chemical analysis, mechanical tests, non destructive examinations, welding procedures, etc., as required in the purchase order, were performed and that the results were in accordance with the requirements of the purchase order. We certify that all required analysis and tests were performed on final production parts, or on specimens which were representative in all respects, of the final production part. We certify that all the instruments used for all the mesurements are properly calibrated according to our internal procedure P07.

Material according to: NACE MR-0175/ISO 15156-2

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Capitale Sociale € 2.582.500,00 interamente versato
Sede Legale e Amministrativa:
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The Original

Dimensional and Visual Inspection Report
N° CERT: VD-S10230405-E 00
REV.: 00
DATA: 21/11/2023

Dimensional and Visual Inspection Report

Main Information

Client Name: SCANDINAVIAN FITTINGS & FLANGES AB
Client P.O.: 82092 (STOCK)
Project: -
Supplier: OFFICINE NICOLA GALPERTI E FIGLIO S.p.A.
Galperti Job: S10230405

Items Description / Result

Items (Q.ty) : 10(100), 96(10), 24(20), 29(5), 92(5), 30(5), 52(10), 70(10), 63(10), 65(25), 85(5), 101(5), 20(10), 33(20), 58(15), 28(10), 81(100), 71(20), 35(20), 31(100),

Result: Satisfactory
According to: ASME B16.5-2020 Inch STD

THE FOLLOWING OPERATION HAVE BEEN WITNESSED BY INTERNAL INSPECTOR:

v DIMENSIONAL AND VISUAL INSPECTION

v EXTERNAL VISUAL CHECK

v VISUAL ROUGHNESS CONTROL ON FACING

v MARKING

Issued By: *(Quality control dep.)*	Samuele De Simoni	External Inspector
Approved by:	QM Bertera Lorenzo	
Gera Lario (Co) - Italy:	21/11/2023	

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0033122	Project: Day-To-Day			Client: AQUAGAS SWEDEN AB		
Order no.	**Item no.**	**Client Art. code**	**LOT No**	**Heat code**	**QTY**	**Description**
IK-23/24 140-22	2	C63-AQU-QIX-002 857 / 917		DG136	1,00	FLANGE-WN 1" 300 RF SCH-40S ASTM A182_GR.F316/316L ASME B16.5

SFF Scandinavian Fittings & Flanges Sweden
VERIFIED TRUE COPY OF ORIGINAL

CHECKED BY ARCUS

VIRAJ PROFILES PRIVATE LIMITED (formerly, Viraj Profiles Limited)**(Forgings Div)**
Survey No-140/1 & G-75 MIDC, Tarapur Ind.Area, Boisar, Dist.Palghar,Maharashtra-401506,INDIA
Email-vflqc@viraj.com,web.www.viraj.com(A01)

(A02) INSPECTION CERTIFICATE & MILL TEST REPORT - EN 10204 3.1

(A06)CUSTOMER :	Manufacturer's	(A03)MTR NO.	**12/230027262/55 / Rev - 00**
ARCUS NEDERLAND BV	Symbol (A04)	INVOICE NUMBER	**910024697**
NIJVERHEIDSTRAAT 4, 3316 AP		(Z02) DATE	**11.08.2023**
P.O. BOX 846, 3300 AV		MATERIAL SPEC.	**ASTM A182/A182M-23/ASME SA182/SA182M-21**
			EN10222-5-2017/ASME SECT.II PART A-2021
DORDRECHT THE NETHERLANDS		(B02) GRADE	**F316/316L/1.4401/1.4404**
Netherlands		DIMENSIONAL SPEC.	**ASME B16.5-2020/EN1759-1-2005**

(B01) : **STAINLESS STEEL FORGED FLANGES** | (B04) **DELIVERY CONDITION :**

ISO 9001:2015-TUV NORD REG.No-04100031210/05 EXPIRY DATE: 22.07.2024 & APPROVED ACCORDING TO AD 2000 MERKBLATT W0 & CERTIFIED ACCORDING TO PED (2014/68/EU) BY CERTIFICATION BODY FOR PRESSURE EQUIPMENT OF TUV NORD SYSTEMS (NOTIFIED BODY REGISTRATION NO. -0045)

(A07)ORDER NO: PUR-IOX03493RH	**(A08)Sales Order No. 100023848/001390**	**(A09)Article No:106**

(B09-B11)ITEM DESCRIPTION	(B08)QUANTITY(PCS)	(B07)HEAT NUMBER
1" WNRF 300# S40S	**105**	**DG136**

(C71-C92) CHEMICAL ANALYSIS

ELEMENT	%C	%Mn	%Si	%S	%P	%Cr	%Ni	%Mo	%Ti	%N
MIN						16.50	10.00	2.00		
MAX	0.030	2.00	1.00	0.030	0.045	18.50	12.00	2.50		0.1000
HEAT	0.024	1.62	0.38	0.025	0.035	16.75	10.09	2.03	0.002	0.0660

MECHANICAL PROPERTIES

(C01) Sample location : Mid thickness-forging	(C03) Test Temp : RT	(C02) Test Direction : Tr	(C10) Sample Shape Round		ASTM E10	

Test Values	(C12) Tensile Strength	(C11) Yield Strength		(C13)	Reduction of Area	(C32) Hardness	(C40) Charpy V-Notch 10x10x55mm Values At +20°C (Joules)			
		Rp=0.2%	Rp = 1%	Elongation%			**(C42) Single values**			(C43)
	MPA	MPA	MPA	Lo=4D	%	BHN	1	2	3	AVG
Req.	515/690	205 MIN	225 MIN	35 MIN	50 MIN	237 MAX				
T	546.88	282.81	325.65	59.40	70.40	151	195	209	214	206

Other applicable Specifications :: NACE MR 0175-2021 / ISO 15156 - 2020 NACE MR 0103 - 2015 & MATERIAL CONFORMS TO W2/W9/W10 / NORSOK MDS S01 Rev.5-2021

Melting Process : Electrical induction furnace & Argon Oxygen decarburization(IRS) Concast

Heat Treatment	: Solution Annealed at 1080°C and water Quenched
Dimensional Inspection	: Conform with the specification (100% inspected)
Surface quality	: Satisfactory Roughness value - RZ 12.5 to 25 µm / RA 3.2 to 6.3 µm
PMI Test	: No objection (100% tested with mobile spectro)
Corrosion Test	: Passed IGC test in accordance with DIN EN ISO 3651-2 & ASTM A262 Practice E
Micro Observation	: No carbide precipitation observed on grain boundaries
Radioactitivity Test	: We here by certify that all the material is free from radioactive contamination
Mercury Contamination	: Free from mercury contamination

we certify that the above material has been inspected and tested and complies with the order/contract and is of Indian origin

VF 1

(Z03)Inspector's Stamp

VIJAY KUMAR PILLAI (GM, QAD)

VIRAJ PROFILES LTD. VIRAJ QUALITY ASSURANCE

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0033122	Project: Day-To-Day			Client: AQUAGAS SWEDEN AB		
Order no.	**Item no.**	**Client Art. code**	**LOT No**	**Heat code**	**QTY**	**Description**
IK-23/24 140-22	2	C63-AQU-QIX-002 858 / 917		DG136	1,00	FLANGE-WN 1" 300 RF SCH-40S ASTM A182_GR.F316/316L ASME B16.5

SFF Scandinavian Fittings & Flanges Sweden
VERIFIED TRUE COPY OF ORIGINAL

CHECKED BY ARCUS

VIRAJ PROFILES PRIVATE LIMITED (formerly, Viraj Profiles Limited)**(Forgings Div)**
Survey No-140/1 & G-75 MIDC, Tarapur Ind.Area, Boisar, Dist.Palghar,Maharashtra-401506,INDIA
Email-vflqc@viraj.com,web.www.viraj.com(A01)

(A02) INSPECTION CERTIFICATE & MILL TEST REPORT - EN 10204 3.1

(A06)CUSTOMER :	Manufacturer's	(A03)MTR NO.	**12/230027262/55 / Rev - 00**
ARCUS NEDERLAND BV	Symbol (A04)	INVOICE NUMBER	**910024697**
NIJVERHEIDSTRAAT 4, 3316 AP		(Z02) DATE	**11.08.2023**
P.O. BOX 846, 3300 AV		MATERIAL SPEC.	**ASTM A182/A182M-23/ASME SA182/SA182M-21**
			EN10222-5-2017/ASME SECT.II PART A-2021
DORDRECHT THE NETHERLANDS		(B02) GRADE	**F316/316L/1.4401/1.4404**
Netherlands		DIMENSIONAL SPEC.	**ASME B16.5-2020/EN1759-1-2005**

(B01) : **STAINLESS STEEL FORGED FLANGES** | (B04) **DELIVERY CONDITION :**

ISO 9001:2015-TUV NORD REG.No-04100031210/05 EXPIRY DATE: 22.07.2024 & APPROVED ACCORDING TO AD 2000 MERKBLATT W0 & CERTIFIED ACCORDING TO PED (2014/68/EU) BY CERTIFICATION BODY FOR PRESSURE EQUIPMENT OF TUV NORD SYSTEMS (NOTIFIED BODY REGISTRATION NO. -0045)

(A07)ORDER NO: PUR-IOX03493RH	**(A08)Sales Order No. 100023848/001390**	**(A09)Article No:106**

(B09-B11)ITEM DESCRIPTION	(B08)QUANTITY(PCS)	(B07)HEAT NUMBER
1" WNRF 300# S40S	**105**	**DG136**

(C71-C92) CHEMICAL ANALYSIS

ELEMENT	%C	%Mn	%Si	%S	%P	%Cr	%Ni	%Mo	%Ti	%N
MIN						16.50	10.00	2.00		
MAX	0.030	2.00	1.00	0.030	0.045	18.50	12.00	2.50		0.1000
HEAT	0.024	1.62	0.38	0.025	0.035	16.75	10.09	2.03	0.002	0.0660

MECHANICAL PROPERTIES

(C01) Sample location : Mid thickness-forging	(C03) Test Temp : RT	(C02) Test Direction : Tr	(C10) Sample Shape Round		ASTM E10	

Test Values	(C12) Tensile Strength	(C11) Yield Strength		(C13)	Reduction of Area	(C32) Hardness	(C40) Charpy V-Notch 10x10x55mm Values At +20°C (Joules)			
		Rp=0.2%	Rp = 1%	Elongation%			**(C42) Single values**			(C43)
	MPA	MPA	MPA	Lo=4D	%	BHN	1	2	3	AVG
Req.	515/690	205 MIN	225 MIN	35 MIN	50 MIN	237 MAX				
T	546.88	282.81	325.65	59.40	70.40	151	195	209	214	206

Other applicable Specifications :: NACE MR 0175-2021 / ISO 15156 - 2020 NACE MR 0103 - 2015 & MATERIAL CONFORMS TO W2/W9/W10 / NORSOK MDS S01 Rev.5-2021

Melting Process : Electrical induction furnace & Argon Oxygen decarburization(IRS) Concast

Heat Treatment : Solution Annealed at 1080°C and water Quenched

Dimensional Inspection : Conform with the specification (100% inspected)

Surface quality : Satisfactory Roughness value - RZ 12.5 to 25 µm / RA 3.2 to 6.3 µm

PMI Test : No objection (100% tested with mobile spectro)

Corrosion Test : Passed IGC test in accordance with DIN EN ISO 3651-2 & ASTM A262 Practice E

Micro Observation : No carbide precipitation observed on grain boundaries

Radioactivity Test : We here by certify that all the material is free from radioactive contamination

Mercury Contamination : Free from mercury contamination

we certify that the above material has been inspected and tested and complies with the order/contract and is of Indian origin

VF 1

(Z03)Inspector's Stamp

VIJAY KUMAR PILLAI (GM, QAD)

VIRAJ PROFILES LTD. QUALITY ASSURANCE

Busch + Kunz
GmbH & Co. KG
Fittingswerk

Management System ISO 9001:2015
TÜVRheinland ZERTIFIZIERT
www.tuv.com ID 9105080869

Abnahmeprüfzeugnis
Inspection certificate

gemäß DIN EN 10204-3.1-1/2005
acc.

Nr. W0837022 0000
No.:

Datum: **30.10.2023**

Firmenzeichen
Manufacturer stamp

Stempel des Abnahmebeauftragten
Mark of inspection representative

Busch + Kunz GmbH & Co. KG, Postfach 1247, 57292 Burbach

Dahl Sverige AB

Gullivervägen 2/ Ulvättra

17677 Järfälla
Sweden

Stck. Quantity	Produkt Article	Abmessung Dimension	Abm. gemäß Dim. Acc.
100	RED KON CON RED	33.7X 21.3/ 2.6X 2.0	10253-2B

Kom-Nr.: Works No.:	Pos.: Item	Lieferdatum Delivery date	Ihre Best.-Nr. Your order no.
103865	0020	24.10.23	6519671

Vormaterial
base Material

TLB-Vormaterial tech. Req. DIN EN 10216-2 AD2000 -W4

Werkstoff Material	Schmelze-Nr. Heat no.	Hersteller Manufacturer	Erstschmelzungsart *[melting process]*	J-Faktor *[J-Factor]*:	CEQ *[CEQ]*:
5 P235GHTC1	320971	RMH	E	(Si + Mn) *(P + Sn) * 10000	C + (Mn / 6) + (Cr + Mo + V) / 5 + (Cu + Ni) / 15

Analyse *[analysis]*	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	V	Nb	Al	B	Ti	N	As			CEQ	J-Fakt
	0,080	0,230	0,490	0,007	0,006	0,110	0,030	0,100	0,120	0,000	0,001	0,026		0,001	0,008				0,203	

Mech.-technologische Prüfung *[mech. technological test]*

Proben Nr. *[test no.]*	Zugversuch *[tensile test]*					Kerbschlagbiegeversuch *notched bar impact*							Härteprüfung HB [hardness test]
	Pr.-Lage [pos. of sample]	Temp. ° C	Streckgr. [yield atr.]	Zugfestigkeit *[tensile str.]* Rm (N/mm²)	Dehnung *[elongation]* A5 (%)	Pr.-Lage [pos. of sample]	Temp. ° C	Querschnitt *[cross sec.]* cm²	Kerbschlag-arbeit *[impact values]* (J)			Mittel-wert	
T5253	L	RT	314	398,00	33,5								120-130

Wärmebehandlung
Heat treatment **N**

Die gestellten Anforderungen sind erfüllt.
The prescribed requirements are met.

Besichtigung und Abmessung ohne Beanstandung.
Visual inspection and dimension without objection.

Abnahmebeauftragter des Bestellers
Purchaser's authorized representativ

Anforderungen
Requirements

VdTÜV1252/12 DIN EN10253-2 11/2021
AD2000 HP8/3 EN 12007-1 DIN 21057-10
T- Stücke: 10% OFR geprüft (DIN EN 10253-2/14.9.3)
Tees : 10% MT tested acc. (DIN EN 10253-2/14.9.3)
KBZ entspricht DGRL 2014/68/EU Abs.4.3 Kap.7.5
impact energy according PED 2014/68/EU
Ch.4.3cap.7.5

Bemerkungen
Comment

Kennzeichnung: Marking B+K B+K1 P235GHTC1 DE EN2B 320971

Lief-Nr./Pos. : DN-No./Item **212473 /0020**

Abnahmebeauftragter des Herstellers
Inspection representative

Andreas Weissenberg
Telefon: 02736 – 4403-25
Fax: 02736 – 4403-476
e-mail: weissenberg@busch-kunz.de

Dieses Dokument wurde elektronisch erstellt und ist ohne Unterschrift gültig. *[The certificate is issued by the computerized system and is valid without signature.]*

Zugelassen als Werkstoffhersteller nach DGR 2014/68/EU Anhang I Absatz 4.3 und AD2000 W0 durch den TÜVRheinland CE0035 Zertifikats-Nr. 01 202 642/Q-14 0001
(Certified as manufactuer acc. PED 2014/68/EU Annex I Chap. 4.3 and AD 2000 W0 TÜVRheinland CE 0035 certificate-no. 01 202 642/Q-14 0001)

BK230419wa

Customer Order #	Item #	Heat #	Art #	Description
C603-AQU-GIX-002 859 / 917 DEDR-500/36 COOLING	5	320971	1410661	33,7X2,6/21,3X2,0 KONA CC

This document is electronically reproduced and is identical to the original.

Böllinghaus Steel Lda.
Trav. da Indústria 6 | 2430-668 Vieira de Leiria
ISO 9001:2015 | EN 9100:2018
CERT No. 01 100 030458 | 01 117 1800364

Abnahmeprüfzeugnis/Mill Test Certificate/Certificado de Qualidade
EN 10204:2004 / 3.1

Cert.No.: 1155590.1

Unsere innere Verweisung /Our Int. Ref. / Ref. int.
5600066129 / 000120

Datum / Date / Data
29.05.2023

Kunde / Customer / Cliente
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Produktgruppe / Product Group / Grupo Produto
AISI 316/L CD HEX 30 MM
1.4404 / X 2 CrNiMo 17-12-2

Bestell Nr./Order Nr./Enc.Nr.: DEPPO-00016641-1

Gewicht/ Weight/ Peso
1.473 KG

Bunde/Bundles/Atados
3

Endgültiger Kunde/Final Customer/Cliente Final
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Beschreibung / Description / Descrição
Stainless steel cold drawn hexagon bars

Bestell Nr./Order Nr./Enc.Nr.:
DEPPO-00016641-1.05

Normen / Standards / Normas
1.4401/1.4404 | TYPE 316/UNS S31600 TYPE 316L/UNS S31603 | DIN EN 10088-3:2014 (Condition 2H)
DIN EN 10272:2016-10 | PED 2014/68/EU | AD 2000 Merkblatt W0/W2/W10:2020-01 | ASTM A276/A276M-17
ASTM A479/A479M-21 | ASME SA-276 2021 | ASME SA-479/SA-479M 2021 | NACE MR0103/ISO 17945:2015
NACE MR0175/ISO 15156:2015 | DIN EN 10278:1999 - h11 | DIN EN ISO 6506-1:2015 | ISO 6892-1:2019
ISO 148-1:2016 | ISO 3651-2:1998 Method A+T1 - Conform

Checked according to: EN10272

Coded marking: 2823G7

Chemische analyse in % / Chemical composition in % / Análise química em %

C	0,009	**Si**	0,420	**Mn**	1,325	**P**	0,027	**S**	0,0248	**Cr**	16,698	**Ni**	10,204	**Mo**	2,039	**Co**	0,184	**Cu**	0,457
N	0,0420	**Ti**	0,0100	**Al**	0,004														

Schmelzen Nr./Cast nr./Fusão nr.	67234114
Erschmelzungsart/Melting/Processo de Fundição	EAF+AOD+CC
Wärmebehandlung/Heat treatment/Tratamento térmico	Solution annealed 1050°C (1922°F)
Visuelle Kontrolle/Visual Inspection/Inspeção Visual	OK
Mak. Untersuchung/Macrographic Test/T.Macr.	OK
Proben Nr./Test no./Amostra nr.:	5177869.02 3107058.04 #1
Härte/Hardness/Dureza [HB]	222
Streckgrenze/Yield point/Tensão limite Rp 0,2 % [MPa]	436
Dehngrenze/1% point/Limite de extensão Rp 1,0% [MPa]	458
Zugfestigkeit/Tensile strength/Tensão de rotura Rm [MPa]	631
Dehnung/Elongation/Alongamento A5 [%]	44,6
Dehnung/Elongation/Alongamento 4D [%]	48,0
Einschnürung/Reduction of area/Coef. Estrição Z [%]	76,7
Korngrösse/Grain size/Tamanho de grão	10

Country of origin: Portugal
Antimixing checked.
Material is free of mercury and radiation contamination.
No weld repair done.
We confirm that this material meets this specification according the mentioned standards.

Certified acc. PED 2014/68/EU and AD 2000 W0
Notified Body 0035 - TUV Rheinland Industrie Service Gmbh
01 202 926/Q-02 0040

CE
NB 0035
14
Certificate N.: 0035-CPR-A196
EN 10088-5:2009
Stainless steel hot rolled and cold drawn bars
for building constructions or civil engineering

Abnahmebeauftragter
Authorized Inspection Representative
Rep. Inspeção Autorizado

305

Nuno Silva (BS-NS)

Böllinghaus Steel Lda.
Trav. da Indústria 6 | 2430-668 Vieira de Leiria
ISO 9001:2015 | EN 9100:2018
CERT No. 01 100 030458 | 01 117 1800364

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Cert.No.: 1155590.1

Unsere innere Verweisung /Our Int. Ref. / Ref. int.
5600066129 / 000120

Datum / Date / Data
29.05.2023

Kunde / Customer / Cliente
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Produktgruppe / Product Group / Grupo Produto
AISI 316/L CD HEX 30 MM
1.4404 / X 2 CrNiMo 17-12-2

Bestell Nr./Order Nr./Enc.Nr.: DEPPO-00016641-1

Gewicht/ Weight/ Peso
1.473 KG

Bunde/Bundles/Atados
3

Endgültiger Kunde/Final Customer/Cliente Final
Damstahl GmbH
Raiffeisenstrasse 6-8
40764 Langenfeld
Germany

Beschreibung / Description / Descrição
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Bestell Nr./Order Nr./Enc.Nr.:
DEPPO-00016641-1.05

Normen / Standards / Normas
1.4401/1.4404 | TYPE 316/UNS S31600 TYPE 316L/UNS S31603 | DIN EN 10088-3:2014 (Condition 2H)
DIN EN 10272:2016-10 | PED 2014/68/EU | AD 2000 Merkblatt W0/W2/W10:2020-01 | ASTM A276/A276M-17
ASTM A479/A479M-21 | ASME SA-276 2021 | ASME SA-479/SA-479M 2021 | NACE MR0103/ISO 17945:2015
NACE MR0175/ISO 15156:2015 | DIN EN 10278:1999 - h11 | DIN EN ISO 6506-1:2015 | ISO 6892-1:2019
ISO 148-1:2016 | ISO 3651-2:1998 Method A+T1 - Conform

Checked according to: EN10272

Coded marking: 2633G8

Chemische analyse in % / Chemical composition in % / Análise química em %

C	0,009	**Si**	0,420	**Mn**	1,325	**P**	0,027	**S**	0,0248	**Cr**	16,698
Ni	10,204	**Mo**	2,039	**Co**	0,184	**Cu**	0,457	**N**	0,0420	**Ti**	0,0100
Al	0,004										

Schmelzen Nr./Cast nr./Fusão nr.	67234114
Erschmelzungsart/Melting/Processo de Fundição	EAF+AOD+CC
Wärmebehandlung/Heat treatment/Tratamento térmico	Solution annealed 1050°C (1922°F)
Visuelle Kontrolle/Visual Inspection/Inspeção Visual	OK
Mak. Untersuchung/Macrographic Test/T.Macr.	OK
Proben Nr./Test no./Amostra nr.:	5177869.02 3107058.04
	#1
Härte/Hardness/Dureza [HB]	222
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Dehngrenze/1% point/Limite de extensão Rp 1,0% [MPa]	458
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Dehnung/Elongation/Alongamento 4D [%]	48,0
Einschnürung/Reduction of area/Coef. Estrição Z [%]	76,7
Korngrösse/Grain size/Tamanho de grão	10

Country of origin: Portugal
Antimixing checked.
Material is free of mercury and radiation contamination.
No weld repair done.
We confirm that this material meets this specification according the mentioned standards.

Certified acc. PED 2014/68/EU and AD 2000 W0
Notified Body 0035 - TUV Rheinland Industrie Service Gmbh
01 202 926/Q-02 0040

CE
NB 0035
14
Certificate N.: 0035-CPR-A196
EN 10088-5:2009
Stainless steel hot rolled and cold drawn bars
for building constructions or civil engineering

Abnahmebeauftragter
Authorized Inspection Representative
Rep. Inspeção Autorizado

305

Nuno Silva (BS-NS)

Herstellererklärung zur EU-Richtlinie ATEX 2014/34/EU

Manufacturer's Declaration to European Directive ATEX 2014/34/EU

Déclaration du Fabricant de la Directive ATEX 2014/34/EU

Goetze KG Armaturen
Robert-Mayer-Straße 21
71636 Ludwigsburg

Fon +49 (0) 7141 / 4 88 94-60
Fax +49 (0) 7141 / 4 88 94-88
info@goetze-armaturen.de
www.goetze-armaturen.de

USt.- ID.DE 146 139 484

Besteller
Customer / Client
PROCAB AB
Marieholmsgatan 10A
SE 415 02 Göteborg

Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Bestellung *Customers order no. / n° commande client*
8672

Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
363464

Pos.
6

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Typ
Type / Type
861 tGFO
1000000414406

Herstellnummer
Series No. / n° de série
1001218536

Nominalgröße
Nominal size / Diamètre nominal
DN 15

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
Der oben angeführte Ventiltyp in der geprüften Ausführung ist gemäß technischem Bericht der TÜV SÜD Product Service GmbH zu Bescheinigung Nr. 713082362 vom 14.04.16 für die Verwendung in der Gerätegruppe I Kategorie M2 und Gerätegruppe II Zonen 1, 21 und 2, 22 verwendbar.

In co-operation with the TÜV SÜD Product Service GmbH, the products were subject to a hazard analysis according to Directive 2014/34/EU with the following result:
The valve type specified above in the tested version, is according to the technical report of the TÜV SÜD Product Service GmbH relating to Attestation No. 713082362 dd. 14.04.16 suitable for use in Group I category M2 and Equipment Group II zones 1, 21 and 2, 22.

Les produits ont été soumis à une procédure d 'évaluation de risque de danger selon la directive 2014/34/EU en collaboration avec le TÜV SÜD Product Service GmbH, dont le résulat est le suivant:
Le type de robinettrie specifiée ci-dessus est dans la version contrôlée, selon le rapport téchnique en relation de l'attestation no. 713082362 dd. 14.04.16 du TÜV SÜD Product Service GmbH, convenable pour utilisation dans les Groupes des Appareils I catégorie M2 et Groupes des Appareils II zones 1, 21 et 2, 22.

Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 19.02.2024

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

Herstellererklärung zur EU-Richtlinie ATEX 2014/34/EU

Manufacturer's Declaration to European Directive ATEX 2014/34/EU

Déclaration du Fabricant de la Directive ATEX 2014/34/EU

Goetze KG Armaturen
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Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Bestellung *Customers order no. / n° commande client*
8672

Goetze Vorgangsnummer
Goetze Transaction-no. / Référence Goetze
363464

Pos.
1

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Typ
Type / Type
461 tGFO
1000000613038

Herstellnummer
Series No. / n° de série
1001206459-1001206460

Nominalgröße
Nominal size / Diamètre nominal
DN 8

Eintritt / Inlet / Entrée
Nennweite
Nominal diam. / taille nominale
DN 08

Anschluß
Connection thread / raccord fileté
m

Austritt / Outlet / Sortie
Nennweite
Nominal diam. / taille nominale
DN 15

Anschluß
Connection thread / raccord fileté
f

Die Produkte wurden zusammen mit der TÜV SÜD Product Service GmbH einer Gefahrenanalyse nach der Richtlinie 2014/34/EU unterzogen mit folgendem Ergebnis:
Der oben angeführte Ventiltyp in der geprüften Ausführung ist gemäß technischem Bericht der TÜV SÜD Product Service GmbH zu Bescheinigung Nr. 713082362 vom 14.04.16 für die Verwendung in der Gerätegruppe I Kategorie M2 und Gerätegruppe II Zonen 1, 21 und 2, 22 verwendbar.

In co-operation with the TÜV SÜD Product Service GmbH, the products were subject to a hazard analysis according to Directive 2014/34/EU with the following result:
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Les produits ont été soumis à une procédure d 'évaluation de risque de danger selon la directive 2014/34/EU en collaboration avec le TÜV SÜD Product Service GmbH, dont le résulat est le suivant:
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Angewandte harmonisierte Normen:
Applicable harmonized standards:
Normes harmonisés en vigeur:
DIN EN 1127-1

Ludwigsburg, 19.02.2024

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

ARMATUREN GOETZE

Wartungs- und Montageanleitung
Service- and Installation Instructions
Instructions de Montage et d'Entretien

Zusätzliche Hinweise
Supplementary Information
Renseignements additionels

Hinweise für den Einsatz in explosionsgefährdeten Bereichen in Anlehnung an die Richtlinie 2014/34/EU (ATEX)

Recommendations for use in potentially explosive areas based on the guideline 2014/34/EU (ATEX)

Renseignements pour l'emploi dans des zones explosibles basé sur la directive 2014/34/EU (ATEX)

Die Armatur ist grundsätzlich auch für den Einsatz im Ex-Bereich verwendbar und wurde demzufolge einem Konformitätsbewertungsverfahren entsprechend der RL 2014/34/EU unterzogen.
Im Rahmen der Untersuchungen wurde eine Zündgefahrenanalyse nach EN 13463-1 durchgeführt mit folgendem Ergebnis:

- **Die Armatur besitzt keine potentielle Zündquelle und fällt nicht in den Anwendungsbereich der ATEX.**
- **Die Armatur darf unter Beachtung des jeweiligen Betriebszustandes im EX-Bereich eingesetzt werden.**

This fitting is in principle also suitable for use in Ex-zones and was consequently subject to a conformity analysis according to guideline 2014/34/EU. Within the scope of the tests, a potential ignition source analysis according to EN 13463-1 was carried-out with the following results:

- *The fitting does not have a potential ignition source and consequently is not subject to ATEX*
- *The fitting may be used in the Ex-zone, providing that the individual operating conditions are respected.*

La robinetterie est en principe aussi employable pour des zones Ex. Par conséquence, elle était soumis à une analyse de conformité d'après directive 2014/34/EU. Dans le cadre de ces tests, une analyse des source d'ignition était exécuté d'après EN 13463-1. Les résultats étaient comme suit :

- *La robinetterie ne possède pas de source d'ignition potentielle et par conséquence ne fait pas partie de la domaine d'emploi ATEX.*
- *La robinetterie peut être employé dans des zones Ex – pourvu que les conditions d'opération individuels sont respectés.*

Bei Einsatz im Ex-Bereich sind zusätzlich zur bestimmungsgemäßen Verwendung nach der Auswahltabelle für GÖTZE ATEX - Produkte entsprechend den Herstellerangaben folgende Punkte zu beachten:

- **Die gesamte Anlage muss den Anforderungen der ATEX entsprechend überprüft und abgenommen sein.**
- **Die Armatur muss in das Erdungskonzept der Gesamtanlage eingebunden werden.**
- **Je nach Einbauort ist auch eine Einbindung in das Blitzschutzsystem vorzunehmen.**
- **Vor dem Öffnen des Ventils zu Reinigungs- und Wartungsarbeiten muss die Innentemperatur der Armatur unterhalb der Zündtemperatur des eingesetzten explosiven Gemisches sein.**

An der Armatur ist sichergestellt, dass Teile, die zum Erreichen des Schutzgrades notwendig sind, nicht unabsichtlich oder unbeabsichtigt entfernt werden können. Dies ist beispielsweise durch Verschlussteile erreicht, die nur mittels Werkzeug oder Schlüssel abgenommen werden können.

Bei uneingestellt gelieferten ATEX-Ventilen für die Kategorien 1 und 2 muss nach der Einstellung die Gasdichtheit geprüft und gewährleistet werden.

In case of use in the Ex-zone, in addition to correct usage as per the GOETZE ATEX product selection table, the following manufacturer's notes must be adhered to:

- *The complete plant must fulfil all ATEX requirements and have been certified accordingly.*
- *The fitting must be included in the grounding concept of the complete plant.*
- *Depending on its position, if necessary, the fitting must be taken into account in the lightning protection system.*
- *Before the valve is opened for cleaning or maintenance purposes, the inner temperature of the fitting must be below the flashpoint of the explosive medium employed.*

The valve is designed in such a way that the parts of the valve which guarantee the required level of protection cannot be removed unintentionally. This is achieved for example with closure parts which can only be removed by means of a tool or spanner.

En cas d' utilisation dans des zones Ex, pourvu que la correcte robinetterie était sélecté d'après la table GÖTZE ATEX sélection des produits, il faut respecter les points suivants:

- *L'entière installation doit satisfaire tous exigences ATEX et doit être certifié de façon analogue.*
- *La robinetterie doit être inclus à la stratégie de mis à la terre de l'ensemble de l'installation.*
- *Dépendant de l'endroit du montage, il faut aussi l'intégrer dans le système protection contre les éclairs.*
- *Avant d'ouvrir la soupape pour des raisons de maintenance et nettoyage, la température interne de la robinetterie doit rester inférieure à la température d'étuvage de la mélange explosible.*

Il est assuré que des pièces qui sont nécessaire pour obtenir un certain degré de protection ne peuvent pas être enlevé involontairement. C'est obtenu par exemple par des pièces de fermeture qui peuvent être détachés seulement avec un outillage ou une clé.

En cas des soupapes ATEX non tarées pour les catégories 1 et 2, il est indispensable de vérifier et d'assurer l'étanchéité au gaz suite au tarage des soupapes.

BESCHEINIGUNG ■ CERTIFICATION ■ ATTESTATION ■ COMPROBANTE ■ ZAŚWIADCZENIE ■ СПРАВКА

Product Service

Bescheinigung

Nr. 713082362

vom 01.08.2016

Auftraggeber:	Goetze KG Armaturen Robert-Mayer-Strasse 21 D-71636 Ludwigsburg
Hersteller:	Goetze KG Armaturen Robert-Mayer-Straße 21 D-71636 Ludwigsburg
Produkt:	Sicherheitsventile; Überström- und Regelventile; Druckminderventile; Wechselkugelhahn Produkte zur Verwendung in explosionsgefährdeten Bereichen im Sinne der: Gruppe II, Gerätekategorien 1; 2; 3; sowie Gruppe I, Gerätekategorie M1 und M2
Technische Daten:	Kupfer, Rotguss, Edelstahl, Messing
Prüf-spezifikation:	Grundlegende Sicherheits- und Gesundheitsanforderungen gemäß Anhang II der Richtlinie 2014/34/EU EN 1127-1:2011
Zugrunde liegender Bericht:	Technischer Bericht Nr. 713082362 vom 14.04.2016 Dieser Bericht ist Bestandteil dieser Bescheinigung.
Bedingungen:	Technischer Bericht Nr. 713082362 vom 14.04.2016, Abschnitt 4.

Nach Durchführung einer Zündgefahrenbewertung bescheinigt die TÜV SÜD Product Service GmbH für die oben genannten Produkte die **Zündquellenfreiheit** und die Erfüllung der Sicherheitsanforderungen für explosionsgefährdete Bereiche gemäß dem Technischen Bericht Nr. 713082362 vom 14.04.2016.

TÜV SÜD Product Service GmbH

Michael Reuschel
Branchenkompetenzzentrum Maschinen und Industrieprodukte

TÜV SÜD Product Service GmbH

Sebastian Willer
Branchenkompetenzzentrum Maschinen und Industrieprodukte

BESCHEINIGUNG ■ CERTIFICATION ■ ATTESTATION ■ COMPROBANTE ■ ZAŚWIADCZENIE ■ СПРАВКА

Product Service

Attestation

no. 713082362

dated 01.08.2016

Client:	Goetze KG Armaturen Robert-Mayer-Strasse 21 D-71636 Ludwigsburg
Manufacturer:	Goetze KG Armaturen Robert-Mayer-Straße 21 D-71636 Ludwigsburg
Product:	Safety valve Overflow and pressure control valve Pressure relief valve Pressure reducing valve Ball diverter valve Products intended for use in potentially explosive atmospheres in line with: Group II, equipment categories 1; 2; 3; as well as Group I, equipment category M1 and M2
Technical data:	Copper, red brass, stainless steel, brass
Test specification:	Fundamental health and safety requirements according to Annex II of the Directive 2014/34/EU EN 1127-1:2011
Underlying report:	Technical report no. 713082362 dated 14.04.2016 This report is part of this certificate.
Conditions:	Technical report no. 713082362 dated 14.04.2016, section 4.

After the performance of an ignition hazard assessment, TÜV SÜD Product Service GmbH certifies the **absence of ignition sources** and compliance with the safety requirements for potentially explosive atmospheres according to the Technical report no. 713082362 dated 14.04.2016 for the products specified above.

TÜV SÜD Product Service GmbH

Michael Reuschel
Centre of Excellence for Machinery and Industrial Products

TÜV SÜD Product Service GmbH

Sebastian Willer
Centre of Excellence for Machinery and Industrial Products

HY-LOK CORPORATION

97,Noksansandan 27-ro,Gangseo-gu,Busan
618-270 Korea
Tel : 82.51.970.0940
Fax : 82.51.931.7923
www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1224
PO No. : 202340688
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
DZN	Reducer 8mmOD-12mmOD(ACR8M-12M)	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.010	0.22	1.65	0.038	0.024	10.12	16.19	2.69								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
622	701	47	78	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

97,Noksansandan 27-ro,Gangseo-gu,Busan
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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1225
PO No. : 202440099
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
BLB	Female Gauge Adapter 12mmOD-G 1/4(CAFG12M-4G)	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.015	0.23	1.67	0.036	0.022	10.07	16.17	2.65								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
659	724	42	75	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1226
PO No. : 202340249
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
FZQ	Gauge Connector 6mmOD-G 1/4(ACGC6M-4G)	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.013	0.21	1.67	0.035	0.027	10.03	16.07	2.67								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
678	744	38	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1227
PO No. : 202340865
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
JSK	Male Pipe Weld Connector 8mmOD-1/4"NPS(ACWC8M-4P)	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.014	0.20	1.74	0.037	0.023	10.04	16.15	2.62								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
626	720	42	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1228
PO No. : 202340865
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
JSK	Male Pipe Weld Connector 8mmOD-1/4"NPS(ACWC8M-4P)	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.014	0.20	1.74	0.037	0.023	10.04	16.15	2.62								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
626	720	42	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1229
PO No. : 202340626
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
DX8	Adjustable Elbow 8mmOD(ACAL-8M)	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.019	0.477	1.332	0.0311	0.0093	10.066	16.765	2.052	0.0633							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
331	615	62	77	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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Fax : 82.51.931.7923
www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1230
PO No. : 202340626
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
DX8	Adjustable Elbow 8mmOD(ACAL-8M)	4 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.019	0.477	1.332	0.0311	0.0093	10.066	16.765	2.052	0.0633							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
331	615	62	77	

Remarks
ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1231
PO No. : 202340321
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
E4A	Union Tee 22mmOD(ACTA-22M)	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.019	0.486	1.263	0.0297	0.0102	10.062	16.768	2.048	0.0621							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
318	622	66	80	

Remarks
ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1232
PO No. : 202340502
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
ELV	Straight Union 8mmOD(ACUA-8M)	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.014	0.25	1.66	0.035	0.025	10.25	16.03	2.64								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
631	713	44	76	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

97,Noksansandan 27-ro,Gangseo-gu,Busan
618-270 Korea
Tel : 82.51.970.0940
Fax : 82.51.931.7923
www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1233
PO No. : 202240270
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
D4J	Male Pipe Weld Connector 12mmOD-3/4"NPS(ACWC12M-12P)	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.028	0.509	1.749	0.0325	0.0215	10.569	16.877	2.107								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
683	724	33	69	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.5
* Heat treatment 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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618-270 Korea
Tel : 82.51.970.0940
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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1234
PO No. : 202340699
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
JSK	Male Pipe Weld Connector 6mmOD-1/4"NPS(ACWC6M-4P)	5 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.014	0.20	1.74	0.037	0.023	10.04	16.15	2.62								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
626	720	42	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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618-270 Korea
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www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1235
PO No. : 202340699
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
JSK	Male Pipe Weld Connector 6mmOD-1/4"NPS(ACWC6M-4P)	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.014	0.20	1.74	0.037	0.023	10.04	16.15	2.62								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
626	720	42	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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618-270 Korea
Tel : 82.51.970.0940
Fax : 82.51.931.7923
www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1236
PO No. : 202340678
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
EGM	Port Connector 8mmOD(CPC-8M)	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.023	0.469	1.950	0.0327	0.0180	10.059	16.696	2.049								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
435	620	48	78	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 4.5
* Solution Treatment 1050°C, 30Min/Inch, Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR0175 / ISO 15156-3, NACE MR0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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618-270 Korea
Tel : 82.51.970.0940
Fax : 82.51.931.7923
www.hy-lok.com

CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1237
PO No. : 202340643
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
MCM	Port Connector 6mmOD(CPC-6M)	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.024	0.498	1.882	0.0326	0.0181	10.047	16.759	2.052								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
485	640	46	75	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 7.0
* Solution 1050°C, 30min/inch , Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR 0103/ NACE MR 0175 / ISO 15156-3

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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Tel : 82.51.970.0940
Fax : 82.51.931.7923
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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1238
PO No. : 202340596
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
GG4	Male Connector 12mmOD-G 3/4(ACMC12M-12G)	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.020	0.484	1.763	0.0324	0.0216	10.626	16.949	2.071								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
703	730	33	69	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.0
* Heat Treatment 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1245
PO No. : 202340321
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
E4A	Union Elbow 22mmOD(ACLA-22M)	4 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.019	0.486	1.263	0.0297	0.0102	10.062	16.768	2.048	0.0621							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
318	623	66	72	

Remarks
ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1246
PO No. : 202340665
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
A8V	Adjustable Run Tee 8mmOD(ACRTA-8M)	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.016	0.492	1.265	0.0334	0.0087	10.023	16.564	2.061	0.0536							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
322	626	67	79	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1247
PO No. : 202440061
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
EKX	Male Pipe Weld Connector 18mmOD-1/2"NPS(ACWC18M-8P)	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.015	0.23	1.71	0.037	0.025	10.34	16.18	2.71								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
632	737	36	74	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1248
PO No. : 202340680
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
DX6	Plug 8mmOD(ACPA-8M)	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.020	0.449	1.891	0.0320	0.0184	10.092	16.642	2.048								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
510	690	45	67	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5.5
* Solution : 1050°C, 30Min/Inch, Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR0175 / ISO 15156-3, NACE MR0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202403-1249
PO No. : 202140283
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
APT	Union Tee 8mmOD(ACTA-8M)	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.016	0.517	1.332	0.0336	0.0086	10.058	16.689	2.039	0.0666							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
321	622	67	79	

Remarks
ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202405-2552
PO No. : 202240270
POR No. : -
Date of issue : May-27-2024

HCD No	Description (Part Name)	Q'ty
D4J	Male Pipe Weld Connector 12mmOD-3/4"NPS(ACWC12M-12P)	5 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.028	0.509	1.749	0.0325	0.0215	10.569	16.877	2.107								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
683	724	33	69	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.5
* Heat treatment 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HD202405-2553
PO No. : 202440029
POR No. : -
Date of issue : May-27-2024

HCD No	Description (Part Name)	Q'ty
DXT	Male Pipe Weld Connector 22mmOD-3/4"NPS(ACWC22M-12P)	5 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.023	0.469	1.812	0.0318	0.0218	10.538	16.863	2.049								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
675	717	33	69	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.0
* Heat Treatment 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HM202301-0330
PO No. : 202240860
POR No. : -
Date of issue : Jan-06-2023

HCD No	Description (Part Name)	Q'ty
DDP	Tee Filter 8mmOD,50Micron(VFTH-8M-50) - BODY	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.022	0.486	1.529	0.0309	0.0023	11.161	16.704	2.046	0.0607							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
310	610	66	77	

Remarks
ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

PRESSURE TEST REPORT

CUSTOMER	HY-LOK EUROPE	PROJECT NO.	Z002	HULL NO.		DOC NO.	PTR-23A06-045
PROJECT NAME	대리점 Stock	PO NO.	202240860	POR NO.	-	TEST DATE	2022-11-17
CAS NO.	20221104-813					PROCEDURE	TS-035

SERIAL / ITEM NO	PART NO.	BODY MATERIAL	DESCRIPTION	Q'TY
011	VFTH-8M-50	ASTM A182 F316/F316L	Tee Filter 8mmOD,50Micron	3

TEST CONDITION

No.	Test	Fluid	Duration (sec)	Pressure (psi)	Pressure (bar)	Result (Test Q'ty : 100%)	Gauge ID NO.	Due Date
1	EXTERNAL LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	TPG-02	2023-04-08
2	SHELL	Water	15	9000.0	621.0	Accept (No Leakage)	HD-P04	2023-03-14

< REMARK >

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Prepared By	Approved By	Witnessed By
N. H. Kim	J. M. Kim	

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HM202403-0921
PO No. : 202340459
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
ENL	3-Way Ball Valve(Side) 8mmOD,PEEK,P/M,Without H/D(VH1B3S-H8MPKM-WH) - BODY	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.015	0.20	1.71	0.039	0.025	10.12	16.18	2.71								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
583	683	40	73	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 4.5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good
* NACE MR0175

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification :	ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)	CAS No. :	
Material Mfr. :	EZER CORP.	Certificate No. :	HM202403-0922
Customer :	HY-LOK EUROPE	PO No. :	202340459
Project Name :	Petrochemical	POR No. :	-
		Date of issue :	Mar-11-2024

HCD No	Description (Part Name)	Q'ty
CJZ	3-Way Ball Valve(Side) 8mmOD,PEEK,P/M,Without H/D(VH1B3S-H8MPKM-WH) - END CONNECTOR	4 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.023	0.557	1.766	0.0335	0.0199	10.552	16.82	2.082								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
683	717	31	69	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.0
* Heat treatment 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202403-0923
PO No. : 202340459
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
BUW	3-Way Ball Valve(Side) 8mmOD,PEEK,P/M,Without H/D(VH1B3S-H8MPKM-WH) - END CONNECTOR	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.020	0.467	1.70	0.0353	0.0211	10.539	16.82	2.044								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
662	717	34	70	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.5
* Heat treatment 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202403-0924
PO No. : 202340459
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
E9C	3-Way Ball Valve(Side) 8mmOD,PEEK,P/M,Without H/D(VH1B3S-H8MPKM-WH) - BALL	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.021	0.506	1.890	0.0332	0.0169	10.038	16.677	2.031								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
330	575	56	78	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 4.5
* Solution : 1050°C, 30Min/Inch, Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR0175 / ISO 15156-3, NACE MR0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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Fax : 82.51.931.7923
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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202403-0925
PO No. : 202340459
POR No. : -
Date of issue : Mar-11-2024

HCD No	Description (Part Name)	Q'ty
GFZ	3-Way Ball Valve(Side) 8mmOD,PEEK,P/M,Without H/D(VH1B3S-H8MPKM-WH) - STEM	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.019	0.472	1.912	0.0335	0.0175	10.005	16.742	2.044								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
415	610	51	75	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 7.0
* Solution : 1050°C, 30Min/Inch , Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR0175/ ISO 15156-3, NACE MR 0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

PRESSURE TEST REPORT

CUSTOMER	HY-LOK EUROPE	PROJECT NO.	A000	HULL NO.		DOC NO.	PTR-24C11-029
PROJECT NAME	Petrochemical	PO NO.	202340459	POR NO.	-	TEST DATE	2023-08-17
CAS NO.	20230707-807					PROCEDURE	TS-035

SERIAL / ITEM NO	PART NO.	BODY MATERIAL	DESCRIPTION	Q'TY
013	VH1B3S-H8MPKM-WH	ASTM A479 TYPE316/316L	3-Way Ball Valve(Side) 8mmOD,PEEK,P/M,Without H/D	2

TEST CONDITION

No.	Test	Fluid	Duration (sec)	Pressure (psi)	Pressure (bar)	Result (Test Q'ty : 100%)	Gauge ID NO.	Due Date
1	SHELL	Water	15	12000.0	827.0	Accept (No Leakage)	FSG-07	2024-04-26
2	EXTERNAL LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	PG-TR07	2024-04-07
3	SEAT LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	PG-TR07	2024-04-07

< REMARK >

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HM202403-0281
PO No. : 202440083
POR No. : -
Date of issue : Mar-05-2024

HCD No	Description (Part Name)	Q'ty
EZG	Ball Valve 8mmOD,PEEK,P/M,Without Handle(VH1B-H-8MPKM-WH) - BODY	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.024	0.532	1.763	0.0322	0.0181	10.534	16.789	2.039								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
510	634	46	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5.0
* Solution - Annealed
* Heat Treatment : 1050°C
* Intergranular Corrosion Test : Good
* NACE MR0175

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202403-0287
PO No. : 202440083
POR No. : -
Date of issue : Mar-05-2024

HCD No	Description (Part Name)	Q'ty
GL9	Ball Valve 8mmOD,PEEK,P/M,Without Handle(VH1B-H-8MPKM-WH) - END CONNECTOR	2 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.022	0.498	1.761	0.0321	0.0190	10.578	16.817	2.049								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
703	730	33	68	

Remarks
* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.5
* Heat Treatment : 1050°C
* Intergranular Corrosion Test : Good

ISSUE No. : -

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202403-0288
PO No. : 202440083
POR No. : -
Date of issue : Mar-05-2024

HCD No	Description (Part Name)	Q'ty
FMD	Ball Valve 8mmOD,PEEK,P/M,Without Handle(VH1B-H-8MPKM-WH) - BALL	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.019	0.428	1.895	0.0337	0.0167	10.073	16.693	2.026								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
360	580	54	76	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.0
* Solution Treatment Smooth Turned
* Solution : 1050°C, 30Min/Inch, Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR 0175 / ISO 15156-3, NACE MR 0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202403-0289
PO No. : 202440083
POR No. : -
Date of issue : Mar-05-2024

HCD No	Description (Part Name)	Q'ty
C2L	Ball Valve 8mmOD,PEEK,P/M,Without Handle(VH1B-H-8MPKM-WH) - STEM	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.022	0.499	1.906	0.0320	0.0169	10.042	16.648	2.042								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
440	630	47	75	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 8.0
* Solution : 1050°C, 30 Min/Inch, Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR 0175 / ISO 15156-3, NACE MR 0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

PRESSURE TEST REPORT

CUSTOMER	HY-LOK EUROPE	PROJECT NO.	A000	HULL NO.		DOC NO.	PTR-24C05-074
PROJECT NAME	Petrochemical	PO NO.	202440083	POR NO.	-	TEST DATE	2024-02-14
CAS NO.	20240130-814					PROCEDURE	TS-035

SERIAL / ITEM NO	PART NO.	BODY MATERIAL	DESCRIPTION	Q'TY
005	VH1B-H-8MPKM-WH	ASTM A479 TYPE316/316L	Ball Valve 8mmOD,PEEK,P/M,Without Handle	1

TEST CONDITION

No.	Test	Fluid	Duration (sec)	Pressure (psi)	Pressure (bar)	Result (Test Q'ty : 100%)	Gauge ID NO.	Due Date
1	SHELL	Water	15	15000.0	1034.0	Accept (No Leakage)	FSG-07	2024-04-26
2	SEAT LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	PG-TR03	2024-04-07
3	EXTERNAL LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	PG-TR03	2024-04-07

< REMARK >

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A182 F316/F316L
Material Mfr. : HY-LOK FORGING CORPORATION
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202309-1787
PO No. : 202240946
POR No. : -
Date of issue : Sep-19-2023

HCD No	Description (Part Name)	Q'ty
EGN	NV Needle Valve 8mmOD,Regulating(VNV2H-8M-R) - BODY	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo	N							
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-15.00	16.00-18.00	2.00-3.00	0.10 max							
0.021	0.483	1.299	0.0327	0.0080	10.014	16.763	2.025	0.0589							

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	50 min	
333	609	62	77	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Solution Annealed
immediately W.C after forging (Material Heating Temperature 1150°C±50°C)
* NACE MR0175/ISO 15156

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : SEAH CHANGWON INTEGRATED SPECIAL STEEL
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202309-1788
PO No. : 202240946
POR No. : -
Date of issue : Sep-19-2023

HCD No	Description (Part Name)	Q'ty
DT7	NV Needle Valve 8mmOD,Regulating(VNV2H-8M-R) - STEM	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.020	0.446	1.905	0.0312	0.0154	10.086	16.567	2.025								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
680	785	34	71	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 4.5
* Solution : 1050°C, 30Min/Inch, Water Cooling
* Intergranular Corrosion Test : Good
* NACE MR0175 / ISO 15156-3, NACE MR0103

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

PRESSURE TEST REPORT

CUSTOMER	HY-LOK EUROPE	PROJECT NO.	A000	HULL NO.		DOC NO.	PTR-23I19-013
PROJECT NAME	Petrochemical	PO NO.	202240946	POR NO.	-	TEST DATE	2023-01-09
CAS NO.	20221202-821					PROCEDURE	TS-035

SERIAL / ITEM NO	PART NO.	BODY MATERIAL	DESCRIPTION	Q'TY
009	VNV2H-8M-R	ASTM A182 F316/F316L	NV Needle Valve 8mmOD,Regulating	1

TEST CONDITION

No.	Test	Fluid	Duration (sec)	Pressure (psi)	Pressure (bar)	Result (Test Q'ty : 100%)	Gauge ID NO.	Due Date
1	SHELL	Water	15	9000.0	621.0	Accept (No Leakage)	HD-P04	2024-03-13
2	SEAT LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	PG-W13	2024-03-13
3	EXTERNAL LEAKAGE	Nitrogen	15	1000.0	69.0	Accept (No Leakage)	PG-W13	2024-03-13

< REMARK >

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

CAS No. :

Specification : ASTM A479 TYPE316/316L
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

Certificate No. : HM202310-2472
PO No. : 202340645
POR No. : -
Date of issue : Oct-27-2023

HCD No	Description (Part Name)	Q'ty
FMN	Plug Valve 6mmOD(VP1VH-6M) - BODY	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.021	0.505	1.726	0.0337	0.0189	10.602	16.870	2.038								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
537	634	44	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.0
* Solution - Annealed, 1050°C
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202310-2473
PO No. : 202340645
POR No. : -
Date of issue : Oct-27-2023

HCD No	Description (Part Name)	Q'ty
DZN	Plug Valve 6mmOD(VP1VH-6M) - STEM	1 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.010	0.22	1.65	0.038	0.024	10.12	16.19	2.69								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
720	805	33	69	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

PRESSURE TEST REPORT

CUSTOMER	HY-LOK EUROPE	PROJECT NO.	A000	HULL NO.		DOC NO.	PTR-23J27-040
PROJECT NAME	Petrochemical	PO NO.	202340645	POR NO.	-	TEST DATE	2023-10-13
CAS NO.	20230919-809					PROCEDURE	TS-035

SERIAL / ITEM NO	PART NO.	BODY MATERIAL	DESCRIPTION	Q'TY
021	VP1VH-6M	ASTM A479 TYPE316/316L	Plug Valve 6mmOD	1

TEST CONDITION

No.	Test	Fluid	Duration (sec)	Pressure (psi)	Pressure (bar)	Result (Test Q'ty : 100%)	Gauge ID NO.	Due Date
1	SEAT LEAKAGE	Nitrogen	15	600.0	41.0	Accept (No Leakage)	PG-TR07	2024-04-07
2	SHELL	Water	15	4500.0	310.0	Accept (No Leakage)	HD-P04	2024-03-13
3	EXTERNAL LEAKAGE	Nitrogen	15	600.0	41.0	Accept (No Leakage)	PG-TR07	2024-04-07

< REMARK >

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L
Material Mfr. : EZER CORP.
Customer : HY-LOK EUROPE
Project Name :

CAS No. :
Certificate No. : HM202309-1791
PO No. : 202240180
POR No. : -
Date of issue : Sep-19-2023

HCD No	Description (Part Name)	Q'ty
D8X	Plug Valve 8mmOD(VP1VH-8M) - BODY	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.022	0.459	1.761	0.0329	0.0193	10.515	16.899	2.028								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
205 min	515 min	30 min	40 min	
530	641	43	72	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 6.0
* Annealed 1050°C
* Intergranular Corrosion Test : Good
* NACE MR0175

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

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CERTIFICATE OF MATERIAL

* According to EN 10204:2004 (E) 3.1

Specification : ASTM A479 TYPE316/316L (STRAIN-HARDENED 2)
Material Mfr. : YAMASHIN STEEL CO., INC.
Customer : HY-LOK EUROPE
Project Name : Petrochemical

CAS No. :
Certificate No. : HM202309-1792
PO No. : 202240180
POR No. : -
Date of issue : Sep-19-2023

HCD No	Description (Part Name)	Q'ty
AY3	Plug Valve 8mmOD(VP1VH-8M) - STEM	3 EA

Chemical Composition(%)

C	Si	Mn	P	S	Ni	Cr	Mo								
0.030 max	1.00 max	2.00 max	0.045 max	0.030 max	10.00-14.00	16.00-18.00	2.00-3.00								
0.015	0.29	1.72	0.038	0.023	10.32	16.30	2.74								

Mechanical Properties

Yield Strength MPa	Tensile Strength MPa	Elongation (%)	Reduction of Area (%)	Hardness ( )
515 min	655 min	25 min	40 min	
732	819	32	70	

Remarks

ISSUE No. : -

* Visual & Dimensional Inspection : Good
* Mechanical Tested According to ASTM A370
* Grain Size Result : 5
* Solution Treatment 1060°C WQ
* Intergranular Corrosion Test : Good

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

(Customer / Third Party)

Manager of Quality Assurance Dept.

HY-LOK CORPORATION

PRESSURE TEST REPORT

CUSTOMER	HY-LOK EUROPE	PROJECT NO.	A000	HULL NO.		DOC NO.	PTR-23I19-014
PROJECT NAME	Petrochemical	PO NO.	202240180	POR NO.	-	TEST DATE	2022-04-04
CAS NO.	20220223-821					PROCEDURE	TS-035

SERIAL / ITEM NO	PART NO.	BODY MATERIAL	DESCRIPTION	Q'TY
016	VP1VH-8M	ASTM A479 TYPE316/316L	Plug Valve 8mmOD	3

TEST CONDITION

No.	Test	Fluid	Duration (sec)	Pressure (psi)	Pressure (bar)	Result (Test Q'ty : 100%)	Gauge ID NO.	Due Date
1	SHELL	Water	15	4500.0	310.0	Accept (No Leakage)	PG-W10	2024-07-25
2	EXTERNAL LEAKAGE	Nitrogen	15	600.0	41.0	Accept (No Leakage)	PG-W14	2024-03-13
3	SEAT LEAKAGE	Nitrogen	15	600.0	41.0	Accept (No Leakage)	PG-W14	2024-03-13

< REMARK >

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C63-AQU-QIX-002 911 / 917

4614359

Werkszeugnis 2.2 gemäß DIN EN 10204
Test report 2.2 according to DIN EN 10204
Certificat d´usine 2.2 selon DIN EN 10204

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Prüfgegenstand / *Test specimen / Objet du test*

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Artikel
Article / Article
861 tGFO
1000000414406

	Eintritt / Inlet / Entrée	*Austritt / Outlet / Sortie*
Nominalgröße *Nominal size / Diamètre nominal*	Nennweite *Nominal diam. / taille nominale*	Nennweite *Nominal diam. / taille nominale*
DN 15	DN 15	DN 15
	Anschluß *Connection thread / raccord fileté*	Anschluß *Connection thread / raccord fileté*
	m	f

Bauteilkennzeichen
Type-test-mark
Numéro d'homologation
TÜV-SV. 21-2061.10.D/G.0,71.
TÜV-SV. 21-2061.10.F.0,47.

Konformitätsbewertungsverfahren
Conformity assessment procedure
Procédure d'évaluation de la conformité
Kategorie IV gemäß DGRL 2014/68/EU; Modul B, D
Category IV according to PED 2014/68/EU; module B, D
Catégorie IV selon PED 2014/68/EU; module B, D

Notifizierte Stelle
Notified body / Organisme notifié
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln

Kennnummer
Identification no./ n° d'identification
CE 0035

Prüfungen / *Tests / Tests*

Einstelldruck gem. DIN EN ISO 4126-1
Set pressure according to DIN EN ISO 4126-1
Tarage selon DIN EN ISO 4126-1
6 bar | 87 psi | 0,6 MPa

Stückzahl
Pieces
Quantité
1

Prüfmedium
Test medium / Fluide du test
Luft
Air / Air

Prüftemperatur
Test temperature / Température du test
Umgebungstemperatur
Ambient temperature / Température ambiante

Bemerkung
Remark / Notes

Goetze KG Armaturen
Robert-Mayer-Straße 21
71636 Ludwigsburg

Fon +49 (0) 7141 / 4 88 94-60
Fax +49 (0) 7141 / 4 88 94-88
info@goetze-armaturen.de
www.goetze-armaturen.de

USt.- ID.DE 146 139 484

Werkszeugnis 2.2 gemäß DIN EN 10204
Test report 2.2 according to DIN EN 10204
Certificat d´usine 2.2 selon DIN EN 10204

Bestellangaben / *Order information / Informations commande*

Bestellung *Customers order no. / n° commande client*
8672

Goetze Vorgangsnummer *Goetze Transaction-no. / Référence Goetze*	Pos.
363464	6

Herstellerprüfungen / *Manufacturer's Tests / Tests du fabricant*

Das Sicherheitsventil wurde durch den Hersteller gemäß DIN EN ISO 4126-1 auf Druckfestigkeit und Dichtheit geprüft. Die Prüfanforderungen sind eingehalten.
Der Einstelldruck wurde auf einem überwachten Prüfstand mit kalibrierten Feinmessmanometern justiert. Die Ventile sind gegen Verstellung durch eine Werksplombierung gesichert.

The safety valve was tested by the manufacturer according to DIN EN ISO 4126-1 for resistance to pressure and tightness. The test requirements were complied with.
The set pressure was adjusted on a monitored test rig with calibrated precision pressure gauges. The valves are protected against adjustment by means of a factory seal.

Le fabricant a testé la résistance à la pression et l'étanchéité de la soupape selon DIN EN ISO 4126-1. Les exigences pour le test ont été respectées.
Le tarage a été réalisé sur un banc d'éssai contrôlé à l'aide de manomètres calibrés de haute précision. Les soupapes sont protégées du déréglage par un capuchon de plombage.

Werkstoffspezifikationen / *Material specification / spécificités du matériau*

Bezeichnung *Designation / Désignation*	Werkstoff EN *Material / Matériau*	Norm EN *Standard/ Norme*	Werkstoff ASME *Material / Matériau*	Norm ASME *Standard/ Norme*
Gehäuse *Body / corps*	CC499K	EN 1982	CC499K	Code Case 1750
Ventilsitz *Valve seat / Siége de la soupape*	1.4404	DIN EN 10272	316L	SA-479
Federhaube *Spring housing / Chapeau du ressort*	CW617N	DIN EN 12164	CW617N	Code Case 1750
Druckfeder *Spring / Ressort*	1.4310	DIN EN 10270-3	302	ASTM A-228
Sitzdichtung *Gasket / Portée*	PTFE TFM 1600			

Ludwigsburg, 19.02.2024

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

Qualitätssicherung des Herstellers
Quality Assurance of the manufacturer
Expert autorisé du fabricant

C63-AQU-QIX-002 913 / 917

4614354

Abnahmeprüfzeugnis 3.1 gemäß DIN EN 10204
Inspection certificate 3.1 according to DIN EN 10204
Certificat d´inspection 3.1 selon DIN EN 10204

Goetze KG Armaturen
Robert-Mayer-Straße 21
71636 Ludwigsburg

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www.goetze-armaturen.de

USt.- ID.DE 146 139 484

Besteller
Customer / Client
PROCAB AB
Marieholmsgatan 10A
SE 415 02 Göteborg

Hersteller
Manufacturer / Fabricant
Goetze KG Armaturen
Robert-Mayer-Str. 21
DE 71636 Ludwigsburg

Prüfgegenstand / *Test specimen / Objet du test*

Bezeichnung
Designation / Désignation
Sicherheitsventil
Safety valve
Soupape de sûreté

Artikel
Article / Article
461 tGFO
1000000613038

Herstellnummer
Series No. / n° de série
1001206459-1001206460

	Eintritt / Inlet / Entrée	*Austritt / Outlet / Sortie*
Nominalgröße *Nominal size / Diamètre nominal*	Nennweite *Nominal diam. / taille nominale*	Nennweite *Nominal diam. / taille nominale*
DN 8	DN 08	DN 15
	Anschluß *Connection thread / raccord fileté*	Anschluß *Connection thread / raccord fileté*
	m	f

Bauteilkennzeichen
Type-test-mark
Numéro d'homologation
TÜV-SV. 21-2061.6.D/G.0,68.
TÜV-SV. 21-2061.6.F.0,5.

Konformitätsbewertungsverfahren
Conformity assessment procedure
Procédure d'évaluation de la conformité
Kategorie IV gemäß DGRL 2014/68/EU; Modul B, D
Category IV according to PED 2014/68/EU; module B, D
Catégorie IV selon PED 2014/68/EU; module B, D

Notifizierte Stelle
Notified body / Organisme notifié
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Köln

Kennnummer
Identification no./ n° d'identification
CE 0035

Prüfungen / *Tests / Tests*

Einstelldruck gem. DIN EN ISO 4126-1
Set pressure according to DIN EN ISO 4126-1
Tarage selon DIN EN ISO 4126-1
36 bar | 522 psi | 3,6 MPa

Stückzahl
Pieces
Quantité
2

Prüfmedium
Test medium / Fluide du test
Luft
Air / Air

Prüftemperatur
Test temperature / Température du test
Umgebungstemperatur
Ambient temperature / Température ambiante

Bemerkung
Remark / Notes

Abnahmeprüfzeugnis 3.1 gemäß DIN EN 10204
Inspection certificate 3.1 according to DIN EN 10204
Certificat d´inspection 3.1 selon DIN EN 10204

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USt.- ID.DE 146 139 484

Bestellangaben / *Order information / Informations commande*

Bestellung *Customers order no. / n° commande client*
8672

Goetze Vorgangsnummer *Goetze Transaction-no. / Référence Goetze*
363464

Pos.
1

Herstellnummer
Series No. / n° de série
1001206459-1001206460

Herstellerprüfungen / *Manufacturer's Tests / Tests du fabricant*

Das Sicherheitsventil wurde durch den Hersteller gemäß DIN EN ISO 4126-1 auf Druckfestigkeit und Dichtheit geprüft. Die Prüfanforderungen sind eingehalten.
Der Einstelldruck wurde auf einem überwachten Prüfstand mit kalibrierten Feinmessmanometern justiert. Die Ventile sind gegen Verstellung durch eine Werksplombierung gesichert.

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Werkstoffspezifikationen / *Material specification / spécificités du matériau*

Bezeichnung *Designation / Désignation*	Werkstoff EN *Material / Matériau*	Norm EN *Standard/ Norme*	Werkstoff ASME *Material / Matériau*	Norm ASME *Standard/ Norme*
Gehäuse *Body / corps*	1.4408	DIN EN 10213	CF8M	SA-351
Ventilsitz *Valve seat / Siége de la soupape*	1.4404	DIN EN 10272	316L	SA-479
Federhaube *Spring housing / Chapeau du ressort*	1.4404	DIN EN 10272	316L	SA-479
Druckfeder *Spring / Ressort*	1.4310	DIN EN 10270-3	302	ASTM A-228
Sitzdichtung *Gasket / Portée*	PTFE TFM 1600			

Ludwigsburg, 19.02.2024

Goetze KG
Robert-Mayer-Str. 21
D-71636 Ludwigsburg

Abnahmebeauftragter des Herstellers
Authorized inspector of the manufacturer
Expert autorisé du fabricant

17 - INSPECTION AND TEST PLAN

17.2 - INSPECTION AND TEST PLAN DOC

AQUAGAS SWEDEN AB

INSPECTON & TEST PLAN (ITP)

Inspection, test plan & certificate list
Document No: ITP A-23/24 140
Customer: ELOGEN
Customer order No. / Project No.: BC0006223 / C63
This I&T plan is valid for: hydrogen dryer DEDR 500/36 Offshore
Design code Vessels: PED 2014/68/EU (Module G), EN 13445

Date: 2024-01-22

No	Quality Control Stage check	Control Document	Report or Document	Inspected By					Clarifications
				Sub-contractor	Aquagas	Customer	End-user	Notified Body	
1.0	**Pre-manufacturing**			GYP					GYP: = Gyémánt-Pirazol, Hungary
1.1	Verification of sub-contracted design drawings		Manufacturing drawings		R1, AP				Sub-contracted manufactured parts: - DE and DR pressure vessels, - Heater pipe
1.2	Verification of design drawing and calculation	EN 13445:2014	Design statement		R1	R1		AP	Pressure vessels
2.0	**Approval**								
2.1	Welding procedure specification (WPS)	EN 15614-1	WPS		R1	R1		R1	Subcontractor and/or Aquagas WPS
2.2	Welding procedure qualification test (WPQR)	EN 15614-1	WPQR		R1	R1		AP	Subcontractor and/or Aquagas WPQR
2.3	Welder's qualification (WPQ)	EN 9606-1	WPQ		R1	R1		AP	Subcontractor and/or Aquagas WPQ
2.4	Radiographic procedure specification	EN 17636-1 class B	Procedure		R1			R1	Applicable 10% welds
2.5	NDT operator's qualification	EN 9712, level II	Certificate		R1			R1	
2.6	Hydrostatic pressure test:	EN 13445:2014	COC	R1	R1	R1		AP	
2.7	Welding and test plan vessels		Test Plan	R1	R1	R1		R1	
2.8	Pressure leak test air	A-10-13	Procedure	R1	R1	R1,			Final test complete units at FAT
2.9	Helium Leak Test		Procedure		R1	R2			Included

Inspection code:
A1=100% inspection
A2=Sample inspection
W1=Witnessed inspection-No hold point
W2= Optional witness-No hold point
H=Hold point
R1=100% review of documentation
R2=Sample review
AP=Approval of document
S=Surveillance

AQUAGAS SWEDEN AB

INSPECTON & TEST PLAN (ITP)

Inspection, test plan & certificate list
Document No: ITP A-23/24 140
Date: 2024-01-22
Customer: ELOGEN
Customer order No. / Project No.: BC0006223 / C63
This I&T plan is valid for: hydrogen dryer DEDR 500/36 Offshore
Design code Vessels: PED 2014/68/EU (Module G), EN 13445

No	Quality Control Stage check	Control Document	Report or Document	Inspected By					Clarifications
				Sub-contractor	Aquagas	Customer	End-user	Notified Body	
3.0	**Fabrication**								
3.1	Inspection of incoming material, identification and transfer identity markings material certificates for pressure parts	EN 10204/3.1 B	Material list/material certificate	A1	R1			R1	Critical items procured by Aquagas: Fittings, internals, valves, instruments
3.2	Examine cut edges of shell, pipes and heads		COC	A1	A2, A1			R1	
3.3	Dimension &visually inspection press. vessels and piping		Shop insp. Cert.	A1	R1, AP			A1	Pressure vessels
3.4	Radiographic examination of vessel & piping	EN 17636-1 class B	X-ray certificate	A1	R1	R1		R1	Standard 10% of welds
3.5	Verification of pressure gauge calibration				R1			R1	
3.6	Verification of pressure safety valve calibration				R1			R1	
3.7	Hydrostatic pressure test	PED 2014/68/EU	P.T. Cert	A1	A1, R1	W2		A1	
3.8	Examination of NDT-reports		Shop insp. Cert	A1	A1, R1	R1		R1	
3.9	Surface treatment / painting	ISO-12944 , C3	COC	A1	A1, R1	R2			
3.10	Leak test with air		COC	A1	A1, R1	R1			
3.11	Issue as built drawing	Dimension report	As built drawing		A1	R2			
3.12	Functional test	Function report	COC		A1	W2	W2		
3.13	Factory Acceptance Test	FAT report	Check list		R1	W2, R1, H	W2		
3.14	Issue of manufacturing record books	I/T plan	MRB		R1	R1			Final Documentation
4.0	**Expediting**								
4.1	Shipping release note issued by customer		Release note		H	H			
4.2	Packing and Labelling inspection				A1	R2			

Inspection code:
A1=100% inspection
A2=Sample inspection
W1=Witnessed inspection-No hold point
W2= Optional witness-No hold point
H=Hold point
R1=100% review of documentation
R2=Sample review
AP=Approval of document
S=Surveillance

00	First Issue	C.SUC			
Revision	**Description**	**Prepared by**	**Date**	**Approved by**	**Date**

NIDEC ASI S.A.S.
Z.I. du Buisson
5, rue Marc Seguin
42230 Roche La Molière
FRANCE

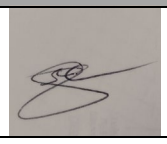
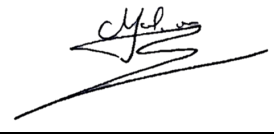
ELOGEN
8, AVENUE DU PARANA
91940 LES ULIS
France

ELOGEN 2.5MW H2 Electrolyser

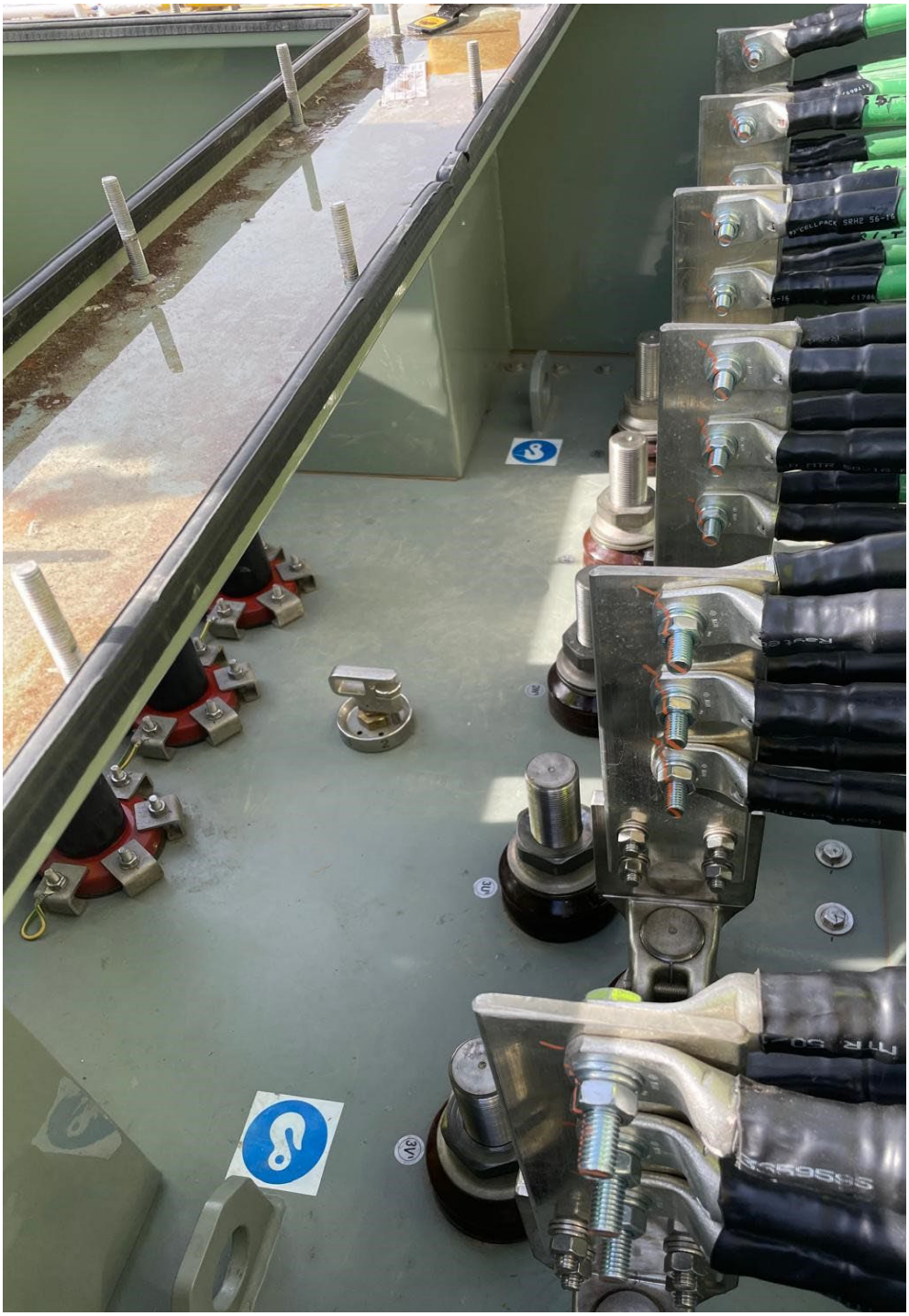
NIDEC document reference :	**Site Acceptance Tests progress & results**
8934SAT00	
CUSTOMER document reference :	

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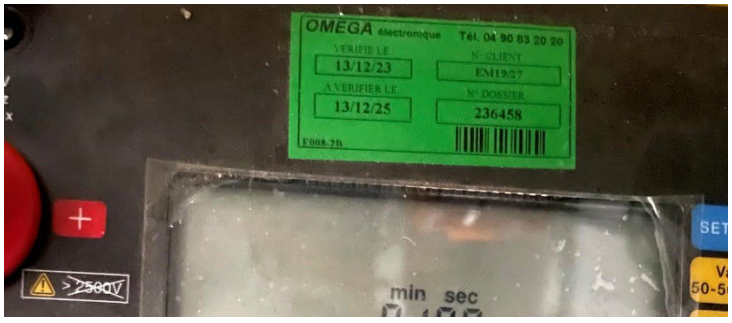
Control Number	Hidden collum for control number	Control Description	Comments	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE
3		**INSTALLATION CHECKING (WITHOUT VOLTAGE)**	**SAT01 procedure**	
3.1	1	**Visual inspection**		
		External inspection		P
		Doors accessibility		P
3.2	2	**Mechanical installation**		
		Cabinets securely fastened		P
3.3	3	**Ground wires**		
		Cabinets grouding	*insert pictures*	P Tightened by Nidec on 12/03/2025
3.4	4	**Cabinet interconnection**		
		Interconnection between A500 and A201		P
		Interconnection between A500 and A202		P
		Interconnection between A100 and A201		P
		Interconnection between A100 and A202		P
		Interconnection between A100 and A500		P
3.5	5	**Auxiliaries cables connection and labelling**		
		Auxiliaries cables connection and labelling		P
3.6	6	**HV input cables**		
		HV input cables type and connection	*insert pictures*	P
		Cable insulation report	*copy of report in annex, or indicate measured value*	NA, Tests carried out during installation by Crosswind, but they don't want to transfer the reports to us. Measurements taken by Nidec before power-up: Primary: 800 MΩ Secondary 1: 34.85M Ω Secondary 2: 25.56MΩ
		HVCB settings		NA No access to HV cell for Nidec
		Surger arrester check (no continuity)		NP No surge arresters
		Correct sealing of cable entry (if applicable)		NA
3.7	7	**Transformer tap changer**		
		tap changer position	*write the position*	P 3:0%
3.8	8	**DC power cables**		
		DC output cables type and connection	*insert pictures*	P
		Cable insulation report	*copy of report in annex, or indicate measured value*	NA, Tests carried out during installation by Crosswind but won't transfer reports to us
		Correct sealing of cable entry (if applicable)		P Nidec cabinet side
4		**CONTROL CABINET WITH LOW VOLTAGE**	**SAT01 procedure**	
4.1	1	**400V Auxiliary supply**		
		Voltage measurement	*Write the measure*	P
		Check the voltage sequence	*Voltage must be direct sequence (R S T)*	P
		No short circuit on downstream of circuit breaker		P
		Switch ON 100Q1 (no trip)		P
4.2	2	**230V Auxiliary supply**		
		Voltage measurement	*Write the measure*	P
		Neutral check	*measure N / earth*	P
		No short circuit on downstream of circuit breaker		P
		Switch ON 100Q2 (no trip)		P
4.3	3	**230V UPS auxiliairies supply**		
		Voltage measurement	*Write the measure*	P
		Neutral check	*measure N / earth*	P
		No short circuit on downstream of circuit breaker		P
		Switch ON 100Q3 (No trip)		P
4.4	4	**Cooling circuit monitoring**		
		Cooling circuit filling		P
		No leaks, neither corrosion		P
		Starts pump and check pressure	*write pressures value*	P 2Bar
		Check pressure value after more than 1 hour running	*write pressures value*	P 1,9 Bar
4.5	5	**Maintenance tools check (if applicable)**		
		Remote connection		P
		All software installed with update applicative program		P
4.6	6	**Safety test**		
		Test of all emergency stop: - ES button 162S1 - customer e-stop 1 - customer e-stop 2 - PLC watchdog - DGPT2 Pressure trip - DGPT2 Gas trip - DGPT2 Temperature trip	*Ask customer if he wants to witness*	P
4.7	7	**HVCB I/O exchange (if possible)**	**If not possible performed on test 6.2**	
		Check HV status	***Require to have HV cell in test mode*** ***To be performed with customer presence*** ***(write customer representative name)***	NP Position feedback not wired. Make a modification to obtain information via communication
		Check HVCB opening in case of ES		NP
		Check HVCB opening in case of DGPT2 fault		P
5		**EXCHANGE DATA**	**SAT01 procedure**	
5.1	1	**Communication check with customer PLC**		
		Profinet communication test		P
5.2	2	**I/O exchange test**		
		All I/O feedback as expected		P
6		**INSTALLATION CHECK WITH HIGH VOLTAGE SUPPLY**	**SAT01 procedure**	
6.1	1	**Main voltage supply check**		
		Check HVCB status	*Not necessary if test 4.7 performed*	
		Voltage measurement on secondary 1	*write the values (UV, VW, WU)*	362V
		Phase rotation secondary 1		P
		AC voltage measured by SPDM 1	*write the value*	
		AC voltage measured by AFE 1	*Write the value*	
		Voltage measurement on secondary 2	*write the values (UV, VW, WU)*	362V
		Phase rotation secondary 2		P
		AC voltage measured by SPDM 2	*write the value*	
		AC voltage measured by AFE 2	*Write the value*	
6.2	2	**AFE1 operating test**		
		Check precharge		
		Check DC voltage regulation		
6.3	3	**AFE2 operating test**		
		Check precharge		
		Check DC voltage regulation		
6.4	4	**ES stop test**	**Not mandatory if test 4.7 performed**	
		Check LVCB opening in case of ES	***To be performed with customer presence*** ***(write customer representative name)***	
		Check HVCB opening in case of ES		
6.5	5	**Backup**	**Not mandatory if test 4.10 performed**	
		Converter snapshot		

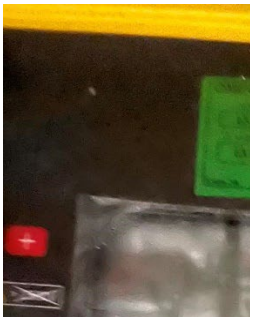
Control Number	Hidden collum for control number	Control Description	Comments	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE
		PLC backup		
7		**Liste of equipement used for tests**		
Type		**Reference**	**Internal S/N**	**Date of certificate**
Multimeter		EM22/70		11/04/2026
8		**Signature**		
Company		**Name**	**Date**	**Signature**
Nidec		Chloé SUC	17/03/2025	
B2B energies		Stéphane Molina	17/03/2025	

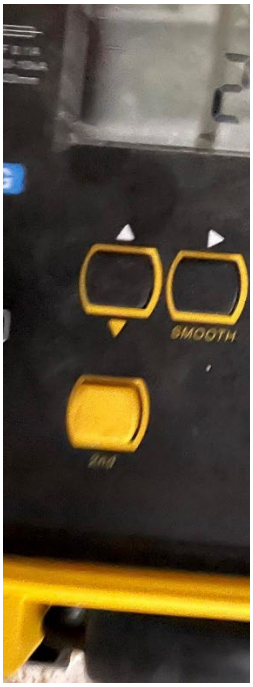
3.6. HV input cables:



3.6. Cable insulation



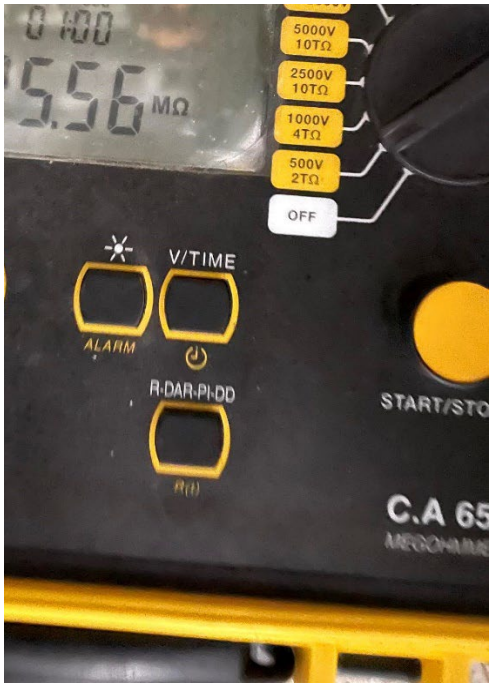



FF 0.1A
380V-10kA
5x20mm
34.85 MΩ
G
SMOOTH
ALARM
V/TIME
R-DAR-PI-DD
2nd
R(1)

SMOOTH
2nd






SET-UP
Var
50-5000V


5000V
10TΩ
2500V
10TΩ
1000V
4TΩ
500V
2TΩ
OFF
V/TIME
ALARM
R·DAR·PI·DD
START/STO
C.A 65

00	First release	C. SUC	09/12/2024	C.DANIEL	13/12/2024
Revision	**Description**	**Prepared by**	**Date**	**Approved by**	**Date**

NIDEC ASI S.A.S.
Z.I. DU BUISSON
5, RUE MARC SEGUIN
42230 ROCHE LA MOLIERE
FRANCE

ELOGEN
8 AVENUE DU PARANA
91940 LES ULIS
FRANCE

ELOGEN
2.5MW H2 Electrolyser

NIDEC document reference:	**SITE ACCEPTANCE TEST**
8934SAT04	**Low voltage & High Voltage tests procedure**
CUSTOMER document reference:	
C63-NID-ELO-SAT04	

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SUMMARY

1 SAFETY CONDITIONS 4
1.1 PPE reminder 4
1.2 General Safety Risk assessment 4
1.3 Required tools 4

2 REFERENCE DOCUMENTS 4

3 INSTALLATION CHECKING (WITHOUT VOLTAGE) 5
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LIST OF ABBREVIATIONS

- **AC:** Alternate current
- **AFE:** Active Front End
- **DC:** Direct Current
- **DGPT2:** Détection Gaz Pression Température 2 seuils (Detection Gas Pressure Temperature 2 thresholds)
- **ES :** Emergency Stop
- **FAT :** Factory Acceptance Test
- **HMI:** Human Machine Interface
- **HVCB:** High Voltage Circuit Breaker
- **I/O:** Input / Output
- **IMD:** Insulation Monitoring Device
- **LOTO:** Lock Out tag Out
- **LV:** Low Voltage
- **MC:** Main Contactor
- **MV:** Medium Voltage
- **OPC UA:** OPen Connectivity – Unified Architecture
- **OPC:** OPen Connectivity
- **PCS:** Power Conversion System
- **PCU**: Power Conversion Unit
- **PLC:** Programmable Logic Controller
- **POC:** Point of connection
- **PPE:** Personal Protective Equipment
- **RMU:** Ring Main Unit
- **SAT:** Site Acceptance Test
- **SCADA:** Supervisory Control And Data Acquisition
- **TAC:** Transformation Auxiliary Center
- **UPS:** Uninterruptible Power Supply

1 SAFETY CONDITIONS

1.1 PPE reminder



1.2 General Safety Risk assessment

Hazardous voltage will cause death, serious personal injury, or equipment damage.
During operation, parts of the device or system are carrying hazardous electrical voltage. Improper handling of the device or system can result in death or serious injury, as well as significant materiel damage.

- Commissioning phase has to be performed only by qualified personnel.
- Pay attention to all the following steps procedures
- Before any instruction, ensure that no voltage is present on the power distribution equipment.

1.3 Required tools

- Multimeter
- Manual pump for cooling circuit filling



2 REFERENCE DOCUMENTS

	Document name	Description	revision
DA01	*C63-NID-ELO-DED01_A.5 Detailed Electrical Drawing.pdf*	Detailed electrical drawing	A.5
DA02	*C63-NIDE-ELO-MP006* Hydraulic system maintenance procedure	Hydraulic system maintenance procedure	00

3 INSTALLATION CHECKING (WITHOUT VOLTAGE)

3.1 Visual inspection

External inspection, no shocks, no rust on cabinets or cooling system. Cabinet doors are not warped and close properly.

Acceptance :
- **No chocs or rust on the cabinet, cabinets doors close properly**

To check door accessibility (that's easy to open and close).

Acceptance :
- **The door accessibility is correct.**

3.2 Mechanical installation

Check that the cabinets are securely fastened in the container

Acceptance :
- **Cabinets are securely fastened**

3.3 Ground wires

Visually check that the cabinet ground bars are corrected connected to plant earthing point according to earth diagram of [DA01].

Acceptance :
- **The cabinet are correctly grounded according earth diagram, with respect of cable size and tightening torque.**

3.4 Cabinet interconnection

Check interconnection between A500 (Control unit) and A201 (PCS unit 1) cabinets

Acceptance :
- **The interconnection wiring complies with the diagram**
- **The labels are correct**

Check interconnection between A500 (Control unit) and A202 (PCS unit 2) cabinets

Acceptance :
- **The interconnection wiring complies with the diagram**

- **The labels are correct**

Check interconnection between A100 (Transformer) and A201 (PCS unit 1) cabinets
Check cable insulation test report (take a copy)
Check cable tightening (Write the value communicated)
Check correct sealing of cable entry if applicable.

Acceptance :
- **The interconnection wiring complies with the diagram**
- **The labels are correct**
- **No phase inversion**
- **Presence of mark of tightening**
- **Cable insulation test successfully performed.**
- **No sealing issue.**

Check interconnection between A100 (Transformer) and A202 (PCS unit 2) cabinets
Check cable insulation test report (take a copy)
Check cable tightening (Write the value communicated)
Check correct sealing of cable entry if applicable.

Acceptance :
- **The interconnection wiring complies with the diagram**
- **The labels are correct**
- **No phase inversion**
- **Presence of mark of tightening**
- **Cable insulation test successfully performed.**
- **No sealing issue.**

Check interconnection between A100 (Transformer) and A500 (Control unit) cabinets

Acceptance :
- **The interconnection wiring complies with the diagram**
- **The labels are correct**

3.5 Auxiliaries Cables Connections and Labelling

Check the connection of auxiliaries and exchange cable:
- Cabinet A500 Terminal X1.0 : 400V supply
- Cabinet A500 Terminal X2.0: 230VAC supply & 230VAC UPS
- Cabinet A500 Terminal X12.1: I/O exchanges with Elogen

Check the labels of each cable since the FAT state with the electrical drawing:

Check correct sealing of cable entry if applicable. In case of cable glands, check that all spares are correctly filled.

Acceptance :
- **The labels of each component and cables are correct.**
- **No sealing issue (no remaining opening)**

3.6 HV input cables

WARNING: For this part you need :
- **To access to transformer with checking that LOTO procedure has been done properly**
- **Perform a check of Absence of Voltage**

Check type of input HV cable and correct connection on transformer terminal, with shield grounding.
Take picture of cable connections.
Check cable insulation test report (take a copy)
Check HVCB settings
Check correct sealing of cable entry if applicable.
Check surge arrester (continuity check between phase and earth)

Acceptance :
- **Correct cable type used (according to nominal voltage) and correctly connected (with shield grounding)**
- **Cable insulation test successfully performed.**
- **HVCB settings appropriate according to transformer data**
- **No continuity on surge arrester**
- **No sealing issue.**

3.7 Main transformer tap changer

WARNING: For this part you need :
- **To access to transformer with checking that LOTO procedure has been done properly**
- **Perform a check of Absence of Voltage**

Check transformer off-load tap changer position. It should be on 0% or +2,5% or +5% position to have a secondary voltage at value between 330Vac and 370Vac. (depending of HV grid value).
Default position should be +2,5%

Acceptance :
- **Off load tap changer on correct position (write the setting on the report)**

3.8 DC power cables

Check type of output DC cable and correct connection on terminal.

Check cable labelling and correct connection of each polarity (No short circuit) (if applicable measure resistance between each polarity and with earth). Write the value on the report.
Check cable insulation test report (take a copy)
Check correct sealing of cable entry if applicable.

Acceptance :

- **Correct cable type used (according to [DA01]) and correctly connected (no mistake between polarity)**
- **Cable insulation test successfully performed.**
- **No sealing issue**

4 CONTROL CABINET WITH LOW VOLTAGE SUPPLY

4.1 400V auxiliaries supply check

Check that 400V main auxiliary circuit breaker is opened (100Q1)
Close the appropriate departure in customer main LV panel.
Measure the 400 VAC voltage & phase rotation on the upstream side of the 100Q1 circuit breaker.
Check short circuit absence on the downstream side of the 100Q1 circuit breaker.

Acceptances :
- **Voltage measurements upstream the breaker 100Q1 is equal to 400 VAC (+/- 10V).**
- **Phase rotation L1-L2-L3 passed.**
- **No short circuit test must beep.**

Close the 100Q1 circuit breaker.

Acceptance :
- **The 100Q1 circuit breaker is close and shouldn't trip**

4.2 230V auxiliaries supply check

Check that 230VAC main auxiliary circuit breaker is opened (100Q2)
Close the appropriate departure in customer main LV panel.
Measure the 230 VAC voltage on the upstream side of the 100Q2 circuit breaker.
To check the neutral position on the terminal bloc :
Since the neutral is wired to the ground but separated, you can check the voltage measurement between the ground of the cabinet and the neutral cable.
Check short circuit absence on the downstream side of the 100Q2 circuit breaker.

Acceptances :
- **Voltage measurements upstream the breaker 100Q2 is equal to 230 VAC (+/- 5V).**
- **Voltage measurement from Neutral cable and the ground is near 0 VAC (+/- 1V)**
- **No short circuit test must beep.**

Close the 100Q02 switch.

Acceptances :
- **The 100Q2 circuit breaker is close and shouldn't trip.**

4.3 230V UPS auxiliaries supply check

Check that 230VAC UPS main auxiliary circuit breaker is opened (100Q3)
Close the appropriate departure in customer main LV panel.
Measure the 230 VAC UPS voltage on the upstream side of the 100Q3 circuit breaker.
Check short circuit absence on the downstream side of the 100Q3 circuit breaker.

Acceptances :

- **Voltage measurements upstream the breaker 100Q3 is equal to 230 VAC (+/- 5V).**
- **Voltage measurement from Neutral cable and the ground is near 0 VAC (+/- 1V)**
- **No short circuit test must beep.**

Close the 100Q03 switch.

Acceptances :

- **The 100Q3 circuit breaker is close and shouldn't trip.**

Check that every components inside the cabinet are a live :

Acceptances :

- **LED ON active on every devices**

All breakers inside the control panel must be closed at this stage.

4.4 Cooling circuit monitoring

Follow procedure [DA02] to fill the cooling circuit.

Start one of the two pumps.
Follow procedure [DA02] to check correct working of cooling circuit:

- Visual inspection of all circuit inside container (no leaks)
- Correct pressure value
  Check automatic drains position (closed position)
- Absence of fault on HMI

Acceptance :

- **No leaks and corrosion**
- **Pump running**
- **Correct pressure value and absence of fault**

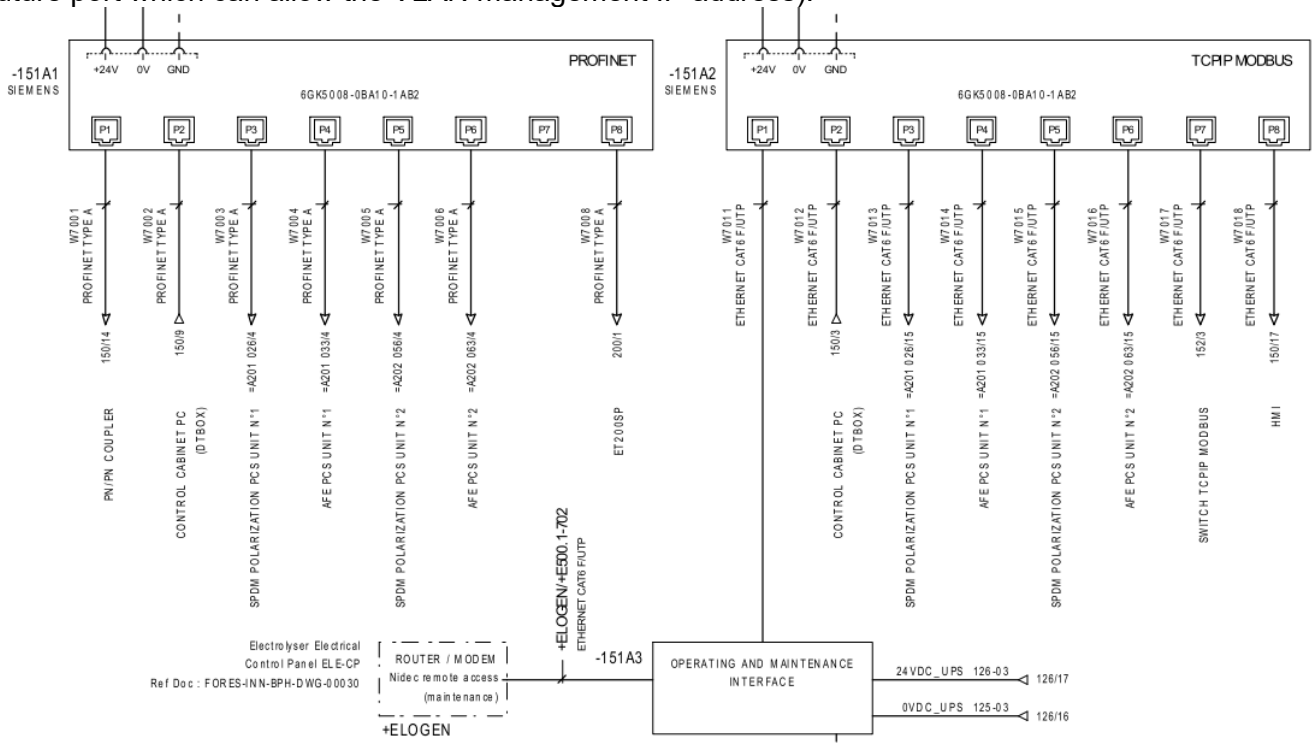
Let it run for few hours.
If the pressure goes below 1,5 bar, stop the pump and replenish the circuit up to 2.5 bars (with pump stopped).
Start the pump again.

Acceptance :

- **The pressure at the pump discharge is between 1,5 and 2 bars (pressure value to be checked on as-built documentation).**

4.5 Maintenance tools check

Connect a RJ45 ethernet cable from your PC to the switch 151A2 (in A500 cabinet) on the port P1 (future port which can allow the VLAN management IP address).



Search for : “Remote Connexion Desktop” on your PC. Then type the IP address corresponding to the container maintenance PC (192.168.10.203).
Check software installed and the correct version of program:

- ArticsTools with converter snapshots
- Isagraf with program last version
- IBA in operation
- Beijer panel operator software

Acceptances :

- **You success to connect to the maintenance tool PC**
- **All software with last applicative program are present:**
  - **Successful online mode on Isagraf (connected to DTbox)**
  - **Correct recording of IBA**

4.6 Safety tests

Note: Ask customer if he wants to witness these tests.

Check the safety relays LEDs, if the outputs (2 bottoms LED) are off or if the reset button lights up blue, rearm remotely through the HMI system “Ack” command, or by pressing the reset button (163S1 in A500 cabinet)

Acceptance :

- **All the LEDS of the relay are lightened in green.**

Check all safety loop elements (including DGPT2 contacts) according to the wiring diagram and their feedback on the HMI system alarm view. For each input test, you must reset the safety relay using the HMI system button or the blue button inside the control panel.

Acceptance :
- **For each loop element, the safety relay LEDs have gone out.**

4.7 HVCB I/O exchange (if possible)

With customer HV CB in test mode, check the wiring exchange with it (if possible depending on HV cell).
*If test mode is not allowed on customer HVCB, follow chapter "**6.4 ES stop test**" to perform this check with HV.*

Note : This test should be performed with customer presence.

Check HV CB status
Check HV CB opening in below cases:
- Safety relay stop command
- Opening command from DGPT2 fault (Reed fault, Pressure fault & temperature fault)

Acceptance :
- **All I/O wiring exchange with HVCB are correct**
- **HV switchgear breaker opened on safety relay stop command**

PCS container are ready for HV supply energization

5 EXCHANGE DATA

Note 1 : this section could be done before or after High Voltage energization (chapter 6).

Note 2 : This test should be performed with customer automation engineer.

5.1 Communication check with customer PLC

Check correct Profinet communication with customer PLC

Acceptances :

- **No communication fault.**

5.2 I/O exchange check

Check all I/O wiring exchanges by forcing the corresponding output, according to [DA01], and resume in below tables, check scaling:

Input from Elogen	
I/O Description	***Test***
High voltage circuit breaker status 1=Closed	
High voltage circuit breaker status 1= Opened	
Electrolyzer 1 system healthy feedback 1=Healthy	
Electrolyzer 2 system healthy feedback 1=Healthy	
Elogen Start/stop command 1=Start	

Acceptances :

- **All I/O feedback should be as expected**

6 INSTALLATION CHECK WITH HIGH VOLTAGE SUPPLY

WARNING: Before energize HV and close HVCB, check :
- **Transformer terminal box correctly closed with all eventual temporary earting connections removed (according to local procedure)**
- **LV circuit breaker on both transformer secondary side opened (020Q1, 021Q1, 022Q1, 023Q2, 050Q1, 051Q1, 052Q1, 053Q2).**

6.1 Main voltage supply check

Close the HV circuit breaker and energize the transformer.

HV supply energized, Power transformer energized from the 6,6kV HV line.

Check the voltage at the 2 transformer secondaries

Acceptance :
- **HV circuit breaker status correct (if not checked in "*124.7 HVCB I/O exchange (if possible)*")**
- **Voltage measurements upstream the breaker 020Q1 and 050Q1 is equal to 360 VAC (+/- 10V).**
- **Voltage measurements is balanced between the 3 phases (+/- 2V)**
- **Voltage measurements is balanced between the 2 secondary (+/- 1%)**
- **Phase rotation L1-L2-L3 passed on the two secondaries.**

Close the AFE synchronization transformers circuit breakers (022Q1 and 052Q1).

Acceptance :
- **The circuit breaker is close and shouldn't trip.**
- **AC voltage measurement on AFE converter is equal to voltage measure +/-2%**
  Note: AFE voltage measurement could be adjusted if necessary [25.01]

Close the SPDM synchronization transformers circuit breakers (023Q2 and 053Q2).

Acceptance :
- **The circuit breaker is close and shouldn't trip.**
- **AC voltage measurement on SPDM converter is equal to voltage measure +/-2%**
  Note SPDM voltage measurement could be adjusted if necessary

Close the insulation monitoring device fuse breaker (021Q1 and 051Q1).

Acceptance :
- **Correct voltage value on insulation monitoring device**
- **No faults on permanent insulation monitoring device**

Lock in open position the DC switches (040Q1 and 070Q1) to avoid any supply of the electolyzer stacks

6.2 AFE 1 operating test

Send precharge order
Check closing of precharge contactor (032KM1) and smooth increase of DC voltage
Check closing of AC circuit breaker (020Q1)

Acceptance :
- **Precharge contactor closed until end of precharge**
- **No inrush current during precharge (No precharge fuse blown)**
- **AC circuit breaker closed and precharge contactor opened after end of precharge**

Check DC regulation.
Check DC voltage measure and compare with AFE feedback

Acceptance :
- **AFE started without fault**
- **AFE regulating the voltage setpoint at +/-1%**
- **DC voltage measurement on AFE converter is equal to voltage measure +/-5V**
  Note: AFE voltage measurement could be adjusted if necessary

6.3 AFE 2 operating test

Send precharge order
Check closing of precharge contactor (062KM1) and smooth increase of DC voltage
Check closing of AC circuit breaker (050Q1)

Acceptance :
- **Precharge contactor closed until end of precharge**
- **No inrush current during precharge (No precharge fuse blown)**
- **AC circuit breaker closed and precharge contactor opened after end of precharge**

Check DC regulation.
Check DC voltage measure and compare with AFE feedback

Acceptance :
- **AFE started without fault**
- **AFE regulating the voltage setpoint at +/-1%**
- **DC voltage measurement on AFE converter is equal to voltage measure +/-5V**
  Note: AFE voltage measurement could be adjusted if necessary

6.4 ES stop test

Note 1: This test is not mandatory if "***4.7 HVCB I/O exchange (if possible)***" has been performed.

Note 2: This test should be performed with customer presence.

Perform an ES stop command
Check LV CB opening
Check HV CB opening

Acceptance :
- **LV and HV circuit breaker opened on ES stop command**

6.5 Backup

Perform a backup of all converter parameters (snapshot).
Perform a backup of PLC program (Isagraf)
Copy these backup on maintenance tools if present

Acceptance :
- **Backup performed**

00	First release	C. SUC	09/12/2024	C.DANIEL	13/12/2024
Revision	**Description**	**Prepared by**	**Date**	**Approved by**	**Date**

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ELOGEN
2.5MW H2 Electrolyser

NIDEC document reference:	**SITE ACCEPTANCE TEST**
8934SAT07	**Functional and performance tests procedure**
CUSTOMER document reference:	
C63-NID-ELO-SAT07	

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LIST OF ABBREVIATIONS

- **AC:** Alternate current
- **AFE:** Active Front End
- **DC:** Direct Current
- **DGPT2:** Détection Gaz Pression Température 2 seuils (Detection Gas Pressure Temperature 2 thresholds)
- **ES :** Emergency Stop
- **FAT :** Factory Acceptance Test
- **HMI:** Human Machine Interface
- **HVCB:** High Voltage Circuit Breaker
- **I/O:** Input / Output
- **IMD:** Insulation Monitoring Device
- **LOTO:** Lock Out tag Out
- **LV:** Low Voltage
- **MC:** Main Contactor
- **MV:** Medium Voltage
- **OPC UA:** OPen Connectivity – Unified Architecture
- **OPC:** OPen Connectivity
- **PCS:** Power Conversion System
- **PCU:** Power Conversion Unit
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- **SAT:** Site Acceptance Test
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- **TAC:** Transformation Auxiliary Center
- **UPS:** Uninterruptible Power Supply

1 SAFETY CONDITIONS

1.1 PPE reminder



1.2 General Safety Risk assessment

Hazardous voltage will cause death, serious personal injury, or equipment damage.
During operation, parts of the device or system are carrying hazardous electrical voltage. Improper handling of the device or system can result in death or serious injury, as well as significant materiel damage.

- Commissioning phase has to be performed only by qualified personnel.
- Pay attention to all the following steps procedures
- Before any instruction, ensure that no voltage is present on the power distribution equipment.

2 REFERENCE DOCUMENTS

	Document name	Description	revision
DA01	*C63-NID-ELO-AFD01 Functional analysis*	Functional analysis	00
DA02	*C63-NID-ELO-AFL01_01 Alarm & Warning List.pdf*	Alarm and Warning list and associated safety action	01
DA03			

3 *STARTING AND STOPPING ELECTROLYSER*

3.1 Test ON Sequence – Electrolyser power on

3.1.1 Power-Up command

Test procedure

After receiving "Power-Up command"(***ELO_IB_PowerUpCmd_1***)(from Elogen on Profinet), check:

- Cooling system starting (pump running).
- Alternation between pumps.
- Cabinets ventilation running.
- AFE preload completed.
- AFE AC circuit breaker closed.

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** document.
- Correct cooling operation

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

3.1.2 Polarization command

Test procedure

After receiving "Start polarization command"(***ELO_IB_PolaCmd_1***)(from Elogen on Profinet), check:

- Discharge resistor contactor opened, polarization contactors closed.
- SPDM running to the polarization voltage setpoint according to Elogen ramp and with current limitation at 20A.
- AFE start running at polarization voltage setpoint.

- SPDM stop running, polarization contactors opened.
- DC circuit breaker closed.

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** document.
- Polarization ramp correctly followed (+/-5%)
- Polarization setpoint respected, and 20A limit
- Correct cooling operation

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

3.1.3 Production command

Test procedure

After receiving "Start regulation I command"(***ELO_IB_StartReg_Cmd_1***)(from Elogen on Profinet), check:

- AFE regulate current according to Elogen setpoint according to Elogen ramp

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** document.
- Production ramp correctly followed (+/-5%)
- Production current setpoint respected (+/-1% Full Scale = 15A)
- Correct cooling operation
- Lovato's measurements are correct

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		

Name of Operator		

3.2 TestOFF Sequence – Electrolyser power off

3.2.1 Stop production

Test procedure

After receiving "Stop control command"(***ELO_IB_StopControl_Cmd_1***)(from Elogen on Profinet), check:

- Current decrease
- AFE regulates voltage at polarization voltage setpoint

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** document.
- Polarization setpoint respected (+/-5V)
- Cooling system started

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

3.2.2 Stop electrolyzer

Test procedure

After receiving "Stop electrolyzer command"(***ELO_IB_StopElectro_Cmd_1***)(from Elogen on Profinet), check:

- AFE stopped
- DC switch opened
- Discharge resistor contactor closed

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** document.
- Cooling system running
- DC voltage decrease (through resistor)

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

3.2.3 Power off

Test procedure

After receiving “Power off command”(***ELO_IB_PowerOFFCmd_1***)(from Elogen on Profinet), check:

- AFE stopped
- DC switch opened
- Discharge resistor contactor closed
- Pumps stopped
- Cabinets ventilation stopped

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** document.
- Cooling system stopped

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not		

Passed/NA)		
Date		
Name of Operator		

3.2.4 Fault

Test procedure

After generating a fault, check:

- Check that the system responds as described in the **DA02** document.

Curve of the test :

Criteria :

- Sequence applied like described, in accordance with the **DA01** and **DA02** documents.

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

4 *LOAD TEST ELECTROLYSER*

4.1 Operation at full load

Test procedure
In production mode:
- Applied maximum current setpoint according to electrolyser configuration (as close as possible to 1407Adc)
- Check correct current feedback (with external measure)
- Check Lovato's feedback
- Check harmonics on grid side
- Check current stability
- Check current balancing between the rectifiers

Curve of the test :

External current measurement:

Criteria :
- Required setpoint reached (+/- 1%)
- Current stability (< 2% on rms value)
- THDI < 5%

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

4.2 Ripple measurement

Test procedure
- Applied maximum current setpoint according to electrolyser configuration (as close as possible to 1407Adc)
- Measure with external probe current ripple

Scope measurement :

Criteria :

- DC ripple < 2%

	Rectifier 1	**Rectifier 2**
Test Result (Passed/Not Passed/NA)		
Date		
Name of Operator		

5 ***EQUIPMENT ACCEPTANCE***

Equipment is running according to the contractual requirements.

Commissioning and start-up activities are accomplished on ……/…../…….

Nidec	Customer
.....	.....

C63-NID-QIX-001

FAT RECTIFIER NIDEC

01	*1st Issue*	*22-OCT-2024*	*NID*	*IDI*	*LDG*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Client Document Number	**ELO-INN-BPH-RPT-00018**

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00	First release	C. DANIEL	24/09/2024	A. MICHAUD	27/09/2024
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NIDEC document reference:	**FACTORY ACCEPTANCE TEST**
8934FAT02	**Witnessed test**
CUSTOMER document reference:	
C63-NID-ELO-XXX01	

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1. Introduction

This document presents the results of operational tests performed with customer presence during FAT on 30th of September and 1st of October 2024 at Nidec factory in St Etienne.

Factory tests are described in 8934FAT00 document.
This document only presents the operational tests and additional witnessed tests required by ELOGEN during FAT (factory Acceptance test) with their results.

2. Reference documents

	Document name	***Description***	***revision***
DA01	*8934FAT00_01 Schedule & Results.pdf*	FAT Tests	01
DA02	*8755AFL01_01 Alarm & Fault List.pdf*	Alarm and Fault list and associated safety action	01
DA03	*8934AFD01_00 Functional Analysis.pdf*	Functional Analysis	00
DA04	*8934FAT01_00 PCS cabinet Test procedure hardware and live test*	FAT procedure	00
DA05	*C63-NID-ELO-SEQ01_02 General sequence*	General sequence	02

3. Associated documents

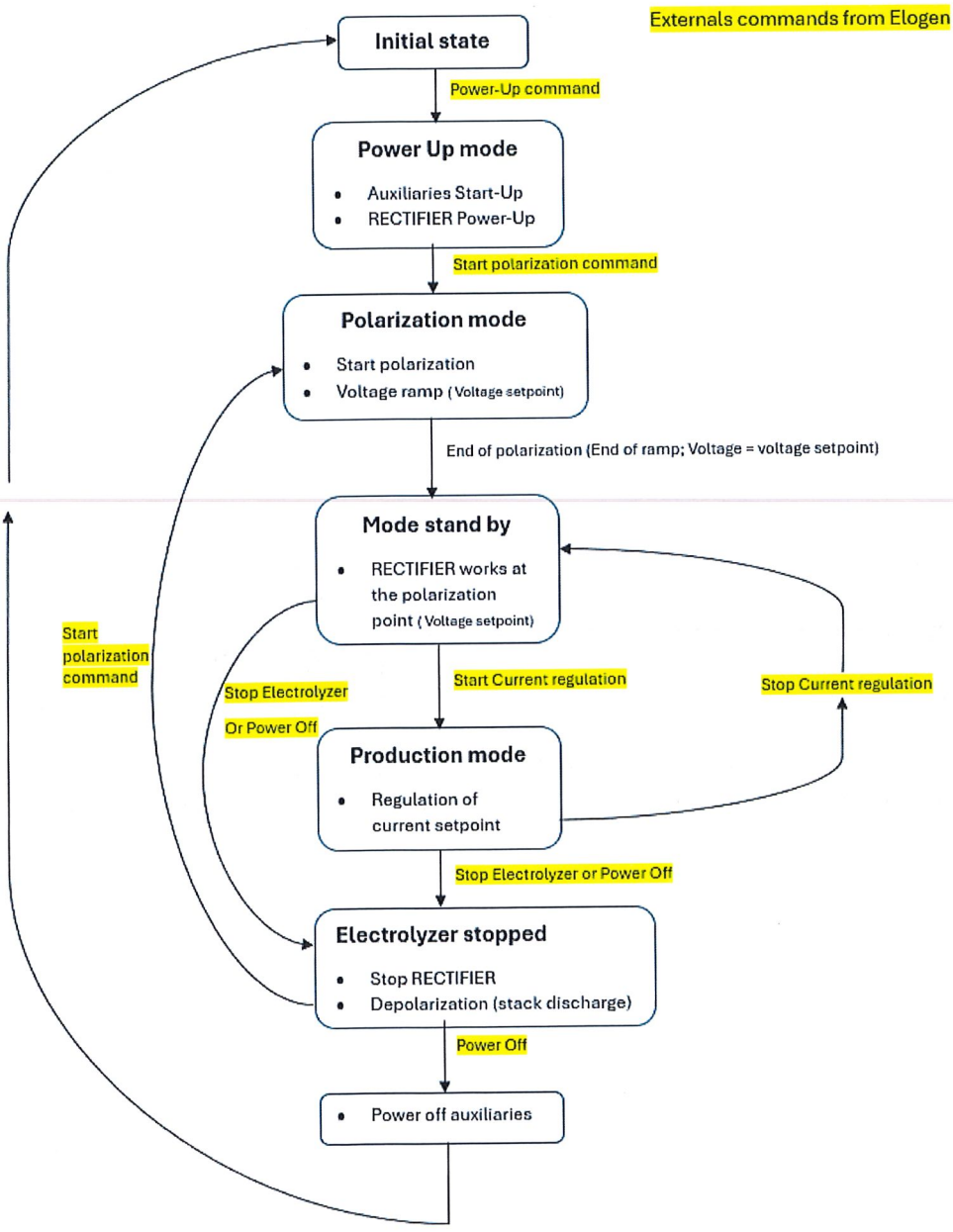
	Document name	Description	revision
DA06	*8934FAT00_00 Annex Remarks & Comments.pdf*	FAT Annex for punchlist	00

5. Operation tests

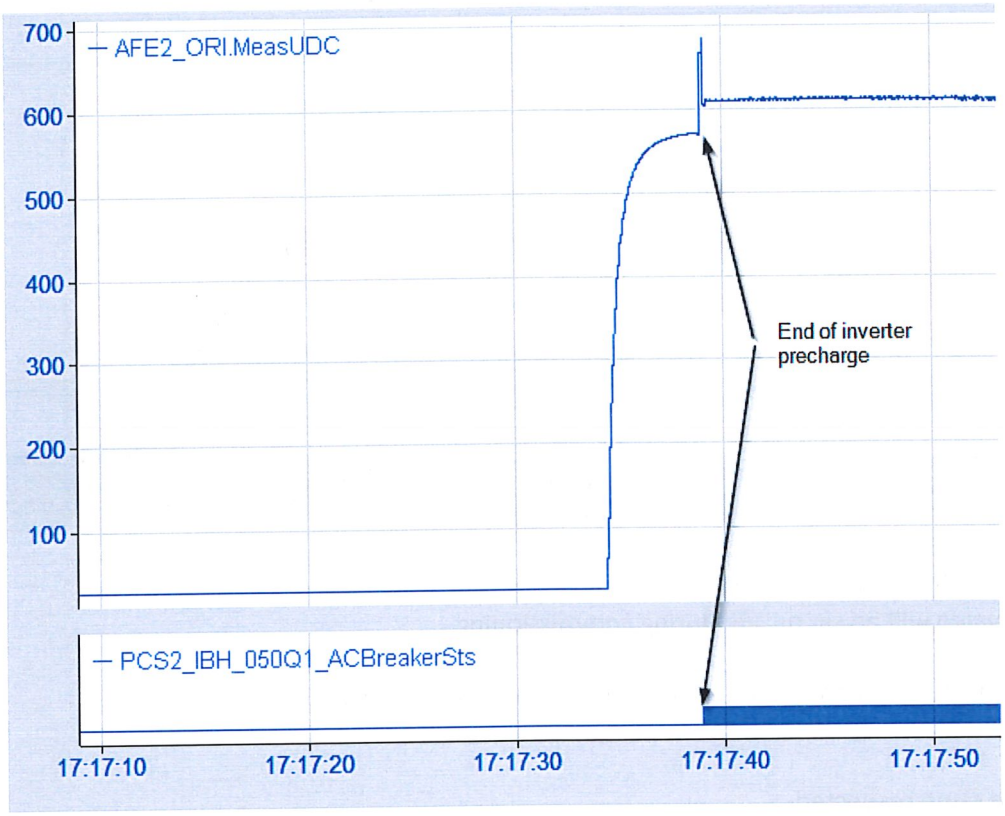
Check of correct system operation according to [**DA03**].

All different sequence operation are tested. Acceptance criteria is that system status and operation is according to [**DA03**].

Test are performed on one PCS cabinet without load (only a capacitive load in order to check voltage regulation and polarization sequence)



Functional sequence diagram



Note: Due to power limitation of test bench power supply, this state could not be withstand for more than few seconds (before test bench main circuit opening).

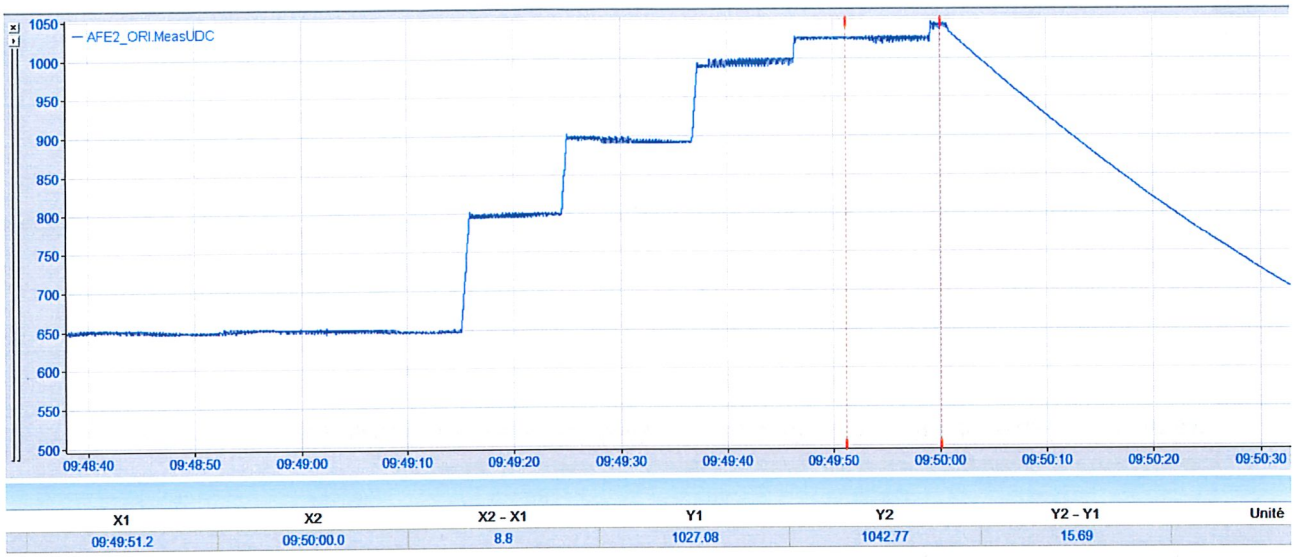
5.2. Polarization function

PCS unit tested: **PCS 1 – A202**
Systems goes from "*power up mode*" to "*polarization mode*" and "*stand-by*" mode

Check:

- Disconnection of precharge resistor
- Start of polarization rectifier
- Check correct sequence end of polarization and stand-by mode (close of main DC breaker)

Polarization mode:
Following of voltage setpoint send by ELOGEN PLC with current limitation at 20Adc.



Correct operation up to 1027Vdc.
Fault detection and stop at 1040Vdc (1042Vdc measured)
Note: the fault stop threshold value could be set according to ELOGEN requirement for stack protection.

Check of correct compensation of capacitor filter.
External measure with Ampmeter:

- Inverter stopped and AC line breaker closed: 311A ac
- Inverter in operation: 49Aac

Criteria:

- Reach of maximum operating point of 1027Vdc

⇨ Test passed

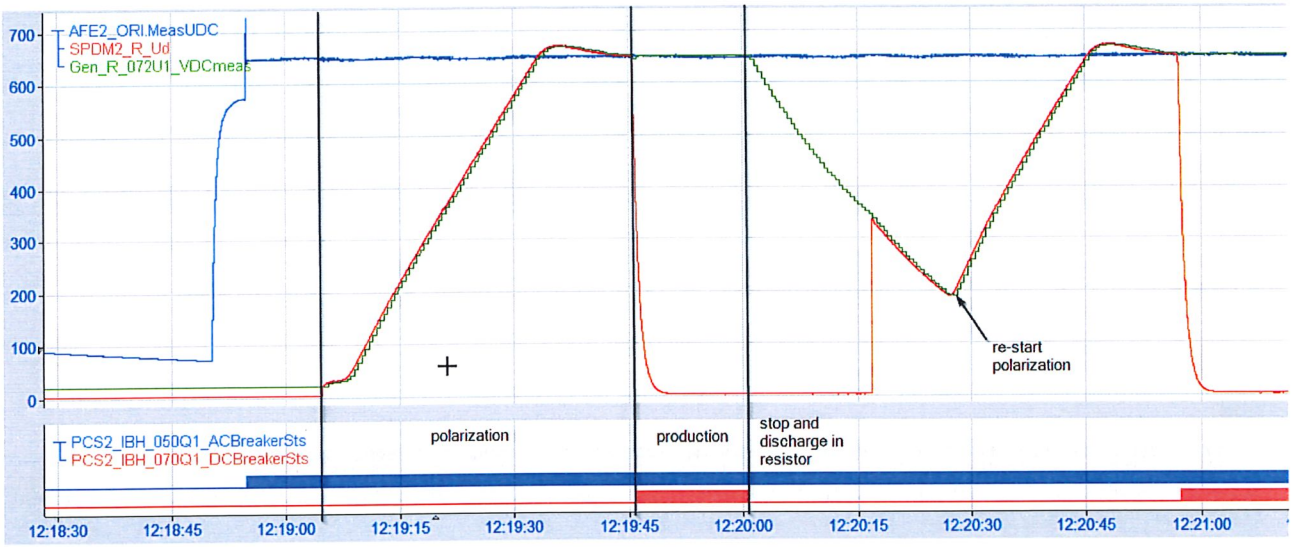
Note: only no-load test.

5.4. Emergency stop

PCS unit tested: **PCS 1 – A201**
Systems shunt down after ES stop action

Check:

- Correct stop of the complete PCS unit



Criteria:

- Correct stop and discharge

⇨ Test passed

5.6. Re-start polarization

PCS unit tested: **PCS 2 – A202**
Systems goes from "*initial state*" to stand-by and "*production mode*".

Check:

- Check correct pre-charge, and polarization with current limitation
- Check correct discharge resistor disconnection

Same curve than above.

⇨ Test passed

5.7. Electrolyser stop from fault

PCS unit tested: **PCS 2 – A201**
Systems goes from "*stand-by mode*" / "*production mode*" to "*power off*" due to internal fault.
Note: different fault could be simulated

Check:

- Check correct stop
- Check correct discharge in resistance

6. List of equipment used

Instruments List :

	Serial n°	*Expiry date*
Multimeter	EM24/69	2026
Clamp Ampmeter	EM23/115	10/11/2025
Megohmmeter	EM19/27	13/12/2025

7. Acceptance - signature

Date:

NIDEC representative (name and signature)

C. DANIEL

ELOGEN representative (name and signature)

N. Haji

N. LETROY DERRA

CROSSAY MD
A. MAMBELLI
01/10/2024

CROSSWIND	INSPECTION REPORT	Report No. IR-01-C63-NIDEC	SHEET 1 di 4
		Data 01/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

DESCRIZIONE DEL MATERIALE / *Material Description*				
POSIZIONE *Item*	QUANTITA' *Quantity*	DESCRIZIONE & TAG *Description and Tag*	TIPO DI ISPEZIONE / *Kind of Inspection*	ESITO / *Result*
-	1	2.5MW Rectifires tag A201&A202, Hydraulic Cooling Unit A300, and HCU Control Panel A500	Witnessed test of 2.5 MW Rectifiers tag A201&A202, Hydraulic Cooling Unit A300, and HCU Control Panel A500 according to QCP no C63-NID-ELO-QCP01, rev 01, activity no I.3.1., and visual inspection of transformer retention tank. At supplier workshop: NIDEC ASI SAS, Za Les Baraudes, Impasse Du Buchat, 42530 Saint Genest Lerpt, France	Positive With punch-list items.

DOCUMENTI APPLICABILI / *Applicable Documents*			
TITOLO DOCUMENTO / *Document Title*	NUMERO DOCUMENTO / *Document Number*	REVISIONE / *Revision*	STATO DOCUMENTO / *Document Status*
Purchase Order	BC0005845	00	-
Quality Control Plan	C63-NID-ELO-QCP01	01	Under review
Factory Acceptance Test Schedule & Results	C63-NID-ELO-FAT00	01	Code 1
Single Line Diagram	C63-NID-ELO-SLD01	02	Code 1
Detailed Electrial drawing of PCS Units	C63-NID-ELO-ED01	04	Under review
Mechanical Drawing (Rectifier)	C63-NID-ELO-MED01	04	Code 1
Mechanical Drawing (HCU)	C63-NID-ELO-MED02	00	Code 1
Transformer Retention Tank	ASP24021	d	Code 1
Transformer anti vibration mounts	PG22A316OFF24188	24/04/2024	n.a.

DISTRIBUZIONE A: / *Distribution to:*	
☒GESTIONE FORNITURE / *Supply Management Department*	☒CAPO COMMESSA / *Project Manager*
☒PRODUZIONE / *Production*	☒FORNITORE / *Supplier*
☒CONTROLLO QUALITA' / *Quality Control*	☐AMMINISTRAZIONE / *Administration*
☒MAGAZZINO / *Warehouse*	☒P.E.M.

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Haji DEKRA Mr. Jean Marc Leroy	NIDEC ASI SAS Project Manager Mrs. Aissata Adamou

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
This document does not relieve the Supplier of the responsibility of any possible defects and/or misfunctioning arising during the utilisation.

CROSSWIND	INSPECTION REPORT	Report No. IR-01-C63-NIDEC	SHEET 2 di 4
		Data 01/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

ATTIVITA' ESEGUITE / *Activities Carried Out*

Witnessed test of 2.5MW Rectifires tag A201&A202, Hidraulic Cooling Unit A300, and HCU Control Panel A500 according to NIDEC's QCP no C63-NID-ELO-QCP01, rev 01, activity no I.3.1., and visual inspection of transformer retention tank, antivibration mounts and Filter, according to test notification issued by ELOGEN, ref mail Andreia Vilarinho dated 26/09/2024.
At supplier workshop:
NIDEC ASI SAS, Za Les Baraudes, Impasse Du Buchat, 42530 Saint Genest Lerpt, France.

Before the FAT Nidec declare that all the steps mentioned in the Factory Acceptance Test Schedule & Results doc. no. C63-NID-ELO-FAT00 was carried out during internal test successfully without punches, attached internal test report.

The FAT tests are carried out following the given agenda received by mail from Elogen Andreia Vilarinho dated 26/09/2024, here attached IR-01-C63-NIDEC FAT AGENDA.

The agenda's steps are referenced to some steps of Factory Acceptance Test Schedule & Results doc. no. C63-NID-ELO-FAT00, in which are described the procedures to follow, and the acceptance criteria to be respected.

Here attached Nidec FAT report ref no 8934FAT02_00, title Factory Acceptance Test Witnessed Test, as evidence of carried out tests and results.

Some punch-list items was raised, reference is made to the OWL no IR-01-C63-NIDEC here attached.

During the SAT Subvendor shall perform the on load tests, example: harmonic, power factor, ripple voltage, current regulation, with the definitive stacks.
It shall provide all the necessary instrumentations and tools, certificates, and the relevant specialized manpower to cover the points described in document no .

The Goods are accepted by Elogen, the relevant release note it will be issued by Elogen to Nidec only after closing of punch-list verification, to be done before shipment (expected to be the on Thursday 3rd October at 14:00), by sending pictures which as to be reviewed by Elogen.

Attachments:

1. Nidec IAT report: Factory Acceptance Test Schedule & Results doc. no. C63-NID-ELO-FAT00 internal tests
2. IR-01-C63-NIDEC FAT AGENDA;
3. NIDEC FAT report: ref no 8934FAT02_00, title Factory Acceptance Test Witnessed Test
4. OWL no IR-01-C63-NIDEC
5. NIDEC FAT RED LINE MARK UP 01/10/2024;

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Haji DEKRA Mr. Jean Marc Leroy	NIDEC ASI SAS Project Manager Mrs. Aissata Adamou

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
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CROSSWIND	INSPECTION REPORT	Report No. IR-01-C63-NIDEC	SHEET 3 di 4
		Data 01/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

PUNCH-LIST REPORT

OUTSTANDING WORKING LIST (OWL) N°: N°: IR-01-C63-NIDEC	PROJECT C63	PURCHASE ORDER N°: BC0005845	REQUISITION N°: 1		SUPPLIER: ELOGEN	SUB-SUPPLIER: NIDEC ASI SAS
INSPECTION DATE: 01/10/2024	MATERIAL / EQUIPMENT: 2.5MW RECTIFIER	PO ITEM / TAG N° : -	INSPECTION LOCATION : NIDEC ASI SAS Saint Genest Lerpt		REVISION: 0	PAGE : 1 / 2
OWL ITEM N°	DESCRIPTION OF ACTIVITY	TO BE DONE BEFORE SHIPMENT	TO BE DONE ON CONSTRUCTION SITE	ACTION		VERIFICATION OF THE CORRECTIVE ACTION
				SUPPLIER	SUBSUPPLIER	DATE & SIGNATURE
1	Nidec to add two earthing bar on top of HCU cabinet, close to A500 control panel with relevant TAG numbers according to the documentation	X			X	
2	Nidec to provide grounding jumper on reactor tags: 030L1, 030L2, 030L4, 060L2, 060L3, 060L4.	X			X	
3	Nidec to provide nr 5 M20, nr. 3 M25, nr. 5 M32, holes on top right of A500 Control Panel, with relevant cable glands to accommodate instrumentation interface cabels.	X			X	
4	Nidec to provide nr4 additional and brand new rectifier's panel covers for MCT installation, they will be send separate to Fores (address Fores Engineering Srl, Via Secondo Casadei, 12, 47122 Forlì FC Italy, reference person Matteo Zanellato tel no +39 335-399601), in order to be laser cutted by Fores if needed.		X		X	
5	Nidec to update the documentation following the red line mark up made during this FAT, see attachment "NIDEC FAT RED LINE MARK UP 01/10/2024"	X	Within 3 weeks from FAT		X	

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND	ELOGEN Mr Mohamed Haji	NIDEC ASI SAS
Mr. Alberto Mambelli	DEKRA Mr. Jean Marc Leroy	Project Manager Mrs. Aissata Adamou

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
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CROSSWIND	INSPECTION REPORT	Report No. IR-01-C63-NIDEC	SHEET 4 di 4
		Data 01/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

PUNCH-LIST REPORT

OUTSTANDING WORKING LIST (OWL) N°: N°: IR-01-C63-NIDEC	PROJECT C63	PURCHASE ORDER N°: BC0005845	REQUISITION N°: 1	SUPPLIER: ELOGEN	SUB-SUPPLIER: NIDEC ASI SAS
INSPECTION DATE: 01/10/2024	MATERIAL / EQUIPMENT: Local Control Panel	PO ITEM / TAG N° : -	INSPECTION LOCATION : ALFA LAVAL	REVISION: 0	PAGE : 2 / 2

OWL ITEM N°	DESCRIPTION OF ACTIVITY	TO BE DONE BEFORE SHIPMENT	TO BE DONE ON CONSTRUCTION SITE	ACTION		VERIFICATION OF THE CORRECTIVE ACTION DATE & SIGNATURE
				SUPPLIER	SUBSUPPLIER	
6	Nidec to add plexiglass cover protection on discharge resistors and warning label from heating risk.	X			X	
7	Nidec to add nr1 document holder pocket inside A500 Control Panel	X			X	
8	Nidec to add tag number on circuit breaker 053Q1 on cabinet A202	X			X	
9	The holes in *	X			X	

NEW INSPECTION VISIT TO BE SCHEDULED ☐ NO ADDITIONAL INSPECTION VISIT SCHEDULED ☐	INSPECTOR NAME: ALBERTO MAMBELLI DATE & VISA : 01/10/2024	SUBVENDOR NAME : AISSATA ADAMOU DATE – VISA & STAMP: 01/10/2024

Diffusion : Original → Final Dossier attached to the Inspection Release Note, Copy → TEPC DPTN & Vendor
(1) Project Reference – (2) Trigram from Vendor (*) – (3) Sequential Number per Vendor

* Transformer antivibration mounts do not match with the holes on top plate, manufacturer to inform how to proceed with the installation

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Haji DEKRA Mr. Jean Marc Leroy	NIDEC ASI SAS Project Manager Mrs. Aissata Adamou

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
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Révision	Description	Préparé par	Date	Validé par	Date
01	Update	C.SUC	18/09/2024	A MICHAUD	20/09/2024
00	First release	C.SUC	09/08/2024	A MICHAUD	13/08/2024

NIDEC ASI S.A.S
Z.I. DU BUISSON
5, RUE MARC SEGUIN
42230 ROCHE LA MOLIERE
FRANCE

ELOGEN
8, AVENUE DU PARANA
91940 LES ULIS
France

ELOGEN 2.5MW H2 Electrolyser

NIDEC document reference :	FACTORY ACCEPTANCE TESTS Schedule & Results
8934FAT00	
CUSTOMER document reference :	
C63-NID-ELO-FAT00	

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JM LEROY
DEKRA
30.09.24

INTERNAL TEST REPORT FOLLOWED DURING FAT

CROSSWIND
A. MAMBERU
30/09/2024

Elogen
Mohamed Haj H. HAMMAMI
30/09/24

ELOGEN
ADAMOU HASSANE
Aissata
30/09/24

Control Number	Hidden collum for control numb	Control Description	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE		
1		Checking wihtout voltage			
1.1	1	Cubicle - Global Inspection			
1.1.1	1	Identification code of the Cubicle	Cubicle A201	Cubicle A202	Cubicle A500
1.1.2	2	General aspect			
1.1.2.2	2	*Check the labelling of each part of the cabinet: safety logo, equipment name, ...*	P	P	P
1.1.2.3	3	*Check opening and closing of cabinet doors*	P	P	P
1.1.3	3	Main breakers locking function			NA
1.1.3.1	1	*AC Breaker PCS Unit 1*	P	P	NP
1.1.3.2	2	*DC Switch PCS Unit 1*	P	P	NP
1.1.3.3	3	*AC Breaker PCS Unit 2*	P	P	NP
1.1.3.4	4	*DC Switch PCS Unit 2*	P	P	NP
1.1.4	4	Switching devices accessibility & settings			
1.1.4.1	1	*Check the easy access to every switching device (AC & DC circuit breakers, switches, fuses holder ...)*	P	P	P
1.1.5	5	Emergency switching device			
1.1.5.1	1	*Set emergency switching device parameters as written in electrical drawing*	NA	NA	P
1.1.5.2	2	*Make all electrical bridges to close emergency stop chain*	P	P	P
1.1.6	6	No short circuit			
1.1.6.1	1	*Check the absence of short circuit on power line AC Side*	P	P	P
1.1.6.2	2	*Check the absence of short circuit on power line DC Side*	P	P	P
1.1.6.3	3	*Lock circuit breakers of unconnected circuits using the appropriate equipment*	P	P	P
1.1.7	7	Earth wires			
1.1.7.1	1	*Check all the ground wires (Cubicle, doors, devices, roof, floor)*	P	P	P
1.1.7.2	2	*Check with continuity tester*	P	P	P
1.1.8	8	Safety protection (Protections against contact with live parts)			
1.1.8.1	1	*Check safety protections against nude parts under voltage*			
1.1.8.2	2	*Check the accessibility and the operation of the emergency push buttons*	NA	NA	P
1.1.8.3	3	*Check presence of all plexiglass*	P	P	NA
1.1.9	9	Check general Cleanliness			
1.1.10	10	General mechanical assembly and device location			
1.1.10.1	1	*Visual inspection of mechanical mounting (cutting, drilling, aeration)*	P	P	P
1.1.10.2	2	*Visual inspection of device location*	P	P	P
1.1.10.3	3	*Cable entry inspection (cable gland, cable plate..)*	P	P	P
1.1.11	11	Busbar			
1.1.11.1	1	*Spacing and fasteners or insulators*	P	P	
1.1.11.2	2	*Sufficient space between bars and between bars and metal parts*	P	P	
1.1.11.3	3	*Sufficient nuts and bolts*	P	P	
1.1.11.4	4	*Check the bimetal plates between alimunium and copper bars*	P	P	
1.1.12	12	Connections			
1.1.12.1	1	*Checking of the tightening (pull the wires- torque wrench)*	P	P	P
1.1.12.2	2	*Respect of the number of wires per terminal (2 for the live wires and 1 for ground terminal)*	P	P	P
1.1.12.3	3	*Marking of each conductor (at both end)*	P	P	P
1.1.13	13	Wiring cable flexible			
1.1.13.1	1	*Check Section*	P	P	P
1.1.13.2	2	*Check color of wires*	P	P	P
1.1.13.3	3	*Shielding continuity and grounding according to drawings*	P	P	P
1.1.14	14	DC Bus continuity			
1.1.14.1	1	*Make a shunt between earth and + of DCBUS then test continuity*	P	P	
1.1.14.2	2	*Make a shunt between earth and - of DCBUS then test continuity*	P	P	
1.1.15	15	Labels			
1.1.15.1	1	*Check the labels of each device, wire, busbar*	P	P	P
1.1.15.2	2	*Labels must be seen clearly even without getting closed to the cabinet*	P	P	P
1.1.16	16	Electrical diagram conformity			
1.1.17	17	Electrical diagram update			
1.1.18	18	Power wire color identification			
1.1.18.1	1	*DC - wire (blue)*	P	P	NA

Internal tests performed between 9/09/2024 and 27/09/2024

Control Number	Hidden collum for control numb	Control Description	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE		
1.1.18.2	2	*DC + wire (red)*	P	P	NA
1.1.18.3	3	*Live parts (orange)*	P	P	NA
1.2	2	**Inverter and hydraulic skid - Inspection**			
1.2.1	1	**Main AC circuit breaker**			
1.2.1.1	1	*Type*	AS-32E3-32P M2D2D2BX AD6U2BK EXP	AS-32E3-32P M2D2D2BX AD6U2BK EXP	
1.2.1.2	2	*S/N*	240309-4761.01	240309-4761.02	
1.2.1.3	3	*Test Report No.*	LSD24031210766	LSE24031210655	
1.2.2	2	**Main DC Switch**			
1.2.2.1	1	*Type*	DDH-16E4-00P M2D2D2BX 000U2BK EXP	DDH-16E4-00P M2D2D2BX 000U2BK EXP	
1.2.2.2	2	*S/N*	240309-4520.01	240309-4520.02	
1.2.2.3	3	*Test Report No.*	LSD24031110716	LSD24031110717	
1.2.3	3	**Inverters Check**	P	P	
1.2.3.1	1	**SPDM**			
1.2.3.1.1	1	*Type*	SPDM030UHSHINN62	SPDM030UHSHINN62	
1.2.3.1.2	2	*Code*	1000397448	1000397448	
1.2.3.1.3	3	*S/N*	24A00168	24A00169	
1.2.3.1.4	4	*Date of manufacture*	mai-24	mai-24	
1.2.3.1.5	5	*Input voltage*	600V/50HZ/60HZ	600V/50HZ/60HZ	
1.2.3.1.6	6	*Output voltage*	700V DC	700V DC	
1.2.3.1.7	7	*Auxiliary voltage*	230 V AC	230 V AC	
1.2.3.1.8	8	*Option*			
1.2.3.2	2	**SPDM Auxilliaries & Cheking**			
1.2.3.2.1	1	*SYSTEM2*	DC71001552/1000310170 R.01	DC71001552/1000310170 R00	
1.2.3.2.2	2	*POWER BOARD*	NA	NA	
1.2.3.2.3	3	*GAAPA(Power Supply)*	1000240282 R00 / NS 287	1000240282 R00 / NS 292	
1.2.3.2.4	4	*GPSIA (Interface)*	1000252402	1000252402	
1.2.3.2.5	5	*Profinet*	1000286933 R00 / SN 628	1000289633 R00 / SN 627	
1.2.3.2.6	6	*To be completed, if necessary, with other component of the drive*	NA	NA	
1.2.3.2.7	7	*PROFINET Wire of inverter is connected*	P	P	
1.2.3.2.8	8	*Modbus TCP/IP Wire of inverter is conneced*	P	P	
1.2.3.2.9	9	*Check of cooling pipe*	P	P	
1.2.3.2.10	10	*POWER AC connection*	P	P	
1.2.3.2.11	11	*POWER DC connection*	P	P	
1.2.3.2.12	12	*0 V control grounding*	P	P	
1.2.3.2.13	13	*Rectifier grounding*	P	P	
1.2.3.2.14	14	*Main earth connection*	P	P	
1.2.3.2.15	15	*Control card jumper & switches configuration*	P	P	
1.2.3.2.16	16	*KEYPAD Installed*	SVGTAFK 8000001597 / R02 3G0300K1	SVGTAFK 8000001597 / R02 3G0300K2	
1.2.3.2.17	17	*Cabinet FAN*	P	P	
1.2.3.3	3	**Synchronization transformer 360V 400V**			
1.2.3.3.1	1	*Pirmary voltage on the transformer in accordance with diagram*	360 V	400 V	
1.2.3.3.2	2	*Secondary voltage on the transformer in accordance with diagram*	360 V	400 V	
1.2.3.4	4	**AFE**			
1.2.3.4.1	1	***Control Box***			
1.2.3.4.1.1	1	*Type*	AD5ACNTXSP4NNAN1062-33	AD5ACNTXSP4NNAN1062-33	
1.2.3.4.1.2	2	*Code*	1000397423	1000397423	
1.2.3.4.1.3	3	*S/N*	24A00477	24A00478	
1.2.3.4.1.4	4	*Date of manufacture*	mai-24	mai-24	
1.2.3.4.1.5	5	*Input voltage*	24V	24V	
1.2.3.4.1.6	6	*SYSTEM2*	5AAE52S2 / 91.52.01 / 1000284943 R.04 / SN 17	5AAE52S2 / 91.52.01 / 1000284943 R.04 / SN 18	
1.2.3.4.1.7	7	*GAAPA(Power Supply)*	1000240282R00 / SN 431	1000240282R00 / SN 090	
1.2.3.4.1.8	8	*GEOSA (Interface)*	8000012699 R.02 / SN 078	8000012699 R.02 / SN 025	
1.2.3.4.1.9	9	*MODE SYS*	1000329113 R01	1000329113 R01	
1.2.3.4.1.10	10	*Profinet*	1000289633 R00 / SN 715	1000289633 R00 / SN 679	
1.2.3.4.1.11	11	*To be completed, if necessary, with other component of the drive*	NP	NP	
1.2.3.4.1.12	12	*Option*	NP	NP	
1.2.3.4.2	2	***Modules***			
1.2.3.4.2.1	1	*TYPES*	AD5W740JNNFNNNN10CF62-07	AD5W740JNNFNNNN10CF62-07	
1.2.3.4.2.2	2	*Input voltage*	0-690V AC	0-690V AC	
1.2.3.4.2.3	3	*Output voltage*	975 +/- 10% V DC	975 +/- 10% V DC	
1.2.3.4.2.4	4	*Auxiliary voltage*	230 V AC PN	230 V AC PN	
1.2.3.4.2.5	5	*Module 1 S/N*	24A00475	24A00473	
1.2.3.4.2.6	6	*Module 1 Code*	1000397250	1000397250	
1.2.3.4.2.7	7	*Module 1 manufacturing date*	juin-24	mai-24	
1.2.3.4.2.8	8	*Module 2 S/N*	24A00469	24A00474	
1.2.3.4.2.9	9	*Module 2 Code*	1000397250	1000397250	
1.2.3.4.2.10	10	*Module 2 manufacturing date*	avr-24	mai-24	
1.2.3.4.2.11	11	*Module 3 S/N*	24A00472	24A00476	
1.2.3.4.2.12	12	*Module 3 Code*	1000397250	1000397250	
1.2.3.4.2.13	13	*Module 3 manufacturing date*	mai-24	mai-24	
1.2.3.4.2.14	14	*Module 4 S/N*	24A00271	24A00470	
1.2.3.4.2.15	15	*Module 4 Code*	1000397250	1000397250	
1.2.3.4.2.16	16	*Module 4 manufacturing date*	mai-24	mai-24	
1.2.3.5	5	**Chekings**			

Control Number	dden collum for control numl	Control Description	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE		
1.2.3.5.1	1	*PROFINET Wire of inverter is connected*	P	P	
1.2.3.5.2	2	*Modbus TCP/IP Wire of inverter is conneced*	P	P	
1.2.3.5.3	3	*Check of cooling pipe*	P	P	
1.2.3.5.4	4	*POWER AC connection*	P	P	
1.2.3.5.5	5	*POWER DC connection*	P	P	
1.2.3.5.6	6	*0 V control grounding*	P	P	
1.2.3.5.7	7	*Rectifier grounding*	P	P	
1.2.3.5.8	8	*Main earth connection*	P	P	
1.2.3.5.9	9	*Control card jumper & switches configuration*	P	P	
1.2.3.5.10	10	*KEYPAD Installed*	P	P	
1.2.3.5.11	11	*Cabinet FAN*	P	P	
1.2.3.6	6	***Synchronization transformer 330V 10,22V***			
1.2.3.6.1	1	*Pirmary voltage on the transformer in accordance with diagram*	330 V	330 V	
1.2.3.6.2	2	*Secondary voltage on the transformer in accordance with diagram*	10,22 V	10,22 V	
1.2.3.6.3	3	*Check DC current transformer (LEM) (Check direction , wriring and fixing)*	P	P	
1.2.4	4	**Sinus Filter**			
1.2.4.1	1	**Condensateur : 210 +/- 5% uF**	**30C1**	**60C1**	
1.2.4.1.1	1	*Model*	PEC AC 630-210	PEC AC 630-210	
1.2.4.1.2	2	*S/N*	C1 : 231/C2 : 230/ C3 : 229	C1 : 217/C2 : 218/ C3 : 219	
1.2.4.1.3	3	*Btch Number*	B K12210DG	B K12210DG	
1.2.4.2	2	**Condensateur : 210 +/- 5% uF**	**30C2**	**60C2**	
1.2.4.2.1	1	*Model*	PEC AC 630-210	PEC AC 630-210	
1.2.4.2.2	2	*S/N*	C1 : 222/C2 : 221/ C3 : 220	C1 : 205/C2 : 206/ C3 : 207	
1.2.4.2.3	3	*Btch Number*	B K12210DG	B K12210DG	
1.2.4.3	3	**Condensateur : 210 +/- 5% uF**	**30C3**	**60C3**	
1.2.4.3.1	1	*Model*	PEC AC 630-210	PEC AC 630-210	
1.2.4.3.2	2	*S/N*	C1 : 213/C2 : 212/ C3 : 211	C1 : 202/C2 : 203/ C3 : 204	
1.2.4.3.3	3	*Btch Number*	B K12210DG	B K12210DG	
1.2.4.4	4	**Condensateur : 210 +/- 5% uF**	**30C4**	**60C4**	
1.2.4.4.1	1	*Model*	PEC AC 630-210	PEC AC 630-210	
1.2.4.4.2	2	*S/N*	C1 : 234/C2 : 233/ C3 : 232	C1 : 208/C2 : 209/ C3 : 210	
1.2.4.4.3	3	*Btch Number*	B K12210DG	B K12210DG	
1.2.4.5	5	**Condensateur : 210 +/- 5% uF**	**30C5**	**60C5**	
1.2.4.5.1	1	*Model*	PEC AC 630-210	PEC AC 630-210	
1.2.4.5.2	2	*S/N*	C1 : 237/C2 : 236/ C3 : 235	C1 : 223/C2 : 224/ C3 : 225	
1.2.4.5.3	3	*Btch Number*	B K12210DG	B K12210DG	
1.2.4.6	6	**Condensateur : 210 +/- 5% uF**	**30C6**	**60C6**	
1.2.4.6.1	1	*Model*	PEC AC 630-210	PEC AC 630-210	
1.2.4.6.2	2	*S/N*	C1 : 228/C2 : 227/ C3 : 226	C1 : 214/C2 : 215/ C3 : 216	
1.2.4.6.3	3	*Btch Number*	B K12210DG	B K12210DG	
1.2.4.7	7	**Self :100 uH**	**30L1**	**60L1**	
1.2.4.7.1	1	*Model*	AFRHTR00213	AFRHTR00213	
1.2.4.7.2	2	*S/N*	202400002746	202400002740	
1.2.4.7.3	3	*Code*	1000401335	1000401335	
1.2.4.8	8	**Self :100 uH**	**30L2**	**60L2**	
1.2.4.8.1	1	*Model*	AFRHTR00213	AFRHTR00213	
1.2.4.8.2	2	*S/N*	202400002745	202400002743	

Control Number	dden collum for control numl	Control Description	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE		
1.2.4.8.3	3	*Code*	1000401335	1000401335	
1.2.4.9	9	**Self :100 uH**	**30L3**	**60L3**	
1.2.4.9.1	1	*Model*	AFRHTR00213	AFRHTR00213	
1.2.4.9.2	2	*S/N*	202400002744	202400002741	
1.2.4.9.3	3	*Code*	1000401335	1000401335	
1.2.4.10	10	**Self :100 uH**	**30L4**	**60L4**	
1.2.4.10.1	1	*Model*	AFRHTR00213	AFRHTR00213	
1.2.4.10.2	2	*S/N*	202400002742	202400002739	
1.2.4.10.3	3	*Code*	1000401335	1000401335	
1.2.5	5	**Autotransformateur**	**023T1**	**053T1**	
1.2.5.1	1	*Reference*	A50B45ZZ00001	A50B45ZZ00001	
1.2.5.2	2	*S/N*	151006	151007	
1.2.6	6	**Preload circuit**			
1.2.6.1	1	*Check preload circuit. Check accordance with DC Bus polarities*	P	P	
1.2.7	7	**Insulation test**			
1.2.7.1	1	*Mesure POWER AC Side insulation resistance vs earth*	P (2 TOhm)	P (2 TOhm)	
1.2.7.2	2	*Mesure DCBUS "+"insulation vs earth*	P (2 TOhm)	P (2 TOhm)	
1.2.7.3	3	*Mesure DCBUS "-"insulation vs earth*	P (2 TOhm)	P (2 TOhm)	A500
1.2.8	8	**Cooling system**			
1.2.8.1	1	*Check Hydraulic piping*			
1.2.8.2	2	*Test report SKID received*			
1.2.8.3	3	*Skid serial number*			
1.2.8.4	4	*Test report of cooling unit*			
1.2.8.5	5	*Check the labels and the pipe connections of each part of the hydraulic circuit*			
1.2.8.6	6	*Check that each components is correctly mounted (Pump, Fans, Sensors ...)*			
2		Check power on			
2.1	1	**General Check**			
2.1.1	1	*Connect Rectifier Cabinet to 400V/230V external supply*	P	P	P
2.1.2	2	*Check the voltage sequence*	P	P	P
2.1.3	3	*Check operation of light*	NA	NA	P
2.1.4	4	*Check operation of sockets*	NA	NA	P
2.1.5	5	*Check operation of switchs*	NA	NA	P
2.1.6	6	**Protections devices**			
2.1.6.1	1	*Check the rating of the fuses*	P	P	P
2.1.6.2	2	*Check the rating of the circuit breakers*	P	P	P
2.1.6.3	3	*Apply electrical settings to main AC breaker and check operating*	P	P	P
2.1.7	7	**IMD**			
2.1.7.1	1	*Set alarm and trip threshold*	Pré-Alarm : 100KOhm (10s)/ Alarm : 15 Kohm (5s)	Pré-Alarm : 100KOhm (10s)/ Alarm : 15 Kohm (5s)	
2.1.7.2	2	*Test correct fault detection with 15KOhm resistance test*	P	P	
2.1.8	8	*Check operation of the power measurement modules*			
2.2	2	**PCS settings**	A201	A202	A500
2.2.1	1	**Main AC circuit breaker**			

Control Number	Hidden collum for control numb	Control Description	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE		
2.2.1.1	1	*Configuration protection settings*	P	P	
2.2.1.2	2	*Perform a test of the Circbuit breaker with dedicated tool*	P	P	
2.2.1.3	3	*Lockout seal manual closing command*			
2.2.2	2	**Inverters settings**			
2.2.2.1	1	**SPDM**			
2.2.2.1.1	1	**TCP/IP Settings**			
2.2.2.1.1.1	1	*Set IP address*	P	P	
2.2.2.1.1.2	2	*Set Network mask*	P	P	
2.2.2.1.2	2	**Profinet parameters**			
2.2.2.1.2.1	1	*Set IP address*	P	P	
2.2.2.1.2.2	2	*Set Network mask*	P	P	
2.2.2.1.2.3	3	*Set Profinet Name*	P	P	
2.2.2.1.2.3	3	*Setup Firmware*	P	P	
2.2.2.1.2.4	4	*Version of the firmware*	71.00.15 - DC71001SS2	71.00.15 - DC71001SS2	
2.2.2.1.3	3	**Parameters setting**			
2.2.2.1.3.1	1	*To be completed (List here all settings of the inverter that are not default settings)*			
2.2.2.1.4	4	**Make a backup of settings at the end of tests**			
2.2.2.1.5	5	**Check Synchronization**	P	P	
2.2.2.2	2	**AFE**			
2.2.2.2.1	1	**TCP/IP Settings**			
2.2.2.2.1.1	1	*Set IP address*	P	P	
2.2.2.2.1.2	2	*Set Network mask*	P	P	
2.2.2.2.2	2	**Profinet parameters**			
2.2.2.2.2.1	1	*Set IP address*	P	P	
2.2.2.2.2.2	2	*Set Network mask*	P	P	
2.2.2.2.2.3	3	*Set Profinet Name*	P	P	
2.2.2.2.2.3	3	*Setup Firmware*	P	P	
2.2.2.2.2.4	4	*Version of the firmware*	91.52.01 - 5AAE52S2	91.52.01 - 5AAE52S2	
2.2.2.3	3	**Parameters setting**			
2.2.2.3.1	1	*To be completed (List here all settings of the inverter that are not default settings)*			
2.2.2.4	4	**Make a backup of settings at the end of tests**			
2.2.2.5	5	**Check Synchronization**	P	P	
2.3	3	**Cooling System**			
2.3.1	1	*Check Water flow direction with the 2 pumps*			P
2.3.2	2	*Check Water pressure*			P
2.3.3	3	*Check absence of water leakage*			
2.3.4	4	*Check operation of bypass valve*			
2.3.5	5	*Check fans direction of rotation*	P	P	NA
2.4	4	**SAFETY check**			
2.4.1	1	*Configuration of safety devices*	NA	NA	P
2.4.2	2	*Check DGPT2 relay of transformer*	NA	NA	NA
2.4.3	3	*Test each emergency stop*	NA	NA	P
2.4.4	4	*Test restart function after an emergency stop*	NA	NA	P
2.5	5	**PLC settings and I/O test**			
2.5.1	1	*Configure PLC IP Addresses*			P
2.5.2	2	*Load Profinet Master configuration*			P
2.5.3	3	*Load PLC Program*			P
2.5.4	4	*Check communication with SPDM 1*	P	P	P
2.5.5	5	*Check communication with AFE 1*	P	P	P
2.5.6	6	*Check communication with SPDM 2*	P	P	P
2.5.7	7	*Check communication with AFE 2*	P	P	P
2.5.8	8	*Check communication with PN/PN Gateway*	P	P	P
2.5.9	9	*Check communication with HMI*			P
2.5.10	10	*Test of IO using 8934FAT00_00 Remote IO excel file*	P	P	P
2.5.11	11	*Test of faults*			
2.5.12	12	*Test that all faults are displayed on the HMI*			
2.6	6	**Inverter measures**	A201	A202	A500
2.6.1	1	**Synchronisation transformer and precharge**			
2.6.1.1	1	*Check precharge polarity, perform inverter precharge*	P	P	
2.6.1.2	2	*Check correct AC voltage synchronisatino*	P	P	
2.6.2	2	**AC voltage scaling**			
2.6.2.1	1	*AC voltage measurement*	P	P	
2.6.3	3	**DC voltage measurement**			
2.6.3.1	1	*DC voltage measurement*			
2.6.4	4	**AC current measurement**			
2.6.4.1	1	*AC current measurement (inverter stopped: to checked current inside LC filter)*			
2.6.4.2	2	*AC current measurement (inverter in operation)*			
2.6.5	5	**PLC measurement**			
2.6.5.1	1	*Check the measurement of all inverter data from the PLC*			
2.6.6	6	**Backup**			
2.6.6.1	1	*Save project settings by making a snapshot at the end of tests and save it on project server*			

Control Number	dden collum for control numl	Control Description	Results P = PASS NP = NOT PASS NA = NOT APPLICABLE		
3		Operation tests			
3.1	1	Sequence Test			
3.1.1	1	*Start the sequence by setting the Power-up command to TRUE*	P	P	P
3.1.2	2	*Start the polarization sequence by setting the polarization command to TRUE*	P	P	P
3.1.3	3	*Check the voltage regulation*	P	P	P
3.1.4	4	*Start the production phase by setting the command regulation I to TRUE*			
3.1.5	5	*Check the current regulation*	NA	NA	NA
3.1.6	6	*In production (I regulation), Stop by setting the stop control command to TRUE*			
3.1.7	7	*In production (I regulation), Stop by setting the stop electrolyzer command to TRUE*			
3.1.8	8	*In production (I regulation), Stop by setting the stop electrolyzer command to TRUE and check that you can restart a polarization*			
3.1.9	9	*In production (I regulation), Stop by setting the power off command to TRUE*			
3.1.10	10	*In production (I regulation), Stop by simulating the loss of permanent conditions*			
3.1.11	11	*In polarization mode (U regulation), Stop by simulating the loss of permanent conditions*	P	P	P
3.1.12	12	*In polarization mode (U regulation), Stop by Setting the power off command to TRUE*	P	P	P
3.1.13	13	*In production (I regulation), Stop by Emergency Stop button*	P	P	P
3.1.14	14	*Test HMI feedback*			
3.2	2	Cooling system			
3.2.1	1	*Test pump alternation function*			P
3.2.2	2	*Check water temperature control*			P
3.3	3	Prepare for shipping			
3.3.1	1	*Lock external supply source and disconnect wires*			
3.3.2	2	*Drain cooling circuit for shipping*			
4		Liste of equipement used for tests			
Type		Reference	Date of certificate		
Multimeter		FLUKE / 175	2026		
Current Clamp		CHAUVIN ARNOUX/ F 406	10/11/2025		
Continuity Tester		CHAUVIN ARNOUX/ C.A. 6011			
Scope		METRIX ScopiX IV 0X 9104	12/12/2024		
Torque wrench		WURTH / SN. 118751931231139186/Art. 0714720101	/12/2026		
Megohmeter		CHAUVIN ARNOUX / C.A. 6545	13/12/2025		



IR-01-C63-NIDEC
FAT AGENDA

ambelli Alberto (Fores)

Da: Giorgini Luca (Fores)
Inviato: giovedì 26 settembre 2024 14:52
A: Mambelli Alberto (Fores); Manenti Marco (Fores); Maioli Luca (Fores)
Oggetto: Fwd: NIDEC_RECTIFIER_FAT_INVITATION

CROSSWIND A.MAMBELLI 01/10/2024
NIDEC ADAMOU. H 01/10/2024
Elogen. Rohaud Haji 01/10/2024

Luca

Inizio messaggio inoltrato:

Da: andreia Vilarinho <andreia.vilarinho@ext-elogenh2.com>
Data: 26 settembre 2024 alle ore 14:51:11 CEST
A: Stephen Bremner <stephen.bremner@crosswindhkn.nl>, Lancelot Di Giulio <lancelot.digiulio@elogenh2.com>, "Giorgini Luca (Fores)" <Luca.Giorgini@fores.it>, Dominik Sznajder <dominik.sznajder@crosswindhkn.nl>
Cc: Hassan Hammami <hassan.hammami@elogenh2.com>, Karim Touag <karim.touag@ext-elogenh2.com>
Oggetto: RE: NIDEC_RECTIFIER_FAT_INVITATION

Hello Stephen,

Sorry, I was waiting to receive the FAT Procedure from NIDEC (in a report form) to send it to you but didn't received it yet.

You will find bellow the FAT agenda, with the tests that will occur.
As soon as we receive it in a report form, I will send it to you.

1. **Monday morning : Checking without voltage**
    1. From 9h00 to 11h00 :
        1. Installation and review documentation
        2. Visual inspection of external and internal part of cabinets (1)
        3. Safety protection (Protections against contact with live parts) - §1.1.8
        4. Check of earth wires, with random continuity test - §1.1.7
    2. From 11h00 to 12h:
        1. Check of correct tightening of power connections (random check): § 1.1.12
        2. Insulation test on AC power and DC power - §1.2.6

2. Lunch break 12h – 13h30 / connection preparation for live tests

3. **Monday afternoon: operation tests on cabinet 1**
   These tests' purpose is to check the correct operation of the complete system according to functional analysis.
   Measurements feedback inside PLC and display on local HMI are checked for each below test.
    1. §3.1.1: Sequence with power-up command
        1. Check correct working of auxiliaries (cooling, with flowrate and pressure measurements)
        2. Check correct precharge of inverter (AC and DC voltage measurement)
        3. Check of wiring I/O status with ELOGEN system (if any)
    2. §3.1.2: Polarization function

5000V minimum of polar

30/09/2024 1. Check disconnection of discharge resistor
30/09/2024 2. Start of precharge rectifier, check of correct voltage ramp and current limitation divrus polarization
01/10/2024 3. Check of wiring I/O status with ELOGEN system (if any)

3. §3.1.12: Production phase
01/10/2024 1. Check correct operation of inverter (DC voltage and current)
30/09/2024 2. Check grid value and correct compensation of filter reactive power
01/10/2024 3. Check of wiring I/O status with ELOGEN system (if any)

4. §3.1.13: Emergency stop
30/09/2024 1. Stop from emergency stop button
30/09/2024 2. Check correct action and sequence (stop of inverter, LVCB opening…)
01/10/2024 3. Check of wiring I/O status with ELOGEN system (if any)

5. Test of all remaining wiring I/O exchange with ELOGEN system - §2.5.10

4. **<u>Tuesday morning: operation tests on cabinet 2</u>**

Continuation of operations tests, but on cabinet 2

1. Start of cabinet 2 in production mode (no specific check).
2. §3.1.4: Normal stop (stand-by mode)
   1. Check correct action and sequence (stop of inverter…)
   2. Check of wiring I/O status with ELOGEN system (if any)
   3. Check DC voltage regulation
3. §3.1.5: Re-start in production mode and electrolyser stop ✓
   1. Check correct action and sequence (stop of inverter…)
   2. Check of wiring I/O status with ELOGEN system (if any)
   3. Check voltage discharge in resistor

01/10/2024

4. §3.1.6: Re-start polarization
   1. Start of precharge rectifier, check of correct voltage ramp and current limitation
   2. Check of wiring I/O status with ELOGEN system (if any)
5. §3.1.10: electrolyser stop ✓
   1. Check correct action and sequence (stop of inverter…)
   2. Check of wiring I/O status with ELOGEN system (if any)
   3. Check voltage discharge in resistor
6. §3.1.8: Re-start in production mode and stop from fault
   1. Check correct feedback to ELOGEN, but not stop in case of alarm
   2. Check correct stop in case of fault

<u>Note:</u> Different fault could be simulated and tested.

5. **<u>Tuesday afternoon: conclusion and preparation for shipping</u>**
   1. 14h: FAT conclusion and action list
   2. Cabinet disconnection

Don't hesitate if you have any question.

Best regards,

[redacted] Must to be continued
[redacted] Must comment

① Visual inspection retention tank ASP 24021 ok MT
01/10/2024

Adamou. H
Aissata NIDEC

FAT COPY
CROSSWIND
A. MAMBECH
30/09/2024

DEKRA
JOY LEROY

elogen
Mohamed Haji

INDICE	MODIFICATION	DATE	DESSINE	DATE	VERIFIE
A.4	UPDATED AFTER FAT	26/09/2024	NIDEC		NIDEC FM
A.3	ADD. POWER MEASUREMENT MODULE	26/07/2024	NIDEC		NIDEC FM
A.2	UPDATED	09/07/2024	NIDEC		NIDEC FM
A.1	UPDATED	28/05/2024	NIDEC		NIDEC FM
A.0	FIRST EDITION	03/04/2024	NIDEC		NIDEC FM

Nidec
All for dreams

161 EMILAND GAUTHEY
71200 LE CREUSOT
FRANCE

DOCUMENT N° : 8934DED01

elogen

DOCUMENT N° : C63-NID-ELO-ED01

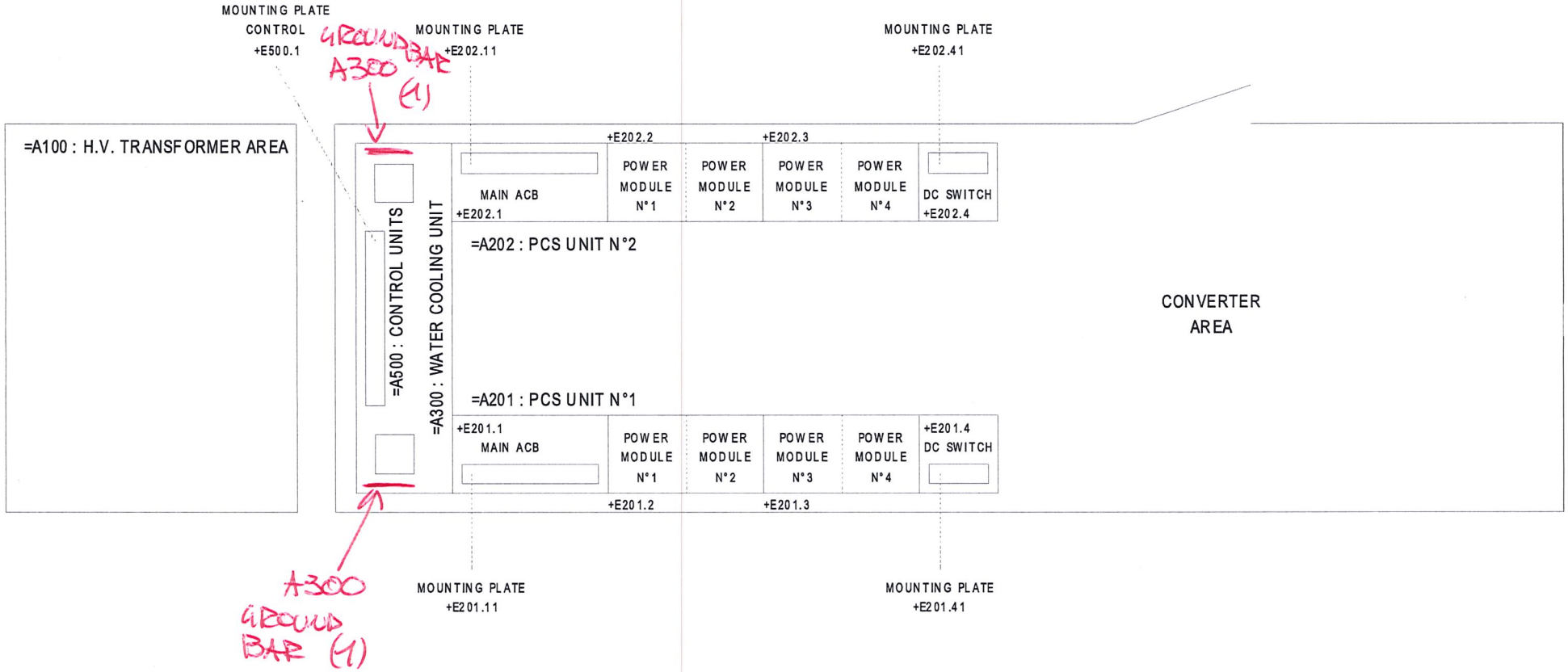
ELOGEN : C63 - 2.5MW
TRANSFORMER RECTIFIERS FOR E500 ELECTROLYSER
DETAILED ELECTRICAL DRAWING OF PCS UNITS

GENERALITY

COVER PAGE

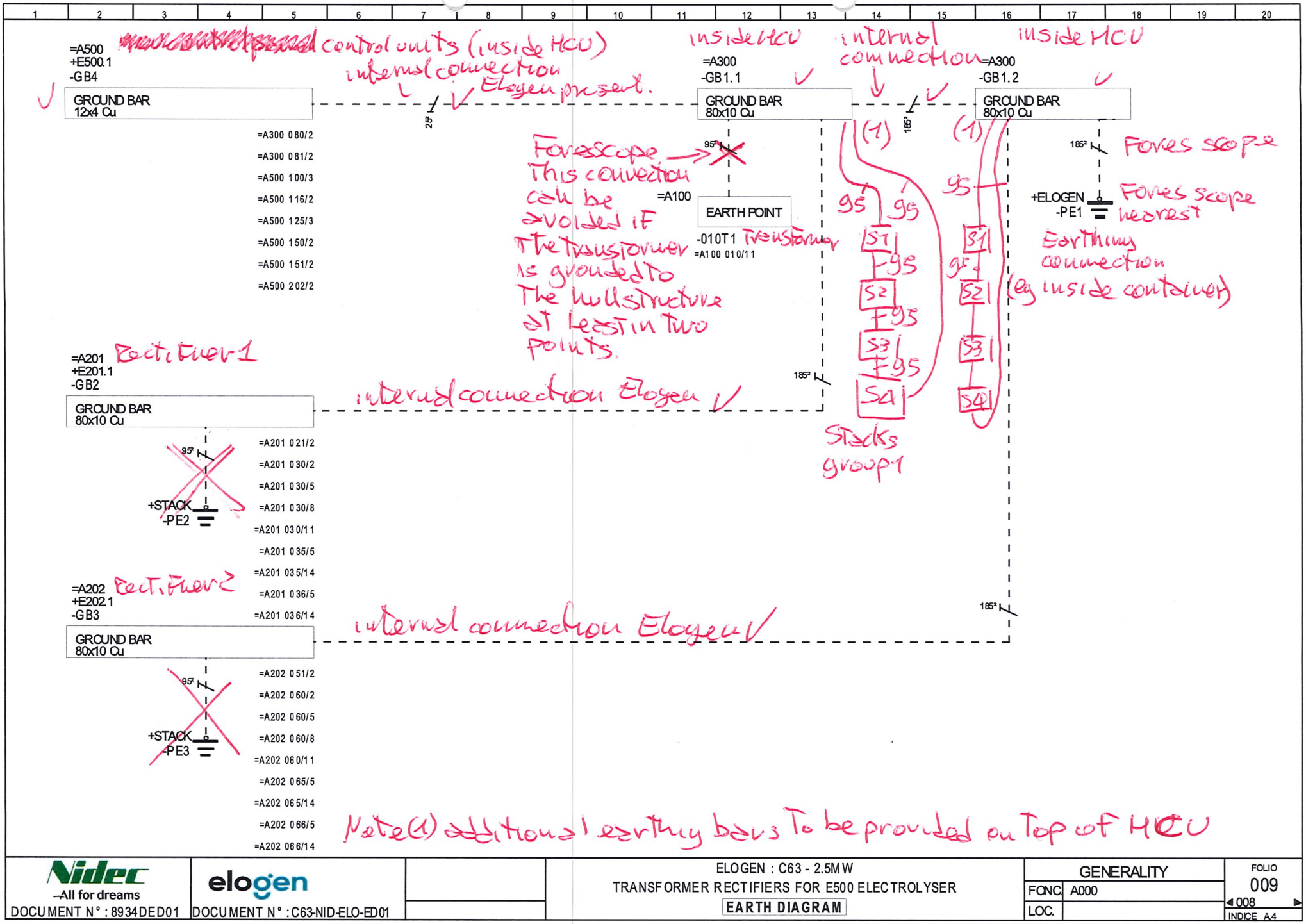
AFFAIRE N°: 8934 | 000/008

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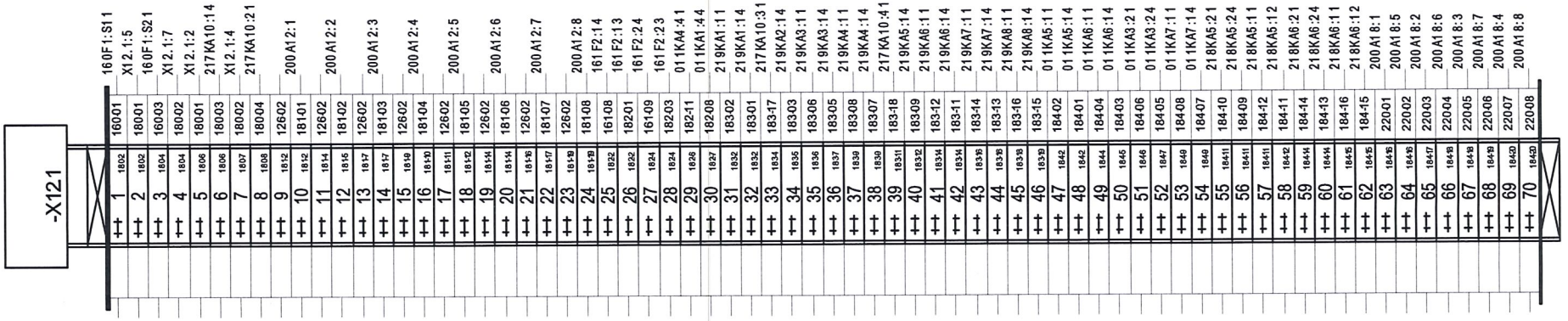


Note (1) additional earthing bar to be provided on Top of HCU

Nidec -All for dreams DOCUMENT N° : 8934DED01	elogen DOCUMENT N° : C63-NID-ELO-ED01		ELOGEN : C63 - 2.5MW TRANSFORMER RECTIFIERS FOR E500 ELECTROLYSER CONTAINER LAYOUT	GENERALITY FONC. A000 LOC.	FOLIO 008 ◀006 009▶ INDICE A1

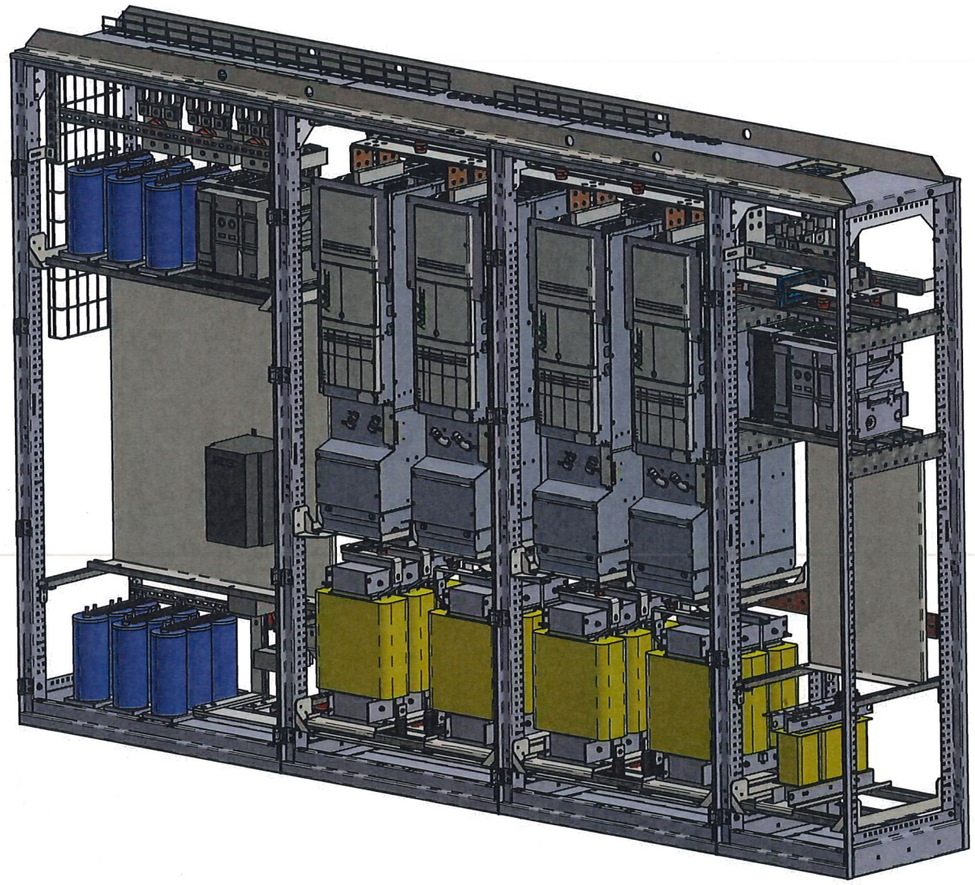


Nidec –All for dreams DOCUMENT N° : 8934DED01	elogen DOCUMENT N° : C63-NID-ELO-ED01		ELOGEN : C63 - 2.5MW TRANSFORMER RECTIFIERS FOR E500 ELECTROLYSER **EARTH DIAGRAM**	GENERALITY FONC. A000 LOC.	FOLIO 009 ◀008 INDICE A4



Add external cable to customer

Nidec –All for dreams DOCUMENT N° : 8934DED01	elogen DOCUMENT N° : C63-NID-ELO-ED01		ELOGEN : C63 - 2.5MW TRANSFORMER RECTIFIERS FOR E500 ELECTROLYSER **TERMINAL DIAGRAM : +E500.1-X12.1**	TERMINAL DIAGRAM FONC. LOC. +E500.1	FOLIO 549 ◀548 ▶ INDICE A4



04	AS BUILT	17/09/2024	C. VEROT	17/09/2024	JP. CHOVET
03	ADD PAGE WITH EXTERNAL VIEWS	05/08/2024	L.RONDET	05/08/2024	C.VEROT
02	AS BUILT	27/06/2024	L.RONDET	27/06/2024	C.VEROT
01	UPDATED CABINET	07/06/2024	L.RONDET	07/06/2024	C.VEROT
00	CREATION	03/04/2024	L.RONDET	03/04/2024	C.VEROT
INDEX	MODIFICATION	DATE	DRAWN	DATE	CHECKED

Nidec
All for dreams

NIDEC ASI S.A.

Z.I DU BUISSON
5 RUE MARC SEGUIN
42230 ROCHE LA MOLIERE
FRANCE

elogen

ELOGEN
8 AVENUE DU PARANA
91940 LES ULIS
FRANCE

ELOGEN
2.5 MW H2 Electrolyser

MECHANICAL DRAWING

DOC. N° / N° DOC. :
8934MED01

CROSSWIND
FAT COPY
A. MAMBERU
30/09/2024

ELOGEN
H. HAMMAMI
30/09/24

ADAMOU. H
Aissata NIDEC
30/09/24

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SHEET / PAGE	DESIGNATION	MODIFICATION / MODIFICATIONS									
		00	01	02	03	04	05	06	07	08	09
01	FRONT PAGE	X	X	X	X	X					
02	TABLE OF CONTENTS	X	X	X	X	X					
03	EXTERNAL VIEW OF CONVERTER CABINET	X	X	X	X	X					
04	INTERNAL VIEW OF CONVERTER CABINET	X	X	X	X	X					
05	EXTERNAL VIEW OF SYM CONVERTER CABINET					X					
06	INTERNAL VIEW OF SYM CONVERTER CABINET					X					
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Nidec All for dreams

elogen

INDEX / INDICE : 04

DATE : 17/09/2024

ELOGEN 2.5MW H2 ELECTROLYSER

TABLE OF CONTENTS

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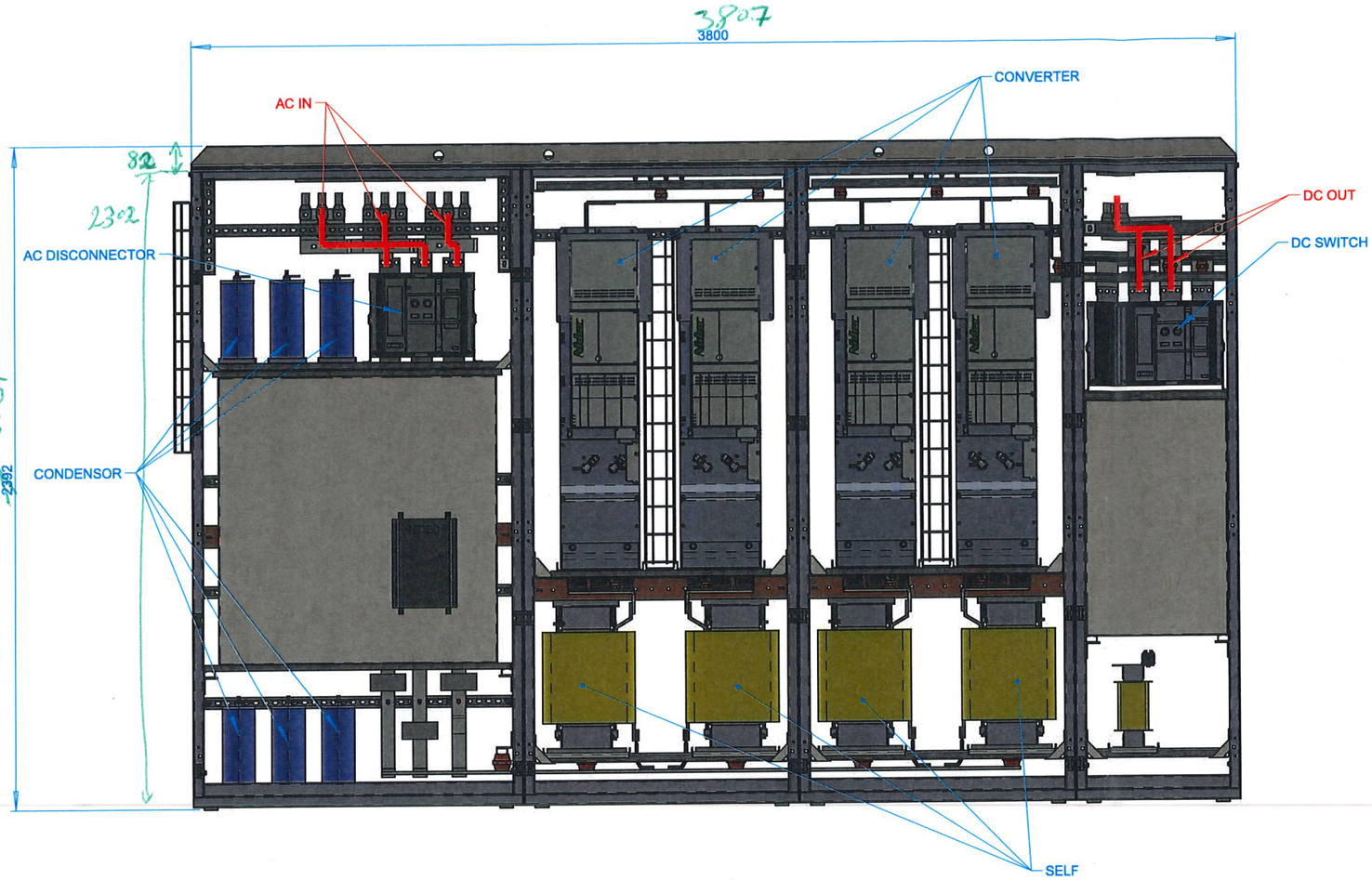
FOLIO 2

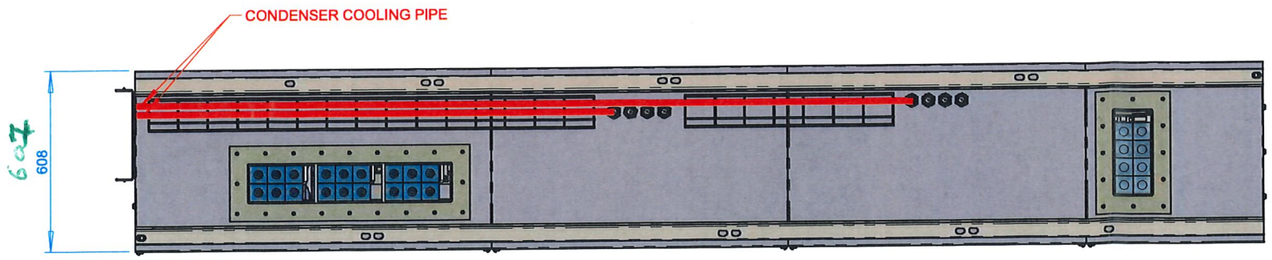
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Ech.:1:1

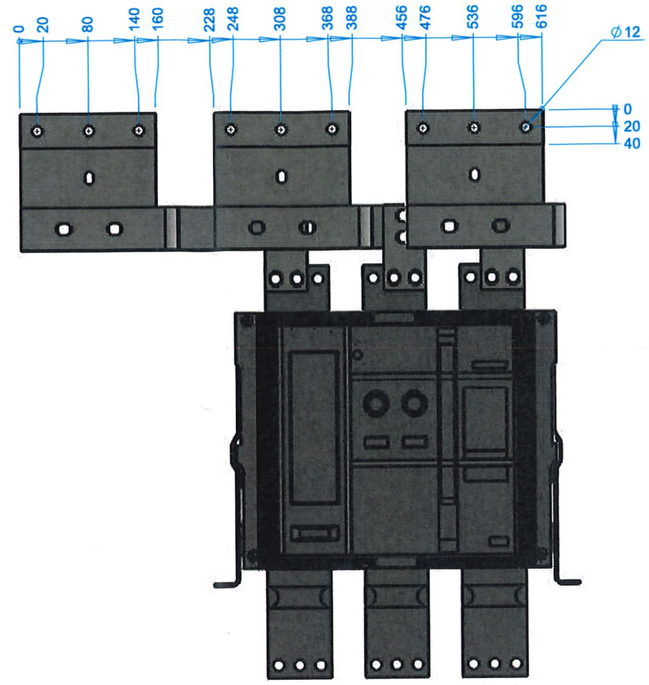
Emplacement du Fichier:C:\EPDM_NIDEC_ASI\BE\8934\01-AR\

CONVERTER CABINET



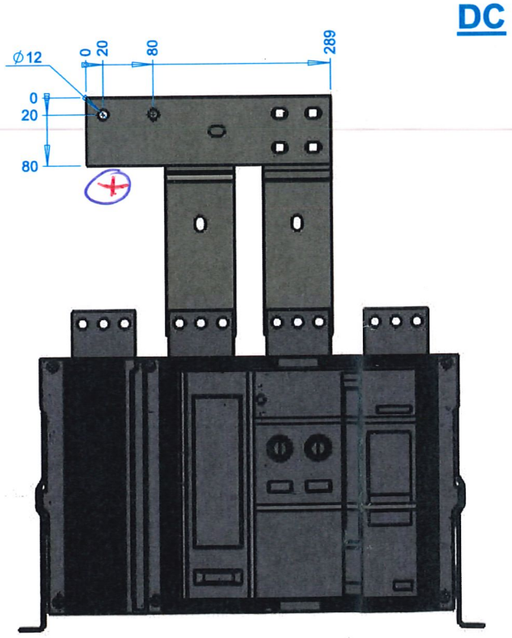


AC

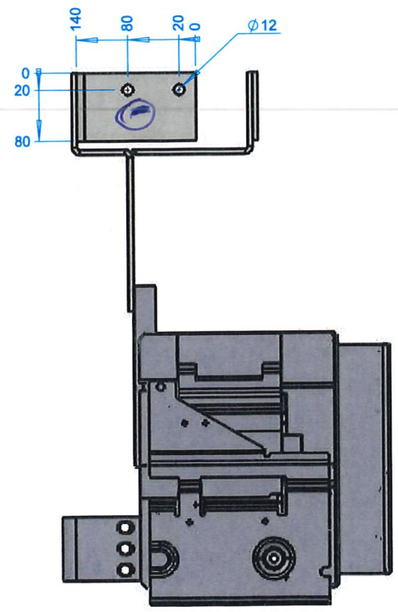


SCALE 1 : 7

DC



SCALE 1 : 7



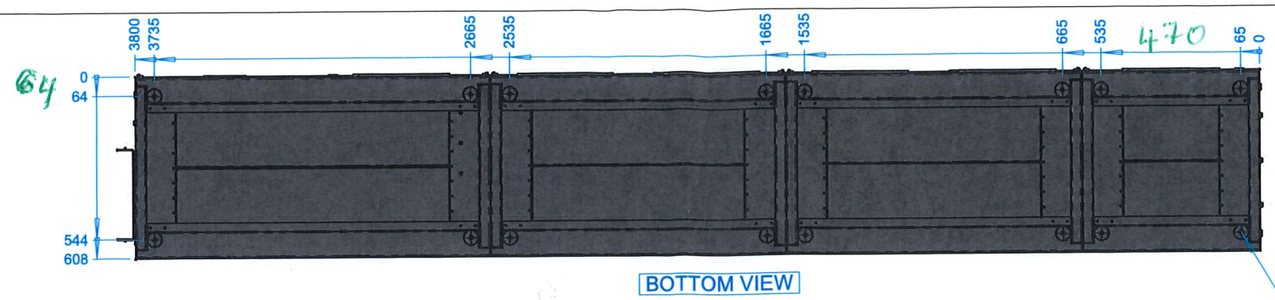
SCALE 1 : 7

Nidec All for dreams	elogen	INDEX / INDICE : 04	ELOGEN 2.5MW H2 ELECTROLYSER	DOC. N° / N° DOC. : 8934MED01	FOLIO 4
		DATE : 17/09/2024	INT VIEW OF CONV CABINET	CUST. DOC. N° / N° DOC CLIENT :	SCALE / FORMAT : A3

Ech.:1:20

Emplacement du Fichier:C:\EPDM_NIDEC_ASI\BE\8934\01-AR\

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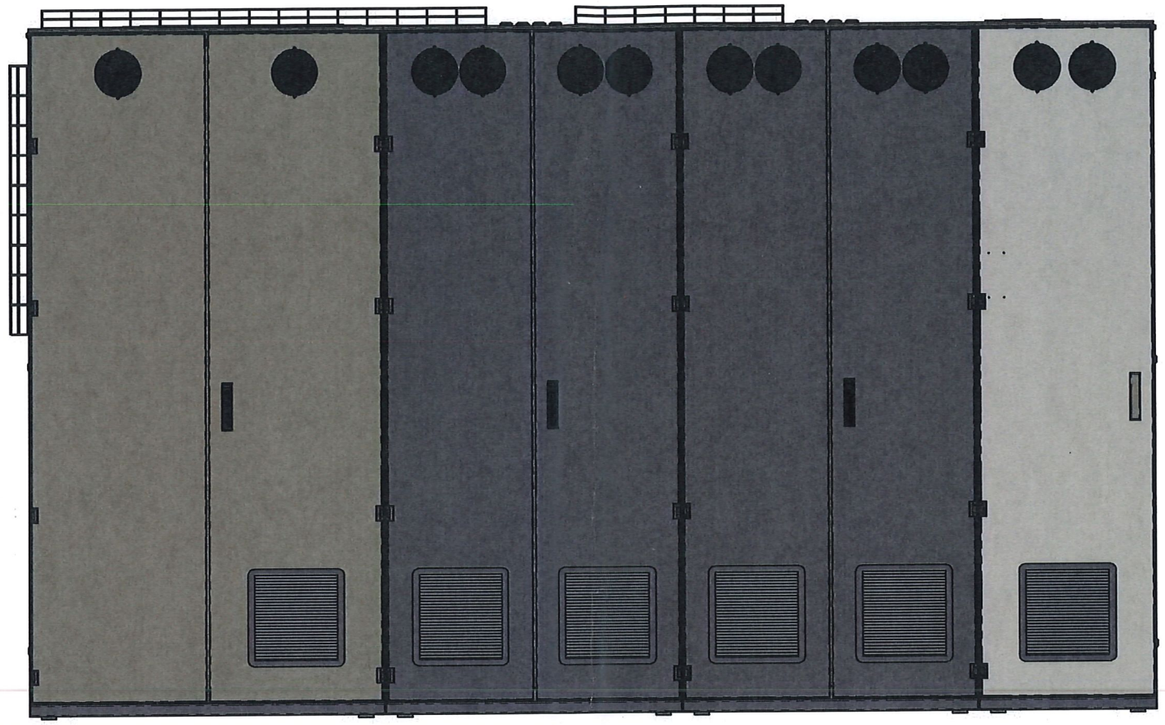


BOTTOM VIEW

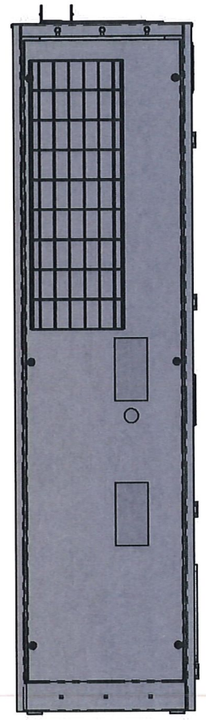
W = 5000 kg



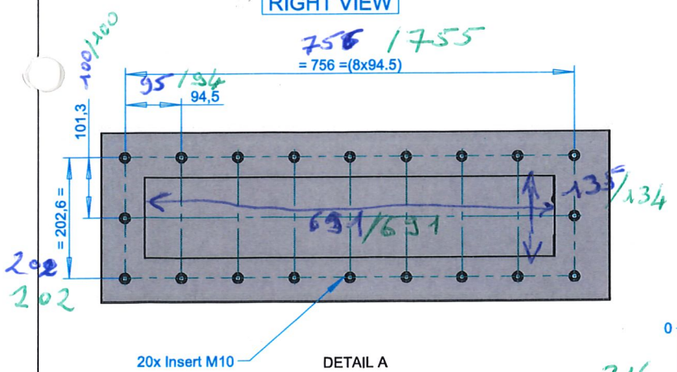
RIGHT VIEW



FRONT VIEW

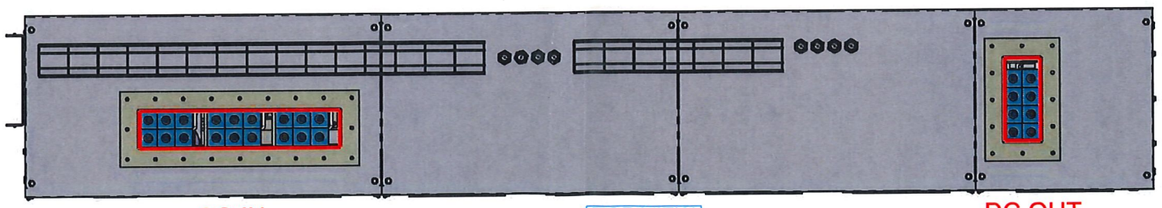


LEFT VIEW

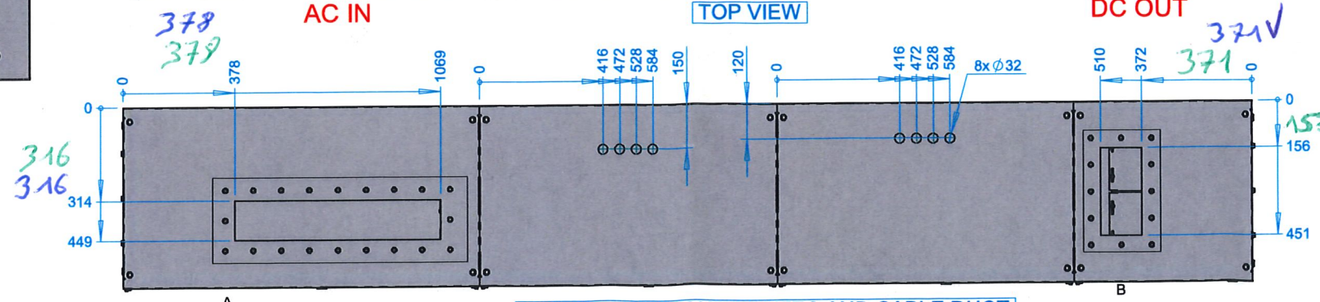


DETAIL A
SCALE 1 : 10

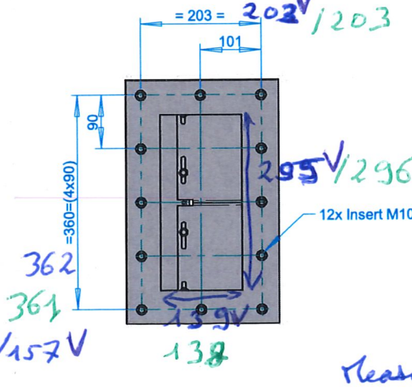
measure in A201
measure in A202



TOP VIEW



TOP VIEW WITHOUT ROXTEC AND CABLE DUCT



DETAIL B
SCALE 1 : 10

measure in A202
measure in A201

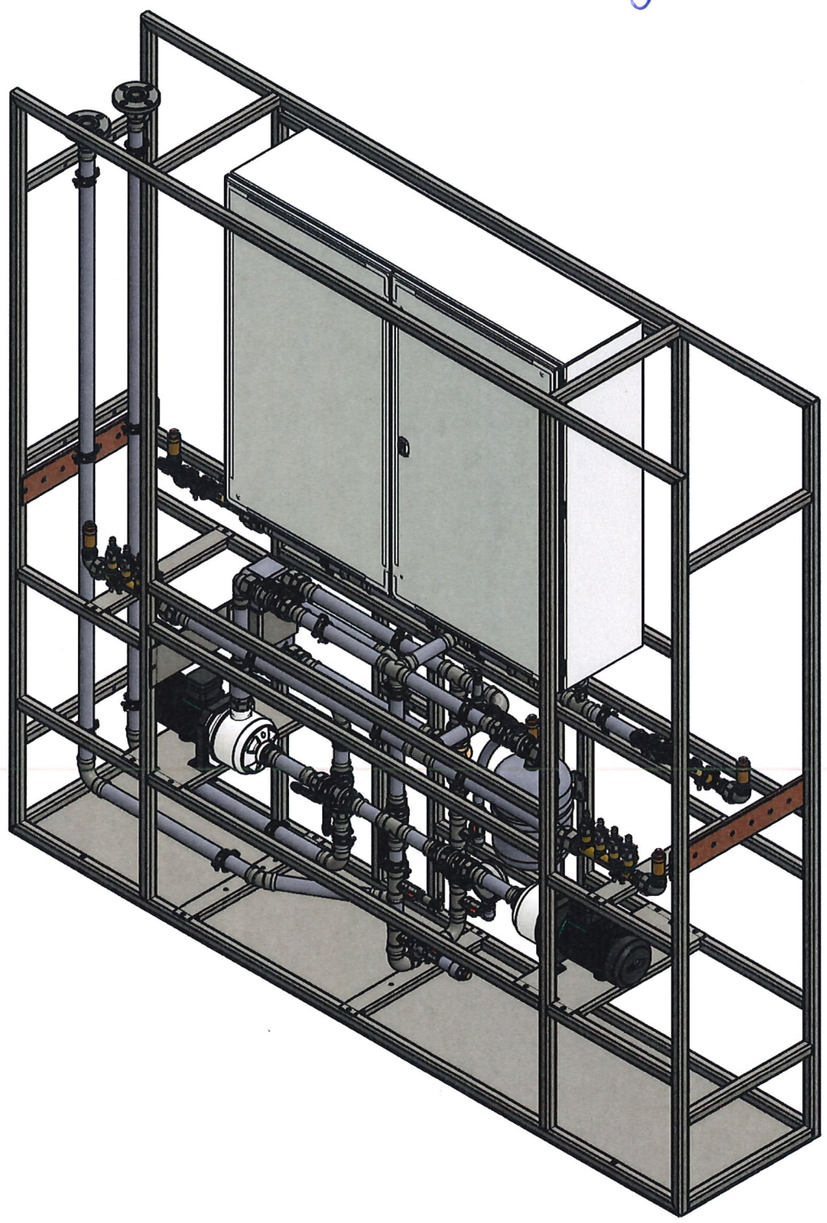
FIXING HOLES SUITABLE FOR M10 BOLT

Nidec All for dreams / elogen	INDEX / INDICE : 04	ELOGEN 2.5MW H2 ELECTROLYSER	DOC. N° / N° DOC. : 8934MED01	FOLIO 3
	DATE : 17/09/2024	EXT VIEW OF CONV CABINET	CUST. DOC. N° / N° DOC CLIENT :	SCALE / FORMAT : A3

Ech.:1:20

Emplacement du Fichier:C:\EPDM_NIDEC_ASI\BE\8934\01-AR\

kl = 1500 kg



00	CREATION	16/09/2024	C. VEROT	16/09/2024	JP. CHOVET
INDEX	MODIFICATION	DATE	DRAWN	DATE	CHECKED

Nidec

All for dreams

NIDEC ASI S.A.

Z.I DU BUISSON
5 RUE MARC SEGUIN
42230 ROCHE LA MOLIERE
FRANCE

elogen

ELOGEN

8 AVENUE DU PARANA
91940 LES ULIS
FRANCE

ELOGEN

2.5 MW H2 ELECTROLYSER

MECHANICAL DRAWINGS

DOC. N° / N° DOC. :
8934MED02

CUST. DOC. N° / N° DOC. CLIENT :
-

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EAT COPY
CROSSWIND
A. MAMBERTI
30/09/2024

ELOGEN
H. HAMMAMI
30/09/24

Adamou. H
Aissata NIDEC
30/09/24

SHEET / PAGE	DESIGNATION	MODIFICATION / MODIFICATIONS									
		00	01	02	03	04	05	06	07	08	09
01	FRONT PAGE	X									
02	TABLE OF CONTENTS	X									
03	GENERAL ARRANGEMENT & DIMENSIONS	X									
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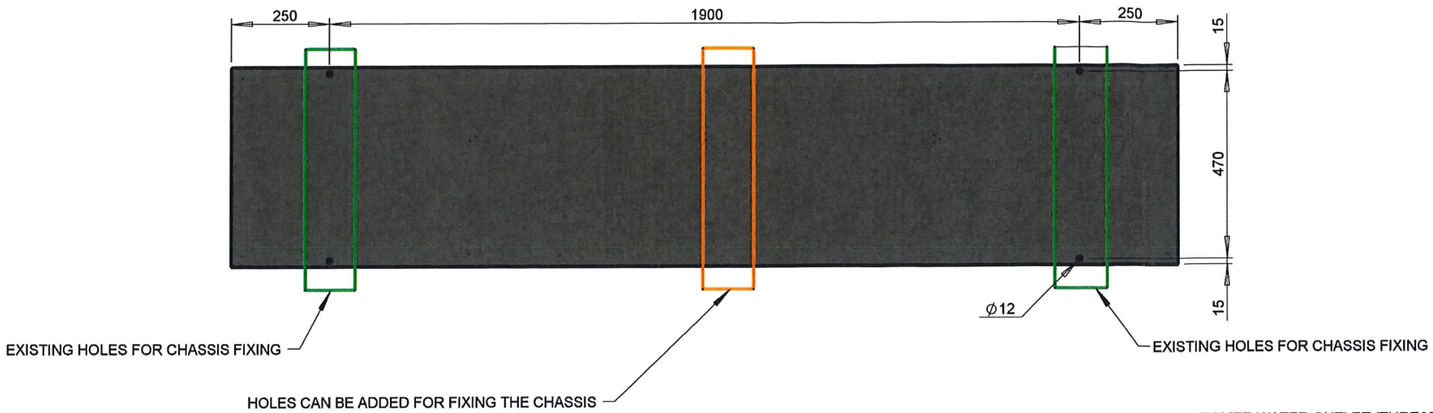
Nidec All for dreams

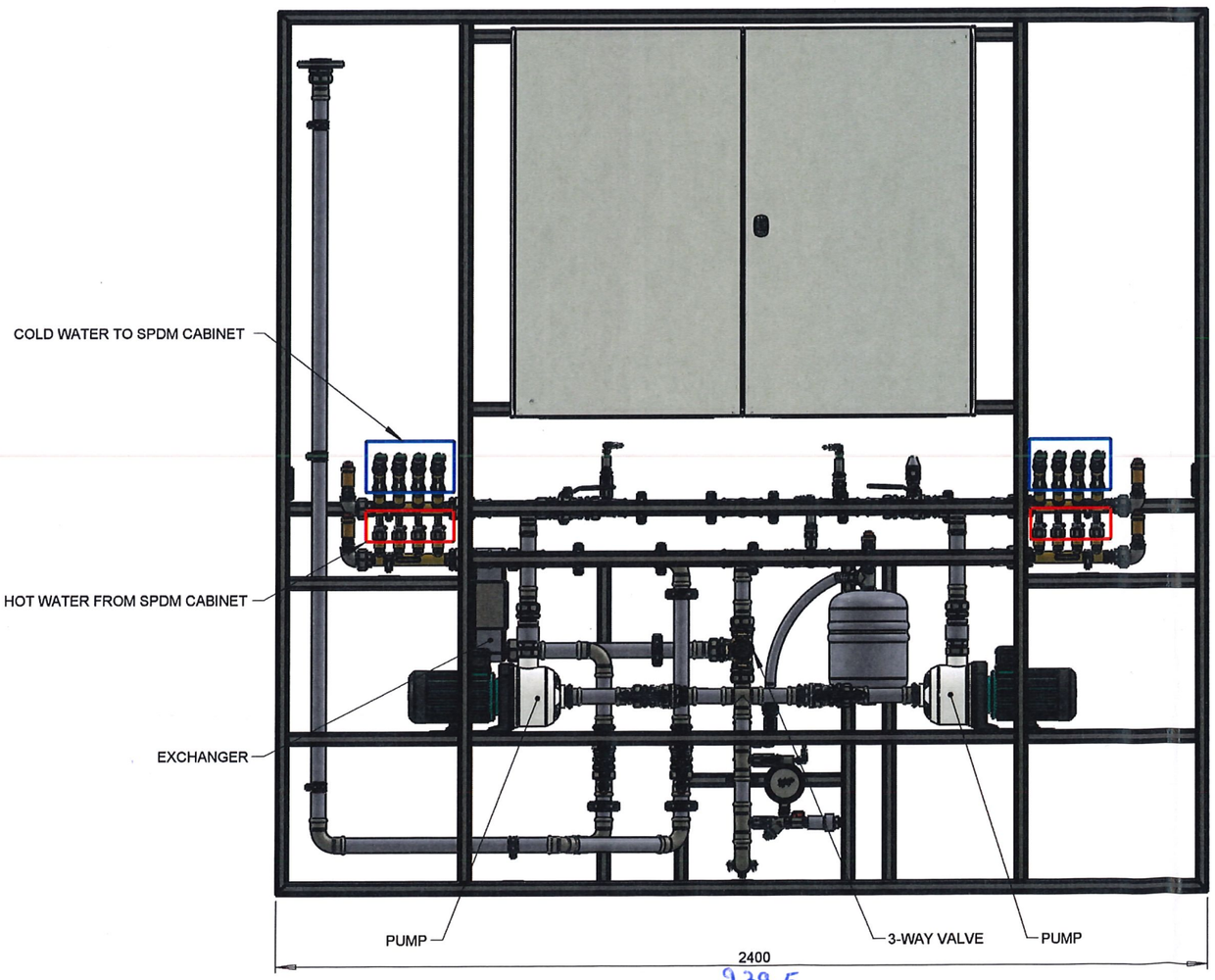
elogen

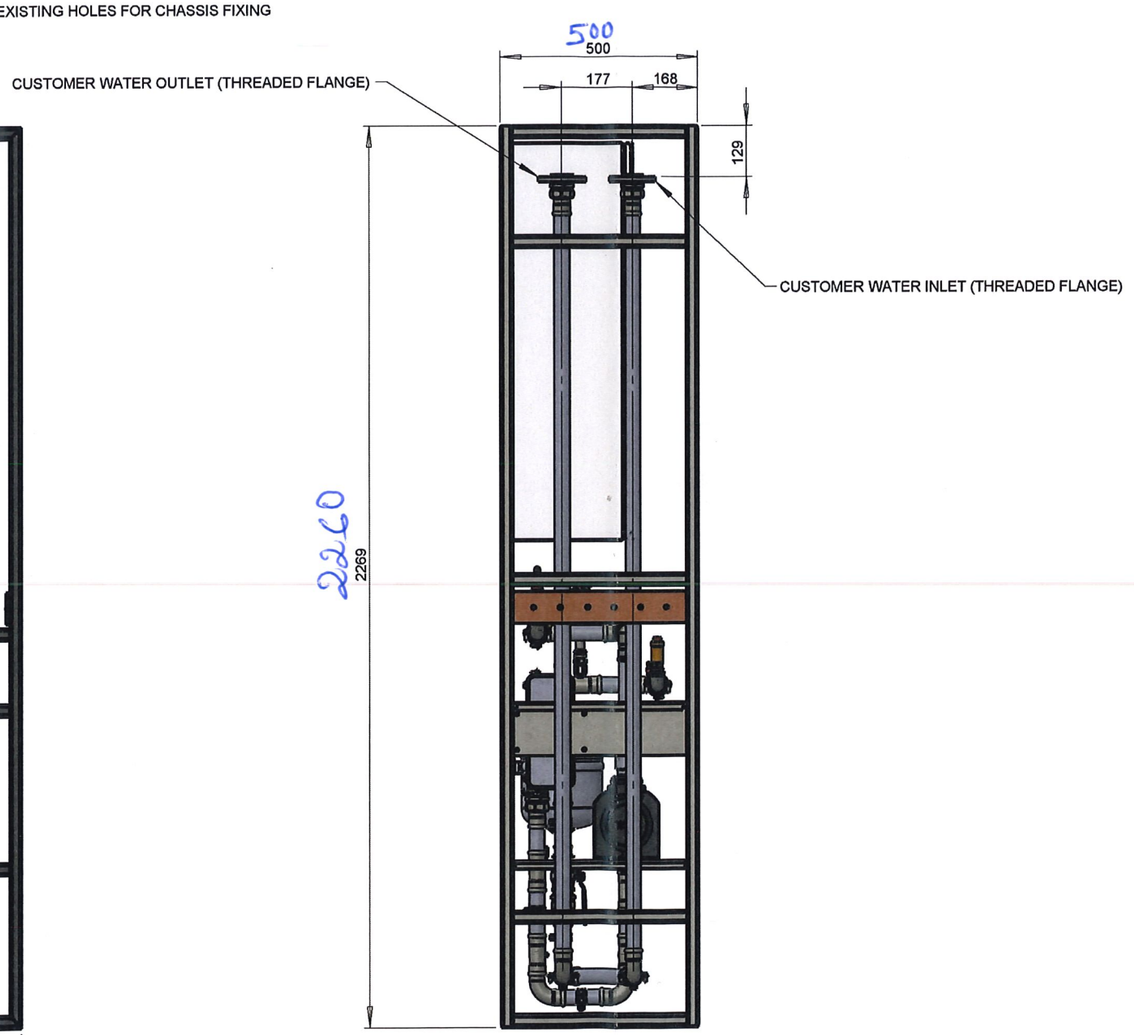
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DATE : 16/09/2024	TABLE OF CONTENTS	CUST. DOC. N° / N° DOC CLIENT :	SCALE / FORMAT : A3

Emplacement du Fichier:C:\EPDM_NIDEC_ASI\BE\8934\11-PDT\

Ech.:1:1







THE PIPEWORK AND CHASSIS ARE MADE OF STAINLESS STEEL
FIXING HOLES SUITABLE FOR M10 BOLT

Nidec All for dreams	elogen	INDEX / INDICE : 00	ELOGEN 2.5 MW H2 ELECTROLYSER	DOC. N° / N° DOC. : 8934MED02	FOLIO 3
		DATE : 16/09/2024	GENERAL ARRANGEMENT & DIMEN.	CUST. DOC. N° / N° DOC CLIENT :	SCALE / FORMAT : A3

Emplacement du Fichier:C:\EPDM_NIDEC_AS\BE\8934\11-PDT\

Ech.:1:15

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

From Customer HV substation

6,6kV network

Transformer

Transformer Dy11y11 KNAN
6,6kV+/-2x2,5% off load
2x 360V / 2x270V
2x 1,6MVA / 2x 1,2MVA
UCC 7%

P1 S1 S2

DGPT2 to Safety relay & PLC

FAT COPY
CROSS CHECKED
A. ADAMOU BELLO
30/09/2024

Elogen
Mohamed Haji

Adamou. H
Aissata
NIDEC

test connection

insulation test

From Customer

230Vac UPS 2KVA | 230Vac Aux. 3KVA | 400Vac Aux. 4KVA

From Control cabinet

230Vac UPS | 230Vac

230Vac UPS

230Vac

400Vac I/O

Control cabinet

Cooling system

360V / 270V - Isc=40kA (ACU)

-Q OFF -QF OFF -QF 125A 125A gF OFF -Q M Setting : 2500A UV OFF -QF OFF IMD OFF

Surge Arrester

insulation test

360V / 540V (270V / 405V) 17kVA

SPDM030H

4mH 20A

3x 1280µF

100µH 100µH 100µH 100µH

24VDC 230VAC

-U SYNCHRO AUX. CTRL AD5W 4x740J

OFF

-Q 1600A OFF -QF OFF K R

Discharge resistor

Polarization 650V max

PCS cabinet 1

PCS cabinet 2

E500
1478A
610-1027V
Stack 01 to 04

E500
1478A
610-1027V
Stack 05 to 08

insulation test

test connection

REV.	DATE	MODIFICATION	DES.
02	26/09/2024	AS BUILT	NIDEC
01	28/11/2023	UPDATED	NIDEC
00	09/11/2023	FIRST ISSUE	NIDEC

Nidec -All for dreams

N° Document : 8934SLD01

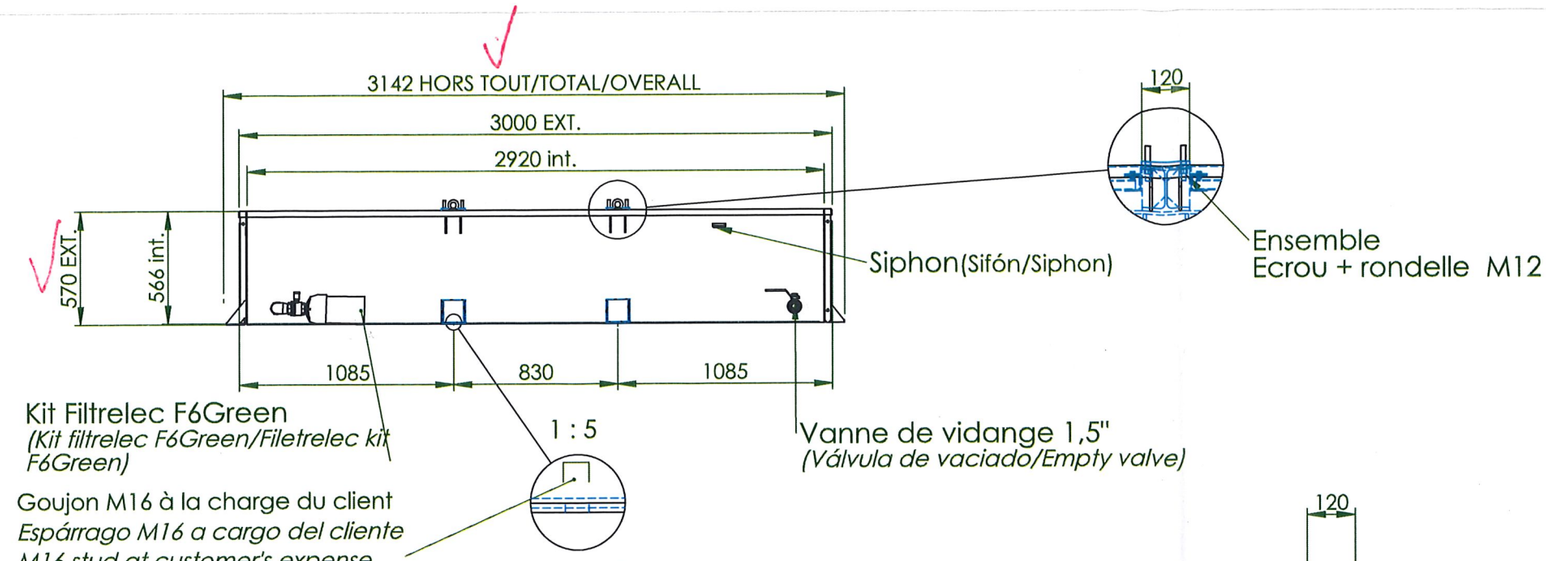
N° Document : C63–NID-ELO–SLD01

LOC.

C63 - 2,5 MW Transformer Rectifier for E500 Electrolyser
SINGLE LINE DIAGRAM

Sheet 001

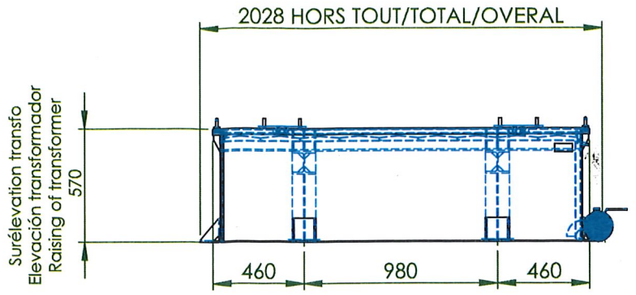
Software Autocad



Kit Filtrelec F6Green
(Kit filtrelec F6Green/Filetrelec kit F6Green)

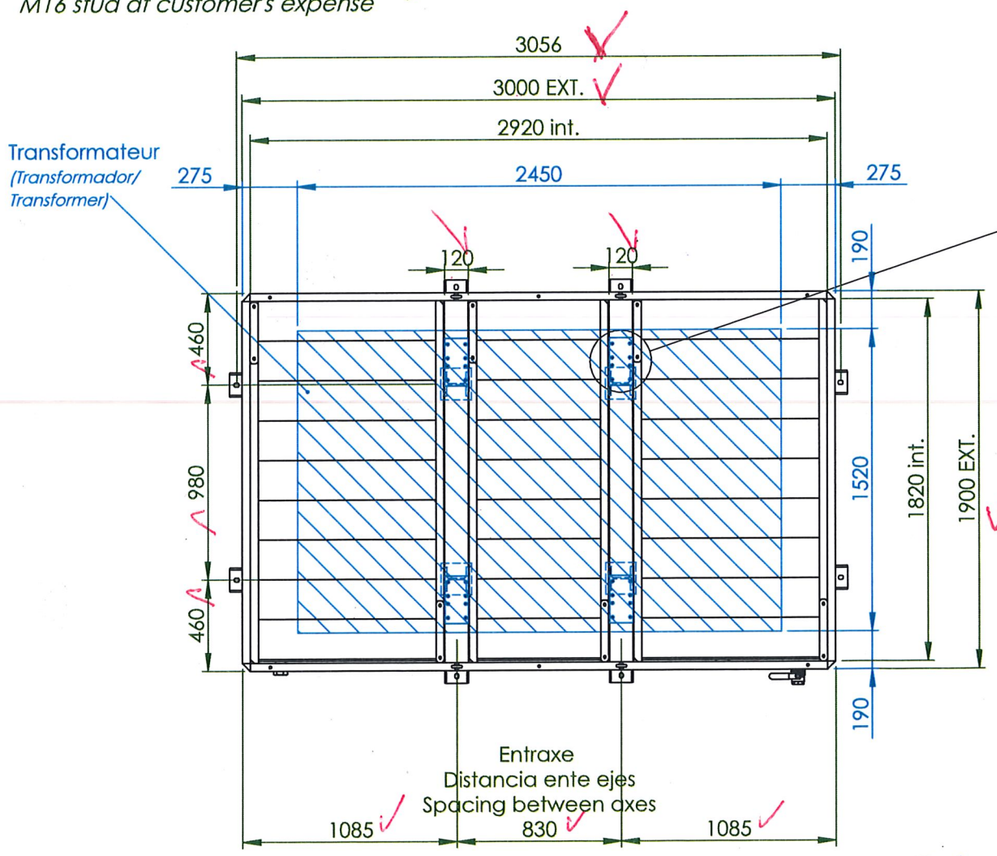
Goujon M16 à la charge du client
Espárrago M16 a cargo del cliente
M16 stud at customer's expense

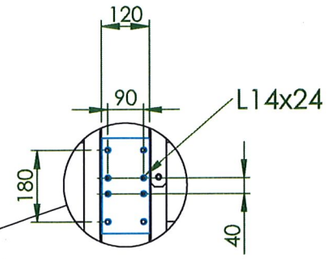
Vanne de vidange 1,5"
(Válvula de vaciado/Empty valve)



ELOGEN
H. HAMDANI
30/09/2024

FAT COPY
CROSSWIND
A.MAMBEZU
30/09/2024





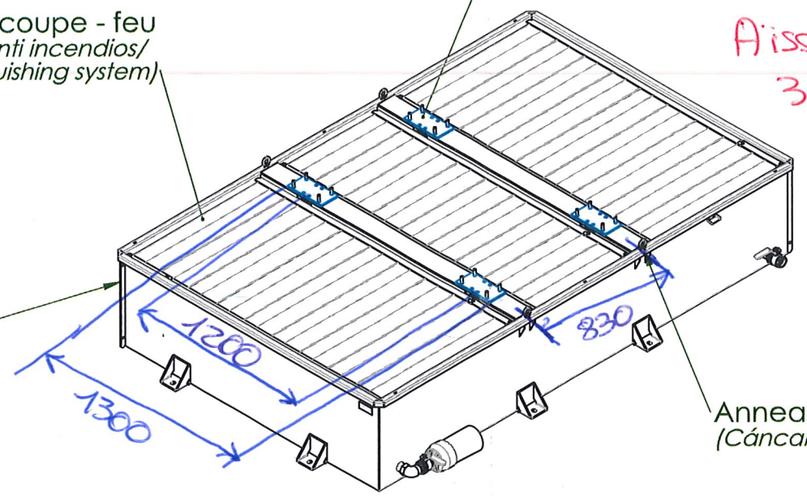
Platine fixation plots anti-vibration

Platine fixation plots anti-vibration

ADAMOU. H
Aissata NIDEC
30/09/2024

Système coupe - feu
(Sistema anti incendios/
Fire extinguishing system)

Plat de MALT
(Pasamano de puesta a tierra/
Earthing plate)



Anneau de levage
(Cáncamo/Lifting eyebolt)

815 kg
(with anti-vibration).

Le transformateur doit être gruté
(El transformador debe ser colocado con una grúa/
The transformer must be installed with a crane)

GALVANISE A CHAUD RENFORCEE (GALVANIZADO EN CALIENTE REFORZADO/REINFORCED HOT DIP GALVANIZED)
MASSE TOTALE A VIDE (MASA TOTAL EN VACÍO/TOTAL UNLADEN WEIGHT) : 763 kg
VOLUME UTILE *(VOLUMEN UTIL/USEFUL VOLUME)*: 2513 L
CHARGE MAX ADMISSIBLE *(CARGA MAX ADMISIBLE/MAX. LOAD CAPACITY)* : 7.83T
CHARGE TRANSFO *(CARGA TRANSFO/TRANSFORMER LOAD)*: 7.83T

Tolérances de positionnement et dimensionnelle selon norme ISO 13920
(Tolerancias de posicionamiento y dimensional según norma ISO 13920/
Positioning and dimensional tolerances according to standard ISO 13920)

GMT	PLAN CLIENT *(PLANO CLIENTE/GENERAL ASSEMBLY DRAWING)*	Rep *(Ref/Ref)*: -	Unités *(Unidades/Units)*: mm
	Série *(Serie/Series)*: BAFX1 - NIDEC(42) - INSTALLATION 8934 ELOGEN	N ASP24021	5/6
	Matériau *(Material/Material)*: GALVA.	ABCD....	
	Dessinateur *(Delineante/Designer)*: KTZ — Affaire *(Proyecto/Project)*: G2311013		
Echelle *(Escala/Scale)*: 1:50	A4		

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Révision	Description	Prepared by	Date	Validated by	Date
01	Second release	JP CHOVET	18/09/2024	P. ROYER	18/09/2024
00	First edition	JP CHOVET	03/11/2023	P. ROYER	03/11/2023

Nidec
All for dreams

NIDEC ASI S.A.
Z.I. DU BUISSON
5, RUE MARC SEGUIN
42230 ROCHE LA MOLIERE
FRANCE

elogen

ELOGEN
8, AVENUE DU PARANA
91940 IES ULIS
France

ELOGEN 2.5MW H2 Electrolyser

NIDEC document reference :	QUALITY CONTROL PLAN
8934QCP01	
CUSTOMER document reference :	
C63-NID-ELO-QCP01	

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CROSSWIND A. MAMBELLI 30/09/2024

Hassan HAYMANI ELOGEN

Adamou Aissata NIDEC 30/09/24

Nidec
All for dreams

QUALITY CONTROL PLAN

I. FAT (PRODUCTION & TEST) / *FAT (PRODUCTION & TESTS)*

N° / *Nr.*	Vérification / *Inspection tests*	Echantillonnage / *Sampling*	Essai / organisation - Type de vérification / *Test / control organization - Type of check* V (Contrôle visuel / *Visual inspection*) / D (Contrôle dimensionnel / *Dimensional inspection*) / I (Contrôle instrumentaux / *Instrumental check*) / F (Essai fonctionnel / *Functional test*) / Q (Documentation et enregistrement qualité / *Documentation and quality records check*) / H (Point d'arrêt / *Hold point*) / W (Présence Client / *Witness*)				Enregistrement qualité / *Quality record*	
			Où a été fait le contrôle ? / *Where has the control been done?*	Qui a fait le contrôle ? / *Who has done the control?*	NIDEC ASI France	Client / *Customer*	Document d'entrée / *Input document*	Document interne et/ou fournisseur / *Internal &/or Subcontractor document*
I.1	**ARMOIRES PUISSANCE UAX (CONVERSION) / *UAX POWER CABINETS (CONVERSION)***							
I.1.1	Contrôle de l'armoire AC/DC 1 / *AC/DC inverter cabinet 1 checking*	100%	NIDEC ASI	NIDEC ASI / (ALS)	I, F Q	Q	Detailed electrical drawing of one converter unit 8934DED01	8934FAT00 Procedure of AC/DC conversion cabinets Hardware and live tests (ACX)
I.1.2	Contrôle de l'armoire AC/DC 2 / *AC/DC inverter cabinet 2 checking*	100%	NIDEC ASI	NIDEC ASI / (ALS)	I, F Q	Q	Detailed electrical drawing of one converter unit 8934DED01	8934FAT00 Procedure of AC/DC conversion cabinets Hardware and live tests (ACX)
I.1.3	Contrôle de l'armoire de contrôle/ *Coontrole cabinet checking*	100%	NIDEC ASI	NIDEC ASI / (ALS)	I, F Q	Q	Detailed electrical drawing of one converter unit 8934DED01	8934FAT00 Procedure of AC/DC conversion cabinets Hardware and live tests (ACX)
I.2	**AUTRES EQUIPEMENTS / *OTHER EQUIPEMENTS***							
I.2.1	Transformateur HT/BT / *Step up transformers*	100%	CELME	CELME	Q	Q	Commande N°600045206 / Purchase order Nb 600045206	8934 NXTRX Routine tests report
I.2.2	Contrôle Armoire Hydraulique / *Complet water circuit of cooling system (checking*	100%	SUB-CONTRACTOR NIDEC ASI	SUB-CONTRACTOR NIDEC ASI	V, D, I, F Q, H	Q	Hydraulic synoptic 8934HS01	8934 NX 01 Skid checks & Water circuit pressure test report
I.2.3	Disjoncteur AC *AC Circuit breaker*	100%	LS ELECTRIC	LS ELECTRIC	Q	Q	Commande N°600047592 / Purchase order Nb	8934 N1CB1 Routine tests report 8934 N2CB1 Routine tests report
I.2.4	Interrupteur DC *DC Switch*	100%	LS ELECTRIC	LS ELECTRIC	Q	Q	Commande N° 600047592 / Purchase order Nb 600047592	8934 N1SW1 Routine tests report 8934 N2SW1 Routine tests report
I.2.5	VARIATEUR DC *DC Drive*	100%	NIDEC ASI SPA	NIDEC ASI SPA	Q	Q	Commande N°600046029 / Purchase order Nb 600046029	8934 N1DRV1 Routine tests report 8934N1DRV2 Routine tests report 8934 N1DRV3 Routine tests report 8934 N1DRV4 Routine tests report 8934 N2DRV1 Routine tests report 8934N2DRV2 Routine tests report 8934 N2DRV3 Routine tests report 8934 N2DRV4 Routine tests report
I.3	**TESTS FONCTIONNELS GENERAUX / *GENERALFUNCTIONAL TESTS***							
I.3.1	Tests fonctionnels / *Functional tests*	100%	NIDEC ASI	NIDEC ASI / AAI	F Q, H	Q H, W	Functional analysis 8934AFD01	8934FAT00 Procedure of conversion container hardware and functional tests (NX)
I.4	**CONTRÔLE FINAL AVANT EXPEDITION / *FINAL INSPECTION BEFORE SHIPPING***							
I.4.1	Contrôle du conditionnement / *Packing inspection*	100%	NIDEC ASI France	Internal manpower	V	Q	Packing lists 8934PL01	8934CLBS01 Equipment check List

00	First release	A.ADAMOU	07/10/2024	C.DANIEL	09/10/2024
Révision	**Description**	**Préparé par**	**Date**	**Validé par**	**Date**

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8934 - ELOGEN 2x1 MW DC rectifier for hydrogen VEO

NIDEC document reference :	**FACTORY ACCEPTANCE TESTS** **Annex: Remarks & Comments**
8934FAT00	
CUSTOMER document reference :	
C63-NID-ELO-FAT00	

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Identification équipement (armoire, pupitre, coffret) / Equipment identification (cabinet, desk, box) : A201, A202, A300 & A500				Dossier de recettes / *Checking file*		8934FAT
N° d'affaire / Business Nr. : 8934	Client / *Customer* : ELOGEN	Date / *Date* :	Contrôleur / *Controller* :	Contrôleur / *Controller* :	Date / *Date* :	Vérificateur / *Auditor* :	
		30/09/2024	ELOGEN/CROSSWIND	NIDEC	02/10/2024	NIDEC	

IDENTIFIEES PAR: / *IDENTIFIED BY:* ELOGEN/CROSSIND during witnessed FAT (IR-01-C63-NIDEC document)		REMARQUES / ACTIONS A MENER *REMARKS / ACTIONS TO BE TAKEN*			SOLDEES PAR: / *DONE BY:*	
NOM: / NAME:	DATE: / DATE:	RESPONSABLE/ RESPONSIBLE	Descriptif	Correction	NOM: / *NAME:*	DATE: / *DATE:*
IR-01-C63-NIDEC	01/10/2024	NIDEC	Nidec to add two earthing bar on top of HCU cabinet, close to A500 control panel with relevant TAG numbers according to the documentation		NIDEC	02/10/2024
IR-01-C63-NIDEC	01/10/2024	NIDEC	Nidec to provide grounding jumper on reactor tags: 030L1, 030L2, 030L4, 060L2, 060L3, 060L4		NIDEC	02/10/2024
IR-01-C63-NIDEC	01/10/2024	NIDEC	Nidec to add plexiglass cover protection on discharge resistors and warning label from heating risk.		NIDEC	02/10/2024
IR-01-C63-NIDEC	01/10/2024	NIDEC	Nidec to add nr1 document holder pocket inside A500 Control Panel		NIDEC	02/10/2024

IR-01-C63-NIDEC	01/10/2024	NIDEC	Nidec to add tag number on circuit breaker 053Q1 on cabinet A202		NIDEC	02/10/2024
IR-01-C63-NIDEC	01/10/2024	NIDEC	NIDEC to provide nr 5 M20, nr 3 M25, nr 5 M32, holes on top right of A500 control panel, with cable glands		NIDEC	02/10/2024
IR-01-C63-NIDEC	01/10/2024	NIDEC	NIDEC to provide nr 4 additionnal and brand new rectifier's panel covers for MCT installation, they will be send separate to fores (address Fores Engeneering Srl, Via Secondo Casadei,12, 47122 Forli FC Italy, reference person Matteo Zanellato tel no +39 335-399601), in order to be laser cutted by Fores if needed	4 additional and brand new panel covers have been ordered and will be delivered to Fores in Italy.	NIDEC	02/10/2024
IR-01-C63-NIDEC	01/10/2024	NIDEC	Transformer antivibration mounts do not match with the holes on the top plate, manifacturer to inform how to proceed with the installation	You need to use screws whose active threaded part (entering the plate) is 15 mm long, to make sure you don't hit and stress the rubber. So by using M12 screws 35mm long + 3mm washer (transformer foot thickness 20mm).	NIDEC	08/10/2024

C63-QIX-NID-002

FAT TRANSFORMER NIDEC

01	*1st Issue*	*22-OCT-2024*	*NID*	*IDI*	*LDG*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Client Document Number	**ELO-INN-BPH-RPT-00019**

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Italy, Montebello Vicentino, October 4th , 2024

FACTORY ACCEPTANCE TEST – FINAL REPORT

Celme' order confirmation: **23/00084**
Customer order no: **600045206 Change 5**
Customer: **Nidec ASI S.A.S.**
Project name: **8934**
Transformer under tests:

Model: **TOD3176.001** Serial number: **60258**

T no.	*Sno*	*DESCRIPTION*	*Result*
1	60258	Separate source AC withstand voltage (AV)	passed
2	60258	Short duration induced AC withstand voltage (IVW)	passed
3	60258	Measurement of no-load loss and current	passed
4	60258	Measurement of no-load loss and current at 90 % and 110 % of rated voltage	measured
5	60258	Measurement of winding resistance	measured
6	60258	Measurement of short-circuit impedance and load loss	passed
7	60258	Measurement of voltage ratio and check of phase displacement	passed
8	60258	Auxiliaries: functionality	passed
9	60258	Dimensional Check / Overall Visual Check	passed

Test reviewed

10	60258	Check of core and frame insulation	done during production
11	60258	Fluid leak test under pressure	done during production

FAT outcome: ***SUCCESSFUL***

Attendees:

Company	*Name*	*Position*	*Date*	*Stamp / Signature*
Nidec ASI S.A.S	Aissata Adamou Hassane	Project Manager	04/10/2024	
ELOGEN	Mohamed HAJI	Electrical Engineer	04/10/2024	
ELOGEN	Hassan Hammami	Quality Engineer	04/10/2024	
CROSS WIND	Alberto Mambelli	Electrical Engineer	04/10/2024	
CROSS WIND	Matteo Zanellato	Construction Manager	04/10/2024	
celme	Chiara Vezzaro	Project Manager	04/10/2024	
celme	Luciano Gallina	EE	04/10/2024	

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Attached documents (index):

Doc	Sno	Description	Page no.
1	-	FACTORY ACCEPTANCE TEST – FINAL REPORT	1
2	-	Agenda	4
3	60258	Routine test report	5
4	60258	PEI & kPEI CALCULATION note	6
5	60258	Dimensional Check / Overall Visual on GA	7
6		Instruments list	11

To be noted: only the attached reports must be considered part of the official FAT report.
Any additional documents and/or pictures not agreed, are non-official.

25/09/2024 lg

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FAT AGENDA

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

Customer	**NIDEC ASI SA**
Customer PO	**600045206 Rev4 dated 05/09/2024**
Project name	**8934**
Celme Ref.	**23/00084**

LINE	XFMR	TEST*	DESCRIPTION	DATE	TIME BEGIN	TIME END
1	1	R	Separate source AC withstand voltage (AV) (11.1.2.1 e)	04/10/2024	08:30	09:00
2	1	R	Short duration induced AC withstand voltage (IVW) (11.1.2.1 e)	04/10/2024	09:00	09:30
3	1	R	Measurement of no-load loss and current (11.5)	04/10/2024	09:30	10:00
4	1	R	Measurement of winding resistance (11.2)	04/10/2024	10:00	10:30
5	1	R	Measurement of short-circuit impedance and load loss (11.4)	04/10/2024	10:30	11:30
6	1	R	Measurement of voltage ratio and check of phase displacement (11.3)	04/10/2024	11:30	12:00
7	1	R	Dimensional checking	04/10/2024	14:00	14:30
8	1	R	Auxiliaries: functionality	04/10/2024	14:30	15:00
9	1	-	Report issue, control, approvement, signature	04/10/2024	15:00	17:00
10	1	R	Fluid leak test under pressure (11.8): carried out during production (reviewed)	04/10/2024	15:00	17:00
11	1	R	Check of core and frame insulation (11.12): carried out during production; report available (reviewed)	04/10/2024	15:00	17:00

9:00 → 12:00
14:00 → 16:00

R= Routine; T= Type; S= Special

Xfmr	Type	Sno
1	TOD3176.001	60258

Rev. No	Date		Descritpion	Issued	Checked	Approved
1	24/09/2024		First issue	MZA	NMA	LGA

NOTE Program may change during FAT execution due to testing or production needs.

RR.24

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Test Report

Test performed according Standard:	CEI EN 60076	**Test Date:**	04/10/24	**Order N°:**	23/00084
Transformer type:	TOD3176.001	**Serial number :**	60258	**Customer:**	NIDEC ASI SA

Frequency [Hz]:	50	**Insulating oil:**	Natural ester Cargill FR3
Phases:	3	**Cooling:**	KNAN
Windings material:	Al	**Tap regulation:**	+2 / -2 x 2.5 %
Vector group:	Dy11y11		

Primary Windings	Power [kVA]	Voltage [V]	Current [A]
HV	3200	6600	279.9

Secondary Windings	Power [kVA]	Voltage [V]	Current [A]
LV2	1600	360	2566
LV3	1600	360	2566

INSULATION WITHSTAND TEST

Power frequency applied voltage

Winding	Test Voltage [kV]	Duration [s]
HV	20	60
LV2	3	60
LV3	3	60

Test result: PASSED

Induced voltage withstand test

Volt. Source [V]: 720 f [Hz]: 150 t [s]: 40

Test result: PASSED

MEASUREMENT OF TURNS RATIO

6600 / 360 - 270 V

Tap regulation: +2 / -2 x 2.5 %

Polarity and phase relation tests :

D y 11 : **PASSED** D y 11 : **PASSED**

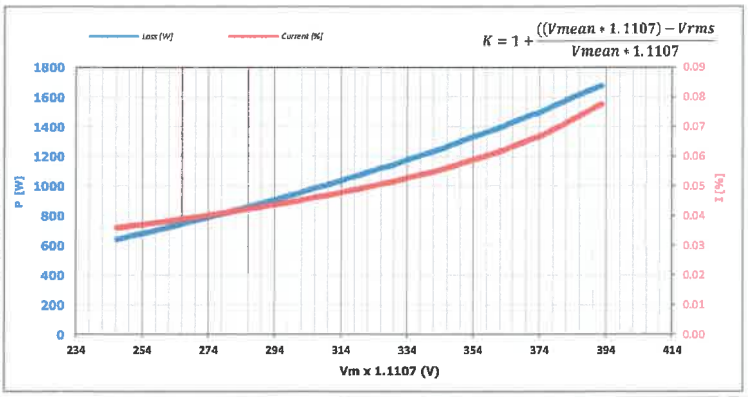
TAP Pos.	Theorical Ratio	Measured Ratio Phase U	Phase V	Phase W	Max Dev. %
1	33.34	33.41	33.42	33.41	0.225
2	32.55	32.58	32.58	32.57	0.110
3	31.75	31.74	31.75	31.74	-0.010
4	30.96	30.91	30.92	30.91	-0.140
5	30.17	30.08	30.08	30.08	-0.274
1	33.34	33.41	33.42	33.41	0.225
2	32.55	32.58	32.58	32.57	0.110
3	31.75	31.74	31.75	31.74	-0.010
4	30.96	30.91	30.92	30.91	-0.140
5	30.17	30.08	30.08	30.08	-0.274
1	44.45	44.54	44.56	44.53	0.220
2	43.40	43.43	43.44	43.42	0.110
3	42.34	42.32	42.33	42.31	-0.060
4	41.28	41.21	41.22	41.20	-0.190
5	40.22	40.10	40.11	40.09	-0.330
1	44.45	44.54	44.56	44.53	0.220
2	43.40	43.43	43.44	43.42	0.110
3	42.34	42.32	42.33	42.31	-0.070
4	41.28	41.21	41.22	41.20	-0.190
5	40.22	40.10	40.11	40.09	-0.330

MEASUREMENT OF NO-LOAD LOSS AND CURRENT

Energized winding: LV2 (360 V) f [Hz]: 50

	Phase U	Phase V	Phase W	Aver. Val.	Voltage [V]
V mean x 1.1107 [V]	359.2	361.6	359.2	360.0	357.2
Current [A]	3.3	2.5	3.4	3.1	K factor
Losses [W]	561.8	366.1	425.8		1.008

	90%	100%	110%
Losses [W]	1092.9	1364.1	1691.1
Current [%]	0.05	0.06	0.08



MEASUREMENT OF WINDINGS RESISTANCE

Test Temperature [°C]: 23.7

Tap Pos	1U-1V [Ω]	1V-1W [Ω]	1W-1U [Ω]
3	0.13084	0.13092	0.13085
	2U-2V [Ω]	2V-2W [Ω]	2W-2U [Ω]
LV2	0.00074	0.00074	0.00075
LV3	0.00079	0.00079	0.00082

MEASUREMENT OF SHORT-CIRCUIT IMPEDANCE AND LOAD LOSS

F [Hz]	Measured Current [A]				Uk [V]				Load Losses [W]				Kf		
	Iu	Iv	Iw	Im	Vuv	Vvw	Vwu	Vm	Wu	Wv	Ww	Wsum			
49.98	146.0	148.2	146.7	147.0	237.1	236.6	237.7	236.9	3625.1	3426.6	3112.0	10163.7	1.00	V at Ir [V]:	451.1
														V at Ir and fr = V at Ir x Kf [V]:	451.4
														Losses at In [W]:	36830.3

Ambient Temperature [°C]:	23.7	**Reference Temperature [°C]:**	75	**Component X [%]:**	6.74
Winding Resistance HV [Ω]:	0.13087	**Winding Resistance HV [Ω]:**	0.15786	**Component R [%]:**	1.32
Winding Resistance LV2 [Ω]:	0.000745	**Winding Resistance LV2 [Ω]:**	0.000898	**Impedance Z [%]**	6.87
Winding Resistance LV3 [Ω]:	0.000797	**Winding Resistance LV3 [Ω]:**	0.000962	**Power factor:**	0.19
Total Ohmic losses [W]:	30614.3	**Total Ohmic losses [W]:**	36929.2		
Additional losses [W]:	6216.0	**Additional losses [W]:**	5154.1		
Load losses [W]:	36830.3	**Load losses [W]:**	42083.2		

- Leak test with pressure: 15 kPa for 8 h: PASSED (Performed during production)
- Auxiliaries dielectric: 2 kV for 60": PASSED
- Functional check of auxiliaries and tap-changer: PASSED
- Core and frame insulation (§ 11.12): checked at 500V d.c. for 60s without breakdown: PASSED (Performed during production)

TEST SUMMARY

	No-load loss [W]	No-load current [%]	Load loss [W]	Short-circuit imp. 1-2/3 [%]	Short-circuit imp. 1-2 [%]	Short-circuit imp. 1-3 [%]
Guaranteed	1400	0.5	42000	7.00	7.00	7.00
Tollerance [%]	15	30	15	+0 -10	+0 -10	+0 -10
Measured	1364.1	0.06	42083.2	6.87	6.58	6.54
Difference [%]	-2.6	-88.0	0.2	-1.9	-6.1	-6.5

Test result: PASSED

THE CUSTOMER **TESTED BY**

COMPLIED WITH THE NORM

Celme S.r.l.

celme	TEST REPORT	23/00084 revision A/2

PEI & kPEI CALCULATION

Standard: EU 548/2014, EU 1783-2019

Transformer ref.

Des	*Value*	*Des*	*Value*
Rated power (Sn) [kVA]	**3200**	P.O.	**23/00084**
Primary Voltage (1U) [V]	6600 ±2x2,5	TRF sno	60258
Secondary (2u) [V]	360/270	Type	TOD3176.001
Tertiary (3u) [V]	360/270	Vector group	Dyn11y11

Formulae

$$PEI = 1 - \frac{2(P_0 + P_{c0} + P_{ck}(k_{PEI}))}{S_r\sqrt{\frac{P_0 + P_{c0} + P_{ck}(k_{PEI})}{P_k}}} = 1 - \frac{2}{S_r}\sqrt{(P_0 + P_{c0} + P_{ck}(k_{PEI}))P_k}\ (\%)$$

Where:

P_0	is the no load losses measured at rated voltage and rated frequency on the rated tap
P_{c0}	is the electrical power required by the cooling system for no load operation, derived from the type test measurements of the power taken by the fan and liquid pump motors (for ONAN and ONAN/ONAF cooling systems P_{c0} is always zero)
P_{ck} (k_{PEI})	is the electrical power required by the cooling system in addition to P_{c0} to operate at k_{PEI} times the rated load. P_{ck} is a function of the load. P_{ck} (k_{PEI}) is derived from the type test measurements of the power taken by the fan and liquid pump motors (for ONAN cooling systems P_{ck} is always zero).
P_k	is the measured load loss at rated current and rated frequency on the rated tap corrected to the reference temperature
S_r	is the rated power of the transformer or autotransformer on which P_k is based
k_{PEI}	is the load factor at which Peak Efficiency Index occurs';

Measuring & Calculation

Po [W]	Pco [W]	Pck(kPEI) [W]	Pk +75°C [W]	Ptot [W]	PEI meas [%]	Tier	PEI min [%]	kPEI
1364,1	0	0	42093	43457,1	99,526	2	99,519	0,18

Acceptance criteria: PEI meas > PEI min

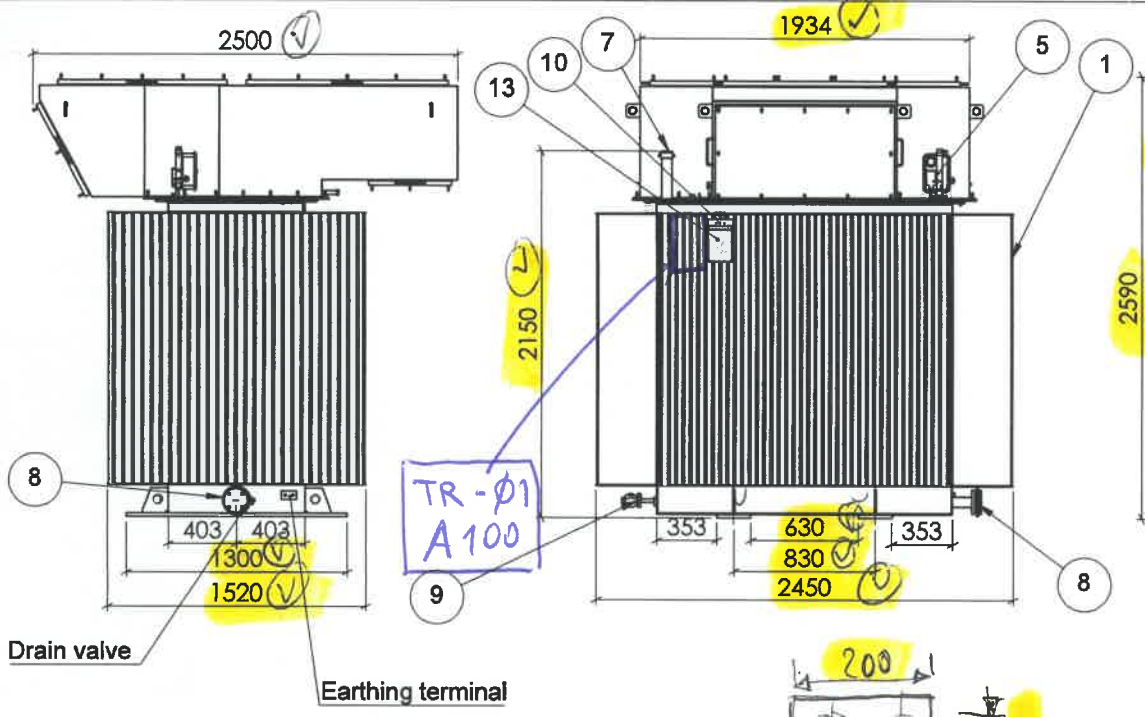
Result: **COMPLIANCE**

Note -

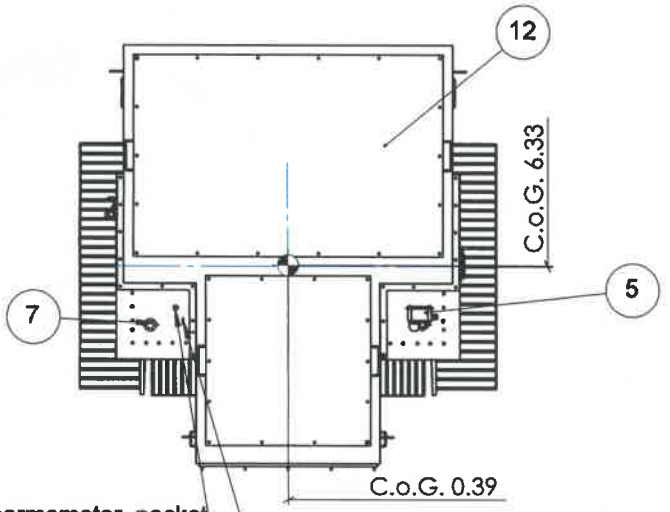
Instruments Celme Testing room

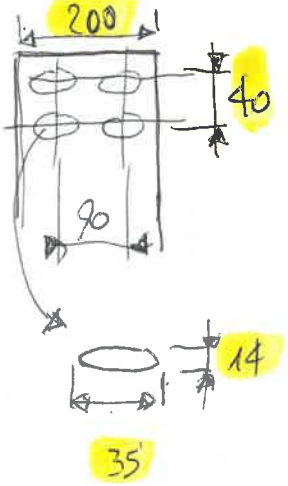
Test date	Technician	Checked	Approved
04/10/2024	MZA	LGA	LGA

FAT 09/10/24



Bushing	Voltage [V]
1U-1V-1W	6600
2u-2v-2w	360
2u'-2v'-2w'	270
3u-3v-3w	360
3u'-3v'-3w'	270





OIL MASS	2220 [kg]
DRY MASS	5880 [kg]
TOTAL MASS	8100 [kg]

Other data on technical data sheet

Pos.	Description	Q.ty
13	Rating Plate	1
12	Protection box AISI 304	1
11	Surge arrester	1
10	Standard rating plate support	1
9	Gate sample valve 1/2" DN15 PN6 lockable	1
8	Intercepting valve DN50 - PN6	1
7	Oil filling plug G2	1
6	Tap-changer type 24kV 120A 5 pos.	1
5	Integrated safety detector DGPT2 with PT100	1
4	Bushing type 1 kV - 3150A with flag - tinned	12
3	Bushing type EN 50180 36kV - 630A M400AR-3	3
2	Cover	1
1	Tank	1

C.o.G. = Center of Gravity

Tolerance in according with EN-22768 ISO-2768

From 0,5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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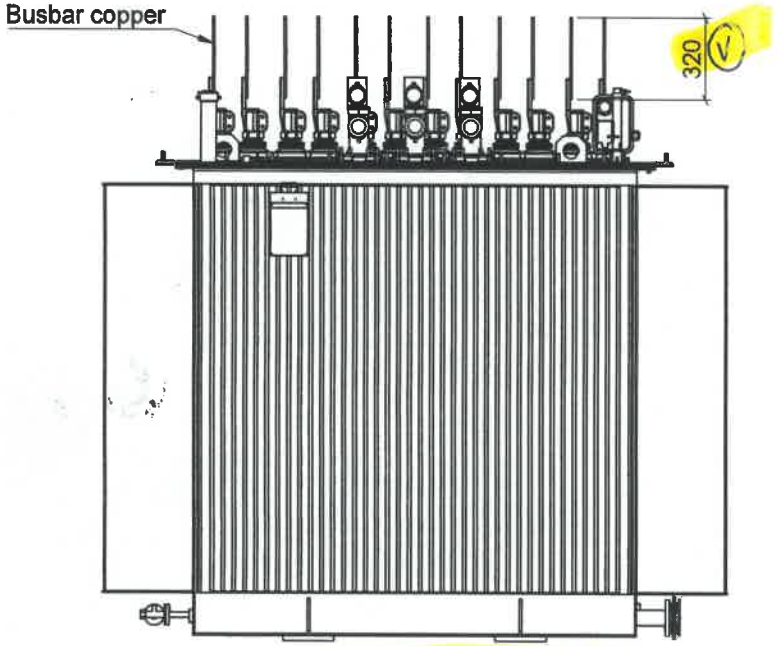
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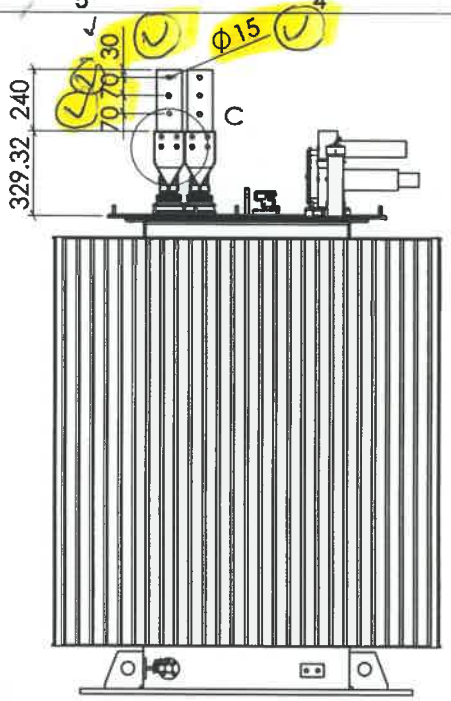
FORMAT	CODE	REV.
A3	TOD3176.V001	D

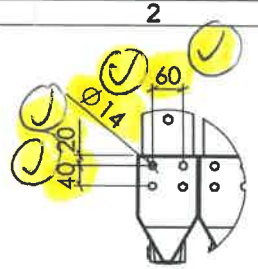
SCALE	TOT MASS	SHEET
1:30	8100 [kg]	1 / 4

PS.07

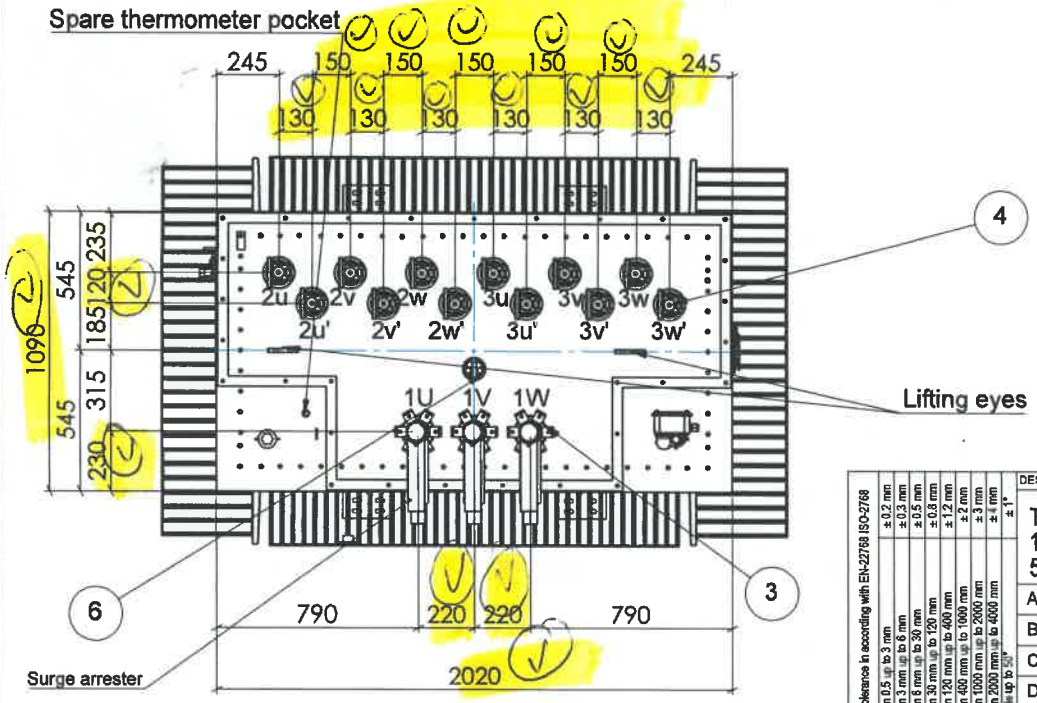
FAT 04/10/24







Detail C Scale 1:10



DGPT2 check

T1 : ✓

T2 : ✓

pressure : ✓

Gas : ✓

Pt100 : 109,7 Ω

pasted

Tolerance in according with EN-22768 ISO-2768	
From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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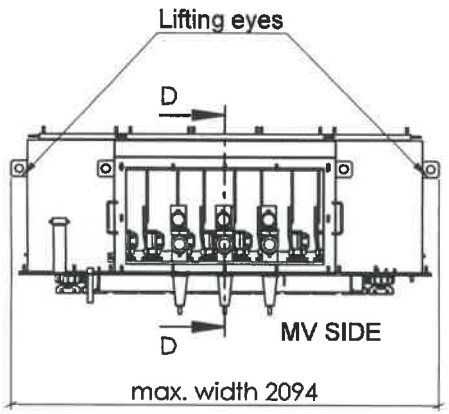
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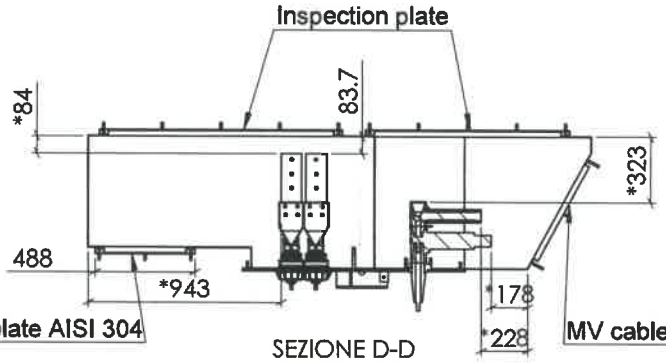
FORMAT	CODE	REV.
A3	TOD3176.V001	D

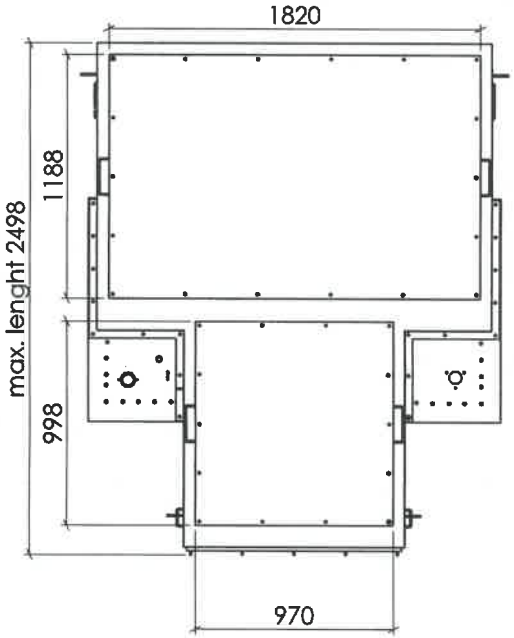
SCALE	TOT MASS	SHEET
1:20	8100 [kg]	2 / 4

PR08

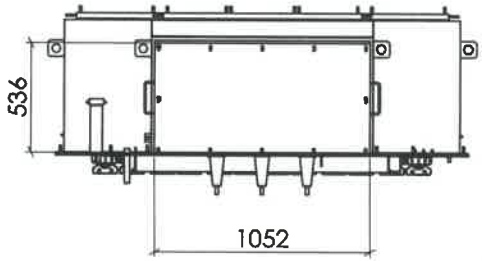
04/10/24

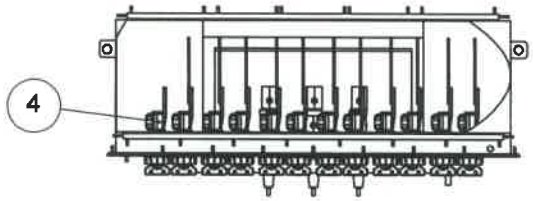






***= minimum air clearances**





Tolerance in according with EN-22768 ISO-2768	
From 0,5 up to 3 mm	± 0,2 mm
From 3 mm up to 6 mm	± 0,3 mm
From 6 mm up to 30 mm	± 0,5 mm
From 30 mm up to 120 mm	± 0,8 mm
From 120 mm up to 400 mm	± 1,2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
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C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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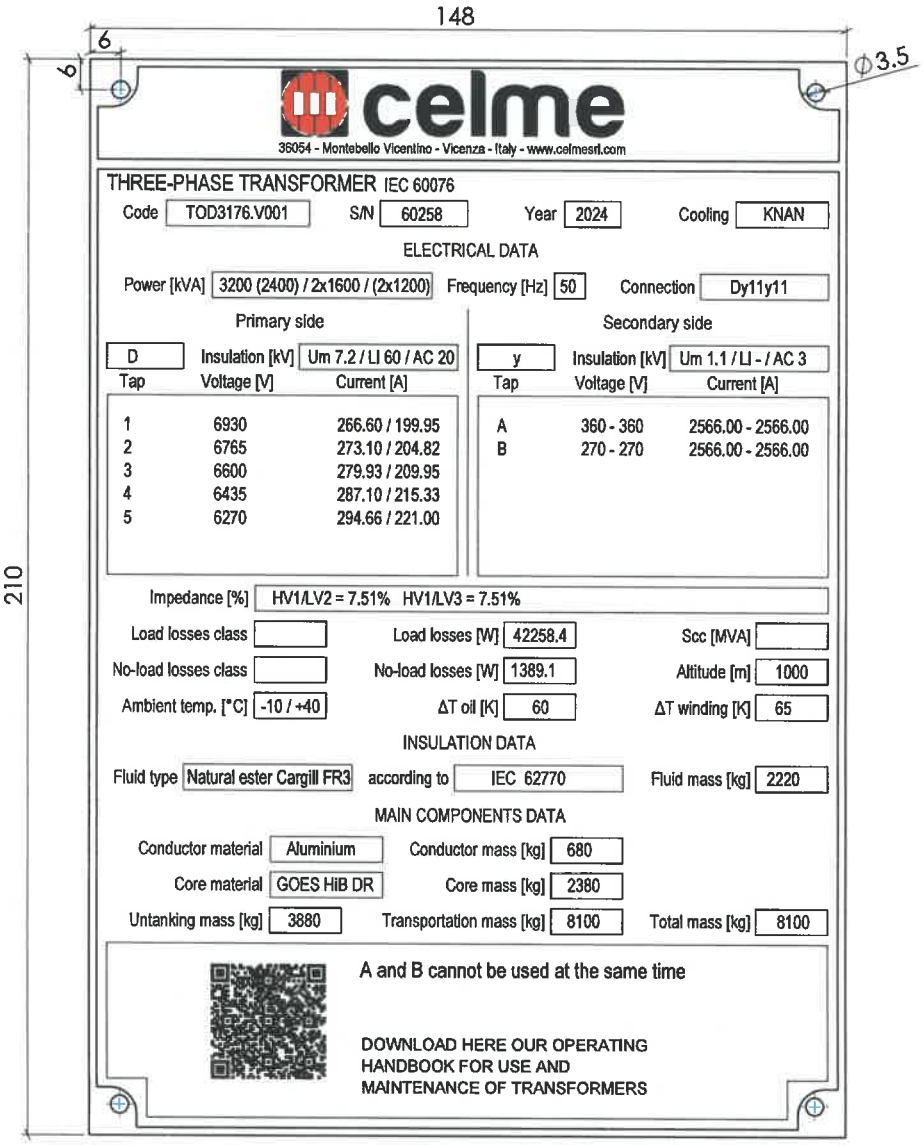
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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:25	8100 [kg]	3/4

PR 09

FAT 04/10/24



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36054 - Montebello Vicentino - Vicenza - Italy - www.celmesrl.com

THREE-PHASE TRANSFORMER IEC 60076

Code	S/N	Year	Cooling
TOD3176.V001	60258	2024	KNAN

ELECTRICAL DATA

Power [kVA]	Frequency [Hz]	Connection
3200 (2400) / 2x1600 / (2x1200)	50	Dy11y11

Primary side

D — Insulation [kV]: Um 7.2 / LI 60 / AC 20

Tap	Voltage [V]	Current [A]
1	6930	266.60 / 199.95
2	6765	273.10 / 204.82
3	6600	279.93 / 209.95
4	6435	287.10 / 215.33
5	6270	294.66 / 221.00

Secondary side

y — Insulation [kV]: Um 1.1 / LI - / AC 3

Tap	Voltage [V]	Current [A]
A	360 - 360	2566.00 - 2566.00
B	270 - 270	2566.00 - 2566.00

Impedance [%]			
HV1/LV2 = 7.51% HV1/LV3 = 7.51%			
Load losses class		Load losses [W]: 42258.4	Scc [MVA]
No-load losses class		No-load losses [W]: 1389.1	Altitude [m]: 1000
Ambient temp. [°C]: -10 / +40		ΔT oil [K]: 60	ΔT winding [K]: 65

INSULATION DATA

Fluid type	according to	Fluid mass [kg]
Natural ester Cargill FR3	IEC 62770	2220

MAIN COMPONENTS DATA

Conductor material	Aluminium	Conductor mass [kg]	680		
Core material	GOES HiB DR	Core mass [kg]	2380		
Untanking mass [kg]	3880	Transportation mass [kg]	8100	Total mass [kg]	8100

A and B cannot be used at the same time

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Material: stainless steel , thickness 1 mm

Black words/drawings on metallic background

Tolerance in according with EN-22768 ISO-2768	
From 0,5 up to 3 mm	± 0,2 mm
From 3 mm up to 6 mm	± 0,3 mm
From 6 mm up to 30 mm	± 0,5 mm
From 30 mm up to 120 mm	± 0,8 mm
From 120 mm up to 400 mm	± 1,2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
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C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:1	8100 [kg]	4 / 4

PR 10

Measurement equipment for testing room

Code	Description	Manufacturer	Model	Manufacturer SN	Calibration frequency (months)	Expiry Date	Last control date	Measuring range	Calibration certificate number
Instrument type : Tool certified by external Lab.									
SC064	Capacitive divider	A.M.E.	CC - 1 - 800 Kv	199 - DIV - AT	48	12/07/25	13/07/21	1 ÷ 800 kV	10215 D-K-19153-01-00 2021-07
SC068	Shunt	OFEL	-----	1503	60	22/07/25	23/07/20	15 A - 300 mv	4292
SC069	Shunt	OFEL	-----	1504	60	22/07/25	23/07/20	75 A - 300 mv	4293
SC080	Wattmeter threephase	FLUKE	NORMA 5000	C414145BA	12	05/03/25	05/03/24	0 ÷ 10 A / 0 ÷ 1000 V	101 Q339_2024_ACCR_EO
SC081	Digital multimeter	AGILENT	34411A	MY48005411	12	28/03/25	28/03/24	0 ÷ 750 V	LAT 019 74332
SC082	Digital multimeter	AGILENT	34401A	MY47053427	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74333
SC083	Digital multimeter	AGILENT	34401A	MY47052991	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74338
SC084	Digital multimeter	AGILENT	34401A	MY47053725	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74335
SC085	Digital multimeter	AGILENT	34401A	MY47053365	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74339
SC092	Wattmeter threephase	FLUKE	NORMA 5000	D208177BA	12	02/04/25	02/04/24	0 ÷ 10 A / 0 ÷ 1000 V	LAT 019 74343
SC112	Thermometer	DELTA OHM	HD2307.0	17020652	12	01/03/25	01/03/24	-200°C +650°C	101 M306_2024_ACCR_MC
SC115	Ratio meter	TETTEX	WA2293	188111	36	19/12/24	20/12/21	Rapporto 1 / X	ESTIC-BIL-CI-21011831
Instrument type : Tool certified by internal Lab.									
SV071	Voltage transformer	Wandler - WirGes	TV 7	548875	12	26/03/25	26/03/24	0 - 60000 V	Interno
SV100	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 24 - 50 KV	8951-02-01	12	11/01/25	12/01/24	30 - 60 / 5 A	Interno
SV101	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 24 - 50 KV	8951-02-02	12	11/01/25	12/01/24	30 - 60 / 5 A	Interno
SV102	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 24 - 50 KV	8951-02-03	12	11/01/25	12/01/24	30 - 60 / 5 A	Interno
SV103	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 7,2 - 20 KV	8951-03-01	12	11/01/25	12/01/24	50 - 100 - 200 / 5 A	Interno
SV104	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 7,2 - 20 KV	8951-03-02	12	11/01/25	12/01/24	50 - 100 - 200 / 5 A	Interno
SV105	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 7,2 - 20KV	8951 - 03 - 03	12	11/01/25	12/01/24	50 - 100 - 200/ 5 A	Interno

CELME s.r.l.
Controllo Qualità

pg 11

25/09/2024 lg

celme
we make transformers

FAT AGENDA

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

Customer	NIDEC ASI SA
Customer PO	600045206 Rev4 dated 05/09/2024
Project name	8934
Celme Ref.	23/00084

LINE	XFMR	TEST*	DESCRIPTION	DATE	TIME BEGIN	TIME END
1	1	R	Separate source AC withstand voltage (AV) (11.1.2.1 e) ✓	04/10/2024	08:30	09:00
2	1	R	Short duration induced AC withstand voltage (IVW) (11.1.2.1 e) ✓	04/10/2024	09:00	09:30
3	1	R	Measurement of no-load loss and current (11.5) ✓	04/10/2024	09:30	10:00
4	1	R	Measurement of winding resistance (11.2) ✓	04/10/2024	10:00	10:30
5	1	R	Measurement of short-circuit impedance and load loss (11.4) ✓	04/10/2024	10:30	11:30
6	1	R	Measurement of voltage ratio and check of phase displacement (11.3) ✓	04/10/2024	11:30	12:00
7	1	R	Dimensional checking ✓	04/10/2024	14:00	14:30
8	1	R	Auxiliaries: functionality ✓	04/10/2024	14:30	15:00
9	1	-	Report issue, control, approvement, signature	04/10/2024	15:00	17:00
10	1	R	Fluid leak test under pressure (11.8): carried out during production (reviewed)	04/10/2024	15:00	17:00
11	1	R	Check of core and frame insulation (11.12): carried out during production; report available (reviewed)	04/10/2024	15:00	17:00

*R= Routine; T= Type; S= Special

Xfmr	Type	Sno
1	TOD3176.001	60258

Rev. No	Date		Descritpion	MZA Issued	NMA Checked	LGA Approved
1	24/09/2024		First issue			

NOTE Program may change during FAT execution due to testing or production needs.

FAT COPY
CROSSED ND
A. MALBEZIN
04/10/2024

Elogen.
N. Hajji
04/10/2024

ELOGEN
H. HATTABI
04/10/2024

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CELME srl
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Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

NIDEC
A.H. Aissata
04/10/2024

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Web: celmesrl.com

Test Procedure

Mod 06 13 -F

TP_23_00084

revision A-1

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Cod. SDI SUBM70N

09/10/24

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

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A. MAMBELLI
04/10/2024

Elogen
N. Haji
04/10/2024

ELOGEN
H. HAMMAMI
04/10/2024 8934

NIDEC
A. ADAMOU
04/10/2024

Rev.	Date	Prepared	Checked	Notes
1	2024/09/25	N.Marcazzan	L.Gallina	First issue

Revision index

INDEX

Routine

1	Auxiliaries		p. 3
2	Separate source AC withstand voltage (AV) (11.1.2.1 e)		p. 4
3	Short duration induced AC withstand voltage (IVW) (11.1.2.1 e)		p. 5
4	Measurement of voltage ratio and check of phase displacement (11.3)		p. 6
5	Measurement of winding resistance (11.2)		p. 7
6	Measurement of short-circuit impedance and load loss (11.4)		p. 8
7	Measurement of no-load loss and current (11.5)		p. 9
8	Check of core and frame insulation (11.12)	*	p. 10
9	Fluid leak test under pressure (11.8)	*	p. 11
10	Dimensional Check / Overall Visual Check		p. 12

* ***Carried out during production: available as review***

Note: Routine tests are performed on every transformer. Type, special and other tests are performed upon previous agreement between manufacturer and customer. Not all tests apply to every transformer type. Different arrangements and tolerances are possible upon previous agreement between manufacturer and customer.

Auxiliaries

Standard: IEC 60076-3 ed. 3.0 (2013-07)
Power transformers
Part 3: Insulation levels, dielectric tests and external clearances in air
§ 9

DGPT2+PT100

Surge arresters

A visual control of the placement of the auxiliaries is done, together with a functional check of the alarm and trip contacts and their respective cabling to the marshalling box.
In detail:
1. auxiliary dielectric and insulation resistance test (through relavant terminals on marshalling box); a test voltage of 2 kV is applied for 60 s between the auxiliaries' contacts and earth to verify the adequate insulation and protection.
2. auxiliary functionality (through relevant terminals on marshalling box);
3. accessories check;
4. Thermometer and WTI: calibration and setting on alarm and trip thresholds according to the references indicated on the general arrangement.

celme	Test Procedure	TP_23_00084 revision A-1

Separate source AC withstand voltage (AV) (11.1.2.1 e)

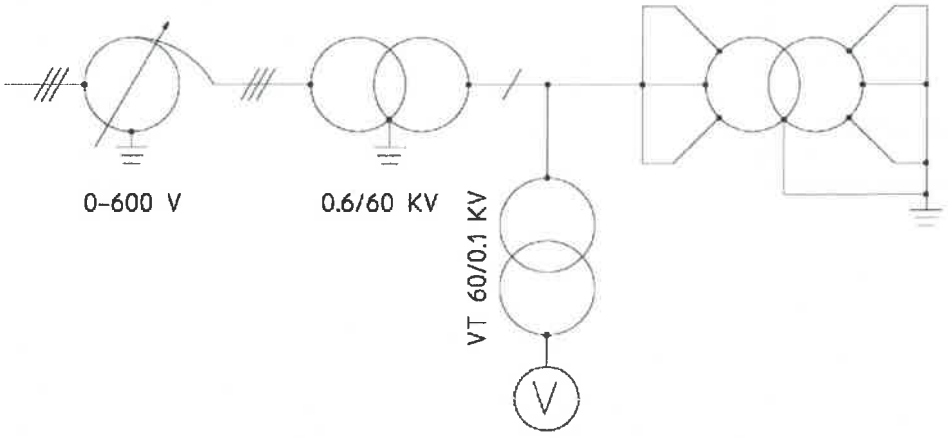
Standard: IEC 60076-3 ed. 3.0 (2013-07)
Power transformers
Part 3: Insulation levels, dielectric tests and external clearances in air
§ 11

Procedure: The separate source AC withstand test shall be made with single-phase alternating voltage as nearly as possible on **sine-wave form and not less than 80% of the rated frequency. The peak value of voltage divided by √2 shall be equal** to the test value. The full test voltage shall be applied for 60s between all terminals of the winding under test connected together and all terminals of the remaining windings, core, frame and tank connected together at earth. The test is performed on every winding according to its insulation level.

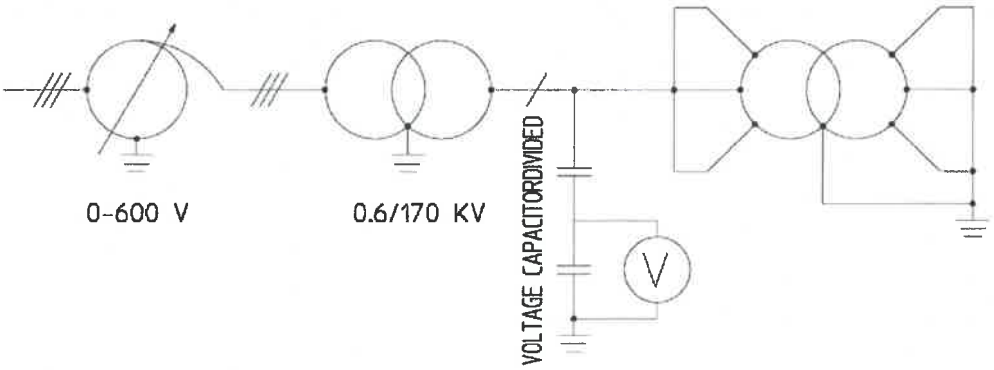
20KV at primary no intervention of protection OK
3KV at 1° secondary OK no intervention of protection
3KV at 2° secondary OK no intervention of protection

Wiring diagram

Variant 1:



Variant 2:



Results: /

celme	Test Procedure	TP_23_00084 revision A-1

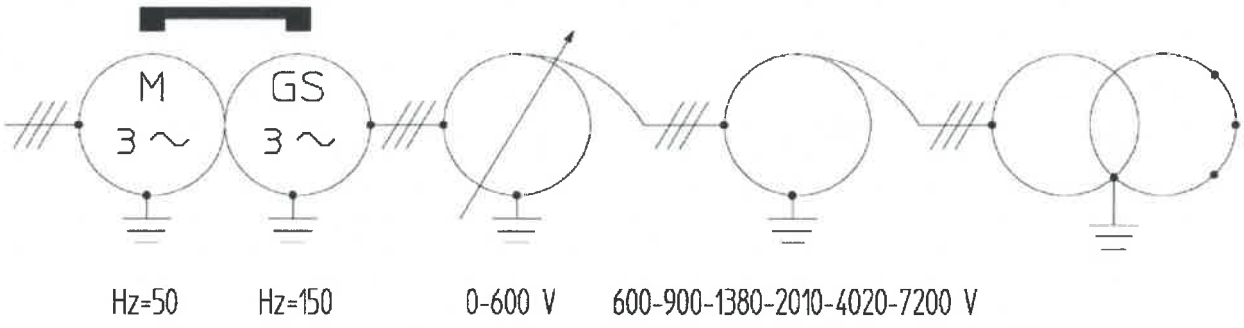
Short duration induced AC withstand voltage (IVW) (11.1.2.1 e)

Standard: IEC 60076-3 ed. 3.0 (2013-07)
Power transformers
Part 3: Insulation levels, dielectric tests and external clearances in air
§ 12.2

Procedure: An alternating voltage as close as possible to two times the nominal voltage shall be applied to the terminals of one winding of the transformer. The test time shall be 120x([rated frequency]/[test frequency]) but not less than 15s. The equipment in the test room provides a 150Hz voltage so the duration is: 120x50/150 = 40s.

720V @ 150Hz For 40sec
acceptance criteria: no discharge no intervention of protection
OK passed

Wiring diagram



Results: /

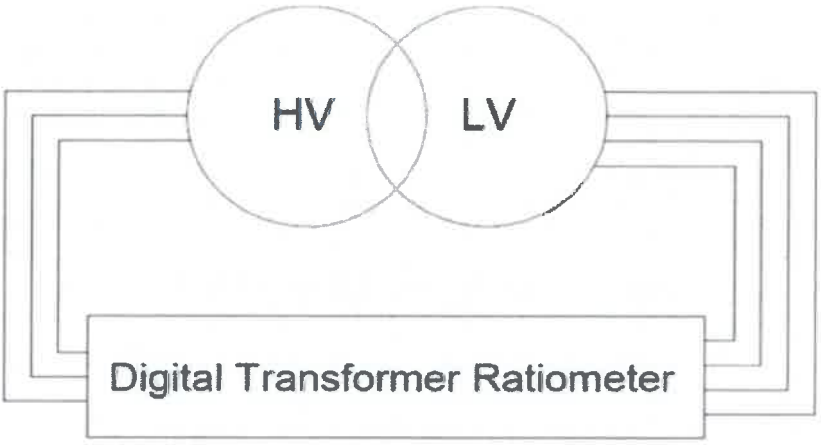
celme	Test Procedure	TP_23_00084 revision A-1

Measurement of voltage ratio and check of phase displacement (11.3)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.3

Procedure: The transformer is connected to a portable fully automated three phase turns ratio meter. The group and phase displacement is verified on every tap position.

Wiring diagram



N° 5 position Tap changer (2,5% each)
See Pos on general nameplate
acceptance criteria ±0,5° phase displacement.
±0,5% ratio deviation

Results: /

celme	Test Procedure	TP_23_00084 revision A-1

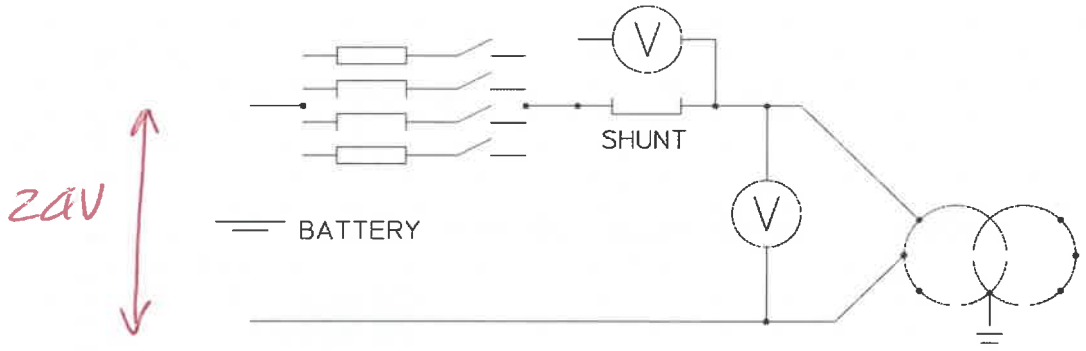
Measurement of winding resistance (11.2)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.2

Procedure: The transformer shall be at rest in a constant ambient temperature for at least 3 hours. The temperature of the winding is then deemed to be the same as the average oil temperature. A small current is feeded through the each pair of phases in the winding and the voltage is read. The mean value is the resistance of the winding. The value is then corrected to the reference temperature of 75°C.

Temperature 23,7 °C

Wiring diagram



Aluminium winding 225
↙ ref temperature
225 + 75 = 300

225 + 23,7 = 248,7
↖ measured temperature

300 / 248,7 = 1,2 coefficient for temperature compensation to 75°C

Results: /

celme	Test Procedure	TP_23_00084 revision A-1

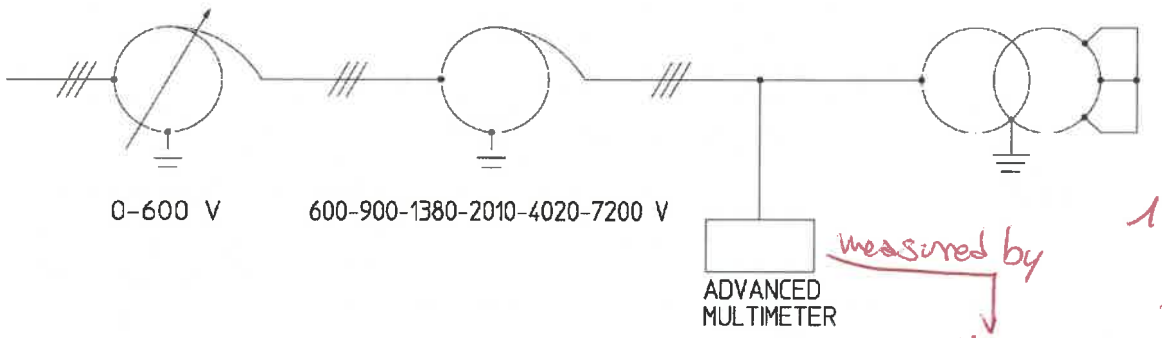
Measurement of short-circuit impedance and load loss (11.4)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.4

Procedure: The short-circuit impedance and load loss for a pair of windings shall be measured at rated frequency with a voltage applied to the terminals of one winding and the terminals of the other winding short-circuited. All other windings, if present, must be open-circuited. The applied current shall be between 50% and 100% of the rated current. The measurement must be made quickly to avoid any significant error coming from the heating of the windings.

$In' = 279,93A \rightarrow 50\% = 139,96A$

Wiring diagram



measured by

1° winding

100%

$\frac{Vcc}{Vn} \cdot 100 = Vcc\%$

6,866 V @100%

acceptance criteria impedance 7% ± 10%

load loss < 42000 ± 15% = 42083 V

be measured and then calculated by sw.

$P_k = P_J + P_{add} + P_{adde} \propto B \propto \frac{1}{T}$

winding $\propto RI^2 \propto T$

@ 50% 6,575%

2° Winding

Results: /

~~@ 100%~~

@ 50% 6,543 %

celme	Test Procedure	TP_23_00084 revision A-1

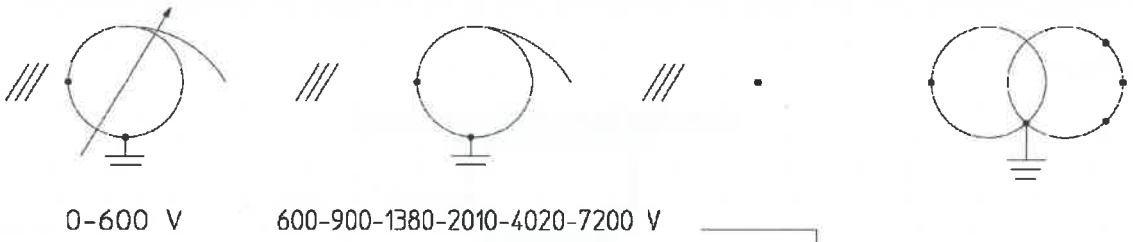
Measurement of no-load loss and current (11.5)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.5

Procedure: The no-load loss and the no-load current shall be measured on one of the windings at rated frequency and rated voltage. The remaining windings shall be left open-circuited. The winding that can be connected in open delta must be in closed. The transformer shall be approximately at factory ambient temperature. This test shall be performed at 90, 100 and 110% of rated voltage, measuring relevant corrent and losses.

3Ø

Wiring diagram



acceptance criteria

no load lossess < 1400W (+15%)

no load current < 0,5% + 30%
< 16,679 A

90% 1092
100% 1364 ← OK
110% 1694
< 2566 0,5% + 30%

0,65%
0,06 OK

Results: /

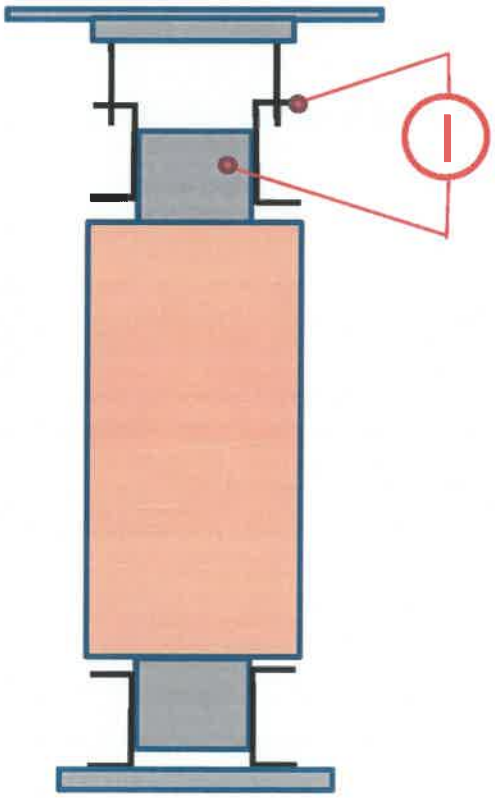
celme	Test Procedure	TP_23_00084 revision A-1

Check of core and frame insulation (11.12)

Standard: IEC 60076-1 ed3.0 (2011-04)
Power transformers
Part 1: General
§ 11.12

Procedure: This test shall be carried out on all liquid immersed transformers which incorporate insulation separating core and frame and/or frame and tank.
For transformers where the core and frame earth connections are not accessible when the transformer is liquid filled, the insulation shall be tested at 500 V d.c. for 1 min without breakdown before the active part is installed in the tank.
For transformers where the core and frame earth connections are accessible when the transformer is liquid filled, the insulation shall be tested at 2 500 V d.c. for 1 min without breakdown after the transformer is filled with liquid.

Wiring diagram



Results: /

celme	Test Procedure	TP_23_00084 revision A-1

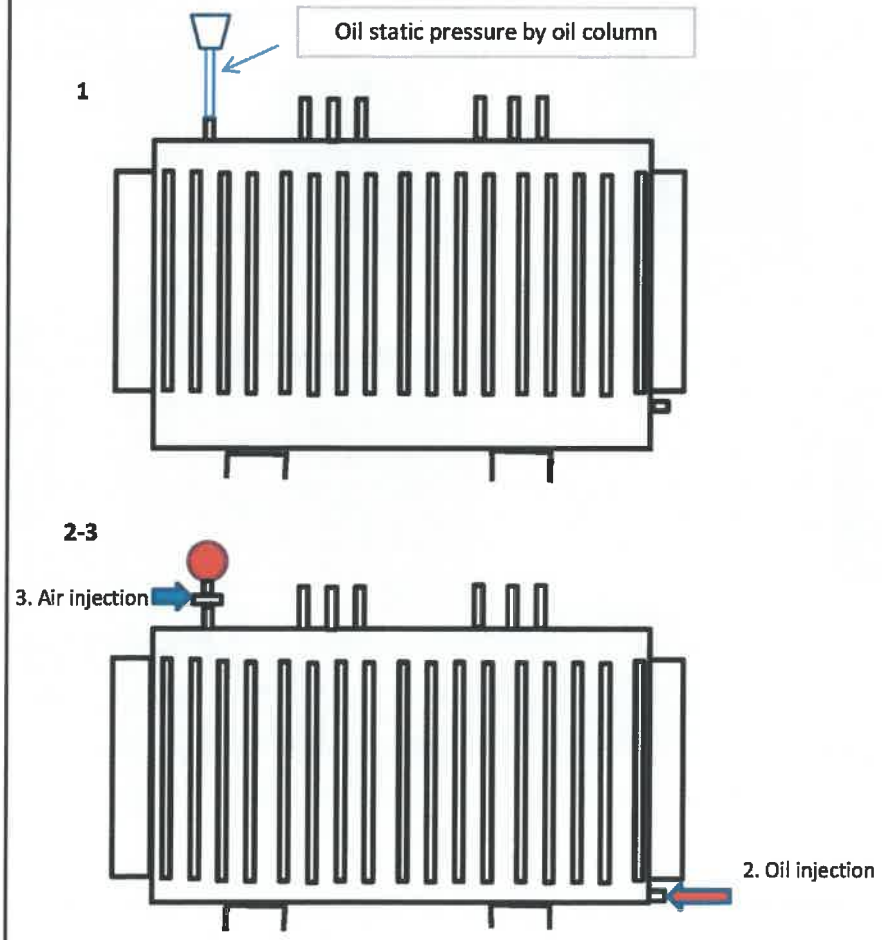
Fluid leak test under pressure (11.8)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.8

Procedure: If not differently agreed between manufacturer and purchaser, a pressure (by either using a liquid column or gas pressure in the conservator) of at least 30 kPa is applied over the normal liquid pressure. This pressure shall be maintained for 24 hours for transformers greater than 20 MVA or 72,5 kV and 8 hours for transformers with lower rating and voltage. The test is not applicable to hermetic transformers.

Even if this type of transformer is hermetic type (thus not under this test), the agreement between parts is to apply a pressure of 30kPa for 8hs. Celme follows three methods alternately:
1. pipe estension full of oil over the filling pipe up to height at least of mm over the cover surface.
2. injection of oil by a pump controlled by a calibrated pressure gauge installed on the filling pipe.
3. Injection of air controlled by calibrated pressure gauge installed on the filling pipe.

Sketch of test



Results: /

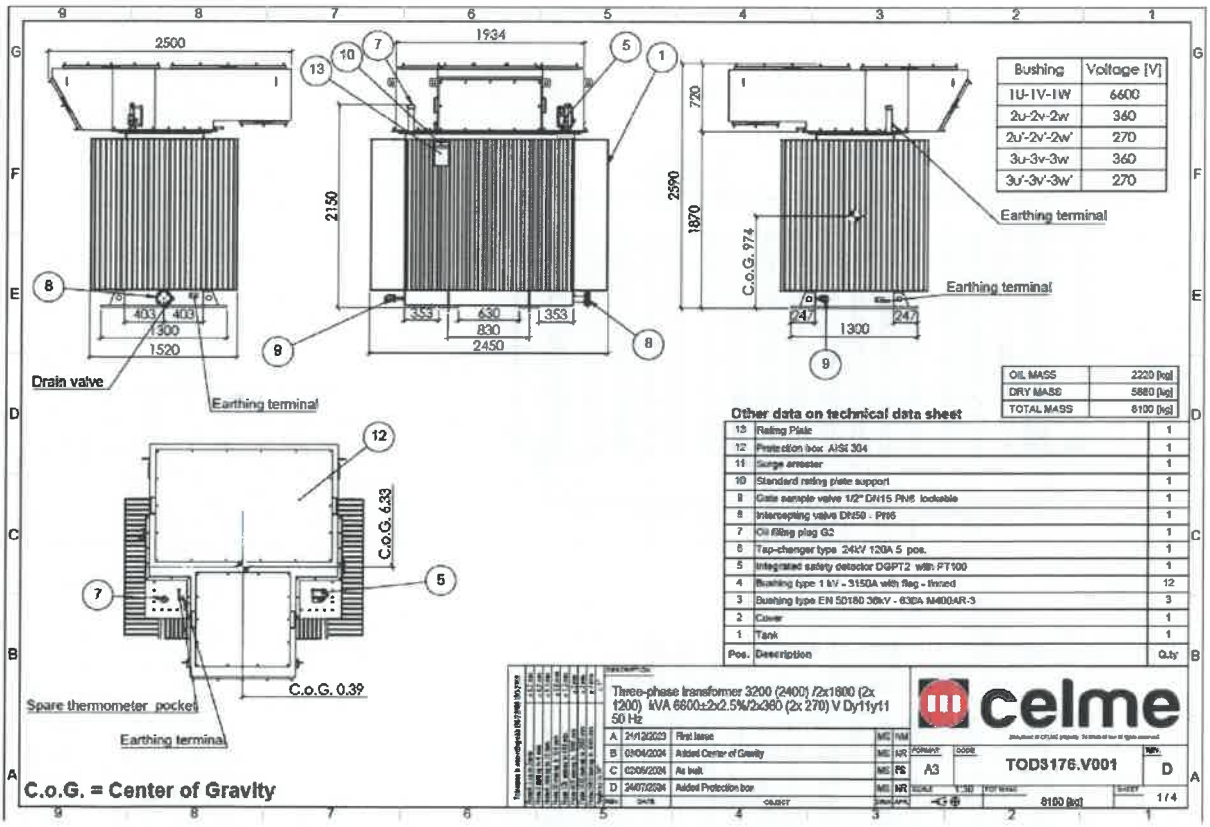
celme	Test Procedure	TP_23_00084 revision A-1

Dimensional Check / Overall Visual Check

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General

Procedure: General control is performed using the general arrangement drawing as reference. The tollerances are reported into the relevant drawnings.

Sketch



Results: /

CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 3 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

PUNCH-LIST REPORT

OUTSTANDING WORKING LIST (OWL) N°: N°: IR-02-C63-NIDEC	PROJECT C63	PURCHASE ORDER N°: BC0005845	REQUISITION N°: 1		SUPPLIER: ELOGEN	SUB-SUPPLIER: NIDEC ASI SAS CELME
INSPECTION DATE: 04/10/2024	MATERIAL / EQUIPMENT: 3.2MVA TRANSFORMER	PO ITEM / TAG N° : -	INSPECTION LOCATION : CELME Montebello Vicentino		REVISION: 0	PAGE : 1 / 2
OWL ITEM N°	DESCRIPTION OF ACTIVITY	TO BE DONE BEFORE SHIPMENT	TO BE DONE ON CONSTRUCTION SITE	ACTION		VERIFICATION OF THE CORRECTIVE ACTION DATE & SIGNATURE
				SUPPLIER	SUBSUPPLIER	
1	Celme to apply identification labels on HV and LV power terminals, according to general arrangement for their identification.	X			X	
2	Celme to install LV tinned terminations and extention busbars only in 360V power terminals, by using proper bolt, nuts to be torqued and marked, the remaining parts with their bolts and nuts shall be delivered as loose.	X			X	
3	Celme to install general nameplate with updated data from the FAT, on transformer before shipment, and update the general arragement accordinghly	X			X	
4	Celme to provide mounting procedure of Transformer and cable box with torque values, since they will be delivered separately.	X			X	
5	Celme to provide as loose touch up paint can.	X			X	

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Haji	NIDEC ASI SAS Mrs. Aissata Adamou CELME Mrs Chiara Vezzaro

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
This document does not relieve the Supplier of the responsibility of any possible defects and/or misfunctioning arising during the utilisation.

CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 4 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	**FORNITORE: ELOGEN** *Supplier:*	**COMMESSA: C63** *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	**No. Ordine: BC0005845** *P.O. No.:*	**OGGETTO: 2.5MW Rectifier** *Object:*	

PUNCH-LIST REPORT

OUTSTANDING WORKING LIST (OWL) N°: N°: IR-02-C63-NIDEC	**PROJECT** C63	**PURCHASE ORDER N°:** BC0005845	**REQUISITION N°: 1**	**SUPPLIER: ELOGEN**	**SUB-SUPPLIER: NIDEC ASI SAS CELME**
INSPECTION DATE: 04/10/2024	MATERIAL / EQUIPMENT: 3.2MVA TRANSFORMER	PO ITEM / TAG N° : -	INSPECTION LOCATION : CELME Montebello Vicentino	REVISION: 0	PAGE : 2 / 2

OWL ITEM N°	DESCRIPTION OF ACTIVITY	TO BE DONE BEFORE SHIPMENT	TO BE DONE ON CONSTRUCTION SITE	ACTION		VERIFICATION OF THE CORRECTIVE ACTION DATE & SIGNATURE
				SUPPLIER	SUBSUPPLIER	
6	Celme to provide stainless steel Tansformer's TAG plate, with project tag: TR-01 A100 close to general nameplate (HV left side).	X			X	

NEW INSPECTION VISIT TO BE SCHEDULED ☐ NO ADDITIONAL INSPECTION VISIT SCHEDULED ☐	INSPECTOR NAME: ALBERTO MAMBELLI DATE & VISA : 04/10/2024	SUBVENDOR NAME : AISSATA ADAMOU DATE – VISA & STAMP: 04/10/2024

Diffusion : Original → Final Dossier attached to the Inspection Release Note, Copy → TEPC DPTN & Vendor
(1) Project Reference – (2) Trigram from Vendor (*) – (3) Sequential Number per Vendor

L' INCARICATO / *The person in charge*	**IL FORNITORE** / *Supplier*	**IL SUBFORNITORE** / *Subsupplier*
CROSSWIND ***Mr. Alberto Mambelli***	**ELOGEN** **Mr Mohamed Haji**	**NIDEC ASI SAS Mrs. Aissata Adamou** **CELME Mrs Chiara Vezzaro**

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CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 2 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

ATTIVITA' ESEGUITE / *Activities Carried Out*

Witnessed test of 3.2MVA Transfomer tag TR-01/A100 according to FAT agenda, and visual and dimensional inspection, according to test notification issued by ELOGEN, ref mail Andreia Vilarinho dated 26/09/2024.
At supplier workshop:
CELME Via Cà Sordis, 30, 36054 Montebello Vicentino VI, Italy.

Before the FAT CELME declare that all internal tests was carried out successfully without punches.

The FAT tests are carried out following the given agenda here attached IR-01-C63-CELME FAT AGENDA, and FAT test procedure IR-01-C63-CELME FAT PROCEDURE, in which are described the procedures to follow, and the acceptance criteria to be respected.

Here attached CELME FAT report ref no 23/00084_241004_FAT, as evidence of carried out tests and results.

Some punch-list items was raised, reference is made to the OWL no IR-02-C63-NIDEC here attached.

Celme informs that before the SAT he will provide the check list for installation.

The Goods are accepted by Elogen, the relevant release note it will be issued by Elogen to Nidec only after closing of punch-list verification, to be done before shipment (expected to be the next Wednesday 9th Thursady 10th October), by sending pictures which as to be reviewed by Nidec/Elogen.

Attachments:

1. **IR-01-C63-CELME FAT AGENDA;**
2. **IR-01-C63-CELME FAT PROCEDURE;**
3. **CELME FAT report: 23/00084_241004_FAT**
4. **OWL no IR-01-C63-CELME**
5. **CELME FAT RED LINE MARK UP 04/10/2024;**

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Hajji	NIDEC ASI SAS Mrs. Aissata Adamou CELME Mrs Chiara Vezzaro

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
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CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 1 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	**FORNITORE: ELOGEN** *Supplier:*	**COMMESSA: C63** *Job:*	
SUBFORNITORE: *Subsupplier:* **NIDEC ASI SAS**	**No. Ordine: BC0005845** *P.O. No.:*	**OGGETTO:** *Object:* **2.5MW Rectifier**	

DESCRIZIONE DEL MATERIALE / *Material Description*

POSIZIONE *Item*	**QUANTITA'** *Quantity*	**DESCRIZIONE & TAG** *Description and Tag*	**TIPO DI ISPEZIONE** / *Kind of Inspection*	**ESITO** / *Result*
-	1	**3.2MVA Transformer tag TR-01/A100**	**Witnessed test of 3.2 MW Transformer tag TR-01. according to FAT agenda, and visual and dimentional inspection. At supplier workshop: CELME Via Cà Sordis, 30, 36054 Montebello Vicentino VI, Italy**	**Positive With punch-list items.**

DOCUMENTI APPLICABILI / *Applicable Documents*

TITOLO DOCUMENTO / *Document Title*	**NUMERO DOCUMENTO** / *Document Number*	**REVISIONE** / *Revision*	**STATO DOCUMENTO** / *Document Status*
Purchase Order	**BC0005845**	**00**	-
FAT agenda	-	**1**	**approved**
Quality Control Plan	**PFC02.2300084**	**A/1**	**For information**
Test procedure	**TP_23_00084**	**A-1**	**approved**
General arrangment drawing	**TOD3176.V001**	**D**	**approved**
Transformer datasheet	**TDS.TOD3176.V001**	**A-0**	**approved**

DISTRIBUZIONE A: / *Distribution to:*

☒**GESTIONE FORNITURE** / *Supply Management Department*	☒**CAPO COMMESSA** / *Project Manager*
☒**PRODUZIONE** / *Production*	☒**FORNITORE** / *Supplier*
☒**CONTROLLO QUALITA'** / *Quality Control*	☐**AMMINISTRAZIONE** / *Administration*
☒**MAGAZZINO** / *Warehouse*	☒**P.E.M.**

L' INCARICATO / *The person in charge*	**IL FORNITORE** / *Supplier*	**IL SUBFORNITORE** / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	**ELOGEN** Mr Mohamed Hajl	**NIDEC ASI SAS Mrs. Aissata Adamou** **CELME Mrs Chiara Vezzaro**

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Italy, Montebello Vicentino, October 10th , 2024

PUNCH LIST ACTIONS

Celme' order confirmation: **23/00084**
Customer order no: **600045206 Change 5**
Customer: **Nidec ASI S.A.S.**
Project name: **8934**

Model: **TOD3176.001** Serial number: **60258**

T no.	*DESCRIPTION*	*Pictures*	
1	Celme to apply identification labels on HV and LV power terminals, according to general arrangement for their identification.	23_00084_1	✓
2	Celme to install LV tinned terminations and extension busbars only in 360V power terminals, by using proper bolt, nuts to be torqued and marked, the remaining parts with their bolts and nuts shall be delivered as loose.	23_00084_2	✓
3	Celme to install general nameplate with updated data from the FAT, on transformer before shipment, and update the general arrangement accordingly	23_00084_3	✓
4	Celme to provide stainless steel Transformers TAG plate, with project tag: TR-01 A100 dose to general nameplate (HV Left side).	23_00084_3	✓
5	Celme to provide as lose **touch up paint can.**	23_00084_4	✓
6	Celme to provide mounting procedure of Transformer and cable box with torque values, since they will be delivered separately.		By 18/10

celme

via Ca' Sordis 30/32
IT-36054
Montebello Vic. (VI)

Tel: +39-0444-440254
Fax: +39-0444-440191
Web: celmesrl.com

Transformer Technical Datasheet

Mod 03 13 rev. F

TDS.TOD3176.V001
revision A/0

CELME srl
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Fax +39 0444.440191
Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

04/10/24

NIDEC
A. ADAMOU
04/10/2024

FAT COPPI
CROSSWIND
A. MAMBELLI
04/10/2024

Elogen.
N. Haji
04/10/2024

ELOGEN
H. HATTMATTI
04/10/2024

Nidec
All for dreams

Approved 13/12/23
J-P Chovet

Rev.	Date	Prepared	Checked	Notes
0	22/11/23	M.Sharma	N.Rossin	First issue

Revision index

celme	Transformer Technical Datasheet	TDS.TOD3176.V001 revision A/0

Three phase transformer according to IEC 60076 for installation in safe zone with the following features:

natural ester Cargill FR3 (according to IEC 62770)

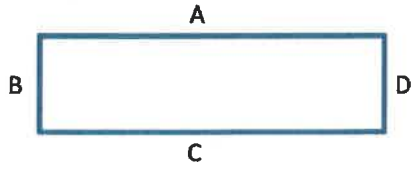
hermetic type (integral filling)

Type of load

The transformer is designed for continuous duty (THDi considered <3%)

Nominal ratings

Power 3,2 MVA KNAN



	Primary	Secondary
Power [MVA]	3.2/2.4	2 x 1.6/ 2 x 1.2
Rated voltage [V]	6600	2 x 360/ 2 x 270
Rated current [A]	279.93	2 x 2566
Material	AL	AL
Tap-changer	off-circuit	/
Taps	±2x2.5	/
Highest system voltage [kV]	7,2	1,1
Power frequency voltage [kV]	20	3
Impulse voltage [kV]	60	/
Bushing type	plug-in type - int. C 36kV/630A	porcelain 1kV/3150A
Bushing number	3	2 x 3 + 2 x 3
Bushing placement	cover side A	cover side C
Bushing protection	/	/

Electrical data

Frequency [Hz]	50	
Vector group	Dy11y11	
Impedance [%] @75 °C	7	(at Sn/2, 6600/360 V)
No load loss [W]	1400	
Load loss [W] @75 °C	42000	(at Sn/2, 6600/360 V)
Total loss [W] @75 °C	43400	(at Sn/2, 6600/360 V)
No load current [%]	0,5	
PEI [%]	99,52	

		Voltage drop				Efficiency			
Power factor		0,85	0,90	0,95	1,00	0,85	0,90	0,95	1,00
Load	1/4	1,19	1,05	0,86	0,34	99,41	99,44	99,47	99,50
	2/4	2,40	2,13	1,74	0,72	99,13	99,18	99,22	99,26
	3/4	3,63	3,22	2,65	1,12	98,79	98,85	98,91	98,97
	4/4	4,87	4,34	3,58	1,55	98,43	98,52	98,59	98,66

Environmental and working conditions

Minimum ambient temperature	-10 °C	
Maximum ambient temperature	40 °C	
Maximum installation altitude	1000 m	
Fluid temperature rise	60 K	
Winding temperature rise	65 K	
Corrosivity category	C5	durability: VH
Lp(A) @ 1m	75 dB(A)	

Mechanical data

Weights		Base
Fluid	2220 kg	Skid
Total	7830 kg	

Overall dimensions

Service conditions

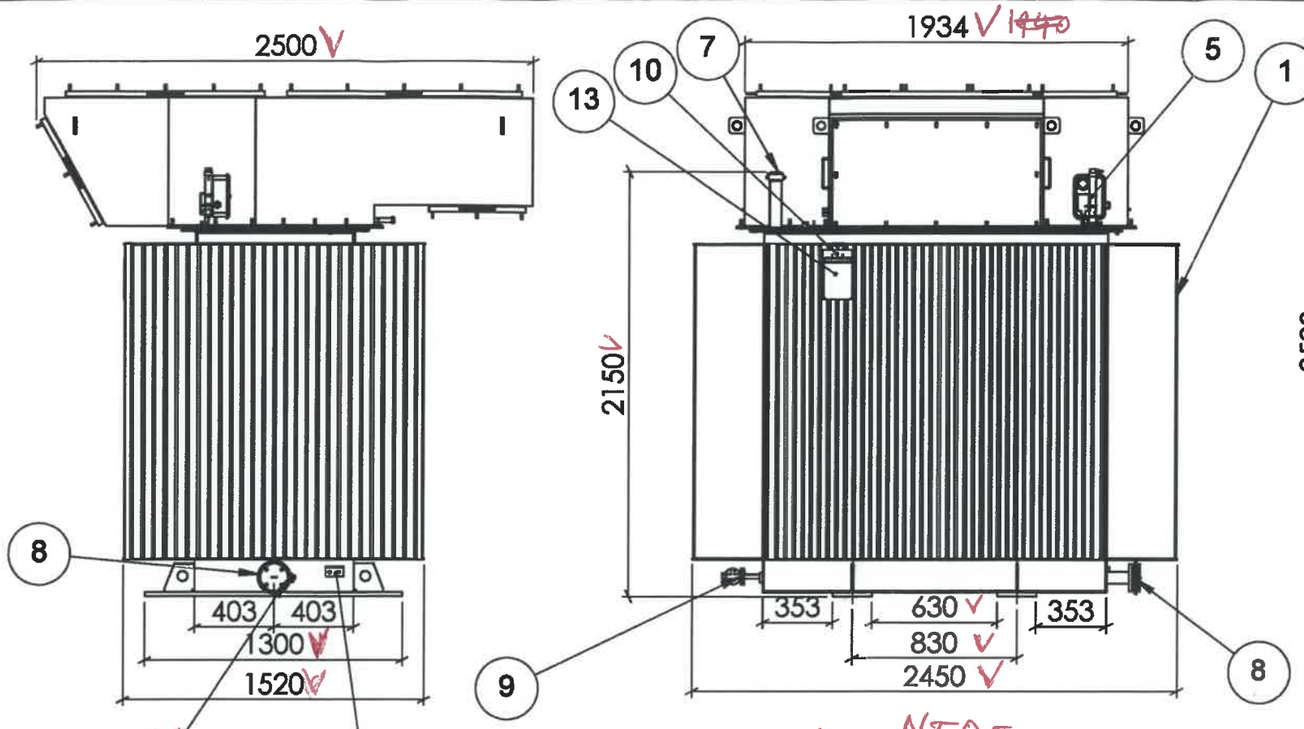
Lenght	2450 mm
Width	1520 mm
Height	2199 mm

Painting

The external protection is suitable for ambient C5. All the metallic surfaces are sandblasted Sa 2½. Tank is hot-dip galvanized (except for stainless steel parts). The paint thickness is 310µm. The color is RAL 7033.

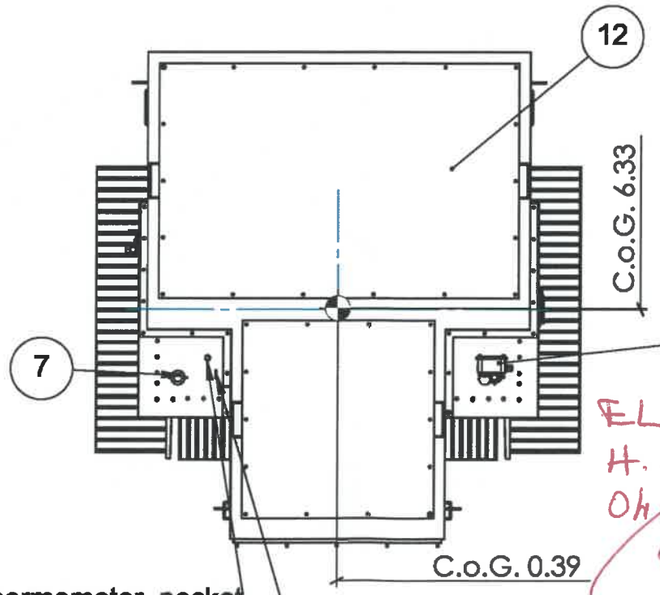
Fittings

1 x Rating plate
2 x Earthing plate
1 x Filling plug
1 x Drain valve
1 x Sampling valve
1 x Spare thermometer pocket
1 x Electrostatic shield
1 x DGPT2 (safety device for hermetic transformers) fitted with PT100
3 x Surge arrester (primary side) - supply as loose material



Bushing	Voltage [V]
1U-1V-1W	6600
2u-2v-2w	360
2u'-2v'-2w'	270
3u-3v-3w	360
3u'-3v'-3w'	270

OIL MASS	2220 [kg]
DRY MASS	5880 [kg]
TOTAL MASS	8100 [kg]



C.o.G. = Center of Gravity

NIDEC
A. Adamou
04/10/2024

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

FAT COPY
CROSSWIND
A. MAMBELLI
04/10/2024

Elogen
D. Haji
04/10/2024

ELOGEN
H. HAJJAJI
04/10/2024

Other data on technical data sheet

Pos.	Description	Q.ty
13	Rating Plate	1
12	Protection box AISI 304	1
11	Surge arrester	1
10	Standard rating plate support	1
9	Gate sample valve 1/2" DN15 PN6 lockable	1
8	Intercepting valve DN50 - PN6	1
7	Oil filling plug G2	1
6	Tap-changer type 24kV 120A 5 pos.	1
5	Integrated safety detector DGPT2 with PT100	1
4	Bushing type 1 kV - 3150A with flag - tinned	12
3	Bushing type EN 50180 36kV - 630A M400AR-3	3
2	Cover	1
1	Tank	1

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Tel. +39 0444 440254
Fax +39 0444 440191
Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

04/10/24

Tolerance in according with EN-22768 ISO-2768

From 0,5 up to 3 mm	±0,2 mm
From 3 mm up to 6 mm	±0,3 mm
From 6 mm up to 30 mm	±0,5 mm
From 30 mm up to 120 mm	±0,8 mm
From 120 mm up to 400 mm	±1,2 mm
From 400 mm up to 1000 mm	±2 mm
From 1000 mm up to 2000 mm	±3 mm
From 2000 mm up to 4000 mm	±4 mm
Angle up to 50°	±1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

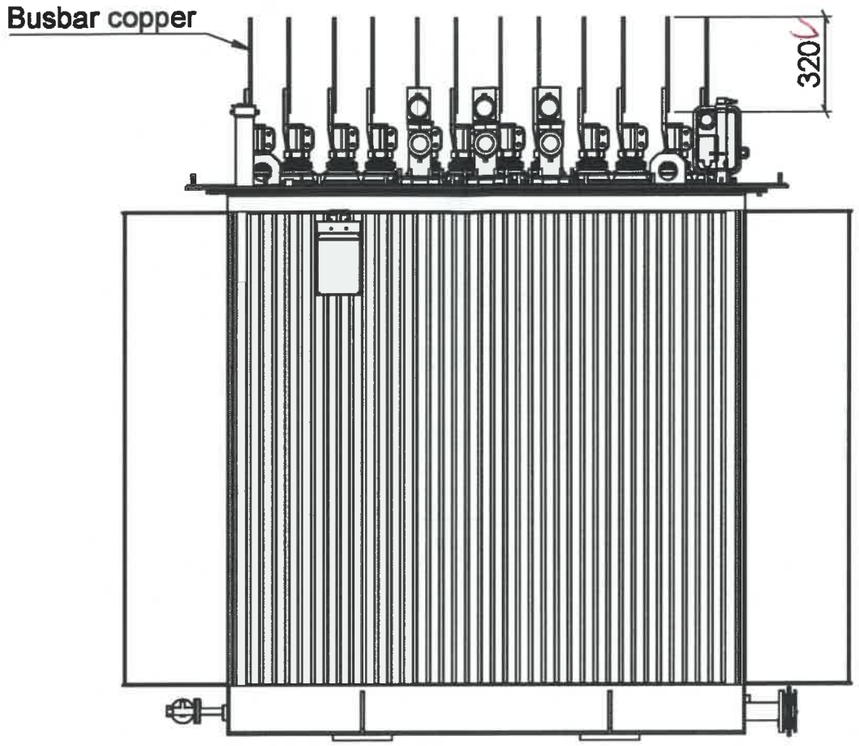
REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

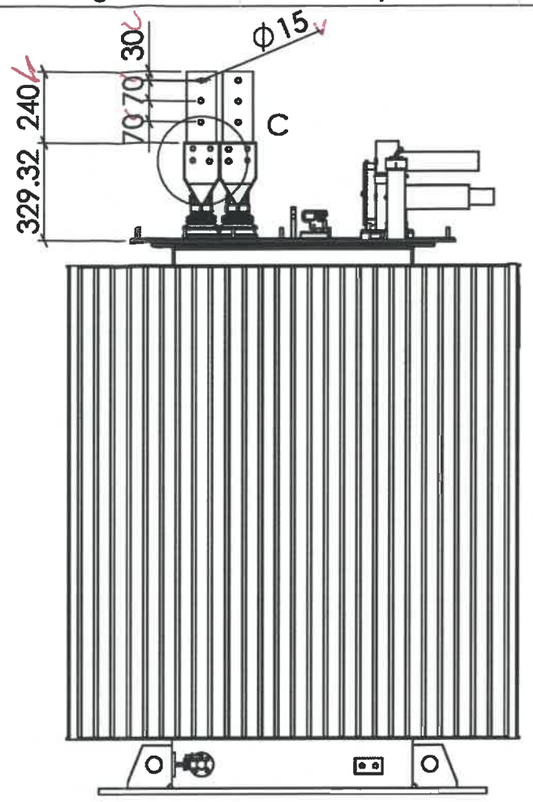
celme

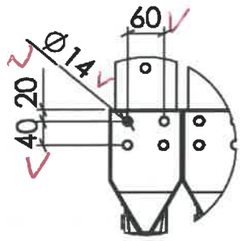
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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:30	8100 [kg]	1 / 4



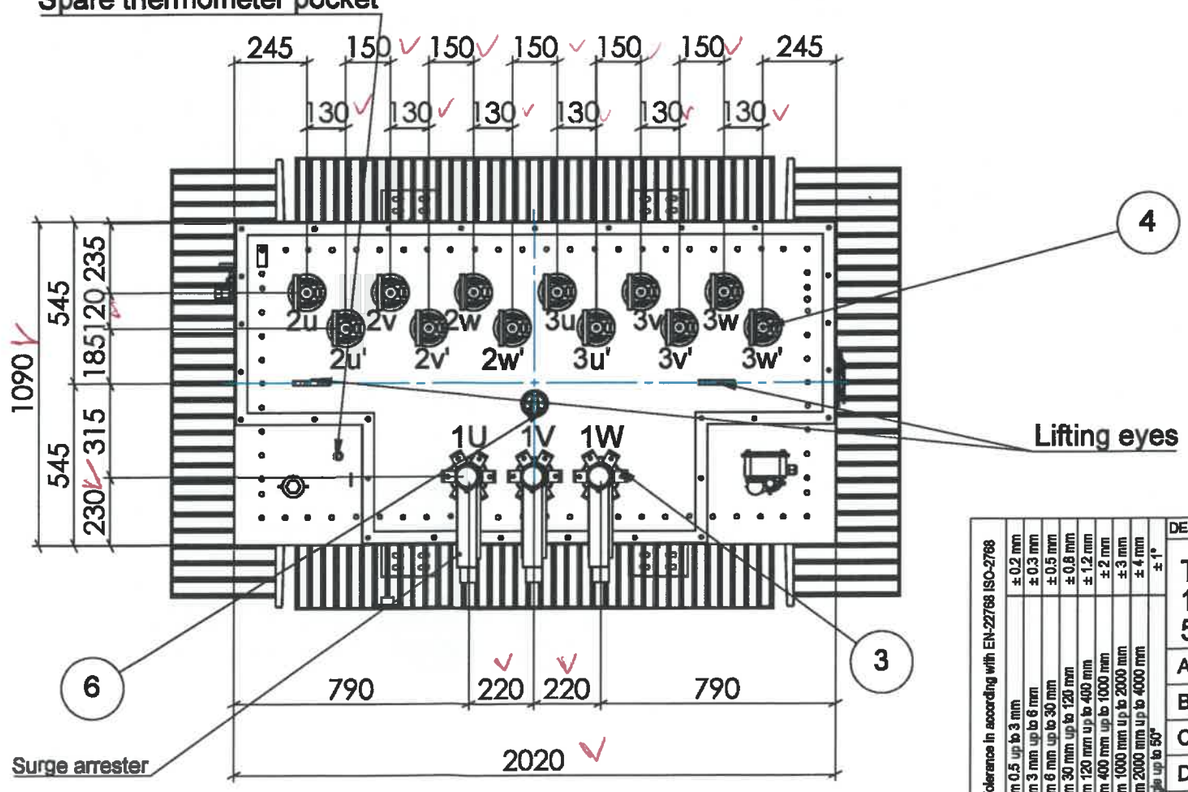




Detail C Scale 1:10

DGPT2

- CABLE GLAND M25
- P_T 100 = 109,9
- ALL THE AUXILIARY CONTACTS WORK PROPERLY



Tolerance in according with EN-22768 ISO-2768	
From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:20	8100 [kg]	2 / 4

148

6

6

Ø3.5

210

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36054 - Montebello Vicentino - Vicenza - Italy - www.celmesrl.com

THREE-PHASE TRANSFORMER IEC 60076

Code	S/N	Year	Cooling
TOD3176.V001	60258	2024	KNAN

ELECTRICAL DATA

Power [kVA]	Frequency [Hz]	Connection
3200 (2400) / 2x1600 / (2x1200)	50	Dy11y11

Primary side

D — Insulation [kV]: Um 7.2 / LI 60 / AC 20

Tap	Voltage [V]	Current [A]
1	6930	266.60 / 199.95
2	6765	273.10 / 204.82
3	6600	279.93 / 209.95
4	6435	287.10 / 215.33
5	6270	294.66 / 221.00

Secondary side

y — Insulation [kV]: Um 1.1 / LI - / AC 3

Tap	Voltage [V]	Current [A]
A	360 - 360	2566.00 - 2566.00
B	270 - 270	2566.00 - 2566.00

Impedance [%]	HV1/LV2 = 7.51% HV1/LV3 = 7.51%				
Load losses class		Load losses [W]	42258.4	Scc [MVA]	
No-load losses class		No-load losses [W]	1389.1	Altitude [m]	1000
Ambient temp. [°C]	-10 / +40	ΔT oil [K]	60	ΔT winding [K]	65

INSULATION DATA

Fluid type	according to	Fluid mass [kg]
Natural ester Cargill FR3	IEC 62770	2220

MAIN COMPONENTS DATA

Conductor material	Aluminium	Conductor mass [kg]	680		
Core material	GOES HiB DR	Core mass [kg]	2380		
Untanking mass [kg]	3880	Transportation mass [kg]	8100	Total mass [kg]	8100

A and B cannot be used at the same time

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Material: stainless steel , thickness 1 mm

Black words/drawings on metallic background

Tolerance in according with EN-22768 ISO-2768	
From 0,5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW.	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:1	8100 [kg]	4 / 4

celme

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Montebello Vic. (VI)

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Fax: +39-0444-440191
web: celmetransformers.com

QUALITY CONTROL PLAN

Oil immersed transformers
Mod 04 13

PFC02.2300084
revision A/1

Legend:

INSTRUCTIONS AND PLANS
IT: operative instructions;
SF: supply specifications;
PCA: check-in control plan;
PCQ: quality control plan;
D: drawing.

RECORDS OF P.C.C.
VCNu: magnetic circuit record;
VCCa: tank control record;
VCOl: oil control record;
Vco: test record;
RPF: supplier test record.

OPERATIVE AND CONTROL DATASHEET
SRM: assembly datasheet;
SA: winding datasheet;
SS: pre-spedition check.

OTHER
D.d.C.: supplier's declaration of conformity;
M: marking;
DD: PC record;
F: supplier's check;
AE: external assembler check.

INTERNAL FUNCTIONS
DG: general management;
FQ: quality function;
CQ: quality control;
FT: technical function;
FP: production function;
FC: sale function;
FA: purchase function;
MAG: warehouseman.

PARTICIPANTS
C: customer;
CF: final customer;
TP: third party.

ACTIVITIES
H: must be performed with a witness;
W: should be perfomerd with a witness; the internal record can be requested;
R: the internal record can be requested.

NOTE:
CELME, for some of its actions, doesn't prepare any quality document because the material is approved by the supplier's documents. In case of defective or broken material, a non-conformity record (N.C.) is open.
The column "Record n°" can be compiled upon customer's request with the relevant documents of the single transformer or of the production batch.

Rev.	Date	Prepared	Checked	Notes
1	2024/10/04	N.Marcazzan	L.Gallina	First issue

Revision index

FAT COPY CROSSWIND A. MAMBELLI 04/10/2024

celme	QUALITY CONTROL PLAN					PFC02.2300084 - revision A/1				
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
MATERIAL CHECK-IN										
1	**Insulated copper wire**									
1.01	Physico-chemical characteristics	F					R	R	R	
1.02	Dimensional characteristics	F					R	R	R	
1.03	Insulation characteristics	F	SF 01 Purchase order		D.d.C. RPF DD		R	R	R	
1.04	Identification	F/AE								
1.05	Packing visual control	F/AE								
1.06	Conformity to the order	F/AE								
2	**Foil - ribbon - bar**									
2.01	Physico-chemical characteristics	F					R	R	R	
2.02	Dimensional characteristics	F					R	R	R	
2.03	Identification	F/AE	SF 02 Purchase order		D.d.C. RPF DD					
2.04	Packing visual control	F/AE								
2.05	Conformity to the order	F/AE								
3	**Magnetic circuit**									
3.01	Iron core type (circular/oval)	F/AE					R	R	R	
3.02	Leg total thickness	F/AE					R	R	R	
3.03	Step number	F/AE					R	R	R	
3.04	Central distance	F/AE	PCA 03 SF 04 Purchase order		VCNu M RPF D.d.C.		R	R	R	
3.05	Frame	F/AE					R	R	R	
3.06	Identification label	F/AE					R	R	R	
3.07	Other components (if present)	F/AE					R	R	R	
3.08	No-load loss	F		IEC 60076-1	Vco / RPF		R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
4	**Steelworks**									
	Tank									
4.01	Frame dimensions	F/AE	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.02	Internal dimensions	F/AE					R	R	R	
4.03	Wheel type, axis and support	F/AE					R	R	R	
4.04	Cooling fins dimensions (if present)	F/AE					R	R	R	
4.05	Other components applied	F/AE					R	R	R	
4.06	Identification label	F/AE					R	R	R	
4.07	Paint type and status	F/AE					R	R	R	
4.08	General visual control	F/AE					R	R	R	
4.09	Paint thickness (8 points' averange)	F/AE		ISO 2808			R	R	R	
	Cover									
4.10	Dimensions	F/AE	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.11	Holes number	F/AE					R	R	R	
4.12	Holes size	F/AE					R	R	R	
4.13	Bushings' hole distance	F/AE					R	R	R	
4.14	Tap-changer fixing points	F/AE					R	R	R	
4.15	Stainless steel plate position and dimensions	F/AE					R	R	R	
4.16	Other components applied	F/AE					R	R	R	
4.17	Conservator connection's type and distance	F/AE					R	R	R	
4.18	Identification and serial number	F/AE					R	R	R	
4.19	Paint type and status	F/AE					R	R	R	
4.20	General visual control	F/AE					R	R	R	
4.21	Paint thickness (8 points' averange)	F/AE		ISO 2808			R	R	R	

n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
	Conservator									
4.22	Dimensions	F/CQ	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.23	Connection type and distance	F/CQ					R	R	R	
4.24	Buchholz's tube angle	F/CQ					R	R	R	
4.25	Oil level indicator holes	F/CQ					R	R	R	
4.26	Other components applied	F/CQ					R	R	R	
4.27	Identification label	F/CQ					R	R	R	
4.28	Paint type and status	F/CQ					R	R	R	
4.29	General visual control	F/CQ					R	R	R	
4.30	Paint thickness (8 points' averange)	F/CQ		ISO 2808			R	R	R	
	Cable boxes									
4.31	Dimensions	F/CQ	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.32	Type of removable plates	F/CQ					R	R	R	
4.33	Gland plate exit holes (if present)	F/CQ					R	R	R	
4.34	Paint type and status	F/CQ					R	R	R	
4.35	Identification label	F/CQ					R	R	R	
4.36	General visual control	F/CQ					R	R	R	
4.37	Paint thickness (8 points' averange)	F/CQ		ISO 2808			R	R	R	
	Radiators									
4.38	Dimensions	F/CQ	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.39	Number of elements	F/CQ					R	R	R	
4.40	Paint type and status	F/CQ					R	R	R	
4.41	Identification label	F/CQ					R	R	R	
4.42	General visual control	F/CQ					R	R	R	
4.43	Paint thickness (8 points' averange)	F/CQ		ISO 2808			R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
5	**Windings**									
5.01	Conductor dimensions	F	PCA 01 SF 09 D Purchase order		SA M D.d.C. RPF DD		R	R	R	*if requested by FT or FA
5.02	Winding direction	F					R	R	R	
5.03	Radial dimension	F					R	R	R	
5.04	External perimeter (oval)	F					R	R	R	
5.05	External diameter (circular)	F					R	R	R	
5.06	Height	F					R	R	R	
5.07	Number of turns	F					R	R	R	
5.08	Number of terminations	F					R	R	R	
5.09	GTAW (foil)	F					R	R	R	
5.10	Identification	F/AE					R	R	R	
5.11	General visual control	F/AE					R	R	R	
5.12	Batch conformity	F/AE					R	R	R	
5.13	Winding weight	F/ *					R	R	R	
6	**Insulating fluid**									
6.01	Weight	F/CQ/MAG	PCA 04 SF 05 Purchase order		VCOI RPF D.d.C.		R	R	R	
6.02	Dielectric strength	F/CQ		IEC 60156			R	R	R	
6.03	PCB content	F/Ext. Lab.		IEC 60296 IEC 61619			R	R	R	
6.04	Batch conformity	F/CQ					R	R	R	
7	**Tap-changer**									
7.01	Type	F/AE	PCA 03 D Catalog Purchase order		D.d.C. RPF DD		R	R	R	
7.02	Mechanical functioning	F					R	R	R	
7.03	General visual control	F/AE					R	R	R	
7.04	Batch conformity	F/AE					R	R	R	

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
8	**Bushing**									
8.01	Type	F/MAG	PCA 03 D / Catalog Purchase order		RPF DD		R	R	R	
8.02	General visual control	F/MAG					R	R	R	
8.03	Batch conformity	F/MAG					R	R	R	
9	**Valves**									
9.01	Type	F/MAG	PCA 03 D / Catalog Purchase order		RPF DD		R	R	R	
9.02	General visual control	F/MAG					R	R	R	
9.03	Batch conformity	F/MAG					R	R	R	
10	**Accessories**									
10.01	Type	F/MAG	PCA 03 D / Catalog Purchase order		RPF DD		R	R	R	
10.02	General visual control	F/MAG					R	R	R	
10.03	Batch conformity	F/MAG					R	R	R	
11	**Thermopox paper**									
11.01	Type	F/MAG	PCA 03 Purchase order		RPF DD		R	R	R	
11.02	General visual control	F/MAG					R	R	R	
11.03	Batch conformity	F/MAG					R	R	R	
12	**Cylinders - wooden support components**									
12.01	Type	F/MAG	PCA 03 Purchase order		RPF DD		R	R	R	
12.02	General visual control	F/MAG					R	R	R	
12.03	Batch conformity	F/MAG					R	R	R	

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
13	**Duct spacers - wheels - insulating tubes**									
13.01	Type	F/MAG	PCA 03 Catalog Purchase order		RPF DD		R	R	R	
13.02	General visual control	F/MAG					R	R	R	
13.03	Batch conformity	F/MAG					R	R	R	
14	**Tank-cover gasket**									
14.01	Type	F/MAG	D Purchase order		RPF DD		R	R	R	
14.02	General visual control	F/MAG					R	R	R	
14.03	Batch conformity	F/MAG					R	R	R	
15	**Composite paper**									
15.01	Type	F/MAG	PCA 03 Catalog Purchase order		RPF DD		R	R	R	
15.02	General visual control	F/MAG					R	R	R	
15.03	Batch conformity	F/MAG					R	R	R	
16	**Consumables**									
16.01	Batch conformity	MAG	PCA 02 Purchase order		DD					

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
	PRODUCTION									
1	**Winding manufacture**									
1.01	Frame type check (after setting)	AE	PCQ 02 IT D		SA		R	R	R	
1.02	Program (NC windger)	AE					R	R	R	
1.03	Conductor dimensions	AE					R	R	R	
1.04	Internal cylinder diameter (circular)	AE					R	R	R	
1.05	External diameter (circular)	AE					R	R	R	
1.06	External perimeter (oval)	AE					R	R	R	
1.07	Height	AE					R	R	R	
1.08	Number of turns (executing)	AE					R	R	R	
1.09	GTAW (foil)	AE					R	R	R	
1.10	Terminations's number, identification and lenght	AE					R	R	R	
1.11	General comparison against drawing	AE					R	R	R	
1.12	Identification	AE					R	R	R	
2	**Winding processing**									
2.01	Press type	AE	PCQ 02 IT D		SRM		R	R	R	
2.02	Winding height during pressing	AE					R	R	R	
2.03	Processing time and temperature	AE					R	R	R	
2.04	Width check after processing (oval)	AE					R	R	R	
2.05	Height check after processing (circular)	AE					R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
3	**Cover assembly**									
3.01	Type, integrity and serial number of cover	AE	PCQ 03 IT D		SRM		R	R	R	
3.02	Type and integrity of components	AE					R	R	R	
3.03	Type, integrity and surface of bushings	AE					R	R	R	
3.04	Bushing and gaskets positioning	AE					R	R	R	
3.05	Tap-changer positioning	AE					R	R	R	
3.06	Tap-changer gasket positioning	AE					R	R	R	
3.07	Tap-changer integrity and functionality	AE					R	R	R	
4	**Active part assembly**									
	Magnetic circuit preparation									
4.01	Type and integrity of magnetic circuit	AE	PCQ 03 IT / D		SRM		R	R	R	
4.02	Identification label check	AE					R	R	R	
	Winding and yoke mounting									
4.03	Type and integrity of windings	AE	PCQ 03 IT D		SRM		R	R	R	
4.04	Identification label check	AE					R	R	R	
4.05	Sticks and windings positioning (circular)	AE					R	R	R	
4.06	Winding insulation / LV (1°)	AE					R	R	R	
4.07	Yoke placing	AE					R	R	R	
4.08	Frame orientation	AE					R	R	R	
4.09	Winding insulation / LV (2°)	AE					R	R	R	
4.09.1	Core and frame insulation test: 500Vdc @60s	AE					R	R	R	

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
	Cover mounting over active part, HV and LV connections									
4.10	Cover orientation according HV/LV	AE	PCQ 03 IT D		SRM		R	R	R	
4.11	Cover height over active part	AE					R	R	R	
4.12	HV connection group	AE					R	R	R	
4.13	HV insulation supports	AE					R	R	R	
4.14	LV connection group	AE					R	R	R	
4.15	LV bars fixing (if present)	AE					R	R	R	
4.16	LV insulation supports	AE					R	R	R	
	Voltage ratio check									
4.17	Voltage ratio / number of turns	AE	PCQ 03 IT	IEC 60076-1	SRM		R	R	R	
4.18	Connection group	AE		IEC 60076-1			R	R	R	
	Oil and active part processing, encasing and finishing									
4.19	Processing's time and temperature	AE	PCQ 04 IT D		SRM		R	R	R	
4.20	Active part's bolts fastening	AE					R	R	R	
4.21	Connection and insulators placement	AE					R	R	R	
4.22	Tank type and cleaning	AE					R	R	R	
4.23	Gaskets' type and integrity	AE					R	R	R	
4.24	Tank and active part contacts	AE					R	R	R	
4.25	Active part height and tank bolts fastening	AE					R	R	R	
4.26	Dielectric strength before filling	AE		IEC 60156			R	R	R	
4.27	Autoclave's vacuum level during filling	FP					R	R	R	
4.28	Oil level during filling	FP					R	R	R	
4.29	Components and accessories check	FP					R	R	R	
4.30	Components and accessories mounting	FP					R	R	R	
4.31	Pressure leak test	FP		60076-1			R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
5	**Final test**									
5.01	Turns ratio and vector group	CQ	PCQ 05	IEC 60076-1	Vco ** DD		W	W	W	*if requested on purchase order **can be made of one or more test records of points 5.01-5.15
5.02	Applied voltage (HV/LV)	CQ		IEC 60076-3			W	W	W	
5.03	Induced voltage	CQ					W	W	W	
5.04	No-load loss and current	CQ		IEC 60076-1			W	W	W	
5.05	Winding resistance	CQ					W	W	W	
5.06	Load loss and short-circuit impedance	CQ					W	W	W	
5.07	Auxiliary circuits' dielectric test	CQ		IEC 60076-3			W	W	W	
5.08	Lightning impulse */Lightning impulse chopped *	CQ		IEC 60076-3 IEC 60076-4			W	W	W	
5.09	Temperature rise *	CQ		IEC 60076-2			W	W	W	
5.10	Noise level *	CQ		IEC 60076-10			W	W	W	
5.11	Insulation resistance *	CQ		IEC 60076-1			W	W	W	
5.12	Coupling *	CQ					W	W	W	
5.13	Oil dielectric strength *	CQ		IEC 60156			W	W	W	
5.14	Protective coating *	CQ		ISO 2808			W	W	W	
5.15	Short-time leak test under pressure *	CQ					W	W	W	
5.16	Auxiliary circuits' functioning	CQ	PCQ 05		SS		W	W	W	
5.17	Tap-changer functioning	CQ					W	W	W	
5.18	Accessories check	CQ					W	W	W	

celme	QUALITY CONTROL PLAN					PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
6	**Pre-shipping checks**									
6.01	Accessories tuning	CQ	PCQ 06		SS		R	R	R	*if requested on purchase order
6.02	Bushings	CQ					R	R	R	
6.03	Wheels	CQ					R	R	R	
6.04	Oil leakage	CQ					R	R	R	
6.05	Paint (visual)	CQ					R	R	R	
6.06	Paint type	CQ					R	R	R	
6.07	Oil level	CQ					R	R	R	
6.08	Dimensions and weight	CQ					R	R	R	
6.09	Warranty seals	CQ					R	R	R	
6.10	Separable connectors *	CQ					R	R	R	
6.11	Phases marking	CQ					R	R	R	
6.12	Tank/cover bolts' fastening	CQ					R	R	R	
6.13	Bushings' fastening	CQ					R	R	R	
6.14	Bushings' deviation mark	CQ					R	R	R	
6.15	Photo of package on truck	CQ					R	R	R	
	Attachments									
6.16	User's manual	CQ	PCQ 06		SS		R	R	R	*if requested on purchase order
6.17	Test report	CQ					R	R	R	
6.18	Dielectric fluid certificate *	CQ					R	R	R	

the end

C063-OVI-REP-PE-030

End of Manufacturing Report

01	*1st Issue*	*06-NOV-2021*	*AQU*	*IDI*	*LDG*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Subcontractor Document Number	ELO-INN-BPH-RPT-00020

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END OF MANUFACTURING REPORT

Contract No: SWL0000767 Customer: ELOGEN

Project: CROSSWIND Customer Order No.: BC0006205

TITLE PAGE

EQUIPMENT SUPPLIED:

Water Purification Unit 500L/H Offshore C63

SUPPLIED TO:

ELOGEN

P.O. NO: BC0006205

PROJECT: CROSSWIND

SUPPLIED BY:

OVIVO UK LIMITED
760 The Crescent
COLCHESTER
ESSEX
CO4 9YQ
UNITED KINGDOM

Telephone: +44 (0) 1206 756600

CONTRACT No: SWL0000767

REVISION STATUS / SUMMARY OF CHANGES

Revision	Purpose	Amendment	By	Date	Approved
01	New	First issue	P Nicholls	12/09/2024	M Kurjata
02	Updated	Updated to clients comments	P Nicholls	30/09/2024	M Kurjata

END OF MANUFACTURING REPORT

Contract No: SWL0000767 Customer: ELOGEN

Project: CROSSWIND Customer Order No.: BC0006205

SECTION 1

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SECTION 2

Declaration of Conformity

CE

EC Conformity Declaration

Manufacturer:	EnviroFALK GmbH Prozesswasser-Technik Gutenbergstrasse 7 Industriegebiet Sainscheid D 56457 Westerburg, Germany Phone: +49 2663 9908-0 Fax: +49 2663 9908-50
Name of the unit:	Reverse osmosis system RO + EDI 500 with water supply system
Item no.:	23004680
Applicable EC directives:	2006/42/EC, Appendix II, Part 1A (complete machines in compliance with the directive) 2014/30/EC (EMV) 2011/65/EU (RoHS)
Harmonized standards applied in full or in part:	EN 60204-1:2019-06 DIN EN ISO 12100:2011-03 DIN EN 82079-1 DIN EN 61000-6-4:2011-09
Documentation Authorized representative:	Julian Barendt, Willy Sui *(Department: Technical Editing)*

We hereby declare that the design and construction of the above-mentioned equipment, as well as the design that we have placed on the market, comply with the basic safety and health requirements of the EC Directives.
The safety aims of the low voltage directive 2014/35/EU have been observed in accordance with Annex I, No. 1.5.1 of the Machinery Directive 2006/42/EC.
This declaration will lose its validity in the event that any changes are made to the unit without our prior consent.

22.07.2024

_____

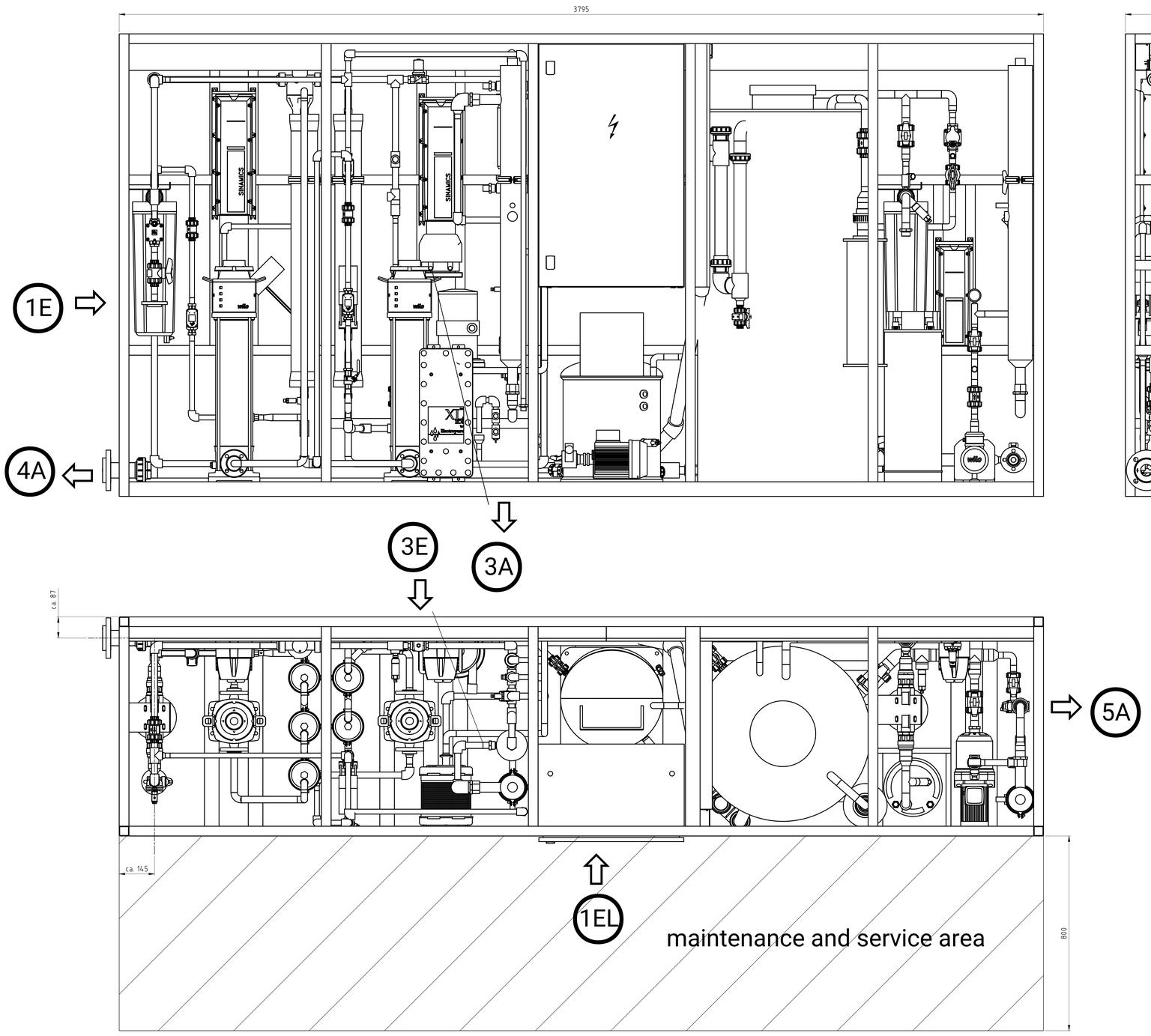
Date, signature of CE representative
(*Lutz Bohmerich, Technical Managing Director*)

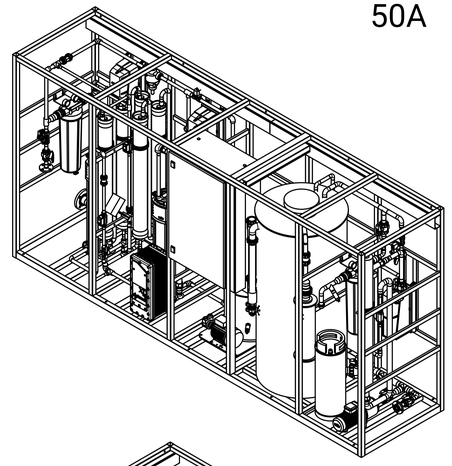
SECTION 3

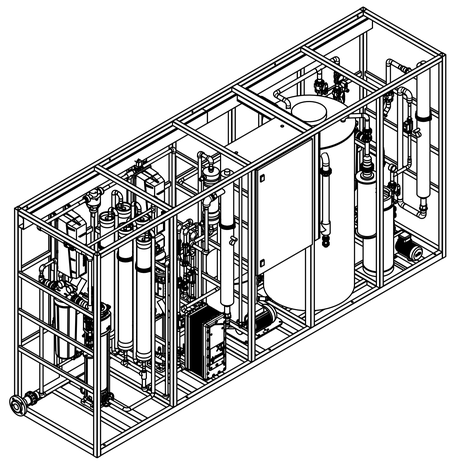
3a GA Drawing – "As Built" Page 6

3b Spare Parts List st Page 8

DRG No. 907670003







switch cabinet:
600 x 1000 x 400

el. power supply:
3x 400V, N, PE, 50 Hz

power:
ca. 12 kW

fuse:
50A

Interfaces:

1E = inlet softened water, 670 l/h, 4 bar, flange DN20/d25
3E = instrument air inlet, 1,7 Nm³/h, 7 bar, R1/2" male NPT
3A = air outlet, G3/8" female thread on pump with nozzle and 2m tube 12x9

4A = waste water gravity drain, flange DN50/d63
5A = client take off, flange DN20/d25
1EL = el. power supply (see top right)

all flanges to customer Class 150 / ASME B16.5

REV		
C	maintenance and service area added 3A air outlet added	NK 11.01.2024
B	flanges added	NK 12.01.2024
A	first issue	NK 18.01.2024

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info.uk@ovivowater.com www.ovivowater.com

CUSTOMER DRG No.	-
PROJECT REF	CLIENT
ECW SW L0000767	ELOGEN
PROJECT NAME	CROSSWIND
TITLE	Process & Instrumentation diagram ECW-1 Skid 1
STATUS	GENERAL ARRANGEMENT

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ORIGINATOR	DRAWN	CHECKED	APPROVED
-	NK	NS	MK
SCALE	DATE	DATE	DATE
NTS	11.01.2024	12.01.2024	18.01.2024

DRG No. 907670003 REV C

M A0

DRG No. 907670001

example EID: 1E HV 1

- identification number
- counter number

assembly:
A = expansion tank
B = tank
C = ion exchanger
DS = metering station
ED = electrodeionization
EH = softener
F = filter
FR = backwashing filter
LE = leak detection system
ME = membrane degassing
MF = microfiltration
NA = neutralization
NF = nanofiltration
PS = pump station
R = mixer
RF = return unit
RO = reverse osmose
RS = cleaning station
UF = ultrafiltration
W = heat exchanger / heater
Z = UV system

takeover points:
A = outlet
DL = compressed air
E = inlet
EL = electrical supply
R = return
V = flow line

valve overview:
AP = sample valve
BV = operation valve
BY = bypass valve
DH = pressure relief valve
EF = vent valve
EV = drain valve
HV = hand valve for maintenance tasks
RS = backflush valve
RV = check valve
SV = control valve
VS = safety valve
VV = reject valve

components:
A = expansion tank
B = tank
C = ion exchanger
EH = softener
P = pump
F = filter
R = mixer
W = heat exchanger
X = I ye trap, chlorine electrolysis, RO-membrane
Z = UV system

1EL customer / Ovivo
Power Supply
3 x400V,N,PE, 50 Hz
Power: max. ca. 12 kW
Fuse: 50A
Master-Cabinet
600 x 1000 x 400
S7-1200 with TP700
Remote Maintenance

welding methods:
PP-H socket-welding
PP-H butt-welding
stainless steel-welding

INSTRUMENT DEVICE CODES

FIRST LETTER - PARAMETER		SUCCEEDING LETTER(S)	
A	ANALYTICAL (SEE NOTE 1)	A	ALARM
B	-	B	-
C	-	C	CONTROLLER
D	DENSITY	D	DIFFERENCE
E	-	E	SENSING ELEMENT
F	FLOW	F	-
G	GAUGING POSITION , LENGTH	G	-
H	-	H	-
I	INDICATOR	I	INDICATOR
J	-	J	-
K	TIME	K	-
L	LEVEL	L	-
M	MOISTURE , HUMIDITY	M	-
N	-	N	-
O	-	O	-
P	PRESSURE	P	-
Q	QUALITY	Q	TOTALISER
R	-	R	RECORDER
S	SPEED OR FREQUENCY	S	SWITCH
T	TEMPERATURE	T	TRANSMITTER
U	-	U	-
V	VISCOSITY	V	-
W	WEIGHT , FORCE	W	-
X	-	X	-
Y	-	Y	-
Z	POSITION	Z	-

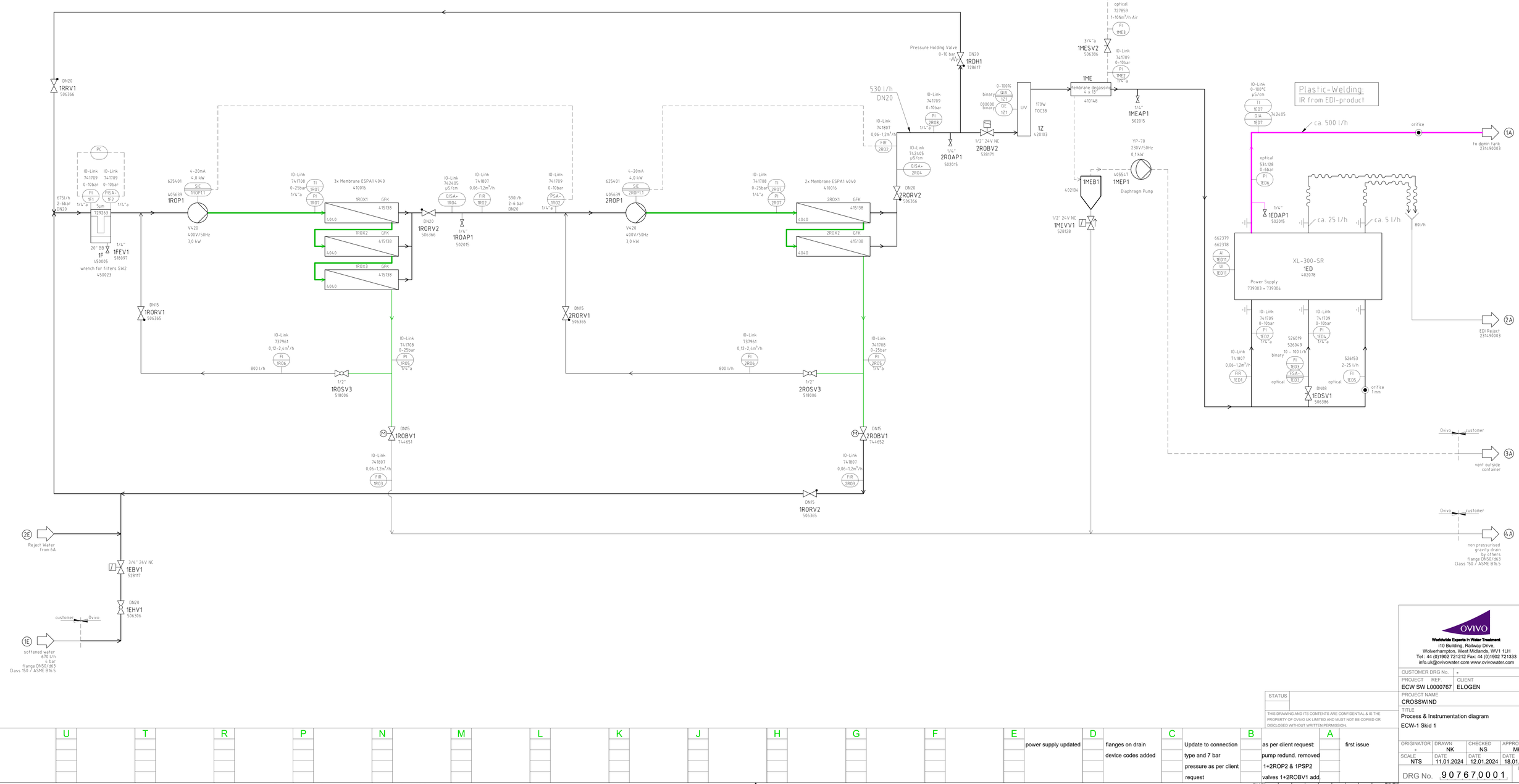
NOTE: 1 - A NOTE SHALL BE ADDED TO SPECIFY THE PROPERTY MEASURED (SEE BELOW)

Legend:

Devices and Valves:

- Reverse osmose
- Heat exchanger
- Cartridge filter
- Fixed-bed filters
- Ion exchanger
- Pump
- Actuator with electric motor
- Local control station
- Central control station
- Locally indication
- Backflow preventer
- Diaphragm valve
- Ball valve
- Pressure holding valve
- Safety valve
- Pressure reducing valve
- Check valve
- Flap trap
- Solenoid valve
- Pneumatic diaphragm valve
- Pilot solenoid valve
- Heater
- Hose
- Funnel
- Union
- Flange
- Static mixer
- UV Immersion UV lamp

Pipe material:
Pipe material: PP-H S5/SDR11; PN10; DIN 8077 / 8078 DIBT Z-40.23-4; RAL 7032
Pipe material: VA 1.4401 press fittings; M-pressing contour
Pipe material: PPs; DIN 8078 hot water resistant; low flammability according to DIN 4102



V		U		T		R		P		N		M		L		K		J		H		G	
F		E	power supply updated	D	flanges on drain	C	Update to connection	B	as per client request:	A	first issue												
					device codes added		type and 7 bar		pump redund. removed															
							pressure as per client		1+2ROP2 & 1PSP2															
							request		valves 1+2ROBV1 add.															

0 0,5 1 1,5 2 1:20 | 0 0,5 1 1,5 2 1:25 | 0 0,5 1 1,5 2 1:33,3 CMS

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CUSTOMER DRG No.	-		
PROJECT REF.	CLIENT		
ECW SW L0000767	ELOGEN		
PROJECT NAME	CROSSWIND		
TITLE	Process & Instrumentation diagram		
	ECW-1 Skid 1		
ORIGINATOR	DRAWN	CHECKED	APPROVED
-	NK	NS	MK
SCALE	DATE	DATE	DATE
NTS	11.01.2024	12.01.2024	18.01.2024
DRG No. 907670001			REV E

STATUS

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Project Name:	**Crosswind Elogen**
Project Number :	**SWL0000767**
Doc. No.	
Location :	
TITLE	**Ovivo - Recommended Spare Parts**

Ovivo PO Number Ref	Description of Recommended Spare Parts	Unit Price (GBP)	Price valid until date (YYYY-MM-DD) (*Minimum 6 month validity required)	Delivery Lead Time (weeks)	Ovivo Part Number	Type Of Consumble	Unit Of Measure	Recommended Spares Quantity	Total Price (GBP)
PWL-ECW001	Ion exchange resin MB regenerable	7.60	2024-12-31	TBC	425100	Consumable	Ltrs	25	190.00
PWL-ECW001	Filling For CO2 - Adsorber in canister 4.5Kg	10.18	2024-12-31	TBC	475412	Consumable	Kg	4.5	45.81
PWL-ECW001	Filter element, PP, 20" 5 µm, Big Blue no fibre loss	38.18	2024-12-31	TBC	729263	Consumable	Each	4	152.72
PWL-ECW001	Sterile filter PP / EPDM 10 "for tank ventilation hydrophobic 0.6µm	178.18	2024-12-31	TBC	732550	Consumable	Each	1	178.18
PWL-ECW001	Coloured solution for tank overflow with bactericide	55.15	2024-12-31	TBC	475196	Consumable	Ltrs	3	165.45
PWL-ECW001	Rotary vane pump 100 l/h, SS with accessories without motor	458.18	2024-12-31	TBC	907911	Wearing Part	Each	1	458.18
PWL-ECW001	UV lamp 170	462.44	2024-12-31	TBC	727461	Wearing Part	Each	2	924.88
PWL-ECW001	RO element ESPA1-4040	534.55	2024-12-31	TBC	410016	Wearing Part	Each	5	2,672.75
PWL-ECW001	Vacuum pump type 70 3600l/h, 230V, 100W	721.25	2024-12-31	TBC	405547	Spare Parts	Each	1	721.25
PWL-ECW001	Centrifugal pump V420 1.4301/EPDM / PN25 3x400V / 50 Hz, 3 kW	2,346.06	2024-12-31	TBC	405639	Spare Parts	Each	1	2,346.06
PWL-ECW001	Centrifugal pump M205 1.4404/EPDM 3x400V/50 Hz, 0,55 kW 1,5A Rp1 PN10	1,510.30	2024-12-31	TBC	405644	Spare Parts	Each	1	1,510.30
PWL-ECW001	Switch contact MAX for flowmeter DN10,15,20	93.34	2024-12-31	TBC	526019	Spare Parts	Each	1	93.34
PWL-ECW001	2/2-way solenoid valve 24VDC Stainless steel, positively controlled 0-16bar 3/4"i Viton, NC	466.68	2024-12-31	TBC	528099	Spare Parts	Each	1	466.68
PWL-ECW001	2/2 ways solenoid valve 24VDC stainless steel, servo 0,3-20 bar 1/2"i Viton NC inside: V2A	246.90	2024-12-31	TBC	528127	Spare Parts	Each	1	246.90
PWL-ECW001	Solenoid valve2/2, 1/2"i, NC 24VDC, brass/EPDM 0-12bar, direct	170.00	2024-12-31	TBC	528128	Spare Parts	Each	1	170.00
PWL-ECW001	Solenoid valve SS 1/2" f 0-10 bar, 24V DC, NC, FKM forced pilot	195.15	2024-12-31	TBC	528171	Spare Parts	Each	1	195.15
PWL-ECW001	Pressure gauge 0-6 bar G1/4"B hinten, Glyzerine SS, ø 63 mm	54.30	2024-12-31	TBC	534128	Spare Parts	Each	1	54.30
PWL-ECW001	Pressure gauge 0-10 bar G1/4"B hinten, Glyzerine SS, ø 63 mm	54.30	2024-12-31	TBC	534131	Spare Parts	Each	1	54.30
PWL-ECW001	Pressure gauge 0-6 bar G1/4" B unten, Glyzerine SS, ø 50 mm	45.81	2024-12-31	TBC	534137	Spare Parts	Each	1	45.81
PWL-ECW001	Frequency converter 0,55 kW 3AC 380-480V Power Module IP55/UL	560.00	2024-12-31	TBC	625391	Spare Parts	Each	1	560.00
PWL-ECW001	Frequency converter 4 kW 3AC380-480V Power Module IP55/UL	1,064.84	2024-12-31	TBC	625401	Spare Parts	Each	1	1,064.84
PWL-ECW001	Flow sensor with display 2...40 l/min IO-Link -10..90°C 12 bar G 1/2 DN10	475.15	2024-12-31	TBC	737961	Spare Parts	Each	1	475.15
PWL-ECW001	Flow sensor with display 1...20 l/min IO-Link -10..90°C 12 bar G 1/2 DN8	436.96	2024-12-31	TBC	741807	Spare Parts	Each	1	436.96
PWL-ECW001	Pressure sensor with IO-Link -1-25 bar, IO-Link G 1/4" AG, V4A, -40-90°C	190.91	2024-12-31	TBC	741708	Spare Parts	Each	1	190.91
PWL-ECW001	Pressure sensor with IO-Link -1-10 bar, IO-Link G 1/4" AG, V4A, -40-90 °C	190.91	2024-12-31	TBC	741709	Spare Parts	Each	1	190.91
PWL-ECW001	Pressure sensor front-flush -125-2500 mbar, IO-Link 4-20mA, G 1/2" AG, V4A	547.27	2024-12-31	TBC	741710	Spare Parts	Each	1	547.27
PWL-ECW001	Conductivity sensor IO-Link 0,04-1000µS/cm, 4...20mA G 1/2" AG, V4A, 25...100°C	1,272.73	2024-12-31	TBC	742405	Spare Parts	Each	1	1,272.73
PWL-ECW001	Motor control needle valve kv0,2, G 1/2", 24VAC/DC	2,083.03	2024-12-31	TBC	744651	Spare Parts	Each	1	2,083.03
PWL-ECW001	Motor control needle valve kv0,6, G 1/2", 24VAC/DC	2,083.03	2024-12-31	TBC	744652	Spare Parts	Each	1	2,083.03

SECTION 4

P&ID's – "As Built"

DRG No. 907670002

INSTRUMENT DEVICE CODES

FIRST LETTER - PARAMETER		SUCCEEDING LETTER(S)	
A	ANALYTICAL (SEE NOTE 1)	A	ALARM
B	-	B	-
C	-	C	CONTROLLER
D	DENSITY	D	DIFFERENCE
E	-	E	SENSING ELEMENT
F	FLOW	F	-
G	GAUGING POSITION , LENGTH	G	-
H	-	H	-
I	INDICATOR	I	INDICATOR
J	-	J	-
K	TIME	K	-
L	LEVEL	L	-
M	MOISTURE , HUMIDITY	M	-
N	-	N	-
O	-	O	-
P	PRESSURE	P	-
Q	QUALITY	Q	TOTALISER
R	-	R	RECORDER
S	SPEED OR FREQUENCY	S	SWITCH
T	TEMPERATURE	T	TRANSMITTER
U	-	U	-
V	VISCOSITY	V	-
W	WEIGHT , FORCE	W	-
X	-	X	-
Y	-	Y	-
Z	POSITION	Z	-

NOTE: 1 - A NOTE SHALL BE ADDED TO SPECIFY THE PROPERTY MEASURED (SEE BELOW)

example EID: 1E HV 1

identification number | counter number

assembly:
A = expansion tank
B = tank
C = ion exchanger
DS = metering station
ED = electrodeionization
EH = softener
F = filter
FR = backwashing filter
LE = leak detection system
ME = membrane degassing
MF = microfiltration
NA = neutralization
NF = nanofiltration
PS = pump station
R = mixer
RF = return unit
RO = reverse osmose
RS = cleaning station
UF = ultrafiltration
W = heat exchanger / heater
Z = UV system

takeover points:
A = outlet
DL = compressed air
E = inlet
EL = electrical supply
R = return
V = flow line

valve overview:
AP = sample valve
BV = operation valve
BY = bypass valve
DH = pressure relief valve
EF = vent valve
EV = drain valve
HV = hand valve for maintenance tasks
RS = backflush valve
RV = check valve
SV = control valve
VS = safety valve
VV = reject valve

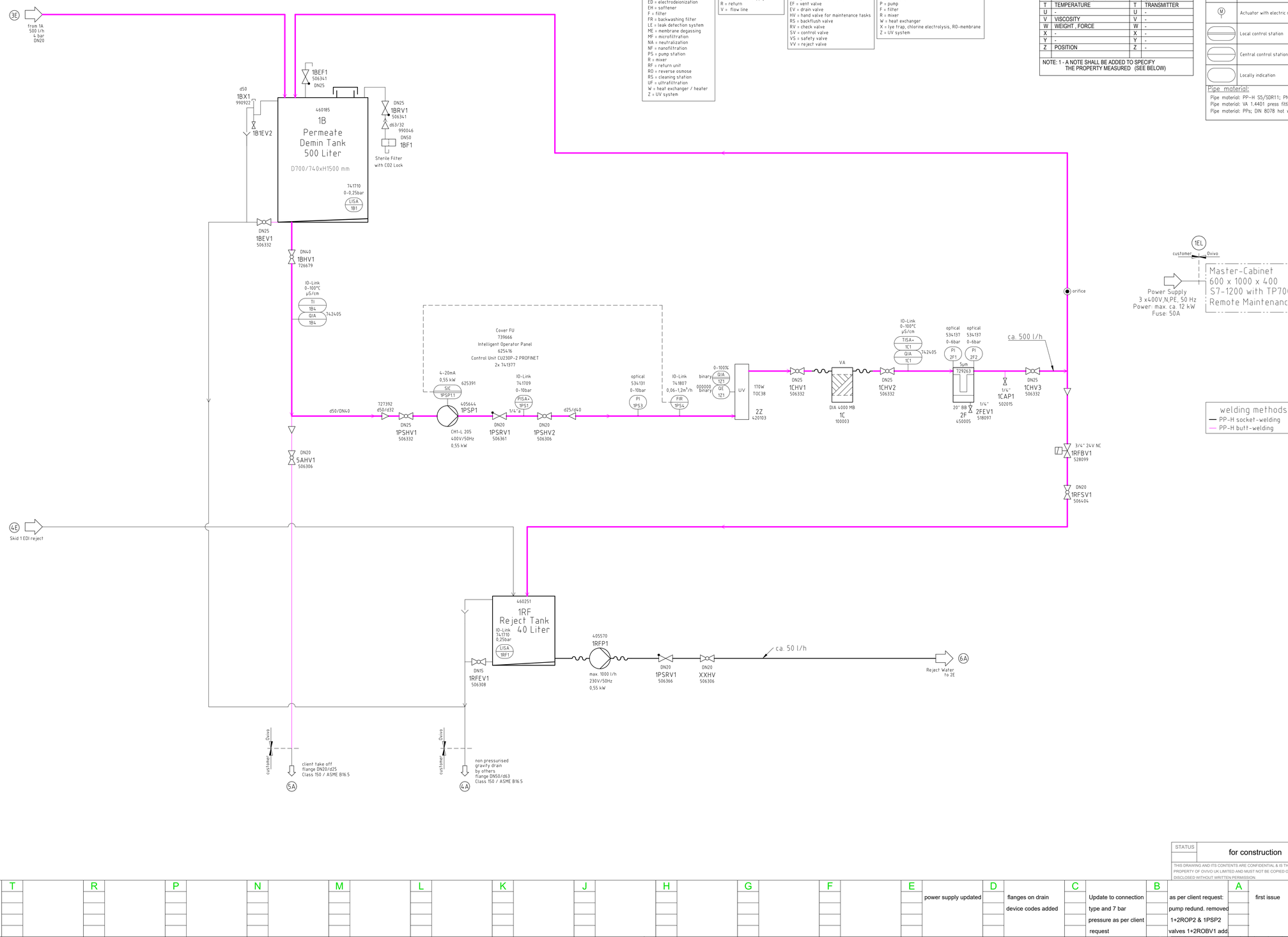
components:
A = expansion tank
B = tank
C = ion exchanger
EH = softener
P = pump
F = filter
R = mixer
W = heat exchanger
X = lye trap, chlorine electrolysis, RO-membrane
Z = UV system

Legend:

Devices and Valves:

	Reverse osmose		Backflow preventer
			Diaphragm valve
	Heat exchanger		Ball valve
			Pressure holding valve
	Cartridge filter		Safety valve
			Pressure reducing valve
	Fixed-bed filters		Check valve
			Flap trap
	Ion exchanger		Solenoid valve
			Pneumatic diaphragm valve
	Pump		Pilot solenoid valve
			Heater
M	Actuator with electric motor		Hose
			Funnel
	Local control station		Union
			Flange
	Central control station		Static mixer
	Locally indication	UV	Immersion UV lamp

Pipe material:
Pipe material: PP-H S5/SDR11; PN10; DIN 8077 / 8078 DIBT Z-40.23-4; RAL 7032
Pipe material: VA 1.4401 press fittings; M-pressing contour
Pipe material: PPs; DIN 8078 hot water resistant; low flammability according to DIN 4102



REV			
V			
U			
T			
R			
P			
N			
M			
L			
K			
J			
H			
G			
F			
E	power supply updated		
D	flanges on drain device codes added		
C	Update to connection type and 7 bar pressure as per client request		
B	as per client request: pump redund. removed 1+2ROP2 & 1PSP2 valves 1+2ROBV1 add.		
A	first issue		

0 0,5 1m 1,5 2 1: 20 | 0 0,5 1m 1,5 2 1: 25 | 0 0,5 1m 1,5 2 1: 33.3

CMS

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CUSTOMER DRG No.	-
PROJECT REF.	ECW SW L00000767
CLIENT	ELOGEN
PROJECT NAME	CROSSWIND
STATUS	for construction
TITLE	Process & Instrumentation Diagram
	ECW-1 Skid 2

ORIGINATOR	DRAWN	CHECKED	APPROVED
-	NK	KSR	MK
SCALE	DATE	DATE	DATE
NTS	11.01.2024	12.01.2024	18.01.2024

DRG No. 907670002 REV E

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SECTION 5

Inspection and Test Plan

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Inspection & Test Plan

Crosswind-ITP

Ovivo Project Number:	SWL0000767
Ovivo Project Name:	Crosswind
Ovivo Document Number:	SWL0000767-ITP-EF-001
Ovivo Document Title:	Inspection & Test Plan
Customer:	Elogen
Customer P.O. Title:	Demineralisation Plant
Customer P.O. Number:	BC0006205
Current Revision Number:	B
Current Revision Date:	04 March 2024
Number of Pages	5

REVISION	DATE	CREATED	CHECKED	AUTHORIZED
A	22.02.2024	NK	KSR	FG
B	04/03/2024	NK	PN	MK

Ovivo UK Ltd
i10 Building Railway Drive,
Wolverhampton, UK, WV1 1LH

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Equipment Factory Acceptance Test Plan Rev A

Factory acceptance testing of the modular demineralizer system will consist first of a "dry" test, followed by a "wet" functional demonstration of flowing water through the system.

Dry Check Out:

1. General Inspection:
   - ☐ Completeness based on installation plan
   - ☐ Type plate present
   - ☐ Hydrostatic tests completed and reports reviewed.
   - ☐ P&ID walk down completed to verify completeness and accuracy of the assembled system. *Refer to drawings.*
   - ☐ Assembly walk down completed to verify completeness and accuracy of the assembled system. *Refer to drawings*
   - ☐ Control software development completed.
   - ☐ Panel checkouts completed and software uploaded.
   - ☐ Wiring to transformers, EDI module, motors, in-line heaters, and HVAC inspected and EDI controller
   - ☐ Power to the EDI locked out so that it cannot be energized during testing.

   Verified by: Peter Kasperski / 06.08.24 [name, title, date]

2. Physical and electrical Set Up:
   - ☐ Electrical check present
   - ☐ Three-phase power connection
   - ☐ Clockwise rotating field
   - ☐ Switch cabinet and rack grounded – grounding signs present
   - ☐ Circuit diagram and nameplate inside control cabinet
   - ☐ Voltage arrows present
   - ☐ All cables checked for sufficient strain relief
   - ☐ Correct setting of all rated currents on motor-protective circuit breakers
   - ☐ Contact hazard protection cover on main switch and control terminal strip (X1) present
   - ☐ Component labeling in the control cabinet outside checked for correctness
   - ☐ Temporary plugs installed in the sample connections for ORP and pH probes. ORP and pH probes wired but not installed in the sample lines.
   - ☐ Temporary power connected to the Main Control Panel.
   - ☐ Temporary interconnecting power and communications cables connected from the Main Control Panel to other users.
   - ☐ Temporary connections made without punching holes in enclosures.
   - ☐ Presence of all defined IO's and control system.

   Verified by: Simon Müller, 06.08.2024 [name, title, date]

Steps 1 & 2 must be completed prior to energizing the system.

3. Controls Set up:
   - ☐ IP addresses set up and network communications established between the PLC controllers and devices.
   - ☐ VFDs set up and parameters stored.
     - VFD output to the 1st Pass RO Pump limited if required.
     - VFD output to the 2nd Pass RO Pump limited if required.
   - ☐ EDI controller set up and parameters stored.
   - ☐ Instrument ranges and scaling set to match PLC/HMI.

   Verified by: Simon Müller, 06.08.2024 [name, title, date]

4. Manual Verification:
   - ☐ In manual operation, each actuated valve responds to the HMI open/close push buttons. HMI status of actuated valve matches actual status. Speed controls adjusted for smooth operation.
   - ☐ The HMI displayed value for each transmitter matches the local instrument display.
   - ☐ The HMI displayed status for each switch matches the status of the switch. Switch status manually manipulated to verify both states.

   Verified by: Simon Müller, 06.08.2024 [name, title, date]

Wet Functional Demonstration:

1. Feedwater quality:
   - ☐ Conductivity raw water 124 µS/cm
   - ☐ Total hardness of raw water 0 °dH
   - ☐ Inlet pressure of raw water 4 bar
   - ☐ Temperature of raw water 25.1 °C

2. Set Up:
   - ☐ RO housings and RO membranes installed.
   - ☐ Temporary connections made to bypass the EDI module.
   - ☐ Temporary connections made:
     - for recirculation to the raw water connection
     - from the 1st pass reject connection to the recirculation tank
     - from the demineralized water connection to the recirculation tank

   Verified by: Peter Wagner / 06.08.24 [name, title, date]

3. Manual Verification:
   - ☐ In manual operation, each VFD-driven pump responds to the HMI run/stop push buttons #and speed settings. HMI status of each VFD-driven pump matches actual status. VFD output cannot be forced to exceed the limits defined above. Direction of motor rotation verified.
   - ☐ In manual operation, each straight speed pump responds to the HMI run/stop push buttons. HMI status of each straight speed pump matches actual status. Direction of motor rotation verified.

   Verified by: Simon Müller, 06.08.2024 [name, title, date]

4. Functional Demonstration:
   - ☐ With shortened timers and reduced settings, the system performs the sequences in automatic operation as described in the Software Detailed Description.
   - ☐ Using forced conditions, alarms and interlocks verified to interrupt operating sequences as described in the Software Detailed Description.
   - ☐ Software calculated variables verified to be accurate.
   - ☐ Hardwired inputs from the DCS (permissive and run command) verified using jumpers and/or forced bits.
   - ☐ Hardwired outputs to the DCS verified at the output terminals.
   - ☐ All indicator lights in order
   - ☐ Potential free contacts and fault signals controlled
   - ☐ Restart after emergency stop and main switch off
   - ☐ Error messages of the program checked.

   Verified by: Peter Wagenseil / 06.08.24 [name, title, date]

Ovivo UK Ltd
i10 Building Railway Drive,
Wolverhampton, UK, WV1 1LH

5. Client Witnessed Demonstration:
   - Present the inspection and test documentation for the Client's review.
   - Demonstrate the automatic operating sequences using shortened timers and reduced settings.
   - Demonstrate a random sampling of alarms and interlock conditions, up to 10% of the total alarms.
   - Demonstrate functionality of hardwired inputs from the DCS.
   - Demonstrate functionality outputs to the DCS.

   Witnessed by: Hassan HAMMANT [name, title, date]

6. Prepare for Shipping:
   - ☐ Valves used for throttling flow during testing returned to normal positions.
   - ☐ Temporary piping removed. System fully drained.
   - ☐ Plant preserved
   - ☐ Cartridge filter elements put in package with plant.
   - ☐ Any limitations on VFD outputs removed. Default settings entered and stored. Final software version saved.
   - ☐ Temporary power and communications cables removed. Lockout to the EDI removed. Electrical panels sealed.
   - ☐ Pictures taken
   - ☐ Cover panels installed over terminal point locations.
   - ☐ Temporary bracing installed as needed.
   - ☐ Equipment cleaned and secured for shipment.

   Verified by: Peter Kaperski / 06.08.24 [name, title, date]

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Inspection & Test Plan

SWL0000767-01-ITP

GENERAL INSPECTION

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
1.1.1	Pre-Inspection Meeting	-	-	Meeting Minutes	H	H	H			
1.1.2	Supplier Documentation Review	-	-	Supplier Document requirements list (SDRL)	R	R	R			
1.1.3	Supplier to submit all pre-manufacture documents		Contract	Supplier documents	R	R	R			

RO VESSELS / EDI / DEGASSER

RO Vessels

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
2.2.1	Purchase RO vessels	Internal procedures	Purchase order	Purchase order	R	-	-			
2.2.2	Goods inwards inspection	Internal procedures	Purchase order	Data Sheet	R	R	R			

EDI Module

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
2.3.1	Purchase EDI module	Internal procedures	Purchase order	Purchase order	R	-	-			
2.3.2	Goods inwards inspection	Internal procedures	Purchase order	Data Sheet	R	R	R			

Degasser Module

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
2.4.1	Purchase degassing module	Internal procedures	Purchase order	Purchase order	R	-	-			
2.4.2	Goods inwards inspection	Internal procedures	Purchase order	Data Sheet	R	R	R			

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PUMPS

Vertical Pumps

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
3.1.1	Purchase pumps	Internal procedures	Purchase order	Purchase order	R	-	-			
3.1.2	Goods inwards inspection	Internal procedures	Purchase order	Data Sheet	R	R	R			

VALVES

Valves

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
4.1.1	Purchase valves	Internal procedures	Purchase order	Goods inwards inspection	R	-	-			
4.1.2	Goods inwards inspection	Internal procedures	Purchase order	Data Sheet	R	R	R			

INSTRUMENTATION

Instruments

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
5.1.1	Purchase instruments	Internal procedures	Purchase order	Purchase order	R	-	-			
5.1.2	Goods inwards inspection	Internal procedures	Purchase order	Data Sheet	R	R	R			

FABRICATION

Skid Frames

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
6.1.1	Purchase materials	Internal procedures	Purchase order	Purchase order	R	-	-			
6.1.2	Goods inwards inspection	Internal procedures	Purchase order	Material Certificate EN 10204 2.2 for steelwork	R	R	-		EN 10204 3.1 certs can be supplied instead of 2.2	
6.1.3	Weld stainless steelwork (EnviroPharma)	Welding procedures	EN ISO 15614	Welding documents	R	R	R			
6.1.5	Visual Examination [VT] 100% VT on welds	Internal procedure	Internal procedure	Visual Examination Report			R			
6.1.6	Pickle and passivate	Internal procedure	Internal procedure	Report	R	R	R			
6.1.7	Dimensional Inspection	Internal procedure	Internal procedure	Dimensional Report / Signed Drawings	W	R	R			

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Stainless steel Piping

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
6.2.1	Purchase material	Internal procedure	Purchase order	Purchase order	R	-	-			
6.2.2	Material Verification	Internal procedure	Purchase order	Material Certificate EN 10204 2.2 for steelwork	R	R	R		EN 10204 3.1 certs can be supplied instead of 2.2	
6.2.3	Weld stainless steel pipework (EnviroPharma)	Welding procedures to include WPQR WQR	EN ISO 15614	Welding documents	R	R	R		(WPQR = Weld procedure qualification records, WQR = Welders qualification records)	
6.2.4	Visual Examination [VT] 100% on welds	Internal procedure	BS EN 5817 level C	Visual Examination Report	R	R	R			
6.2.5	Pickle and passivate	Internal procedure	Internal procedure	Report	R	R	R			
6.2.6	Dimensional Inspection	Internal procedure	Internal procedure	Dimensional Report / Signed Drawings	R	W	R			

Non-Metallic Piping

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
6.3.1	Purchase material	Internal procedure	Purchase order	Purchase order	R	-	-			
6.3.2	Goods inwards inspection	Internal procedure	Purchase order	Certificate of conformity	R	-	-			
6.3.3	Welding, Infra-red and butt	Internal procedure	Internal procedure	Welding procedure	R	-	-			
6.3.4	Final Inspection	Internal procedure	Internal procedure	Certificate of Conformance	R	W	-			

CONTROLS

Control Panel / Software

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
7.1.1	Purchasing equipment	Internal procedure	Purchase order	Purchase order	R	-	-			
7.1.2	opsCTRL Link FAT	Internal procedure	Internal procedure	FAT Report	I	W	-		(opsCTRL is the Ovivo remote monitoring link, so that the plant can be monitor remotely)	
7.1.3	Control System FAT	Internal procedure	Internal procedure	FAT Report	I	W	W			

GENERAL ASSEMBLY

Assembled Skids Wet Test

ITEM	DESCRIPTION	CONTROL PROCEDURES	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTATION	INSPECTION FUNCTION NOTES				NOTES	COMPLETION DATE & SIGN
					EnviroFalk	OVIVO	Elogen			
8.1.1	Carry out final assembly	Internal procedure	Internal procedure	FAT Protocol, GA and details drawings	R	-	-			
8.1.2	System Wet Factory Test Leak function test	Internal procedure	Internal procedure	System Shop Test Report	R	W	W			
8.1.3	Pressure Test	Internal procedure	Internal procedure	Hydrostatic Test Report	R	R	R		In accordance with manufacturer's standard practice.	
8.1.4	Final Inspection and Test	Internal procedure	Internal procedure	Test Report / Ovivo Inspection release note	R	W	W		Accepted with minor Comments	

8.1.5	End of Manufacturing Report (EoMR)	Contract	Contract	EoMR	[illegible]	R	R			
8.1.6	Preservation and packaging	Internal procedure	Internal procedure	Packing List	[illegible]	W	-			

LEGEND	
W	WITNESS POINT An inspection point to be attended by the Inspector but where the activity may proceed if the Inspector fails to attend. Notify Ovivo with ten working days' notice
H	HOLD POINT An inspection point to be attended by the Inspector that shall not be passed without written authorization from Ovivo. Notify Ovivo with ten working days' notice
R	DOCUMENT REVIEW A review of documentation or certification
I	INSPECT (Surveillance) An inspection point where the Inspector may attend, no need to notify Ovivo

SECTION 6

Material Certificates
Stainless Steel Pipe and Frame

Title: – Material certificates

Total Pages	
Project No	SWL0000735
Project Name	Crosswind

Address: Ovivo UK Limited
Ogilvie House
760 The Crescent
Colchester Business Park
Essex CO4 9YQ

Ovivo Internal Checking & Verification

Rev.	Date	Checked	Approved	Comment
001	04/09/2024	Peter Nicholls	Marta Kurjata	1st Issue
		Checker	Approver	
		Ovivo	Ovivo	

Contents Page

Item	Component	Material Specification	Description	Certificate number	Heat or Cast number	Chemical Analysis	Mechanical properties	C of C	Test Report		Page numbers
1	Fittings – Bogen 45˚	EN 10217-7 - 1.4435	31235_MatZert31_Bogen_90_DN020_701176_008005	80036143-01-20 & 47310A	008005	✓	✓				24
2	Fittings - Bogen 90°	AD2000-W2/W10 – 1.4435	40533 MatZert31 Steri-Bo 90 DN020 H118028 0511841	80084947-01-40	H118028	✓	✓				26
3	Fittings - Bogen 90°	DIN 11866 – 1.4435	47033 MatZert31 bogen 90 DN20 440135	80112253-01-60 & 160689	H123815/ 440135	✓	✓				27
4	Fittings - Bogen 90°	1.4404/316L	57452 1042-302 MZ31 Bogen 90 DN20 Schwer 3376	166496	S680732	✓	✓				29
5	Fittings - Bogen 90°	DIN 11866 – 1.4435	59057 1042-172 MZ31 Bogen 90 DN25 Neumo H143526 823023	80195088-01-41 & Z20008189	H143526 & 823023	✓	✓				31
6	Fittings - Bogen 90°	DIN 11866 – 1.4435	134049_MZ_1042171_STERI-Bo 90° DN020 DIN Ø23x1.5MBK400 1.4435 (BN2) 316LDIN 11865-BL-90	80198767-01-10	134049	✓	✓				41
7	Fittings - Bogen 90°	DIN 11866 – 1.4435	144830 134049_MZ_3118564_Bogen 90° DN 20 11865	80200848-01-20	144830/ 134049	✓	✓				42
8	Fittings - Flansch	1.4404	58583 1042-513 MZ31 Vorschweißflansch DN25 E211191	49.123	E211905	✓	✓				43
9	Fittings - Flansch	1.4404	567863_MZ_3112508_Vorschweiß-Flansch DN 25 PN 40 DIN EN 1092-1	67.178	567863	✓	✓				44
10	Fittings - Muffe-SO	1.4435	49548 MatZert31 Muffe-SO DN015 19x1.5 G1-4 328428	255297	328428	✓	✓				45
11	Fittings - Muffe-SO	1.4435	57138 1042-450 MZ31 Muffe Kiesel DN15 G¼	57138	390306			✓			47

			390306 Deckblatt								
12	Fittings - Nippel-SO	1.4435	405683	515582	405683	✓	✓				48
13	Fittings - Redu	1.4404	54292 WAZ 3.1 AS-RK23r19-4L 277205 18-1845c	MEST328184/2018	18-1845c/ 277205	✓	✓				50
14	Fittings - Redu	1.4404/316L	58997 1042-504 MZ31 Reduzierung DN20-15 Schwer 3324	21-12855	S680732	✓	✓				54
15	Fittings - Redu	1.4404/316L	55688 WAZ3.1 AS-RKK23r19-4Li 2825	19-12647	2825/ 13049 390306 406289 680732	✓	✓				56
16	Fittings - TKR-Stück	1.4404	52401 WAZ 3.1 AS-TK23r19-4L CH 728013 18-05223	CERT114869	728013	✓	✓				57
17	Fittings - T-Stück	1.4435	31235_MatZert31_T_DN020_908047	100058	908047	✓	✓				60
18	Fittings - T-Stück	1.4435	40533 MatZert31 Steri-T DN020 403961	30 000 030 952/00	403961	✓	✓				61
19	Rohr	1.4435	59044 1041-101 MZ31 Rohr DN20 Dockweiler 049093	10002895107 / 00	049093	✓	✓				65
20	Rohr	1.4435	HQ-Tube DN025 DIN Ø29x1.5 223124 H4o	8814-1	223124	✓	✓				68
21	Vierkantrohr	1.4301/1.4307	1A 466303_MZ_4002501_Vierkantrohr 1.4404, 40 x 30 x 2,0 mm	24001395	1A/547488	✓	✓				96
22	Vierkantrohr	1.4404	1A 547933_MZ_4002502_Vierkantrohr 1.4404, 40 x 20 x 2,0 mm	23059664	1A/547933	✓	✓				72
23	Vierkantrohr	1.4404	547935_MZ_4002500_Vierkantrohr 1.4404, 60 x 40 x 2,0 mm	0000837477	54935	✓	✓				74
24	Pipework	Polypropylene Homopolymer β nucleated	D20-315 D16-110 D75, D90, D110	NA	NA				✓		75

LS79540 Pos 31

Rohrbogen AG

Wasenstrasse 13
CH-4133 Pratteln Switzerland
Tel: +41 61 826 55 11
Fax: +41 61 821 13 58

SQS Zertifikat ISO 9001: 2000 Nr.: 10519
SQS Certificat ISO 9001: 2000 no: 10519

Industrie Service

Zertifiziert nach: AD 2000-W0/TRD und DGR 97/23/EG durch TÜV SÜD Zertifizierungsstelle für Druckgeräte benannte Stelle, Nr.: 0036
Certified acc: AD 2000-W0/TRD und DGR 97/23/EC by TÜV SÜD group for pressure equipment NOB no: 0036

Besteller: Customer:

Kiesel Steriltechnik GmbH
Wannenäckerstrasse 20
D-74078 HEILBRONN

I/Bestell-Nr. 18332
Your Order No.
U/Auftrags-Nr. 24677 Tschopp
Our Order No.
Positions-Nr. 20
Item No.

Attesttyp 06

Zeugnis-Nr. 80036143-01-20
Certificate No.

Abnahmeprüfzeugnis nach EN 10204-3.1
Inspection Certificate according EN 10204.3.1

Anforderungen Specification: AD2000-Merkblatt W2 / VDTÜV Merkblatt 1252
Ausgestellt im Einvernehmen mit dem TÜV SÜD. Siehe Zulassungsschreiben
Laut Schreiben des TÜV SÜD wird auf eine Gegenzeichnung verzichtet.
Issued according TÜV SÜD
No countersignature required TÜV SÜD

Kennzeichnung Marking: RP-LOGO 1.4435 (BN2) KIESEL-LOGO
RE 23.00 x1.50
108491/008005
DIN 11865

Zeichen des Lieferwerks Manufacturer brand

Stempel des Werksachverständigen Work Inspector's stamp *RE*

Stück Quantity	Gegenstand / Object Anforderungen / Requirements	I)	II)	Werkstoff / Material Vormaterial nach / Starting material acc	Chargen Nr.	Schmelze Nr. Heat No.
1.055	Bogen KST -11865-A-90-BD-23,0 x 1,50-W-1.4435	HT	I	1.4435 EN 10217-7 DIN 11866 BN 2	H108491	008005

I): S = Aus nahtlosem Rohr / Of seamles Tube
W = Aus geschweisstem Rohr / of welded Tube
BL = Halbschalen aus Blech gepresst / Longitudinal seam welded elbow
LM = Rohre für Lebensmittel / Pipes for the food industrie
HT = Rohre für Aseptik / Pipes for the aseptic, chemical and pharmaceutical industries
II): I = IHU / Hydroforming
K = Kaltverformte Rohrbogen / Cold formded Elbows

Schmelzen-Analyse gemäss Vormaterialzeugnis / Heat analysis acc. to base material certificate

Int. Werks Nr. / Int. Work No. 803840

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Ti %	N %	Cu %	Al %	Erschmelzungsart Steel making process
.017	.4	1.38	.03	.001	17.23	2.5	12.62	.007	.033	.27	.004	

Ergebnis der Prüfungen Vormaterial / Test Results Starting Materials

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	
1		287	314	575	64.8		OB	

Ergebnis der Formstückprüfung / Test Results Fittings

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	Delta Ferrit Klasse DF Classe	Zf-Prüfung der Schweissnaht nach: ND test of weld acc to: EN1435
						133		3	*OB

OB = ohne Beanstandungen / without objection

Wärmebehandlung Heat-treatment: Glühen annealing C°	Haltezeit holding time min.	Abkühlung in cooling in	Werkstoff-verwechslung Material check	Besichtigung und Abmessung Visual inspection and dimensional check	sonstige Prüfungen / Other tests
1070	3	H2N2	OB	OB	Gemäss Besteller wird auf IK- Test am Bogen verzichtet.

*Laut Schreiben des TÜV Süd vom 22.9.2003 reduzierter Prüfumfang

Die gestellten Anfoderungen sind erfüllt
The desired requirements are fulfilled.

Dieses Zeugnis wurde mit Hilfe der EDV erstellt und ist ohne Unterschrift gültig
This certificate is made by ADP-System and is valid without signature

Anlagen
Enclosure

Der Werksachverständige
Work's inspector

Pratteln 23.06.2011

R. Eisele

ZWAHLEN & MAYR
ZM TUBES

Z.I. 2, CH-1860 **AIGLE**
Tel. ++41-(0)24-468 46 46
Fax ++41-(0)24-468 46 01

INSPECTION CERTIFICATE

CERTIFICAT DE RECEPTION
ABNAHMEPRÜFZEUGNIS

EN 10204 - 3.1

N° **102457**

* DER TÜV SUDWEST HAT MIT SCHREIBEN VOM 3 NOVEMBER 1992 AUF DIE GEGENZEICHNUNG VERZICHTET

CONFIRMATION N°: / AUFTRAGS N° **47310 A**

CUSTOMER: / CLIENT/ KUNDE **KIESEL**

CUSTOMER ORDER N° COMMANDE CLIENT / KUNDENBESTELLUNG	SPECIFICATIONS: ANFORDERUNGEN	HEAT N. COULEE N. SCHMELZE N.	QUANTITY QUANTITE STÜCKE	DIMENSIONS mm ABMESSUNGEN	LENGTH LONGUEUR LÄNGE mm	STEEL GRADE NUANCE D'ACIER MARKENBEZEICHNUNG
17241						
PRODUCT PRODUIT / PRÜFGEGENSTAND **REDRAWN TUBES - TUBES ETIRES - NACHGEZOGENE ROHRE**	**EN 10217-7 TC2 AD 2000-W2/W10 BN2 DIN 11866 ASTM A270 ASME SA249M**	**008005**	**364.5 m**	**23.00 x 1.5**	**6000**	**1.4435/TP316L**

HEAT ANALYSIS ANALYSE DE COULEE / SCHMELZANALYSE

HEAT N. COULEE N. SCHMELZE N.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	% Cu	% Fe	% Al	% Co	% B	% Zr	%	%
008005	0.017	0.40	1.38	0.030	0.001	17.23	12.62	2.50	0.033	0.007	0.27		0.004					

PRODUCT ANALYSIS ANALYSE PRODUIT / STÜCKANALYSE

HEAT N. COULEE N. SCHMELZE N.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	% Cu	% Fe	% Al	% Co	% B	% Zr	%	%
PIECE	0.0170	0.298	1.31	0.0936	0.0167	17.0	13.0	2.51		0.0028	0.206	65.1	0.0202	0.186				

HEAT TRAITMENT : TREATEMENT THERMIQUE WÄRMEBEHANDLUNG
ANNEALED AT : HYPERTREMPE A LÖSUNGSGEGLÜHT BEI **1050°C**
AND RAPIDLY COOLING ET REFROIDI RAPIDEMENT UND ABGESCHRECKT

100 % OF THE MATERIAL HAVE BEEN PASSED WITH SATISFACTORY RESULT THE : DU MATERIEL SATISFAIT AU(X) CONTROLE(S) DES MATERIALS HAT DIE PRÜFUNG BESTANDEN

Eddy Current

TEST ACCORDING TO : SUIVANT ENTSPRECHEND **SEP 1914/1925 ASME SA 1016**

MANUFACTURING DATE :

MARKING : MARQUAGE KENNZEICHNUNG ***KST HQ TUBE-ZM-Ø23 x 1.5-TP 316L/1.4435-ASTM A270-ASME SA249M-BN2-W-DIN 11866 H4o-EN 10217-7 TC2 WCR-AD-2000-Schmelzen Nr 008005***

REMARKS : REMARQUE ANMERKUNG

(10 BAR = 1M Pa)

FLATTENING APLATISSEMENT RINGFALTVERSUCH	HYDROSTATIC TEST ESSAI HYDRAULIQ BAR WASSERDRUCKVERSUCH	FLARING EVASEMENT AUFWEITUNG
S	**NE**	**S 100%**
FLANGING COLLET BÖRDELVERSUCH	REVERSE FLATTENING RETOURNEMENT INVERSE WURZELSEITIGER RINGFA	GRAIN SIZE ASTM GROSSEUR DE GRAIN KORNGRÖSSE
S	**S**	**S 6-8**
CORROSION TEST TEST CORROSION IK TEST	P.M.I. TEST DE NON MELANGE VERWECHSELLUNGSPR.	VISUAL CONTROL CONTROLE VISUEL BESICHTIGUNGSKONTR.
S EN ISO 3651-2	**S**	**S Grinded 400**
SPECIFICATION SPEZIFIKATION	SPECIFICATION SPEZIFIKATION	SPECIFICATION SPEZIFIKATION
S Ferrite test < 0.50%		

S = Satisfactory - Satisfaisant - Zufriedenstellend
NE = Not executed - Pas effectué - Nicht durchgeführt

TEST RESULTS RESULTATS DES ESSAIS / ERGEBNIS DER PRÜFUNGEN (1 N/mm2 = 1M Pa)

SAMPLE ECHANTILLON PROBE	Ø OU EXT AUSS	Ø INT. INN.	WALL THIC. EPAISSEU WANDSTÄR	LENGTH LONGUEUR LÄNGE	ROUGHNESS RUGOSITE RAUHIGKEIT	ROUGHNESS RUGOSITE RAUHIGKEIT	ROUGHNESS RUGOSITE RAUHIGKEIT	TENSILE TRACTION / ZUGVERSUCH Rp 0,2% N/mm 2	Rp 1% N/mm 2	Rm N/mm 2	A % Lo=5,65√ So	HARDNESS DURETE. HÄRTE	
TOLERANCES	**23.00**	**20.00**	**1.5**	**6000**	**int.Ra**	**ext.Ra**							
TOLERANZEN	±0.12		±0.15	±50	<0.40 µ	<0.80 µ	µ					HV3	
1	**22.99**	**20.14**	**1.43**	**5500**	**0.22**	**0.13**		287	314	575	64.8	166.2	
2	**22.98**	**20.13**	**1.43**		**0.18**	**0.15**		284	312	576	64.7		
3	**22.99**	**20.14**	**1.43**	**5500**	**0.22**	**0.14**		295	319	579	64.5		
4	**22.99**	**20.14**	**1.42**		**0.18**	**0.14**		271	303	576	63.6		
5	**22.99**	**20.14**	**1.40**	**6000**	**0.13**	**0.14**		305	326	579	64.6	175.5	

Emis et vérifié par : Issued and checked by :

ISO 9001 Certification Nr. LRQA 943175 Quality system

Z.M. Q.C. C. PARIS

Aigle, 24-févr-11

Rohrbogen AG
Wasenstrasse 13
CH-4133 Pratteln Switzerland
Tel: +41 61 826 55 11
Fax: +41 61 821 13 58

SQS Zertifikat ISO 9001: 2000 Nr.: 10519
SQS Certificat ISO 9001: 2000 no: 10519

Industrie Service

Zertifiziert nach: AD 2000-W0/TRD und DGR 97/23/EG durch TÜV SÜD Zertifizierungsstelle für Druckgeräte benannte Stelle, Nr.: 0036
Certified acc: AD 2000-W0/TRD und DGR 97/23/EC by TÜV SÜD group for pressure equipment NOB no: 0036

Besteller: Customer:

Kiesel Steriltechnik GmbH
Wannenäckerstrasse 20
D-74078 HEILBRONN

I/Bestell-Nr. 32803
Your Order No.
U/Auftrags-Nr. 57784 Rzehaczek
Our Order No.
Positions-Nr. 40
Item No.

Attesttyp 06

Zeugnis-Nr. 80084947-01-40
Certificate No.

Abnahmeprüfzeugnis nach EN 10204-3.1
Inspection Certificate according EN 10204.3.1

Anforderungen AD2000-Merkblatt W2/W10 / HP 8/3, VDTÜV Merkblatt 1252
Specification
Ausgestellt im Einvernehmen mit dem TÜV SÜD. Siehe Zulassungsschreiben
Laut Schreiben des TÜV SÜD wird auf eine Gegenzeichnung verzichtet.
Issued according TÜV SÜD
No countersignature required TÜV SÜD

Kennzeichnung RP-LOGO 1.4435 (BN2) KIESEL-LOGO
Marking HO 23.00 x1.50
118028/0511841
DIN 11865

Zeichen des Lieferwerks Manufacturer brand

Stempel des Werksachverständigen *HO*
Work inspector's stamp

Stück Quantity	Gegenstand / Object Anforderungen / Requirements	I)	II)	Werkstoff / Material Vormaterial nach / Starting material acc	Chargen Nr.	Schmelze Nr. Heat No.
501	Bogen KST -11865-A-90-BD-23,0 x 1,50-W-316L		I	1.4435 AD2000-W2/W10	H118028	0511841

I): S = Aus nahtlosem Rohr / Of seamles Tube
W = Aus geschweisstem Rohr / of welded Tube
BL = Halbschalen aus Blech gepresst / Longitudinal seam welded elbow
LM = Rohre für Lebensmittel / Pipes for the food industrie
HT = Rohre für Aseptik / Pipes for the aseptic, chemical and pharmaceutical industries
II): I = IHU / Hydroforming
K = Kaltverformte Rohrbogen / Cold formded Elbows

Schmelzen-Analyse gemäss Vormaterialzeugnis / Heat analysis acc. to base material certificate

Int. Werks Nr. / Int. Work No. 809118

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Ti %	N %	Cu %	Co %	Erschmelzungsart Steel making process
0.021	0.50	0.88	0.025	0.001	17.30	2.71	12.82	0.007	0.044	0.22	0.26	

Ergebnis der Prüfungen Vormaterial / Test Results Starting Materials

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	
1	23 X 1.5	293	330	585	54		OK	

Ergebnis der Formstückprüfung / Test Results Fittings

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	Delta Ferrit Klasse DF Classe	Zf-Prüfung der Schweissnaht nach: ND test of weld acc to: DIN EN ISO 3452
						129		3	*OB

OB = ohne Beanstandungen / without objection

Wärmebehandlung Heat-treatment: Glühen annealing C°	Wärmebehandlung Heat-treatment: Haltezeit holding time min.	Wärmebehandlung Heat-treatment: Abkühlung in cooling in	Werkstoffverwechslung Material check	Besichtigung und Abmessung Visual inspection and dimensional check	sonstige Prüfungen / Other tests
1070	3	H2N2	OB	OB	Gemäss Besteller wird auf IK- Test am Bogen verzichtet.

Die gestellten Anfoderungen sind erfüllt
The desired requirements are fulfilled.

Dieses Zeugnis wurde mit Hilfe der EDV erstellt und ist ohne Unterschrift gültig
This certificate is made by ADP-System and is valid without signature

Anlagen
Enclosure

Der Werksachverständige
Work's inspector

Pratteln 09.10.2014

H. Oezbey

LS142716 Pos. 1

Rohrbogen AG

Wasenstrasse 13
CH-4133 Pratteln Switzerland
Tel: +41 61 826 55 11
Fax: +41 61 821 13 58

SQS Zertifikat ISO 9001: 2000 Nr.: 10519
SQS Certificat ISO 9001: 2000 no: 10519

Zertifiziert nach: AD 2000-W0/TRD und DGR 97/23/EG durch TÜV SÜD Zertifizierungsstelle für Druckgeräte benannte Stelle, Nr.: 0036
Certified acc: AD 2000-W0/TRD und DGR 97/23/EC by TÜV SÜD group for pressure equipment NOB no: 0036

Besteller: Customer:

Kiesel Steriltechnik GmbH
Wannenäckerstrasse 20
D-74078 HEILBRONN

I/Bestell-Nr. 42008
Your Order No.
U/Auftrags-Nr. 75119 Bursac
Our Order No.
Positions-Nr. 60
Item No.

Attesttyp 06

Zeugnis-Nr. 80112253-01-60
Certificate No.

Abnahmeprüfzeugnis nach EN 10204-3.1
Inspection Certificate according EN 10204.3.1

Anforderungen AD2000-Merkblatt W2/W10 / HP 7/3, HP 8/3, VDTÜV Merkblatt 1252
Specification
Ausgestellt im Einvernehmen mit dem TÜV SÜD. Siehe Zulassungsschreiben
Laut Schreiben des TÜV SÜD wird auf eine Gegenzeichnung verzichtet.
Issued according TÜV SÜD
No countersignature required TÜV SÜD

Kennzeichnung RP-LOGO 1.4435 (BN2) KIESEL-LOGO
Marking HO 23.00 x1.50
123815/440135
DIN 11865

Zeichen des Lieferwerks
Manufacturer brand

Stempel des Werksachverständigen *HO*
Work Inspector's stamp

Stück Quantity	Gegenstand / Object Anforderungen / Requirements	I)	II)	Werkstoff / Material Vormaterial nach / Starting material acc	Chargen Nr.	Schmelze Nr. Heat No.
1.029	Bogen KST -11865-A-90-BD-23,0 x 1,50-W-316L DIN 11865-A	S	K	1.4435 DIN 11866	H123815	440135

I): S = Aus nahtlosem Rohr / Of seamles Tube
W = Aus geschweisstem Rohr / of welded Tube
BL = Halbschalen aus Blech gepresst / Longitudinal seam welded elbow
LM = Rohre für Lebensmittel / Pipes for the food industrie
HT = Rohre für Aseptik / Pipes for the aseptic, chemical and pharmaceutical industries
II): I = IHU / Hydroforming
K = Kaltverformte Rohrbogen / Cold formded Elbows

Schmelzen-Analyse gemäss Vormaterialzeugnis / Heat analysis acc. to base material certificate
Int. Werks Nr. / Int. Work No. 812368

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Ti %	N %	Cu %	Al %	Erschmelzungsart Steel making process
0,015	0,42	1,34	0,031	0,002	17,19	2,50	12,63	0,012	0,025	0,28	0,003	

Ergebnis der Prüfungen Vormaterial / Test Results Starting Materials

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	
1	23.0 X 1.50	287	312	550	64	166	OK	

Ergebnis der Formstückprüfung / Test Results Fittings

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	Delta Ferrit Klasse DF Classe	Zfp der Schweissnaht nach ND-test weld seam acc. DIN EN ISO 3452
						129			*OB

OB = ohne Beanstandungen / without objection

Wärmebehandlung Heat-treatment: Glühen annealing C°	Haltezeit holding time min.	Abkühlung in cooling in	Werkstoff-verwechslung Material check	Dimensionen und Sichtprüfung Dimensions and visual inspection	Aufweitversuch Drift-expanding test DIN ISO EN 8493	sonstige Prüfungen / Other tests
1070	3	H2N2	OB	OB		Gemäss Besteller wird auf IK- Test am Bogen verzichtet.

Die gestellten Anfoderungen sind erfüllt
The desired requirements are fulfilled.

Dieses Zeugnis wurde mit Hilfe der EDV erstellt und ist ohne Unterschrift gültig
This certificate is made by ADP-System and is valid without signature

Anlagen
Enclosure

Der Werksachverständige
Work's inspector

Pratteln 25.08.2016

H. Oezbey

ZM
ZWAHLEN & MAYR
ZM TUBES

Z.I. 2, CH-1860 **AIGLE**
Tel. ++41-(0)24-468 46 46
Fax ++41-(0)24-468 46 01

INSPECTION CERTIFICATE

CERTIFICAT DE RECEPTION
ABNAHMEPRÜFZEUGNIS

EN 10204 - 3.1

N° **160689**

Certified ISO 9001
LRQA n° 943175
Quality System
Management

* DER TÜV SUDWEST HAT MIT SCHREIBEN VOM 3 NOVEMBER 1992 AUF DIE GEGENZEICHNUNG VERZICHTET

CONFIRMATION N° / AUFTRAGS N° **47310 B**

CUSTOMER: / CLIENT/ KUND **KIESEL**

CUSTOMER ORDER N° COMMANDE CLIENT / KUNDENBESTELLUNG	SPECIFICATIONS: ANFORDERUNGEN	HEAT N. COULEE N. SCHMELZE N.	QUANTITY QUANTITE STÜCKE	DIMENSIONS mm ABMESSUNGEN	LENGTH LONGUEUR LÄNGE mm	STEEL GRADE NUANCE D'ACIER MARKENBEZEICHNUNG
39938	**EN 10217-7 TC2 AD 2000-W2/W10 BN2 DIN 11866 ASTM A270 ASME SA249M**	**440135**	**557.8 m**	**23.00 x 1.5**	**6000**	**1.4435/TP316L**

PRODUCT / PRODUIT / PRÜFGEGENSTAND: **REDRAWN TUBES - TUBES ETIRES - NACHGEZOGENE ROHRE**

HEAT ANALYSIS — ANALYSE DE COULEE / SCHMELZANALYSE

HEAT N. COULEE N. SCHMELZE N.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	% Cu	% Fe	% Al	% Co	% B	% Zr	%	%
440135	0.015	0.42	1.34	0.031	0.002	17.19	12.63	2.50	0.025	0.012	0.28		0.003					

PRODUCT ANALYSIS — ANALYSE PRODUIT / STÜCKANALYSE

HEAT N. COULEE N. SCHMELZE N.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	% Cu	% Fe	% Al	% Co	% B	% Zr	%	%
PIECE	0.0245	0.451	1.63	0.0019	0.0015	17.3	12.7	2.50		0.0066	0.229	64.8	0.0194	0.0846		0.0109		

HEAT TRAITMENT / TREATEMENT THERMIQUE / WÄRMEBEHANDLUNG: ANNEALED AT / HYPERTREMPE A / LÖSUNGSGEGLÜHT BEI **1050° C** AND RAPIDLY COOLING / ET REFROIDI RAPIDEMENT / UND ABGESCHRECKT

100 % OF THE MATERIAL HAVE BEEN PASSED WITH SATISFACTORY RESULT THE : DU MATERIEL SATISFAIT AU(X) CONTROLE(S) DES MATERIALS HAT DIE PRÜFUNG BESTANDEN

Eddy Current

TEST ACCORDING TO / SUIVANT / ENTSPRECHEND: **SEP 1914/1925 ASME SA 1016**

MARKING / MARQUAGE / KENNZEICHNUNG: ***KST HQ TUBE-ZM-Ø23 x 1.5-TP 316L/1.4435-ASTM A270-ASME SA249M-BN2-W-DIN 11866 H4o-EN 10217-7 TC2 WCR-AD-2000-Schmelzen Nr 440135**

REMARKS / REMARQUE / ANMERKUNG:

(10 BAR = 1M Pa)

FLATTENING / APLATISSEMENT / RINGFALTVERSUCH	HYDROSTATIC TEST / ESSAI HYDRAULIQ BAR / WASSERDRUCKVERSUCH	FLARING / EVASEMENT / AUFWEITUNG
S	**NE**	**S**
		100%
FLANGING / COLLET / BÖRDELVERSUCH	REVERSE FLATTENING / RETOURNEMENT INVERSE / WURZELSEITIGER RINGFA	GRAIN SIZE ASTM / GROSSEUR DE GRAIN / KORNGRÖSSE
S	**S**	**S**
		6-8
CORROSION TEST / TEST CORROSION / IK TEST	P.M.I. / TEST DE NON MELANGE / VERWECHSELLUNGSPR.	VISUAL CONTROL / CONTROLE VISUEL / BESICHTIGUNGSKONTR.
S	**S**	**S**
EN ISO 3651-2		**Grinded**
		400
SPECIFICATION / SPEZIFIKATION	SPECIFICATION / SPEZIFIKATION	SPECIFICATION / SPEZIFIKATION
S		
Ferrite test		
< 0.50%		

TEST RESULTS — RESULTATS DES ESSAIS / ERGEBNIS DER PRÜFUNGEN (1 N/mm2 = 1M Pa)

SAMPLE / ECHANTILLON / PROBE	Ø OU EXT AUSS.	Ø INT. INN.	WALL THIC. EPAISSEU WANDSTÄR	LENGTH LONGUEUR LÄNGE	ROUGHNESS RUGOSITE RAUHIGKEIT	ROUGHNESS RUGOSITE RAUHIGKEIT	ROUGHNESS RUGOSITE RAUHIGKEIT	TENSILE TRACTION / ZUGVERSUCH Rp 0,2% N/mm2	Rp 1% N/mm2	Rm N/mm2	A % Lo=5,65 √ So	HARDNESS DURETE. HÄRTE	A%
TOLERANCES / TOLERANZEN	**23.00** ±0.12	**20.00**	**1.5** ±0.15	**6000** ±50	**int.Ra** <0.40 µm	**ext.Ra** <0.80 µm	µm					HV3 <=180	2"/50mm
1	**22.95**	**20.17**	**1.39**	**5800**	**0.35**	**0.19**		287	312	550		166.2	64
2	**22.95**	**20.19**	**1.38**		**0.32**	**0.20**		287	313	551			64
3	**22.94**	**20.18**	**1.38**	**6000**	**0.23**	**0.20**		285	310	550			64
4	**22.94**	**20.18**	**1.38**		**0.35**	**0.18**		289	314	551			64
5	**22.94**	**20.18**	**1.38**	**6000**	**0.31**	**0.22**		285	314	552		157.5	64

S = Satisfactory - Satisfaisant - Zufriedenstellend
NE = Not executed - Pas effectué - Nicht durchgeführt

Emis et vérifié par : Issued and checked by :

Z.M.
Q.C. V. LAVANCHY

Aigle, 04-avr-16

schwer fittings

EnviroFALK
PharmaWaterSystems GmbH
Margit Lilienthal
Maybachstr. 29

51381 Leverkusen

Deckblatt zum Abnahmeprüfzeugnis 3.1 nach DIN EN 10204
Cover sheet for the inspection certificate 3.1 according to DIN EN 10204

Besteller Customer	Margit Lilienthal		
Teil-Nr. Part-No.	AS-B90L23-4Li	Bogen 90° lang	
Kunden-Artikelnr. Customer Part-No.	1042-302		
Best.-Nr. Order-No.	57542		
Stückzahl Quantity	2,00 Stk		
Lieferdatum Delivery Date	02.12.2021		
Lieferschein-Nr. Delivery-Note-No.	157-793462	Pos.-Nr. Pos.-No.	20
Chargen-Nr. Heat-No.	S680732	gestempelt: Mark:	3376
Werkstoff-Nr. Material No.	1.4404		

Die Teile wurden aus dem Material hergestellt gem. beigefügtem Zeugnis nach EN 10204 3.1
The parts were produced out of the material according to the enclosed copy.

166496

stamp:3376

Mill Test Certificate/检查证明书

Certificate No./证明书号码 :190115-ZRNC-019-001
Date of Issue/发行日期:Feb., 15, 2019

Surface Finish/表面整理:NO.2B

AS-B90L23-4Li
21-10299

PO No./采购号码:

Commodity/品名:STS CR Coil

Spec & Type/规格:ASTM-A240-2016:316L(ZP316L WQ) 3. 1 EN10204

Size/尺寸	Product No. 产品号码	Quantity 数量	Weight 重量 (kg)	Heat No. 制钢号码	POSITION	Tensile/拉伸试验 YS 0.2% (MPa)	TS	EL (%)	Hardness /硬度 ≤95 HRB		DIVISION	Chemical Composition/ C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Mo (%)	N (%)
						≥170	≥485	≥40				0~0.03	0~0.75	0~2	0~0.045	0~0.03	16~18	10~14	2~3	0~0.1
1.41x1219xC	QVVN0645B	1	20,588	S060732	T	294	630	51	82		L	0.0158	0.401	1.343	0.0291	0.0028	16.81	10.01	2.02	0.0165
					B	295	629	52	81											
*** Sub Total (020) ***		1	20,588 (kg)																	
*** Grade Total ***		3	63,430 (kg)																	
*** Grand Total ***		3	63,430 (kg)																	

==== Last Item ====

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test Direction : Transversal, Gauge Length : 50mm(Rectangular), YP Method : 0.2% off-set
* Division - L:Ladle Analysis * Tr(Trace)

We hereby certify that the material herein has been made in accordance with the order and specification.

* This Mill Test Certificate cannot be copied for any purpose.
* After-sale Tel:(0512)58569641 or 58569573

Surveyor To:

POSCO (Zhangjiagang) Stainless Steel Co.,Ltd. No.1 Jinfeng Riverside Road, Zhangjiagang City, Jiangsu Province,PRC.

Chief of material testing section Ding Bing

NEUMO GmbH + Co KG · Postfach 1163 · 75434 Knittlingen

EnviroFALK PharmaWaterSystems GmbH
Maybachstraße 29
D-51381 Leverkusen

Knittlingen, 08.08.2022
Fr.Radel

Deckblatt / Cover Sheet

Ihre Best.Nr./ Your P.O. No.	59057 vom 02.08.2022 Margit Lilienthal
Unsere AB Nr./ Our Confirmation No.	266046/10
Unsere LS Nr./ Our Packing List No.	22410751/10
Verkaufsbezeichnung/ Descriptions (Sales)	NEUMO STERIL-BOGEN 90° DN 25 DIN (29 X 1,5) DIN 11865 - BL - 90 - REIHE A
Werkstoff/ Material	Werkstoff: 1.4435 Oberfläche: H3o innen Ra < 0,80 µm, außen Ra < 1,00 µm
Charge- oder Job-Nr./ Heat- or Job-No.	H143526/823023
Abnahmeprüfzeugnis/ Certificate	3.1 DIN EN 10204

Neumo GmbH + Co KG
Armaturenfabrik - Apparatebau
Metallgießerei
Henry-Ehrenberg-Platz
75438 Knittlingen
Telefon 07043-36-0

Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig.
This is an automated document, and is therefore valid without being signed.

Rohrbogen AG
Wasenstrasse 13
CH-4133 Pratteln Switzerland
Tel: +41 61 826 55 11
Fax: +41 61 821 13 58

SQS Zertifikat ISO 9001: 2015 Nr.: 10519
SQS Certificat ISO 9001: 2015 no: 10519

Zertifiziert: AD 2000 Merkblatt W0 und DGRL 2014/68 EU
Anhang 1 Nummer 4.3 , Zertifikat Nr.: 29/2016

Certified: AD 2000 Instruction W0 and PED 2014/68 EU
Annex 1 Section 4.3 , Certificate no: 29/2016

Besteller: Customer:

Neumo GmbH & Co.KG
Postfach 11 63
75434 KNITTLINGEN
DEUTSCHLAND

I/Bestell-Nr. 2200059
Your Order No.
U/Auftrags-Nr. 115895 Dërmaku
Our Order No.
Positions-Nr. 41
Item No.

Attesttyp 16

Zeugnis-Nr. 80195088-01-41
Certificate No.

Abnahmeprüfzeugnis nach EN 10204-3.1
Inspection Certificate according EN 10204.3.1

Anforderungen AD2000-Merkblatt W2/W10 / HP 7/3, HP 8/3, VDTÜV Merkblatt 1252
Specification
Ausgestellt im Einvernehmen mit dem TÜV SÜD. Siehe Zulassungsschreiben
Laut Schreiben des TÜV SÜD wird auf eine Gegenzeichnung verzichtet.
Issued according TÜV SÜD
No countersignature required TÜV SÜD

Kennzeichnung NEUMO
Marking
29.00 x1.50 / 1.4435
H143526 / 823023
DIN 11865 H3o

Stück Quantity	Gegenstand / Object Anforderungen / Requirements	I)	II)	Werkstoff / Material Vormaterial nach / Starting material acc	Chargen Nr.	Schmelze Nr. Heat No.
795	Bogen DIN 11865 BL-90-A-29.0 x 1.5-1.4435-DF3-H3o	W	K	1.4435 EN 10217-7 DIN 11866 BN 2	H143526	823023

I): S = Aus nahtlosem Rohr / Of seamles Tube
W = Aus geschweisstem Rohr / of welded Tube
BL = Halbschalen aus Blech gepresst / Longitudinal seam welded elbow
LM = Rohre für Lebensmittel / Pipes for the food industrie
HT = Rohre für Aseptik / Pipes for the aseptic, chemical and pharmaceutical industries
II): I = IHU / Hydroforming
K = Kaltverformte Rohrbogen / Cold formded Elbows

Schmelzen-Analyse gemäss Vormaterialzeugnis / Heat analysis acc. to base material certificate **Int. Werks Nr. /** Int. Work No. 823933

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Ti %	N %	%	%	Erschmelzungsart Steel making process
0.020	0.410	1.430	0.028	0.001	17.220	2.530	12.630	0.008	0.031			

Ergebnis der Prüfungen Vormaterial / Test Results Starting Materials

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	
		290	324	588	58		OK	

Ergebnis der Formstückprüfung / Test Results Fittings

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit Intergranular Corrosion test	Delta Ferrit Klasse DF Classe	Zfp der Schweissnaht nach ND-test weld seam acc. DIN EN ISO 3452

OB = ohne Beanstandungen / without objection

Wärmebehandlung Heat-treatment: Glühen annealing C°	Wärmebehandlung Heat-treatment: Haltezeit holding time min.	Wärmebehandlung Heat-treatment: Abkühlung in cooling in	Werkstoff-verwechslung Material check	Dimensionen und Sichtprüfung Dimensions and visual inspection	Aufweitversuch Drift-expanding test DIN ISO EN 8493	sonstige Prüfungen / Other tests
1070	3	H2N2	OB	OB		

Die gestellten Anfoderungen sind erfüllt
The desired requirements are fulfilled.

Dieses Zeugnis wurde mit Hilfe der EDV erstellt und ist ohne Unterschrift gültig
This certificate is made by ADP-System and is valid without signature

Anlagen Vormaterialzeugnis/Rawmaterialcertificate
Enclosure

Abnahmebeauftragter
Inspection representative

Pratteln 18.07.2022

P. Sharnova

NEUMO GmbH + Co KG · Postfach 1163 · 75434 Knittlingen

Rohrbogen AG
Wasenstr. 13
CH- 4133 Pratteln
SCHWEIZ

Knittlingen, 14.12.2021
Hr.Ander

Deckblatt / Cover Sheet

Ihre Best.Nr./ Your P.O. No.	4500006011 vom 01.12.2021 Artesa Dermaku Rohre für Neumo Rahmenkontrakt Bögen Nr. 35728
Unsere AB Nr./ Our Confirmation No.	168521/40B
Unsere LS Nr./ Our Packing List No.	21414204/40B
Verkaufsbezeichnung/ Descriptions (Sales)	Welded tube, NEUMO-Pharmatube S DIN 11866 (EN 10217-7 TC2) 29,00 x 1,50 mm DF < 0,5% (DF-3) AD2000-W2
Werkstoff/ Material	Material: 1.4435 Surface finish: HE3o inside EP Ra < 0,80 µm, outside Ra < 1,00 µm
Charge- oder Job-Nr./ Heat- or Job-No.	823023_3035633100
Abnahmeprüfzeugnis/ Certificate	3.1 DIN EN 10204

Neumo GmbH + Co KG
Armaturenfabrik - Apparatebau
Metallgießerei
Henry-Ehrenberg-Platz
75438 Knittlingen
Telefon 07043-36-0

Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig.
This is an automated document, and is therefore valid without being signed.

IW-Nr: 823933

Schoeller Werk GmbH & Co. KG
Im Kirschseiffen
53940 Hellenthal / Eifel
DE

Telefon: +49 (0) 2482/81-0
Telefax: +49 (0) 2482/81-109
Mail: info@schoellerwerk.de
Datum: 11.08.2020

Schoeller Werk * Postfach 67 * 53940 Hellenthal / Eifel

Neumo GmbH + Co.KG
Henry-Ehrenberg-Platz 1
75438 Knittlingen
Deutschland

EN 10204

Abnahmeprüfzeugnis: 3.1
Inspection certificate: 3.1

Zeugnisnr./Certificate no.: Z20008189
Lieferscheinnr./Delivery note no.: VLS2007573

Auftragsdaten / Order data:

Artikelnr. / Part no.:	80085029015830	
Bestellnr. / Order No.:	1900284 POS. 30 1900284-RA Pos.	
Unsere Artikelnr. / Our part no.:	60110628	
Unsere Auftragsnr. / Our order no.:	VKA2051207	
Stückzahl / Quantity:	130	Stk. / pcs.:
Gesamtlänge / Total length:	791,24	m
Nettogewicht / Net weight:	873,73	Kg

Produkt / Product:

WIG-geschweißte, kalibrierte, nahtgeglättete, wärmebehandelte Rohre aus nichtrostendem Stahl.
TIG-welded, calibrated, cold worked in weld area, heat treated tubes of stainless steel.

Schweißfaktor / Welding factor:	V=1,0 (ohne Schweißzusatz / without filler material)
Werkstoff 1 / Material 1:	1.4435
Werkstoff 2 / Material 2:	TP316L
Abmessung / Size:	29,000 X 1,500 X 6000,00 MILLIMETER
Lieferzustand / Delivery condition:	DIN EN 10217-7 W2RB
Glühung / Annealing:	Ja, Yes
Außendurchmesser Toleranz / Outside diameter tolerance:	KUNDENSPEZIFIKATION
Wanddicken Toleranz / Wall thickness tolerance:	KUNDENSPEZIFIKATION
Kennzeichnung / Marking:	SWH 29,00 X 1,50 1.4435 TP316L DIN EN 10217-7 TC2 ADW2 DIN 11866 H3o ASTM A249 DIN EN 10217-7 W2RB Heat-No. ... Batch ... AK welded NEUMO Pharmatube S
Lieferbedingungen / Terms of delivery:	DIN EN 10217-7 TC2 AD Merkblatt W2 / ASTM A249/A249M-18a / ASME SA249/SA249M-Sect. II-Part A Edit.2019 DIN 11866 H3O / BASLER NORM 2

Gelieferte Chargen / Delivered Batches

Charge / Batch	Schmelze / Cast
3035633000	823023

Chemische Zusammensetzung / Chemical composition:

Es wird bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellannahme entspricht.
We hereby certify that the delivery complies with the terms of the order contract.

Der Werkssachverständige
The authorized representative

Schoeller Werk GmbH & Co. KG
Im Kirschseiffen
53940 Hellenthal / Eifel
DE

Telefon: +49 (0) 2482/81-0
Telefax: +49 (0) 2482/81-109
Mail: info@schoellerwerk.de

Zeugnisnr./Certificate no.: Z20008189
Lieferscheinnr./Delivery note no.: VLS2007573

Schmelzanalyse / Cast analysis (%)

Schmelze / Cast		CR	C	MN	MO	NI	P	S	SI	N	TI
	min	17,0	0	0	2,50	12,5	0	0	0	0	0
	max	18,0	0,030	2,00	3,00	14,0	0,040	0,005	0,75	0,10	0,05
823023		**17,220**	**0,020**	**1,430**	**2,530**	**12,630**	**0,028**	**0,0010**	**0,410**	**0,031**	**0,008**

Stückanalyse / Product analysis (%)

Schmelze / Cast		C	CR	MN	MO	N	NI	P	S	SI	TI
	min	0	16,8	0	2,40	0	12,35	0	0	0	0
	max	0,035	18,0	2,00	3,00	0,11	14,00	0,045	0,018	1,00	0,05
823023		**0,013**	**17,090**	**1,459**	**2,587**	**0,031**	**12,650**	**0,029**	**0,0020**	**0,386**	**0,008**

Prüfergebnisse / Test results:

Zugversuch längs / Tensile test longitudinal (MPa/%)

Charge / Batch	Los / Lot:	Nummernkreis / Number range:	Probe Nr. / Specimen no.:	°C		Rp0,2	Rp1,0	Rm	A100	A5
					min	190	225	490	40	40
					max	300	325	690	80	
3035633000		**0 - 587**		**RT**		**290**	**324**	**588**	**48**	**58**
3035633000		**0 - 587**		**RT**		**287**	**319**	**593**	**49**	**58**
3035633000		**0 - 587**		**RT**		**290**	**323**	**592**	**50**	**60**
3035633000		**0 - 587**		**RT**		**288**	**320**	**593**	**51**	**60**
3035633000		**0 - 587**		**RT**		**291**	**322**	**598**	**48**	**58**
3035633000		**0 - 587**		**RT**		**290**	**322**	**590**	**50**	**60**

Härteprüfung / Hardness test

Charge / Batch	Los / Lot:	Nummernkreis / Number range:	Probe Nr. / Specimen no.:	°C		HRB
					min	
					max	90
3035633000				**RT**		**85,0**
3035633000				**RT**		**85,0**

GW = Grundwerkstoff / Base material
SN = Schweißnaht / Weld seam
GF = Gefüge / Microstructure
OF = Oberfläche / Surface

IK-Test / Corrosion Test

Charge / Batch	Los / Lot:	Nummernkreis / Number range:	Probe Nr. / Specimen no.:	Norm / Standard	Ergebnis / Result
3035633000		**0 - 587**		**EN ISO 3651-2 Practice A**	**bestanden / passed**
3035633000		**0 - 587**		**ASTM A 262 Practice E**	**bestanden / passed**

Es wird bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellannahme entspricht.
We hereby certify that the delivery complies with the terms of the order contract.

Der Werkssachverständige
The authorized representative

Schoeller Werk GmbH & Co. KG
Im Kirschseiffen
53940 Hellenthal / Eifel
DE

Telefon: +49 (0) 2482/81-0
Telefax: +49 (0) 2482/81-109
Mail: info@schoellerwerk.de
Datum: 11.08.2020

Zeugnisnr./Certificate no.: Z20008189
Lieferscheinnr./Delivery note no.: VLS2007573

Sonstige Prüfungen / Additional tests	**Status / Status**
Besichtigung und Maßkontrolle / Visual and dimensional inspection	bestanden / passed
Wirbelstromprüfung / Eddy current test DIN EN ISO 10893-1	bestanden / passed
Wirbelstromprüfung / Eddy current test DIN EN ISO 10893-2	bestanden / passed
Wirbelstromprüfung / Eddy current test ASTM A1016/A1016M	bestanden / passed
Verwechslungsprüfung / Identity check	bestanden / passed
Technologische Prüfungen / Technological tests	bestanden / passed
Aufweitversuch / Drift expanding Test	bestanden / passed
Bördelversuch / Flanging Test	bestanden / passed
Ringfaltversuch / Flattening Test	bestanden / passed
Nahtrückbiegeversuch / Reverse-Bend Test	bestanden / passed

Vermerk / Remarks:

Die Rohre weisen den für das Herstellverfahren typischen Zustand der inneren und äußeren Oberfläche auf.
The tubes show the typical condition of the inner and outer surface regarding the specified manufacturing process.

Wärmebehandlung / Heat Treatment	**1080°C**	Abkühlung schroff unter Schutzgas / Rapid cooling under protective atmosphere /

*Lt. Überwachungsvertrag mit dem TÜV Rhld. vom 25.01.1980 VR 1 - 3 \Überprüfter Werkstoffhersteller nach DGRL 2014/68/EU \Zert.-Nr. 01 202 926/Q-00 0012.
*According to the Surveying Contract with TÜV/Rhld. dt. 25.01.1980 VR 1 - 3\ Material manufacturer certified according to European Directive 2014/68/EU\Certificate No. 01 202 926/Q-00 0012.

Es wird bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellannahme entspricht.
We hereby certify that the delivery complies with the terms of the order contract.

Der Werkssachverständige
The authorized representative

Schoeller Werk GmbH & Co. KG
Im Kirschseiffen
53940 Hellenthal / Eifel
DE

Charge / Batch
3035633000

Schoeller Werk * Postfach 67 * 53940 Hellenthal / Eifel

Anlage zu Zeugnisnr./an annex to Certificate no.: Z20008189

Delta-Ferritmessung / Measurement of delta ferrit (%)

Proben Nr. / Specimen no.:		Ergebnis / Result
	min	
	max	0,5
190		0,0
200		0,0
210		0,0
220		0,0
230		0,0
240		0,0
250		0,0
260		0,0
270		0,0
280		0,0
290		0,0
300		0,0
310		0,0
320		0,0
330		0,0
340		0,0
350		0,0
360		0,0
370		0,0
380		0,0
390		0,0
400		0,0
410		0,0
420		0,0
430		0,0
440		0,0
450		0,0
460		0,0
470		0,0
480		0,0
490		0,0
500		0,0
510		0,0
520		0,0

Proben Nr. / Specimen no.:		Ergebnis / Result
	min	
	max	0,5
530		0,0
540		0,0
550		0,0
560		0,0
570		0,0
580		0,0

Schoeller Werk GmbH & Co. KG
Im Kirschseiffen
53940 Hellenthal / Eifel
DE

Charge / Batch
3035633000

Schoeller Werk * Postfach 67 * 53940 Hellenthal / Eifel

Anlage zu Zeugnisnr./an annex to Certificate no.: Z20008189

Rauheitsmessung / Roughness test (µm)

Proben Nr. / Specimen no.:		Ra innen längs SN	Ra innen längs GW	Ra innen quer SN	Ra innen quer GW	Ra aussen längs
	min					
	max	0,8	0,8	0,8	0,8	1,0
190		**0,70**	**0,18**			**0,14**
200		**0,70**	**0,27**			**0,17**
210		**0,67**	**0,21**			**0,12**
220		**0,53**	**0,21**			**0,14**
230		**0,66**	**0,20**			**0,15**
240		**0,78**	**0,23**			**0,20**
250		**0,76**	**0,55**			**0,20**
260		**0,55**	**0,21**			**0,26**
270		**0,80**	**0,26**			**0,12**
280		**0,69**	**0,27**			**0,14**
290		**0,66**	**0,52**			**0,15**
300		**0,67**	**0,23**			**0,21**
310		**0,80**	**0,37**			**0,15**
320		**0,66**	**0,34**			**0,26**
330		**0,60**	**0,27**			**0,35**
340		**0,63**	**0,27**			**0,26**
350		**0,66**	**0,24**			**0,14**
360		**0,78**	**0,29**			**0,24**
370		**0,75**	**0,21**			**0,09**
380		**0,78**	**0,31**			**0,15**
390		**0,78**	**0,31**			**0,29**
400		**0,67**	**0,32**			**0,11**
410		**0,80**	**0,29**			**0,09**
420		**0,73**	**0,31**			**0,11**
430		**0,60**	**0,34**			**0,14**
440		**0,60**	**0,27**			**0,24**
450		**0,64**	**0,32**			**0,18**
460		**0,73**	**0,35**			**0,10**
470		**0,50**	**0,27**			**0,14**
480		**0,67**	**0,31**			**0,09**
490		**0,73**	**0,35**			**0,31**
500		**0,80**	**0,32**			**0,44**
510		**0,74**	**0,21**			**0,23**
520		**0,66**	**0,37**			**0,18**

Außen längs = Outside longitudinal
Außen quer = Outside transverse
Innen längs = Inside longitudinal
Innen quer = Inside transverse
GW = Grundwerkstoff / Base material
SN = Schweißnaht / Weld seam

Schoeller Werk GmbH & Co. KG
Im Kirschseiffen
53940 Hellenthal / Eifel
DE

Charge / Batch
3035633000

Schoeller Werk · Postfach 67 · 53940 Hellenthal / Eifel

Anlage zu Zeugnisnr./an annex to Certificate no.: **Z20008189**

Rauheitsmessung / Roughness test (µm)

Proben Nr. / Specimen no.:		Ra innen längs SN	Ra innen längs GW	Ra innen quer SN	Ra innen quer GW	Ra aussen längs
	min					
	max	0,8	0,8	0,8	0,8	1,0
530		**0,75**	**0,34**			**0,18**
540		**0,60**	**0,23**			**0,12**
550		**0,78**	**0,21**			**0,37**
560		**0,64**	**0,26**			**0,18**
570		**0,78**	**0,27**			**0,17**
580		**0,60**	**0,29**			**0,37**

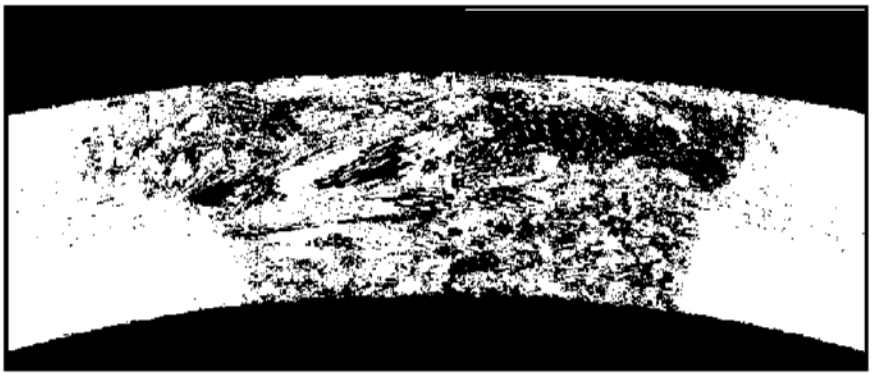
Außen längs = Outside longitudinal
Außen quer = Outside transverse
Innen längs = Inside longitudinal
Innen quer = Inside transverse

GW = Grundwerkstoff / Base material
SN = Schweißnaht / Weld seam

SCHOELLER	Kunde/customer: 3035633000	Auftrags-Nr./order-no.: -	Datum/date: 30.11.2018

Dokumententitel/document title:

Querschliff



20x

Bild/picture 1

Schweißnaht



50x

Bild/picture 2

Schweißnaht

Schliff-Nr./microsection-no.:	Bearbeitet durch/worked by:	Auftraggeber/orderer:	Bemerkung/comment:	Seite/page:
9829	M.Stoff			1 /1

Rohrbogen AG
Wasenstrasse 13
CH-4133 Pratteln Switzerland
Tel: +41 61 826 55 11
Fax: +41 61 821 13 58

SQS Zertifikat ISO 9001: 2015 Nr.: 10519
SQS Certificat ISO 9001: 2015 no: 10519

Zertifiziert: AD 2000 Merkblatt W0 und DGRL 2014/68 EU
Anhang 1 Nummer 4.3 , Zertifikat Nr.: 29/2016

Certified: AD 2000 Instruction W0 and PED 2014/68 EU
Annex 1 Section 4.3 , Certificate no: 29/2016

Besteller: Customer:

Kiesel Steriltechnik GmbH
Wannenäckerstrasse 20
74078 HEILBRONN
DEUTSCHLAND

I/Bestell-Nr. 78920
Your Order No.
U/Auftrags-Nr. 118302 Comak
Our Order No.
Positions-Nr. 10
Item No.

Attesttyp 06

Zeugnis-Nr. 80198767-01-10
Certificate No.

Abnahmeprüfzeugnis nach EN 10204-3.1
Inspection Certificate according EN 10204.3.1

Anforderungen AD2000-Merkblatt W2/W10 / HP 7/3, HP 8/3, VDTÜV Merkblatt 1252
Specification
Ausgestellt im Einvernehmen mit dem TÜV SÜD. Siehe Zulassungsschreiben
Laut Schreiben des TÜV SÜD wird auf eine Gegenzeichnung verzichtet.
Issued according TÜV SÜD
No countersignature required TÜV SÜD

Kennzeichnung KST-LOGO1.4435 (BN2)
Marking
23.00 x1.50 / DIN 11865
144828 / 134049

Stück Quantity	Gegenstand / Object Anforderungen / Requirements	I)	II)	Werkstoff / Material Vormaterial nach / Starting material acc	Chargen Nr.	Schmelze Nr. Heat No.
427	Bogen DIN 11865 BL-90-A-23.0 x 1.5-w-1.4435-DF3	W	I	1.4435 EN 10217-7 DIN 11866 BN 2	144828	134049

I): S = Aus nahtlosem Rohr / Of seamles Tube
W = Aus geschweisstem Rohr / of welded Tube
BL = Halbschalen aus Blech gepresst / Longitudinal seam welded elbow
LM = Rohre für Lebensmittel / Pipes for the food industrie
HT = Rohre für Aseptik / Pipes for the aseptic, chemical and pharmaceutical industries
II): I = IHU / Hydroforming
K = Kaltverformte Rohrbogen / Cold formded Elbows

Schmelzen-Analyse gemäss Vormaterialzeugnis / Heat analysis acc. to base material certificate **Int. Werks Nr. /** Int. Work No. 825080

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Ti %	N %	Cu %	Al %	Erschmelzungsart Steel making process
0.021	0.300	1.300	0.028	0.007	17.150	2.530	12.660	0.008	0.037	0.280	0.001	

Ergebnis der Prüfungen Vormaterial / Test Results Starting Materials

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit IGC-test acc. EN ISO 3651-2/A	
		274	312	567	60			

Ergebnis der Formstückprüfung / Test Results Fittings

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point Rp 0.2 N/mm2	Streck-/Dehngrenze Yield point Rp 1.0 N/mm2	Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit IGC-test acc. EN ISO 3651-2/A	Delta Ferrit Klasse DF Classe	Zfp der Schweissnaht nach ND-test weld seam acc. DIN EN ISO 3452
								3	*OB

OB = ohne Beanstandungen / without objection

Wärmebehandlung Heat-treatment: Glühen annealing C°	Wärmebehandlung Heat-treatment: Haltezeit holding time min.	Wärmebehandlung Heat-treatment: Abkühlung in cooling in	Werkstoff-verwechslung Material check	Dimensionen und Sichtprüfung Dimensions and visual inspection	Aufweitversuch Drift-expanding test DIN ISO EN 8493	sonstige Prüfungen / Other tests
			OB	OB		

*OB reduzierter Prüfumfang gem. Schreiben TÜV Süd vom 03.06.2013

Die gestellten Anfoderungen sind erfüllt
The desired requirements are fulfilled.

Dieses Zeugnis wurde mit Hilfe der EDV erstellt und ist ohne Unterschrift gültig
This certificate is made by ADP-System and is valid without signature

Anlagen
Enclosure

Abnahmebeauftragter
Inspection representative

Pratteln 18.11.2022

P. Sharnova

Rohrbogen AG
Wasenstrasse 13
CH-4133 Pratteln Switzerland
Tel: +41 61 826 55 11
Fax: +41 61 821 13 58

SQS Zertifikat ISO 9001: 2015 Nr.: 10519
SQS Certificat ISO 9001: 2015 no: 10519

Zertifiziert: AD 2000 Merkblatt W0 und DGRL 2014/68 EU
Anhang 1 Nummer 4.3 , Zertifikat Nr.: 29/2016

Certified: AD 2000 Instruction W0 and PED 2014/68 EU
Annex 1 Section 4.3 , Certificate no: 29/2016

Besteller: Customer:

Kiesel Steriltechnik GmbH
Wannenäckerstrasse 20
74078 HEILBRONN
DEUTSCHLAND

I/Bestell-Nr. 78920
Your Order No.
U/Auftrags-Nr. 118302 Comak
Our Order No.
Positions-Nr. 20
Item No.

Attesttyp 06

Zeugnis-Nr. 80200848-01-20
Certificate No.

Abnahmeprüfzeugnis nach EN 10204-3.1
Inspection Certificate according EN 10204.3.1

Anforderungen AD2000-Merkblatt W2/W10 / HP 7/3, HP 8/3, VDTÜV Merkblatt 1252
Specification
Ausgestellt im Einvernehmen mit dem TÜV SÜD. Siehe Zulassungsschreiben
Laut Schreiben des TÜV SÜD wird auf eine Gegenzeichnung verzichtet.
Issued according TÜV SÜD
No countersignature required TÜV SÜD

Kennzeichnung KST-LOGO / 1.4435 (BN2)
Marking
23.00 x1.50 / DIN 11865 H3o
144830 / 134049

Stück Quantity	Gegenstand / Object Anforderungen / Requirements	I)	II)	Werkstoff / Material Vormaterial nach / Starting material acc	Chargen Nr.	Schmelze Nr. Heat No.
938	Bogen DIN 11865 BL-90-A-23.0 x 1.5-w-1.4435-DF3-H	W	I	1.4435 EN 10217-7 DIN 11866 BN 2	144830	134049

I): S = Aus nahtlosem Rohr / Of seamles Tube
W = Aus geschweisstem Rohr / of welded Tube
II): K = Kaltverformte Rohrbogen / Cold formded Elbows

Schmelzen-Analyse gemäss Vormaterialzeugnis / Heat analysis acc. to base material certificate

Int. Werks Nr. / Int. Work No. 825080

C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Ti %	N %	Cu %	Al %	Erschmelzungsart Steel making process
0.021	0.300	1.300	0.028	0.007	17.150	2.530	12.660	0.008	0.037	0.280	0.001	

Ergebnis der Prüfungen Vormaterial / Test Results Starting Materials

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point		Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit IGC-test acc. EN ISO 3651-2/A	
		Rp 0.2 N/mm2	Rp 1.0 N/mm2					
		274	312	567	60			

Ergebnis der Formstückprüfung / Test Results Fittings

Probe Nr. Test No.	Abmessung der Probe Specimen's mm	Streck-/Dehngrenze Yield point		Zugfestigkeit Tensil Rm N/mm2	Dehnung Elongation A5 %	Härte Hardness HB 187.5/2.5	IK-Beständigkeit IGC-test acc. EN ISO 3651-2/A	Delta Ferrit Klasse DF Classe	Zfp der Schweissnaht nach ND-test weld seam acc. DIN EN ISO 3452
		Rp 0.2 N/mm2	Rp 1.0 N/mm2						
								3	*OB

OB = ohne Beanstandungen / without objection

Wärmebehandlung Heat-treatment			Werkstoff- verwechslung	Dimensionen und Sichtprüfung	Aufweitversuch	sonstige Prüfungen / Other tests
Glühen annealing C°	Haltezeit holding time min.	Abkühlung in cooling in	Material check	Dimensions and visual inspection	Drift-expanding test DIN ISO EN 8493	
			OB	OB		

*OB reduzierter Prüfumfang gem. Schreiben TÜV Süd vom 03.06.2013

Die gestellten Anfoderungen sind erfüllt
The desired requirements are fulfilled.

Dieses Zeugnis wurde mit Hilfe der EDV erstellt und ist ohne Unterschrift gültig
This certificate is made by ADP-System and is valid without signature

Anlagen
Enclosure

Abnahmebeauftragter
Inspection representative

Pratteln 23.02.2023

P. Sharnova

WAFFENSCHMIDT
Spezialfabrik für Edelstahlflansche

Ewald Waffenschmidt GmbH + Co. KG · Otto-Hahn-Str. 6 · D-57482 Wenden

Nolte GmbH Edelstahlhandel
und Metallverarbeitung
An der Becke 6 a
45527 Hattingen

Unsere Kom.-Nr.: Our Ident. No.: 49.123

Ihre Bestellung Nr.: Your Order No.: BE205569

Bestelldatum: Your Order date: 24-05-22

Tag der Lieferung: Date of Delivery: 09-06-22

Werkstoff-Nr.: Material-No.: 1.4404

Abnahmeprüfzeugnis 3.1

nach EN 10 204

Inspection Certificate 3.1

according to EN 10 204

Zerreißversuch/Kerbschlagprobe ISO-V Tensile/Impact Test ISO-V

Pos. Item No.	Stückzahl piece	Prüfgegenstand: Gesenkschmiedestücke, wärmebehandelt, allseitig gedreht. Probenlage: tangential Test Subject: Drop forging pieces, heat treatet, surfaced allround. Location of specimen: tangential Prüftemp.: RT falls nicht angegeben Test temp.: RT if not specified	Schmelze-Nr. Heat-No.	Probe-Nr. Test-No.	0,2-Grenze 0,2 limitation N/mm²	1 % Dehngrenze 1 % proof stress N/mm²	Zugfestigkeit Tensile Strenght N/mm²	Dehnung Elongation %	Einschnürung Reduction %	Kerbschlagarbeit Impact Strenght Joule
			Anforderungen: Requirements:		190	225	490–690	35		60

V-Flansch EN 1092-1/11 / WN Flange EN 1092-1/11

1	5	B1	DN	25/ 29x1,5	PN 40	E211191	12741	312	354	583	54	73	218	314	186
2	2	B1	DN	50/ 53x1,5	PN 40	E211905	12746	337	385	592	52	75	263	264	177
3	6	B1	DN	65/ 70x2,0	PN 40	E211905	12746	337	385	592	52	75	263	264	177
4	3	B1	DN	80/ 85x2,0	PN 40	557463	12730	349	394	608	49	74	246	175	235

Analyse / Analysis

Schmelze/Heat	C	Si	Mn	P	S	Cr	Mo	Ni	N	Ca	Ti
E211191	0,018	0,370	1,710	0,036	0,011	16,80	2,020	10,09	0,081	0,001	0,006
E211905	0,021	0,410	1,660	0,031	0,009	16,95	2,070	10,13	0,078	0,001	0,003
557463	0,025	0,300	1,460	0,020	0,009	16,76	2,030	10,23	0,066	0,000	0,008

Anforderungen/Requirements: DIN EN 10222-5 06.17; AD2000-W2,-W9,-W10
IK beständig nach Prüfung gem.:/IC resistant acc.testing to: DIN EN ISO 3651-2 Meth. A-T1
Die Teile wurden nach dem Schmieden von Lösungsglühtemp.(>1040°C) in Wasser abgeschreckt.
After forging the parts have been quenched rapidly in water from solutioning temp. (>1040°C).

MADE IN GERMANY. Vormaterial von / Prematerial from: Outokumpu (SE),Sandvik (SE)
Vormaterial von westeuropäischem Hersteller / prematerial from western european manufacturer.
Analyse laut Stahlhersteller,Erschmelzungsart: Elektro. Analysis acc. to steel mill,steelmaking proc.: electric.
Besichtigung und Ausmessung ohne Beanstandung. Visual and dimensional inspection without complaints.
Werkstoffverwechslungsprüfung: ohne Beanstandung. PMI-Test: without complaints.
Die Teile entsprechen den Anforderungen der/ The parts meet the requirements of 2011/65/EU RoHS II and REACH.
Frei von Quecksilber und radioaktiver Kontamination / Free from mercury and radioactive contamination
Unser System wurde überprüft und bestätigt nach / Our System was surveyed and certified acc. to:
AD2000 - W0 / TRD 100, DIN EN ISO 9001:2015, KTA 1401 + AVS D100/50, DGRL/PED 2014/68/EU (97/23/EG)
Diese Bescheinigung wurde maschinell erstellt und ist ohne Unterschrift gültig.
This document has been produced electronically and is valid without a signature.

Jens Wagener
(Werkssachverständiger/Expert) Datum/Date: 07.07.22

Stempel des Werkssachverständigen: (B)
Stamp of Expert:
Stempel des Lieferwerkes:
Stamp of Supplier:

WAFFENSCHMIDT
Spezialfabrik für Edelstahlflansche

Ewald Waffenschmidt GmbH + Co. KG · Otto-Hahn-Str. 6 · D-57482 Wenden

ABC Edelstahl
Armaturen & Fittings GmbH
Corneliusstr. 2
42329 Wuppertal

Unsere Kom.-Nr.: Our Ident. No.: **67.178**

Ihre Bestellung Nr.: Your Order No.: BE-202308/12254

Bestelldatum: Your Order date: 07-08-23

Tag der Lieferung: Date of Delivery: 17-08-23

Werkstoff-Nr.: Material-No.: **1.4404**

Abnahmeprüfzeugnis 3.1

nach EN 10 204

Inspection Certificate 3.1

according to EN 10 204

Zerreißversuch/Kerbschlagprobe ISO-V Tensile/Impact Test ISO-V

Pos. Item No.	Stückzahl piece	Prüfgegenstand: Gesenkschmiedestücke, wärmebehandelt, allseitig gedreht. Probenlage: tangential Test Subject: Drop forging pieces, heat treatet, surfaced allround. Location of specimen: tangential	Schmelze-Nr. Heat-No.	Probe-Nr. Test-No.	0,2-Grenze 0,2 limitation N/mm²	1 % Dehngrenze 1 % proof stress N/mm²	Zugfestigkeit Tensile Strenght N/mm²	Dehnung Elongation %	Einschnürung Reduction %	Kerbschlagarbeit Impact Strenght Joule
		Prüftemp.: RT falls nicht angegeben Test temp.: RT if not specified	Anforderungen:				490-			
			Requirements:		190	225	690	35		60

V-Flansch EN 1092-1/11 / WN Flange EN 1092-1/11

2 12 B1 DN 25/ 29x1,5 PN 40 567863 12918 320 367 590 51 74 204 255 234

Analyse / Analysis

Schmelze/Heat	C	Si	Mn	P	S	Cr	Mo	Ni	N	Ca	Ti
567863	0,023	0,270	1,500	0,020	0,011	16,77	2,020	10,23	0,066	0,000	0,003

Anforderungen/Requirements: DIN EN 10222-5 06.17; AD2000-W2,-W9,-W10
IK beständig nach Prüfung gem.:/IC resistant acc.testing to: DIN EN ISO 3651-2 Meth. A-T1
Die Teile wurden nach dem Schmieden von Lösungsglühtemp.(>1040°C) in Wasser abgeschreckt.
After forging the parts have been quenched rapidly in water from solutioning temp. (>1040°C).

MADE IN GERMANY. Vormaterial von / Prematerial from: Alleima (SE)
Vormaterial von westeuropäischem Hersteller / prematerial from western european manufacturer.
Analyse laut Stahlhersteller,Erschmelzungsart: Elektro. Analysis acc. to steel mill,steelmaking proc.: electric
Besichtigung und Ausmessung ohne Beanstandung. Visual and dimensional inspection without complaints.
Werkstoffverwechslungsprüfung: ohne Beanstandung. PMI-Test: without complaints.
Die Teile entsprechen den Anforderungen der/ The parts meet the requirements of 2011/65/EU RoHS II and REACH.
Frei von Quecksilber und radioaktiver Kontamination / Free from mercury and radioactive contamination
Unser System wurde überprüft und bestätigt nach / Our System was surveyed and certified acc. to:
AD2000 - W0 / TRD 100, DIN EN ISO 9001:2015, KTA 1401 + AVS D100/50, DGRL/PED 2014/68/EU (97/23/EG)
Diese Bescheinigung wurde maschinell erstellt und ist ohne Unterschrift gültig.
This document has been produced electronically and is valid without a signature.

Jens Wagener
(Werkssachverständiger/Expert) Datum/Date: 17.08.23

Stempel des Werkssachverständigen: (B)
Stamp of Expert:
Stempel des Lieferwerks:

Engelsberg 22
D-75015 Bretten
Fon +49 7252 9637-10
Fax +49 7252 9637-20
www.kiesel-steriltechnik.de
info@kiesel-steriltechnik.de

Umstempel-Bescheinigung | *Restamping Certificate*

Besteller Wilhelm Werner GmbH ***customer***	**Bestellnummer 49548/60450** ***order number***

unser Auftrag 108520 ***our commission***	**Lieferschein 152936 POs. 9** ***delivery note***

Wir bestätigen hiermit, dass das/die gelieferte(n) Teil(e)
We herewith confirm that the delivered part(s)

Muffe-SO DN015 DIN Ø19x1.5 G - ¼"

Artikel - Nr. **704012**
item No

aus den Abmessungen (Rundstahl gemäß EN 10088-3 / EN 10272) **Ø020 mm**
made of (round bars according to EN 10088-3 / EN 10272)

ausgewiesen durch
proved by

- ☒ Abnahmeprüfzeugnis nach EN 10204 - 3.1
  inspection certificate acc. to EN 10204 - 3.1
- ☐ Anforderungen gemäß AD-W2 Merkblatt
  Requirements acc. to instruction sheet AD-W2
- ☒ Anforderungen gemäß AD 2000-W2 Merkblatt
  Requirements acc. to instruction sheet AD 2000-W2

der Firma **BGH** (Zeugnis - Nr. **255297**)
of the company (certificate No)

gefertigt wurden und die
have been made and the

Werkstoff - Nr. **1.4435**
steel grade
Schmelze - Nr. **328428**
Heat No

vor dem Trennen übertragen worden sind.
were transferred before separating.

Zum Zeichen der ordnungsgemäßen Umstempelung, wurde(n) das/die Teile(e) außerdem mit unserem Stempel versehen.
For showing the restamping according to the rules, the part(s) was/were also marked with our stamp.

KST 1.4435/316L 19.0x1.5 - G ¼" CH.328428

Mit der Stempelung beauftragt **Herr Kradija**
Given the task of restamping

Die Umstempelung erfolgt mit Zustimmung des TÜV Südwest.
The restamping is carried out with permission of TÜV Südwest.

Datum 20.08.2018
date

Unterschrift
signature

Code F1120

Seite / Page 1 /1

BGH

BGH Edelstahl Freital GmbH

BGH Edelstahl Freital GmbH Am Stahlwerk 1 01705 Freital

BGH Edelstahlwerke GmbH

Am Stahlwerk 1

01705 Freital
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat: **255297**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poinçon de l'inspecteur

BGH Q406

Kunden-Bestell-Nr. / Customer order no. / Cde no. du client: **08015900100**

BGH-Auftrags-Nr. / BGH works no. / BGH référence: **080159-001**

Erzeugnisform / Product	Stab, rund, geschält Round bars, peeled
Werkstoff / Quality	1.4435 X 2 CrNiMo 18-14-3
Anforderungen / Requirements	DIN EN 10088-3 9/05 1.4435 X 2 CrNiMo 18-14-3 DIN EN 10272 01/01 AD2000 W 10 10/03 316L - UNS S31603 NACE MR0175/ISO15156 UNS S31603 - F 316L ASTM A182/182M 05 a AD2000 W 2 07/06 AISI 316 L ASTM A 276M - 2006 1.4435 X2CrNiMo18-14-3 BN 2 Ausg. 06/97

Bestätigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Melting process/secondary refining / Mode d'élaboration/traitement ultérieur	Verwechslungsprüfung (spektroanalytisch) / Identification test (spectral-analysis) / examination d' identification(analyse spectrale)
ohne Beanstandung without objection	E - VOD	ohne Beanstandung without objection

Pos. Item	Anzahl Quantity	Abmessung Dimension	Gewicht Weight kg	Schmelz-Nr. Heat-No
1	2Bd.	20,00 RD	1810	328428

Schmelze Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Ti	N2
328428	0,021	0,28	1,86	0,024	0,013	17,25	2,58	12,75	0,005	0,0880

Wärmebehandlungszustand / Condition of heat treat / Traitment thermique	abgeschreckt quenched 1040°C 55' Wasser/ water

Probe-Nr. / Test-No.	Lage	Temp. °C	Rp0,2 N/mm²	Rp1,0 N/mm²	Rm N/mm²	A4/A5 %	Z %	Kerbschlagarbeit / Impact value J		Probenform / Shape of test piece / Charpy-V °C		Härte / Hardness HRC
200GE1	L	RT	273	287	622	51/47	77	260	256	263	RT	<20
200GE2	L	RT	269	284	620	51/47	77	267	262	259	RT	

Deltaferritgehalt/ ferrite delta: 0,05% Korngröße/ grain size ASTM E 112: 6/7

IK-Beständigkeit/ intercrystalline corrosion DIN EN ISO 3651-2/ ASTM A 262 Pract.E:
wird gewährleistet- is warrented.

US-Prüfung/ us-test DIN EN 10308 03/02 Tab.1 - Typ 1a (vollständig - complete)
Tab.3 - Qual.Kl.3: ohne Beanstandung- no objection.

Anlagen / Encl. / Annexe	Freital,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
	13.08.2007	Kadner

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig. / This certificate was generated by data system it must not be signed for validity as well. / Ce certificat a été établi sur système informatique et est valable sans signature auss.

Engelsberg 22 Fon +49 7252 9637-10 www.kiesel-steriltechnik.de
D-75015 Bretten Fax +49 7252 9637-20 info@kiesel-steriltechnik.de

Umstempel-Bescheinigung | *Restamping Certificate*

Besteller EnviroFalk GmbH ***customer***	**Bestellnummer 57138** ***order number***

unser Auftrag 132112 ***our commission***	**Lieferschein 184451 Pos. 3** ***delivery note***

Wir bestätigen hiermit, dass das/die gelieferte(n) Teil(e)
We herewith confirm that the delivered piece(s)

Muffe-SO DN015 DIN Ø19x1.5 G - ¼" ähnlich DIN 2986 -orbital-

Artikel - Nr. **704012**
item No

aus den Abmessungen (Rundstahl gemäß EN 10088-3 / EN 10272) **Ø020 mm**
made of ***(round bars according to EN 10088-3 / EN 10272)***

ausgewiesen durch
proved by
- ☒ Abnahmeprüfzeugnis nach EN 10204 - 3.1 ***inspection certificate acc. to EN 10204 - 3.1***
- ☐ Anforderungen gemäß AD-W2 Merkblatt ***Requirements acc. to instruction sheet AD-W2***
- ☒ Anforderungen gemäß AD 2000-W2 Merkblatt ***Requirements acc. to instruction sheet AD 2000-W2***

der Firma **BGH** (Zeugnis - Nr. **425324**)
of the company ***(certificate No)***

gefertigt wurden und die
have been made and the
- Werkstoff - Nr. **1.4435** ***steel grade***
- Schmelze - Nr. **390306** ***Heat No***

vor dem Trennen übertragen worden sind.
we transferred before separating.

Zum Zeichen der ordnungsgemäßen Umstempelung, wurde(n) das/die Teile(e) außerdem mit unserem Stempel versehen.
For showing the restamping according to the rules, the piece(s) were also signed with our stamp.

KST 1.4435 19.0x1.5 / G¼" AG CH.390306

Mit der Stempelung beauftragt **Herr Kradija**
Given the task of restamping

Die Umstempelung erfolgt mit Zustimmung des TÜV Südwest.
The restamping is carried out with permission of TÜV Südwest.

Datum 20.10.2021
date

Unterschrift
signature



BGH

BGH Edelstahl Freital GmbH

BGH Edelstahl Freital GmbH Am Stahlwerk 1 01705 Freital

BGH Edelstahl Freital GmbH
Handelslager

Hüttenstraße

01705 Freital
Deutschland

Zeugnis-Nr. 515582
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

BGH Q466

Kunden-Bestell-Nr. **264063001**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **39231101/264063**
BGH works no.
BGH référence

Erzeugnisform Product	Stab, rund, geschält round bars,peeled
Werkstoff / Quality	1.4435 X2CrNiMo18-14-3
Anforderungen Requirements	1.4435 X2CrNiMo18-14-3 DIN EN 10272 10/16 1.4435 X2CrNiMo18-14-3 AD 2000 Merkblatt W 2 Januar 2020 1.4435 X2CrNiMo18-14-3 AD 2000 Merkblatt W 10 Januar 2020 1.4435 X2CrNiMo18-14-3 DIN EN 10088 -3 12/14 UNS S31603 - Type 316 L ASTM A 276 - 17 UNS S31603 - Type 316L ASTM A 479 /A479M -20 UNS S31603 - F 316L ASTM A 182 /A 182M -20 (chemistry and mechanicals only) UNS S31603 ANSI/NACE MR 0175 /ISO15156-3 2015 1.4435 X2CrNiMo18-14-3 BN 2 Ausgabe 06/97

Besichtigung und Maßnachprüfung Inspection and dimensional control Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung Meltingprocess/secondary refining Mode d'élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) Identification test (spectral-analysis) examination d' identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. Item Poste	Anzahl Quantity Quantité	Abmessung Dimension Dimensions	Gewicht Weight Poids	Schmelz-Nr. Heat-No. No. de coulée
1	48	55,00 RD	5148 kg	405683

Schmelze Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Ti	N	Ferrit Basler
405683	0,015	0,49	1,82	0,026	0,0130	17,25	2,56	12,93	0,001	0,0985	5,4

Wärmebehandlungszustand
Condition of heat treat

lösungsgeglüht
solution annealed
1053°C 541sec. Wasser/water

Probe-Nr. Test-No.		Lage loc.	Temp. °C	Rp0,2 N/mm²	Rp1,0 N/mm²	Rm N/mm²	A5/A4 %	Z %	Kerbschlagarbeit Impact value J		Probenform Shape of test piece Charpy-V °C		Härte Hardness HRC
002FV1	+	L	RT	359	403	640	47/-	78	259	244	243	RT	<20
002FV1	*	L	RT	395		650	--/46	75					
002FV2	+	L	RT	367	410	634	46/-	78	251	241	239	RT	

+ Erprobung nach/testing acc. to DIN EN ISO 6892-1 / DIN EN ISO 148-1
* Erprobung nach/testing acc. to ASTM/ASME A 370

Korngröße/grain size ASTM E 112: 7.5

Deltaferrit/ferrite delta: 0 %

Anlagen Encl. Annexe	Freital,den Place and date Lieu et date 17.06.2022	Abnahmebeauftragter Inspector representative Inspecteur de réception **Müller**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Ce certificat a été établi sur système informatique et est valable sans signature aussi.

BGH

BGH Edelstahl Freital GmbH

BGH Edelstahl Freital GmbH Am Stahlwerk 1 01705 Freital

BGH Edelstahl Freital GmbH
Handelslager

Hüttenstraße

01705 Freital
Deutschland

Zeugnis-Nr. 515582
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

BGH Q466

Kunden-Bestell-Nr. **264063001**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **39231101/264063**
BGH works no.
BGH référence

IK-Beständigkeit/intercrystalline corrosion DIN EN ISO 3651-2, Prüfverfahren A,
ASTM E 262 Pract. E: ohne Befund/without objection
Probenvorbereitung/preparation of test specimen: 700°C 30' Wasser/water

US-Prüfung nach/ultrasonic testing acc. to
DIN EN 10308 03/02 Tab.1-Typ1a(vollst.)Tab.3-Qual.-kl.3:
ohne Beanstandung/no objection

Fertigung nach QM-System ISO 9001: 2015/ QM system in effect is ISO 9001: 2015
Zertifiziert nach / certificated AD2000 W0.

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection limit of 0.1 Bq/g.

Anlagen Encl. Annexe	Freital,den Place and date Lieu et date 17.06.2022	Abnahmebeauftragter Inspector representative Inspecteur de réception **Müller**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.
This certificate was generated by data system and it is valid without signature as well.
Ce certificat a été établi sur système informatique et est valable sans signature aussi.

Wilhelm Werner GmbH
Reinstwassertechnik
Margit Lilienthal
Maybachstr. 29

51381 Leverkusen

Deckblatt zum Abnahmeprüfzeugnis 3.1 nach DIN EN 10204
Cover sheet for the inspection certificate 3.1 according to DIN EN 10204

Besteller Customer	Margit Lilienthal	
Teil-Nr. Part-No.	AS-RK23r19-4L	Bez.: Reduzierstück konzentrisch
Kunden-Artikelnr. Customer Part-No.	1042-531	
Best.-Nr. Order-No.	54292/60904	
Stückzahl Quantity	1,00 Stk	
Lieferdatum Delivery Date	21.08.2020	
Lieferschein-Nr. Delivery-Note-No.	157-702691	Pos.-Nr. Pos.-No. 490
Chargen-Nr. Heat-No.	277205	gestempelt: 18-1845c
Werkstoff-Nr. Material No.	1.4404	

Die Teile wurden aus dem Material hergestellt gem. beigefügtem Zeugnis nach EN 10204 3.1
The parts were produced out of the material according to the enclosed copy.

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST328184 / 2018 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
SCHWER FITTINGS

AS-RK23r19-4L
18-1845c

Ordine nr: PO #180047
Bestell
Your order
Commande

Conferma ordine nr: EI18009990
Werks/Our Order/Ref nr.

Avviso di Spedizione: D-VI18029788
Lieferanzeige/Packing list/B.L.

Stato di fornitura : Hot rolled - Annealed COLD PROCESSED
Lieferzustand
Delivery state
Etat de livraison

Tipo di Elaborazione: E+AOD
Erschmelzungsart
Melting process
Mode d'elaboration

Qualità: 1.4401/1.4404
Werkstoff/Grade/Nuance

Marca: MVAPML (MAXIVAL)
Markenbezeichnung
Brand / Nuance

Produttore :
Hersteller/Item/Usine productrice

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica: AV
Zeichen des Liefernwerkes
Trade marks
Sigles de l'usine productrice

Punzone del Collaudatore: MR
Stempel des Werkssachverständigen
Inspector`s stamp/Poinçon de l`assayeur

Punzonatura: 1.4401/4/LOT NR./HEAT NR
Kennzeichnung
Marking
Marquage

SPECIFICHE :
Anforderungen / Requirements / Exigences

VAL AD-W2 2007 1.4401/1.4404 A,CF
AD 2000-M. W 2 2008 1.4401 A,CF (0)
AD 2000-M. W 2 2008 1.4404 A,CF (1)
AISI 316
AISI 316L
ASME SA182 2017 S31600 A (2)
ASME SA182 2017 S31603 A (3)
ASME SA479 2017 S31600 A (4)
ASME SA479 2017 S31603 A (5)
ASTM A182 2018 S31600 A (6)
ASTM A182 2018 S31603 (7)
ASTM A276 2017 S31600 A,CF
ASTM A276 2017 S31603 A,CF
ASTM A479 2018 S31600 A
ASTM A479 2018 S31603 A
EN 10088-3 2014 1.4401 A,CF
EN 10088-3 2014 1.4404 A,CF
EN 10272 2007 1.4401 A,CF
EN 10272 2007 1.4404 A,CF
NACE MR0175 2015 S31600 A (8)
NACE MR0175 2015 S31603 A (9)
QQ-S-763 F 316 A,CF
QQ-S-763 F 316L A,CF

Note:
Aufzeichnungen / Notes / Notes

(0)ACCORDING TO EN 10272,2007 AD 2000-M. W 10 REV. 2007
(1)ACCORDING TO EN 10272,2007 AD 2000-M. W 10 REV. 2007
(2)Section II Part A 2017 EDITION For products machined directly from bar refer to ASME SA479.
(3)Section II Part A 2017 EDITION For products machined directly from bar refer to ASME SA479.
(4)Section II Part A 2017 EDITION
(5)Section II Part A 2017 EDITION
(6)For products machined directly from bar refer also to ASTM A479.
(7)For products machined directly from bar refer also to ASTM A479.
(8)ANSI/NACE MR0175/ISO 15156-3, third edition November 23,2015
(9)ANSI/NACE MR0175/ISO 15156-3, third edition November 23,2015

		Tolleranza: k12 Tolleranza/Allowance/Tolerance					
Pos. nr. Pos. nr. Item nr. Nr. de poste	Oggetto Gegenstand Product description Descrip. du produit	Dimensioni - mm Abmessungen Dimension Dimension	Lunghezza - mm Lange Length Longueur	Colata Schmelze Heat Coulée	Pezzi Stückzahl Pieces Pieces	Peso - KG Gewicht Weight Poids	Lotto nr. Losnr. Lot nr. Lot nr.
0010	Round	25,000	5000/ 5500	277205		705,0	734010630

Vicenza, 23/11/18
VCQ008 - MEST328184
(Mod. MCE2) WSP0698A531EBD24D01BAA5D61883C1A2A

Il collaudatore di stabilimento / der Werkssachverständige / Works inspector / L`agent d`usine
M.RIZZOTTO

Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.
Telefono 0444.968211 - Fax 0444.963836
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4/37
Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a : EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1
Nach/According to/Selon

Certificato nr. MEST328184 / 2018 /
Prüfung/Test/Essai

Cliente / Besteller/Purchaser/Client
SCHWER FITTINGS

Stato di fornitura : Hot rolled - Annealed COLD PROCESSED
Lieferzustand / Delivery state / Etat de livraison

Produttore :
Hersteller/Item/Usine productrice
ACCIAIERIE VALBRUNA S.P.A.

Tipo di Elaborazione: E+AOD
Erschmelzungsart / Melting process / Mode d'elaboration

Marchi di Fabbrica:
Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice

Ordine nr: PO #180047
Bestell / Your order / Commande

Qualità: 1.4401/1.4404
Werkstoff/Grade/Nuance

Punzone del Collaudatore:
Stempel des Werkssachverständigen / Inspector's stamp/Poinçon de l'assayeur

Conferma ordine nr: EI18009990
Werks/Our Order/Ref nr.

Avviso di Spedizione: D-VI18029788
Lieferanzeige/Packing list/B.L.

Marca: MVAPML (MAXIVAL)
Markenbezeichnung / Brand / Nuance

Punzonatura: 1.4401/4/LOT NR./HEAT NR
Kennzeichnung / Marking / Marquage

TEST ALLO STATO DI FORNITURA
Test on delivery condition Prüefung auf lieferbereitem produkt test a l'etat de fourniture Prueba sobre el material así come entregado

1) L=longitudinale/längs, T=trasversale/quer, Q=Tangenziale/tangential

TEST	Provetta/ Probestab Specimen/Eprouvette Larg.diam Spess. Breite Diam. Dicke Width Diam. Thickness Larg. diam. epais mm	°C	Posiz. Saggio Probentage Location Emplacement 1)	Snervamento Streckgrenze Yield Stress Limite elastique Rp 0,2% N/mm2	Snervamento Streckgrenze Yield Stress Limite elastique Rp 1% N/mm2	Resistenza Zugfestigkeit Tensile strength Resistance à traction Rm N/mm2	Allungamento Bruchdehnung Elongation Allongement A5 %	Allungamento E 4d %	Strizione Einschnürung Reduction of area Striction Z %	Strizione RA %	Resilienza Kerbschlagarbeit Impact Value Resilience KV J			Durezza Haerte Hardness Durete HB	
Valori richiesti Anfonderungen/Required values Valeurs démandées		min max		207	235	517 900	20	30	-	50	100			- 315	
A	10	20	L	447	521	704	47	50	68	68	184	184	188	232	

TEST ALLO STATO DI FORNITURA
Test on delivery condition / Prüefung auf lieferbereitem produkt / Test a l'etat de fourniture / Prueba sobre el material así come entregado

TEST		min	max	
A	Grain size for ASTM E112			5

Tensile testing according to ISO 6892-1

Impact testing according to ISO 148-1

Analisi chimica
Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

Colata /Heat Schmelze/Coulée	C %	Si %	Mn %	Cr %	Mo %	Cu %	Ni %	P %	S %	N %
min -	-	-	1,25	16,50	2,00	-	10,00	-	-	-
max	0,030	1,00	2,00	18,00	2,50	1,00	13,00	0,040	0,030	0,100
277205	0,014	0,50	1,58	17,04	2,03	0,47	10,17	0,030	0,027	0,064

Corrosion test in 16% sulfuric acid and copper sulfate solutions

Test standard: UNI EN ISO 3651-2 Method A

Test	Heat treatment before test	Length of Period (h)	Test temp (°C)	Bend Angle (°)	Ø spindle (mm)	Result of visual inspection at 20 x magnification after bend test	Result
Intergranular corrosion	Sensitized T1	20	boil	90	5	Absence of cracks	**SATISFACTORY**

Reduction ratio = 61,1 : 1
Material solution annealed 1060° C for 1h/water cooled.

Im Einvernehmen mit TUV BAYERN (Juli 1972).

Gegenzeichnungsverzicht durch TUV BAYERN (21.05.1979).

In Agreement with TUV BAYERN (Juli 1972).

Renuciation of countersignature by TUV BAYERN (21.05.1979).

Ausgestellt im Einvernehmen mit TUV SUD und

Anwendungsgutachten n. 537984

Vicenza, 23/11/18
VCQ008 - MEST328184
(Mod. MCE2) WSP0698A531EBD24D01BAA5D641883C1A2A

Il collaudatore di stabilimento / der Werkssachverständige / Works inspector / L'agent d'usine
M.RIZZOTTO

Acciaierie Valbruna S.p.A.

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Telefono 0471.924111 - Fax 0471.924497

CERTIFICATO DI COLLAUDO - ABNAHMEPRUEFZEUGNIS - INSPECTION CERTIFICATE - CERTIFICAT DE RECEPTION

In conformità a / Nach/According to/Selon: EN 10204 (2004) , 3.1 / ISO 10474 (2013) , 3.1

Certificato nr. / Prüfung/Test/Essai: MEST328184 / 2018 /

Cliente / Besteller/Purchaser/Client: SCHWER FITTINGS

Ordine nr / Bestell / Your order / Commande: PO #180047

Conferma ordine nr / Werks/Our Order/Ref nr.: EI18009990

Avviso di Spedizione / Lieferanzeige/Packing list/B.L.: D-VI18029788

Stato di fornitura / Lieferzustand / Delivery state / Etat de livraison: Hot rolled - Annealed COLD PROCESSED

Tipo di Elaborazione / Erschmelzungsart / Melting process / Mode d'elaboration: E+AOD

Qualità / Werkstoff/Grade/Nuance: 1.4401/1.4404

Marca / Markenbezeichnung / Brand / Nuance: MVAPML (MAXIVAL)

Produttore / Hersteller/Item/Usine productrice:

ACCIAIERIE VALBRUNA S.P.A.

Marchi di Fabbrica / Zeichen des Liefernwerkes / Trade marks / Sigles de l'usine productrice: AV

Punzone del Collaudatore / Stempel des Werkssachverständigen / Inspector`s stamp/Poinçon de l`assayeur: MR

Punzonatura / Kennzeichnung / Marking / Marquage: 1.4401/4/LOT NR./HEAT NR

Sono state soddisfatte tutte le condizioni richieste Die gestellen Anforderungen sind it. Anlage erfüllt The material has been furnished in accordance with the requirements Le materiel à eté trouvé conforme aux exigences	Controllo antimescolanza: OK Verwechslungprüfung: spectralanalytisch durchgeführt Antimixing testing performed: OK Contrôle antimelange fait: r.a.s.	Controllo visivo e dimensionale: soddisfa le esigenze Besichtigung und Ausmessung: ohne Beanstandung Visual inspection and dimensional checks:satisfactory Contrôle visuel et dimensions: satisfaisant

Melted and manufactured in Italy — No welding or weld repair — Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination through Portal System when it leaves the production plant.

QUALITY MANAGEMENT SYSTEM CERTIFIED BY LLOYD'S REGISTER ACCORDING TO ISO 9001 : 2015, IATF 16949 : 2016, AS 9100D

The Quality Management System is Certified acc. Pressure Equipment Directive ['97/23/EC'] Annex 1,s.,4.3 and 2014/68/EU by TUEV and LLOYD`S

Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.

Maxival and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.

The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/ or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

Vicenza, 23/11/18

VCQ008 - MEST328184

(Mod. MCE2) WSP0698A531EBD24D01BAA5D641883C1A2A

Il collaudatore di stabilimento / der Werkssachverständige / Works inspector / L`agent d`usine

M.RIZZOTTO

163658
RKK23r19-4Li
stamp:3324

Mill Test Certificate/检查证明书

Certificate No./证明书号码 :190115-ZRNC-019-001
Date of Issue/发行日期:Feb., 15, 2019

Surface Finish/表面整理:NO.2B

RKK23r19-4Li
21-12855

PO No./采购号码:

Commodity/品名:STS CR Coil

Spec & Type/规格:ASTM-A240-2016:316L(ZP316L WQ) 3. 1 EN10204

Size/尺寸	Product No. 产品号码	Quantity 数量	Weight 重量 (kg)	Heat No. 制钢号码	POSITION	Tensile/拉伸试验 YS 0.2% (MPa)	TS	EL (%)	Hardness /硬度 ≤95 HRB		DIVISION	Chemical Composition/ C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Mo (%)	N (%)
						≥170	≥485	≥40				0~0.03	0~0.75	0~2	0~0.045	0~0.03	16~18	10~14	2~3	0~0.1
1.41x1219xC	QWN0645B	1	20,588	S660732	T	294	630	51	82		L	0.0158	0.401	1.343	0.0291	0.0028	16.81	10.01	2.02	0.0185
					B	295	629	52	81											
*** Sub Total (020) ***		1	20,588 (kg)																	
*** Grade Total ***		3	63,430 (kg)																	
*** Grand Total ***		3	63,430 (kg)																	

==== Last Item ====

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test Direction : Transversal, Gauge Length : 50mm(Rectangular), YP Method : 0.2% off-set
* Division - L:Ladle Analysis * Tr(Trace)

We hereby certify that the material herein has been made in accordance with the order and specification.

* This Mill Test Certificate cannot be copied for any purpose.
* After-sale Tel:(0512)58569641 or 58569573

Surveyor To:

POSCO (Zhangjiagang) Stainless Steel Co.,Ltd. No.1 Jinfeng Riverside Road, Zhangjiagang City, Jiangsu Province,PRC.

Chief of material testing section Ding Bing

Wilhelm Werner GmbH
Reinstwassertechnik
Margit Lilienthal
Maybachstr. 29

51381 Leverkusen

Deckblatt zum Abnahmeprüfzeugnis 3.1 nach DIN EN 10204
Cover sheet for the inspection certificate 3.1 according to DIN EN 10204

Besteller Customer	Margit Lilienthal		
Teil-Nr. Part-No.	AS-RKK23r19-4Li	Bez.:	Reduzierstück konzentrisch kurz
Kunden-Artikelnr. Customer Part-No.			
Best.-Nr. Order-No.	55688/60904		
Stückzahl Quantity	10,00 Stk		
Lieferdatum Delivery Date	24.02.2021		
Lieferschein-Nr. Delivery-Note-No.	157-736668	Pos.-Nr. Pos.-No.	30
Chargen-Nr. Heat-No.	S680732	gestempelt:	2825
Werkstoff-Nr. Material No.	1.4404		

Die Teile wurden aus dem Material hergestellt gem. beigefügtem Zeugnis nach EN 10204 3.1
The parts were produced out of the material according to the enclosed copy.

137889

stamp:2825

Mill Test Certificate/检查证明书

Certificate No./证明书号码 :190115-ZRNC-019-001
Date of Issue/发行日期:Feb., 15, 2019

Surface Finish/表面整理:NO.2B

AS-RKK23r19-4Li
19-12647

PO No./采购号码:
Commodity/品名:STS CR Coil
Spec & Type/规格:ASTM-A240-2016:316L(ZP316L WQ) 3.1 EN10204

Size/尺寸	Product No. 产品号码	Quantity 数量	Weight 重量 (kg)	Heat No. 制钢号码	POSITION	Tensile/拉伸试验 YS 0.2% (MPa) ≥ 170	TS ≥ 485	EL (%) ≥ 40	Hardness /硬度 ≤ 95 HRB		DIVISION	Chemical Composition/ C (%) 0~0.03	Si (%) 0~0.75	Mn (%) 0~2	P (%) 0~0.045	S (%) 0~0.03	Cr (%) 15~18	Ni (%) 10~14	Mo (%) 2~3	N (%) 0~0.1
1.41x1219xC	QWN0645B	1	20,588	S680732	T	294	630	51	82		L	0.0158	0.401	1.343	0.0291	0.0028	16.81	10.01	2.02	0.0185
					B	295	629	52	81											
*** Sub Total (020) ***		1	20,588 (kg)																	
*** Grade Total ***		3	63,430 (kg)																	
*** Grand Total ***		3	63,430 (kg)																	

==== Last Item ====

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test Direction : Transversal, Gauge Length : 50mm(Rectangular), YP Method : 0.2% off-set
* Division - L:Ladle Analysis * Tr(Trace)

We hereby certify that the material herein has been made in accordance with the order and specification.

* This Mill Test Certificate cannot be copied for any purpose.
* After-sale Tel:(0512)58569641 or 58569573

Surveyor To:

POSCO (Zhangjiagang) Stainless Steel Co.,Ltd. No.1 Jinfeng Riverside Road, Zhangjiagang City, Jiangsu Province,PRC.

Chief of material testing section Ding.Bing

Wilhelm Werner GmbH
Reinstwassertechnik
Margit Lilienthal
Maybachstr. 29

51381 Leverkusen

Deckblatt zum Abnahmeprüfzeugnis 3.1 nach DIN EN 10204
Cover sheet for the inspection certificate 3.1 according to DIN EN 10204

Besteller Customer	Margit Lilienthal	
Teil-Nr. Part-No.	AS-TK23r19-4L	Bez.: Reduzier T-Stück kurz
Kunden-Artikelnr. Customer Part-No.		
Best.-Nr. Order-No.	52401/60904	
Stückzahl Quantity	2,00 Stk	
Lieferdatum Delivery Date	30.10.2019	
Lieferschein-Nr. Delivery-Note-No.	157-647796	Pos.-Nr. Pos.-No. 270
Chargen-Nr. Heat-No.	728013	gestempelt: CH728013 IW854935
Werkstoff-Nr. Material No.	1.4404	

Die Teile wurden aus dem Material hergestellt gem. beigefügtem Zeugnis nach EN 10204 3.1
The parts were produced out of the material according to the enclosed copy.

AS-TK23r19-4L 18-05223

Umstempel-Bescheinigung

Registrier-Nr. : 281755/18/TOBIEN

Bestellnummer : Schwer Fittings GmbH 18208715 150-124778

Hiermit bestätigen wir, daß die gelieferten

Teile : 20,00 Stück

Red. T-Stück SSS, kurze Ausführung
DN 20/15 - 23x1,5/19x1,5
1.4404 - poliert
2004802001930

aus den Abmessungen : Edelstahlrohr
23,00 x 1,50

ausgewiesen durch : Abnahmeprüfzeugnis DIN EN 10204 /3.1

der Firma : La Meusienne

gefertigt und die Stempelung

Werkstoff : 1.4404

Schmelze-Nr. : 728013

vor dem Trennen übertragen worden sind.

Zum Zeichen der ordnungsmäßigen Umstempelung wurden die Teile außerdem

mit unserem Stempel 1.4404/3
23/19x1,5
CH 728013
IW 854935
versehen.

Mit der Stempelung beauftragt: Frau Tobien

Das Umstempeln erfolgt mit der Zustimmung des TÜV Nord Systems GmbH & Co.KG,
Region Magdeburg, September 2017.

22.03.18
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig.

LA MEUSIENNE
1, Rue de Prêle
F-55170 ANCERVILLE
Tel. 0329797427
Fax 0329797498

TEST CERTIFICATE according to EN 10204/3.1

CERTIFICAT DE RECEPTION
ABNAHMEPRÜFUNGZEUGNIS

For longitudinally welded tubes / pour tubes soudés longitudinalement
Für längsnahtgeschweisste Rohre

ISO 14001
ISO 9001
OHSAS 18001
ISO/TS 16949

Nr : CERT114869	Delivery Nr : BL0067546 31/01/2018
	La MEUSIENNE order : AR0036204 / 5,00

Marking : LOGO 23x1,5 316L 1 4404 DIN11850 EN10357 CC EN10217-7 TC1 W2b N°Coulée (BM) Date/Heure

Manufacturer's mark : LA MEUSIENNE

Inspector's stamp :

Specifications : - DIN11850 / EN10357 CC - EN 10217-7 TC1 W2b V=1
- EN ISO 1127 06/96 D4/T3

Dimensions	Your Article Nr	Our Article Nr	Grade	Heat treatment	Désignation
23,00 x 1,50 x 6 000,00	222071	002603	4404		R 4404 23 1,5 BF TIG CM DKP ALI 6

Chemical analysis according to : EN 10088-1 / EN 10088-2 / EN 10028-1 / EN 10028-7

Heat		% C	% Si	% Mn	% Ni	% Cr	% Mo	% Ti	%Al	% N	% S	% P	% Nb	% Cu
Requirements	Mini				10,000	16,500	2,000							
	Maxi	0,030	0,750	2,000	12,500	18,000	2,500	0,020		0,060	0,015	0,040		
728013		0,025	0,450	1,230	10,030	16,550	2,040	0,006		0,039	0,003	0,030		

Packet nb		Test Nb	Heat	Tensile strength	Yield strength		Elongation	Flange test (ISO 8493) (A370)	Flattening test (ISO 8492) (A370)	Reverse test (A370)	Hardness (ISO 6508-1)
				ISO 6892 - 1							
N° de colis		N° essai	Coulée	Rés. à traction	Limite d'élasticité		Allongement	Evasement	Aplatissement	Retournement	Dureté
Packet Nr	Unit quantity	Prüfung Nr	Schmelze	Zugfestigkeit	Streck-Dehngrenze		Bruchdehnung	Aufweitung	Ringfaltversuch	Umdrehen	Härte
				Rm (N/mm²)	Rp 0.2 (N/mm²)	Rp 1 (N/mm²)	A%	(%)			HRB
Requirements	m		Mini	490	190	225	40	25			
Exigences			Maxi	760							
S000483689	1 200,00	TL506463	728013	654	491	524	43	47	OK		

Intergranular corrosion test *(EN ISO 3651-2 Mét A)* Corrosion intergranulaire	OK	Interkristalline Korrosion	Inside Roughness Ra max 0.8 µm - On welding area Ra max 1 6 µm
Eddy current test *(EN ISO 10893-2-E1H /E426)* Contrôle électromagnétique	OK	Wirbelstromprüfung	
Appearance and size *(EN 1127)* Contrôle visuel & dimensionnel	OK	Aussehen und Abmessung	
Leaktightness test *(EN ISO 10893-1/E426)* Essai d'étanchéité	OK	Dichtheitsprüfung	
Identification test Test de non confusion des nuances	OK	Werkstoffverwechslungsprüfung	
Air under pressure test Epreuve air sous eau		Wasserdruckprüfung	

We certify that the delivered products comply with the specification order *Nous attestons que les tubes livrés sont conformes aux stipulations de la commande* *Hiermit bestätigen wir, dass die Rohre den im Auftrag gestellten Anforderungen entsprechen*	**The chief inspector** *Le chef du service Qualité* *Das Werkschaverständige*

TÜV QMOS 01 202 F V 14 73066668

PED 2014/68/UE annexe 1 § 4.3 - TÜV Rheinland 01 202F/O-07 1850

A MEMBER OF THE SIT INDUSTRIE GROUP
ZWAHLEN & MAYR S.A.
ZM TUBES
Z.I. 2, CH-186 AIGLE
Tel. ++41-(0)24-468 46 46
Fax ++41-(0)24-468 46 01

INSPECTION CERTIFICATE
CERTIFICAT DE RECEPTION
ABNAHMEPRÜFZEUGNIS

EN 10204 - 3.1

N° 100058

SHEET / PAGE / SEITE 1 OF / DE / VON 1

* DER TÜV SUDWEST HAT MIT SCHREIBEN VOM 3 NOVEMBER 1992 AUF DIE GEGENZEICHNUNG VERZICHTET

CONFIRMATION N° / AUFTRAGS N° 47180 D

CUSTOMER: / CLIENT/ KUND KIESEL

CUSTOMER ORDER N° COMMANDE CLIENT / KUNDENBESTELLUNG	SPECIFICATIONS: ANFORDERUNGEN	HEAT N. COULEE N. SCHMELZE N.	QUANTITY QUANTITE STÜCKE	DIMENSIONS mm ABMESSUNGEN	LENGTH LONGUEUR LANGE mm	STEEL GRADE NUANCE D'ACIER MARKENBEZEICHNUNG
12895	EN 10217-7 TC2 AD 2000-W2/W10 BN2 DIN 11866 ASTM A270 ASME SA249 W2Rb	908047	849.2 m	23.00 x 1.50	6000	1.4435/TP316L

PRODUCT / PRODUIT / PRÜFGEGENSTAND: REDRAWN TUBES - TUBES ETIRES - NACHGEZOGENE ROHRE

HEAT ANALYSIS — ANALYSE DE COULEE / SCHMELZANALYSE

HEAT N. COULEE N. SCHMELZE N.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	% Cu	% Fe	% Al	% Co	% B	% Zr	%	%
908047	0.019	0.41	1.36	0.029	0.002	17.23	12.63	2.50	0.030	0.010	0.26		0.004					

PRODUCT ANALYSIS — ANALYSE PRODUIT / STÜCKANALYSE

HEAT N. COULEE N. SCHMELZE N.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% N	% Ti	% Cu	% Fe	% Al	% Co	% B	% Zr	%	%
PIECE	0.0141	0.359	1.28	0.0119	0.0017	17.4	12.8	2.51		0.008	0.193	65.0	0.006	0.174				

HEAT TRAITMENT / TREATEMENT THERMIQUE / WÄRMEBEHANDLUNG: ANNEALED AT / HYPERTREMPE A / LÖSUNGSGEGLÜHT BEI 1050° C AND RAPIDLY COOLING / ET REFROIDI RAPIDEMENT / UND ABGESCHRECKT

100 % OF THE MATERIAL HAVE BEEN PASSED WITH SATISFACTORY RESULT THE : / DU MATERIEL SATISFAIT AU(X) CONTROLE(S) / DES MATERIALS HAT DIE PRÜFUNG BESTANDEN

Eddy Current

TEST ACCORDING TO : / SUIVANT / ENTSPRECHEND: SEP 1914/1925, ASTM A 1016

MANUFACTURING DATE :

MARKING / MARQUAGE / KENNZEICHNUNG: *KST STERI TUBE-Ø23x1.5-TP 316L/1.4435-ASME SA 249M-ASTM A270-BN2-DIN11866 H3o-EN 10217-7 TC2 W2Rb-AD-2000-W2-Schmelzen Nr 908047*

REMARKS / REMARQUE / ANMERKUNG :

(10 BAR = 1M Pa)

FLATTENING / APLATISSEMENT / RINGFALTVERSUCH	HYDROSTATIC TEST / ESSAI HYDRAULIQ BAR / WASSERDRUCKVERSUCH	FLARING / EVASEMENT / AUFWEITUNG
S	NE	S 100%
FLANGING / COLLET / BÖRDELVERSUCH	**REVERSE FLATTENING / RETOURNEMENT INVERSE / WURZELSEITIGER RINGFA**	**GRAIN SIZE ASTM / GROSSEUR DE GRAIN / KORNGROSSE**
S	S	S 6-8
CORROSION TEST / TEST CORROSION / IK TEST	**P.M.I. / TEST DE NON MELANGE / VERWECHSELLUNGSPR.**	**VISUAL CONTROL / CONTROLE VISUEL / BESICHTIGUNGSKONTR.**
S ISO 3651-2	NE	S Grinded 400
SPECIFICATION / SPEZIFIKATION	SPECIFICATION / SPEZIFIKATION	SPECIFICATION / SPEZIFIKATION
S Ferrite test < 0.50%		

S = Satisfactory - Satisfaisant - Zufriedenstellend
NE = Not executed - Pas effectué - Nicht durchgeführt

TEST RESULTS — RESULTATS DES ESSAIS / ERGEBNIS DER PRÜFUNGEN (1 N/mm2 = 1M Pa)

SAMPLE / ECHANTILLON / PROBE	Ø OU EXT / AUSS.	Ø INT. / INN	WALL THIC. / EPAISSEU / WANDSTÄR	LENGTH / LONGUEUR / LANGE	ROUGHNESS / RUGOSITE / RAUHIGKEIT	ROUGHNESS / RUGOSITE / RAUHIGKEIT	ROUGHNESS / RUGOSITE / RAUHIGKEIT	TENSILE TRACTION / ZUGVERSUCH: Rp 0.2% N/mm2	Rp 1% N/mm2	Rm N/mm2	A % Lo=5,65√So	HARDNESS / DURETE. / HÄRTE
TOLERANCES / TOLERANZEN	23.00 ±0.12	20.00	1.50 ±0.15	6000 ±50	int.Ra <0.80 µm	ext.Ra <0.80 µm	µm					HV3
1	22.99	20.19	1.40	3700	0.06	0.16		299	327	578	53.7	169.8
2	22.98	20.18	1.40		0.10	0.23		294	328	582	50.4	171.6
3	22.98	20.18	1.40	6000	0.13	0.21		290	318	573	53.4	173.7
4	22.99	20.21	1.39		0.10	0.17		286	321	572	52.7	175.5
5	22.97	20.19	1.39	6000	0.07	0.16		294	325	575	52.5	177.6

Emis et vérifié par : Issued and checked by :

ISO 9001
Certification Nr.
LRQA 943175
Quality system

Z.M. Q.C. C. PARIS

Aigle, 14-janv-10

Engelsberg 22
D-75015 Bretten
Fon +49 7252 9637-10
Fax +49 7252 9637-20
www.kiesel-steriltechnik.de
info@kiesel-steriltechnik.de

Umstempel-Bescheinigung / *Restamping Certificate*

Besteller Wilhelm Werner GmbH ***purchaser***	**Bestellnummer 40533/60450** ***order number***
unser Auftrag 81491 ***our commission***	**Lieferschein 115993 Pos. 9** ***delivery note***

Wir bestätigen hiermit, dass das/die gelieferte(n) Teil(e)
We herewith confirm that the delivered piece(s)

STERI-T DN020 DIN Ø23x1.5 e-poliert

Artikel - Nr.
item No **701221**

aus den Abmessungen (geschweißtes Rohr nach DIN 17457 / DIN 11866) **Ø23x1.5**
made of *(welded tube according to DIN 17457 / DIN 11866)*

ausgewiesen durch
proved by

- ☒ Abnahmeprüfzeugnis nach DIN EN 10204 - 3.1.B
  inspection certificate acc. to DIN EN 10204 - 3.1.B
- ☐ Anforderungen gemäß AD-W2 Merkblatt
  Requirements acc. to instruction sheet AD-W2
- ☒ Anforderungen gemäß AD 2000-W2 Merkblatt
  Requirements acc. to instruction sheet AD 2000-W2

der Firma **Butting** (Zeugnisnummer **30 000 030 952 / 00**)
of the company *(certificate No)*

gefertigt wurden und die
have been made and the

Werkstoffnummer **1.4435**
steel grade
Schmelze - Nr. **403961**
heat No

vor dem Trennen übertragen worden sind.
we transferred before separating.

Zum Zeichen der ordnungsgemäßen Umstempelung, wurde(n) das/die Teile(e) außerdem mit unserem Stempel versehen.
For showing the restamping, according to the rules, the piece(s) were also signed with our seal.

KST 1.4435/316L 23.0x1.5 CH.403961 DIN 11865

Mit der Stempelung beauftragt **Herr Kradja**
Given the task of restamping

Die Umstempelung erfolgt mit Zustimmung des TÜV Südwest.
The restamping is carried out with permission of TÜV Südwest.

Datum 24.03.2015
date

Unterschrift
signature

Abnahmeprüfzeugnis 3.1
EN10204-3.1

BUTTING

Dokument-Nr.:	30 000 030 952 / 00		
Besteller:	KIESEL Steriltechnik GmbH 75015 Bretten	**BUTTING Auftrags-Nr.:**	30027 **Pos.:** 40
Bestell-Nr.:	22273	**Fertigungs-Auftrags-Nr.:**	1057464
Kunden-Material-Nr.:	700635	**BUTTING Material-Nr.:**	100073873
Prüfgegenstand:	längsnahtgeschweißte Rohre		
Abmessung:	23,00 x 1,50 mm	**Menge:**	504,802 m = 83 Stück
Werkstoff:	1.4435 / TP316L		

Anforderungen

DIN 11866 H3o
AD2000-W2/W10/BN2/DIN11866/ASME SA249/
ASTM-A269/A270/Bestellbedingungen
Ausnutzung der zulässigen Berechnungsspannung: 100 %.

Geliefert von	Lief.-Charge	Fertigungs-Auftrags-Nr.	Serial-Nr.
OUTOKUMPU	403961	1032955-	27;63;65-66;68-70;72-73;75-78;80;82-87;89-91;93;96-101;103-106; 110-111;127-129;131-136;138-139;141;143;145;150;159;161-166;168-173; 175;177-180;182-187;189-191;193;209;211;213-214

Hergestellt aus Rohr mit Abnahmeprüfzeugnis nach EN 10204-3.1.

Schmelzanalyse

Ergebnisse gemäß Abnahmeprüfzeugnis des Stahlwerkes:

Geliefert von	Lief.-Charge	C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	N (%)	Ti (%)	Mo (%)
OUTOKUMPU	403961	0,019	0,43	1,62	0,024	0,001	17,2	12,66	0,06	0	2,54

Kennzeichnung

1032955 23,0x1,50 1.4435/TP316L DIN 11866 H3o DIN EN 10217-7 TC2 WG
ASTM A269/A270 NDE HEAT CH.403961 KST Steri-Tube

BK 47

Materialkontrollen

Kontrolle Materialkennzeichnung:	OK
Materialverwechslung:	durchgeführt OK
Oberflächenkontrolle:	außen 100 % OK innen 100 % im Gegenlicht OK
Oberflächenbeschaffenheit entspricht:	EN 10217-7 WG

Qualitätsstelle
H. Butting GmbH & Co. KG
29379 Knesebeck · Germany
Knesebeck, 28.06.2012 / 7281

BUTTING Abnahmebeauftragter
Andreas Klan
Telefon +49 5834 50-337

Dieses Dokument wurde mit Hilfe rechnergestützter Programme erstellt und ist ohne Unterschrift gültig.

Abnahmeprüfzeugnis 3.1
EN10204-3.1

BUTTING

Dokument-Nr. 30 000 030 952 / 00

Ausführungsart entspricht: EN 10217-7 WG
Wärmebehandlung durchgeführt mit: 1040 - 1090 °C, Abkühlung in Wasser
Maßkontrolle durchgeführt und entspricht: DIN 11866 / Tab.1 - Reihe A

Ergebnisse der zerstörenden Prüfungen

Zugversuch(e)

Serial-Nr.	Lief.-Charge	Pr.-Lage	Temp. (°C)	a (mm)	D (mm) D (mm)	Rp0.2 (MPa)	Rp1.0 (MPa)	Rm (MPa)	A (%)	B-Lage
28	403961	l	20	1,58	22,88	299	331	594	55,7	
130	403961	l	20	1,51	23,00	296	329	599	56,3	GW

Pr.-Lage = Probenlage, a = Dicke, b = Breite, d = Durchmesser, D = Rohrdurchmesser, G/GW = Grundwerkstoff, S/SN = Schweißnaht, WEZ = Wärmeeinflusszone, q = quer, l = längs, V1 = Rt0,5/Rm, B-Lage = Bruchlage, Z = Brucheinschnürung

Technologische Prüfungen

Benennung	Befund	Bemerkungen
Reverse Bend Test	OK	
Aufweitversuch gem. DIN EN ISO 8493	OK	

je Los und je Lieferantencharge durchgeführt

Korrosionstest(s)

Benennung	Befund	Bemerkungen
Interkristalliner Korrosionstest gem. ASTM A 262 Verfahren E	OK	

je Los und je Lieferantencharge durchgeführt

Metallografische Untersuchungen

Benennung	Befund	Lief.-Charge	Dokument-Nr.	Bemerkungen
Schliffuntersuchung (Makro 1x)	OK	403961	20000067837	
Schliffuntersuchung (Makro 1x)	OK	403961	20000067992	
Delta Ferrit Messung an Grundwerkstoff u. Schweißnaht auf der Außen- und Innenoberfläche (4 Messpunkte)	OK	403961	20000067839	
Delta Ferrit Messung an Grundwerkstoff u. Schweißnaht auf der Außen- und Innenoberfläche (4 Messpunkte)	OK	403961	20000067870	
Delta Ferrit Messung an Grundwerkstoff u. Schweißnaht auf der Außen- und Innenoberfläche (4 Messpunkte)	OK	403961	20000067871	
Delta Ferrit Messung an Grundwerkstoff u. Schweißnaht auf der Außen- und Innenoberfläche (4 Messpunkte)	OK	403961	20000067995	
Korngrößenbestimmung gem. ASTM E 112	OK	403961	20000067840	
Korngrößenbestimmung gem. ASTM E 112	OK	403961	20000067993	
Härteprüfung 9 Messpunkte	OK	403961	20000067873	
Härteprüfung 9 Messpunkte	OK	403961	20000068073	

Stückanalysen

Benennung	Befund	Lief.-Charge	Dokument-Nr.	Bemerkungen
Stückanalyse Grundwerkstoff OES	OK	403961	20000067943	
Stückanalyse Grundwerkstoff OES	OK	403961	20000068067	
Stückanalyse Schweißnaht OES	OK	403961	20000067943	
Stückanalyse Schweißnaht OES	OK	403961	20000068067	

Qualitätsstelle
H. Butting GmbH & Co. KG
29379 Knesebeck · Germany
Knesebeck, 28.06.2012 / 7281

BUTTING Abnahmebeauftragter
Andreas Klan
Telefon +49 5834 50-337

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Abnahmeprüfzeugnis 3.1
EN10204-3.1

Dokument-Nr. 30 000 030 952 / 00

Sonstige zerstörende Prüfungen

Benennung	Befund	Lief.-Charge	Dokument-Nr.	Bemerkungen
Rauheit BK-Rau 01 PK7	OK	403961	20000068046	

Zerstörungsfreie Prüfungen

Benennung	Befund	Umfang	Bemerkungen
Dichtheitsprüfung - gem. DIN EN ISO 10893-1	OK	100 %	
Wirbelstromprüfung Längsnaht - außen DIN EN ISO 10893-2	OK	100 %	

Bemerkungen

Außenfläche der Rohre mit Korn 400 geschliffen.

Überprüft nach AD2000-Merkblatt W0 und zertifiziert nach Richtlinie
97/23/EG, Anhang I, Ziffer 4.3 durch die TÜV CERT-Zertifizierungsstelle
für Druckgeräte der TÜV Nord Gruppe, Benannte Stelle, Kenn-Nr. 0045 mit
Zertifikat-Nr. 07 202 4211/Z/0002/1/H
Das zur Anwendung gekommene Schweißverfahren gem. Druckgeräterichtlinie
97/23/EG, AD2000 HP2/1 / EN 288-3 und die Schweißerqualifikation
gem. EN 1418 sind Zertifiziert durch die TÜV CERT-Zertifizierungsstelle
für Druckgeräte der TÜV Nord Gruppe, Benannte Stelle, Kenn-Nr. 0045.

Die Anforderungen an den Hersteller nach AD 2000-Merkblatt W0/HP0 sind erfüllt. Auf eine Gegenzeichnung wird verzichtet.
Das eingesetzte Schweiß- und Prüfpersonal erfüllt die Anforderungen der EN 10217-7.
Die Anforderungen sind erfüllt.

Qualitätsstelle
H. Butting GmbH & Co. KG
29379 Knesebeck · Germany
Knesebeck, 28.06.2012 / 7281

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Abnahmeprüfzeugnis 3.1 nach EN 10204
Inspection Certificate 3.1 acc. to EN 10204

Bescheinigungsnummer - *Document No.*: 10002895107 / 00 A03

A02

DOCKWEILER
connecting flow to purity

Dockweiler AG - An der Autobahn 10/20 - 19306 Neustadt-Glewe - Germany A01

EnviroFALK A06
PharmaWaterSystems GmbH
Maybachstrasse 29
51381 LEVERKUSEN
GERMANY

Certified as per ASME BPE A04
Certificate of Authorization No. BPE-105
expiring on 2025-11-17,
ISO 9001:2015 Cert. No. 07 100 980183,
ISO 14001:2015 Cert. No. 07 104 980183,
Directive 2014/68/EU Annex I, Section 3.1
Cert. No. 50164/4,
AD 2000-Merkblatt HP0 &
ISO 3834-2:2005 Cert. No. 50164/3.

Kundenbestellnr. - *Customer P.O. no.* A09	Auftrags-Nr. - *Our order no.* A13	Geliefert am - *Delivered on* A10
59044	1030179324	August 23, 2022

Lieferschein-Nr./Pos. - *Our delivery no./item* A14/A15	Chargen-Nr. des Artikels - *Batch-no.* A08
1080376071 / 900001	2100541840

Qualität - *Quality* B04	Norm - *Standard* B17	Stückzahl - *Qty* B08	Länge - *Length* B10	NPS B15	Schedule B16
weldtron	DIN 11866	-	18,00 M	-	-

Zeichnungsnr. - *Drawing no.* B06	Schweißverfahren - *Welding process* A11	Stahlherstellungsverfahren - *Steelmaking process* C70
-	-	-

Produkt - *Product* B01/B09

ROHR 23,00 mm () x 1,50 mm () - GESCHWEISST - 1.4435/S31603 DIN 11866 - H3o

Kennzeichnung - *Marking* B06

*DOCKWEILER - PC2359 - Ø23,00 x 1,50mm 1.4435/S31603 - BN2 - DIN 11866H3o - EN 10217-7 TC2 W2Rb - ASTM A269/A270 WLD NDE - ASME SA249M - HEAT/SCHMELZE 049093 - ZM - AC

Kundenspezifikation - *Purchasers specification*	Kundenmaterialnr. - *Purchasers material no.*
-	1041-101

Vormaterialhersteller - *Manufacturer of raw material* A12	Schmelze - *Heat* B07	Vormaterialchargennr. - *Batch-no. of raw material* A16
Zwahlen & Mayr SA	049093	2100541840

Schmelze - *Heat* B07	Anforderungen - *Requirements* B03
049093	DIN EN 10217-7 TC2, DIN 11866 H3o, ASTM A269, ASTM A270, ASME SA-249M-E19, PED 2014/68/EU, AD 2000-W0, AD 2000-W2, BN 2, NACE MR0175

Chemische Zusammensetzung Schmelze [Gew.-%] - *Chemical Analysis Heat [WT-%]*

Übertragen aus Vormaterialzeugnis - *Results acc.to raw material inspection certificate*

	Schmelze B07 *Heat*	Werkstoff B02 *Steel Grade*	Herstellercode B14 *Manufacturer's code*	C C71	Si C72	Mn C73	P C74	S C75	Cr C76	Ni C77	N C88
1	049093	1.4435/S31603 (316L)	-	0,016	0,370	1,340	0,029	0,006	17,27	12,71	0,0320

	Ti C79	Mo C80	Al C81	Fe C82	Cu C83	Nb C84	Se C85	Ca C86	Ta C87	W C88	V C89	Cr(äq) - 0,91 x Ni(äq) - *Cr(eq) - 0,91 x Ni(eq)* C90
1	0,012	2,540	0,000	-	0,240	-	-	-	-	-	-	7,45

Materialkontrollen - *Material examination*

Übertragen aus Vormaterialzeugnis - *Results acc.to raw material inspection certificate*

Wärmebehandlung - *Heat treatment*:	049093	1040 °C, annealed, quenched	B05
Materialverwechselungsprüfung - *P.M.I.*:	049093	-	D04

Zerstörende Prüfungen - *Results of destructive tests*

Übertragen aus Vormaterialzeugnis - *Results acc.to raw material inspection certificate*

Zugversuch - *Tensile test(s)*

	Schmelze - *Heat* B07	Probenform C10 *Type of test piece*	Rp0.2		Rp1.0 C11		Rm C12	Bruchdehnung A C13 *Elongation*	Brucheinschnürung Z C14 *Reduction of area*
-	-	-	MPa	psi	MPa	psi	MPa	%	%
1	049093	-	231	-	264	-	509	56	-

Bescheinigungsnummer - *Document no.*10002895107 / 00 A03

Kerbschlagbiegeversuch - *Impact test*						Härte - *Hardness* C30		
	Schmelze - *Heat* B07	Probenform C40 *Type of test piece*	Probenbreite C41 *Width of test piece*	Mittelwert C42 *Mean value*	Prüftemperatur C43 *Test temperature*	HV	HR	BHN
-		-				-		
1	049093	-	-	-	-	138 HV5	-	-

	Schmelze - *Heat* B07	Aufweitversuch C50 *Flaring test*	Bördelversuch C51 *Flange test*	Ringzugversuch C52 *Ring tensile test*	Ringfaltversuch C53 *Flattening test*	Biegeversuch C58 *Bend test*
-	-	-	-	-	-	-
1	049093	OK	OK	-	OK	-

	Schmelze - *Heat* B07	Ringaufdornversuch C54 *Ring expanding test*	Wurzelseitiger Ringfaltversuch C55 *Reverse flattening test*	Schweißnahtbiegeversuch C56 *Reverse bend test*
-	-	-	-	-
1	049093	-	-	OK

	Schmelze - *Heat* B07	Korrosionstest C57 *Corrosion test*	Korngröße C59 *Grain size*
-	-	DIN EN ISO 3651-2, ASTM A262 Pract. E	ASTM E112
1	049093	OK	8

Zerstörungsfreie Prüfungen - *Results of non-destructive tests*

Übertragen aus Vormaterialzeugnis - *Results acc.to raw material inspection certificate*

Dichtheitsprüfung - *Leak test*				
	Schmelze - *Heat* B07	Innendruckversuch mit Wasser D05 *Hydrostatic test*	Druckprüfung D13 *Pneumatic test*	Wirbelstromprüfung D06 *Eddy current test*
-	-	EN ISO 10893-1	-	ASTM A 1016, DIN EN ISO 10893-2
1	049093	OK	-	OK

	Schmelze - *Heat* B07	Ferritgehalt D02 *Ferrite test*	Ultraschallprüfung D07 *Ultrasonic test*	Durchstrahlprüfung D08 *Radiographic test*	Ultraschallprüfung D09 *Ultrasonic test*
-	-	-	-	-	-
1	049093	-	-	-	-

Endkontrolle - *Final Examination*

Kontrolle Materialkennzeichnung: *Control of material marking*	OK		D01	Maßkontrolle: *Dimensional control*	OK D01
Oberflächenkontrolle: *Surface examination*	OK	außen - *outside* innen - *inside*	D03	Materialverwechslung: *P.M.I.*	2.4% tested: OK D04

Rauheit innen/Naht D11 *Roughness inside/ weld*		Rauheit außen D12 *Roughness outside*		Härteprüfung HV10 C30 *Hardness*	Durchstrahlungsprüfung D08 *Radiographic test*	Eindringprüfung (ZfP) D14 *Penetrant testing (NDT)*
EN ISO 4287, ASME B46.1		EN ISO 4287, ASME B46.1		EN ISO 6507-1	EN 1435	EN ISO 3452-1
Ra(avg)	Ra(max)	Ra(avg)	Ra(max)	-	-	-
0,17 µm	0,39 µm	0,13 µm	0,28 µm	-	-	-

Ferritgehalt ges. Teil D02 *Ferrite test*		Ferritgehalt LN & GW D02 *Ferrite test (weld seam)*		Dichtheitsprüfung D05 *Leak test*	Druckprüfung D13 *Pressure test*	Magn. Permeabilität D15 *Magnetic permeability*
max	avg	max	avg	-	-	-
-	-	0,15 %	-	-	-	-

Konformitätserklärung - *Certificate of Conformity* Z01

Hiermit wird bestätigt, dass das gelieferte Produkt mit den Anforderungen der Spezifikation und den Vereinbarungen der Bestellung übereinstimmt.

We herewith confirm that the product supplied is in conformity with the demands of the specification and agreements in the order.

Anlagen - *Attachment* No

Dr. Jan Rau (D95) Z03
Abnahmebeauftragter - Inspection Representative
Certified Individual (CI) acc. to ASME BPE, Part CR

August 23, 2022
Datum - *Date* Z02

Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig.
This document was created electronically and is valid without signature.

Alle Angaben zu Normen und Spezifikationen ohne Verweis auf eine spezifische Revision oder ein Datum beziehen sich auf die jeweils letzte Ausgabe.
All standards and specifications listed without a specific edition or date refer to the most current edition.

Angaben zu Fertigungs- und Schweißverfahren:
Zertifiziert nach Richtlinie 2014/68/EU, DIN EN ISO 15614-1, AD 2000 HP 2/1, ASME IX Ed. 2007 (Zert No. HAM0865090/ZE-1110/1) und Modul A2 der Richtlinie 2014/68/EU (Zert. No. 50164-1).
Statement on manufacturing and welding procedures:
Certified as per Directive 2014/68/EU, DIN EN ISO 15614-1, AD 2000 HP 2/1, ASME IX Ed. 2007 (Cert No. HAM0865090/ZE-1110/1) and Module A2 of the Directive 2014/68/EU (Cert. No. 50164-1).

ZWAHLEN & MAYR SA

ZWAHLEN & MAYR ZM TUBES

Route de l'Industrie 18
CH-1860 AIGLE
Tel: +41 24 468 4646

INSPECTION CERTIFICATE
ABNAHMEPRÜFZEUGNIS

EN 10204 / 3.1
N. 8814-1

CUSTOMER KIESEL STERILTECHNIK GMBH
KUNDE 8883

CUSTOMER ORDER 78727
KUNDENBESTELLUNG

CONFIRMATION 3448
BESTÄTIGUNG

PRODUCT PRÜFGEGENSTAND	ITEM ARTIKEL	ITEM ZM ARTIKEL ZM	DIMENSIONS ABMESSUNGEN	STEEL GRADE MARKENBEZEICHNUNG	HEAT SCHMELZE	METERS METER
NACHGEZOGENE ROHRE	706300	TE-PH-029-1.50-A30-1/07	Ø 29.00 x 1.50 x 6000	316L/1.4435	223124	1'008.00
SPECIFICATION ANFORDERUNGEN	DIN 11866 H4o-EN 10217-7 TC2 AD2000-W2					
					TOTAL:	1'008.00

HEAT TREATMENT: ANNEALED AT 1040 °C mini **AND RAPIDLY COOLING**
WÄRMEBEHANDLUNG: GLÜHUNG BEI UND ABGESCHRECKT

VISUAL AND DIMENSIONAL CONTROL: S
BESICHTIGUNG UND MAßKONTROLLE:

INTERGRANULAR CORROSION TEST: EN ISO 3651-2
IK BESTÄNDIGKEIT:

JOINT EFFICIENCY EJ: 1.0
SCHWEISSFAKTOR V:

TEST NON DECTRUCTIVE: EN 10893-2
ZERSTÖRUNGSFREIE PRÜFUNG:

LEAKING TEST: EN 10893-1
DICHTHEITSPRÜFUNG:

REMARKS : Ferritdehalt : < 0.5%
ANMERKUNG :

PMI :
VERWECHSELUNGSPRUEFUNG :

GRAIN POLISHING: 400
KORN POLIEREN:

TEST RESULTS
ERGEBNIS DER PRÜFUNGEN

(1 N/mm2 = 1 MPa) (10 BAR = 1 MPa)

HEAT SCHMELZE	Ø EXTERNAL Ø AUSSEN 29.00 ±0.14	Ø INTERNAL Ø INNEN 26.00	WALL THICKN. WANDSTÄRKE 1.50 ±0.15	LENGTH LÄNGE 6000 ±50	ROUGHNESS RAUHIGKEIT µm Int Ra < 0.40	ROUGHNESS RAUHIGKEIT µm Ext.Ra < 1.00	ROUGHNESS RAUHIGKEIT µm	ROUGHNESS RAUHIGKEIT µm	X	Y	TENSILE / ZUGVERSUCH Rp 0.2 % N/mm2	Rp 1 % N/mm2	Rm N/mm2	A % Lo = 2"	Lo = 5.65VSo	HARDNESS HÄRTE HV3 <180
223124	29.11	25.98	1.57	6000.00	0.23	0.26					237	280	582	54		138
OF13489	29.12	25.99	1.57		0.18	0.21					236	282	591	54		138
	29.12	25.99	1.57	6000.00	0.38	0.21					237	281	587	54		138
	29.12	25.99	1.57		0.22	0.22					232	278	585	54		138
	29.12	25.98	1.57	6000.00	0.28	0.12					234	279	581	54		138

HEAT ANALYSIS/ SCHMELZANALYSE

% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% N	% Ti	% Cu	% Al
0.025	0.380	1.400	0.033	0.008	17.240	2.530	12.680	0.036	0.012	0.370	0.001

PRODUCT ANALYSIS / STÜCKANALYSE

% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% N	% Ti	% Cu	% Al
0.017	0.410	1.370	0.026	0.006	17.100	2.630	12.800	0.050			

EXAMEN TECHNOLOGIQUE
TECHNOLOGISCHE PRÜFUNG

FLATTENING RINGFALTVERSUCH	FLARING AUFWEITUNG	ROOT BEND TEST FALTUNG RÜCKSEITE	FACE BEND TEST FALTUNG VORDERSEITE	FLANGING BÖRDELVERSUCH	REVERSE BEND WURZEL.BIEGER.	RING EXPANDING RINGAUFDORNVERSUCH	RING TENSILE RINGZUGVERSUCH	REVERSE FLATTENING WURZELSEIT.RINGFALTVER.
S	100%			S	S			

X = SENS / RICHTUNG Y = DRAWING / ENTNAHME L = LONGITUDINAL / LÄNGE M = RAW MATERIAL / ROHMATERIAL S = SATISFACTORY / ZUFRIEDENSTELLEND

MARKING :
KENNZEICHNUNG : KST HQ TUBE - ZM - Ø29 x 1.5 - TP316L/1.4435 - BN2 - DIN 11866 H4o - EN 10217-7 WCR TC2 - ASTM A269/A270 - ASME SA249M - AD2000 W2/W10 - HEAT 223124 - ON

*Ausgestellt im Einvernehmen mit der TÜV SÜD Industrie Service GmbH (Datum der Erstzulassung 08.03.1991)

ZM TUBES has been examined and certified according to AD 2000 W 0 / TRD 100 and PED 2014/68/EU by TÜV Süddeutschland. Certifications are valid until March 2024

ISO 9001
ISO 14001
LRQA 943175
Quality system

12/12/2022

PRODUCER TRADE MARK
ZICHEN DES LIEFERWERKS **ZM**

Z.M. Q.C.

Aigle, 12/12/2022

PADANA TUBI
& PROFILATI ACCIAIO S.P.A.
Società a socio unico, soggetta a dir. e coord. di Padana Holding srl
Via Portamurata, 8/A
42016 GUASTALLA (RE) – ITALIA
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Fax + + 39 522 83.65.72 – 83.65.73
Cod. Fis. e P. IVA IT00323370353

AZIENDA CON SISTEMA DI GESTIONE QUALITA' CERTIFICATO SECONDO **UNI EN ISO 9001**

TIPO DOCUMENTO – TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1
Inspection Certificate 3.1
Nr. : 24001395

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

Data – Date
08/01/2024

Country of Production: Italy
Coils Origin: EU Country

D.D.T. – DELIVERY NOTE
24001004 – 08/01/2024

Riferimenti Normativi Tubi – Hollow Sections Standard: ASTM A554 + EN10219–2 (DIMENSIONAL TOLERANCES)

Tubi Saldati Longitudinalmente (ERW) Longitudinal Welded Tubes (ERW)								**Composizione Chimica** Chemical Composition										**Proprietà Meccaniche e Tecnologiche** Mechanical and Technical Properties					
Dim. (mm)	Sp. Th. (mm)	L (mm)	Acciaio Steel	Fin.	Lotto	MT Tot. (m)	Peso WGT (kg)	Colata Heat	%C	%Si	%Mn	%P	%S	%Nb	%V	%Al	%Ti	%Cr	%Ni	%Mo	%Cu	%N	Trazione / Tensile Test $R_{p0,2}$ MPa	$R_{p1,0}$ MPa	Rm MPa	A %	A80 %	Durezza Hardness HRB
ORDINE PADANA TUBI – P.T. ORDER SE – 23061521								**FATTURA** – INVOICE – –															
20X20	**1,50**	6000	**1.4301/1.4307**	SP	TN06113525	726,00	605	**4A/60498**	0,024	0,360	1,310	0,034	0,001					18,400	8,100		0,065		306	343	637	62,0	57,0	82
20X20	**2,00**	6000	**1.4301/1.4307**	SP	TN06114388	726,00	787	**2A/829250**	0,021	0,360	1,420	0,039	0,001					18,090	8,030		0,073		305	347	632	52,0	50,0	87
20X20	**2,00**	6000	**1.4301/1.4307**	SP	TN06114476	726,00	777	**2A/829250**	0,021	0,360	1,420	0,039	0,001					18,090	8,030		0,073		305	347	632	52,0	50,0	87
30X30	**1,50**	6000	**1.4301/1.4307**	SP	TN06055286	600,00	814	**1A/548498**	0,024	0,310	1,680	0,035	0,001					18,010	8,040	0,360	0,072		279	308	605		62,1	82
30X30	**1,50**	6000	**1.4301/1.4307**	SP	TN06055340	600,00	745	**1A/548498**	0,024	0,310	1,680	0,035	0,001					18,010	8,040	0,360	0,072		279	308	605		62,1	82
30X30	**1,50**	6000	**1.4301/1.4307**	SP	TN06055354	600,00	743	**1A/548498**	0,024	0,310	1,680	0,035	0,001					18,010	8,040	0,360	0,072		279	308	605		62,1	82
50X50	**2,00**	6000	**1.4301/1.4307**	SP	TN06116080	294,00	842	**2A/828630**	0,022	0,350	1,400	0,032	0,004					18,000	8,020		0,071		291	336	626	54,0	52,0	86
50X50	**2,00**	6000	**1.4301/1.4307**	SP	TN06116081	294,00	844	**2A/828630**	0,022	0,350	1,400	0,032	0,004					18,000	8,020		0,071		291	336	626	54,0	52,0	86
50X50	**2,00**	6000	**1.4301/1.4307**	SP	TN06116106	294,00	837	**2A/828630**	0,022	0,350	1,400	0,032	0,004					18,000	8,020		0,071		291	336	626	54,0	52,0	86
50X50	**2,00**	6000	**1.4301/1.4307**	SP	TN06116107	294,00	838	**2A/828630**	0,022	0,350	1,400	0,032	0,004					18,000	8,020		0,071		291	336	626	54,0	52,0	86
25X25	**1,50**	6000	**1.4301/1.4307**	SP	TN06104873	864,00	911	**2A/337052**	0,023	0,400	1,420	0,036	0,003					18,050	8,060		0,072		290	323	643	56,0		92
60X60	**4,00**	6000	**1.4301/1.4307**	SP	TN06102329	150,00	1.038	**2A/827400**	0,025	0,400	1,430	0,039	0,002					18,030	8,020		0,065		297	339	632	63,0	64,0	90
60X60	**4,00**	6000	**1.4301/1.4307**	SP	TN06102330	150,00	1.038	**2A/827400**	0,025	0,400	1,430	0,039	0,002					18,030	8,020		0,065		297	339	632	63,0	64,0	90
40X30	**2,00**	6000	**1.4301/1.4307**	SP	TN05957072	420,00	853	**1A/547488**	0,030	0,400	1,680	0,031	0,001					18,020	8,040	0,370	0,073		355	418	673		49,0	87
40X30	**2,00**	6000	**1.4301/1.4307**	SP	TN05957073	420,00	853	**1A/547488**	0,030	0,400	1,680	0,031	0,001					18,020	8,040	0,370	0,073		355	418	673		49,0	87

Controllo visivo e dimensionale:
esito positivo

Visual and dimensional control:
OK

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www.ehi-edelstahl.de

Certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordine

We certify that material supplied complies with the requirements agreed on order

Verifica antimescolamento:
esito positivo

Anti–mixing test :
OK

The tubes listed on this certificate are produced with raw material complying with EN 10088–2.

(EN ISO 10893–2)

P.N.D.: correnti indotte sulla saldatura: **esito positivo**
NDT: Eddy Current test on the weld: **OK**

Padana Tubi & Profilati Acciaio S.p.A.
Ing. Stefano Passera
Controllo Qualità / Quality Department

PADANA TUBI
& PROFILATI ACCIAIO S.P.A.
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AZIENDA CON SISTEMA DI GESTIONE QUALITA' CERTIFICATO SECONDO **UNI EN ISO 9001**

TIPO DOCUMENTO – TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1
Inspection Certificate 3.1
Nr. : 24001395

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

Data – Date
08/01/2024

Country of Production: Italy
Coils Origin: EU Country

D.D.T. – DELIVERY NOTE
24001004 – 08/01/2024

Riferimenti Normativi Tubi – Hollow Sections Standard: ASTM A554 + EN10219–2 (DIMENSIONAL TOLERANCES)

Tubi Saldati Longitudinalmente (ERW)
Longitudinal Welded Tubes (ERW)

Composizione Chimica
Chemical Composition

Proprietà Meccaniche e Tecnologiche
Mechanical and Technical Properties

Dim. (mm)	Sp. Th. (mm)	L (mm)	Acciaio Steel	Fin.	Lotto	MT Tot. (m)	Peso WGT (kg)	Colata Heat	%C	%Si	%Mn	%P	%S	%Nb	%V	%Al	%Ti	%Cr	%Ni	%Mo	%Cu	%N	Trazione / Tensile Test $R_{p0,2}$ MPa	$R_{p1,0}$ MPa	Rm MPa	A %	A80 %	Durezza Hardness HRB
15X15	1,50	6000	1.4301/1.4307	SP	TN06016279	726,00	443	2A/813510	0,022	0,390	1,450	0,032	0,004					18,010	8,010			0,077	290	316	642	57,0		88
15X15	1,50	6000	1.4301/1.4307	SP	TN06016372	726,00	442	2A/813510	0,022	0,390	1,450	0,032	0,004					18,010	8,010			0,077	290	316	642	57,0		88
ORDINE PADANA TUBI – P.T. ORDER SE – 23061527								**FATTURA** – INVOICE – –																				
40X40	3,00	6000	1.4571–AISI 316 Ti	SP	TN05842258	294,00	962	1A/466303	0,024	0,560	1,030	0,028	0,001				0,250	16,640	10,560	2,050		0,017	272	320	594	54,8		75
60X60	3,00	6000	1.4571–AISI 316 Ti	SP	TN05995661	216,00	1.106	4A/54662	0,024	0,370	0,910	0,036	0,002				0,270	16,800	10,500	2,050		0,013	330	374	631	49,0		95
80X80	4,00	6000	1.4571–AISI 316 Ti	SP	TN06047475	96,00	881	4A/52198	0,029	0,460	0,850	0,034	0,003				0,290	16,700	10,600	2,040		0,012	261	314	588	54,0		77
100X60	4,00	6000	1.4571–AISI 316 Ti	SP	TN05836594	108,00	971	1A/465829	0,018	0,700	1,040	0,031	0,001				0,230	16,840	10,610	2,040		0,011	292	354	614	54,0		79
60X40	4,00	6000	1.4571–AISI 316 Ti	SP	TN05566475	150,00	822	01/541195	0,018	0,640	0,980	0,027	0,001				0,190	16,900	10,580	2,020		0,016	290	345	600		55,0	76
50X30	3,00	6000	1.4571–AISI 316 Ti	SP	TN06108513	288,00	946	1A/469583	0,020	0,650	0,950	0,031	0,001				0,230	16,790	10,640	2,070		0,016	278	337	590		54,6	78
60X60	5,00	6000	1.4571–AISI 316 Ti	SP	TN05878980	96,00	777	1A/466214	0,013	0,590	1,030	0,030	0,001				0,220	16,700	10,620	2,190		0,015	280	334	601	55,3		83
100X50	5,00	6000	1.4571–AISI 316 Ti	SP	TN04527871	90,00	945	01/531244	0,018	0,610	1,040	0,028	0,001				0,230	16,700	10,620	2,030		0,015	284	335	606	51,2		80
ORDINE PADANA TUBI – P.T. ORDER SE – 23061528								**FATTURA** – INVOICE – –																				
20X20	2,00	6000	1.4404–AISI 316L	SP	TN06113949	726,00	819	1A/470835	0,016	0,340	1,040	0,031	0,001					16,730	10,040	2,060		0,046	336	384	623		52,2	80
25X25	2,00	6000	1.4404–AISI 316L	SP	TN06109473	726,00	1.044	1A/470835	0,016	0,340	1,040	0,031	0,001					16,730	10,040	2,060		0,046	336	384	623		52,2	80

Controllo visivo e dimensionale:
esito positivo
Visual and dimensional control:
OK

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Certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordine

We certify that material supplied complies with the requirements agreed on order

Verifica antimescolamento:
esito positivo
Anti–mixing test :
OK

The tubes listed on this certificate are produced with raw material complying with EN 10088–2.

(EN ISO 10893–2)

P.N.D.: correnti indotte sulla saldatura: **esito positivo**
NDT: Eddy Current test on the weld: **OK**

Padana Tubi & Profilati Acciaio S.p.A.
Ing. Stefano Passera
Controllo Qualità / Quality Department

PADANA TUBI
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Cod. Fis. e P. IVA IT00323370353

AZIENDA CON SISTEMA DI GESTIONE QUALITA' CERTIFICATO SECONDO **UNI EN ISO 9001**

TIPO DOCUMENTO – TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1
Inspection Certificate 3.1
Nr. : 24001395

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

Data – Date
08/01/2024

Country of Production: Italy
Coils Origin: EU Country

D.D.T. – DELIVERY NOTE
24001004 – 08/01/2024

Riferimenti Normativi Tubi – Hollow Sections Standard: ASTM A554 + EN10219–2 (DIMENSIONAL TOLERANCES)

Tubi Saldati Longitudinalmente (ERW) Longitudinal Welded Tubes (ERW)									**Composizione Chimica** Chemical Composition										**Proprietà Meccaniche e Tecnologiche** Mechanical and Technical Properties					
Dim. (mm)	Sp. Th. (mm)	L (mm)	Acciaio Steel	Fin.	Lotto	MT Tot. (m)	Peso WGT (kg)	Colata Heat	%C	%Si	%Mn	%P	%S	%Nb	%V	%Al	%Ti	%Cr	%Ni	%Mo	%Cu	%N	Trazione / Tensile Test $R_{p0,2}$ MPa	$R_{p1,0}$ MPa	Rm MPa	A %	A80 %	Durezza Hardness HRB
30X30	**2,00**	6000	**1.4404–AISI 316L**	SP	TN05996703	600,00	1.041	**1A/547932**	0,020	0,300	1,120	0,029	0,001					16,630	10,080	2,020		0,055	307	369	618		49,3	79
40X40	**2,00**	6000	**1.4404–AISI 316L**	SP	TN06054792	486,00	1.126	**4A/53710**	0,019	0,520	0,900	0,034	0,002					17,000	10,000	2,010		0,043	325	366	625	56,0	53,0	87
ORDINE PADANA TUBI – P.T. ORDER SE – 24000233																												
FATTURA – INVOICE – –																												
60X40	**4,00**	6000	**1.4404–AISI 316L**	SP	TN06035850	150,00	823	**1A/469147**	0,018	0,310	1,020	0,030	0,001					16,640	10,060	2,110		0,048	300	347	626	53,8		82
60X40	**4,00**	6000	**1.4404–AISI 316L**	SP	TN06088963	150,00	816	**1A/470364**	0,016	0,370	1,070	0,037	0,001					16,670	10,090	2,060		0,046	274	322	590	51,2		78
60X40	**4,00**	6000	**1.4404–AISI 316L**	SP	TN06088966	150,00	807	**1A/470364**	0,016	0,370	1,070	0,037	0,001					16,670	10,090	2,060		0,046	274	322	590	51,2		78
60X40	**4,00**	6000	**1.4404–AISI 316L**	SP	TN06088976	150,00	811	**1A/470364**	0,016	0,370	1,070	0,037	0,001					16,670	10,090	2,060		0,046	274	322	590	51,2		78

Controllo visivo e dimensionale:
esito positivo

Visual and dimensional control:
OK

Verifica antimescolamento:
esito positivo

Anti–mixing test :
OK

The tubes listed on this certificate are produced with raw material complying with EN 10088–2.

EHI Edelstahl
Tel.: 02736/29468-0
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www.ehi-edelstahl.de

(EN ISO 10893–2)

P.N.D.: correnti indotte sulla saldatura: **esito positivo**
NDT: Eddy Current test on the weld: **OK**

Certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordine

We certify that material supplied complies with the requirements agreed on order

Padana Tubi & Profilati Acciaio S.p.A.
Ing. Stefano Passera
Controllo Qualità / Quality Department

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AZIENDA CON SISTEMA DI GESTIONE QUALITA' CERTIFICATO SECONDO **UNI EN ISO 9001**

TIPO DOCUMENTO – TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1
Inspection Certificate 3.1

Nr. : 23059664

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

Data – Date
14/07/2023

Country of Production: Italy
Coils Origin: EU Country

D.D.T. – DELIVERY NOTE
23041997 – 14/07/2023

Riferimenti Normativi Tubi – Hollow Sections Standard: ASTM A554 + EN10219–2 (DIMENSIONAL TOLERANCES)

Tubi Saldati Longitudinalmente (ERW)
Longitudinal Welded Tubes (ERW)

Composizione Chimica
Chemical Composition

Proprietà Meccaniche e Tecnologiche
Mechanical and Technical Properties

Dim. (mm)	Sp. Th. (mm)	L (mm)	Acciaio Steel	Fin.	Lotto	MT Tot. (m)	Peso WGT (kg)	Colata Heat	%C	%Si	%Mn	%P	%S	%Nb	%V	%Al	%Ti	%Cr	%Ni	%Mo	%Cu	%N	Trazione / Tensile Test $R_{p0,2}$ MPa	$R_{p1,0}$ MPa	Rm MPa	A %	A80 %	Durezza Hardness HRB
								ORDINE PADANA TUBI – P.T. ORDER SE – 23033851										**FATTURA** – INVOICE – –									
35X35	2,00	6000	1.4404–AISI 316L	SP	TN05954819	432,00	871	1A/468542	0,020	0,500	1,030	0,030	0,001					16,950	10,070	2,110		0,046	339	400	623		52,0	81
40X20	2,00	6000	1.4404–AISI 316L	SP	TN05986712	540,00	938	1A/547933	0,020	0,310	1,080	0,029	0,001					16,570	10,060	2,060		0,050	297	350	598		51,1	78
100X100	4,00	6000	1.4571–AISI 316 Ti	SP	TN05960427	96,00	1.068	1A/468369	0,016	0,610	1,000	0,033	0,001		0,200			16,820	10,630	2,070		0,015	268	323	602	57,5		79
80X80	4,00	6000	1.4571–AISI 316 Ti	SP	TN05937267	96,00	853	1A/468267	0,016	0,620	1,090	0,029	0,001		0,220			16,810	10,560	2,010		0,017	276	323	593	57,7		79
100X100	5,00	6000	1.4571–AISI 316 Ti	SP	TN05917291	72,00	1.007	1A/467428	0,020	0,590	1,100	0,030	0,001		0,180			16,730	10,740	2,030		0,015	285	335	596	55,6		78
100X100	5,00	6000	1.4571–AISI 316 Ti	SP	TN05948550	72,00	998	1A/466214	0,013	0,590	1,030	0,030	0,001		0,220			16,700	10,620	2,190		0,015	280	334	601	55,3		83
100X100	3,00	6000	1.4571–AISI 316 Ti	SP	TN05961129	120,00	1.045	4A/52198	0,029	0,460	0,850	0,034	0,003		0,290			16,700	10,600	2,040		0,012	261	314	588	54,0		77
60X30	3,00	6000	1.4571–AISI 316 Ti	SP	TN05991042	240,00	881	1A/467431	0,018	0,600	1,010	0,030	0,001		0,180			16,900	10,600	2,030		0,016	244	304	575		55,8	67
60X40	2,00	6000	1.4571–AISI 316 Ti	SP	TN05991254	324,00	970	1A/468914	0,017	0,440	1,330	0,030	0,001		0,210			16,660	10,670	2,040		0,018	282	330	597		50,8	75
50X20	2,00	6000	1.4571–AISI 316 Ti	SP	TN05319245	360,00	722	01/461705	0,022	0,430	1,360	0,028	0,001		0,240			16,820	10,610	2,050		0,019	298	349	570		55,9	75
20X20	2,00	6000	1.4301/1.4307	ST	TN05878788	726,00	795	4A/43234	0,027	0,370	1,540	0,035	0,000					18,400	8,000			0,065	322	376	648	52,0	49,0	93
100X100	4,00	6000	1.4301/1.4307	ST	TN05970917	96,00	1.117	2A/803190	0,021	0,420	1,400	0,038	0,002					18,030	8,000			0,075	292	330	620	53,0	54,0	86
40X20	1,50	6000	1.4301/1.4307	ST	TN05891367	540,00	689	4A/49902	0,023	0,460	1,320	0,035	0,001					18,300	8,000			0,075	265	305	608	63,0		84
30X30	2,00	6000	1.4301/1.4307	ST	TN05883376	600,00	1.006	4A/48476	0,025	0,410	1,320	0,033	0,001					18,300	8,100			0,068	302	345	636	60,0	56,0	93
150X50	3,00	6000	1.4301/1.4307	SP	TN05919266	96,00	821	1A/468501	0,030	0,360	1,730	0,033	0,001					18,030	8,030	0,350		0,067	306	359	658		51,6	86

Controllo visivo e dimensionale:
esito positivo

Visual and dimensional control:
OK

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

Certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordine

We certify that material supplied complies with the requirements agreed on order

Verifica antimescolamento:
esito positivo

Anti–mixing test :
OK

The tubes listed on this certificate are produced with raw material complying with EN 10088–2.

(EN ISO 10893–2)

P.N.D.: correnti indotte sulla saldatura: **esito positivo**
NDT: Eddy Current test on the weld: **OK**

Padana Tubi & Profilati Acciaio S.p.A.
Ing. Stefano Passera
Controllo Qualità / Quality Department

PADANA TUBI
& PROFILATI ACCIAIO S.P.A.
Società a socio unico, soggetta a dir. e coord. di Padana Holding srl
Via Portamurata, 8/A
42016 GUASTALLA (RE) – ITALIA
Tel. + + 39 522 83.65.55 (r.a.)
Fax + + 39 522 83.65.72 – 83.65.73
Cod. Fis. e P. IVA IT00323370353

AZIENDA CON SISTEMA DI GESTIONE QUALITA' CERTIFICATO SECONDO **UNI EN ISO 9001**

TIPO DOCUMENTO – TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1
Inspection Certificate 3.1

Nr. : 23059664

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

Data – Date
14/07/2023

Country of Production: Italy
Coils Origin: EU Country

D.D.T. – DELIVERY NOTE
23041997 – 14/07/2023

Riferimenti Normativi Tubi – Hollow Sections Standard: ASTM A554 + EN10219–2 (DIMENSIONAL TOLERANCES)

Tubi Saldati Longitudinalmente (ERW)
Longitudinal Welded Tubes (ERW)

Composizione Chimica
Chemical Composition

Proprietà Meccaniche e Tecnologiche
Mechanical and Technical Properties

Dim. (mm)	Sp. Th. (mm)	L (mm)	Acciaio Steel	Fin.	Lotto	MT Tot. (m)	Peso WGT (kg)	Colata Heat	%C	%Si	%Mn	%P	%S	%Nb	%V	%Al	%Ti	%Cr	%Ni	%Mo	%Cu	%N	Trazione / Tensile Test $R_{p0,2}$ MPa	$R_{p1,0}$ MPa	Rm MPa	A %	A80 %	Durezza Hardness HRB
60X40	**4,00**	6000	**1.4301/1.4307**	SP	TN05935790	150,00	850	**2A/807240**	0,021	0,390	1,400	0,033	0,001					18,000	8,000			0,070	306	343	628	53,0	54,0	86
150X50	**4,00**	6000	**1.4301/1.4307**	SP	TN05920097	96,00	1.094	**4A/52028**	0,025	0,410	1,310	0,033	0,001					18,100	8,000			0,068	299	342	632	57,0		83
50X25	**2,00**	6000	**1.4301/1.4307**	SP	TN05915083	360,00	764	**1A/547058**	0,030	0,310	1,680	0,036	0,001					18,160	8,050	0,400		0,072	285	342	634		52,0	82

Controllo visivo e dimensionale:
esito positivo

Visual and dimensional control:
OK

EHI Edelstahl
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www.ehi-edelstahl.de

Certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordine

We certify that material supplied complies with the requirements agreed on order

Verifica antimescolamento:
esito positivo

Anti–mixing test :
OK

The tubes listed on this certificate are produced with raw material complying with EN 10088–2.

(EN ISO 10893–2)

P.N.D.: correnti indotte sulla saldatura: **esito positivo**
NDT: Eddy Current test on the weld: **OK**

Padana Tubi & Profilati Acciaio S.p.A.
Ing. Stefano Passera
Controllo Qualità / Quality Department

EHI Edelstahl
Tel.: 02736/29468-0
Fax: 02736/29468-20
info@ehi-edelstahl.de
www.ehi-edelstahl.de

COMPANY WITH MANAGEMENT SYSTEM CERTIFIED BY DNV
ISO 9001-ISO 14001
ISO 45001-ISO 50001

Ilta Inox S.p.A.
Strada Statale 45 bis
26010 Robecco d'Oglio (CR) - Italia

C.F. e P.IVA IT 00883040198
N. REA CR-119060
Capitale sociale €34.850.400,00 i.v.
Società soggetta a dir. e coord. di Finarvedi SpA
Società con socio unico

Tel + 39 0372 9801
Fax + 39 0372 921538
e-mail: sales@ilta.arvedi.it
quality@ilta.arvedi.it
www.arvedi.it

TEST CERTIFICATE ACCORDING TO EN 10204(2005) 3.1

N°0000837477

ABNAHMEPRÜFZEUGNIS - CERTIFICAT D'ESSAIS - CERTIFICATO DI COLLAUDO

ERW Longitudinally welded tubes/Längsnahtgeschweisste rohre/Tubes soudes longitudinalement/Tubi saldati longitudinalmente

	Mill's Ilta Inox N°: 0411137956 - 000210 # 0421144293 - 000070 WerksN°/N° référence Interne/Conferma ordine
Specifications: ASTM A 554 Anforderungen/Specifications/Specifiche	Tolerances: EN 10219-2 Toleranzen/Tolérances/Tolleranze
Manufacturer's mark: ilta inox Herstellerzeichen/Marque du fabricant/ Marchio del produttore Inspector's Stamp: M.A. Stempel des Sachverständigen/Poinçon de l'inspecteur/Punzone dell'ispettore	Marking: ========== Kenzeichnung/Marquage/Marcatura

Item Pos. N°	DIMENSIONS Abmessungen Dimensions/Dimensioni	PIECES N° Stückzahl Pièces/Pezzi	METERS Meter Métres/Metri	WEIGHT(kg) Gewicht/Poids Peso	GRADE Werkstoff/Nuance Materiale	STANDARD CODE Normbezeichnung Designation/Designazione	EXECUTION Ausführung Execution/Esecuzione
210	60.00X40.00 X 2.00 X 6000	54	324.00	934.000	TP.316L 1.4404 Z3 CND 17-12-02 UNS S31603	X2 CrNiMo 17-12-2	BNR - WG

Chemical analysis acc.to: ASTM A554
Steel making process :E/AOD

Schmelzanalyse/Chimique analyse/Analisi chimica
Erschmelzungsart/Procéde d'elaboration/Procedimento di elaborazione acciaio

Item N°	Manufacturer Hersteller/Fabricant/Produttore	HEAT N° Schmelze/Coulée/Colata	% C	% Si	% S	% P	% Mn	% Cr	% Ni	% Mo	% Ti	% Co	% Cu	% N
210	. . . . .	547935	0.028	0.330	0.0010	0.034	1.070	16.590	10.100	2.030		0.230	0.380	0.047

Mechanical test acc. to tab.: ASTM A370

Mechanische Prüfungen/Essais mécaniques/Caratteristiche meccaniche

Item Pos. N°	HEAT N° Schmelze Coulée Colata	HOMOLOG. Zulassung Omologation Omologazione	TEST Probe Eprouvette Provino n°		SPECIMEN SIZE Abmessung Probestab Dime. Eprouvette Dimensione provetta mm²	YIELD STRENGTH Streck-Dehngrenze Limite d'élasticité Limite di snervamento 0,2% N/mm² 1%		TENSILE STRENGTH Zugfestigkeit Résistance à traction Limite di rottura N/mm²	ELONGAT. Bruchdehnung Allongament Allungamento A5%	HARDNESS Haerte Dureté Durezza HRB
REQUIREMENT Anforderungen/Exigences/Requisiti						>=170		>= 485	>= 35.0	
210	547935		01	L	12.5 X 2.00	271		721	40.0	

Test Results

Ergebnisse der Prufungen/Résultat des essais/Risultati delle prove

Heat treatment:	Wärmebehandlung/Traitement termique/Trattamento termico
Tecnological test: Ringfaltversuch: i.O. / ====== / Ringaufdornversuch: i.O. / Schweißnaht-Biegeversuch: i.O.	Technologische Prüfung/Examen technologique/Prove tecnologiche
Residual Corrosion Test acc.to : ================	Korrosionsfördernde Rückstäden/Essai residues corrosif/Prova residui corrosivi
Intergranular Corrosion Test acc.to: ASTM A262-A: OK	IK Beständigkeit/Essai corr.intergr./Prova di corrosione intergranulare
Non Destructive Test acc. to: 100%IGE WIRBELSTROMPRÜFUNG NACH SPEC. E426: OK	Zerstörungsfreie Prüfung/Contrôle non destructif/Controllo non distruttivo
Leak Test/Hydrostatic test to: ================	Dichtheitsprüfung/Essai d'étanchèité/Prova di tenuta
Uncorrect Material Test: 100% i.O.	Verwechlungsprüfung/Essai P.M.I./Prova antimiscuglio
Visual and gauging control: i.O.	Besichtigung und Ausmessung/Contrôle visuel et dimensionel/Controllo visivo e dimensionale

Notes:

We certify that the delivered products comply with the specification of the order / Wir bestaetigen, dass die gelieferte Ware den Bestellvorschriften entspricht / Nous attestons que les produits livres sont conformes aux réferences de la commande / Noi attestiamo che il materiale spedito è conforme ai requisiti dell'ordine

Marco Assandri

Robecco d'Oglio, 05/09/2023
A

Mill's Inspector / Der Werksachverständige
Inspecteur de l'usine / Firma Ispettore

Arvedi

EHI Edelstahl
Tel.: 02736/29468-0
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www.ehi-edelstahl.de

+GF+ GEORG FISCHER PIPING SYSTEMS

Test Report 2.2 in accordance with EN 10204

Item			IR-/Butt fusion fittings
Size	d20 - 315	**Raw material**	Polypropylene Homopolymer β nucleated
Production Code	727	**Nom. pressure**	respective marking

Item			Socket fusion fittings
Size	d16 – 110 mm	**Raw material**	Polypropylene Homopolymer β nucleated
Production Code	727	**Nom. pressure**	PN10

Item			Union
Size	d75, d90, d110	**Raw material**	Polypropylene Homopolymer β nucleated
Production Code	727	**Nom. pressure**	PN6, PN6, PN4

We certify that the above listed articles comply with the following requirements:

	No.	Test method	Test standard	Conditions	Unit	Typical values
Material	1.	OIT	ISO/TR 10837	> 15 min, DSC / 210°C		
	2.	Melt mass-flow rate 230°/2,16kg	EN ISO 15494		g/10 min	0.18 – 0.40
	3.	Density	EN ISO 1183-1		g/cm^3	0.900 – 0.910
Component	4.	Dimensions and acceptable deviations	EN ISO 15494	within admissible tolerances		
	5.	Delivery condition	EN ISO 15494	no voids, blisters, burrs or inhomogenities that affect the function		
	6.	Surface finish	EN ISO 15494	within admissible tolerances		
	7.	Internal pressure test	EN ISO 15494	3.5 N/mm2/ 95°C/ withstanding > 1000h		

The production code of the part can be read off the marking of the article.
Georg Fischer Piping Systems possesses a quality management system according to EN ISO 9001:2000 as well as EN ISO 14001:1996.

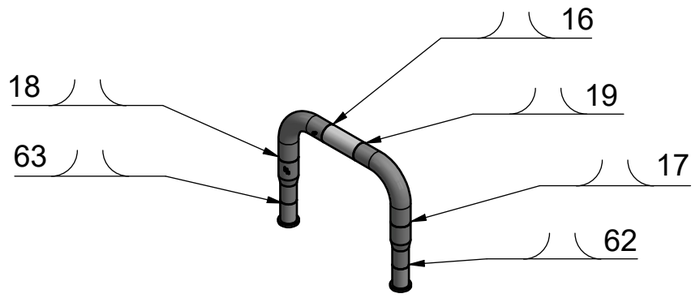
The above mentioned products are manufactured in Europe.

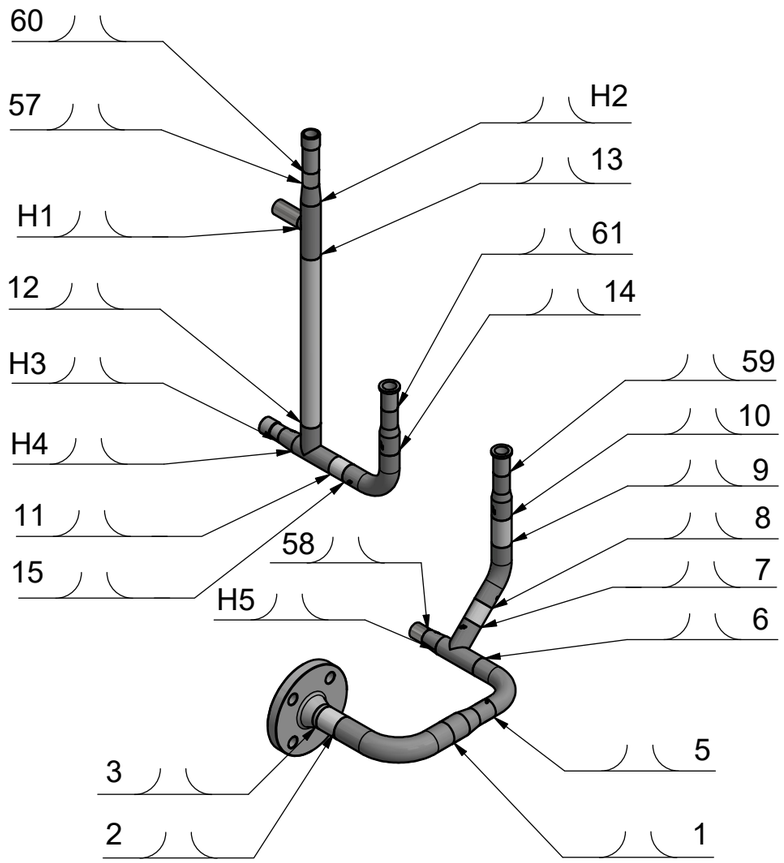
This document is issued electronically and is valid without signature.

Georg Fischer Rohrleitungssysteme AG, CH-8201 Schaffhausen/Schweiz
Telefon +41 52 631 11 11, Fax +41 52 631 28 00
www.piping.georgfischer.com, info@piping.georgfischer.com

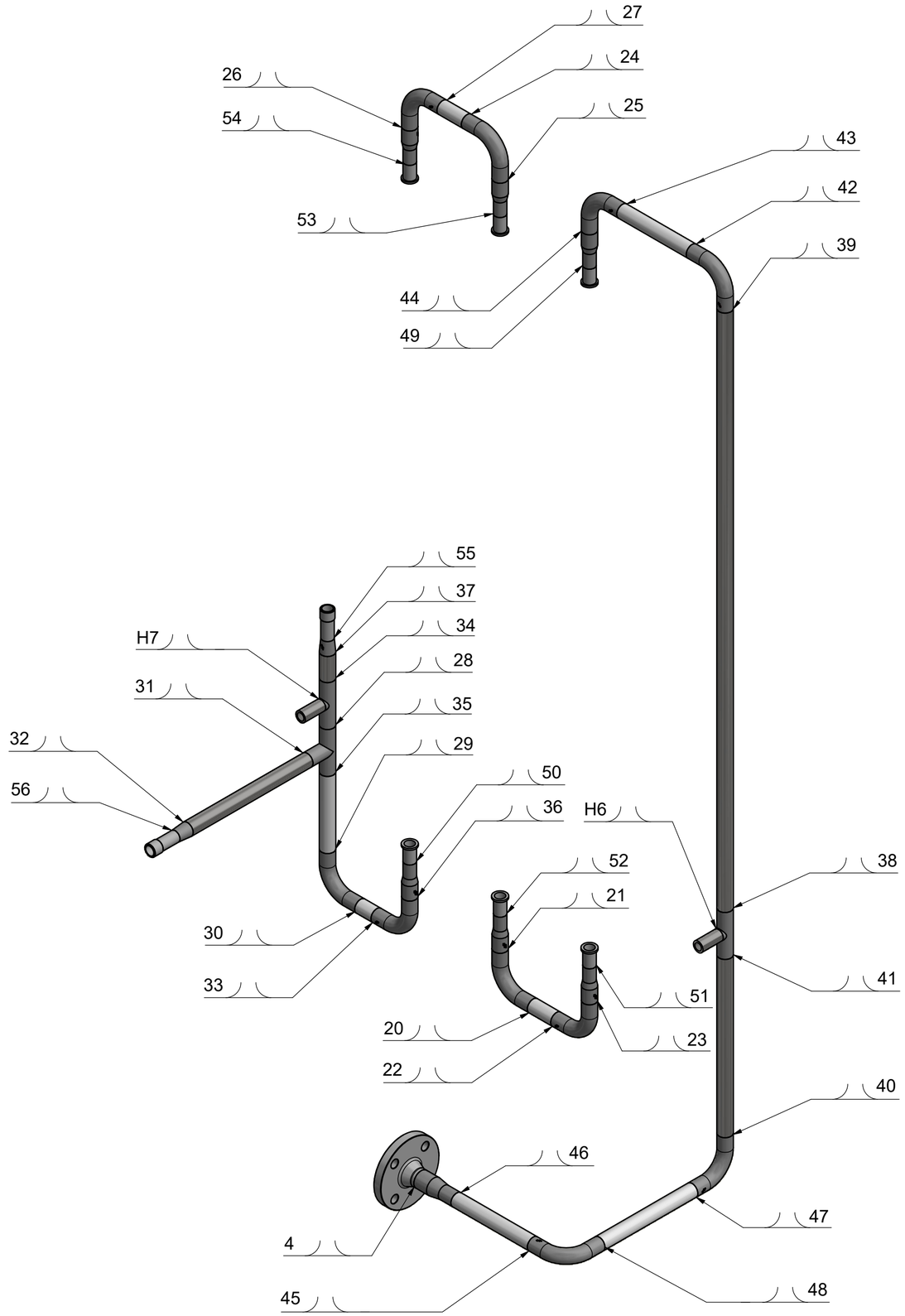
SECTION 7

Welding Records
Stainless Steel Pipe and Frame





Observe the protection notice according to ISO 16016		General tolerance ISO 22081 Linear size: ±t2 DIN 2769-b Welded assembly: DIN EN ISO 13920 B/E		scale: 1 : 7	material:	
				customer:		
			Date / Name	description:		
			Created by 04.07.2024 AlexRossel			
			checked			
			approved			
			PharmaWaterSystems ENVIROFALK Maybachstraße 29 51381 Leverkusen +49 (0) 2171 7675 - 0	drawing number:	Index	Sheet 1 of 2 A3
Rev.	Changes	Date	Name	00013967		Item number:



Observe the protection notice according to ISO 16016				General tolerance ISO 22081 Linear size: ±t2 DIN 2769-b Welded assembly: DIN EN ISO 13920 B/E			scale: 1 : 5
							material:
							customer:
					Date	Name	description:
				Created by	04.07.2024	AlexRossel	
				checked			
				approved			
				PharmaWaterSystems ENVIROFALK Maybachstraße 29 51381 Leverkusen +49 (0) 2171 7675 – 0			drawing number: / Index / Sheet 2 of 2 / A2
Rev.	Changes	Date	Name				00013967 / Item number:

Kunde / customer: **Ovivo UK Ltd.**

Projekt Nr. / project no.: **240313**

Schweißnahtdokumentation / Welding Documentation

PharmaWaterSystems ENVIROFALK

Dokument-Nr. / document no.: F-8.2.1-331-01 Revision: 01 Datum / date: 24.06.2024

Schweißnaht Nr / welding seam No:	Isometrie Blatt Nr / Isometry drawing sheet No:	Schweißung / welding:	Schweiß- Strom Programm / welding current, programm no	Datum / date:	Schweißer / welder:	Werkstoff / material:	Bauteil / Component:	Charge Bauteil / Heat No:	Nennweite / nominal size:	Werkstoff / material:	Bauteil / Component:	Charge Bauteil / Heat No:	Nennweite / nominal size:	Delta-Ferrit / delta ferrite	Visuel / visually:	Endoskopie / endoscopy:	Bild Nr / picture No:	Geprüft / checked:	Seitenzahl Schweißprotokolle / page number of welding logs:	Bemerkung / comment:
		O / H				1	1	1	1	2	2	2	2					OK		
001	1	O	D29K	2024-07-11	006	1.4435	Bogen 90°	H143180 /823023	DN 25	1.4435	Redu 25/20	727801	DN 25	-	X	/	/	X	1	/
002	1	O	D29K	2024-07-11	006	1.4435	Bogen 90°	H143180 /823023	DN 25	1.4435	Rohr	223124	DN 25	-	X	/	/	X	2	/
003	1	O	D29K	2024-07-11	006	1.4435	Rohr	223124	DN 25	1.4404	Flansch	E211191	DN 25	-	X	/	/	X	3	/
004	2	O	D29K	2024-07-11	006	1.4404	Flansch	567863	DN 25	1.4435	Redu 25/20	727801	DN 25	-	X	X	004_01 - 004_04	X	4	/
005	1	O	D23K	2024-07-12	006	1.4435	Redu 25/20	727801	DN 20	1.4435	Bogen 90°	144830 /134049	DN 20	-	X	/	/	X	5	/
006	1	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144830 /134049	DN 20	1.4435	T-Stück	403961	DN 20	-	X	/	/	X	6	/
007	1	O	D23K	2024-07-12	006	1.4435	T-Stück	403961	DN 20	1.4435	Rohr	049093	DN 20	-	X	X	007_01 - 007_04	X	7	/
008	1	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 25	1.4435	Bogen 45°	H111786 /008005	DN 20	-	X	/	/	X	8	/
009	1	O	D23K	2024-07-12	006	1.4435	Bogen 45°	H111786 /008005	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	9	/
010	1	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	10	/
011	1	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4435	T-Stück	908047	DN 20	-	X	X	011_01 - 011_04	X	11	/
012	1	O	D23K	2024-07-12	006	1.4435	T-Stück	908047	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	12	/
013	1	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4435	TR 20/15	708068	DN 20	-	X	/	/	X	13	/
014	1	O	D23K	2024-07-12	006	1.4404	Bogen 90°	3376	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	14	/
015	1	O	D23K	2024-07-12	006	1.4404	Bogen 90°	3376	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	15	/
016	1	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4435	Bogen 90°	H123815 /440135	DN 20	-	X	/	/	X	16	/
017	1	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H123815 /440135	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	17	/
018	1	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H123815 /440135	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	18	/
019	1	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H123815 /440135	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	19	/
020	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144830 /134049	DN 20	1.4435	Rohr	049093	DN 20	-	X	X	020_01 - 020_04	X	20	/
021	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144830 /134049	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	21	/
022	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144828 /134049	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	22	/
023	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144828 /134049	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	23	/
024	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H123815 /440135	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	24	/

Datum, Name, Unterschrift Schweißer / date, name, signature welder: 2024-07-15 K.Rodzik

Kunde / customer: **Ovivo UK Ltd.**

Projekt Nr. / project no.: **240313**

Schweißnahtdokumentation / Welding Documentation

PharmaWaterSystems ENVIROFALK

Dokument-Nr. / document no.: F-8.2.1-331-01 Revision: 01 Datum / date: 24.06.2024

Schweißnaht Nr / welding seam No:	Isometrie Blatt Nr / Isometry drawing sheet No:	Schweißung / welding:	Schweiß- Strom Programm / welding current, programm no	Datum / date:	Schweißer / welder:	Werkstoff / material:	Bauteil / Component:	Charge Bauteil / Heat No:	Nennweite / nominal size:	Werkstoff / material:	Bauteil / Component:	Charge Bauteil / Heat No:	Nennweite / nominal size:	Delta-Ferrit / delta ferrite	Visuel / visually:	Endoskopie / endoscopy:	Bild Nr / picture No:	Geprüft / checked:	Seitenzahl Schweißprotokolle / page number of welding logs:	Bemerkung / comment:
		O / H				1	1	1	1	2	2	2	2					OK		
025	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H123815 /440135	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	25	/
026	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H121339 /0511841	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	26	/
027	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	H121339 /0511841	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	27	/
028	2	O	D23K	2024-07-12	006	1.4435	T-Stück	403961	DN 20	1.4435	T-Stück 20/15	708068	DN 20	-	X	X	028_01 - 028_04	X	28	/
029	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144830	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	29	/
030	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144830	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	30	/
031	2	O	D23K	2024-07-12	006	1.4435	T-Stück	403961	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	31	/
032	2	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4404	Redu 20/15	3324	DN 20	-	X	/	/	X	32	/
033	2	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4435	Bogen 90°	144830 /134049	DN 20	-	X	/	/	X	33	/
034	2	O	D23K	2024-07-12	006	1.4435	T-Stück 20/15	708068	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	34	/
035	2	O	D23K	2024-07-12	006	1.4435	T-Stück	403961	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	35	/
036	2	O	D23K	2024-07-12	006	1.4435	Bogen 90°	144830 /134049	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	36	/
037	2	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4404	Redu 20/15	2825	DN 20	-	X	/	/	X	37	/
038	2	O	D23K	2024-07-12	006	1.4404	TR 20/15	728013	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	38	/
039	2	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4404	Bogen 90°	3376	DN 20	-	X	/	/	X	39	/
040	2	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4404	Bogen 90°	3376	DN 20	-	X	/	/	X	40	/
041	2	O	D23K	2024-07-12	006	1.4404	TR 20/15	728013	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	41	/
042	2	O	D23K	2024-07-12	006	1.4404	Bogen 90°	3376	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	42	/
043	2	O	D23K	2024-07-12	006	1.4435	Rohr	049093	DN 20	1.4404	Bogen 90°	3376	DN 20	-	X	/	/	X	43	/
044	2	O	D23K	2024-07-12	006	1.4404	Bogen 90°	3376	DN 20	1.4404	Redu 20/15	18-1845C	DN 20	-	X	/	/	X	44	/
045	2	O	D23K	2024-07-15	006	1.4404	Bogen 90°	3376	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	45	/
046	2	O	D23K	2024-07-15	006	1.4435	Rohr	049093	DN 20	1.4435	Redu 20/15	727801	DN 25	-	X	/	/	X	46	/
047	2	O	D23K	2024-07-15	006	1.4404	Bogen 90°	3376	DN 20	1.4435	Rohr	049093	DN 20	-	X	/	/	X	47	/
048	2	O	D23K	2024-07-15	006	1.4435	Rohr	049093	DN 20	1.4404	Bogen 90°	3376	DN 20	-	X	/	/	X	48	/

Datum, Name, Unterschrift Schweißer / date, name, signature welder: **2024-07-15** K.Rodzik

Kunde / customer: **Ovivo UK Ltd.**

Projekt Nr. / project no.: **240313**

Schweißnahtdokumentation / Welding Documentation

PharmaWaterSystems ENVIROFALK

Dokument-Nr. / document no.: F-8.2.1-331-01 Revision: 01 Datum / date: 24.06.2024

Schweißnaht Nr / welding seam No:	Isometrie Blatt Nr / Isometry drawing sheet No:	Schweißung / welding:	Schweiß- Strom Programm / welding current, programm no	Datum / date:	Schweißer / welder:	Werkstoff / material:	Bauteil / Component:	Charge Bauteil / Heat No:	Nennweite / nominal size:	Werkstoff / material:	Bauteil / Component:	Charge Bauteil / Heat No:	Nennweite / nominal size:	Delta-Ferrit / delta ferrite	Visuel / visually:	Endoskopie / endoscopy:	Bild Nr / picture No:	Geprüft / checked:	Seitenzahl Schweißprotokolle / page number of welding logs:	Bemerkung / comment:
		O / H				1	1	1	1	2	2	2	2					OK		
049	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	49	/
050	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	50	/
051	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	51	/
052	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	X	052_01 - 052_04	X	52	/
053	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	53	/
054	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	54	/
055	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	2825	DN 15	1.4435	Gewindenippel	406289	DN 15	-	X	/	/	X	55	/
056	2	O	D19K	2024-07-15	006	1.4404	Redu 20/15	3324	DN 15	1.4435	Gewindenippel	405683	DN 15	-	X	/	/	X	56	/
057	1	O	D19K	2024-07-15	006	1.4404	Redu 20/15	3324	DN 15	1.4404	Rohr	20760	DN 15	-	X	/	/	X	57	/
058	1	O	D19K	2024-07-15	006	1.4404	Redu 20/15	2825	DN 15	1.4435	Gewindemuffe	390306	DN 15	-	X	/	/	X	58	/
059	1	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	59	/
060	1	O	D19K	2024-07-15	006	1.4404	Rohr	20760	DN 15	1.4435	Gewindenippel	405683	DN 15	-	X	/	/	X	60	/
061	1	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	61	/
062	1	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN 15	1.4404	Einlegteil	511881	DN 15	-	X	X	062_01 - 062_04	X	62	/
063	1	O	D19K	2024-07-15	006	1.4404	Redu 20/15	18-1845C	DN15	1.4404	Einlegteil	511881	DN 15	-	X	/	/	X	63	/
H001	1	H	39 A	2024-06-28	006	1.4435	Gewindemuffe	328428	DN 15	1.4435	TRK 20/15	708068	DN 15	-	X	X	H001_01 - H001_04	X	/	/
H002	1	H	39 A	2024-06-28	006	1.4435	TRK 20/15	708068	DN 20	1.4404	Redu 20/15	3324	DN 20	-	X	X	H002_01 - H002_04	X	/	/
H003	1	H	39 A	2024-06-28	006	1.4404	Redu 20/15	3324	DN 15	1.4435	Gewindenippel	405683	DN 15	-	X	X	H003_01 - H003_04	X	/	/
H004	1	H	39 A	2024-06-28	006	1.4435	T-Stück	908047	DN 20	1.4404	Redu 20/15	3324	DN 20	-	X	X	H004_01 - H004_04	X	/	/
H005	1	H	39 A	2024-07-01	006	1.4435	T-Stück	403961	DN 20	1.4404	Redu 20/15	2825	DN 20	-	X	X	H005_01 - H005_04	X	/	/
H006	2	H	39 A	2024-07-01	006	1.4435	Gewindemuffe	328428	DN 15	1.4404	TRK 20/15	728013	DN 15	-	X	X	H006_01 - H006_04	X	/	/
H007	2	H	39 A	2024-07-01	006	1.4435	Gewindemuffe	328428	DN 15	1.4404	TRK 20/15	708068	DN 15	-	X	X	H007_01 - H007_04	X	/	/
/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

Datum, Name, Unterschrift Schweißer / date, name, signature welder: **2024-07-15** K.Rodzik

EnviroFalk PharmaWaterSystems Maybach Str. 29 51381 Leverkusen www.envirofalk-pharma.com info@envirofalk-pharma.com	**Schweißnahtdokumentation**	ORBITEC®

Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-11	14:04	1	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D29 K	29.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	3.8s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.5 L 15.3	0.45 0.45	0 100	
90° - 180°	H 48.6 L 15.3	0.45 0.45	0 100	
180° - 270°	H 47.7 L 15.3	0.45 0.45	0 100	
270° - 365°	H 46.8 L 15.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 51.0 L 16.5	7.6 7.0	0 99	
90° - 180°	H 50.0 L 16.5	7.3 6.8	0 99	
180° - 270°	H 49.1 L 16.5	7.3 6.8	0 99	
270° - 365°	H 48.0 L 16.5	7.1 6.7	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.6 l/min	11.6 l/min	20s @ 11.6 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	169.5s	+1%
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	---------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	---------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
26 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-11	14:14	2	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D29 K	29.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	3.8s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.5 L 15.3	0.45 0.45	0 100	
90° - 180°	H 48.6 L 15.3	0.45 0.45	0 100	
180° - 270°	H 47.7 L 15.3	0.45 0.45	0 100	
270° - 365°	H 46.8 L 15.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 50.0 L 16.5	7.1 6.6	0 99	
90° - 180°	H 49.1 L 16.5	7.0 6.6	0 99	
180° - 270°	H 48.8 L 16.5	7.0 6.6	0 99	
270° - 365°	H 48.0 L 16.5	6.8 6.4	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.6 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	169.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	---------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	---------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
26 mm	18°	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-11	14:38	3	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D29 K	29.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	3.8s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.5 L 15.3	0.45 0.45	0 100	
90° - 180°	H 48.6 L 15.3	0.45 0.45	0 100	
180° - 270°	H 47.7 L 15.3	0.45 0.45	0 100	
270° - 365°	H 46.8 L 15.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.1 L 16.5	7.6 6.8	0 99	
90° - 180°	H 51.1 L 16.5	7.5 6.8	0 99	
180° - 270°	H 50.1 L 16.5	7.5 6.9	0 99	
270° - 365°	H 49.1 L 16.5	7.5 7.1	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	169.6s	+3%
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	---------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	---------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
26 mm	18°	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-11	14:55	4	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D29 K	29.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	3.8s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.5 L 15.3	0.45 0.45	0 100	
90° - 180°	H 48.6 L 15.3	0.45 0.45	0 100	
180° - 270°	H 47.7 L 15.3	0.45 0.45	0 100	
270° - 365°	H 46.8 L 15.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.0 L 16.5	7.7 7.0	0 99	
90° - 180°	H 51.1 L 16.5	7.5 6.9	0 99	
180° - 270°	H 50.1 L 16.5	7.4 6.8	0 99	
270° - 365°	H 49.3 L 16.5	7.3 6.7	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	169.5s	+4%
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	---------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	---------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
26 mm	18°	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	06:43	5	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.8 7.1	0 101	
90° - 180°	H 53.0 L 17.5	7.7 7.0	0 98	
180° - 270°	H 52.1 L 17.5	7.4 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.6	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.7 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
8ppm	n/a	Erfolgreich	149.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18°	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	06:58	6	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.8 L 17.5	7.9 6.8	0 101	
90° - 180°	H 53.0 L 17.5	7.8 6.8	0 98	
180° - 270°	H 52.1 L 17.5	7.6 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.4 6.7	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	164.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18°	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	07:09	7	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.7 6.6	0 102	
90° - 180°	H 53.0 L 17.5	7.7 6.7	0 98	
180° - 270°	H 52.1 L 17.5	7.8 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.5 6.7	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	07:19	8	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.7 6.6	0 102	
90° - 180°	H 53.0 L 17.5	7.5 6.7	0 99	
180° - 270°	H 52.1 L 17.5	7.6 6.7	0 98	
270° - 365°	H 51.1 L 17.5	7.5 6.6	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	07:44	9	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.5 6.7	0 100	
90° - 180°	H 53.0 L 17.5	7.5 6.6	0 98	
180° - 270°	H 52.1 L 17.5	7.6 6.8	0 98	
270° - 365°	H 51.1 L 17.5	7.4 6.6	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	07:52	10	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.5 7.0	0 101	
90° - 180°	H 53.0 L 17.5	7.6 7.0	0 99	
180° - 270°	H 52.1 L 17.5	7.6 7.0	0 98	
270° - 365°	H 51.1 L 17.5	7.4 6.8	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:04	11	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.5 6.9	0 101	
90° - 180°	H 53.0 L 17.5	7.6 6.9	0 99	
180° - 270°	H 52.1 L 17.5	7.7 7.0	0 98	
270° - 365°	H 51.1 L 17.5	7.5 6.8	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	149.9s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:09	12	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.5 6.8	0 102	
90° - 180°	H 53.0 L 17.5	7.4 6.6	0 99	
180° - 270°	H 52.1 L 17.5	7.4 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.4 6.8	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.8s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:14	13	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.3 6.7	0 101	
90° - 180°	H 53.0 L 17.5	7.2 6.6	0 98	
180° - 270°	H 52.1 L 17.5	7.3 6.8	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.7	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:22	14	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.4 6.8	0 101	
90° - 180°	H 53.0 L 17.5	7.4 6.8	0 98	
180° - 270°	H 52.1 L 17.5	7.6 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.4 6.8	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:28	15	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.2 6.6	0 101	
90° - 180°	H 53.0 L 17.5	7.1 6.5	0 98	
180° - 270°	H 52.1 L 17.5	7.2 6.7	0 98	
270° - 365°	H 51.1 L 17.5	7.1 6.6	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.8 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:44	16	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.5 6.8	0 101	
90° - 180°	H 53.0 L 17.5	7.4 6.7	0 98	
180° - 270°	H 52.1 L 17.5	7.3 6.7	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.6	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.5 l/min	11.5 l/min	20s @ 11.5 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:51	17	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.9 7.0	0 101	
90° - 180°	H 53.0 L 17.5	7.8 7.0	0 98	
180° - 270°	H 52.1 L 17.5	7.9 7.1	0 98	
270° - 365°	H 51.1 L 17.5	7.7 6.9	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	08:56	18	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.6 6.9	0 101	
90° - 180°	H 53.0 L 17.5	7.6 6.9	0 98	
180° - 270°	H 52.1 L 17.5	7.8 7.2	0 98	
270° - 365°	H 51.1 L 17.5	7.7 7.0	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:00	19	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.3 L 16.5	7.4 6.8	0 102	
90° - 180°	H 51.5 L 16.5	7.2 6.7	0 99	
180° - 270°	H 51.1 L 16.5	7.3 6.9	0 98	
270° - 365°	H 50.0 L 16.5	7.4 6.9	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.0s	-2%
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:14	20	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.4 6.7	0 102	
90° - 180°	H 53.0 L 17.5	7.4 6.8	0 98	
180° - 270°	H 52.1 L 17.5	7.5 7.0	0 98	
270° - 365°	H 51.1 L 17.5	7.3 6.7	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:20	21	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.4 6.9	0 101	
90° - 180°	H 53.0 L 17.5	7.6 6.9	0 98	
180° - 270°	H 52.1 L 17.5	7.8 7.2	0 98	
270° - 365°	H 51.1 L 17.5	7.5 7.0	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Schweißnahtdokumentation

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:26	22	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.1 6.7	0 102	
90° - 180°	H 53.0 L 17.5	7.2 6.6	0 99	
180° - 270°	H 52.1 L 17.5	7.3 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.1 6.7	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:30	23	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.0 6.8	0 102	
90° - 180°	H 53.0 L 17.5	7.2 6.9	0 99	
180° - 270°	H 52.1 L 17.5	7.5 7.1	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.9	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:36	24	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.1 6.7	0 102	
90° - 180°	H 53.0 L 17.5	7.0 6.7	0 99	
180° - 270°	H 52.1 L 17.5	7.3 7.1	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.8	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:41	25	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.3 6.9	0 101	
90° - 180°	H 53.0 L 17.5	7.6 7.2	0 99	
180° - 270°	H 52.1 L 17.4	7.8 7.6	0 98	
270° - 365°	H 51.1 L 17.5	7.5 7.1	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:46	26	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.2 7.0	0 102	
90° - 180°	H 53.0 L 17.5	7.4 7.3	0 99	
180° - 270°	H 52.1 L 17.5	7.7 7.5	0 98	
270° - 365°	H 51.1 L 17.5	7.5 7.2	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.2s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	09:51	27	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.1 6.8	0 101	
90° - 180°	H 53.0 L 17.5	7.1 7.0	0 98	
180° - 270°	H 52.1 L 17.5	7.4 7.3	0 98	
270° - 365°	H 51.1 L 17.5	7.4 7.0	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.2s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	10:05	28	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.5 7.1	0 102	
90° - 180°	H 53.0 L 17.5	7.6 7.3	0 98	
180° - 270°	H 52.1 L 17.5	7.6 7.4	0 98	
270° - 365°	H 51.1 L 17.5	7.3 6.9	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	150.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	10:12	29	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.1 7.0	0 101	
90° - 180°	H 53.0 L 17.5	7.2 7.1	0 98	
180° - 270°	H 52.1 L 17.5	7.2 7.3	0 98	
270° - 365°	H 51.1 L 17.5	7.0 7.0	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 12.1 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.9s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	10:30	30	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.0 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.9 6.3	0 98	
180° - 270°	H 52.1 L 17.5	6.9 6.3	0 98	
270° - 365°	H 51.1 L 17.5	6.9 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	148.9s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	10:39	31	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.2 6.4	0 101	
90° - 180°	H 53.0 L 17.5	7.4 6.5	0 98	
180° - 270°	H 52.1 L 17.5	7.5 6.7	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.5	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
8ppm	n/a	Erfolgreich	149.1s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	10:46	32	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.6 L 17.5	7.1 6.5	0 102	
90° - 180°	H 53.0 L 17.5	7.1 6.5	0 98	
180° - 270°	H 52.1 L 17.5	7.1 6.6	0 98	
270° - 365°	H 51.1 L 17.5	7.0 6.5	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	10:58	33	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	7.1 6.4	0 101	
90° - 180°	H 53.0 L 17.5	6.9 6.4	0 98	
180° - 270°	H 52.1 L 17.5	6.9 6.5	0 98	
270° - 365°	H 51.1 L 17.5	6.9 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:01	34	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.6 L 17.4	7.1 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.9 6.3	0 98	
180° - 270°	H 52.1 L 17.5	7.0 6.4	0 98	
270° - 365°	H 51.1 L 17.5	7.0 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:07	35	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.4	6.9 6.3	0 101	
90° - 180°	H 53.0 L 17.5	7.2 6.5	0 99	
180° - 270°	H 52.1 L 17.5	7.3 6.6	0 98	
270° - 365°	H 51.1 L 17.5	6.9 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	149.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:11	36	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.6 L 17.4	6.7 6.4	0 101	
90° - 180°	H 53.0 L 17.5	6.7 6.4	0 99	
180° - 270°	H 52.1 L 17.5	6.9 6.6	0 98	
270° - 365°	H 51.1 L 17.5	6.7 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:17	37	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	6.9 6.4	0 102	
90° - 180°	H 53.0 L 17.5	6.8 6.3	0 99	
180° - 270°	H 52.1 L 17.5	6.9 6.4	0 98	
270° - 365°	H 51.1 L 17.5	6.8 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.1s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:25	38	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.0 L 16.5	6.9 6.3	0 101	
90° - 180°	H 52.1 L 16.5	6.7 6.3	0 98	
180° - 270°	H 51.1 L 16.5	6.6 6.2	0 98	
270° - 365°	H 50.0 L 16.5	6.7 6.2	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.8 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-1%
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:29	39	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.0 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.9 6.4	0 99	
180° - 270°	H 52.1 L 17.5	6.9 6.4	0 98	
270° - 365°	H 51.1 L 17.5	6.8 6.3	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	149.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:34	40	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	6.9 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.9 6.3	0 98	
180° - 270°	H 52.1 L 17.5	6.9 6.4	0 98	
270° - 365°	H 51.1 L 17.5	6.8 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:38	41	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.6 L 17.4	6.7 6.2	0 101	
90° - 180°	H 53.0 L 17.5	6.6 6.2	0 98	
180° - 270°	H 52.1 L 17.5	6.7 6.3	0 98	
270° - 365°	H 51.1 L 17.5	6.7 6.3	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	149.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:41	42	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	6.8 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.7 6.3	0 98	
180° - 270°	H 52.1 L 17.5	6.7 6.3	0 98	
270° - 365°	H 51.1 L 17.5	6.7 6.3	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	149.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:46	43	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.6 L 17.5	6.7 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.6 6.3	0 98	
180° - 270°	H 52.1 L 17.5	6.7 6.4	0 98	
270° - 365°	H 51.1 L 17.5	6.7 6.3	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	149.0s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-12	11:50	44	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	6.8 6.3	0 101	
90° - 180°	H 53.0 L 17.5	6.7 6.3	0 98	
180° - 270°	H 52.1 L 17.5	6.9 6.5	0 98	
270° - 365°	H 51.1 L 17.5	6.8 6.3	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	06:31	45	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.8 L 17.5	7.2 6.5	0 100	
90° - 180°	H 53.0 L 17.5	7.2 6.5	0 98	
180° - 270°	H 52.1 L 17.5	7.2 6.6	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.6	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
11ppm	n/a	Erfolgreich	149.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	06:36	46	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.8 L 17.5	7.2 6.7	0 100	
90° - 180°	H 53.0 L 17.5	7.3 6.8	0 98	
180° - 270°	H 52.1 L 17.5	7.5 6.9	0 98	
270° - 365°	H 51.1 L 17.5	7.2 6.7	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 12.0 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	164.8s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	06:46	47	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.8 L 17.5	7.1 6.5	0 101	
90° - 180°	H 53.0 L 17.5	7.1 6.6	0 98	
180° - 270°	H 52.1 L 17.5	7.0 6.5	0 98	
270° - 365°	H 51.1 L 17.5	6.9 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 12.0 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	164.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	06:52	48	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D23 K	23.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 52.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 51.8 L 16.3	0.45 0.45	0 100	
180° - 270°	H 50.9 L 16.3	0.45 0.45	0 100	
270° - 365°	H 49.9 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 53.7 L 17.5	7.0 6.4	0 101	
90° - 180°	H 53.0 L 17.5	7.0 6.4	0 98	
180° - 270°	H 52.1 L 17.5	7.0 6.5	0 98	
270° - 365°	H 51.1 L 17.5	6.8 6.4	0 98	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	149.6s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 CS	38S1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
30 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	07:10	49	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	7.1 7.2	0 93	
90° - 180°	H 48.0 L 17.5	6.9 6.9	0 95	
180° - 270°	H 46.0 L 17.5	6.9 7.0	0 97	
270° - 365°	H 44.1 L 17.5	6.8 6.9	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	134.8s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	07:25	50	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.9 6.9	0 95	
90° - 180°	H 48.0 L 17.5	6.9 6.9	0 96	
180° - 270°	H 46.0 L 17.5	6.9 7.1	0 98	
270° - 365°	H 44.1 L 17.5	6.8 6.9	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.8 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	134.3s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	07:34	51	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.8 6.8	0 95	
90° - 180°	H 48.0 L 17.5	6.9 6.8	0 96	
180° - 270°	H 46.0 L 17.5	7.0 7.1	0 98	
270° - 365°	H 44.1 L 17.5	6.6 6.6	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	143.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	07:42	52	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.7 6.7	0 94	
90° - 180°	H 48.0 L 17.5	6.8 6.8	0 96	
180° - 270°	H 46.0 L 17.5	6.7 6.7	0 98	
270° - 365°	H 44.1 L 17.5	6.7 6.7	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	143.7s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	07:47	53	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.6 6.7	0 95	
90° - 180°	H 48.0 L 17.5	6.7 6.8	0 97	
180° - 270°	H 46.0 L 17.5	6.8 6.6	0 99	
270° - 365°	H 44.1 L 17.5	6.7 6.8	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	134.2s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	07:54	54	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.6 6.8	0 95	
90° - 180°	H 48.0 L 17.5	6.8 6.8	0 97	
180° - 270°	H 46.0 L 17.5	6.8 6.8	0 99	
270° - 365°	H 44.1 L 17.5	6.8 6.9	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
7ppm	n/a	Erfolgreich	134.1s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	08:01	55	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.8 6.4	0 94	
90° - 180°	H 48.0 L 17.5	6.8 6.4	0 96	
180° - 270°	H 46.0 L 17.5	6.9 6.5	0 99	
270° - 365°	H 44.1 L 17.5	6.9 6.5	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	134.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	08:06	56	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.9 6.6	0 94	
90° - 180°	H 48.0 L 17.5	6.8 6.4	0 97	
180° - 270°	H 46.0 L 17.5	7.0 6.5	0 98	
270° - 365°	H 44.1 L 17.5	6.7 6.4	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	134.2s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	08:30	57	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	7.3 6.5	0 94	
90° - 180°	H 48.0 L 17.5	7.1 6.5	0 96	
180° - 270°	H 46.0 L 17.5	7.1 6.6	0 98	
270° - 365°	H 44.1 L 17.5	7.0 6.6	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	134.4s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	08:44	58	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 50.7 L 17.5	7.0 6.6	0 95	
90° - 180°	H 49.1 L 17.5	7.0 6.6	0 97	
180° - 270°	H 47.0 L 17.5	7.1 6.7	0 98	
270° - 365°	H 45.0 L 17.5	6.9 6.8	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 12.0 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	143.4s	+2%
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	09:04	59	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	7.2 7.3	0 95	
90° - 180°	H 48.0 L 17.5	6.9 7.4	0 97	
180° - 270°	H 46.0 L 17.5	6.9 7.3	0 99	
270° - 365°	H 44.1 L 17.5	6.9 7.1	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	12.0 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
8ppm	n/a	Erfolgreich	134.1s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	09:25	60	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	7.3 6.8	0 95	
90° - 180°	H 48.0 L 17.5	7.2 6.8	0 96	
180° - 270°	H 46.0 L 17.5	7.3 6.9	0 97	
270° - 365°	H 44.1 L 17.5	7.1 6.8	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	134.5s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

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Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	09:35	61	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	7.0 7.1	0 95	
90° - 180°	H 48.0 L 17.5	6.9 7.2	0 97	
180° - 270°	H 46.0 L 17.5	6.9 7.1	0 99	
270° - 365°	H 44.1 L 17.5	6.8 6.8	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 12.0 l/min	11.9 l/min	20s @ 12.0 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
5ppm	n/a	Erfolgreich	143.4s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

EnviroFalk PharmaWaterSystems Maybach Str. 29 51381 Leverkusen www.envirofalk-pharma.com info@envirofalk-pharma.com	**Schweißnahtdokumentation**	ORBITEC®

Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	09:43	62	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	7.0 7.2	0 95	
90° - 180°	H 48.0 L 17.5	6.9 7.1	0 97	
180° - 270°	H 46.0 L 17.5	6.9 7.1	0 98	
270° - 365°	H 44.1 L 17.5	6.9 6.9	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
10ppm	n/a	Erfolgreich	134.2s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

EnviroFalk PharmaWaterSystems Maybach Str. 29 51381 Leverkusen www.envirofalk-pharma.com info@envirofalk-pharma.com	**Schweißnahtdokumentation**	ORBITEC®

Dokumentation

Firma	Datum	Uhrzeit	Schweißnaht ID	Schweißer
EnviroFalk PharmaWaterSystems	2024-07-15	09:47	63	Krzysztof Rodzik
Schweißer Nr.	**Steuerung**	**Steuerung Nr.**	**Oxy**	**Oxy Nr.**
W006	EVO 200 WP	2EWP220103 (V145)	Oxy-EVO	OEP211023

Programmparameter

Programm Name	Durchmesser [mm]	Wandstärke [mm]	Zangencode	
D19 K	19.00	1.50	24	

Sollparameter

Turbo-Purge	Gasvorströmzeit	Heften	Badbildezeit	Stromabsenkzeit
Aus	20s	Aus	5s	15s
Gasnachströmzeit	**Drehrichtung**	**Toleranz Drehen**	**Toleranz Schweißstrom**	**Min.Lichtbogenspannung**
20s	Rechts	15%	15%	5V
Max.Lichtbogenspannung	**Startmenge Sauerstoff**	**Innendruck im Rohr**	**Max. Korrektur Strom**	
24V	20ppm	n/a	10%	

Grad°	Schweißstrom I [A]	Pulszeit t [s]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 48.8 L 16.3	0.45 0.45	0 100	
90° - 180°	H 47.0 L 16.3	0.45 0.45	0 100	
180° - 270°	H 45.4 L 16.3	0.45 0.45	0 100	
270° - 365°	H 43.6 L 16.3	0.45 0.45	0 100	

Istparameter

Grad°	Schweißstrom I [A]	Spannung U [V]	Zangengeschwindigk. v [mm/min]	
0° - 90°	H 49.9 L 17.5	6.9 7.1	0 95	
90° - 180°	H 48.0 L 17.5	6.8 7.0	0 97	
180° - 270°	H 46.0 L 17.5	7.0 7.0	0 98	
270° - 365°	H 44.1 L 17.5	6.9 7.1	0 99	

	Gasvorströmen	Schweißgasmenge	Gasnachströmen	
Schweißgas	20s @ 11.9 l/min	11.9 l/min	20s @ 11.9 l/min	

Startmenge Sauerstoff	Heften	Status	Gesamtschweißzeit	Strom Korrektur
6ppm	n/a	Erfolgreich	134.3s	-
Innendruck (Pa)				
n/a				

Kommentare

Kunde	Auftragsnummer	Schweißkopftyp	Schweißkopfnummer	Art der Verbindung
Ovivo	--------	OSK 38 C S	38S 1909282	I-Stoß
Anzahl der Lagen	**Startposition**	**Werkstoff Bauteil 1**	**Werkstoff Bauteil 2**	**Charge Bauteil 1**
1	--------	--------	--------	--------
Charge Bauteil 2	**Zusatzwerkstoff**	**Charge Zusatzwerkstoff**	**Projekt Nummer**	**Schweißgasmenge**
--------	--------	--------	240313	12 l/h
Gas Typ	**Formiergasmenge**	**Formiergastyp**	**Elektrodentyp**	**Elektrodendurchmes.**
Argon 4.6	6-8 l/h	Argon 4.6	WC-20	1,6 mm
Elektrodenlänge	**Elektrodenwinkel**	**Elektroden Tip-Fläche**	**Elektrodenabstand**	
31 mm	18	0,2 mm	1,3 mm	

Industrie Service / Industrial Services
Zertifizierungsstelle für Druckgeräte
Certification Body for Pressuere Equipment

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ZERTIFIKAT - CERTIFIKATE

Schweißverfahrensprüfung - Metall / Welding Procedure Qualification - Metal (WPQR)

Zertifikat-Nr. / Certificate No.: **01 202 411/V - 19 094**

Hersteller: Manufacturer:	**Wilhelm Werner GmbH** Maybachstr. 29 51381 Leverkusen	Prüf-Nr.:	094/19 - 1626173/Kd
		Hersteller-Schweißanweisung: Manufacturers Welding Procedure: pWPS-Nr.:	17.07.2019
Datum der Schweißung / Date of Welding:	02.07.2019	Probe-Nr. / Specimen No:	2536/19

PRÜFGRUNDLAGEN / SPECIFICATIONS:	DGR 2014/68/E4; AD 2000-Merkblatt HP 2/1, EN ISO 15614-1
PRÜFSTÜCK / TEST PIECE	**Verbindungsschweißen am Rohr**
Werkstoff – Bezeichnung (Untergruppe nach ISO/TR 15608)/ Material – Designation (Subgroup acc. ISO/TR 15608):	1.4404 (8.1) mit 1.4404 (8.1)
Rohraußendurchmesser, Dicke/ Pipe Outer Diameter, Thickness [mm]:	∅ 23,0 x 1,5 mm
GELTUNGSBEREICH / RANGE OF APPROVAL	
Grundwerkstoffuntergruppe / Base Metal Subgroup:	8.1 – 8.1
Werkstoffdicke / Wall Thickness [mm]:	1,05 – 1,95
Rohraußendurchmesser / Pipe Outer Diameter [mm]:	11,5 – 46,0
Stoßart, Nahtart / Weld Type, Joint Type:	Stumpfstoß, Kehlnaht
Schweißprozess (ISO 4063) / Welding Process (ISO 4063):	m141 (mWIG)
Zusatzwerkstoff, Spezifikation/Bezeichnung Filler metal, Specification/Designation:	EN ISO 14343-A W 19 12 3 L Si
Dicke des Schweißgutes / Deposited weld metal thickness [mm]:	--
Einlagig (sl), mehrlagig (ml) / single-run (sl), multi-run (ml)	sl
Schutzgas/Gas: Pulver/Flux: Spezifikation - Bezeichnung / Specification - Designation:	DIN EN ISO 14175 – I1
Stromart /Type of Welding Current:	= -
Wärmeeinbringung (min. – max.)/ heat input (min. – max.) [kJ/cm]	PH: 0,24 - 0,40 PC: 0,14 – 0,23
Min. Vorwärmtemperatur / Min Preheat Temperature [°C]:	Rt
Max. Zwischenlagentemp. / Max. Interpass Temperature [°C]:	--
Schweißposition gem. ISO 6947/ Welding Position acc. ISO 6947:	PH/PC
Wasserstoffarmglühen / Soaking:	entfällt
Wärmenachbehandlung / Post Weld Heat Treatment:	entfällt

Bemerkungen / Remarks:

ERGEBNIS / RESULT:
Hiermit wird bestätigt, dass die Prüfungsschweißungen in Übereinstimmung mit den Anforderungen der o.g. Prüfgrundlagen zufriedenstellend vorbereitet, geschweißt und geprüft wurden.
This is to certify that test welds were prepared, welded and tested satisfactory in accordance with the specifications indicated above.

Ort: Location: **Köln** **Datum:** Date: **27.08.2019/641-wie-kk**

Zertifizierungsstelle für Druckgeräte
Certification Body for Pressure Equipment

Anlagen: Attachments:
1. Protokoll der Probeschweißung
Report of Weld Test
2. Prüfergebnisse / Test Results

Dipl.-Ing. Michael Winkels

TÜV Rheinland Industrie Service GmbH
Regionalbereich Köln
Am Grauen Stein, 51105 Köln, GERMANY

Benannte Stelle, Kennummer 0035
Notified Body, ID Number 0035

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Certification Body for Pressuere Equipment

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ZERTIFIKAT - CERTIFIKATE

Schweißverfahrensprüfung - Metall / Welding Procedure Qualification - Metal (WPQR)

Zertifikat-Nr. / Certificate No.: **01 202 411/V - 19 095**

Hersteller: Manufacturer:	**Wilhelm Werner GmbH** Maybachstr. 29 51381 Leverkusen	Prüf-Nr.:	094/19 - 1626173/Kd
		Hersteller-Schweißanweisung: Manufacturers Welding Procedure:	
		pWPS-Nr.:	17.07.2019
Datum der Schweißung / Date of Welding:	02.07.2019	Probe-Nr. / Specimen No:	2535/19 + 2538/19

PRÜFGRUNDLAGEN / SPECIFICATIONS: DGR 2014/68/E4; AD 2000-Merkblatt HP 2/1, VdTÜV 1163, EN ISO 15614-1

PRÜFSTÜCK / TEST PIECE **Verbindungsschweißen am Rohr**

Werkstoff – Bezeichnung (Untergruppe nach ISO/TR 15608)/ Material – Designation (Subgroup acc. ISO/TR 15608):	1.4404 (8.1) mit 1.4404 (8.1)
Rohraußendurchmesser, Dicke/ Pipe Outer Diameter, Thickness [mm]:	∅ 70,3 x 2,0 mm und ∅ 13,0 x 1,5 mm

GELTUNGSBEREICH / RANGE OF APPROVAL

Grundwerkstoffuntergruppe / Base Metal Subgroup:	8.1 – 8.1
Werkstoffdicke / Wall Thickness [mm]:	1,5 – 2,0
Rohraußendurchmesser / Pipe Outer Diameter [mm]:	13,0 – 70,0
Stoßart, Nahtart / Weld Type, Joint Type:	Stumpfstoß, Kehlnaht
Schweißprozess (ISO 4063) / Welding Process (ISO 4063):	142 (v-WIG)
Zusatzwerkstoff, Spezifikation/Bezeichnung Filler metal, Specification/Designation:	ohne
Dicke des Schweißgutes / Deposited weld metal thickness [mm]:	--
Einlagig (sl), mehrlagig (ml) / single-run (sl), multi-run (ml)	sl
Schutzgas/Gas: Pulver/Flux: — Spezifikation - Bezeichnung / Specification - Designation:	DIN EN ISO 14175 – I1
Stromart /Type of Welding Current:	= -
Wärmeeinbringung (min. – max.)/ heat input (min. – max.) [kJ/cm]	PK: 0,07 - 0,32
Min. Vorwärmtemperatur / Min Preheat Temperature [°C]:	Rt
Max. Zwischenlagentemp. / Max. Interpass Temperature [°C]:	--
Schweißposition gem. ISO 6947/ Welding Position acc. ISO 6947:	PK
Wasserstoffarmglühen / Soaking:	entfällt
Wärmenachbehandlung / Post Weld Heat Treatment:	entfällt

Bemerkungen / Remarks:

Inverter: Tigtronic 160 Nr: 0808.0001, Steuerung: Tigtronic Orbital 4 Nr: 17061027
Orbitaler Schweißkopf: OSK 38 G (Range 3,17-38,1 mm) und OSK 76 G (Range 6,0 – 76,2 mm)
Zusätzliche Prüfstücke: ø 19,0mm x 1,5mm, ø 23,0mm x 1,5mm, ø 029,0mm x 1,5mm, ø 35,0mm x 1,5mm, ø 141,0mm x 1,5mm und ø 53,0mm x 1,5mm geschweißt: Prüfumfang VT,PT und RT.

ERGEBNIS / RESULT:

Hiermit wird bestätigt, dass die Prüfungsschweißungen in Übereinstimmung mit den Anforderungen der o.g. Prüfgrundlagen zufriedenstellend vorbereitet, geschweißt und geprüft wurden.
This is to certify that test welds were prepared, welded and tested satisfactory in accordance with the specifications indicated above.

Ort: Location: **Köln** **Datum:** Date: **27.08.2019/641-wie-kk**

Zertifizierungsstelle für Druckgeräte
Certification Body for Pressure Equipment

Anlagen: Attachments:
1. Protokoll der Probeschweißung
Report of Weld Test
2. Prüfergebnisse / Test Results

Dipl.-Ing. Michael Winkels

TÜV Rheinland Industrie Service GmbH
Regionalbereich Köln
Am Grauen Stein, 51105 Köln, GERMANY

Benannte Stelle, Kennummer 0035
Notified Body, ID Number 0035

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SECTION 8

Qualification of Welders

DVS PERSZERT

DAkkS Deutsche Akkreditierungsstelle D-ZP-17361-01-00

DVS KURSSTÄTTE REMSCHEID

Schweißer-Prüfungsbescheinigung / Zertifikat

im Geltungsbereich der Richtlinie 2014/68/EU Anhang I 3.1.2

Bezeichnung: ISO 9606-1 141 T BW FM5 S s1.5 D13 H-L045 ss gb

WPS - Bezug	SK Remscheid W194
Name des Schweißers	**Christoph Fredrich**
Legitimation	L711N1R7F
Art der Legitimation	Personalausweis
Geburtsdatum, -ort	27.03.1979, Schönebeck (Elbe)
Beschäftigt bei	EnviroFALK PharmaWaterSystems GmbH
Vorschrift/Prüfnorm	DIN EN ISO 9606-1:2017-12, AD 2000 HP 3:2020-12
Fachkunde	bestanden

DVS-Prüfstelle: DVS-PersZert, PZA Nordrhein

Prüf.-Nr.: DE-08090233-9606-1-220920-P22-000414-Z

Foto (falls nötig)

Kenngrößen	Prüfstück	Geltungsbereich
Schweißprozess(e)	ISO 4063 - 141	141,142,143,145
Stromart/Polung	DC(-)	-
Produktform (Blech oder Rohr)	T	T
Nahtart	BW	BW, Rohrabzw. Winkel >= 60°
Werkstoffgruppe(n)	8 / 1.4301 EN 10088-1 - X5CrNi18-10	-
Schweißzusatzgruppe	FM5	FM5
Schweißzusatz/Bezeichnung	S - ISO 14343 - A: W 19 9 L Si	S, M
Schutzgas	ISO 14175 - I1	-
Hilfsstoffe	ISO 14175 - I1 - Argon	-
Schweißgutdicke (mm)	1,50	1,50 - 3,00
Rohraußendurchmesser (mm)	13,00	13,00 - 26,00
Schweißposition	H-L045	PA, PC, PE, PF
Schweißnahteinzelheiten	ss gb	ss (gb, mb), bs

Zusätzliche Hinweise:

Art der Prüfung	Ausgeführt und bestanden	Nicht geprüft
Sichtprüfung	X	-
Durchstrahlungsprüfung	-	X
Bruchprüfung	-	X
Biegeprüfung	-	X
Kerbzugprüfung	-	X
Makroskopische Untersuchung	X	-
Zusätzliche Prüfungen *	-	X

Stempel: DVS-PersZert, DVS, Zertifizierer DGRL, Dipl.-Ing. M. Metzger

Ort: Remscheid

Verlängerung nach: 9.3a

Datum des Schweißens: 20.09.2022

Gültig bis: 19.09.2025

Bemerkungen: Die Anforderungen der Druckgeräterichtlinie 2014/68/EU Zulassung von Personal Anhang I 3.1.2 sind erfüllt.

06-10-2022

Datum und Unterschrift des DVS-Zertifizierers

ZES-NB-228

Bestätigung der Gültigkeit durch die Schweißaufsichtsperson oder die Prüfstelle DVS-PersZert für die folgenden 6 Monate (Abschnitt 9.2)

Datum	Unterschrift	Dienststellung oder Titel
20.03.2023	S. Windhagen	SFM / IWS
20.09.2023	S. Windhagen	SFM / IWS
20.03.2024	H. Fries	SFM

Datum	Unterschrift	Dienststellung oder Titel

* falls notwendig, Angaben auf Zusatzblatt

Übersetzung und weitere Angaben auf der Rückseite

DVS PERSZERT DAkkS Deutsche Akkreditierungsstelle D-ZP-17361-01-00 DVS KURSSTÄTTE REMSCHEID

Schweißer-Prüfungsbescheinigung / Zertifikat

im Geltungsbereich der Richtlinie 2014/68/EU Anhang I 3.1.2

Bezeichnung: **ISO 9606-1 141 T BW FM5 S s1.5 D53 H-L045 ss gb**

WPS - Bezug	SK Remscheid W193	DVS-Prüfstelle: DVS-PersZert, PZA Nordrhein
Name des Schweißers	**Christoph Fredrich**	Prüf.-Nr.: DE-08090233-9606-1-220920-P22-000413-Z
Legitimation	L711N1R7F	
Art der Legitimation	Personalausweis	Foto
Geburtsdatum, -ort	27.03.1979, Schönebeck (Elbe)	(falls nötig)
Beschäftigt bei	EnviroFALK PharmaWaterSystems GmbH	
Vorschrift/Prüfnorm	DIN EN ISO 9606-1:2017-12, AD 2000 HP 3:2020-12	
Fachkunde	bestanden	

Kenngrößen	Prüfstück	Geltungsbereich
Schweißprozess(e)	ISO 4063 - 141	141,142,143,145
Stromart/Polung	DC(-)	-
Produktform (Blech oder Rohr)	T	T, P
Nahtart	BW	BW, Rohrabzw. Winkel >= 60°
Werkstoffgruppe(n)	8 / 1.4301 EN 10088-1 - X5CrNi18-10	-
Schweißzusatzgruppe	FM5	FM5
Schweißzusatz/Bezeichnung	S - ISO 14343 - A: W 19 9 L Si	S, M
Schutzgas	ISO 14175 - I1	-
Hilfsstoffe	ISO 14175 - I1 - Argon	-
Schweißgutdicke (mm)	1,50	1,50 - 3,00
Rohraußendurchmesser (mm)	53,00	>= 26,50
Schweißposition	H-L045	PA, PC, PE, PF
Schweißnahteinzelheiten	ss gb	ss (gb, mb), bs

Zusätzliche Hinweise:

Art der Prüfung	Ausgeführt und bestanden	Nicht geprüft
Sichtprüfung	X	-
Durchstrahlungsprüfung	-	X
Bruchprüfung	-	X
Biegeprüfung	-	X
Kerbzugprüfung	-	X
Makroskopische Untersuchung	X	-
Zusätzliche Prüfungen *	-	X

Stempel: DVS-PersZert Zertifizierer DGRL Dipl.-Ing. M. Metzger

Ort: Remscheid

Verlängerung nach: 9.3a

Datum des Schweißens: 20.09.2022

Gültig bis: 19.09.2025

Bemerkungen: Die Anforderungen der Druckgeräterichtlinie 2014/68/EU Zulassung von Personal Anhang I 3.1.2 sind erfüllt.

06-10-2022

Datum und Unterschrift des DVS-Zertifizierers
ZLS-NB-228

Bestätigung der Gültigkeit durch die Schweißaufsichtsperson oder die Prüfstelle DVS-PersZert für die folgenden 6 Monate (Abschnitt 9.2)

Datum	Unterschrift	Dienststellung oder Titel
20.03.2023	S. Windhagen	SFM / IWS
20.09.2023	S. Windhagen	SFM / IWS
20.03.2024	H. Fiesen	SFM

Datum	Unterschrift	Dienststellung oder Titel

* falls notwendig, Angaben auf Zusatzblatt

Übersetzung und weitere Angaben auf der Rückseite

Zertifikat

im Geltungsbereich der Richtlinie 2014/68/EU Anhang I, 3.1.2.

Prüfungsbescheinigung für Bediener oder Einrichter von Schweißeinrichtungen

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Hersteller-Schweißanweisung:	pWPS: "Orb-D29"
Beleg-Nr. (falls verfügbar):	
Name des Schweißers:	Rodzik, Krzysztof
Legitimation:	DCT886864
Art der Legitimation:	Polnischer Personalausweis
Geburtsdatum und -ort:	15.01.1979 in Siemianowice Slaskie
Beschäftigt bei:	EnviroFALK PharmaSystems GmbH
Vorschrift / Prüfnorm:	AD 2000-HP3, DIN EN ISO 14732:2013
Prüfung der Funktionskenntnisse:	liegt vor
Fachkunde:	bestanden
Bemerkung:	Zange = Alle kompatiblen Zangen zu dieser Schweißeinrichtung

Prüfer: Dipl.-Ing. Katharina Noe

	Prüfstück	Geltungsbereich
Schweißprozess(e):	142	142
Schweißeinrichtung:	Orbitec Tigtronic 160	Orbitec Tigtronic 160
Schweißeinheit:	Zange	Zange
Details für mechanisches Schweißen		
Sichtprüfung/ferngesteuerte Sichtprüfung:	direkte Sichtprüfung	direkte Sichtprüfung
Automatische Kontrolle der Lichtbogenlänge:	ohne	mit und ohne automatische Kontrolle
Automatisches Nahtverfolgungssystem:	ohne	mit und ohne automatische Kontrolle
Schweißposition:	PK	PK
Einzellagen/Mehrlagen:	Einzellagentechnik	Einzellagentechnik
Schweißbadsicherung:	mit	mit Badsicherung
Schweißzusatzeinlagen:	ohne	mit und ohne Zusatzeinlagen

Zusätzliche Hinweise siehe beigefügtes Blatt und/oder Schweißanweisung

Der Anerkennung liegt zugrunde:	
- Schweißverfahrensprüfung (siehe 4.1 a))	-
- Schweißtechnische Prüfung vor Fertigungsbeginn (siehe 4.1 b))	-
- Standardprüfstück (siehe 4.1 c))	X
- Fertigungsprüfung oder Stichprobenprüfung (siehe 4.1 d))	-
- Ergebnis der Prüfung für die Qualifizierung siehe Dokument-Nr.:	1346/23
(Bericht der Qualifizierung des Schweißverfahrens oder andere Prüfdokumente)	

Die Anforderungen der Richtlinie 2014/68/EU, Anhang I, 3.1.2., Zulassung von Personal, sind erfüllt.

Zertifizierungsstelle:	**TÜV Rheinland Industrie Service GmbH Notifizierte Stelle für Druckgeräte 0035 Zertifizierungsstelle für Fügepersonal**
Zertifikats-Nr.:	01 202 641/S-23 1855
Name:	Dipl.-Ing. Elke Engelmann
Ort / Datum:	Köln, 16.06.2023
Unterschrift:	
Datum der praktischen Prüfung:	27.04.2023
Gültigkeitsdatum bis:	26.04.2029

TÜVRheinland Industrial Services 4433

Gemäß 5.3a: Bestätigung der Gültigkeit durch die Schweißaufsichtsperson / den Prüfer / die Prüfstelle für die folgenden 6 Monate (unter Bezug auf 5.2)

Datum	Unterschrift	Dienststellung oder Titel
26.10.'23	S. Windhagen	SFM / IWS
26.04.24	H. Fries	

Datum	Unterschrift	Dienststellung oder Titel

Stand der Norm: DIN EN ISO 14732:2013

mit EuroWeld Version 5.56.01 erstellt

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Zertifikat

im Geltungsbereich der Richtlinie 2014/68/EU Anhang I, 3.1.2.

Prüfungsbescheinigung für Bediener oder Einrichter von Schweißeinrichtungen

CEOC

TÜVRheinland®
Genau. Richtig.

Hersteller-Schweißanweisung:	pWPS: "Orb-D29"
Beleg-Nr. (falls verfügbar):	
Name des Schweißers:	Rodzik, Krzysztof
Legitimation:	DCT886864
Art der Legitimation:	Polnischer Personalausweis
Geburtsdatum und -ort:	15.01.1979 in Siemianowice Slaskie
Beschäftigt bei:	EnviroFALK PharmaSystems GmbH
Vorschrift / Prüfnorm:	AD 2000-HP3, DIN EN ISO 14732:2013
Prüfung der Funktionskenntnisse:	liegt vor
Fachkunde:	bestanden
Bemerkung:	Zange = Alle kompatiblen Zangen zu dieser Schweißeinrichtung

Prüfer: Dipl.-Ing. Katharina Noe

	Prüfstück	Geltungsbereich
Schweißprozess(e):	142	142
Schweißeinrichtung:	Orbitec EVO WP	Orbitec EVO WP
Schweißeinheit:	Zange	Zange
Details für mechanisches Schweißen		
Sichtprüfung/ferngesteuerte Sichtprüfung:	direkte Sichtprüfung	direkte Sichtprüfung
Automatische Kontrolle der Lichtbogenlänge:	ohne	mit und ohne automatische Kontrolle
Automatisches Nahtverfolgungssystem:	ohne	mit und ohne automatische Kontrolle
Schweißposition:	PK	PK
Einzellagen/Mehrlagen:	Einzellagentechnik	Einzellagentechnik
Schweißbadsicherung:	mit	mit Badsicherung
Schweißzusatzeinlagen:	ohne	mit und ohne Zusatzeinlagen

Zusätzliche Hinweise siehe beigefügtes Blatt und/oder Schweißanweisung

Der Anerkennung liegt zugrunde:	
- Schweißverfahrensprüfung (siehe 4.1 a))	-
- Schweißtechnische Prüfung vor Fertigungsbeginn (siehe 4.1 b))	-
- Standardprüfstück (siehe 4.1 c))	X
- Fertigungsprüfung oder Stichprobenprüfung (siehe 4.1 d))	-
- Ergebnis der Prüfung für die Qualifizierung siehe Dokument-Nr.:	1346/23
(Bericht der Qualifizierung des Schweißverfahrens oder andere Prüfdokumente)	

Die Anforderungen der Richtlinie 2014/68/EU, Anhang I, 3.1.2., Zulassung von Personal, sind erfüllt.

Zertifizierungsstelle:	**TÜV Rheinland Industrie Service GmbH Notifizierte Stelle für Druckgeräte 0035 Zertifizierungsstelle für Fügepersonal**
Zertifikats-Nr.:	01 202 641/S-23 1856
Name:	Dipl.-Ing. Elke Engelmann
Ort / Datum:	Köln, 16.06.2023
Unterschrift:	
Datum der praktischen Prüfung:	27.04.2023
Gültigkeitsdatum bis:	26.04.2029

TÜVRheinland 4433 Industrial Services

Gemäß 5.3a: Bestätigung der Gültigkeit durch die Schweißaufsichtsperson / den Prüfer / die Prüfstelle für die folgenden 6 Monate (unter Bezug auf 5.2)

Datum	Unterschrift	Dienststellung oder Titel
26.10.23 26.04.24	S. Windhagen b). Fues	SEM / IWS STM

Datum	Unterschrift	Dienststellung oder Titel

Stand der Norm: DIN EN ISO 14732:2013

mit EuroWeld Version 5.56.01 erstellt

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Zertifikat

im Geltungsbereich der Richtlinie 2014/68/EU Anhang I, 3.1.2.

Schweißer-Prüfungsbescheinigung

TÜVRheinland®
Genau. Richtig.

2 Bezeichnung: **EN ISO 9606-1 141 T BW FM5 S s1.5 D13 PH-L045 ss gb**

3

4 Hersteller-Schweißanweisung: pWPS: "Hand-D13"

5 Beleg-Nr. (falls verfügbar):

6 Name des Schweißers: Rodzik, Krzysztof

7 Legitimation: DCT886864

8 Art der Legitimation: Polnischer Personalausweis

9 Geburtsdatum und -ort: 15.01.1979 in Siemianowice Slaskie

10 Beschäftigt bei: EnviroFALK PharmaSystems GmbH

11 Vorschrift / Prüfnorm: AD 2000-HP3, DIN EN ISO 9606-1:2017

Bemerkung:

Ergänzende Kehlnahtprüfung: nein Prüfer: Dipl.-Ing. Katharina Noe

12 Fachkunde: bestanden

13

	Prüfdaten-Angaben	Geltungsbereich
14 Schweißprozess(e):	141	141, 142, 143, 145
15 Produktform (Blech/Rohr):	T	T
16 Nahtart:	BW	BW
17 Grundwerkstoffgruppe(n):	8.1	
Schweißzusatz Gruppe(n):	FM5	FM5
18 Schweißzusätze (Bezeichnung):	S	S, M; nm
19 Schutzgase:	EN ISO 14175 - I1	Gleichartige Schutzgase
20 Hilfsstoff / Pulver:	EN ISO 14175 - I1	
Stromart und Polung:	=-	- - -
21 Werkstoffdicke (mm):	1,50	
Dicke des Schweißgutes (mm):	1,50	1,50 - 3,00
22 Rohraußendurchm. (mm):	13,00	13,00 - 26,00
23 Schweißposition:	PH-L045	PA, PC, PE, PF
24 Schweißnahteinzelheiten:	ss gb	ss mb, bs, ss gb

25 Zusätzliche Hinweise siehe beigefügtes Blatt und/oder Schweißanweisung

26 27

Art der Prüfung	Ausgeführt und bestanden
30 Sichtprüfung	X
31 Durchstrahlungsprüfung	X

Die Anforderungen der Richtlinie 2014/68/EU, Anhang I, 3.1.2., Zulassung von Personal, sind erfüllt.

Zertifizierungsstelle: **TÜV Rheinland Industrie Service GmbH**
Notifizierte Stelle für Druckgeräte 0035
Zertifizierungsstelle für Fügepersonal

Zertifikats-Nr.: 01 202 641/S-23 1928

Name: Dipl.-Ing. Elke Engelmann

Ort / Datum: Köln, 03.07.2023

TÜVRheinland® 4433 Industrial Services

Unterschrift:

prakt. Prüfung am: 27.04.2023

Gültigkeitsdatum bis: 26.04.2026

37 *) falls notwendig, Angaben auf Zusatzblatt

38 Gemäß 9.3a: Bestätigung der Gültigkeit durch die Schweißaufsichtsperson / den Prüfer / die Prüfstelle für die folgenden 6 Monate (unter Bezug auf 9.2)

39

Datum	Unterschrift	Dienststellung oder Titel
26.10.'23 26.04.23	S. Windhagen M. Fries	SFM / IWS SFM

Datum	Unterschrift	Dienststellung oder Titel

Stand der Norm: DIN EN ISO 9606-1:2017 mit EuroWeld Version 5.56.01 erstellt

1/011 10.06

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Zertifikat

im Geltungsbereich der Richtlinie 2014/68/EU Anhang I, 3.1.2.

Schweißer-Prüfungsbescheinigung

TÜVRheinland®
Genau. Richtig.

2 Bezeichnung: **EN ISO 9606-1 141 T BW FM5 S s1.5 D53 PH-L045 ss gb**

3

4 Hersteller-Schweißanweisung: pWPS: "Hand-D53"

5 Beleg-Nr. (falls verfügbar):

6 Name des Schweißers: Rodzik, Krzysztof

7 Legitimation: DCT886864

8 Art der Legitimation: Polnischer Personalausweis

9 Geburtsdatum und -ort: 15.01.1979 in Siemianowice Slaskie

10 Beschäftigt bei: EnviroFALK PharmaSystems GmbH

11 Vorschrift / Prüfnorm: AD 2000-HP3, DIN EN ISO 9606-1:2017

Bemerkung:

Ergänzende Kehlnahtprüfung: nein Prüfer: Dipl.-Ing. Katharina Noe

12 Fachkunde: bestanden

13

	Prüfdaten-Angaben	Geltungsbereich
14 Schweißprozess(e):	141	141, 142, 143, 145
15 Produktform (Blech/Rohr):	T	P, T
16 Nahtart:	BW	BW
17 Grundwerkstoffgruppe(n):	8.1	
Schweißzusatz Gruppe(n):	FM5	FM5
18 Schweißzusätze (Bezeichnung):	S	S, M; nm
19 Schutzgase:	EN ISO 14175 - I1	Gleichartige Schutzgase
20 Hilfsstoff / Pulver:	EN ISO 14175 - I1	
Stromart und Polung:	=-	- - -
21 Werkstoffdicke (mm):	1,50	
Dicke des Schweißgutes (mm):	1,50	1,50 - 3,00
22 Rohraußendurchm. (mm):	53,00	≥ 26,50
23 Schweißposition:	PH-L045	PA, PC, PE, PF
24 Schweißnahteinzelheiten:	ss gb	ss mb, bs, ss gb

25 Zusätzliche Hinweise siehe beigefügtes Blatt und/oder Schweißanweisung

26 27

Art der Prüfung	Ausgeführt und bestanden
30 Sichtprüfung	X
31 Durchstrahlungsprüfung	X

Die Anforderungen der Richtlinie 2014/68/EU, Anhang I, 3.1.2., Zulassung von Personal, sind erfüllt.

Zertifizierungsstelle: **TÜV Rheinland Industrie Service GmbH**
Notifizierte Stelle für Druckgeräte 0035
Zertifizierungsstelle für Fügepersonal

Zertifikats-Nr.: 01 202 641/S-23 1929

Name: Dipl.-Ing. Elke Engelmann

Ort / Datum: Köln, 03.07.2023

Unterschrift:

prakt. Prüfung am: 27.04.2023

Gültigkeitsdatum bis: 26.04.2026

37 *) falls notwendig, Angaben auf Zusatzblatt

38 Gemäß 9.3a: Bestätigung der Gültigkeit durch die Schweißaufsichtsperson / den Prüfer / die Prüfstelle für die folgenden 6 Monate (unter Bezug auf 9.2)

39

Datum	Unterschrift	Dienststellung oder Titel
26.10.123 26.04.24	S. Windhagen H. Fries	SFM / IWS SFM

Datum	Unterschrift	Dienststellung oder Titel

Stand der Norm: DIN EN ISO 9606-1:2017

mit EuroWeld Version 5.56.01 erstellt

1/011 10.06

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Zu Grunde liegende WPQR-Nr:	WPS	Seite 1/1 Revision: 01 Erstellt am: 8. Mai 2023 Erstellt von: H.Friesen
01 202 411/V-19 093	**Hand FW**	PharmaWaterSystems ENVIROFALK

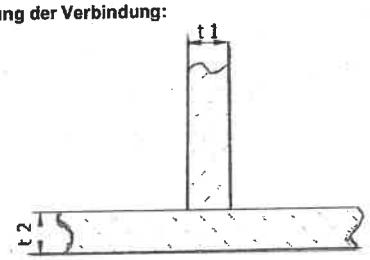
Gültige für Schweißer:	ALLE / div.

Allgemein:	
Nahtart:	Kehlnaht T-Stoß am Blech, Hand.
Schweißprozess ISO 4063:	141 (WIG)
Grundwerkstoff:	Gr. 8.1 ISO/TR 15608 (1.4404, 1.4435 u.ä.)
Besonderheiten:	-

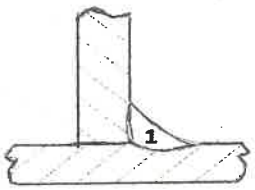
Halbzeug:	
Halbzeug-Typ:	Blech
Außendurchmesser D=	-
Materialstärke t=	1.5 -3,0mm
Schweißposition:	PA / PF / PE

Vorbereitung: Teile entgraten und entfetten. Innenfläche bündig ausrichten (Versatz < 0,5mm). **Vorwärmtemperatur:** 10 - 30°C

Gestaltung der Verbindung: b < 0,5mm



Schweißfolge:



Zwischenlagentemperatur: entfällt
Wärmenachbehandlung : keine

Schweißanlage:	
Schweißstromquelle:	EWM PicoTig 160
Steuerung:	-
Orbitalzange / Zangencode:	-
Handbrenner:	div.

Wolframelektrode:	
Elektrodentyp / Durchmesser :	Wla15 /1,6 mm
Spitzenwinkel:	30°
Flachschliff Spitze:	nein
Spitzenbstand Werkstück:	Ca. 1,6mm / manuell

Schweißzusatzwerkstoff (SZW):	
Zusatzwerkstoff ISO 14343-A:	W 19 12 3 L Si
SZW Gruppe nach ISO 9606-1:	FM5
SZW Markenname:	EWM TR 316 LSi
SZW Durchmesser:	1,6 mm

Schutzgas (SG) nach ISO 14175: Art / Menge	
Brennerseite / Zangenseite:	I1 (Argon) / 6-12 L/min
SG Wurzelschutz:	-
Gas Vor- / Nachströmzeit:	30 sec / 20 sec
Innen Restsauerstoff / Innendruck:	-

Badbildezeit: 4,8 Sek. **Einzelheiten Schweißparameter (Programm:):** Stromabsenkzeit: 4 Sek.

Lage	Sektor	Schweißstrom [A]	Impulszeit [s]	Schweißsp. [V]	Polung	Drahtvorsch.[mm/min]	Schweißgeschwindigkeit
1	-	60 - 80	-	resultierend	DC -	manuell	manuell

Ort / Datum: Lev. 15.01.24

Erstellt durch: H. Friesen SFM

SECTION 9

Data Sheets

(See EoMR Appendix 1 for Data Sheets)

Helix Pump
Medana Pump
Vortex Flow Meter
Pressure Sensor PM15xx
Pressure Switch PV80xx
Conductivity Sensor LDL101
Overflow Pipe Preventor/ Alkaline Siphon
Indicator Solution
DIA Cartridge (Water Demineralizer)
Mixed Bed Resin
Carbon Dioxide Absorbent
UV Radiation System
Operator Panel – Intelligent Configuration Tool
Backing Ring Accessories ANSI

SECTION 10

Visual Examination Reports
For Stainless Steel Pipe and Frame

Prüfbericht / Test Report	240313_VT2_Bericht	ISO-NR.	240313_80
Projekt-Nr.:	240313	Leitg.-Nr.	

Auftraggeber (Name / Adresse) Name / Adress of Orderer	EnviroFALK GmbH Gutenbergstraße 7 D-56457 Westerburg	**Ansprechpartner** Herr ☒ Contactor Frau ☐	Dr. Gehre
Prüfobjekt Project	Orbital- u. Hand-Schweißnähte	☒ LEV ☐ HKW ☐ Baustelle	

Werkstoff Material	1.4435 Ra<0,8	**Abmessung** Dimension	**Siehe S-Doku**

Prüfumfang Extensiveness of testing	Gestell und Verrohrungen

Zeitpunkt der Prüfung Time of Examination	☐ **vor** ☒ **nach** **Wärmebehandlung** before after Heat treatment	**Prüfflächenzustand** Surface Preparation	**Mechanisch blank**

Prüfspezifikation Test specifications	☒ DIN EN 13018:2016 ☒ DIN EN ISO 17367
Auswertung nach Evaluation according	☒ DIN EN ISO 5817 – 06/2014 EnviroFALK Standards SOP AA-8.2.1-11-02

Prüfgerätebezeichnung (Registr.-Nr.) Type of equipment (Registration-no.)	Olympus Edoscope IV 9000G	**Schweißverfahren** Welding Process	**141** **142**

Beleuchtung Illumiantion	☒ **Tageslicht** ☒ Taschenlampe ☐ Halogenstrahler Daylight Flashlight Halogen spotlight	**Prüfverfahren** Test method	☐ **direkt** ☒ **indirekt** direct indirect

Prüfergebnis Test result	10% Orbitalnähte + 100% Handnähte wurden einer indirekten Sichtprüfung unterzogen. Geprüfte Schweißnähte entnehmen sie dem Dokument Schweißnahtdokumentation_240313
	Bewertung ☒ erfüllt ☐ nicht erfüllt Valuation acceptable not acceptable

Prüfdatum Date of Examination	30.07.2024	**Freigabe / Release** Ort / Datum / Name Place / Date / Name Leverkusen / 30.07.2024 / O. Gross
Prüfort Place	EF-PWS Leverkusen	
Prüfer Examiner	O. Gross	**Unterschrift /** Signature

© EnviroFALK PharmaWaterSystems GmbH

SECTION 11

Pickle and Passivation Records

Elektrolytbeiz- und Passivierungsprotokoll
Electrolytic pickling and passivation protocol

Hersteller / *Manufacturer*	EnviroFALK PharmaWaterSystems		
Vertreiber / *Distributor*	EnviroFALK PharmaWaterSystems		
Bauteil / *Component*	Edelstahlrohrleitungen & Rahmengestelle *SS Piping & Frame Rack*	**Seriennummer:** *Serial no.:*	240313 - 1
Zeichnungs-Nr.: *Drawing no.:*	EF-W-00043446, EF-W-00043476, EF-W-00033705		

1. Allgemeines / *General*

Um gefertigte Rohrleitungen oder Anlagengestelle von Beginn an gegen Korrosion zu schützen, werden alle Schweißnähte manuell elektrolytisch gebeizt und passiviert. *In order to protect manufactured pipelines or system frames against corrosion right from the start, all weld seams are manually electrolytically pickled and passivated.*

2. Durchführung der elektrochemischen Beizung und Passivierung / *Electrochemical Pickling & Passivation Process*

Die Schweißnähte von Gestellen und Rohrleitungen werden mittels Pinselverfahren elektrolytisch gebeizt. Als Elektrolyt wird eine spezielle Elektrolytbeize verwendet. Das Elektrolyt bildet in Verbindung mit Sauerstoff eine schützende Passivschicht auf dem behandeltem Werkstück aus. Die behandelte Schweißverbindung wird nach dem Reinigungsprozess wieder mit VE-Wasser abgespült. *The weld seams of frames and pipelines are electrolytically pickled using a brush process. A special electrolytic pickling agent is used as the electrolyte. In combination with oxygen, the electrolyte forms a protective passive layer on the treated workpiece. After the cleaning process, the treated welded joint is rinsed again with demineralized water.*

Equipment:

- Inverter: Greising Brush IT 800W
- Beizelektroly / Pickling Electrolyte: Greinox TF
- Spülmedium / Rinsing Agent: VE-Wasser < 5µS/cm / Demineralized Water <5µS/cm

3. Bestätigung / *Confirmation*

Hiermit bestätigt die mit dem Schweißen der Anlage beauftragte Firma EnviroFALK PharmaWaterSystems GmbH, dass alle Schweißnähte, der oben genannten Anlagenteile gemäß obiger Anweisung gebeizt, gespült und passiviert hat.

Hereby the company EnviroFALK PharmaWaterSystems GmbH commissioned with the welding of the copmponents, confirms: We pickled, rinsed and passivated all seam welds of the components mentioned above in accordance to this procedure.

Leverkusen, 29.07.2024	T.Klein	
Ort, Datum *Place, Date*	Name *Name*	Unterschrift EnviroFALK PWS *Signature*

SECTION 12

Testing Results

- 12a FAT Procedure Signed Page 162
- 12b FAT Certificate – signed by Client Page 163
- 12c Hydrostatic Test Report Page 169

OVIVO
Bringing water to life

CERTIFICATE OF CONFORMITY / FAT CERTIFICATE

CUSTOMER:	ELOGEN
PURCHASE ORDER NO:	BC0006205
PROJECT:	CROSSWIND
OVIVO CONTRACT NO:	SWL0000767
DESCRIPTION OF PLANT:	WATER PURIFICATION UNIT 500L/H OFFSHORE C63

CONFORMITY STATEMENT – FAT

OVIVO UK LIMITED of I10 Building, Railway drive, Wolverhampton, UK, WV1 1LH, United Kingdom, hereby certify that the equipment detailed above, supplied on the above referenced Purchase Order Number has been manufactured, inspected, assembled and tested in accordance with the relevant and specific contract requirements.

Final inspection has been monitored by OVIVO UK LIMITED and sub-suppliers Quality Control and all items were found to comply and conform to the relevant drawings and specifications.

OVIVO UK LIMITED also hereby certifies that the above referenced equipment has been run for a maximum of xxx minutes to ensure satisfactory operation. The test was overseen by OVIVO UK LIMITED/ELOGEN and Ovivo UK sub-suppliers Quality Assurance and was found to be satisfactory

Signed for and on behalf of Client (Elogen)

Printed: Hassan HAMMAMI

Position: Quality Engineer

Date: 06/08/2024

Signed for and on behalf of OVIVO UK LIMITED

Printed: Marta Kurjata

Position: Project Manager

Date: 06/08/2024

Prozesswasser-Technik

ENVIRO BALK

Initial Test Protocol (Verification)

Safety of machinery - electrical equipment of machines
according to EN 60204 / DIN VDE 0113

Customer: Ovivo **Order N°:** 23004690

Project Description: RO + EDI

Audits carried out:	YES	NO
Review:		
1) Protective measure against electric shock	✓	
2) Selection of cables, wires and busbars with regard to current-carrying capacity	✓	
3) Wire line to the main switch in orange. Electrical feed to circuit breaker in 6 mm²	✓	
3) Selection and adjustment of protection and monitoring devices	✓	
4) Presence and correct arrangement of suitable disconnecting and switching devices	✓	
5) Selection of electrical equipment and protective measures in consideration of external influences	✓	
6) Proper marking of neutral and protective conductor	✓	
7) Presence and correct arrangement of circuit diagrams, warning signs and further information	✓	
8) Marking of the electrical equipment	✓	
9) Proper conductor connections	✓	
10) Open earth disconnect terminal (ON)	✓	
11) Easy accessibility of the electrical equipment for operation, marking and maintenance	✓	
12) Cable entry (point andpull relief, sealing)	✓	

Review:

13) Cable labeling attached	✓	
14) Core labeling attached (if required)	/	/
15) All cores laid out and firmly connected	✓	
16) In compliance with customer regulations (if required)	✓	
17) UV-Lamp: Cable should not be laid in the cable duct !	✓	
18) Made pictures of control cabinet, ABS-housing !	✓	

Comments:

System/Plant:
Control cabinet:

Manufacturer control cabinet : SC Auditor: GDM

Cabling of the plant : hhh

Date: 06.08.2024 Date: 06.08.2024

Prozesswasser-Technik
ENVIROSAUK

Initial Test Protocol (Verification)

Safety of machinery - electrical equipment of machines
according to EN 60204 / DIN VDE 0113

Customer: Ovivo Order N°: 23004680

Project Description: RO + EDI

Audits carried out:	YES	NO

Measurements:

1) Continuous connection of the protective conductor system,
Measurement of the voltage drop
(UPE with 10 A)

Protective conductor test performed. Limit values complied with!	✓	

Comments:

System/Plant:
Control Cabinet:

kn Auditor: GDM

Date: 06.08.2024 Date: 06.08.2024

Prozesswasser-Technik
ENVIROMAK

Initial Test Protocol (Verification)

Safety of machinery - electrical equipment of machines
according to EN 60204 / DIN VDE 0113

Customer: Ovivo Order N°: 23004680

Project Description: RO + EDI

Audits carried out:

YES	NO

Measuremnets:

2) Insulation resistance (Riso with 500V)

	YES	NO
Insulation measurement performed. Limit values complied with!	✓	

Comments:

System/Plant :
Control Cabinet:

RAR

Date: 06.08.2024

Auditor: GDM

Date: 06.08.2024

Protokoll für E/A-Test

Prozesswasser-Technik
ENVIRO

Customer: Ovivo Order No.: 23004680

Project Description: RO + EDI

BMK:	Steckpl. Nr.:	Baugruppen-art:	Artikelnummer:	ok	nicht ok	Bemerkung:
-140K1		CPU	6ES7215-1HG40-0XB0	✓		
-140K2		8x DI	6ES7223-1PH32-0XB0	✓		
-140K3		4x AI	6ES7231-4HD32-0XB0	✓		
-140K4		4x AQ	6ES7232-4HD32-0XB0	✓		

Ersteller: SC Prüfer: SMF

Datum: 06.08.2024 Datum: 06.08.2024

OVIVO

Worldwide Experts in Water Treatment

PRESSURE TEST RECORD

[SAMPLE – Edit to suit but capture all data required for ASME B31 compliance]

TEST NUMBER: 1	PROJECT NO.: SWL0000767	PAGE 1 OF 1	
PROJECT NAME: Elogen – Crosswind			
TEST INFORMATION			
SYSTEM DESCRIPTION: Offshore Demineralisation Plant- WTP			
DESIGN TEMPERATURE: 25 °C	DESIGN PRESSURE: 6 bar		
TEST METHOD: X HYDROSTATIC PNEUMATIC:			
TEST FLUID: Softwater			
TEST REQUIREMENTS			
REQUIRED TEST PRESSURE: 4,3 bar	TEST FLUID TEMPERATURE: 25,6 °C		
REQUIRED TEST DURATION: 1 h	AMBIENT TEMPERATURE: 22,5 °C		
TEST RESULTS			
TEST DATE: 06.08.2024	START TIME: 12:35	AM X PM	
	FINISH TIME: 1:35	AM X PM	
TEST EQUIPMENT			
TYPE: ifm PV8004	RANGE: -1...10 bar		
REMARKS: Images from the plant system taken during the , attached for reference.			
TEST ACCEPTANCE			
CODE EXAMINER: Udo Quirmbach / UQ		DATE: 06.08.2024	
CODE INSPECTOR: Peter Kasperski / PK		DATE: 06.08.2024	

SECTION 13

Inspection Release Notes

Closed out Punchlist

elogen	**INSPECTION RELEASE CERTIFICATE** **IRC** **Project: ELOGEN**	OVIVO Worldwide Experts in Water Treatment
	Doc. N°: C63-QRX-858	**Page 1 of 1**

PROJECT N°: C63	**IRC ISSUANCE DATE:** 29/08/2024
SUPPLIER: OVIVO	**CRITICALITY RATING:** N/A
PURCHASE ORDER N°: BC0006205	**TECHNICAL SPECIFICATION:** N/A
EQUIPEMENT: SKID WATER PURIFICATION UNIT	**PACKING ALLOWED:** ~~YES~~ NO

TAG	ARTICLE	DESIGNATION	QUANTITY	STATUS*1	UNIT*2
WTP-300		Water purification unit	1	IRC	SET

Legend:

1* Status

IRC => material is released.

SNAG => material is released with conditions = snag list close out prior issuance of Shipping Release Note.

NCR => 8D or non-conformity report issued => Material cannot be released unless formal agreement to clear on site.

2* Unit

Pieces (PCS), SET or else if needed

Remarks: All comments and non-conformities are listed in the inspection report C63-QRX-828.

IMPORTANT:

- This release does not relieve the Supplier of his responsibilities to comply with the PURCHASE ORDER requirements nor for errors or omissions of his part.

DELIVERY OF THE COMPLETE PACKAGE IS SUBJECT TO:
- Final packing according to Project requirements.
- Final documentation approved.
- ELOGEN written delivery authorisation or Shipping Release Note

ELOGEN representative, position, name & signature	**SUPPLIER** representative, position, name & signature
Hassan HAMMAMI Quality Engineer	Marta KURJATA Project Manager 03/09/2024

Distribution list: V. URBAIN, M. CHELLOUM, F. ALVAREZ, L. DI GIULIO, H. CHETTAOUI, K. TOUAG.

INSPECTION RELEASE NOTE

Supplier name Envirofalk	Project Name /Number Crosswind
Description of equipment Reverse osmosis system RO + EDI 500 with water supply system	
PO Number PWL-ECW001	Customer Ref no. BC0006205
Item Tag numbers SWL0000776-ITP-EF-001	
Punch List	
THE ORDER HAS BEEN COMPLETED AND INSPECTED IN ACCORDANCE WITH PROJECT REQUIREMENTS AND IS RELEASED FOR DESPATCH	
Signature	Print name Peter Nicholls Date 03/09/2024 Sign 
Notes	

Punch List
(as per Inspection Report C63-QRX-828)

POINT	NECESSARY ACTION	RESPONSIBLE	STATE	ESTIMATED DATE	CLOSING DATE	OVIVO COMMENTS & ACTIONS
1	Install the tag of the package WTP-300 (add the full and the empty weight of the package and services condition).	OVIVO	CLOSED	06/08/2024	29/08/2024	Will be added on site, not in OVIVO SCOPE.
2	Add tag for the de-ioniser	OVIVO	CLOSED	06/08/2024	29/08/2024	Tag Added
3	Update the signed acceptance fat procedure	OVIVO	CLOSED	06/08/2024	29/08/2024	Updated & included in EoMR
4	Update MDB documents	OVIVO	CLOSED	06/08/2024	29/08/2024	Updated & included in EoMR
5	Change the inlet flange as per the drawing DN20/d25 instead of 2", straight instead of curved elbow 90°.	OVIVO	CLOSED	06/08/2024	29/08/2024	Changed, images sent to Hassan Hammami
6	Include the flanges Class 150 ASME datasheets	OVIVO	CLOSED	06/08/2024	29/08/2024	Included in EoMR.
7	Submit GA drawing rev E.	OVIVO	CLOSED	06/08/2024	29/08/2024	Ovivo inform that there is no Rev E for the GA's. Last Rev is C included in EoMR
8	Include equipements list and spare part list in the MDB	OVIVO	CLOSED	06/08/2024	29/08/2024	Included in EoMR.
9	Electrical Wiring Diagram to be submitted	OVIVO	CLOSED	06/08/2024	29/08/2024	Action closed. Rev B sent to Elogen
10	Power Supply Terminals must be suitable for 10sqmm cables	OVIVO	CLOSED	06/08/2024	29/08/2024	Changed (as a design change) Power Supply is suitable

DATA SHEETS

EQUIPMENT SUPPLIED:

Water Purification Unit 500L/H Offshore C63

SUPPLIED TO:

ELOGEN

P.O. NO: BC0006205

PROJECT: CROSSWIND

SUPPLIED BY:

OVIVO UK LIMITED
760 The Crescent
COLCHESTER
ESSEX
CO4 9YQ
UNITED KINGDOM

Telephone: +44 (0) 1206 756600

CONTRACT No: SWL0000767

APPENDIX 1

Contents List For Data Sheets

Section	Description			Page Numbers
1	Contents List			2
2	Data Sheets			3
2.1	Helix Pump		OI	4
2.2	Medana Pump		OI	20
2.3	Vortex Flow Meter		OI	43
2.4	Pressure Sensor	PM15xx	OI	58
2.5	Pressure Switch	PV80xx	OI	83
2.6	Conductivity Sensor	LDL101	OI	96
2.7	Overflow Pipe Preventor/ Alkaline Siphon		OI	115
2.8	Indicator Solution		SDS	119
2.9	DIA Cartridge (Water Demineralizer)		OI	128
2.10	Mixed Bed Resin		SDS	156
2.11	Carbon Dioxide Absorbent		SDS	167
2.12	UV Radiation System		OI	177
2.13	Operator Panel – Intelligent Configuration Tool		OI	289
2.14	Backing Ring Accessories ANSI		Data Sheets	383

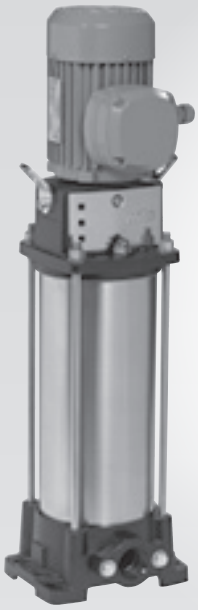
SECTION 2

Data Sheets

Helix Pump		OI
Medana Pump		OI
Vortex Flow Meter		OI
Pressure Sensor	PM15xx	OI
Pressure Switch	PV80xx	OI
Conductivity Sensor	LDL101	OI
Overflow Pipe Preventor/ Alkaline Siphon		OI
Indicator Solution		SDS
DIA Cartridge (Water Demineralizer)		OI
Mixed Bed Resin		SDS
Carbon Dioxide Absorbent		SDS
UV Radiation System		OI
Operator Panel – Intelligent Configuration Tool		OI
Backing Ring Accessories ANSI		Data Sheets

Pioneering for You

Wilo-Helix V(F) 2-4-6-10-16
Wilo-Helix FIRST V(F) 2-4-6-10-16





de Einbau- und Betriebsanleitung
en Installation and operating instructions
fr Notice de montage et de mise en service
nl Inbouw- en bedieningsvoorschriften
ru Инструкция по монтажу и эксплуатации
es Instrucciones de instalación y funcionamiento
it Istruzioni di montaggio, uso e manutenzione
pt Manual de Instalação e funcionamento
tr Montaj ve kullanma kılavuzu
el Οδηγίες εγκατάστασης και λειτουργίας
sv Monterings- och skötselanvisning
no Monterings- og driftsveiledning
fi Asennus- ja käyttöohje
da Monterings- og driftsvejledning

hu Beépítési és üzemeltetési utasítás
pl Instrukcja montażu i obsługi
cs Návod k montáži a obsluze
et Paigaldus- ja kasutusjuhend
lv Uzstādīšanas un ekspluatācijas instrukcija
lt Montavimo ir naudojimo instrukcija
sk Návod na montáž a obsluhu
sl Navodila za vgradnjo in obratovanje
hr Upute za ugradnju i uporabu
sr Uputstvo za ugradnju i upotrebu
ro Instrucțiuni de montaj şi exploatare
bg Инструкция за монтаж и експлоатация
uk Інструкція з монтажу та експлуатації

4 143 727-Ed.09 / 2018-01-Wilo

Fig. 1

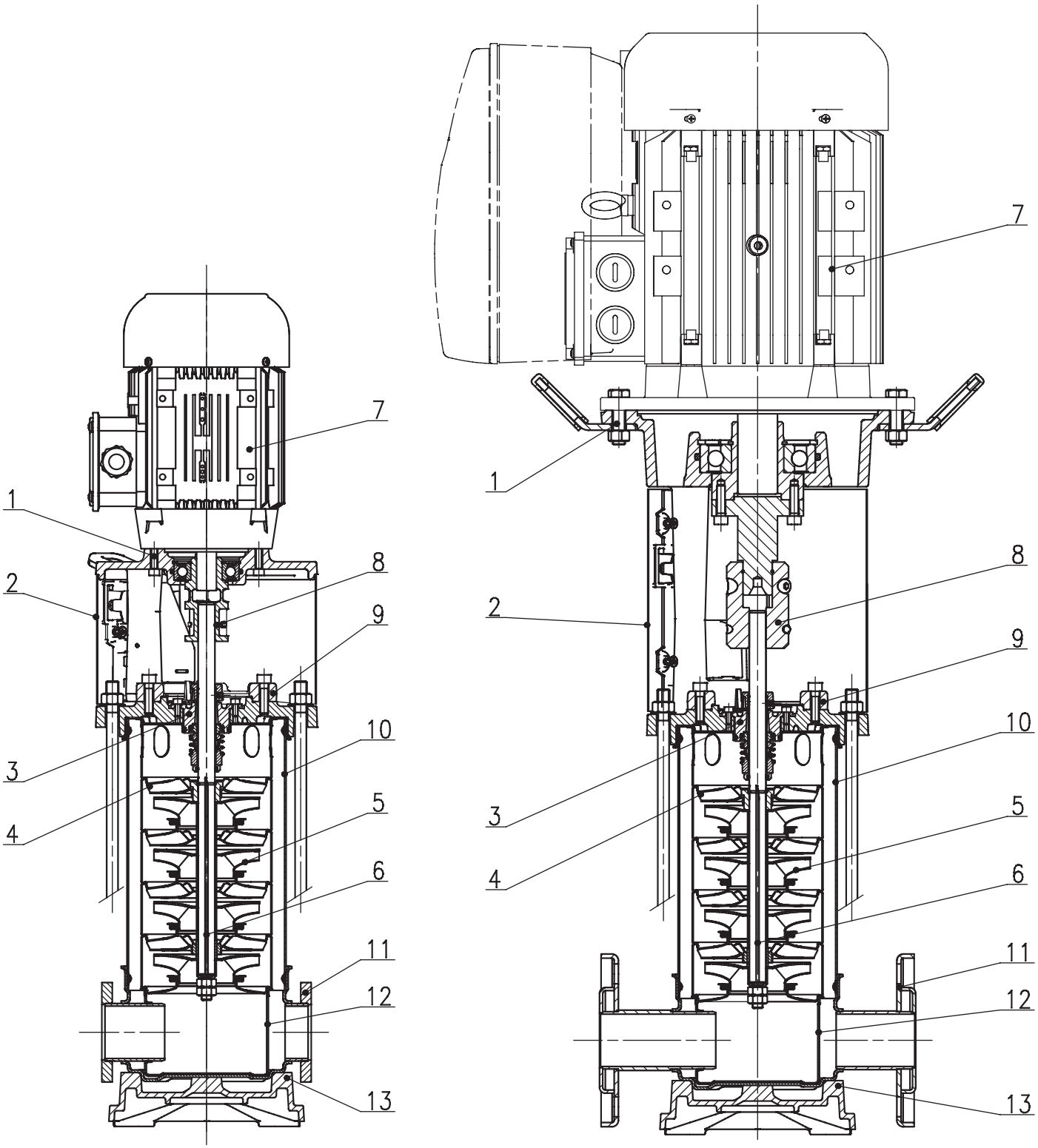


Fig. 2

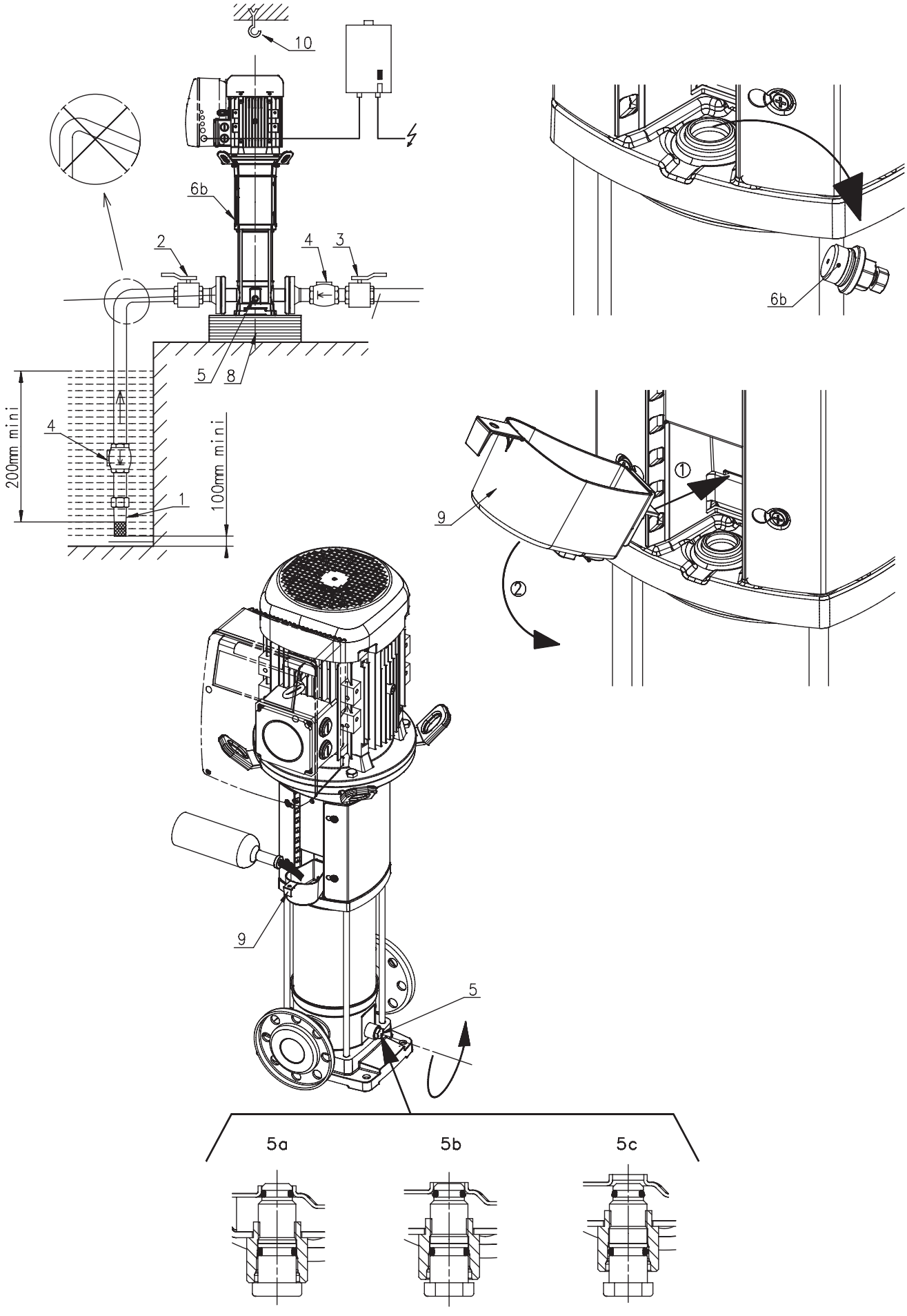


Fig. 3

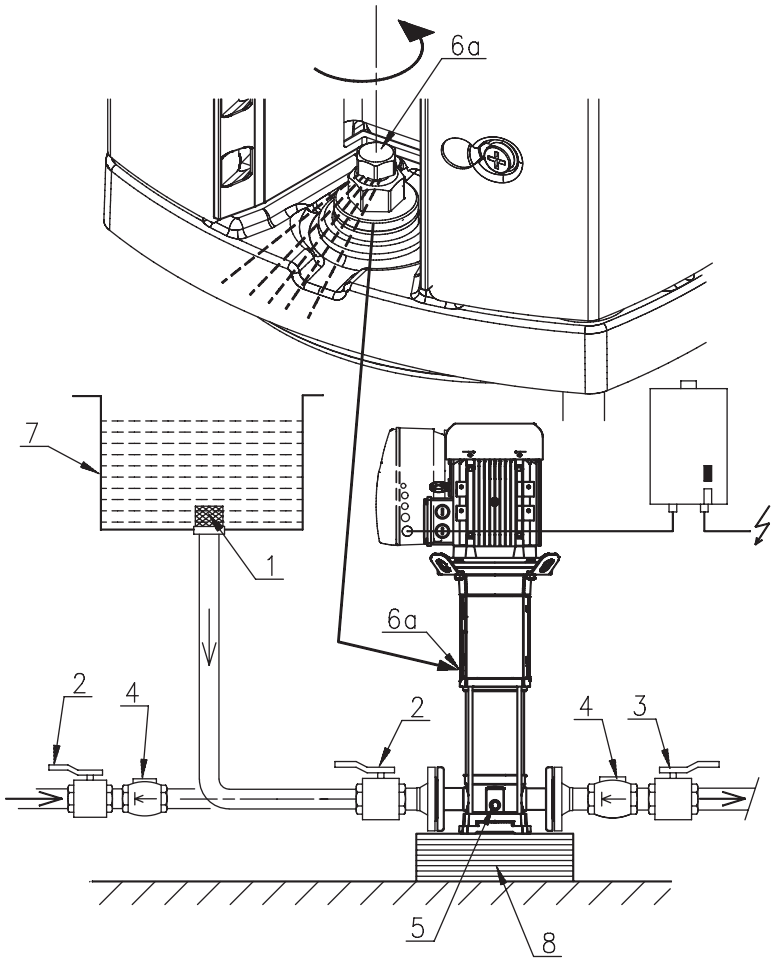
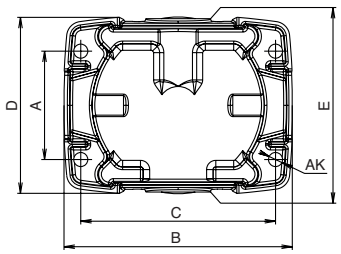
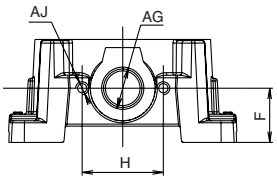
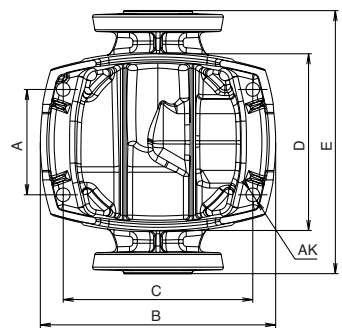


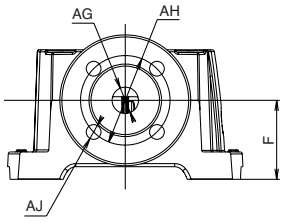
Fig. 4





Type		(mm)									
		A	B	C	D	E	F	G	H	J	K
HELIX V(F)2...	PN16	100	212	180	162	160	50	D32	75	2xM10	4xØ13
HELIX V(F)4...	PN16	100	212	180	162	160	50	D32	75	2xM10	4xØ13
HELIX V(F)6...	PN16	100	212	180	162	160	50	D32	75	2xM10	4xØ13
HELIX V(F)10...	PN16	130	251	215	181	200	80	D50	100	2xM12	4xØ13
HELIX V(F)16...	PN16	130	251	215	181	200	90	D50	100	2xM12	4xØ13





Type		(mm)									
		A	B	C	D	E	F	G	H	J	K
HELIX V(F)2...	PN25/PN30	100	212	180	172	250	75	D25	85	4xM12	4xØ13
HELIX V(F)4...	PN25/PN30	100	212	180	172	250	75	D25	85	4xM12	4xØ13
HELIX V(F)6...	PN25/PN30	100	212	180	172	250	75	D32	100	4xM16	4xØ13
HELIX V(F)10...	PN25/PN30	130	252	215	187	280	80	D40	110	4xM16	4xØ13
HELIX V(F)16...	PN25/PN30	130	252	215	187	300	90	D50	125	4xM16	4xØ13

Fig. 5

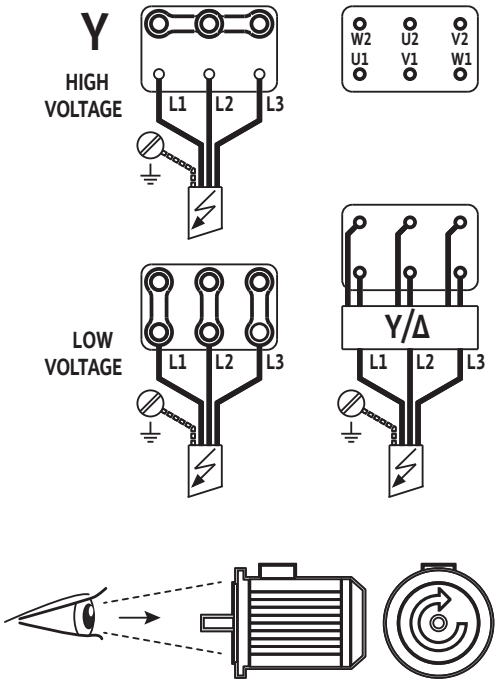


Fig. 6

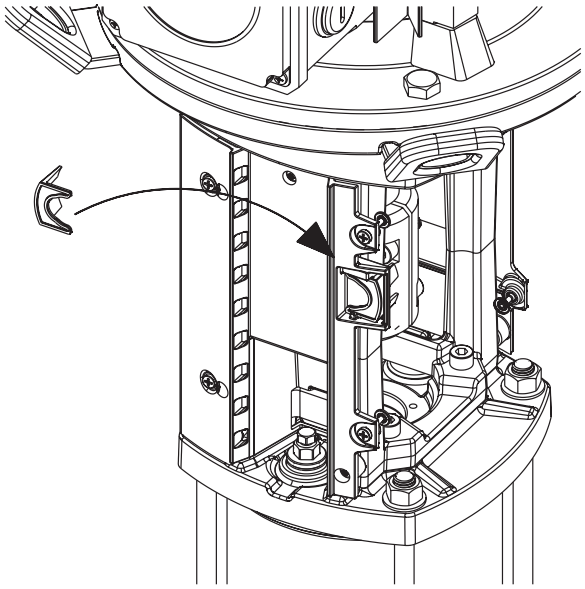
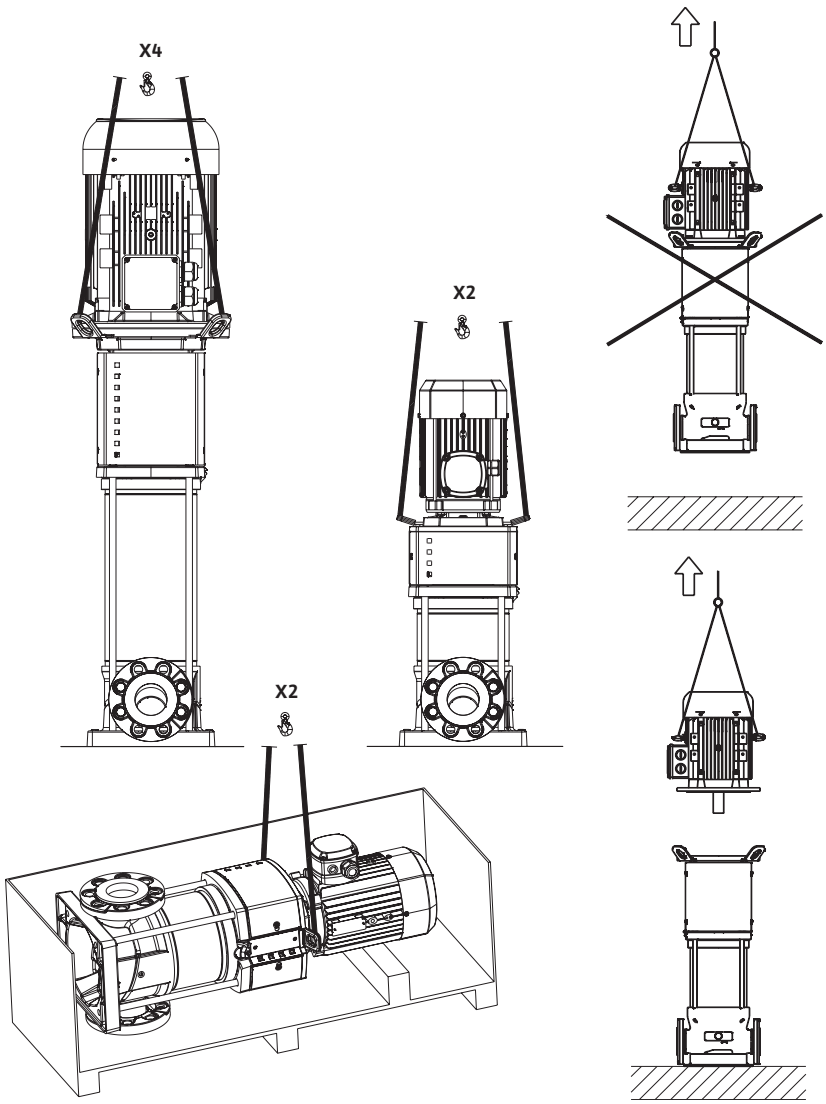


Fig. 7



1. General

1.1 About this document

The language of the original operating instructions is English. All other languages of these instructions are translations of the original operating instructions.

These installation and operating instructions are an integral part of the product. They must be kept readily available at the place where the product is installed. Strict adherence to these instructions is a precondition for the proper use and correct operation of the product.

These installation and operating instructions correspond to the relevant version of the product and the underlying safety standards valid at the time of going to print.

2. Safety

These operating instructions contain basic information which must be adhered to during installation, operation and maintenance. For this reason, these operating instructions must, without fail, be read by the service technician and the responsible specialist/operator before installation and commissioning.

It is not only the general safety instructions listed under the main point "safety" that must be adhered to but also the special safety instructions with danger symbols included under the following main points.

2.1 Symbols and signal words in the operating instructions

Symbols



General safety symbol



Danger due to electrical voltage



NOTICE: ....

Signal words:

DANGER! Acutely dangerous situation. Non-observance results in death or the most serious of injuries.

WARNING! The user can suffer (serious) injuries. 'Warning' implies that (serious) injury to persons is probable if this information is disregarded.

CAUTION! There is a risk of damaging the product/unit. 'Caution' implies that damage to the product is likely if this information is disregarded.

NOTICE: Useful information on handling the product. It draws attention to possible problems.

2.2 Personnel qualifications

The installation, operating and maintenance personnel must have the appropriate qualifications for this work. Area of responsibility, terms of reference and monitoring of the personnel are to be ensured by the operator. If the personnel are not in possession of the necessary knowledge, they are to be trained and instructed. This can be accomplished if necessary by the manufacturer of the product at the request of the operator.

2.3 Danger in the event of non-observance of the safety instructions

Non-observance of the safety instructions can result in risk of injury to persons and damage to the environment and the product/unit. Non-observance of the safety instructions results in the loss for any claims to damages.

In particular, non-observance can, for example, result in the following risks:

- Danger to persons due to electrical, mechanical and bacteriological factors
- Damage to the environment due to leakage of hazardous materials
- Property damage
- Failure of important product/unit functions
- Failure of required maintenance and repair procedures.

2.4 Safety consciousness on the job

The safety instructions included in these installation and operating instructions, the existing national regulations for accident prevention together with any internal working, operating and safety regulations of the operator are to be complied with.

2.5 Safety instructions for installation and maintenance work

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

- If hot or cold components on the product/unit lead to hazards, local measures must be taken to guard them against touching.
- Guards which protect personnel from coming into contact with moving components (e.g. the coupling) must not be removed while the product is in operation.
- Leakages (e.g. from the shaft seals) of hazardous fluids (which are explosive, toxic or hot) must be led away so that no danger to persons or to the environment arises. National statutory provisions are to be complied with.
- Highly flammable materials are always to be kept at a safe distance from the product.
- Danger from electrical current must be eliminated. Local directives or general directives [e.g. IEC, VDE etc.] and local power supply companies must be adhered to.

2.6 Safety instructions for installation and maintenance work

The operator must ensure that all installation and maintenance work is carried out by authorised and qualified personnel, who are sufficiently informed from their own detailed study of the operating instructions.

Work on the product/unit must only be carried out when at a standstill. It is mandatory that the procedure described in the installation and operating

instructions for shutting down the product/unit be complied with.
Immediately on conclusion of the work, all safety and protective devices must be put back in position and/or recommissioned.

2.7 Unauthorised modification and manufacture of spare parts

Unauthorised modification and manufacture of spare parts will impair the safety of the product/ personnel and will make void the manufacturer's declarations regarding safety.
Modifications to the product are only permissible after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety. The use of other parts will absolve us of liability for consequential events.

2.8 Improper use

The operating safety of the supplied product is only guaranteed for conventional use in accordance with Section 4 of the operating instructions. The limit values must on no account fall under or exceed those values specified in the catalogue/data sheet.

3. Transport and interim storage

When receiving the material, check that there has been no damage during the transport. If shipping damage has occurred, take all necessary steps with the carrier within the allowed time.

CAUTION! Outside influences may cause damages. If the delivered material is to be installed later on, store it in a dry place and protect it from impacts and any outside influences (humidity, frost etc.).
The product should be cleaned thoroughly before it is put into temporary storage. The product can be stored for at least one year.

Handle the pump carefully so as not to damage the unit prior to installation.

4. Application

This pump's basic function is to pump hot or cold water, water with glycol or other low viscosity fluids that contain no mineral oil, solid or abrasive substances, or materials having long fibres. The manufacturer's approval is required for use to pump corrosive chemicals.

CAUTION! Risk of explosion!
Do not use this pump to handle flammable or explosive liquids.

4.1 Applications areas

- water distribution and pressure boosting,
- industrial circulation systems,
- process fluids,
- cooling-water circuits,
- fire-fighting and washing stations,
- irrigation systems, etc.

5. Technical data

5.1 Pump designation

Example: Helix V1605-1/16/E/KS/400-50xxxx				
Helix V(F) **Helix FIRST V(F)**	Vertical high-pressure multistage centrifugal pump in in-line design (F) = VdS certified pump version			
16	Nominal volume flow in m³/h			
05	Number of impellers			
1	Pump material code 1 = Pump housing stainless steel 1.4301 (AISI 304) + hydraulics 1.4307 (AISI 304) 2 = Pump housing stainless steel 1.4404 (AISI 316L) + hydraulics 1.4404 (AISI 316L) 5 = Pump housing cast Iron EN-GJL-250 (standard coating) + hydraulics 1.4307 (AISI 304)			
16	Pipe connection 16 = oval flanges PN16 25 = round flanges PN25 30 = round flanges PN40			
E	Seal type code E = EPDM V = FKM			
KS	K = Cartridge seal, versions without "K" are equipped with simple mechanical seal S = Lantern orientation align with suction pipe X = X-Care version			
With motor		OR	**Bare-shaft pump (without motor)**	
400 - 460	Motor electrical voltage (V)		**50 - 60**	Motor frequency (Hz)
50 - 60	Motor frequency (Hz)		**-38FF265**	Ø motor shaft – lantern size
xxxx	Options code (if any)			

5.2 Data table

Maximum operating pressure																	
Pump casing	16, 25 ou 30 bars depend on the model																
Maximum suction pressure	10 bars Note : real inlet pressure (Pinlet)+ pressure at 0 flow delivered by the pump must be below the maximum operating pressure of the pump. In case of exceeding maximum operating pressure, the ball bearing and the mechanical seal could be damaged or lifetime could decrease. P Inlet + P at 0 flow ≤ Pmax pump See pump nameplate to know the maximum operating pressure: Pmax																
Temperature range																	
Liquid temperatures	–30°C to +120°C –15°C to +90°C (wiht FKM seal) –20°C to + 120°C (with cast iron casing)																
Ambient temperature	–15° to +40°C Other temperature on request																
Electrical data																	
Motor efficiency	Motor according to IEC 60034–30																
Motor Protection index	IP55																
Insulation class	155 (F)																
Frequency	See motor's rating plating																
Electrical voltage	See motor's rating plating																
Other data																	
Humidity	< 90% sans condensation																
Altitude	< 1000 m (> 1000m on request)																
Maximum suction head	according to pump's NPSH																
Sound pressure level dB(A) 0/+3 dB(A)		**Power (kW)**															
		0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	18.5	22	30	37	45
	50Hz	56	57		58		62	64	68	69		71		74		76		
	60Hz	60	61		63		67	71	72	74		78		81		84		

5.3 Scope of deliveryt

- Multistage pump.
- Installation and operating instructions.
- Counterflange + screws and o'rings for PN16 configuration.

5.4 Accessories

Original accessories are available for HELIX range:

Designation	Article nº.
2x oval counterflanges, stainless steel 1.4301 (screwing) (PN16 – 1")	4016168
2x round counterflanges in stainless steel 1.4404 (screwing) (PN40 – DN25)	4016165
2x round counterflanges in steel (welding) (PN40 – DN25)	4016162
2x oval counterflanges in stainless steel 1.4301 (screwing) (PN16 – 1" 1/4)	4016169
2x round counterflanges in stainless steel 1.4404 (screwing) (PN40 – DN32)	4016166
2x round counterflanges in steel (welding) (PN40 – DN32)	4016163
2x oval counterflanges in stainless steel 1.4301 (screwing) (PN16 – 1" 1/2)	4016170
2x round counterflanges in stainless steel 1.4404 (screwing) (PN40 – DN40)	4016167
2x round counterflanges in steel (welding) (PN40 – DN40)	4016164
2x oval counterflanges in stainless steel 1.4301 (screwing) (PN16 – 2")	4055063
2x round counterflanges in stainless steel 1.4404 (screwing) (PN40 – DN50)	4038589
2x round counterflanges in steel (welding) (PN40 – DN50)	4038588
Bypass kit 25 bar	4146786
Bypass kit (with pressure gauge 25 bar)	4146788
Baseplate with dampers for pumps up to 5,5 kW	4157154

The use of new accessories is recommended.

6. Description and function

6.1 Product description

Fig. 1

1 – Motor connection bolt
2 – Coupling guard
3 – Mechanical seal
4– Hydraulic stage casing
5 – Impeller
6 – Pump shaft
7 – Motor
8 – Coupling
9 – Lantern
10 – Liner
11 – Flange
12 – Pump housing
13 – Base plate

Fig. 2, 3

1 – Strainer
2 – Pump suction valve
3 – Pump discharge valve
4 – Check valve
5 – Drain + priming plug
6 – Air bleed screw + Filling plug
7 – Tank
8 – Foundation block
10 – Lifting hook

6.2 Design of product

- The Helix pumps are vertical high pressure non-self priming pumps with in-line connection based on multistage design.
- The Helix pumps combine use of both high efficiency hydraulics and motors.
- All metallic parts in contact with water are made of stainless steel.
- For models equipped with heaviest motor (>40 kgs), a specific coupling allows to change the seal without removing the motor. A cartridge seal is then used in order to ease maintenance.
- Special handling devices are integrated in order to facilitate pump installation (Fig. 7).

7. Installation and electrical connection

Installation and electrical work in compliance with any local codes and by qualified personnel only.

WARNING! Bodily injury!
Existing regulations for the prevention of accidents must be observed.

WARNING! Electrical shock hazard!
Dangers caused by electrical energy must be excluded.

7.1 Commissioning

Unpack the pump and dispose of the packaging in an environmentally-responsible manner.

7.2 Installation

The pump must be installed in a dry, well-ventilated and frost-free place.

CAUTION! Possible damage of the pump!
Dirt and solder drops in to the pump body can effect the pump operation.
- It is recommended that any welding and soldering work be done before installing the pump.
- Thoroughly flush the system out before installing the pump.

- The pump must be installed in an easily accessible position to facilitate inspection or replacement.
- For heavy pumps, install a lifting hook (Fig. 2, item 10) above the pump in order to ease its disassembly.

WARNING! Risk of accident by hot surfaces!
The pump must be positioned so that someone cannot come into contact with the hot pump surfaces while operation.

- Install the pump in a dry place protected from frost, on a flat concrete block using appropriate accessories. If possible, use an insulating material under the concrete block (cork or reinforced rubber) to avoid any noise and vibration transmission into the installation.

WARNING! Risk of fall!
The pump must be correctly screwed to the ground.

- Install the pump in a dry and frost-free place on a flat concrete block using appropriate accessories. If possible, use an insulating material under the concrete block (cork or reinforced rubber) to avoid any noise and vibration transmission into the installation.

CAUTION! Risk of parts inside the pump!
Take care to remove closure members of the pump housing before installation.

NOTE: Each pumps could be tested regarding hydraulic features in factory, some water may remain in them. It is recommended for hygienic purposes, to carry out a rinsing of the pump before any using with potable water supply.

- The installation and connection dimensions are given § 5.2.
- Lift the pump carefully by using the integrated hooks rings, if necessary with a hoist and suitable slings according to the current hoist guidelines.

WARNING! Risk of fall!
Take care to pump fixations especially for the highest pumps whose centre of gravity may lead to risk during pump handling.

WARNING! Risk of fall!
Use integrated rings only if they are not damaged (no corrosion ...). Replace them if needed.

WARNING! Risk of fall!
The pump must be never carried by using motor hooks: these are only designed to lift the motor alone.

7.3 Pipe connection

- Connect the pump to the pipes by using appropriate counterflanges, bolts, nuts and gaskets.

CAUTION!
Tightening of screws or bolts must not exceed.

Configuration PN16 / PN25	
M10 – 20 N.m	M12 – 30 N.m
Configuration PN40	
M12 – 50 N.m	M16 – 80 N.m

Use of impact wrench is prohibited.

- The circulation sense of the fluid is indicated on the identification label of the pump.
- Pump must be installed in such a way that it is not stressed by the pipework. The pipes must be attached so that the pump does not bear their weight.
- It is recommended that isolation valves be installed on the suction and discharge side of the pump.
- Use of expansion joints may mitigate noise and vibration of the pump.
- As regards the nominal cross-section of the suction pipe, we recommend a cross-section at least as large as that of the pump connection.
- A check valve could be placed on the discharge pipe in order to protect the pump against hammer shock.
- For direct connection to a public drinking water system, the suction pipe must also have a check valve and a guard valve.
- For indirect connection via a tank, the suction pipe must have a strainer to keep any impurities out of the pump and a check valve.

7.4 Motor connection for bare-shaft pump (without motor)

- Remove coupling guards.

NOTE: Coupling guards can be removed without entirely unscrewing screws.

- Install the motor on the pump by using screws (FT lantern size – see product designation) or bolts, nuts and handling devices (FF lantern size – see product designation) provided with the pump : check motor power and dimension in WILO catalogue.

NOTE: Depending on fluid characteristics, motor power could be modified. Contact The Wilo Customer Services if necessary.

- Close the coupling guards by screwing all screws provided with the pump.

7.5 Electrical connection

WARNING! Electrical shock hazard!
Dangers caused by electrical energy must be excluded.

- Electrical work by a qualified electrician only!
- All electrical connections must be performed after the electrical supply has been switched off and secured against unauthorized switching.
- For safe installation and operation a proper grounding of the pump to the power supply's grounding terminals is required.

- Check that operating current, voltage and frequency used comply with motor plating data.
- The pump must be connected to the power supply by a solid cable equipped with a grounded plug-connection or a main power switch.
- Three-phase motors must be connected to an approved motor starter. The set nominal current must correspond to the electrical data on the pump motor name plate.
- The supply cable must be laid so that it never touches the pipework and/or the pump and motor casing.
- The pump/installation should be grounded in compliance with local regulations. A ground fault interrupter can be used as extra protection.
- The connection to the network must be in accordance with the connection plan (Fig. 5).

7.6 Operation with frequency converter

- Motors used can be connected to a frequency converter in order to adapt pump performance to duty point.
- The converter must not generate voltage peaks at motor terminals higher than 850V and dU/dt slope higher than 2500 V/µs.
- In case of higher value, an appropriate filter must be used: contact converter manufacturer for this filter definition and selection.
- Strictly follow instructions provided by the converter manufacturer data sheet for installation.
- Minimum variable speed should not be set below 40% of pump nominal speed.

8. Commissioning

8.1 System filling – Venting

CAUTION! Possible damage of the pump!
Never operate the pump dry.
The system must be filled before starting the pump.

8.1.1 Air evacuation process – Pump with sufficient supply pressure (Fig. 3)

- Close the two guard valves (2, 3).
- Unscrew the venting screw from filling plug (6a).
- Slowly open the guard valve on the suction side (2).
- Retighten the venting screw when air escapes at the venting screw and the pumped liquid flows (6a).

WARNING!
When the pumped liquid is hot and the pressure high, the stream escaping at the venting screw may cause burns or other injuries.

- Open the guard valve on the suction side completely (2).
- Start the pump and check if direction of rotation matches the one printed on pump plating. If this is not the case, interchange two phases in the terminal box.

CAUTION!
A wrong direction of rotation will cause bad pump performances and possibly coupling damage.

- Open the guard valve on the discharge side (3).

8.1.2 Air evacuation process – Pump in suction (Fig. 2)

- Close the guard valve on the discharge side (3). Open the guard valve on the suction side (2).
- Remove the filling plug (6b).
- Open the drain-priming plug not completely (5b).
- Fill the pump and the suction pipe with water.
- Make sure that there is no air in the pump and in the suction pipe : refilling until complete removal of air is required.
- Close the filling plug with air bleed screw (6b).
- Start the pump and check if direction of rotation matches the one printed on pump plating. If this is not the case, interchange two phases in the terminal box.

CAUTION!
A wrong direction of rotation will cause bad pump performances and possibly coupling damage.

- Open the guard valve on the discharge side a little (3).
- Unscrew the air bleed screw from filling plug for air venting (6a).
- Retighten the air-bleed screw when air escapes at the air bleed screw and the pumped liquid flows.

WARNING!
When the pumped liquid is hot and the pressure high, the stream escaping at the air bleed screw may cause burns or other injuries.

- Open the guard valve on the discharge side completely (3).
- Close the drain-priming plug (5a).

8.2 Starting up

CAUTION!
The pump must not operate at zero flow (closed discharge valve).

WARNING! Risk of injury!
When the pump runs, coupling guards must be in place, tightened with all appropriate screws.

WARNING! Important noise!
Noise emitted by most powerful pumps could be very high : protection must be used in case of long stay close to the pump.

WARNING!
Installation must be designed in order that no one could be hurt in case of fluid leakage (mechanical seal failure ...).

9. Maintenance

All servicing should be performed by an authorized service representative!

WARNING! Electrical shock hazard!
Dangers caused by electrical energy must be excluded.
All electrical work must be performed after the electrical supply has been switched off and secured against unauthorized switching.

WARNING! Risk of scalding!
At high water temperatures and system pressure close isolating valves before and after the pump. First, allow pump to cool down.

- These pumps are maintenance free. Nevertheless a regular check is recommended every 15 000 hours.
- In option, mechanical seal could be easily replace on some models thanks to its cartridge seal design. Insert its adjusting wedge in its housing (Fig. 6) once mechanical seal position is set.
- Always keep the pump perfectly clean.
- Pumps which are not being used during periods of frost should be drained to avoid damage: Close the guard valves, open completely the drain-priming plug and the air bleed screw.
- Service life: 10 years depending on the operating conditions and whether all requirements described in the operation manual have been met.

10. Faults, cause and remedies



WARNING! Electrical shock hazard!
Dangers caused by electrical energy must be excluded.
All electrical work must be performed after the electrical supply has been switched off and secured against unauthorized switching.



WARNING! Risk of scalding!
At high water temperatures and system pressure close isolating valves before and after the pump. First, allow pump to cool down.

Faults	Cause	Remedies
Pump does not run	No current	Check the fuses, the wiring, and the connectors
	The thermistor tripping device has tripped out, cutting off power	Eliminate any cause of overloading of the motor
Pump runs but delivers too little	Wrong direction of rotation	Check the direction of rotation of the motor and correct it if necessary
	Parts of the pump are obstructed by foreign bodies	Check and clean the pipe
	Air in suction pipe	Make the suction pipe airtight
	Suction pipe too narrow	Install a larger suction pipe
	The valve is not open far enough	Open the valve properly
Pump delivers unevenly	Air in pump	Evacuate the air in the pump; check that the suction pipe is airtight. If required, start the pump 20–30s – open the air bleed screw in order to move air away – close the air bleed screw and repeat it several times until no more air is going out of the pump
Pump vibrates or is noisy	Foreign bodies in pump	Remove the foreign bodies
	Pump not properly attached to ground	Retighten the screws
	Bearing damaged	Call the Wilo Customer Service
Motor overheats, its protection trips out	A phase is open-circuit	Check the fuses, the wiring, and the connectors
	Ambient temperature too high	Provide cooling
Mechanical seal is leaking	Mechanical seal is damaged	Replace the mechanical seal

If the fault cannot be solved, please contact the Wilo customer services.

11. Spare parts

Spare parts may be ordered via the Wilo customer service.
To avoid queries and incorrect orders, all data from the rating plate must be specified with every order.
The spare parts catalogue is available at www.wilo.com.

12. disposal

Information on the collection of used electrical and electronic products

Proper disposal and appropriate recycling of this product prevents damage to the environment and dangers to your personal health.



NOTICE: Disposal in domestic waste is forbidden !
In the European Union, this symbol can appear on the product, the packaging or the accompanying documentation. It means that the electrical and electronic products in question must not be dis- posed of along with domestic waste.

To ensure proper handling, recycling and disposal of the used products in question, please note the following points:

- Only hand over these products at designated, certified collecting points.
- Observe the locally applicable regulations! Please consult your local municipality, the nearest waste disposal site, or the dealer who sold the product to you for information on proper disposal. For further information on recycling, go to www.wilo-recycling.com.

Subject to technical alterations!

GARANTİ BELGESİ

Bu belge 6502 sayılı Tüketicinin Korunması Hakkında Kanun ve Garanti Belgesi Yönetmeliği'ne uygun olarak düzenlenmiştir.

GARANTİ ŞARTLARI

1. Garanti süresi, malın teslim tarihinden itibaren başlar ve 2 **yıldır.**

2. Malın bütün parçaları dahil olmak üzere tamamı garanti kapsamındadır.

3. Malın ayıplı olduğunun anlaşılması durumunda tüketici, 6502 sayılı Tüketicinin Korunması Hakkında Kanunun 11 inci maddesinde yer alan;

a- Sözleşmeden dönme,

b- Satış bedelinden indirim isteme,

c- Ücretsiz onarılmasını isteme,

d- Satılanın ayıpsız bir misli ile değiştirilmesini isteme, haklarından birini kullanabilir.

4. Tüketicinin bu haklardan ücretsiz onarım hakkını seçmesi durumunda satıcı; işçilik masrafı, değiştirilen parça bedeli ya da başka herhangi bir ad altında hiçbir ücret talep etmeksizin malın onarımını yapmak veya yaptırmakla yükümlüdür. Tüketici ücretsiz onarım hakkını üretici veya ithalatçıya karşı da kullanabilir. Satıcı, üretici ve ithalatçı tüketicinin bu hakkını kullanmasından müteselsilen sorumludur.

5. Tüketicinin, **ücretsiz onarım hakkını** kullanması halinde malın;

- Garanti süresi içinde tekrar arızalanması,
- Tamiri için gereken azami sürenin aşılması,
- Tamirinin mümkün olmadığının, yetkili servis istasyonu, satıcı, üretici veya ithalatçı tarafından bir raporla belirlenmesi durumlarında;

tüketici malın bedel iadesini, ayıp oranında bedel indirimini veya imkân varsa malın ayıpsız misli ile değiştirilmesini satıcıdan talep edebilir. Satıcı, tüketicinin talebini reddedemez. Bu talebin yerine getirilmemesi durumunda satıcı, üretici ve ithalatçı müteselsilen sorumludur.

6. Malın tamir süresi **20 iş gününü** geçemez. Bu süre, garanti süresi içerisinde mala ilişkin arızanın yetkili servis istasyonuna veya satıcıya bildirimi tarihinde, garanti süresi dışında ise malın yetkili servis istasyonuna teslim tarihinden itibaren başlar. Malın arızasının **10 iş günü** içerisinde giderilememesi halinde, üretici veya ithalatçı; malın tamiri tamamlanıncaya kadar, benzer özelliklere sahip başka bir malı tüketicinin kullanımına tahsis etmek zorundadır. Malın garanti süresi içerisinde arızalanması durumunda, tamirde geçen süre garanti süresine eklenir.

7. Malın kullanma kılavuzunda yer alan hususlara aykırı kullanılmasından kaynaklanan arızalar garanti kapsamı dışındadır.

8. Tüketici, garantiden doğan haklarının kullanılması ile ilgili olarak çıkabilecek uyuşmazlıklarda yerleşim yerinin bulunduğu veya tüketici işleminin yapıldığı yerdeki **Tüketici Hakem Heyetine veya Tüketici Mahkemesine** başvurabilir.

9. Satıcı tarafından bu **Garanti Belgesinin** verilmemesi durumunda, tüketici **Gümrük ve Ticaret Bakanlığı Tüketicinin Korunması ve Piyasa Gözetimi Genel Müdürlüğüne** başvurabilir.

Üretici veya İthalatçı Firma:	**Satıcı Firma :**
WILO Pompa Sistemleri San. ve Tic. A.Ş.	**Unvanı :**
Orhanlı Mah. Fettah Başaran Cad. No:91 Tuzla	**Adresi :**
istanbul/TÜRKİYE	**Telefonu :**
Tel: (0216) 250 94 00	**Faks :**
Faks:(0216)250 94 07	**E-posta :**
E-posta : servis@wilo.com.tr	**Fatura Tarih ve Sayısı :**
	Teslim Tarihi ve Yeri :
Yetkilinin İmzası	**Yetkilinin İmzası :**
Firmanın Kaşesi	**Firmanın Kaşesi :**



Malın		**Malın**	
Cinsi	**:** MOTORLU SU POMPASI	**Garanti Süresi**	**:** 2 yıl
Markası	**:** WILO	**Azami Tamir Süresi**	**:** 20 iş günü
Modeli	**:**	**Bandrol ve Seri No**	**:**

EU/EG KONFORMITÄTSERKLÄRUNG
EU/EC DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITE UE/CE

Als Hersteller erklären wir unter unserer alleinigen Verantwortung, daβ die Pumpenbauarten der Baureihen,
We, the manufacturer, declare under our sole responsability that the pump types of the series,
Nous, fabricant, déclarons sous notre seule responsabilité que les types de pompes des séries,

Helix V 2... /4... /6...
Helix V 10.../16...
Helix First V 2... /4... /6...
Helix First V 10.../16...

(Die Seriennummer ist auf dem Typenschild des Produktes nach Punkten b) & c) von §1.7.4.2 und §1.7.3 des Anhanges I der Maschinenrichtlinie angegeben. / The serial number is marked on the product site plate according to points b) & c) of §1.7.4.2 and §1.7.3 of the annex I of the Machinery directive. / Le numéro de série est inscrit sur la plaque signalétique du produit en accord avec les points b) & c) du §1.7.4.2 et du §1.7.3 de l'annexe I de la Directive Machines.)

in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entsprechen:
In their delivered state comply with the following relevant directives:
dans leur état de livraison sont conformes aux dispositions des directives suivantes :

_ Maschinenrichtlinie 2006/42/EG
_ *Machinery 2006/42/EC*
_ *Machines 2006/42/CE*
und gemäss Anhang 1, §1.5.1, werden die Schutzziele der Niederspannungsrichtlinie 2014/35/EU eingehalten
and according to the annex 1, §1.5.1, comply with the safety objectives of the Low Voltage Directive 2014/35/EU
et, suivant l'annexe 1, §1.5.1, respectent les objectifs de sécurité de la Directive Basse Tension 2014/35/UE

_ Energieverbrauchsrelevanter Produkte - Richtlinie 2009/125/EG
_ *Energy-related products 2009/125/EC*
_ *Produits liés à l'énergie 2009/125/CE*
Nach den Okodesign-Anforderungen der Verordnung 640/2009 für Ausführungen mit einem einstufigen Dreiphasen - 50Hz - Käfigläufer - Induktionselektromotor, der Verordnung 4/2014 Geänderte / Nach den Ökodesign-Anforderungen der Verordnung 547/2012 für Wasserpumpen,
This applies according to eco-design requirements of the regulation 640/2009 to the versions with an induction electric motor, squirrel cage, three-phase, single speed, running at 50Hz, amended by Regulation 4/2014 / This applies according to eco-design requirements of the regulation
suivant les exigences d'éco-conception du règlement 640/2009 aux versions comportant un moteur électrique à induction à cage d'écureuil, triphasé, mono-vitesse, fonctionnant à 50Hz, amendé par le règlement 4/2014 / suivant les exigences d'éco-conception du règlement 547/2012

und entsprechender nationaler Gesetzgebung,
and with the relevant national legislation,
et aux législations nationales les transposant,

sowie auch den Bestimmungen zu folgenden harmonisierten europäischen Normen:
comply also with the following relevant harmonised European standards:
sont également conformes aux dispositions des normes européennes harmonisées suivantes :

EN 809+A1 **EN 60034-1** **EN 60034-30-1**
EN 60204-1

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen ist:
Person authorized to compile the technical file is:
Personne autorisée à constituer le dossier technique est :

Group Quality Manager
WILO SE
Nortkirchenstraβe 100
D-44263 Dortmund

Dortmund,

ppa. H. Herchenhein

Digital unterschrieben von Holger Herchenhein
Datum: 2018.03.12 14:41:27 +01'00'

H. HERCHENHEIN
Senior Vice President - Group Quality

WILO SE
Nortkirchenstraβe 100
44263 Dortmund - Germany

N°2117757.05 *(CE-A-S n°4123482)*

Original-erklärung / Original declaration / Déclaration originale

F_GQ_013-23

EU/EG KONFORMITÄTSERKLÄRUNG
EU/EC DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITE UE/CE

Als Hersteller erklären wir unter unserer alleinigen Verantwortung, daβ die Pumpenbauarten der Baureihen,
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Helix VF 2... /4... /6...
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Helix First VF 10.../16...

(Die Seriennummer ist auf dem Typenschild des Produktes nach Punkten b) & c) von §1.7.4.2 und §1.7.3 des Anhanges I der Maschinenrichtlinie angegeben. / The serial number is marked on the product site plate according to points b) & c) of §1.7.4.2 and §1.7.3 of the annex I of the Machinery directive. / Le numéro de série est inscrit sur la plaque signalétique du produit en accord avec les points b) & c) du §1.7.4.2 et du §1.7.3 de l'annexe I de la Directive Machines.)

in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entsprechen:
In their delivered state comply with the following relevant directives:
dans leur état de livraison sont conformes aux dispositions des directives suivantes :

_ Maschinenrichtlinie 2006/42/EG
_ *Machinery 2006/42/EC*
_ *Machines 2006/42/CE*
und gemäss Anhang 1, §1.5.1, werden die Schutzziele der Niederspannungsrichtlinie 2014/35/EU eingehalten
and according to the annex 1, §1.5.1, comply with the safety objectives of the Low Voltage Directive 2014/35/EU
et, suivant l'annexe 1, §1.5.1, respectent les objectifs de sécurité de la Directive Basse Tension 2014/35/UE

_ Energieverbrauchsrelevanter Produkte - Richtlinie 2009/125/EG
_ *Energy-related products 2009/125/EC*
_ *Produits liés à l'énergie 2009/125/CE*
Nach den Okodesign-Anforderungen der Verordnung 640/2009 für Ausführungen mit einem einstufigen Dreiphasen - 50Hz - Käfigläufer - Induktionselektromotor, der Verordnung 4/2014 Geänderte
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Group Quality Manager
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D-44263 Dortmund

Dortmund,

ppa. H. Herchenhein

Digital unterschrieben von Holger Herchenhein
Datum: 2018.03.12 14:41:12 +01'00'

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N°2195311.01 *(CE-A-S n°4123482)*

Original-erklärung / Original declaration / Déclaration originale

F_GQ_013-23

wilo

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Pioneering for You

Wilo-Medana CH1-L



de Einbau- und Betriebsanleitung
en Installation and operating instructions
fr Notice de montage et de mise en service
nl Inbouw- en bedieningsvoorschriften
es Instrucciones de instalación y funcionamiento
it Istruzioni di montaggio, uso e manutenzione
tr Montaj ve kullanma kılavuzu
ru Инструкция по монтажу и эксплуатации
uk Інструкція з монтажу та експлуатації

4234327 • Ed.04/03/2021

Fig. 1

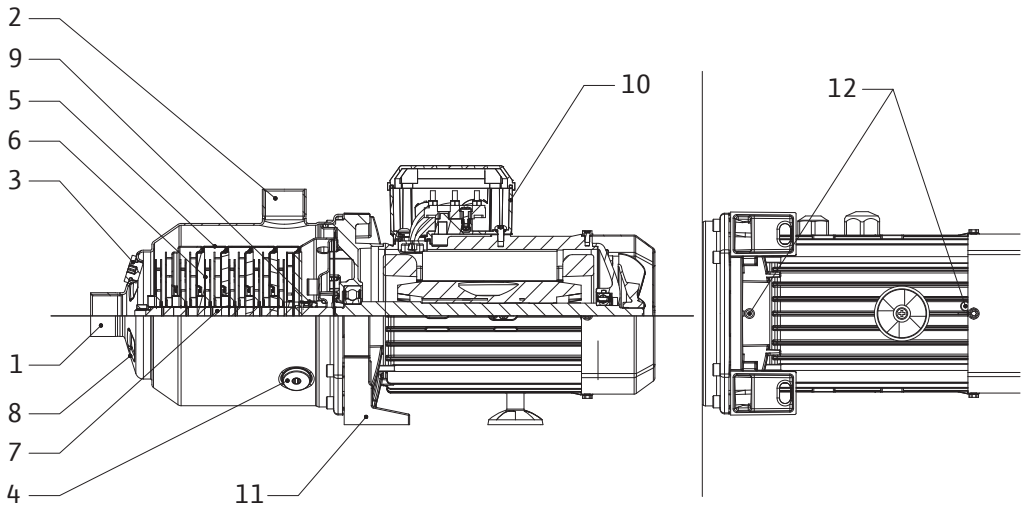


Fig. 2

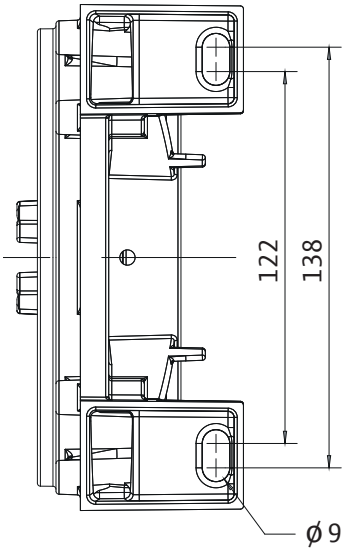


Fig. 3a

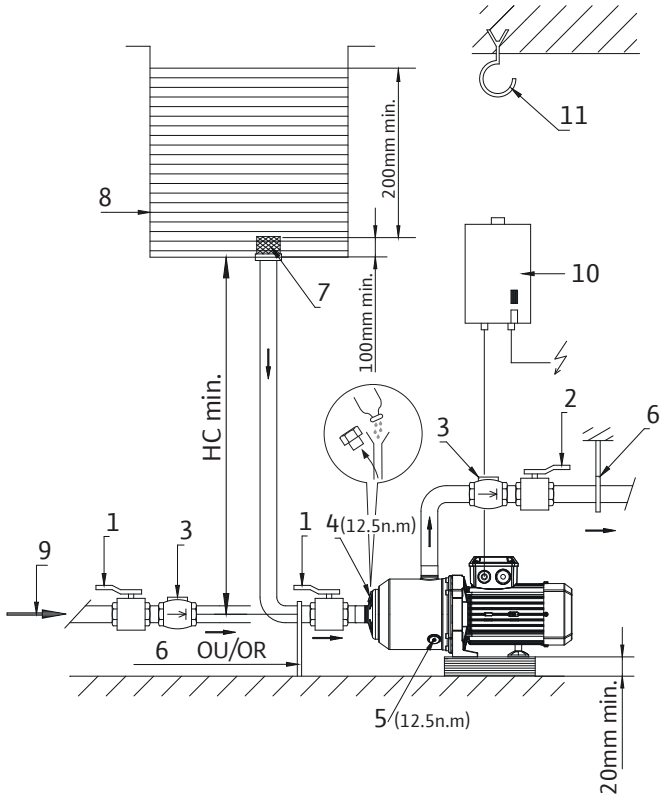


Fig. 3b

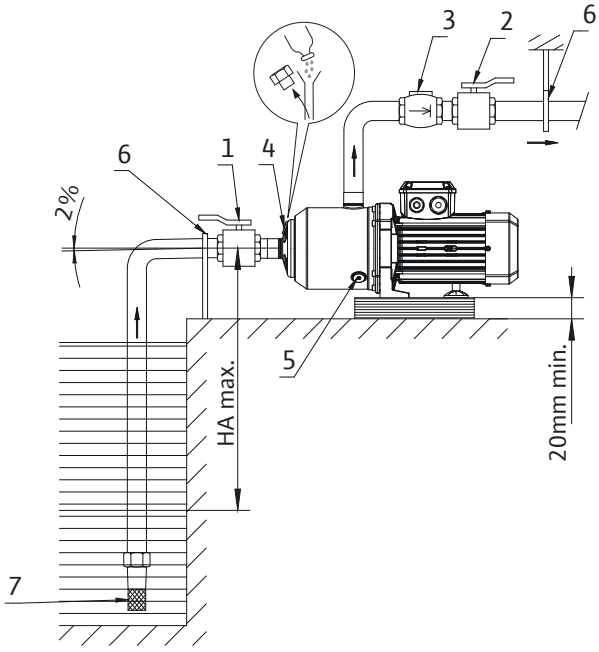


Fig. 3c

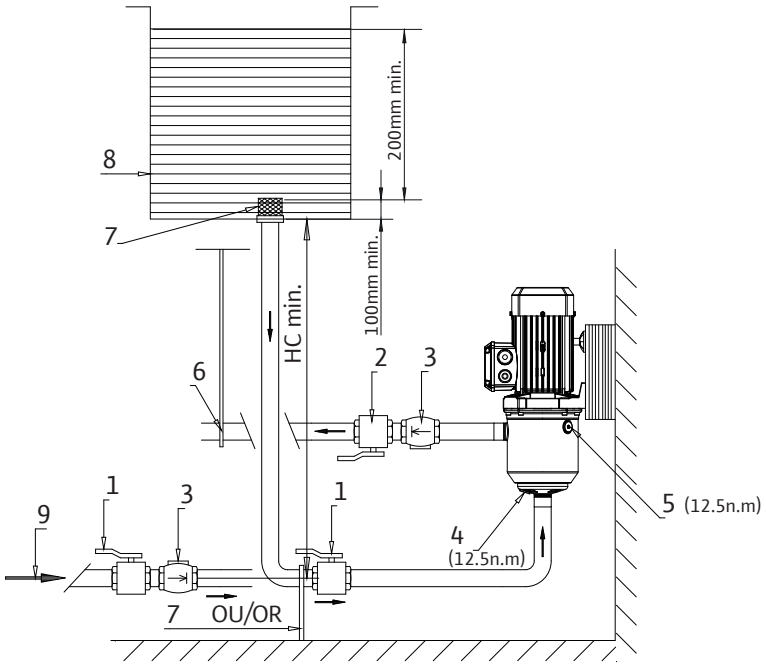


Fig. 4

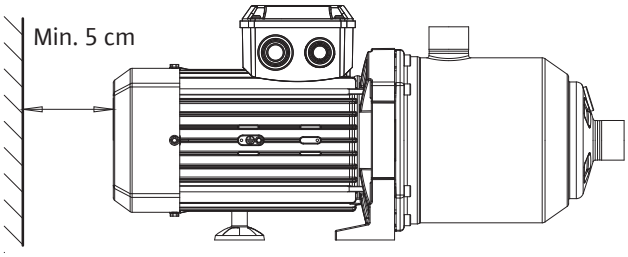


Fig. 5

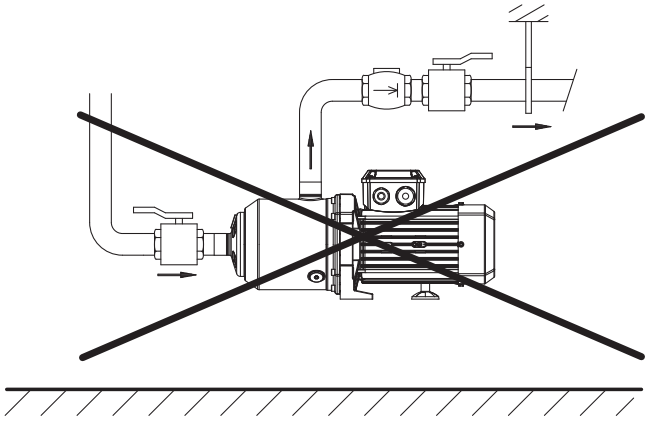


Fig. 6

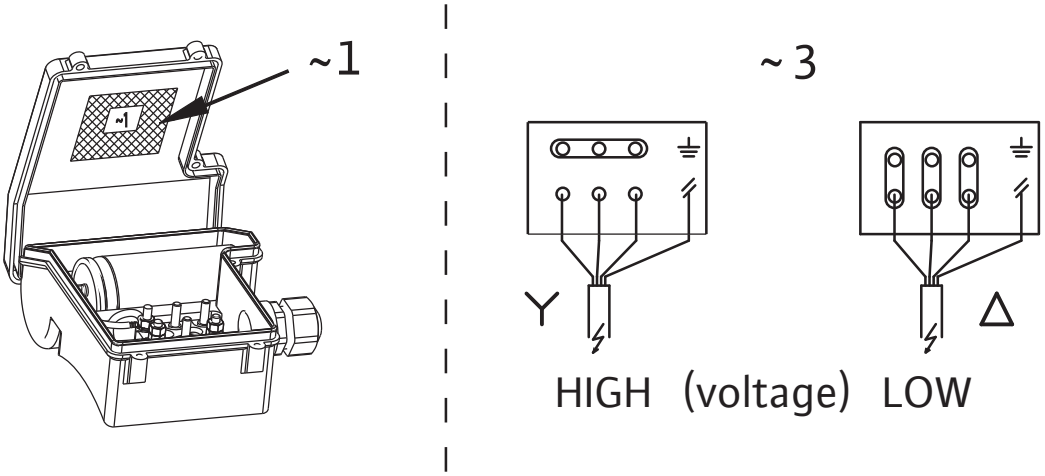
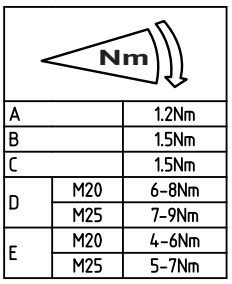
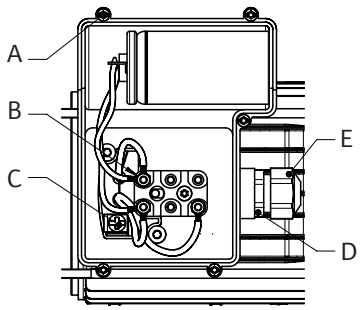


Fig. 7



A		1.2Nm
B		1.5Nm
C		1.5Nm
D	M20	6-8Nm
	M25	7-9Nm
E	M20	4-6Nm
	M25	5-7Nm



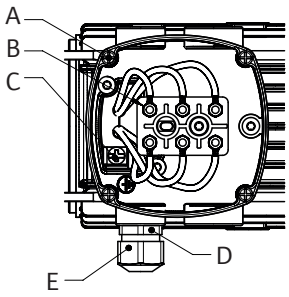


Fig. 8

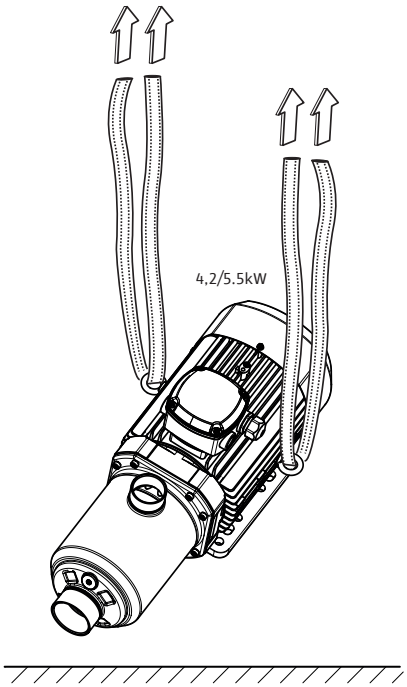
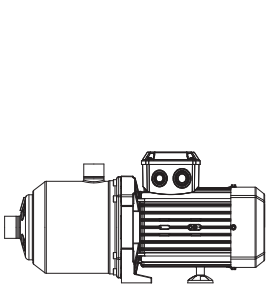
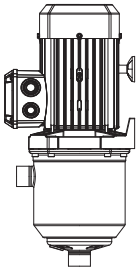
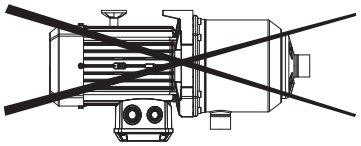
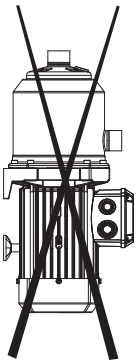


Fig. 9









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1 General

1.1 About this document

The installation and operating instructions are an integral part of the product. Read these instructions before carrying out any work and keep them at hand at all times. Strict adherence to these instructions is a precondition for the correct installation and application of the product. Comply with all indications and signs appearing on the product.

The language of the original installation and operating instructions is English. All other languages of these instructions are translations of the original installation and operating instructions.

EC-Declaration of conformity:
- → A copy of the EC-Declaration of conformity is an integral part of these installation and operating instructions.
- → If a technical modification is made to the series named herein without our agreement, this declaration loses its validity.

2 Safety

This chapter contains essential instructions that must be followed during the different phases of the pump's service life. Non-observance of these instructions may constitute a danger to persons, the environment and the product, and may invalidate the warranty. Non-observance may lead to the following hazards:
- → Injuries due to electrical, mechanical and bacteriological factors and electromagnetic fields.
- → Damage to the environment due to leakage of hazardous materials.
- → Damage to the installation.
- → Failure of important product functions.

Also comply with the indications and safety instructions in other chapters!

2.1 Symbols

Symbols:



WARNING
General safety symbol



WARNING
Electrical risks



NOTICE
Notes

Warnings:



DANGER
Imminent danger.
May result in death or severe injuries if the hazard is not prevented.



WARNING
Non-observance may result in (very) severe injury.



CAUTION
The product risks becoming damaged. "Caution" is used when there is a risk to the product if the user does not observe procedures.

NOTICE
Note containing useful information for the user about the product. It assists the user in the case of an issue.

2.2 Personnel qualifications

The installation, application and maintenance personnel must have the appropriate qualifications to complete this work. The operator must ensure the personnel's areas of responsibility, terms of reference and their supervision. If the personnel are not in possession of the necessary knowledge, they are to be trained and instructed. If necessary, this training can be carried out by the product's manufacturer on the operator's behalf.

2.3 Safety consciousness on the job

The existing directives for accident prevention must be adhered to. Danger from electrical current must be eliminated. Local directives or general directives [e.g. IEC, VDE etc.] and instructions from local energy supply companies must be respected.

2.4 Safety instructions for the operator

This device is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or a lack of experience or knowledge, unless they are monitored or have been given detailed instructions concerning use of the device by a person responsible for their safety.

Children must be supervised to ensure that they do not play with the device.

- → If hot or cold components of the product or installation pose a danger, it is the customer's responsibility to guard them against being touched.
- → Guards protecting against touching moving components (such as the coupling) must not be removed whilst the product is in operation.
- → Hazardous fluids (i.e. which are explosive, toxic or hot) which have leaked (e.g. from the shaft seals) must be disposed of so that they pose no danger to persons or to the environment. National statutory provisions must be respected.
- → Danger from electrical current must be eliminated. Local directives or general directives [e.g. IEC, VDE etc.] and instructions from local energy supply companies must be respected.

2.5 Safety instructions for installation and maintenance work

The operator must ensure that all maintenance and installation work is carried out by authorised and qualified personnel, who are sufficiently informed from their own detailed study of the installation and operating instructions. Work on the product/unit must only be carried out when at a standstill. The procedures described in the installation and operating instructions for deactivating the product/installation must always be complied with.

Immediately on conclusion of the work, all safety and protective devices must be put back in position and recommissioned.

2.6 Unauthorised modification of components and use of unauthorised spare parts

Unauthorised modification of components and use of unauthorised spare parts will impair the safety of the product/personnel, and will render the manufacturer's declarations regarding safety void. Modifications to the product are only permissible following consultation with the manufacturer.

Original spare parts and accessories authorised by the manufacturer ensure safety. The use of other parts absolves the manufacturing company of any and all liability.

2.7 Improper use

The operational reliability of the supplied product is only guaranteed for conventional use in accordance with Chapter 4 of the Installation and operating instructions. The limit values must on no account fall below or exceed the values specified in the catalogue/data sheet.

3 Product information

3.1 Type key

Example:	Medana CH1-L.602-1/E/A/10T
Wilo	Brand
Medana	Multistage centrifugal pump
C	Commercial series
H	Horizontal pump

Example:	Medana CH1-L.602-1/E/A/10T
1	Series level (1 = entry level, 3 = standard level, 5 = premium level)
L	L = Long shaft E = Electronic control
6	Delivery rate in m^3/h
02	Number of impellers
1	1 = Pump housing in 1.4308 stainless steel + hydraulics in 1.4307 stainless steel 2 = Pump housing in 1.4409 stainless steel + hydraulics in 1.4404 stainless steel
E	E = EPDM seal V = FKM seal
A	A = Frequency 50 Hz / single-phase / 230 V B = Frequency 60 Hz / single-phase / 220 V C = Frequency 60 Hz / single-phase / 230 V D = Frequency 50 Hz / three-phase / 400 V E = Frequency 50 Hz / three-phase / 230 – 400 V F = Frequency 60 Hz / three-phase / 220 – 380 V G = Frequency 60 Hz / three-phase / 265 – 460 V I = Frequency 60 Hz / three-phase / 460 V
10	Maximum pressure of the pump in bar
T	T = Screwed connections P = Victaulic connections N = Connections with captive nut

3.2 Data table

Maximum utilisation pressure	
Maximum operating pressure	See pump type key on rating plate and paragraph 3.1
Maximum suction pressure	6 bar
Notice: the suction pressure (P input) + the pressure at zero delivery rate (P zero delivery rate) must always be lower than the maximum authorised operating pressure (P max). P input + P zero delivery rate ≤ P max. Refer to the pump rating plate for the maximum operating pressure: P max.	
Temperature range	
Fluid temperature	-20 °C to +120 °C with EPDM seals -20 °C to +90 °C with VITON seals (only on version L)
Ambient temperature	-15 °C to +50 °C
Electrical data	
Motor protection rating	See plate
Insulation class	See plate
Frequency	See plate
Voltage	See plate
Motor efficiency	See plate
Other characteristics	
Humidity	< 90 % without condensation
Altitude	≤ 1000 m (> 1000 m on request)

Noise level

Motor power (kW)	Frequency (Hz)	Phase	dB(A) at 1 m, BEP tolerance 0 – 3 dB(A)

0.37	50	3	54
0.55	50	3	54
0.75	50	3	55
1.1	50	3	55
1.5	50	3	56
1.85	50	3	57
2.5	50	3	58
3	50	3	59
4.2	50	3	61
0.55	60	3	58
0.75	60	3	58
1.1	60	3	59
1.5	60	3	59
1.85	60	3	60
2.5	60	3	61
3	60	3	62
4.2	60	3	64
5.5	60	3	66
0.37	50	1	52
0.55	50	1	53
0.75	50	1	53
1.1	50	1	54
1.5	50	1	56

3.3 Scope of delivery

→ High-pressure multistage centrifugal pump
→ Installation and operating instructions

3.4 Accessories

Please consult Wilo catalogue for the list of accessories.

4 Transport and interim storage

When receiving the product, check that it has not been damaged during transport. If any damage is found, take all necessary measures with the carrier in the time provided.



CAUTION

Risk of material damage

If the delivered material is to be installed at a later date, store it in a dry place and protect it from impacts and any external influences (humidity, frost etc.). Temperature range for transport and storage: -30 °C to +60 °C.

Handle the product with care so as not to damage it prior to installation.

5 Application

This product has been designed to pump hot or cold water, water/glycol mixtures or other low-viscosity fluids that are free of mineral oil, solid or abrasive substances, or materials containing long fibres.



CAUTION

Risk of motor heating

A technical opinion is required prior to pumping fluid that is denser than water.

DANGER

Risk of explosion

Do not use this pump to convey flammable or explosive liquids.

Fields of application:

Version with stainless steel housing:

MEDANA CH1-L
Distribution and boosting
Industrial systems
Cooling water circulation systems
Irrigation systems

6 Description and function

6.1 Description of the product

See Fig. 1

1. Suction port
2. Pressure port
3. Filler screw
4. Drainage screw
5. Stage casing
6. Impeller
7. Hydraulic shaft
8. Suction housing
9. Mechanical seal
10. Terminal box
11. Lantern
12. Condensate plugs

See Fig. 3a

1. Valve on the suction side
2. Valve on the end pressure side
3. Non-return valve
4. Filler screw
5. Drainage screw
6. Piping or clamp holders
7. Strainer
8. Tank
9. Mains water supply
10. Motor protection switch
11. Lifting hook

6.2 Product characteristics

→ Multistage centrifugal pump with horizontal axle (2 to 7 stages depending on the model), non self-priming.
→ Suction/pressure ports with screwed connections. Axial suction, radial discharge upwards.
→ Shaft sealing with standardised mechanical seal.
→ Integrated thermal motor protection (single-phase version), automatic reset.
→ Condenser integrated into the terminal box (single-phase version).

7 Installation and electrical connection

All installation and electrical connection work must be carried out solely by authorised and qualified personnel, in accordance with applicable regulations.

WARNING
Physical injuries
The applicable regulations for the prevention of accidents must be complied with.

WARNING
Risk of electric shock
Hazards from electric current must be prevented.

7.1 Receipt of the product

Unpack the pump and recycle or dispose of the packaging in an environmentally responsible manner.

7.2 Installation

The pump must be installed in a dry, well-ventilated location free of frost on a flat, rigid surface using the appropriate screws.

CAUTION
Risk of damaging the pump
The presence of foreign matter or impurities in the pump housing may affect the functioning of the product.
It is recommended to perform any welding and soldering work before installing the pump.
Rinse the circuit completely before installing and commissioning the pump.

- → The pump must be installed in a place easy to access for the purposes of inspection or replacement.
- → Install the pump on a smooth floor.
- → The pump must be fixed in place using the 2 holes on the bearing bracket (Ø M8 screw) (Fig. 2).
- → Ensure there is a minimum distance between the motor fan and any surfaces (Fig. 4).
- → For heavy pumps, install a lifting hook (Fig. 3a , pos. 11) in line with the pump axis to facilitate its disassembly.
- → Remove the condensate plugs (Fig. 1, pos. 12) when the pump is in a condensing environment. In this case, the motor protection class IP55 will no longer be guaranteed.

WARNING
Risk of accident due to hot surfaces!
The pump must be installed in such a way that no one can touch the hot surfaces of the product when it is in operation.

WARNING
Risk of tipping
Ensure that the pump is secured to a flat, rigid surface.

CAUTION
Risk of foreign matter in the pump
Ensure that all blanking plugs are removed from the pump housing before installation.

NOTICE
Each pump may have been factory-tested to verify its hydraulic performance, and water may be present in the product. For hygiene purposes, the pump should be rinsed before use.

Install insulating material (cork or reinforced rubber) under the pump to avoid noise pollution and vibrations being transmitted to the installation.

7.3 Mains connection

- → The weight of the piping should not be borne by the pump (Fig. 5).
- → Permitted pump installation positions (Fig. 9).
- → We recommend installing gate valves on the suction and pressure sides of the pump.
- → Use expansion joints to mitigate noise and vibration from the pump if required.
- → The pipe cross-section must be at least equal to the diameter of the suction port on the pump housing.
- → The installation of a non-return valve in the discharge pipe is recommended to protect the pump against pressure surges.
- → If connected directly to the public potable water mains, the suction pipe socket must also be fitted with a non-return valve and a stop valve.
- → If connected indirectly via a tank, the suction pipe socket must be fitted with a suction strainer to stop impurities from entering the pump, and a non-return valve.

7.4 Electrical connection



DANGER

Risk of electrocution

In case of a non-compliant electrical connection, there is a risk of electrocution.

■ Have the electrical connection established by an electrician approved by the local energy supply company in accordance with local regulations.

■ Prior to the electrical connection, the pump must be voltage-free and protected against unauthorised restart.

■ To ensure safe installation and operation, the pump must be earthed correctly with the earth terminals of the power supply (Fig. 6).

- → Verify that the rated current, voltage and frequency used match the information on the pump's rating plate.
- → The pump must be connected to the power supply using a cable fitted with a socket or a main switch.
- → The three-phase motors must be connected to an authorised protection system. The setting rated current must match the value indicated on the motor's sticker.
- → Single-phase motors are equipped as standard with thermal motor protection, which stops the pump if the permissible winding temperature is exceeded and starts it up again automatically once it has cooled down.
- → The connection cable must be placed in such a way that it never comes into contact with the main sewer system and/or the pump housing and motor frame.
- → The pump/installation should be earthed in accordance with local regulations. A circuit breaker can be used as additional protection.
- → The power supply connection must comply with the wiring diagram (Fig. 6).



WARNING

Risk of injuries and water penetration in the connection area

Observe the tightening torques (Fig. 7)

Observe the diameter value of the cable gland wiring to ensure IP55 protection (see Fig. 7 [E]):

M20 = min. Ø6 – max. Ø12

M25 = min. Ø13 – max. Ø18

7.5 Operation with a frequency converter

It is possible to adjust the speed of the pump using a frequency converter. The limit values for adjusting the speed are as follows:

40 % rated ≤ n ≤ 100 % rated. The installation and commissioning instructions for the frequency converter must be followed when connecting it and starting operation. To avoid overloading the motor winding, which could lead to damage and unwanted noise, the frequency converter cannot produce voltage rise speed stages higher than 500 V/µs or voltage spikes U > 650 V.

To make such voltage rise speed stages possible, an LC filter (motor filter) should be installed between the frequency converter and the motor. The specifications for this filter must be provided by the manufacturer of the frequency converter / filter. Control devices with a frequency converter delivered by Wilo have an integrated filter.

8 Commissioning

8.1 Filling and deaeration

Check whether the water level in the tank and the inlet pressure are sufficient.

CAUTION

Risk of infection

Our pumps may be factory-tested to verify their hydraulic performance. If some water remains, the pump should be rinsed before use for hygiene reasons.

CAUTION

Risk of damage to the pump

Never run the pump dry. The pump must be filled before starting.

Pump in horizontal position below the water line (Fig. 3a)

Close the gate valves (pos. 1+2).

Unscrew the filler screw (pos. 4).

Slowly open the valve on the suction side (pos. 1).

Close the filler screw again once the water has exited via the screw port (air removed) (pos. 4).

Open the valve on the suction side completely (pos. 1).

Open the valve on the end pressure side (pos. 2).

Pump in horizontal position in suction mode (Fig. 3b)

NOTICE

Ensure that the suction pipe does not trap air at the transitions and bends.
It may take a long time for the pump and suction pipe to fill.

Close the gate valve (pos. 2).

Open the gate valve (pos. 1).

Unscrew the filler screw (pos. 4).

Using a funnel inserted into the filling port, slowly and completely fill the pump and the suction pipe. Close the filler screw once the air has escaped and the liquid is flowing in the pump (pos. 4).

After checking the deblocking function and the direction of rotation of the motor:

→ Briefly start the motor with an impulse then wait for a few seconds to allow the air to settle.
→ Slightly unscrew the filler screw (pos. 4) to remove the air. If a trickle of water does not appear, remove this screw to fill the right water level in the pump. Put this screw back in place before restarting.
→ If necessary, repeat this operation.

Pump in vertical position in inlet mode (Fig. 3c)

Close the gate valves (pos. 1+2).

Unscrew the filler screw (pos. 4).

Slowly open the valve on the suction side (pos. 1).

Close the filler screw again once the water has exited via the screw port (air removed) (pos. 4).

Open the valve on the suction side completely (pos. 1).

Open the valve on the end pressure side (pos. 2).

8.2 Starting



CAUTION

Risk of damaging the pump

The pump must not be operated at a zero flow rate flow (valve on the end pressure side closed) for more than 10 minutes.

We recommend maintaining a minimum discharge of 10 % of rated discharge.



WARNING

Risk of injury

Depending on the operating conditions of the pump or the installation (the temperature of the discharged liquid and the volume flow), the pump assembly including the motor may become extremely hot. There is a real risk of burns when coming into contact with the pump.



CAUTION

Direction of rotation

An incorrect direction of rotation will cause poor pump performance and may overload the motor.

Checking the direction of rotation (only for three-phase current motors)

By starting the pump up briefly, check whether the direction of rotation of the pump matches the arrow on the pump's rating plate. If the direction of rotation is incorrect, swap 2 phases in the pump's terminal box.



NOTICE

Single-phase motors are intended to operate in the correct direction of rotation.

Open the valve on the end pressure side and stop the pump.

9 Maintenance

All maintenance work must be carried out by authorised and qualified personnel!



WARNING

Risk of electric shock

Danger from electrical current must be eliminated. Ensure that the pump's power supply is switched off and secured against unauthorised reactivation before performing any work on the electric system.



WARNING

Risk of burns

In case of high water temperatures and high system pressures, close the guard valves upstream and downstream of the pump. First, allow pump to cool down.



WARNING

Risk of injury

Depending on the operating conditions of the pump or the installation (the temperature of the discharged liquid and the volume flow), the pump assembly including the motor may become extremely hot. There is a real risk of burns when coming into contact with the pump.

→ No special maintenance required during operation.
→ Pumps that are not being used during periods of frost should be drained to avoid damage.
Close the gate valves, fully open the drainage and filler screws (Fig. 1 , pos. 3 and 4) and empty the pump.



CAUTION
Risk of damaging the pump
Observe the tightening torques of the filler screw and drain plug (Fig. 3a [4-5]).

10 Faults, causes and remedies



WARNING
Risk of electric shock
Danger from electrical current must be eliminated. Ensure that the pump's power supply is switched off and secured against unauthorised reactivation before performing any work on the electric system.



WARNING
Risk of burns
In case of high water temperatures and high system pressures, close the guard valves upstream and downstream of the pump. First, allow pump to cool down.



WARNING
Risk of injury
Depending on the operating conditions of the pump or the installation (the temperature of the discharged liquid and the volume flow), the pump assembly including the motor may become extremely hot. There is a real risk of burns when coming into contact with the pump.

Faults	Causes	Remedies
The pump is not functioning	No electrical power supply	Check fuses, switches and wiring
	The motor protection device has cut off the power	Eliminate any motor overload
The pump operates but does not discharge any fluid	Wrong direction of rotation	Swap 2 phases in the power supply
	The piping or parts of the pump are obstructed by foreign matter	Check and clean the piping and the pump
	Presence of air in the suction pipe	Make the suction pipe air-tight
	Suction pipe too narrow	Install wider suction pipe
	The pressure at the pump inlet is insufficient	Review the installation conditions and recommendations described in this manual
The pump discharges irregularly	The suction pipe has a smaller diameter than that of the pump	The suction pipe must have the same diameter as the pump suction opening
	The strainer and the suction pipe are partially blocked	Dismantle and clean them
	Incorrect choice of pump	Install more powerful pumps
	Wrong direction of rotation	For the three-phase current version, swap 2 phases in the power supply
Insufficient pressure	The flow rate is too low, the suction pipe is blocked	Clean the suction filter and the suction pipe
	The valve is not sufficiently open	Open the valve

Faults	Causes	Remedies
	The pump is obstructed by foreign matter	Clean the pump
The pump is vibrating	Foreign matter in the pump	Remove all foreign matter
	The pump is not firmly secured	Tighten the anchor screws
The motor is overheating, the motor protection engages	Insufficient voltage	Check the fusible cut-outs, the wiring and the connections
	Foreign matter present, bearing damaged	Clean the pump Get the pump repaired by customer service
	Ambient temperature too high	Provide cooling

If the fault cannot be resolved, please contact the Wilo customer service.

11 Spare parts

All spare parts should be ordered directly from the Wilo customer service. To prevent errors, always quote the data on the pump's rating plate when making an order. The spare parts catalogue is available at www.wilo.com

12 Disposal

Information on the collection of used electrical and electronic products.

Proper disposal and appropriate recycling of this product prevents damage to the environment and dangers to your personal health.



NOTICE

Disposal as domestic waste is forbidden!

In the European Union, this symbol can appear on the product, the packaging or the accompanying documentation. It means that the electrical and electronic products in question must not be disposed of along with domestic waste.

To ensure proper handling, recycling and disposal of the used products in question, please note the following points:

→ Only hand over these products at designated, certified collecting points.

→ Observe the locally applicable regulations! Please consult your local municipality, the nearest waste disposal site, or the dealer who sold the product to you for information on proper disposal. For further information on recycling, go to www.wilo-recycling.com.

Subject to change without prior notice.

ДЕКЛАРАЦІЯ ПРО ВІДПОВІДНІСТЬ
DECLARATION OF CONFORMITY
KONFORMITÄTSERKLÄRUNG

Ми, виробник, заявляємо під нашу виключну відповідальність, що ці типи насосів, які виготовляються серійно,
We, the manufacturer, declare under our sole responsability that the pump types of the series,
Als Hersteller erklären wir unter unserer alleinigen Verantwortung, daβ die Pumpenbauarten der Baureihen,

MEDANA CH1-L.
02/04/06/10/16 (OPTI H)

(Серійний номер позначений на інформаційній табличці виробу.
The serial number is marked on the product site plate.
Die Seriennummer ist auf dem Typenschild des Produktes angegeben)

в поставленому виконанні відповідають наступним відповідним Технічним регламентам:
in their delivered state comply with the following relevant directives and with the relevant national legislation:
in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entsprechen 'und entsprechender nationaler Gesetzgebung:

_ БЕЗПЕКИ МАШИН (ПОСТАНОВА 62) / SAFETY OF MACHINERY AND EQUIPMENT (RESOLUTION 62) / SICHERHEIT VON MASCHINEN UND AUSRÜSTUNGEN (BESCHLUß 62)
(і Безпеки низьковольтного електричного обладнання (Постанова 1067) / and Low-Voltage Electrical Equipment (Resolution 1067) / und Sicherheit von Niederspannungs-elektrische Ausrüstungen (Beschluß 1067))

_ ЕКОДИЗАЙНУ (ПОСТАНОВА 804/2018) / ECODESIGN (RESOLUTION 804/2018) / ÖKODESIGN (BESCHLUß 804/2018)
(екодизайну для електродвигунів (Постанова 157/2019) / ecodesign of electric motors (Resolution 157/2019) / ÖkoDesign für Elektromotoren (Beschluß 157/2019))

_ ОБМЕЖЕННЯ ВИКОРИСТАННЯ ДЕЯКИХ НЕБЕЗПЕЧНИХ РЕЧОВИН (ПОСТАНОВА 139) / RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES (RESOLUTION 139) / BESCHRÄNKUNG DER VERWENDUNG BESTIMMTER GEFÄHRLICHER STOFFE (BESCHLUß 139)

також при дотриманні наступних відповідних стандартів:
comply also with the following relevant standards:
sowie auch den Bestimmungen zu folgenden Normen:

ДСТУ EN 809:2015; ДСТУ EN 60034–1:2016; ДСТУ EN 60204–1:2019 ; EN 60034–30–1:2014; ДСТУ EN 50581:2014;

Особа, уповноважена складати технічний файл:
Person authorized to compile the technical file is:
Bevollmächtigter für die Zusammenstellung der technischen Unterlagen ist:

Group Quality
WILO SE
Nortkirchenstraβe 100
D-44263 Dortmund

Dortmund,

ppa. H. Herchenhein

Digital unterschrieben von Holger Herchenhein
Datum: 2020.07.06 10:29:30 +02'00'

H. HERCHENHEIN
Senior Vice President - Group Quality & Qualification

wilo

Nortkirchenstraβe 100
44263 Dortmund -
Germany

Declaration n°2195367-rev03

PC As-Sh n°4236149-UA-rev03

ОРИГІНАЛЬНА ЗАЯВАORIGINAL DECLARATIONORIGINAL-ERKLÄRUNG

F_GQ_013-51

ДЕКЛАРАЦИЯ СООТВЕТСТВИЯ
DECLARATION OF CONFORMITY

Мы, изготовитель, заявляем под нашу исключительную ответственность, что насосы типов
We, the manufacturer, declare under our sole responsability that the pump types of the series,

Medana CH1-L.
02/04/06/10/16... (Opti H)

(Серийный номер указан на заводской табличке изделия)
(The serial number is marked on the product site plate)

в поставленном исполнении соответствуют следующим техническим регламентам
in their delivered state comply with the following relevant directives and with the relevant national legislation:

_ТР ТС 010/2011 "О безопасности машин и оборудования" / TR CU 010/2011 "On the safety of machinery and equipment"

_ТР ТС 004/2011 "О безопасности низковольтного оборудования" / TR CU 004/2011 "On safety of low-voltage equipment"

_ТР ЕАЭС 037/2016 "Об ограничении применения опасных веществ в изделиях электротехники и радиоэлектроники" / TR EAEU 037/2016 "On restriction of the use of certain hazardous substances in electrical and electronic equipment"

соблюдая также следующие соответствующие стандарты:
comply also with the following relevant harmonised European standards:

ГОСТ 31839–2012; ГОСТ IEC 60034–1–2014; ГОСТ Р МЭК 60204–1–2007; ГОСТ EN 50581–2016;

Лицо, уполномоченное составлять технический файл:
Person authorized to compile the technical file is:

WILO SE
Group Quality
Wilopark 1
D-44263 Dortmund

Dortmund,

ppa. Herchenhein

Digital unterschrieben
von Holger Herchenhein
Datum: 2021.02.09
17:37:11 +01'00'

H. HERCHENHEIN
Senior Vice President - Group Quality & Qualification

wilo

Wilopark 1
D-44263 Dortmund

Declaration n°2211600-rev01

PC As-Sh n°4236149-EAEU-rev01

ОРИГИНАЛЬНАЯ ДЕКЛАРАЦИЯ/ORIGINAL DECLARATION

F_GQ_013-64

ДЕКЛАРАЦИЯ СООТВЕТСТВИЯ
DECLARATION OF CONFORMITY

ПРИЛОЖЕНИЕ

I. Информация о дате изготовления

Дата изготовления указана на заводской табличке оборудования. Разъяснения по определению даты изготовления: Например: YYwWW = 19w30

YY = год изготовления w = символ «Неделя» WW= неделя изготовления

II. Сведения об обязательной сертификации.

Сертификат соответствия №	**№ ЕАЭС N RU Д-DE.PA01.B.61133/21**
срок действия	**01.02.2021-25.01.2026**
выдан органом по сертификации	**Не применимо для декларации соответствия**

III. Информация о производителе и официальных представительствах.

1. 1. Информация об изготовителе

Изготовитель: WILO SE (ВИЛО СЕ)

Страна производства указана на заводской табличке оборудования.

2. 2. Официальные представительства на территории Таможенного Союза.

Россия:
ООО «ВИЛО РУС»,
125047, г. Москва, ул. Лесная,
д. 7, эт. 11, комната №21
Телефон +7 (496) 514-61-10
Факс + 7 (496) 514-61-11
E-mail: wilo@wilo.ru

Беларусь:
ИООО "ВИЛО БЕЛ", 220004, г. Минск,
ул. Победителей, дом 7А, этаж 16, офис 51
Телефон: (017) 396-34-53
Факс: (017) 396-34-66
E-mail: wilo@wilo.by

Казахстан:
ТОО «WILO Central Asia», 040704,
Алмаатинская область, Илийский район,
поселок Байсерке, ул. Султана Бейбарса, дом 1
Телефон +7 (727) 312-40-10
Факс +7 (727) 312-40-00
E-mail: info@wilo.kz

IV Дополнительная информация к инструкции по монтажу и эксплуатации.

Срок хранения:

Новое оборудование может храниться как минимум в течение: ***1 года***

Оборудование должно быть тщательно очищено перед помещением на временное хранение. Оборудование следует хранить в чистом, сухом, защищенном от замерзания месте.

Техническое обслуживание:

Оборудование не требует обслуживания. Рекомендуется регулярная проверка каждые ***15000 ч***

Срок службы:

При правильном режиме эксплуатации, соблюдении всех указаний Инструкции по монтажу и эксплуатации и при своевременном выполнении планово-предупредительных ремонтов, срок службы оборудования **10 лет**

Уровень шума:

Уровень шума оборудования составляет не более ***80 дБ(А)***

В случае превышения указанного значения информация указывается на наклейке оборудования или в инструкции по монтажу и эксплуатации.

Безопасная утилизация:

Благодаря правильной утилизации и надлежащему вторичному использованию данного изделия предотвращается нанесение ущерба окружающей среде и опасности для здоровья персонала. Правила утилизации требуют опорожнения и очистки, а также демонтажа оборудования.
Собрать смазочный материал. Выполнить сортировку деталей по материалам (металл, пластик, электроника).
1. Для утилизации данного изделия, а также его частей следует привлекать государственные или частные предприятия по утилизации.
2. Дополнительную информацию по надлежащей утилизации можно получить в муниципалитете, службе утилизации или в месте, где изделие было куплено.

Критерии предельного состояния:

Основным критерием предельного состояния изделия является отказ одной или нескольких составных частей, ремонт или замена которых не предусмотрены или является экономически нецелесообразным.

Wilopark 1
D-44263 Dortmund

ОРИГИНАЛЬНАЯ ДЕКЛАРАЦИЯ ORIGINAL DECLARATION

F_GQ_013-64

DECLARATION OF CONFORMITY
KONFORMITÄTSERKLÄRUNG
DECLARATION DE CONFORMITE

We, the manufacturer, declare under our sole responsability that the pump types of the series,
Als Hersteller erklären wir unter unserer alleinigen Verantwortung, daß die Pumpenbauarten der Baureihen,
Nous, fabricant, déclarons sous notre seule responsabilité que les types de pompes des séries,

MEDANA CH1-L.
02/04/06/10/16... (OPTI H)

(The serial number is marked on the product site plate.
Die Seriennummer ist auf dem Typenschild des Produktes angegeben.
Le numéro de série est inscrit sur la plaque signalétique du produit)

in their delivered state comply with the following relevant directives and with the relevant national legislation:
in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entsprechen 'und entsprechender nationaler Gesetzgebung:
dans leur état de livraison sont conformes aux dispositions des directives suivantes et aux législations nationales les transposant :

_ MACHINERY 2006/42/EC / MASCHINENRICHTLINIE 2006/42/EG / MACHINES 2006/42/CE
(and according to the annex 1, §1.5.1, comply with the safety objectives of the Low Voltage Directive 2014/35/EU / und gemäss Anhang 1, §1.5.1, werden die Schutzziele der Niederspannungsrichtlinie 2014/35/EU eingehalten / et, suivant l'annexe 1, §1.5.1, respectent les objectifs de sécurité de la Directive Basse Tension 2014/35/UE)

_ ENERGY-RELATED PRODUCTS 2009/125/EC / ENERGIEVERBRAUCHSRELEVANTER PRODUKTE - RICHTLINIE 2009/125/EG / PRODUITS LIES A L'ENERGIE 2009/125/CE
(and according to the amended regulation 640/2009 on induction electric motors / und entsprechend der geänderten Verordnung 640/2009 über Induktionsmotoren / et conformément au règlement 640/2009 amendé relatif aux moteurs électriques à induction)

_ RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES 2011/65/EU + 2015/863 / BESCHRÄNKUNG DER VERWENDUNG BESTIMMTER GEFÄHRLICHER STOFFE-RICHTLINIE 2011/65/EU + 2015/863 / LIMITATION DE L'UTILISATION DE CERTAINES SUBSTANCES DANGEREUSES 2011/65/UE + 2015/863

comply also with the following relevant harmonised European standards:
sowie auch den Bestimmungen zu folgenden harmonisierten europäischen Normen:
sont également conformes aux dispositions des normes européennes harmonisées suivantes :

EN 809:1998+A1:2009; EN 60034–1:2010; EN 60204–1:2018; EN 60034–30–1:2014; EN IEC 63000:2018;

Person authorized to compile the technical file is:
Bevollmächtigter für die Zusammenstellung der technischen Unterlagen ist:
Personne autorisée à constituer le dossier technique est :

Group Quality
WILO SE
Wilopark 1
D-44263 Dortmund

Dortmund,

ppa.

Digital unterschrieben von Holger Herchenhein
Datum: 2020.08.27 15:49:33 +02'00'

H. HERCHENH
Senior Vice President - Group Quality & Qualification

wilo

Wilopark 1
D-44263 Dortmund

ORIGINAL DECLARATIONORIGINAL-ERKLÄRUNGDECLARATION ORIGINALE

F_GQ_013-53

Declaration n°2195365-rev04

PC As-Sh n°4236149-EU-rev03

DECLARATION OF CONFORMITY
KONFORMITÄTSERKLÄRUNG
DECLARATION DE CONFORMITE

(BG) - български език
ДЕКЛАРАЦИЯ ЗА СЪОТЕТСТВИЕ ЕС/ЕО

WILO SE декларират, че продуктите посочени в настоящата декларация съответстват на разпоредбите на следните европейски директиви и приелите ги национални законодателства:

Машини 2006/42/ЕО; Продукти, свързани с енергопотреблението 2009/125/ЕО; относно ограничението за употребата на определени опасни вещества 2011/65/UE + 2015/863 ;

както и на хармонизираните европейски стандарти, упоменати на предишната страница.

(CS) - Čeština
EU/ES PROHLÁŠENÍ O SHODĚ

WILO SE prohlašuje, že výrobky uvedené v tomto prohlášení odpovídají ustanovením níže uvedených evropských směrnic a národním právním předpisům, které je přejímají:

Stroje 2006/42/ES; Výrobků spojených se spotřebou energie 2009/125/ES; Omezení používání některých nebezpečných látek 2011/65/UE + 2015/863 ;

a rovněž splňují požadavky harmonizovaných evropských norem uvedených na předcházející stránce.

(DA) - Dansk
EU/EF-OVERENSSTEMMELSESERKLÆRING

WILO SE erklærer, at produkterne, som beskrives i denne erklæring, er i overensstemmelse med bestemmelserne i følgende europæiske direktiver, samt de nationale lovgivninger, der gennemfører dem:

Maskiner 2006/42/EF; Energirelaterede produkter 2009/125/EF; Begrænsning af anvendelsen af visse farlige stoffer 2011/65/UE + 2015/863 ;

De er ligeledes i overensstemmelse med de harmoniserede europæiske standarder, der er anført på forrige side.

(EL) - Ελληνικά
ΔΗΛΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ ΕΕ/ΕΚ

WILO SE δηλώνει ότι τα προϊόντα που ορίζονται στην παρούσα ευρωπαϊκά δήλωση είναι σύμφωνα με τις διατάξεις των παρακάτω οδηγιών και τις εθνικές νομοθεσίες στις οποίες έχει μεταφερθεί:

Μηχανήματα 2006/42/ΕΚ; Συνδεόμενα με την ενέργεια προϊόντα 2009/125/ΕΚ; για τον περιορισμό της χρήσης ορισμένων επικίνδυνων ουσιών 2011/65/UE + 2015/863 ;

και επίσης με τα εξής εναρμονισμένα ευρωπαϊκά πρότυπα που αναφέρονται στην προηγούμενη σελίδα.

(ES) - Español
DECLARACIÓN DE CONFORMIDAD UE/CE

WILO SE declara que los productos citados en la presenta declaración están conformes con las disposiciones de las siguientes directivas europeas y con las legislaciones nacionales que les son aplicables :

Máquinas 2006/42/CE; Productos relacionados con la energía 2009/125/CE; Restricciones a la utilización de determinadas sustancias peligrosas 2011/65/UE + 2015/863 ;

Y igualmente están conformes con las disposiciones de las normas europeas armonizadas citadas en la página anterior.

(ET) - Eesti keel
EL/EÜ VASTAVUSDEKLARATSIOONI

WILO SE kinnitab, et selles vastavustunnistuses kirjeldatud tooted on kooskõlas alljärgnevate Euroopa direktiivide sätetega ning riiklike seadusandlustega, mis nimetatud direktiivid üle on võtnud:

Masinad 2006/42/EÜ; Energiamõjuga toodete 2009/125/EÜ; teatavate ohtlike ainete kasutamise piiramise kohta 2011/65/UE + 2015/863 ;

Samuti on tooted kooskõlas eelmisel leheküljel ära toodud harmoniseeritud Euroopa standarditega.

(FI) - Suomen kieli
EU/EY-VAATIMUSTENMUKAISUUSVAKUUTUS

WILO SE vakuuttaa, että tässä vakuutuksessa kuvatut tuotteet ovat seuraavien eurooppalaisten direktiivien määräysten sekä niihin sovellettavien kansallisten lakiasetusten mukaisia:

Koneet 2006/42/EY; Energiaan liittyvien tuotteiden 2009/125/EY; tiettyjen vaarallisten aineiden käytön rajoittamisesta 2011/65/UE + 2015/863 ;

Lisäksi ne ovat seuraavien edellisellä sivulla mainittujen yhdenmukaistettujen eurooppalaisten normien mukaisia.

(GA) - Gaeilge
AE/EC DEARBHÚ COMHLÍONTA

WILO SE ndearbhaíonn an cur síos ar na táirgí atá i ráiteas seo, siad i gcomhréir leis na forálacha atá sna treoracha seo a leanas na hEorpa agus leis na dlíthe náisiúnta is infheidhme orthu:

Innealra 2006/42/EC; Fuinneamh a bhaineann le táirgí 2009/125/EC; Srian ar an úsáid a bhaint as substaintí guaiseacha acu 2011/65/UE + 2015/863 ;

Agus siad i gcomhréir le forálacha na caighdeáin chomhchuibhithe na hEorpa dá dtagraítear sa leathanach roimhe seo.

(HR) - Hrvatski
EU/EZ IZJAVA O SUKLADNOSTI

WILO SE izjavljuje da su proizvodi navedeni u ovoj izjavi u skladu sa sljedećim prihvaćenim europskim direktivama i nacionalnim zakonima:

EZ smjernica o strojevima 2006/42/EZ; Smjernica za proizvode relevantne u pogledu potrošnje energije 2009/125/EZ; ograničenju uporabe određenih opasnih tvari 2011/65/UE + 2015/863 ;

i usklađenim europskim normama navedenim na prethodnoj stranici.

(HU) - Magyar
EU/EK-MEGFELELŐSÉGI NYILATKOZAT

WILO SE kijelenti, hogy a jelen megfelelőségi nyilatkozatban megjelölt termékek megfelelnek a következő európai irányelvek előírásainak, valamint azok nemzeti jogrendbe átültetett rendelkezéseinek:

Gépek 2006/42/EK; Energiával kapcsolatos termékek 2009/125/EK; egyes veszélyes való alkalmazásának korlátozásáról 2011/65/UE + 2015/863 ;

valamint az előző oldalon szereplő, harmonizált európai szabványoknak.

(IT) - Italiano
DICHIARAZIONE DI CONFORMITÀ UE/CE

WILO SE dichiara che i prodotti descritti nella presente dichiarazione sono conformi alle disposizioni delle seguenti direttive europee nonché alle legislazioni nazionali che le traspongono :

Macchine 2006/42/CE; Prodotti connessi all'energia 2009/125/CE; sulla restrizione dell'uso di determinate sostanze pericolose 2011/65/UE + 2015/863 ;

E sono pure conformi alle disposizioni delle norme europee armonizzate citate a pagina precedente.

(LT) - Lietuvių kalba
ES/EB ATITIKTIES DEKLARACIJA

WILO SE pareiškia, kad šioje deklaracijoje nurodyti gaminiai atitinka šių Europos direktyvų ir jas perkeliančių nacionalinių įstatymų nuostatus:

Mašinos 2006/42/EB; Energija susijusiems gaminiams 2009/125/EB; dėl tam tikrų pavojingų medžiagų naudojimo apribojimo 2011/65/UE + 2015/863 ;

ir taip pat harmonizuotas Europas normas, kurios buvo cituotos ankstesniame puslapyje.

(LV) - Latviešu valoda
ES/EK ATBILSTĪBAS DEKLARĀCIJU

WILO SEdeklarē, ka izstrādājumi, kas ir nosaukti šajā deklarācijā, atbilst šeit uzskaitīto Eiropas direktīvu nosacījumiem, kā arī atsevišķu valstu likumiem, kuros tie ir ietverti:

Mašīnas 2006/42/EK; Enerģiju saistītiem ražojumiem 2009/125/EK; par dažu bīstamu vielu izmantošanas ierobežošanu 2011/65/UE + 2015/863 ;

un saskaņotajiem Eiropas standartiem, kas minēti iepriekšējā lappusē.

(MT) - Malti
DIKJARAZZJONI TA' KONFORMITÀ UE/KE

WILO SE jiddikjara li l-prodotti speċifikati f'din id-dikjarazzjoni huma konformi mad-direttivi Ewropej li jsegwu u mal-leġislazzjonijiet nazzjonali li japplikawhom:

Makkinarju 2006/42/KE; Prodotti relatati mal-enerġija 2009/125/KE; dwar ir-restrizzjoni tal-użu ta' ċerti sustanzi perikoluži 2011/65/UE + 2015/863 ;

kif ukoll man-normi Ewropej armoniżżati li jsegwu imsemmija fil-paġna preċedenti.

F_GQ_013-53

DECLARATION OF CONFORMITY
KONFORMITÄTSERKLÄRUNG
DECLARATION DE CONFORMITE

(NL) - Nederlands
EU/EG-VERKLARING VAN OVEREENSTEMMING

WILO SE verklaart dat de in deze verklaring vermelde producten voldoen aan de bepalingen van de volgende Europese richtlijnen evenals aan de nationale wetgevingen waarin deze bepalingen zijn overgenomen:

Machines 2006/42/EG; Energiegerelateerde producten 2009/125/EG; betreffende beperking van het gebruik van bepaalde gevaarlijke stoffen 2011/65/UE + 2015/863 ;

De producten voldoen eveneens aan de geharmoniseerde Europese normen die op de vorige pagina worden genoemd.

(PL) - Polski
DEKLARACJA ZGODNOŚCI UE/WE

WILO SE oświadcza, że produkty wymienione w niniejszej deklaracji są zgodne z postanowieniami następujących dyrektyw europejskich i transponującymi je przepisami prawa krajowego:

Maszyn 2006/42/WE; Produktów związanych z energią 2009/125/WE; sprawie ograniczenia stosowania niektórych niebezpiecznych substancji 2011/65/UE + 2015/863 ;

oraz z nastepującymi normami europejskich zharmonizowanymi podanymi na poprzedniej stronie.

(PT) - Português
DECLARAÇÃO DE CONFORMIDADE UE/CE

WILO SE declara que os materiais designados na presente declaração obedecem às disposições das directivas europeias e às legislações nacionais que as transcrevem :

Máquinas 2006/42/CE; Produtos relacionados com o consumo de energia 2009/125/CE; relativa à restrição do uso de determinadas substâncias perigosas 2011/65/UE + 2015/863 ;

E obedecem também às normas europeias harmonizadas citadas na página precedente.

(RO) - Română
DECLARAŢIE DE CONFORMITATE UE/CE

Low voltage - 2099/35/EU

Maşini 2006/42/CE; Produselor cu impact energetic 2009/125/CE; privind restricţiile de utilizare a anumitor substanţe periculoase 2011/65/UE + 2015/863 ;

şi, de asemenea, sunt conforme cu normele europene armonizate citate în pagina precedentă.

(SK) - Slovenčina
EÚ/ES VYHLÁSENIE O ZHODE

WILO SE čestne prehlasuje, že výrobky ktoré sú predmetom tejto deklarácie, sú v súlade s požiadavkami nasledujúcich európskych direktív a odpovedajúcich národných legislatívnych predpisov:

Strojových zariadeniach 2006/42/ES; Energeticky významných výrobkov 2009/125/ES; obmedzení používania určitých nebezpečných látok 2011/65/UE + 2015/863 ;

ako aj s harmonizovanými európskych normami uvedenými na predchádzajúcej strane.

(SL) - Slovenščina
EU/ES-IZJAVA O SKLADNOSTI

WILO SE izjavlja, da so izdelki, navedeni v tej izjavi, v skladu z določili naslednjih evropskih direktiv in z nacionalnimi zakonodajami, ki jih vsebujejo:

Stroji 2006/42/ES; Izdelkov, povezanih z energijo 2009/125/ES; o omejevanju uporabe nekaterih nevarnih snovi 2011/65/UE + 2015/863 ;

pa tudi z usklajenimi evropskih standardi, navedenimi na prejšnji strani.

(SV) - Svenska
EU/EG-FÖRSÄKRAN OM ÖVERENSSTÄMMELSE

WILO SE intygar att materialet som beskrivs i följande intyg överensstämmer med bestämmelserna i följande europeiska direktiv och nationella lagstiftningar som inför dem:

Maskiner 2006/42/EG; Energirelaterade produkter 2009/125/EG; begränsning av användning av vissa farliga ämnen 2011/65/UE + 2015/863 ;

Det överensstämmer även med följande harmoniserade europeiska standarder som nämnts på den föregående sidan.

(TR) - Türkçe
AB/CE UYGUNLUK TEYID BELGESI

WILO SEbu belgede belirtilen ürünlerin aşağıdaki Avrupa yönetmeliklerine ve ulusal kanunlara uygun olduğunu beyan etmektedir:

Makine Yönetmeliği 2006/42/AT; Eko Tasarım Yönetmeliği 2009/125/AT; Belirli tehlikeli maddelerin bir kullanımını sınırlandıran 2011/65/UE + 2015/863 ;

ve önceki sayfada belirtilen uyumlaştırılmış Avrupa standartlarına.

(IS) - Íslenska
ESB/EB LEYFISYFIRLÝSING

WILO SE lýsir því yfir að vörurnar sem um getur í þessari yfirlýsingu eru í samræmi við eftirfarandi tilskipunum ESB og landslögum hafa samþykkt:

Vélartilskipun 2006/42/EB; Tilskipun varðandi vörur tengdar orkunotkun 2009/125/EB; Takmörkun á notkun tiltekinna hættulegra efna 2011/65/UE + 2015/863 ;

og samhæfða evrópska staðla sem nefnd eru í fyrri síðu.

(NO) - Norsk
EU/EG-OVERENSSTEMMELSESERKLAEING

WILO SE erklærer at produktene nevnt i denne erklæringen er i samsvar med følgende europeiske direktiver og nasjonale lover:

EG–Maskindirektiv 2006/42/EG; Direktiv energirelaterte produkter 2009/125/EF; Begrensning av bruk av visse farlige stoffer 2011/65/UE + 2015/863 ;

og harmoniserte europeiske standarder nevnt på forrige side.

F_GQ_013-53

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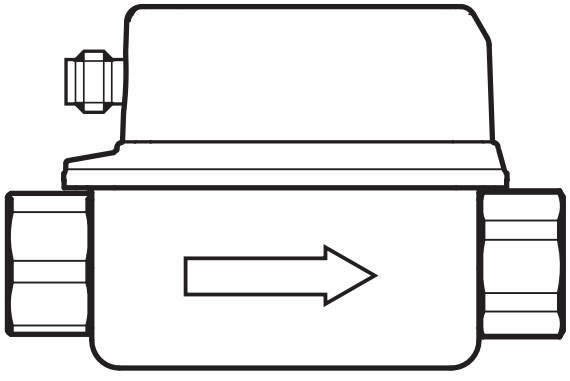
Operating instructions
Vortex flow meter

efector300

SVxxx0

UK

80229859 / 00 06 / 2015



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Technical data, approvals, accessories and further information at www.ifm.com.

1 Safety instructions

- Please read this document prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application. That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- In order to guarantee the correct condition of the device for the operating time it is necessary to use the device only for media to which the wetted materials are sufficiently resistant (→ Technical data).
- The responsibility whether the measurement devices are suitable for the respective application lies with the operator. The manufacturer assumes no liability for consequences of misuse by the operator. Improper installation and use of the units result in a loss of the warranty claims.

⚠ CAUTION

For medium temperatures above 50 °C (122 °F) some parts of the housing can heat up to over 65 °C (149 °F). Risk of burns.

▶ In this case do not touch the unit.

▶ Protect the housing against contact with flammable substances and unintentional contact.

▶ Do not press the pushbuttons manually; instead use another object (e.g. ballpoint pen).

2 Functions and features

The unit monitors water-based fluids (water, deionised water, cooling water).

It detects the two process categories volumetric flow and medium temperature.

Pressure Equipment Directive (PED):
The units comply with the Pressure Equipment Directive and are designed and manufactured for group 2 fluids in accordance with the sound engineering practice. Use of group 1 fluids on request.

3 Function

- The unit detects the volumetric flow quantity based on the Vortex measuring principle.
- It features an IO-Link interface.
- The unit displays the current flow and temperature. It generates 2 output signals according to the parameter setting:

OUT1/IO-Link: 2 selection options

- switching signal for volumetric flow quantity limit value
- or frequency signal for volumetric flow quantity

OUT2: 4 selection options

- switching signal for volumetric flow quantity limit value
- or switching signal for temperature limit value
- or frequency signal for volumetric flow quantity
- or frequency signal for temperature

4 Installation

▶ Flow in the direction of the arrow. Observe the installation direction.

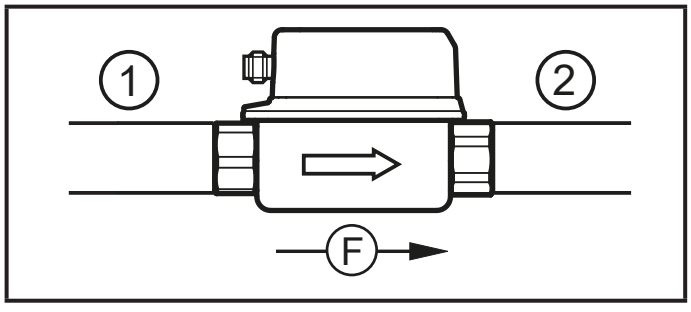
▶ Make sure that pipe and sensor have the same internal diameter.

▶ Avoid deposits, accumulated gas and air in the pipe system. Install the unit so that the measuring pipe is always completely filled with medium.

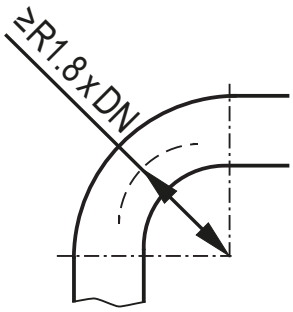
▶ Install in front of or in a rising pipe.

▶ Recommended tightening torque: 30 Nm

▶ Avoid disturbances on the inlet and outlet side. To do so, provide for the following inlet and outlet pipe lengths:



DN = nominal width of the pipe
R = radius

Disturbance	Inlet pipe length (1)	Outlet pipe length (2)
Non-ideal bend	≥ 5 x DN	≥ 1 x DN
Ideal bend 	≥ 0.5 x DN	
Multiple bends (2 x 90°)	≥ 15 x DN	
Reduction of internal pipe diameter	≥ 15 x DN	≥ 15 x DN
Valve or pump	≥ 25 x DN	

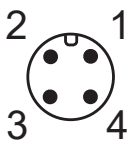
- ▶ Mount the unit in a way that no mechanical forces are exerted on the pipe. To do so, use angle brackets if required.
  - For direct installation, fix the unit on the surface using 4 self-tapping screws M4 DIN 7500. Maximum insertion depth in the housing: 5.5 mm.
  - For installation using the fixing element: ifm mounting accessories at www.ifm.com.
- ▶ Avoid the following installation positions:
  - Directly in front of a falling pipe.
  - In a falling pipe.
  - At the highest point of the pipe system.
  - Directly in front of the spout of the pipe.
  - On the suction side of a pump.

5 Electrical connection

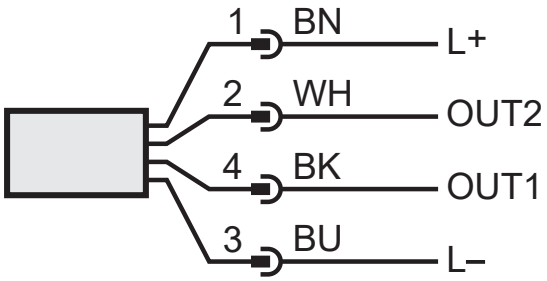
The unit must be connected by a qualified electrician.
The national and international regulations for the installation of electrical equipment must be adhered to.
Voltage supply according to EN 50178, SELV, PELV.

▶ Disconnect power.

▶ Connect the unit as follows:



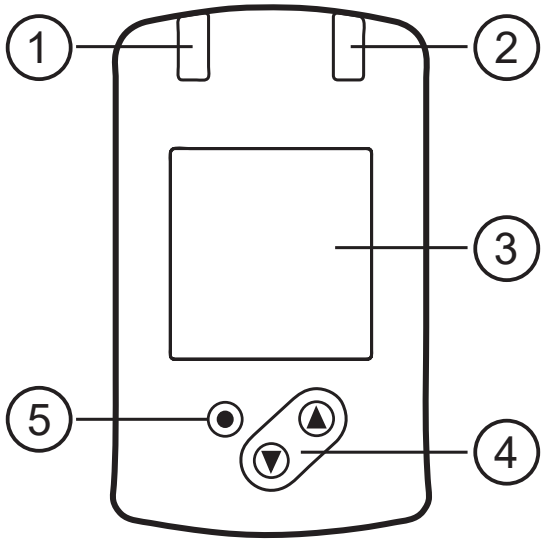
BK: black
BN: brown
BU: blue
WH: white



Colours to DIN EN 60947-5-2

Pin 1	L+
Pin 3	L-
Pin 4 (OUT1)	• Switching signal: limit values for volumetric flow • Frequency signal for volumetric flow quantity • IO-Link
Pin 2 (OUT2)	• Switching signal: limit values for volumetric flow • Switching signal: limit values for temperature • Frequency signal for volumetric flow quantity • Frequency signal for temperature

6 Operating and display elements

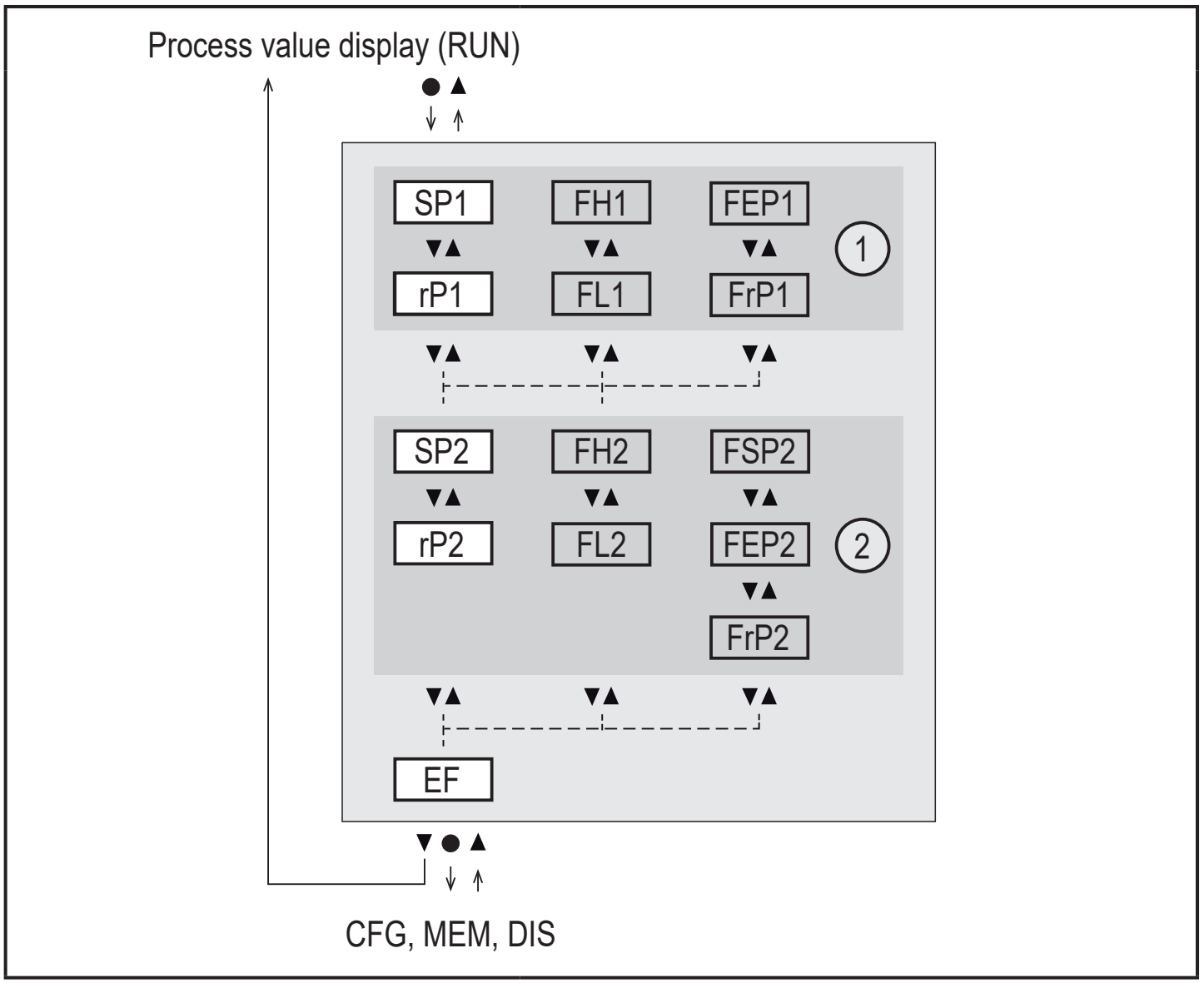


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1 and 2: switching status LEDs
• LED 1 = switching status OUT1 (lights when output 1 is switched) • LED 2 = switching status OUT2 (lights when output 2 is switched)
3: TFT display
• Display of current process values (volumetric flow quantity, temperature) • Display of the parameters and parameter values
4: Buttons [▲] and [▼]
• Select parameters • Change parameter values (hold button pressed) • Change of the process value display in the normal operating mode (Run mode) • Locking / unlocking (press buttons simultaneously > 10 seconds)
5: Button [●] = Enter
• Change from RUN mode to the main menu • Change to setting mode • Acknowledgement of the set parameter value

7 Menu

7.1 Main menu



1: Output functions ou1 (→ 7.2.1)
2: Output functions ou2 (→ 7.2.1)

The parameters are only displayed when selected at ou1 / ou2.

7.1.1 Explanation main menu

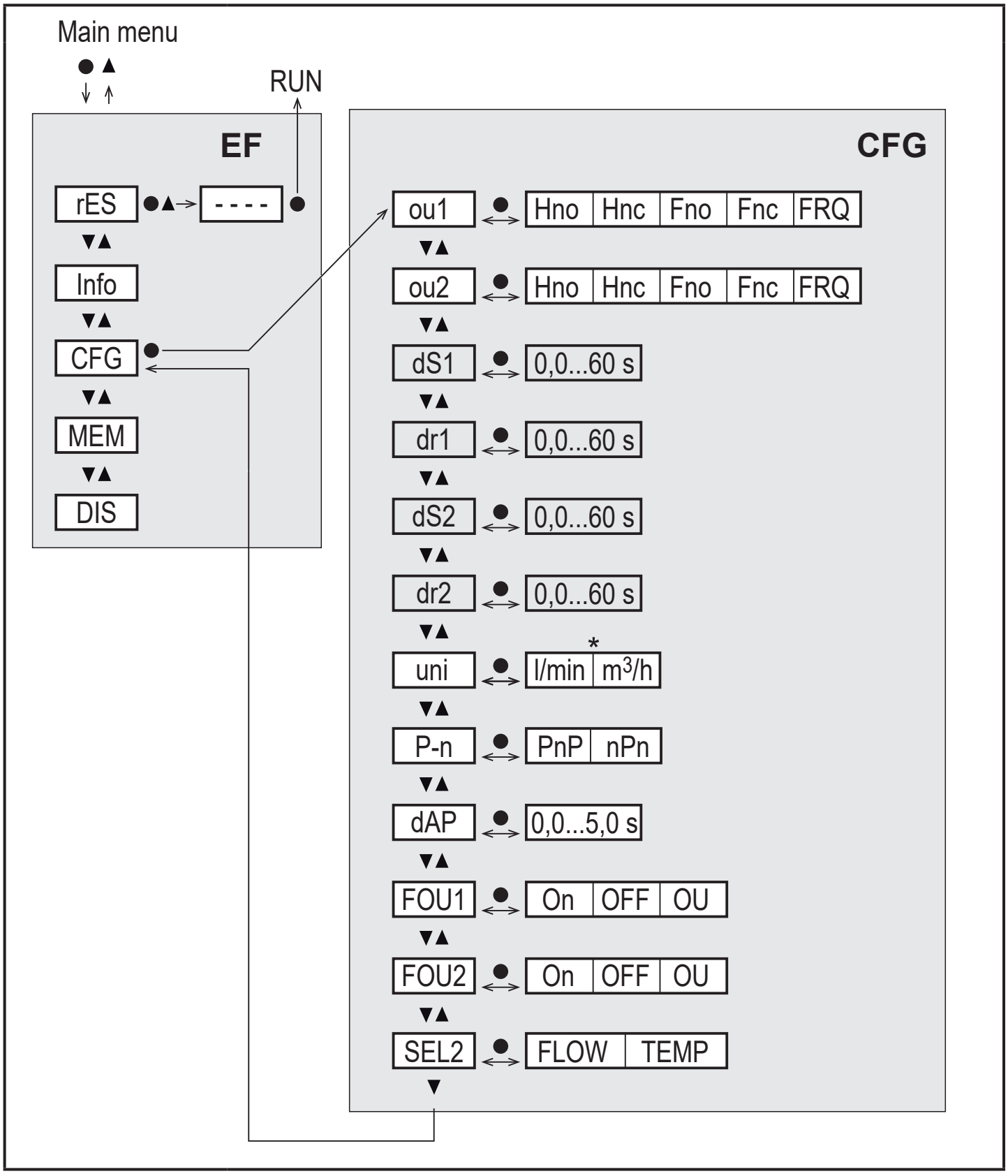
Switching output with hysteresis function	
SP1	Set point 1 = upper limit value at which OUT1 switches.
rP1	Reset point 1 = lower limit value at which OUT1 switches off.
SP2	Set point 2 = upper limit value at which OUT2 switches.
rP2	Reset point 2 = lower limit value at which OUT2 switches off.

Switching output with window function	
FH1	Set point 1 = upper limit value at which OUT1 switches.
FL1	Reset point 1 = lower limit value at which OUT1 switches.
FH2	Set point 2 = upper limit value at which OUT2 switches.
FL2	Reset point 2 = lower limit value at which OUT2 switches.

Frequency output	
FEP1	Process value end point on OUT1.
FrP1	Frequency at process value end point (FEP1) on OUT1.
FSP2	Process value start point on OUT2 (only if SEL2 = TEMP).
FEP2	Process value end point on OUT2.
FrP2	Frequency at process value end point (FEP2) on OUT2.

Extended functions	
EF	Opening of the lower menu level.

7.2 Extended functions – basic settings



* For SVx6xx units: gpm / gph

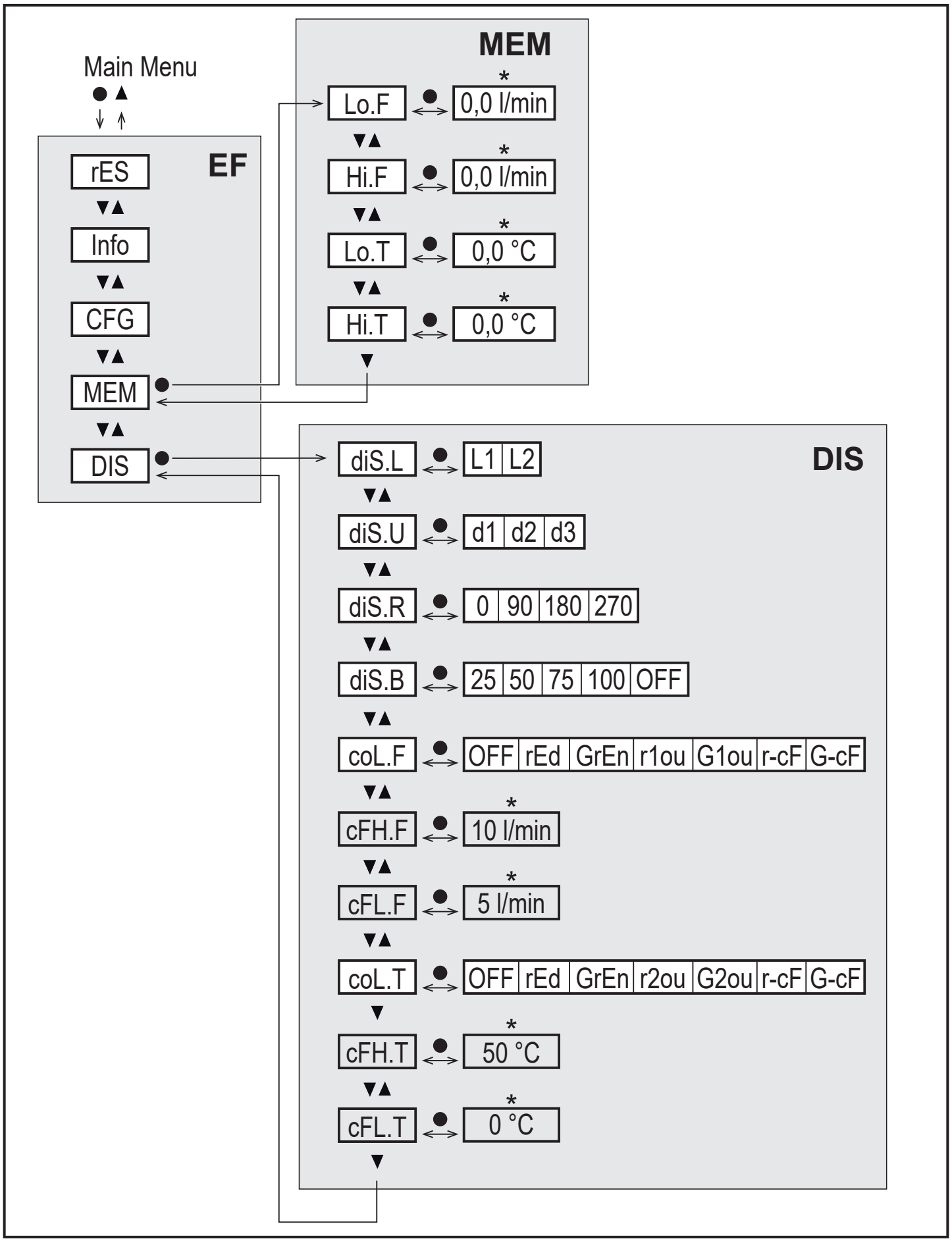
The parameters are only displayed when oux = Hno, Hnc, Fno, Fnc.

rES	Restoring the factory settings
Info	Device information
CFG	Submenu basic settings
MEM	Submenu min/max memory
DIS	Submenu display settings

7.2.1 Explanation basic settings (CFG)

ou1	Output function OUT1 • Flow: Hno, Hnc, Fno, Fnc, FRQ	
ou2	Output function OUT2 • Flow: Hno, Hnc, Fno, Fnc, FRQ • Temperature: Hno, Hnc, Fno, Fnc, FRQ	
Hno	Hysteresis function normally open	
Hnc	Hysteresis function normally closed	
Fno	Window function normally open	
Fnc	Window function normally closed	
FRQ	Frequency output	
dS1	Switching delay on OUT1 in seconds	Only in case of oux = Hno, Hnc, Fno, Fnc
dr1	Switch-off delay on OUT1 in seconds	
dS2	Switching delay on OUT2 in seconds	
dr2	Switch-off delay on OUT2 in seconds	
uni	Standard unit of measurement for volumetric flow	
P-n	Output logic: pnp / npn	
dAP	Measured value damping in seconds (only for volumetric flow)	
FOU1	Behaviour of output OUT1 in case of an error	
FOU2	Behaviour of output OUT2 in case of an error	
SEL2	Standard measured variable for evaluation by OUT2: Volumetric flow quantity or medium temperature	

7.3 Extended functions – min / max memory – display



* For SVx6xx units: gpm, °F

The parameters are only displayed when selected r-cF oder G-cF.

7.3.1 Explanation min/max memory (MEM)

Lo.F	Minimum value of the flow measured in the process
Hi.F	Maximum value of the flow measured in the process
Lo.T	Minimum value of the temperature measured in the process
Hi.T	Maximum value of the temperature measured in the process

7.3.2 Explanation display function (DIS)

diS.L	Standard layout of the display(L1: flow or L2: flow and temperature)	
diS.U	Update rate of display	
diS.R	Display rotation	
diS.B	Display brightness	
coL.F	Colour configuration volumetric flow	
coL.T	Colour configuration temperature	
OFF	No colour change	
rEd	Process value always red, irrespective of the output function	
GrEn	Process value always green, irrespective of the output function	
r1ou / r2ou	Process value red in case of switched output OUT1 / OUT2	
G1ou / G2ou	Process value green in case of switched output OUT1 / OUT2	
r-cF	Display red if measured value between limit values cFL...cFH, irrespective of the output function	
G-cF	Display green if measured value between limit values cFL...cFH, irrespective of the output function	
cFH.F	Upper limit value for colour change flow	Only if r-cF or G-cF is selected.
cFL.F	Lower limit value for colour change flow	
cFH.T	Upper limit value for colour change temperature	
cFL.T	Lower limit value for colour change temperature	

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8 Parameter setting

Parameters can be set before installation and set-up of the unit or during operation.

If you change parameters during operation, this will influence the function of the plant.

▶ Ensure that there will be no malfunctions in your plant.

The parameters can also be set via the IO-Link interface.

8.1 Parameter setting in general

1. Change from RUN mode to the main menu	[●]
2. Selection of the requested parameter	[▲] or [▼]
3. Change to setting mode	[●]
4. Modification of the parameter value	[▲] or [▼] > 1 s
5. Acknowledgement of the set parameter value	[●]
6. Return to the RUN mode	> 30 seconds (timeout) or press [▲] + [▼] simultaneously until the RUN mode is reached.

9 Factory setting

Parameter		Factory setting	User setting
SP1	(FLOW)	**20 % ***	
rP1	(FLOW)	**18.5 % ***	
FH1	(FLOW)	**20 % ***	
FL1	(FLOW)	**18.5 % ***	
FEP1	(FLOW)	**100 % ***	
FrP1	(FLOW)	**100 Hz**	
SP2	(FLOW, TEMP)	**40 % ***	
rP2	(FLOW, TEMP)	**38.5 % ***	
FH2	(FLOW, TEMP)	**40 % ***	
FL2	(FLOW, TEMP)	**38.5 % ***	
FSP2	(TEMP)	**0 % ***	
FEP2	(FLOW, TEMP)	**100 % ***	
FrP2	(FLOW, TEMP)	**100 Hz**	
ou1	(FLOW)	**Hno**	
ou2	(FLOW, TEMP)	**Hno**	

Parameter		Factory setting	User setting
FOU1	(FLOW)	**OFF**	
FOU2	(FLOW, TEMP)	**OFF**	
SEL2	(FLOW, TEMP)	**FLOW**	
col.F	(FLOW)	**OFF**	
col.T	(TEMP)	**OFF**	
dS1		**0 s**	
dR1		**0 s**	
dS2		**0 s**	
dR2		**0 s**	
uni		**l/min (SVx6xx: gpm)**	
P-n		**PnP**	
dAP		**0.6 s**	
diS.L		**L2**	
diS.U		**d2**	
diS.R		**0**	
diS.B		**75 %**	
cFH.F		**MEW**	
cFL.F		**MAW**	
cFH.T		**MEW**	
cFL.T		**MAW**	

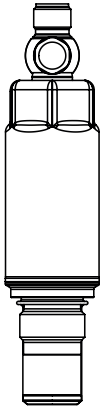
MEW = final value of the measuring range
MAW = initial value of the measuring range

* The percentage values refer to the final value of the measuring range.

Operating instructions
Electronic pressure sensor

PM15xx

UK



11427401 / 00 11 / 2021

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1 Preliminary note

1.1 Symbols used

▶ Instruction

> Reaction, result

[…] Designation of keys, buttons or indications

→ Cross-reference

Important note
Non-compliance may result in malfunction or interference.

Information
Supplementary note

2 Safety instructions

- The device described is a subcomponent for integration into a system.
  - The manufacturer is responsible for the safety of the system.
  - The system manufacturer undertakes to perform a risk assessment and to create a documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the manufacturer of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Functions and features).
- Only use the product for permissible media (→ Technical data).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.
- If the units are used in gas applications > 25 bar the metal seal must be used, not an elastomer seal.

3 Functions and features

The device monitors the system pressure of machines and installations.
2 outputs are available:

3.1 Applications

Type of pressure: Relative pressure

Information on pressure rating and bursting pressure → data sheet.

Avoid static and dynamic overpressure exceeding the indicated pressure rating by taking appropriate measures.

The indicated bursting pressure must not be exceeded.

Even if the bursting pressure is exceeded only for a short time, the unit may be destroyed.
ATTENTION: Risk of injury!

Not suitable for use where the criteria for paragraph E1.2/63-03 of the 3A standard 63-03 have to be met.

The units are vacuum resistant. Adhere to the specifications in the data sheet!

4 Function

- The system pressure is detected by a ceramic-capacitive measuring system, the measured signals are evaluated electronically.
- The unit converts the system pressure into an analogue output signal (4...20 mA).
- The unit has an IO-Link interface which allows to provide additional values:
  - OUT1: Measured pressure value via IO-Link.
    - Measured pressure value (cyclic output mode)
    - Measured temperature value medium (cyclic output mode)
    - Measured temperature value housing (A-cyclic output mode)
    - Diagnostic values
  - OUT2: Analogue signal proportional to pressure 4...20 mA

4.1 IO-Link

4.1.1 General information

The device has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master).

The IO-Link interface enables direct access to the process and diagnostic data and provides the possibility to set the parameters of the unit during operation.

In addition, communication is possible via a point-to-point connection with a USB adapter cable.

The IODDs necessary for the configuration of the unit, detailed information about process data structure, diagnostic information, parameter addresses and the necessary information about the required IO-Link hardware and software can be found at www.ifm.com.

4.1.2 Functions only available via IO-Link communication

- Device temperature: The internal temperature of the sensor can be read via the A-cyclic IO-Link channel. Measuring range:-25...125°C (-13...257°F), resolution 1°C (1.8°F), precision +/- 5°C (9°F).
- Application-specific tag: freely definable text assigned to the unit.
- Function tag: freely definable text describing the device function in the plant.
- Location tag: freely definable text describing the installation location in the plant.

For more detailed information refer to the device-specific IO Device Description PDF at www.ifm.com.

4.1.3 Set-up via IO-Link

The device parameters can be set via IO-Link:

- The device parameters are set via the IO-Link interface (→ 4.1 and → 7).
- All settings can also be carried out before installation of the device.

4.1.4 Process data via IO-Link

All process data is available via IO-Link:

- The unit is designed for fully bidirectional communication.
- The following options are available:
  - Remote display:
    reading and displaying the current system pressure and the medium temperature.
  - Remote parameter setting:
    reading and changing the current parameters via IO-Link parameter setting (→ 4.1).

4.2 Defined state in case of a fault

- If a fault is detected, the analogue output passes into a defined state (= 21.5 mA).

In case of a fault indication (= 21.5 mA)

▶ Read parameters via IO-Link or contact the manufacturer

4.3 Operating modes

The operating mode is defined by the wiring (→ 6 Electrical connection) and automatically recognised by the device.

4.3.1 2-wire operation

OUT2 (pin 2)	Analogue signal proportional to pressure 4...20 mA

4.3.2 3-wire operation

OUT1 (pin 4)	Communication via IO-Link
OUT2 (pin 2)	Analogue signal proportional to pressure 4...20 mA

4.4 Analogue output

The device provides an analogue signal proportional to the pressure.

Within the measuring range the analogue signal is between 4 and 20 mA.

The measuring range is scalable:

- [ASP2] determines at which measured value the output signal is 4 mA.
- [AEP2] determines at which measured value the output signal is 20 mA.

Minimum distance between [ASP2] and [AEP2] = 20 % of the final value of the measuring range.

If the measured value is outside the measuring range or in the event of an internal error, the current signal indicated in figure 1 is provided.

In case of a fault the analogue signal is adjustable:

- [FOU] = On determines that the analogue signal goes to the upper final value (21.5 mA) in case of a fault.
- [FOU] = OU defines that in case of a fault the analogue signal reacts as defined by the current parameters.

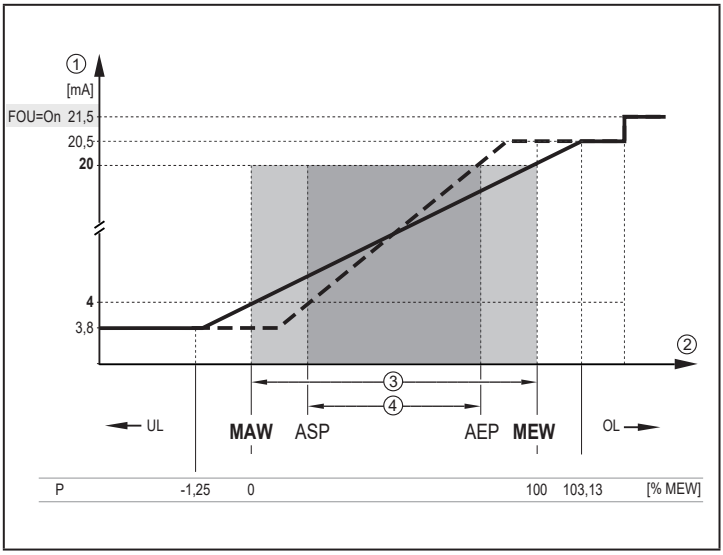


Fig. 1: Output characteristics of the analogue output to Namur

① Analogue signal
② Measured value
③ Measuring range
④ Scaled measuring range

P: Pressure
MAW: Initial value of the measuring range for non-scaled measuring range.
MEW: Final value of the measuring range for non-scaled measuring range
ASP: Analogue start point for scaled measuring range
AEP Analogue end point for scaled measuring range
UL: Below the display range
OL: Above the display range

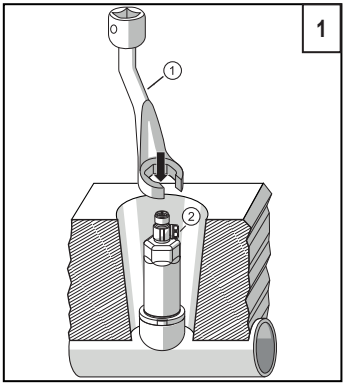
5 Installation

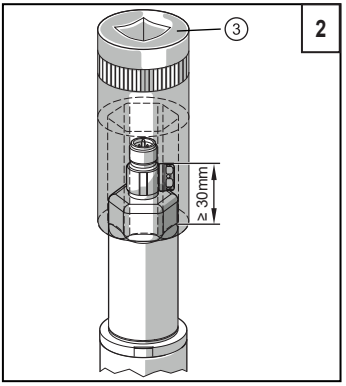
Before installing and removing the unit:
Make sure that no pressure is applied to the system.

In case of a recessed sensor installation, please use an open ring spanner or a hexagon socket with the corresponding inside contour.

During sensor installation, do not exert any axial leverage with the tool (1) on the rotatable filter cover (2) (→ Fig. 1).

In case of installation by means of a hexagon socket (3), make sure that the tool's spanner flat has an inner height of at least 30 mm (→ Fig. 2). Align the rotatable filter cover so that it is flush with one of the spanner flats.





▶ Insert the unit in a process connection.

▶ Tighten firmly. Recommended tightening torque:

Process connection	Tightening torque in Nm
G ½	20
Depends on the lubrication.	

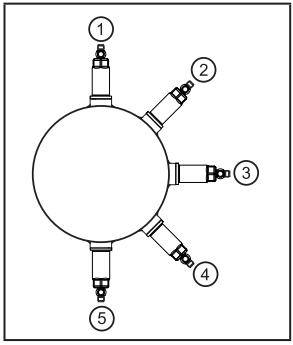
A zero-point calibration of the measured value is possible via the teach function (→ 7.3 Teach offset with the teach button)

5.1 Use in hygienic areas to 3A

Orientation of the unit in pipes and tanks

Please note for optimised cleaning of the measuring element according to the 3A criteria for hygienic areas:

Do not install the unit at the lowest point of the pipe or tank (see fig., position 5) in order that the medium can run off the area of the measuring element completely.

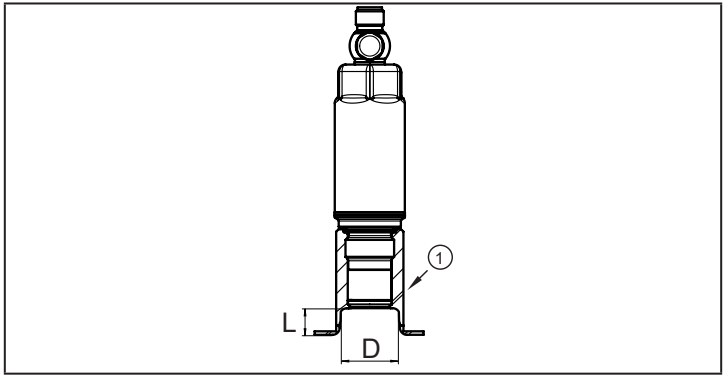


5.2 Use in hygienic areas to EHEDG

The sensor is suited for CIP (cleaning in process) when installed correspondingly.

Observe the application limits (temperature and material resistance) according to the data sheet.

- ▶ Make sure that the sensor is integrated into the system according to EHEDG:
- ▶ Adhere to the dimensions L < D to avoid dead space.



1: Leakage port

- ▶ Use self-draining installation
- ▶ Only use process adapters permitted according to EHEDG with special seals required by the EHEDG position paper

  The gasket of the system interface must not be in contact with the sealing point of the sensor.

- ▶ In case of structures in a tank, the installation must be flush mount. If not possible then direct water jet cleaning and cleaning of dead spaces must be possible.
- ▶ Leakage ports must be clearly visible and must be installed facing downwards for vertical pipes.

5.3 PM15xx with G ½

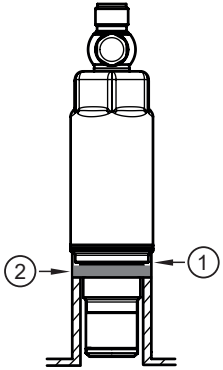
The device can be adapted to standard process connections using two sealing versions:

1	**Flush mount hygienic zero-leak using PEEK gasket**
	The process connection is supplied with a long-term stable and maintenance-free PEEK sealing ring and is suited for use in hygienic installations to EHEDEG and 3A. ▶ If required: Lightly grease the contact areas using a suitable lubricating paste which has been approved for this application. The PEEK sealing ring has been rated for ifm adapters with end stop towards the medium. The sealing between the housing and the process connection can compensate for variable insertion depths but not for the system pressure. If the sealing between the housing and the process connection is to withstand the system pressure→ Installation no. 3. For a hygienic installation to 3A and EHEDG, use adapters with leakage ports. Information on the installation process → Installation instructions enclosed to the adapter. ▶ When the PEEK gasket is mounted several times, check and replace it if necessary.

2	**Flush mount zero-leak using metal-to-metal seal**
	▶ Remove the clipped on PEEK gasket with a tool (screwdriver) using the existing cut-out above the gasket. Do not damage the sealing area during removal. ▶ If required: Lightly grease the contact areas using a suitable lubricating paste which has been approved for this application. ▶ Screw the sensor into the adapter. Only use accessories from ifm electronic gmbh! The optimum function is not ensured when using components from other manufacturers. The seal between the housing and the process connection can compensate for variable insertion depths / tolerances and provides protection against the ingress of media in the thread area. This seal cannot compensate for the system pressure. If required → Installation no. 3. A long-term stable and maintenance-free fitting without bug traps in the sealing is only valid for once-only mounting. If the sealing has to be installed several times, use a PEEK gasket → Installation no. 1.

3	**Installation to G ½ flange / G ½ threaded ferrule**

▶ Prerequisite: high-quality sensing face (1).



When pressure is applied, the customer has to replace the gasket (2) by a gasket according to DIN EN ISO 1179-2.

▶ If required: Lightly grease the contact areas using a suitable lubricating paste which has been approved for this application.

If the seal between the housing and the process connection is replaced by a gasket according to DIN EN ISO 1179-2, the sensor can be installed in existing through-holes or other G ½ threads.

In this case no end stop for the flush mount sealing area exists and the PEEK gasket has to be removed.

5.3.1 Installation in drinking water applications to ACS and WRAS

1	Installation of the sensor with PEEK gasket (as supplied).
2	Remove the PEEK gasket and mount the metal sealing edge to the adapter with metal end stop (ifm accessory).
3	Installation to G1/2 flange (without flush mount sealing edge) with sealing between the housing and the process connection (→ 5.3), Installation 3. ▶ Replace the gasket by a gasket described in DIN EN ISO 1179-2, as well as in ACS, or WRAS.

▶ Operating conditions:
Observe pressure, temperature and chemical resistance (→ Data sheet).

5.4 Ventilation diaphragm with protective cap

5.4.1 Function ventilation diaphragm

The ventilation diaphragm enables the relative pressure measurement since barometric and temperature-dependent pressure fluctuations between the measuring cell and the environment are compensated for.

The ventilation diaphragm is protected against damage by a screwed cap with circumferential ports.

For a correct functioning of the diaphragm please take the following into account:

- ▶ Remove soiling and cleaning agents immediately using plenty of lime-deficient splash water.

If the sensor is in a cooling stage:

- ▶ Avoid contact of the diaphragm with liquids to avoids negative pressure in the measuring system resulting in a slightly falsified measured value and additional strain on the diaphragm.

5.4.2 Orientation of the filter cover

The filter cover is freely rotatable around the sensor's axis and thus adaptable to the environmental conditions.

When the sensor is mounted in a vertical position, the condensate escapes through the ports in the protective cap due to gravity.

When the sensor is mounted in a horizontal position or similar, the filter protection cap must be rotated towards one of the two lateral faces to bring the ventilation diaphragm into a vertical position. This guarantees the optimum drainage for liquids.

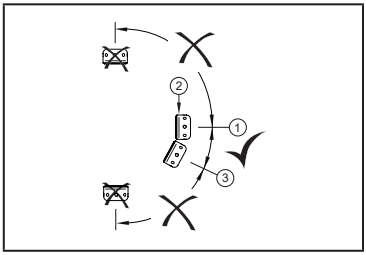


Fig. 1: Orientation

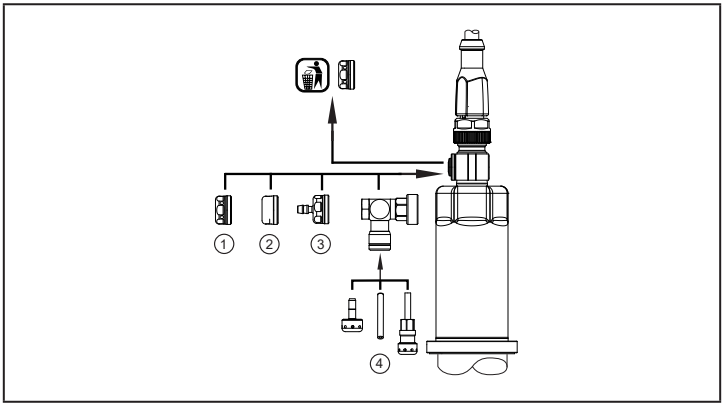
- ▶ Ideal orientation (1):
  Filter cover in horizontal position.
  The ventilation diaphragm (2) in the filter cover is in a vertical position.
- ▶ Maximum inclination: 30° (3)

5.5 Improve the protection of the filter cover

For rough operating conditions, the sensor protection can be improved by using ifm accessories.

1	Exchange the filter cover incl. ventilation diaphragm (E30142).
2	Replace the filter cover with a closed cover cap (E30148).
3	Replace the filter cover with a cover cap with a tube fitting and a vent tube that ends in a protected and dry area (E30139).
4	Set of accessories (E30467) with integrated ventilation diaphragm, for high degree of soiling and / or high climate pollution. Function → Installation instructions E30467

- ▶ Avoid soiling and moisture during the exchange
- ▶ Clean the thread carefully and without residues
- ▶ Do not damage the adhesive area of the sensor
- ▶ Observe the orientation of the filter cover → Installation instructions E30467



When using the closed cover cap, there is no pressure compensation of the measuring cell any more. This results in measurement deviations caused by:

- fluctuations of the atmospheric pressure
- pressure fluctuations inside the unit in case of temperature fluctuations (Δ 10 K ≤ 30 mbar).

6 Electrical connection

The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply according to EN 50178, SELV, PELV.

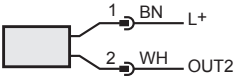
▶ Disconnect power.

▶ Connect the unit as follows:

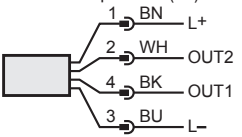
Core colours		
1	BN	brown
2	WH	white
3	BU	blue
4	BK	black



2-wire operation (2L)



3-wire operation (3L)



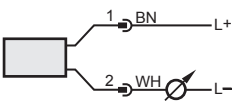
OUT1: communication via IO-Link

OUT2: analogue output

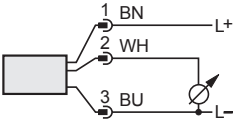
Colours to DIN EN 60947-5-2

Wiring example

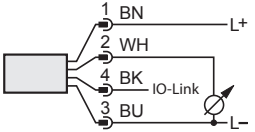
(2L) 1 x analogue



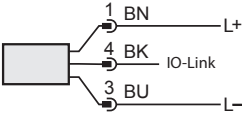
(3L) 1 x analogue



(3L) 1 x analogue / 1 x IO-Link



(3L) 1 x IO-Link



EMC test to EN 61000-4-5 Surge: 0.5 kV

7 Parameter setting

The unit can be configured via the IO-Link function.

- ▶ Prepare IO-Link hardware and software for parameter setting.
- ▶ Connect the unit with e.g. an IO-Link interface (→ 7.1) or a programmed memory plug (→ 7.2).
- ▶ Set the parameters.
- ▶ Put the unit into operation.

The parameters can be set before installation or during operation.

Changing parameters during operation can influence the function of the plant.

- ▶ Ensure that there will be no malfunctions in your plant.

7.1 Parameter setting via PC

For parameter setting, an IO-Link-capable software is necessary (e.g. LINERECORDER DEVICE). IO-Link interfaces from ifm are available for the connection of the unit via the USB interface of a computer → www.ifm.com.

- ▶ Prepare computer, software and interface.
- ▶ Connect the unit with the IO-Link interface.
- ▶ Follow the menu of the IO-Link software.
- ▶ Set the parameters.
- ▶ Put the unit into operation.

7.2 Parameter setting via the memory plug

A parameter set can be written to the unit / can be recorded by the unit via a memory plug (ifm storage module) → www.ifm.com.

In order to allow for data to be written from the memory plug to the sensor, the sensor must have the factory setting.

If the sensor has been configured, the memory plug records the parameter set which can then be transferred to other sensors of the same type.

- ▶ Load a suitable parameter set (e.g. from a PC or from a sensor of the same type) to the memory plug.
- ▶ Connect the memory plug between sensor and socket.
- > Sensor with factory setting:
  When voltage is applied, the parameter set is transferred from the memory plug to the sensor.
- > Sensor with changed settings:
  When voltage is applied, the memory plug records the sensor's parameter set.
- ▶ Remove the memory plug.
- ▶ Put the unit into operation.

Adjustable parameters (→ 7.5).

You can find more information about the memory plug in the corresponding technical documentation → www.ifm.com.

7.3 Teach offset with the teach button

An external teach button (E30425) allows for a zero-point calibration (calibration offset). The current measured value is taken as internal zero point if it lies within a range of +/- 3% of the final value of the measuring range.

For connection information see data sheet of E30425
If a teach button is connected, no IO-Link communication is possible

- ▶ Integrate the teach button between the installed sensor and the supply cable.
- ▶ Maintain the plant pressure constantly at zero (configurable range = +/- 3% of the measuring span).
- ▶ Press the button for > 2 ... < 10 s.
- > When voltage is supplied, the LED in the button flashes at 2 Hz and configures the zero point (calibration offset).
- > In case of a fault, the LED flashes at 8 Hz.

7.3.1 Scaling of the analogue value

▶ Select [ASP2] and set the value at which 4 mA is provided.	[ASP2]
▶ Select [AEP3] and set the value at which 20 mA is provided. Minimum distance between ASP2 and AEP2 = 20 % of the measuring span (scaling factor 5).	[AEP2]

7.3.2 Select the standard unit of measurement (option)

▶ Select [uni.P] and set the unit of measurement: [bAr] / [mbar] / [MPA] / [kPA] / [PSI] / [mWS] / [inH2O] The selectable units of measurement depend on the respective unit.	[uni.P]

7.3.3 Standard unit of measurement for medium temperature

▶ Select [uni.T] and set the unit of measurement:[°C] / [°F]	[uni.T]

7.4 User settings (optional)

7.4.1 Define the status of output 2 in case of a fault

Status of OUT2 in case of an internal fault: ▶ Select [FOU2] and set the value: - OU = The analogue signal behaves as defined by the current parameters. - On = The analogue signal goes to the upper end stop value (21.5 mA).	[FOU2]

7.4.2 Set damping for the analogue output

▶ Select [dAA] and set the damping constant (rise time 10...90 %) in seconds. Setting range: 0.000...4.000 s. Damping [dAA] only influences the analogue output / analogue signal path.	[dAA]

7.4.3 Set damping for the switching signal

▶ Select [dAP] and set the damping constant in seconds (t value: 63 %). Setting range: 0.000...4.000 s. The damping [dAP] influences the process data flow (IO-Link communication).	[dAP]

7.4.4 Zero-point calibration

▶ Select [tcof] Compared to the real measured value, the internal measured value (operating value of the sensor) is shifted. • Teach range: - 3...+ 3 % of the measuring span	[tcof]

7.5 List of the parameters

Parameter	Function
ASP2	Analogue start point Measured value at which 4 mA is provided.
AEP2	Analogue end point Measured value at which 20 mA is provided. Minimum distance between ASP and AEP = 20 % of the measuring span.
uni.P	Standard unit of measurement for system pressure (display): [bAr] / [mbar] / [MPA] / [kPA] / [PSI] / [mWS] / [inH2O] The selectable units of measurement depend on the respective unit.
uni.T	Standard unit of measurement for medium temperature: [°C] / [°F]
FOU2	Status of output 2 in case of a fault.
tcoF	Zero-point calibration (calibration offset) Compared to the real measured value, the internal measured value (operating value of the sensor) is shifted. • Teach range: - 3...+ 3 % of the measuring span
dAA	Damping for the analogue output Pressure peaks of short duration or high frequency can be filtered out using this function.
dAP	Damping of the process value (only applies to IO-Link evaluation)

Parameter	Function
Lo.P	Minimum value memory for system pressure (irrespective of the set damping)
Hi.P	Maximum value memory for system pressure. (irrespective of the set damping)
Lo.T	Minimum value memory for medium temperature
Hi.T	Maximum value memory for medium temperature

7.6 Diagnostic functions

7.6.1 Read min/max values for the system pressure

▶ Select [Hi.P] or [Lo.P.] to display the highest or lowest measured process value: - [Hi.P] = Maximum value system pressure - [Lo.P] = Minimum value system pressure The memory can be reset.	[Hi.P] [Lo.P]

7.6.2 Read min/max values for the medium temperature

▶ Select [Hi.P] or [Lo.P.] to display the highest or lowest measured process value: - [Hi.T] = Maximum value medium temperature - [Lo.T] = Minimum value medium temperature The memory can be reset.	[Hi.T] [Lo.T]

Diagnostic possibilities, unit temperature in chapter IO-Link.

8 Operation

After power-on and expiry of the power-on delay time of approx. 0.5 s the unit is in the RUN mode (= normal operating mode). It carries out its measurement and evaluation functions and generates output signals according to the set parameters.

9 Troubleshooting

The unit has many self-diagnostic options.
It monitors itself automatically during operation.
Warnings and faults are signalled via IO-Link.
If one process value fails, the other process values are still available.

Additional diagnostic functions are available via IO-Link.
→ IODD interface description at www.ifm.com.

IO-Link error codes are contained in the IODD

Type	Description	Output status	Troubleshooting
Error	Unit faulty / malfunction	FOU	Replace device.
Error	Supply voltage too low	off	Check supply voltage.
Error	Parameter setting outside the valid range	FOU	Repeat parameter setting.
Error	Error in pressure measurement	FOU	Check pressure measurement. Replace device.
Error	Error in temperature measurement	FOU	Check temperature measurement. Replace device.
Error	Upper limit temperature value reached (<= 111.4 %MEW*)	FOU	Check temperature range.
Error	Lower limit temperature value reached (<= -8.6 %MAW**)	FOU	Check temperature range.
Warning	Value above the pressure range (>= 105 % MEW*) or value above the temperature range (>= 105.7 % MEW*)	OU	Check pressure range / temperature range.
Warning	Value below the pressure range (>= -5 %MEW*) or below the temperature range (>= -2.9 %MEW*)	OU	Check temperature range.
Warning	Device temperature too high (> 125°C / 257°F)	OU	Check device temperature.

Type	Description	Output status	Troubleshooting
Warning	Device temperature too low (> -25°C / -13°F)	OU	Check device temperature.

*MEW = final value of the measuring range, **MAW = initial value of the measuring range
Output status: In case of a fault the analogue output behaves according to [FOU2] set.
In case of a warning the analogue signal is as defined in the parameters [OU].

10 Technical data and scale drawing

Technical data and scale drawing at www.ifm.com

11 Maintenance, repair, disposal

- ▶ It is not possible to repair the unit.
- ▶ After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.
- ▶ In case of returns ensure that the unit is free from dangerous and toxic substances.

12 Factory setting

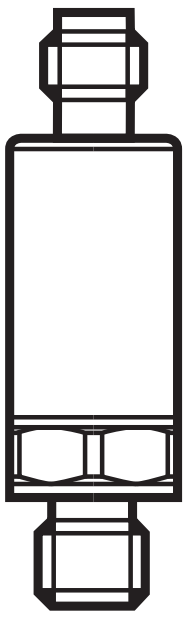
	Factory setting	User setting
ASP2	**0% MEW***	
AEP2	**100% MEW***	
uni.P	**bar / mbar**	
uni.T	**°C**	
FOU2	**OU**	
tcof	**0.0**	
dAA	**0.1**	
dAP	**0.06**	

MEW final value of the measuring range
* = The indicated percentage of the final value of the measuring range (MEW) of the corresponding sensor in bar / mbar is set.

Operating instructions
Electronic pressure sensor
with integrated temperature sensor
for industrial applications

PV80xx

UK



80285909 / 00 02 / 2020

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1 Preliminary note

1.1 Symbols used

▶ Instruction

> Reaction, result

[…] Designation of keys, buttons or indications

→ Cross-reference



Important note
Non-compliance may result in malfunction or interference



Information
Supplementary note



CAUTION

Warning of personal injury.
Slight reversible injuries may result.

2 Safety instructions

- The device described is a subcomponent for integration into a system.
  - The manufacturer is responsible for the safety of the system.
  - The system manufacturer undertakes to perform a risk assessment and to create a documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the manufacturer of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Functions and features).
- Only use the product for permissible media (→ Technical data).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.

- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.



CAUTION

For medium temperatures above 40 °C, parts of the unit may heat up to over 70 °C.

> Risk of burns

▶ Do not touch the unit

▶ Protect the housing against contact with flammable substances and unintentional contact.

3 Functions and features

The unit measures and monitors the system pressure and the medium temperature of machines and installations.

3.1 Applications

- Medium temperature Measuring range of all sensors -40...90°C / -40...194°F
- Type of pressure: relative pressure

Order number	Measuring range		Pressure rating		Bursting pressure	
Pressure sensor with G¼ external thread						
	bar	psi	bar	psi	bar	psi
PV8060	0...600	0...8702	1500	21755	2500	36255
PV8000	0...400	0...5802	1000	14500	1700	25655
PV8001	0...250	0...3626	625	9060	1200	17400
PV8002	0...100	0...1450.5	250	3625	1000	14500
PV8023	0...60	0...870	150	2175	900	13050
PV8003	-1...25	-14.6...362.6	65	940	600	8700
PV8004	-1...10	-14.6...145.05	25	360	300	4350
MPa = (measured value in bar) ÷ 10 kPa = (measured value in bar) x 100						

Avoid static and dynamic overpressure exceeding the indicated pressure rating by taking appropriate measures. The indicated bursting pressure must not be exceeded. Even if the bursting pressure is exceeded only for a short time, the unit may be destroyed. ATTENTION: Risk of injury!

Pressure Equipment Directive (PED):
The units with a pressure rating of ≤ 1000 bar comply with the Pressure Equipment Directive. They are designed for group 2 fluids and are manufactured in accordance with sound engineering practice.
Use of group 1 fluids on request.

Pressure Equipment Directive (PED):
The units with a final value of the measuring range of 600 bar comply with the Pressure Equipment Directive. They are designed for group 2 fluids and are manufactured and tested according to module A.
Use of group 1 fluids on request.

The units are vacuum resistant.

If the cable length exceeds 30 m or if used outside buildings, there is a risk of overvoltage pulses from external sources. We recommend to use the unit in protected operating environments and to limit overvoltage pulses to max. 500 V.

3.2 Use in hydraulic systems

Restrictor in the process connection:
In hydraulic systems, highly dynamic effects such as pressure peaks, cavitation etc. may arise depending on the operating conditions. To reduce these effects on the measuring element of the sensor, a diaphragm attachment is integrated into the process connection. The specific thread pitch of the diaphragm attachment has the effect of a hole of 0.3 mm.

Please note: High viscosity may reduce the response time by some milliseconds. Heavy soiling may affect the functionality.

4 Function

- The unit generates output signals according to the operating mode and the parameter setting.
- It also provides the process data, output signals and diagnostic messages via IO-Link.

4.1 Communication, parameter setting, evaluation

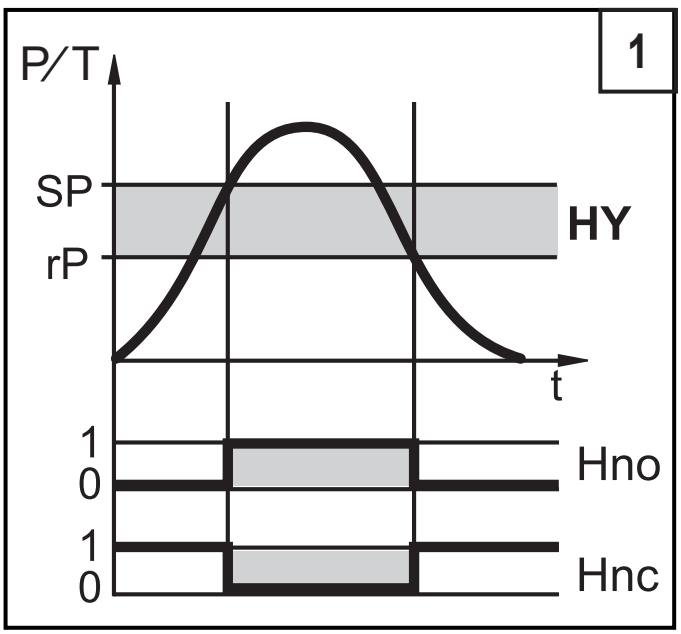
OUT1 (pin 4)	• Switching signal for system pressure limit • Communication via IO-Link
OUT2 (pin 2)	• Switching signal for system pressure limit or medium temperature limit

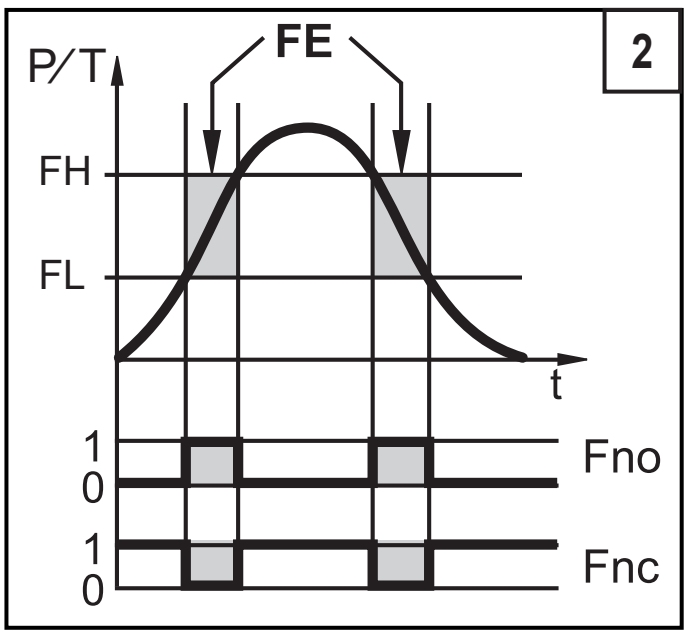
4.2 Switching function

OUTx changes its switching status if it is above or below the set switching limits (SPx, rPx). The following switching functions can be selected:

- Hysteresis function / normally open: [ou1] / [ou2] = [Hno] (→ Fig. 1).
- Hysteresis function / normally closed: [ou1] / [ou2] = [Hnc] (→ Fig. 1).

  First the set point (SPx) is set, then the reset point (rPx).
  The hysteresis defined remains even if SPx is changed again.
- Window function / normally open: [ou1] / [ou2] = [Fno] (→ Fig. 2).
- Window function / normally closed: [ou1] / [ou2] = [Fnc] (→ Fig. 2).
  The width of the window can be set by means of the difference between FHx and FLx. FHx = upper value, FLx = lower value.





P = system pressure; T = medium temperature; HY = hysteresis; FE = window

When set to the window function the set and reset points have a fixed hysteresis of 0.25 % of the measuring span.

4.3 IO-Link

4.3.1 General information

The unit has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master).

The IO-Link interface enables direct access to the process and diagnostic data and provides the possibility to set the parameters of the unit during operation.

In addition, communication is possible via a point-to-point connection with a USB adapter cable.

The IODDs necessary for the configuration of the unit, detailed information about process data structure, diagnostic information, parameter addresses and the necessary information about the required IO-Link hardware and software can be found at www.ifm.com.

4.3.2 Functions only available via IO-Link communication

- Switching cycles counter: The switching cycles on OU1 and OU2 are counted. Both counters can be read via a sub-index and reset via a system command.
- Operating hours counter: If the sensor is in the operating mode (connected to the power supply), this counter is incremented by 1 at an interval of 60 minutes. If the power supply is interrupted during an interval, this interval will not be counted. When the connection is re-established, the interval starts again from the first minute. The operating hours counter cannot be reset.
- Device temperature: The internal temperature of the sensor can be read via the A-cyclic IO-Link channel. Measuring range: -40...95° C (-40...203° F).
- Application Specific Tag: freely definable text assigned to the unit.
- Function Tag: freely definable text describing the device function in the plant.
- Location Tag: freely definable text describing the installation location in the plant.

For detailed information, please refer to the device-specific
IO Device Description PDF at www.ifm.com.

5 Installation

Before installing and removing the unit:Make sure that no pressure is applied to the system.

▶ Insert the unit in a G¼ process connection.

▶ Tighten firmly. Recommended tightening torque:

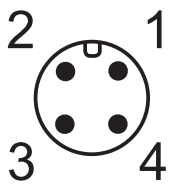
Pressure range in bar	Tightening torque in Nm
up to 400	25...35
600	30...50
Depends on lubrication, seal and pressure load!	

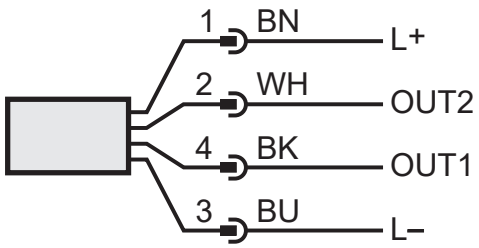
6 Electrical connection

The unit must be connected by a qualified electrician.
The national and international regulations for the installation of electrical equipment must be adhered to.
Voltage supply to EN 50178, SELV, PELV.

- ▶ Disconnect power.
- ▶ Connect the unit as follows:

Core colours	
BK	black
BN	brown
BU	blue
WH	white

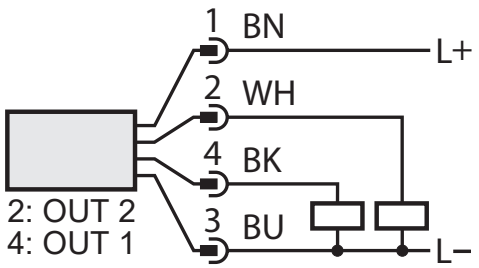




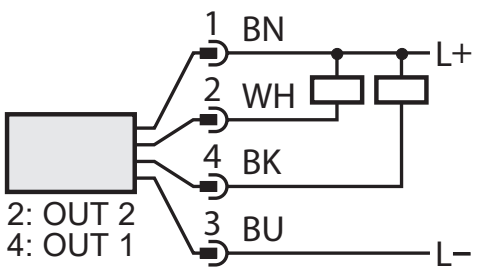
OUT1: Switching output or IO-Link
OUT2: Switching output
Colours to DIN EN 60947-5-2

Example circuits

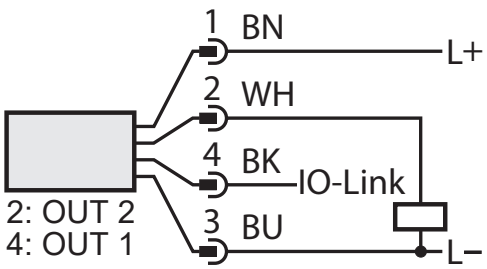
2 x positive switching



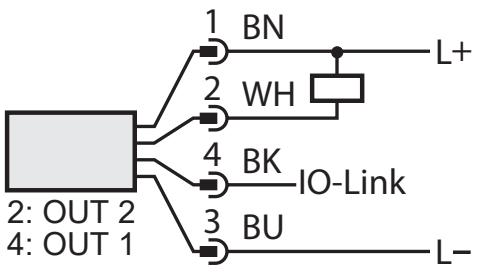
2 x negative switching



1 x positive switching, 1 x IO-Link



1 x negative switching, 1 x IO-Link



7 Parameter setting

The unit can only be configured via the IO-Link function.

- ▶ Prepare IO-Link hardware and software for parameter setting.
- ▶ Connect the unit with e.g. an IO-Link interface (→ 7.1) or a programmed memory plug (→ 7.2).
- ▶ Set the parameters.
- ▶ Put the unit into operation.

The parameters can be set before installation or during operation.

Changing parameters during operation can influence the function of the plant.

- ▶ Ensure that there will be no malfunctions in your plant.

7.1 Parameter setting via PC

For parameter setting, an IO-Link-capable software is necessary (e.g. LINERECORDER DEVICE). IO-Link interfaces from ifm are available for the connection of the unit via the USB interface of a computer → www.ifm.com.

- ▶ Prepare computer, software and interface.
- ▶ Connect the unit with the IO-Link interface.
- ▶ Follow the menu of the IO-Link software.
- ▶ Set the parameters.
- ▶ Put the unit into operation.

Adjustable parameters (→ 7.3).

7.2 Parameter setting via the memory plug

A parameter set can be written / transferred to the unit via a memory plug (storage module) → www.ifm.com.

▶ Load suitable parameter set (e.g. using a PC) to the memory plug.

▶ Connect the memory plug between sensor and socket.

> When voltage is supplied, the parameter set is transferred from the memory plug to the sensor.

▶ Remove the memory plug.

▶ Put the unit into operation.

Adjustable parameters (→ 7.3).

The memory plug can also be used to save the current parameter setting of a unit and to transfer it to other units of the same type.

You can find more information about the memory plug in the corresponding technical documentation → www.ifm.com.

7.3 List of parameters

Parameter	Function
SP1/rP1	Upper / lower limit for system pressure at which OUT1 switches with hysteresis setting. Requirement: OUT1 setting is [Hno] or [Hnc].
FH1/FL1	Upper / lower limit for system pressure at which OUT1 switches with window setting. Requirement: OUT1 setting is [Fno] or [Fnc].
SP2/rP2	Upper / lower limit value for system pressure or medium temperature at which OUT2 switches with hysteresis setting. Requirement: OUT2 setting is [Hno] or [Hnc].
FH2/FL2	Upper / lower limit for system pressure or medium temperature at which OUT2 switches with window setting. Requirement: OUT2 setting is [Fno] or [Fnc].
ou1	Output function for OUT1: Switching signal for the pressure limits: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc], output off [OFF].

Parameter	Function
ou2	Output function for OUT2: Switching signal for pressure limit values or medium temperature limit values: Hysteresis function [H ..] .] or window function [F ..], either normally open [. no] or normally closed [. nc], output off [OFF].
SEL2	Standard measured variable for evaluation by OUT2: PRES (pressure) or TEMP (temperature).
uni.P	Standard unit of measurement for system pressure: [bAr] / [MPA] / [PSI]
uni.T	Standard unit of measurement for medium temperature: [°C] / [°F]
FOU1	Behaviour of output 1 in case of an internal fault
FOU2	Behaviour of output 2 in case of an internal fault
dS1 / dS2	Switch-on delay for OUT1 / OUT2
dr1 / dr2	Switch-off delay for OUT1 / OUT2
P-n	Output logic: pnp / npn
dAP	Damping of the standard measured variable pressure
Lo.P	Minimum value memory for system pressure (memory can be reset)
Hi.P	Maximum value memory for system pressure (memory can be reset)
Lo.T	Minimum value memory for medium temperature (memory can be reset)
Hi.T	Maximum value memory for medium temperature (memory can be reset)
HIPS	Setting of the pressure limit for the counter [HIPC]
HIPC	Number of times the pressure limit is exceeded [HIPS] (the limit must be exceeded for at least 0.5 s)
HITS	Setting of the temperature limit for the counter [HITC]
HITC	Number of times the temperature limit is exceeded [HITS] (the limit must be exceeded for at least 0.5 s)
coF	Zero-point calibration

For more information refer to the IODD description or the context-specific parameter descriptions of the used IO-Link software.

8 Maintenance, repair, disposal

- ▶ It is not possible to repair the unit.
- ▶ After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.
- ▶ In case of returns ensure that the unit is free from dangerous and toxic substances.

9 Factory setting

	Factory setting	User setting
SP1	25% MEW*	
rP1	23% MEW*	
ou1	Hno	
ou2	Hno	
SP2	75% MEW*	
rP2	73% MEW*	
SEL2	PRES	
uni.P	bar	
uni.T	°C	
dS1	0.0	
dr1	0.0	
dS2	0.0	
dr2	0.0	
P-n	PnP	
dAP	0.06	
HIPS	MEW	
HIPC	0	
HITS	MEW	
HITC	0	
coF	0	

*= The indicated percentage of the final value of the measuring range (MEW) of the corresponding sensor is set in bar.

More information at www.ifm.com

GB

Operating instructions
Conductive conductivity sensor for UPW hygienic G1/2
LDL101

11377290 / 00 05 / 2022

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1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at www.ifm.com.

1.1 Symbols used

✓	Requirement
▶	Instructions
▷	Reaction, result
[...]	Designation of keys, buttons or indications
→	Cross-reference
	Important note Non-compliance may result in malfunction or interference.
	Information Supplementary note

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
  - The system architect is responsible for the safety of the system.
  - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.
- Only use the product for permissible media (→ Technical data).
- The unit complies with the standard EN 61000-6-4 and is a class A product. The unit may cause radio interference in domestic areas. If interference occurs, the user must take appropriate actions.

3 Intended use

The device measures the conductivity and temperature of purified and highly purified water, e.g. in water treatment plants for the beverage or pharmaceutical industry. The unit is designed for direct contact with the medium.

3.1 Application area

- Purified and highly purified water applications.
- Electrically hardly conductive media (→ Technical data sheet).

Application examples:

- Ion exchanger
- Reverse osmosis
- Distillation monitoring
- Water for injection (WFI)
- Semiconductor production
- Production of solar modules (surface cleaning)
- Desalination plants

3.2 Restriction of the application area

- Use the unit only for media to which the wetted materials are sufficiently resistant (→ Technical data sheet).
- The unit is not suitable for liquids with a medium to high electrical conductivity (e.g. industrial water, wastewater, sea water, acids, alkalis).
- The unit is not suitable for applications where the probe is subjected to permanent and high mechanical stress (e.g. abrasive media or fast flowing media containing solid particles).
- Not suited for media prone to formation of deposit.
- Do not expose the probe tip to direct sun radiation (UV radiation).

4 Function

4.1 Measuring principle

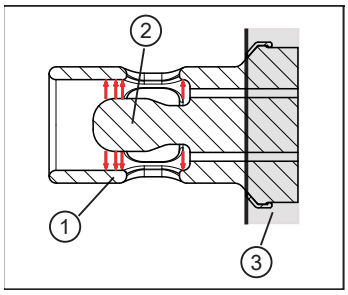


Fig. 1: Sectional view of measuring element

1: Outer electrode
2: Inner electrode
3: Mounting adapters

The unit operates on the conductive measuring principle. It measures the electrical conductivity of the medium to be monitored by means of a current flow between the inner electrode and the outer electrode.

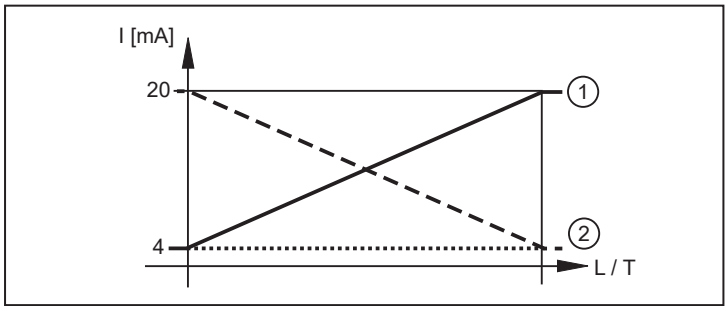
The sensor head must be in contact with the process liquid from the sensor tip to the mounting adapter. Otherwise there is no electrical connection so that no measurement can be made.

To compensate the influence of the temperature, the process temperature is detected by a temperature probe in the sensor tip.

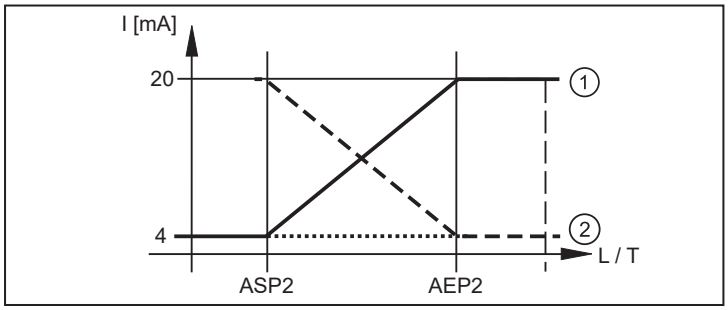
4.2 Analogue function

The unit provides an analogue signal proportional to the conductivity or (as option) the temperature. The analogue output (OUT2) can be configured.

Curve of the analogue signal (factory setting):



Curve of the analogue signal (measuring range scaled):



L: conductivity:
T: temperature
1: [ou2] = [I]
2: [ou2] = [InEG]
ASP2: analogue start point
AEP2: analogue end point

4.3 Defined state in case of a fault

If a fault is detected or if the signal quality is below a minimum value, the output OUT2 passes into a defined state according to Namur recommendation (NE43).

For this case, the response of the output can be set via the parameter [FOU2].

4.4 IO-Link communication interface

The device has an IO-Link communication interface which requires an IO-Link-capable module.

The IO-Link interface allows:

- direct access to process and diagnostic data,
- parameter setting of the unit outside the plant via the IO-Link interface,
- parameter setting of the unit via the IO-Link master during operation.

The IODDs necessary for the configuration of the unit, detailed information about process data structure, diagnostic information, parameter addresses and the necessary information about the required IO-Link hardware and software can be found at www.ifm.com.

5 Installation

CAUTION

If the medium temperature is above 50 °C (122 °F) parts of the housing can increase in temperature to over 65 °C (149 °F).

▷ Risk of burns

▶ Do not touch the unit.

▶ Protect the housing against contact with flammable substances and unintentional contact.

▶ Allow the unit and process adapter to cool down before maintenance.

Before installing and removing the unit:

▶ Make sure that no pressure is applied to the system and there is no medium in the pipe or tank. Also always take into account the potential dangers related to extreme machine and medium temperatures.

The sensor is supplied without installation / connection accessories.

Only use accessories from ifm electronic gmbh! The optimum function is not ensured when using components from other manufacturers.

Available accessories: www.ifm.com.

Before using the sensor for the first time, it must be cleaned with an appropriate cleaning agent that is approved for the application.

5.1 Installation location / environment

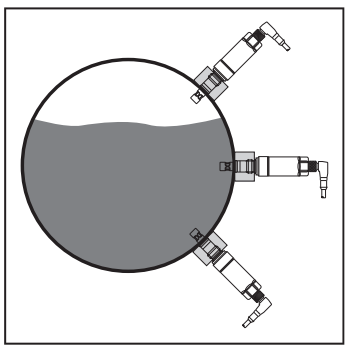
A correct fit and function of the unit and ingress resistance of the connection are only ensured using ifm adapters.

▶ Observe the following for applications in hygienic areas:
Notes on the use according to EHEDG, Notes on the use according to 3-A® (→ 🗋 11).

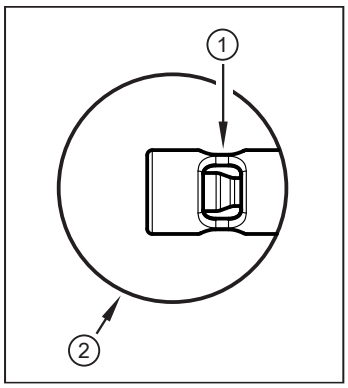
For installation in tanks and pipes:

▶ Install the unit (in particular in horizontal pipes) laterally or at an angle of max. 45 ° to the horizontal.

▷ Avoidance of influence by air bubbles and deposits.



5.1.1 Installation in pipes



1: Measuring element
2: Pipe

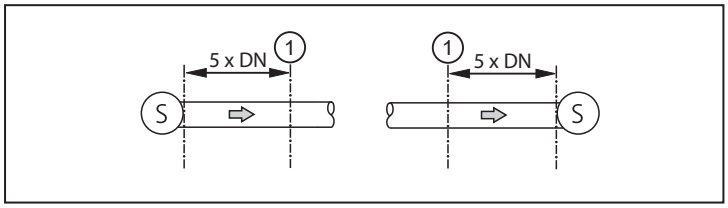
▶ Sensor and measuring element (1) must completely reach into the pipe (2).
▷ Unhindered flow through the measuring element is ensured.

▶ Avoid installation in a clamp adapter as this does not guarantee optimum flow through the measuring element. If installation in a clamp adapter cannot be avoided: adhere to the dimensions, see: Notes on the use according to EHEDG (→ 🗋 10)

▶ Installation preferably before or in rising pipes.

▶ Provide for inlet and outlet pipe lengths (5 x DN).

▶ Disturbances caused by bends, valves or pipe reductions, etc. are then eliminated.



S: Disturbance
DN: Pipe diameter
1: Sensor

5.2 Installation procedure

The unit is installed by means of a G 1/2 adapter (→ Accessories).

5.3 Installation procedure of the adapter

▶ Observe the operating instructions of the adapter used.

▶ Ensure cleanliness of the sealing areas.

▶ Remove protective packaging only just before mounting.

▶ In case of damaged sealing areas replace the unit or the adapter.

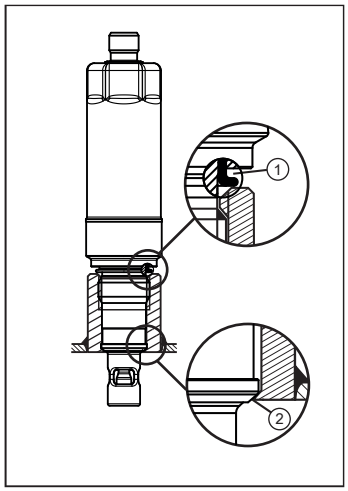
▶ Weld or screw the adapter into the tank / pipe. For welding adapters make sure that the adapter does not warp during the welding process.

With clamp adapters etc. the order of the installation steps differs. Observe the notes in the installation instructions of the respective adapter.

5.4 Installation procedure of the sensor

▶ Slide the supplied seal (gasket) (1) over the thread onto the sensor or check for correct position if it is already mounted.

▷ It seals the gap on the back between the sensor and the adapter.



1: Rear seal (gasket).
2: Sealing cone / sealing PEEK on metal* or metal-to-metal.

* The unit can be used with or without a PEEK sealing ring (pre-mounted on the sealing cone (2)).

For applications in hygienic areas to EHEDG or 3A:

▶ Ensure that the PEEK sealing ring is mounted on the sealing cone (2).

▶ Lightly grease the thread of the sensor using a lubricating paste which is suitable and approved for the application.

▶ Screw the sensor into the respective process connection and tighten it.
Tightening torque: 20 Nm

▶ After installation check the tank / pipe for ingress resistance.

5.5 Notes on the use according to EHEDG

In case welded adapters are used, the food contact surface must be smooth (surface roughness Ra < 0.8 µm) and the welding has to be done according to EHEDG Guideline 9 and 35.

The device is suited for CIP (cleaning in process) when installed correctly.

▶ Observe the application limits (temperature and material resistance) according to the data sheet.

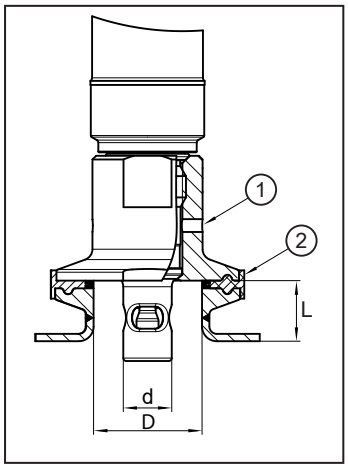
▶ Ensure that the installation of the device in the system complies with EHEDG guidelines.

▶ Use self-draining installation.

▶ Only use process adapters permitted according to EHEDG with special seals required by the EHEDG position paper.

▶ When mounted in a tank, the installation must be flush mount. If not possible then direct water jet cleaning and cleaning of dead spaces must be possible.

▶ Leakage ports must be clearly visible and must be installed facing downwards for vertical pipes.



1: Leakage port
2: Seal

▶ To avoid dead space adhere to the dimensions: L < (D - d).

5.6 Notes on the use according to 3-A®

▶ Make sure that the sensor is integrated into the system according to 3-A.

▶ Use only adapters with 3-A qualification and marked with the 3-A symbol. Available accessories: www.ifm.com.

The process connection must be provided with a leakage port. This is ensured when installed using adapters with 3-A approval.

▶ Leakage ports must be clearly visible and must be installed facing downwards for vertical pipes.

For use according to 3-A, special regulations apply for cleaning and maintenance.

Not suitable for systems that have to meet the criteria of E9.2 of the 3A standard 63-04.

6 Electrical connection

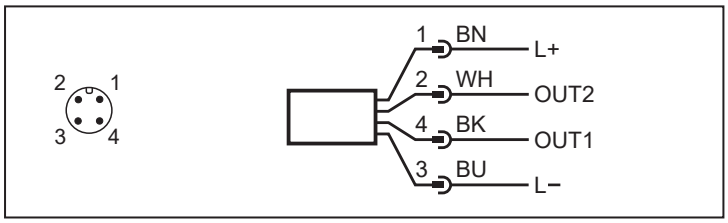
The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Supply voltage to EN 50178, SELV, PELV according to the technical data sheet.

▶ Disconnect power.

▶ Connect the unit as follows:



Pin	Core colour	
1:	BN	brown
2:	WH	white
3:	BU	blue
4:	BK	black
OUT1: • IO-Link		
OUT2: • analogue output		
Colours to DIN EN 60947-5-2		

6.1 For the cULus scope of validity

The electrical supply must only be made via SELV/PELV circuits.
A class 2 power supply can also be used and is not excluded.
The device must be supplied via a limited energy circuit according to section 9.4 of UL standard 61010-1, 3rd issue, or equivalent.
The external circuits connected to the device must be SELV/PELV circuits.
The device is designed to be safe at least under the following conditions:

- Indoor use
- Altitude up to 2000 m
- Relative air humidity up to max. 90%, non condensing
- Pollution degree 3
- Use UL-certified approved cables of category PVVA or CYJV with data suitable for the application.
- No special treatment is needed for cleaning the device.

7 Parameter setting

A PC with USB IO-Link master or a configured IO-Link environment is required to set the parameters.

If you change parameters during operation, this will influence the function of the plant.

- ▶ Make sure that there will be no malfunctions or dangerous operation in your plant.
- ▶ Note the potential dangers related to extreme plant conditions.

7.1 IO-Link communication interface

The device has an IO-Link communication interface which requires an IO-Link-capable module.

The IO-Link interface allows:

- direct access to process and diagnostic data,
- parameter setting of the unit outside the plant via the IO-Link interface,
- parameter setting of the unit via the IO-Link master during operation.

The IODDs necessary for the configuration of the unit, detailed information about process data structure, diagnostic information, parameter addresses and the necessary information about the required IO-Link hardware and software can be found at www.ifm.com.

7.2 Parameter setting using PC and USB IO-Link master

- ▶ Preparing the PC, software and master. Observe the → Operating instructions of the respective units / software.
- ▶ Connect the unit to the USB IO-Link master (→ Accessories).
- ▶ Follow the menu of the IO-Link software.
- ▶ Set the parameters; adjustable parameters(→ Parameters).
- ▶ Check if the unit has accepted the parameter settings. If necessary, read sensor again.
- ▶ Remove the USB IO-Link master and put the unit into operation.

7.3 Parameter setting during operation

Parameter setting during operation is only possible with an IO-Link-capable module (master).

Setting parameters can be directly adjusted via the controller.
Example: Media-specific parameters such as temperature coefficient [T.Cmp] can be adjusted to improve accuracy.

Recipes and settings can be stored in the controller during operation.

By parameter setting via the controller, a check of the units via a bit in parameter setting is ensured.

7.4 Adjustable parameters

7.4.1 Basic settings

Reset to factory settings	Restore the factory settings (button to activate the system command)
rEF.T	Standard temperature (25 °C) = reference temperature for measuring the conductivity. The standard temperature can be adjusted by the user, if necessary. Setting range: 15...35 °C

T.Cmp	Temperature compensation. The conductivity is determined according to the standard temperature ([rEF.T]) when the temperature coefficient (medium-specific characteristic value) is entered. Setting range: 0...5 %
	 • The temperature compensation is freely adjustable over 10 µS/cm in the corresponding value range and is linear. • Temperature compensation below 10 µS/cm is non-linear according to ASTM D 1125. • If the parameter T.Cmp = 0 is set, the temperature compensation is switched off.
uni.T	Selection of temperature unit [°C] = temperature is displayed in °C (degrees Celsius) [°F] = temperature is displayed in °F (degrees Fahrenheit)
CGA	Calibration gain (cell constant correction factor) With this factor the sensor can be adapted to a present system, or optimised to a certain conductivity value, or corrected. Setting range: 80…120 %.

7.4.2 More settings

ou2	Output configuration for analogue output (OUT2): [I] = measuring range is provided as 4...20 mA [InEG] = measuring range is provided as 20...4 mA [OFF] = output OFF (high impedance)
SEL2	Assignment of the analogue output to the process value: [COND] = conductivity [TEMP] = temperature
ASP2-TEMP	Analogue start point temperature; Setting range: -25...115 °C hysteresis of AEP2-TEMP > 20 % of AEP2-TEMP, min. 35 °C
AEP2-TEMP	Analogue end point temperature; Setting range: 10...150 °C hysteresis of ASP2-TEMP > 20 % of ASP2-TEMP, min. 35 °C
Offset TEMP	Zero-point calibration (calibration offset) / temperature; Setting range: +/- 5 K
ASP2-COND	Analogue start point conductivity; Setting range: 0...1500 µS/cm. Hysteresis of AEP2-COND > 50 % of AEP2-COND.
AEP2-COND	Analogue end point conductivity; Setting range: 1....3000 µS/cm. Hysteresis of ASP2-COND > 50 % of ASP2-COND.
Lo.T	Minimum value memory for the temperature
Hi.T	Maximum value memory for the temperature
Reset [Hi.T] and [Lo.T]	Reset maximum and minimum value memory (button to activate the system command)
Lo.C	Minimum value memory for conductivity
Hi.C	Maximum value memory for conductivity
Reset [Hi.C] and [Lo.C]	Reset maximum and minimum value memory (button to activate the system command)
FOU2	Response of OUT2 in case of a fault: [OU] = analogue output reacts according to process value, if possible. Otherwise: analogue output goes to [OFF]. [On] = analogue output switches to value > 21 mA in case of a fault [OFF] = analogue output switches to value < 3.6 mA in case of a fault
dAP	Damping of the measured signal. Setting range: 0...20 s
S.Tim	Simulation; entering the simulation time Setting range: 1...60 min
S.On	Simulation; status of the simulation: [OFF] = simulation OFF [On] = simulation ON
Start simulation	Start simulation (button to activate the system command)
Stop simulation	Stop simulation (button to activate the system command)

S.TMP	Simulation; selection of the temperature value to be simulated Setting range: -35...160 °C
S.CND	Simulation; selection of the conductivity value to be simulated Setting range: 0... 3150 µS/cm
Unit temperature	Current temperature of the unit Measuring range: -40...110 °C

For further information, please refer to the IODD description (www.ifm.com) or to the context-specific parameter descriptions of the used parameter setting software.

7.4.3 Example parameter setting

▶ Set the temperature compensation (parameter [T.Cmp]) to a medium with the temperature coefficient 3.0 %/K. Example: [T.Cmp] = [3.0].

▶ Make all other settings.

▶ Transfer the sensor data to the unit.

7.5 Temperature influence and temperature coefficient

7.5.1 Influence of the medium on the temperature

The conductivity depends on the temperature. When the temperature increases, the conductivity changes. This temperature influence depends on the respective medium and can be compensated by the unit if the temperature coefficient (tempco) of the medium is known. The temperature compensation is set via the parameter [T.Cmp]. Then the temperature-compensated conductivity value corresponds to the conductivity at standard temperature (25 °C; factory setting of the parameter [rEF.T]).

For medium that is not changed the same tempco value has to be set for all sensors (unit-independent characteristic value). There is no further dependence on the measuring principle, the lot or the manufacturer of the sensors.

If the temperature coefficient of the medium is not known, it can be determined.
See: Determination of the temperature coefficient tempco (→ 🗋 15)

In an IO-Link environment, existing tempcos of the media can be stored as recipe in the controller so that the accuracy of the values to be detected is improved.

7.6 Determination of the temperature coefficient tempco

1. Set the parameters [T.Cmp] and [dAP] to zero: [T.Cmp] = [0], [dAP] = [0].

▶ Write the changed values to the sensor.

1. Adjust the medium to 25 °C, for example, and take down the value of the conductivity after 2 min.
2. Heat up the medium to 45 °C, for example, and take down the value of the conductivity after 2 min.

Example of values taken down:
Medium at 25°C = 500 µS/cm; medium at 45°C = 800 µS/cm
Temperature change = 20 K

1. Calculate the change of the conductivity in percent.
   The conductivity has increased by 300 µS/cm.
   The percentage change is 300/500 = 60 %.
2. Calculate the temperature coefficient tempco: The tempco is calculated from the change in percent and the temperature change: Tk = 60 % / 20 K = 3 % / K

3. The calculated tempco can now be adopted into the parameter [T.Cmp].
   Example: [T.Cmp] = [3]. If necessary, set the damping (parameter [dAP]) again.

▶ Write values to the sensor.

8 Operation

8.1 Function check

After power-on the device is in the operating mode. It carries out its measurement and evaluation functions and generates process data (via IO-Link) according to the set parameters.

▶ Check whether the unit operates correctly.

8.2 Operating and diagnostic messages via IO-Link

IODD and IODD descriptive text as a PDF file at: www.ifm.com

8.3 Output response in different operating states

	OUT1 *)	OUT2
Initialisation	process value invalid	OFF
Normal operation	process value according to conductivity / temperature	according to conductivity / temperature and setting [ou2]
Fault	process value invalid	< 3.6 mA at [FOU2] = [OFF] > 21 mA at [FOU2] = [On] no change at [FOU2] = [OU]

*) process value via IO-Link

9 Maintenance, repair, transport and disposal

- ▶ Avoid the formation of deposits and soiling at the sensor element.
- ▶ To avoid damage to the sensor, no hard or sharp objects must be used when cleaning the sensor manually.

When the medium is changed, it may also be necessary to adapt the unit settings for a higher accuracy (parameter [T.Cmp]).

- ▶ It is not possible to repair the unit.
- ▶ After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.
- ▶ In case of return shipment, ensure that the unit is free from soiling, especially from dangerous and toxic substances.
- ▶ For transport only use appropriate packaging to avoid damage of the unit.

10 Factory setting

	Factory setting	User settings
rEF.T	25 (°C)	
T.Cmp	2 (%)	
uni.T	°C	
CGA	100 (%)	
ou2	I	
SEL2	COND (conductivity)	
ASP2-TEMP	0 (°C)	
AEP2-TEMP	150 (°C)	
Offset TEMP	0 (K)	
ASP2-COND	0 (µS/cm)	
AEP2-COND	1000 (µS/cm)	
Lo.T	---	
Hi.T	---	
Lo.C	---	
Hi.C	---	
FOU2	OFF	
dAP	1 (s)	
S.Tim	3 min	
S.On	OFF	
S.TMP	20 (°C)	
S.CND	0.5 (µS/cm)	

I N S T R U C T I O N S

for

Overflow pipe preventer /
Alkaline siphon

As at: February 2009

Customer	Place of installation	Manufacturer
		EnviroFALK GmbH PROZESSWASSER-TECHNIK Industriegebiet Sainscheid 56457 Westerburg www.falk-gmbh.com Telefon: (0)2663 / 99 08 - 0 Telefax: (0)2663 / 99 08 - 50

Read the operating instructions through carefully before commissioning the installation. EnviroFALK shall not be liable for malfunctions due to faulty operation and disregard of this operating manual.

EnviroFALK GmbH , Westerburg retains the copyrights of this documentation.

Please keep for later reference!

General Notes

1. **Before commissioning and/or using the installation:** Please observe the respective installation and operation instructions in this manual.
2. **Please note:** Incorrect usage and improper operation shall void the manufacturer's liability.
3. Changes in the installation may not be carried out without consultation and sanction with us, otherwise damages are not covered by our guarantee.
4. The temperature in the operating room of the unit must be at least **5 °C**.
5. Observe all valid, general decrees and regulations on the installation site. **Accident prevention regulations** also apply.
6. In case of queries and orders for replacement parts, it is vital to state the correct installation name and the installation no. in order to facilitate correct and quick order processing.

Shipment and packaging

FALK installations are carefully packaged and tested before shipment. Since damages caused during transit may nevertheless occur, it is indispensable to **check the installation upon receipt**.

- Check the delivery for **completeness** against the bill of delivery.
- If the packaging is **damaged,** the goods must immediately be **inspected visually**. This is to be **noted** on the haulage company's **transportation documents**. In addition, please observe the fact that you are responsible for **hidden damages** that only appear during start-up. **Contact the haulage company immediately,** otherwise transportation insurance cannot be claimed. Keep the packaging, in case of any possible checks by the haulage or insurance companies.
- Pack up the goods so they are shock-proof for returning them.
- **Drain the installation** before shipment in order to save packaging weight and cost and to prevent spilled water soaking the packaging.

EnviroFALK helpline

Good advice is just a phone call away!

The EnviroFALK GmbH in Westerburg (Germany) helpline EnviroFALK is at hand to offer advice and practical help to EnviroFALK operators. Just give us a call.

Germany: +49 2663 9908 - 22

The FALK team is available during business hours. Our Customer Service is happy to answer any engineering issues.

Business hours:

Monday to Thursday:	8:00 am to 12:00 pm and 12:30 pm to 04:00 pm
Friday:	8:00 am to 12:00 pm and 12:30 pm to 03:00 pm

Safety instructions



- Before actuation, check corrective maintenance to ensure all protective enclosures are fastened.
- In all respects, local safety and accident prevention regulations apply for the operation of the installation.



- The consumption of conditioned water poses a health danger.



- Use caution when tubes are loose. Danger of injuries. Floor may be slippery.
- Pumps must not operate within the installation on the outlet side against closed valves. There is a danger of destruction if overloaded.
- Only tighten tube connections by hand.
- Leaks must be eliminated immediately. Danger of water damage and injuries due to slippery floors.



- Note: Observe valid safety regulations when handling chemical products (e.g. cleaning agents).
- Wear protective clothes!
- If skin or eyes are contacted with chemicals: flush with clean water. Visit your doctor.

Description

The system protects tanks against bacteries or other biological dirts coming out of the drain pipe/overflow pipe.

EnviroFALK GmbH sells you a perfect media for use in the unit:
Colored solution for tank overflow indication, Article No. **475196**
pH: 9.0 – 9.5
without UN-number

Accident prevention regulations also apply.

Fill the media art. No. 475196 into the Overflow pipe preventer

Service and maintenance

- Refill media if necessary.
- Replace filling one time a year.
- For all your questions: **Service-Hotline +49 2663 99 08 22.**

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Article number: 475196
Product name: indicator solution for industrial use

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Colored solution for use in tank overflow, with bactericide

1.3 Details of the supplier of the safety data sheet:

EnviroFALK GmbH
Prozesswasser-Technik
Gutenbergstraße 7
56457 Westerburg
Germany
Tel.: +49 2663 9908-0
Fax.: +49 2663 9908-50
http://www.envirofalk.com
Email: sdb@envirofalk.com

Office hours:	Monday - Thursday:	7:45 am – 16:45 pm
	Friday:	7:45 am – 15:15 pm

1.4 Emergency telephone number:

+49 (0) 2663 9908-23 (EnviroFALK hotline only during office hours)

2. Hazards identification

2.1 Classification of the substance or mixture

Classification according EC regulation 1272/2008: none required
Classification according to CEE regulation 1272/2008: none required
No cat 1 or 2 or 3 or 4 ATE.

2.2 Label elements:



GHS 07
Signal word: WARNING
0.2 % of the product are substances with unknown toxicity.
0.002 ‰ oft he product is a dye that is not classified as acut toxic.
H302+H312+H332: Harmful if swallowed, in contact with skin or if inhaled.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P302+352: IF ON SKIN: Rinse with water

P314: Get medical advice/attention if you feel unwell.

2.3 Other hazards:
PBT: no
vPvB: no

3. Composition/information on ingredients

3.1 Substance:
The product is a mixture

3.2 Mixture:
The mixture contents:

CAS: 26172-55-4 EINECS: 2475007	5-Chlor-2-methyl-2H-isothiazol-3-one	< 0,25 %
CAS: 2682-20-4 EINECS: 2202396	2-Methyl-2H-isothiazol-3-one	< 0,25 %
CAS: 1310-73-2 EINECS:	Natrium hydroxide	< 0,02 %
CAS: 81-88-9 EINECS: 201-383-9	Rhodamin B	< 0,002 %

4. First aid measures

4.1 Description of first aid measures:
After inhalation: supply fresh air.
In case of skin contact: Rinse with water. Remove contaminated clothes.
After eye contact: Rinse opened eye with water. Contact doctor.
After swallowing: Drink water. Contact the doctor.

4.2 Most important symptoms and effects, both acute and delayed:
Headache, nausea, skin and eye irritation

4.3 Indication of any immediate medical attention and special treatment needed:
No additional information available.

5. Firefighting measures

5.1 Extinguishing media:
Water, CO_2, foam, powder. Adapt extinguishing measures to suit the environment.
5.2 Special hazards arising from the substance or mixture:
Mixture is non-flammable.
5.3 Advice for firefighters:
Do not allow fire water to penetrate into surface or ground water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:
Avoid substance contact.

Wear protective clothing (Skin, hand, face and body protection).
Keep unprotected persons away from the product.

6.2 Environmental precautions:
Do not empty into drains or groundwater or surface water.

6.3 Methods and materials for containment and cleaning up:
For small amounts: Pick up with suitable appliance and dispose of.
For larger amounts: Pick up with suitable appliance, store into a suitable container. and dispose of.
Rinse contaminated surfaces with water or cleaning agent with a water content. Use neutralising agent.
Dispose contaminated as waste according chap.13. Ensure sufficient ventilation.

6.4 Reference to other sections:
Sections 8 and 13

7. Handling and storage

7.1 Precautions for safe handling:
Wear protective clothing. Avoid any contact with the product.
For transport and storage: Keep container tightly closed.
Don’t smoke. Keep away from sources of ignition.

7.2 Conditions for safe storage, including any incompatibilities:
Requirements to be met by storerooms and receptacles: Store in a cool and ventilated location.
Store not longer than 6 month after delivery.
Keep container tightly closed.
Freezing and thawing reduces the effectiveness oft he product.
German regulations Storage class VCI: 12.

7.3 Specific end use(s):
Colored solution for use in tank overflow, with bactericide, only for industrial use.

8. Exposure controls/personal protection

8.1 Control parameters:

26172-55-4	5-Chlor-2-methyl-2H-isothiazol-3-on	AGW = 0,05 mg/m³
2682-20-4	2-Methyl-2H-isothiazol-3-on	AGW = 0,05 mg/m³

German national occupational exposure limit value AGW

8.2 Exposure controls:
Engineering measures:
Priority is to be given to organisational and technical measures. Use protective clothing for case of residual danger.

Individual protection measures:
Hygienic measures: Immediately change contaminated clothing.
Use skin cleaning agents and skin care agents after cleaning the skin at the end of the work.

Hand protection: Protective gloves (nitrile rubber, 0,11 mm, penetration time > 480 minutes). Replace used gloves periodically.

Other measures: protective clothing.

Respiratory protection: not necessary.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Form:	liquid
Colour:	red
Odour:	acrid smell
pH:	10,5 (at 20 °C)
Melting point:	approx. -5 °C
Boiling point/boiling range:	approx. 100 °C
Flash point:	no information available
Flammability (solid, gas):	no information available
Lower explosion limit:	no information available
Upper explosion limit:	no information available
Vapour pressure:	no information available
Relative vapour density:	no information available
Density:	1,05 g/cm³ (at 20 °C)
Water solubility:	unrestricted water-soluble
Auto-ignition temperature:	no information available
Decomposition temperature:	no information available
Viscosity, dynamic:	no information available
Explosive properties:	no information available
Oxidizing properties:	no information available

9.2 Other data:

No further data available

10. Stability and reactivity

10.1 Reactivity:

Reacts with oxidizing agents, Amine, reducing agents under heat.

10.2 Chemical stability:

This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions:

There are expected no hazardous reactions for intended use.

10.4 Conditions to avoid:
Avoid temperatures < 0 °C.

10.5 Incompatible materials:
Oxidizing agents, Amine, reducing agents.

10.6 Hazardous decomposition products:
In case of fire (see chapt. 5): NOx, SOx, HCl

11. Toxicological information

LD50 (oral) = 3350 mg 5-Chlor-2-methyl-4-isothiazolin-3-on / kg Rat
LD50 (oral) = 550 mg 2-Methyl-4-isothiazolin-3-on / kg Rat

Skin irritation: possible
Eye irritaition: possible

Further dangerous properties possible. Observe the common safety rules fort he working with chemicals.

12. Ecological information

12.1 Toxicity:
We have no quantitative data concerning the ecological effects of this product.

12.2 Persistence and degradability:
We have no data concerning the persistence effects of this product. The product is biotic degradable only below microbicidal effect concentration.
Abicidal degradability is possible.
With the appropriate introduction of low concentrations into adapted biological wastewater treatment plants, trouble is not to be expected in the decomposition activity of activated sludge.
AOX concentration possible, contents organic halogene.

12.3 Bioaccumulative potential:
No information available.

12.4 Mobility in soil:
No information available.

12.5 Results of PBT and vPvB assessment:
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

12.6 Other adverse effects:
No environmental problems can be expected when the product is handled and used properly.

13. Disposal considerations

13.1 Waste treatment methods

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.
Dispose according to legislation.
Waste code (91/689/EEC) : 16 10 03* aqueous concentrates containing dangerous substances

Product/Packaging disposal

Packing which cannot be properly cleaned must be disposed of.

13.2 Additional information

Do not allow uncontrolled discharge of product into the environment.

14. Transport information

Not classified as dangerous in the meaning of transport regulations.

14.1 UN Number:

No UN number

14.2 UN proper shipping name:

No proper common shipping name.

14.3 Transport hazard class(es):

No information

14.4 Packing group:

No data available.

14.5 Environmental hazards:

No further data available.

14.6 Special precautions for user:

No information.

14.7 Bulk goods transport (MAPROL) and IBC-Code:

No information.

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

Please consider possible restrictions of occupation after maternity protection guideline regulation or law for the protection of young workers.
German regulations Storage class VCI: 12.
The product is considered as low hazardous to waters WGK1, self-classification according to VCI (chemical industry association) concept.

15.2 Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.

16. Other information

The information contained herein is based on the present state of our knowledge. It characterises the product with regard to the appropriate safety precautions. It does not represent a guarantee of any properties of the product.

Changes to Rev. 1.02
P-No. „P302“ changed to „P302+P352“

Abbreviations and acronyms
a.i. = Active ingredient
ACGIH = American Conference of Governmental Industrial Hygienists (US)
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AFFF = Aqueous Film Forming Foam
AISE = International Association for Soaps, Detergents and Maintenance Products (joint project of AISE and CEFIC)
AOAC = AOAC International (formerly Association of Official Analytical Chemists)
aq. = Aqueous
ASTM = American Society of Testing and Materials (US)
atm = Atmosphere(s)
B.V. = Beperkt Vennootschap (Limited)
BCF = Bioconcentration Factor
bp = Boiling point at stated pressure
bw = Body weight
ca = (Circa) about
CAS No = Chemical Abstracts Service Number (see ACS - American Chemical Society)
CEFIC = European Chemical Industry Council (established 1972)
CIPAC = Collaborative International Pesticides Analytical Council
CLP = REGULATION (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.
Conc = Concentration
cP = CentiPoise
cSt = Centistokes
d = Day(s)
DIN = Deutsches Institut für Normung e.V.
DNEL = Derived No-Effect Level
DT50 = Time for 50% loss; half-life
EbC50 = Median effective concentration (biomass, e.g. of algae)
EC = European Community; European Commission
EC50 = Median effective concentration
EINECS = European Inventory of Existing Commercial Chemical Substances (EU, outdated, now replaced by EC Number)
ELINCS = European List of Notified (New) Chemicals (see Tab 7, Background - Guide)
ErC50 = Median effective concentration (growth rate, e.g. of algae)
EU = European Union
EWC = European Waste Catalogue
FAO = Food and Agriculture Organization (United Nations)

GIFAP = Groupement International des Associations Nationales de Fabricants de Produits Agrochimiques (now CropLife International)
h = Hour(s)
hPa = HectoPascal (unit of pressure)
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Concentration that produces 50% inhibition
IMDG Code = International Maritime Dangerous Goods Code
IMO = International Maritime Organization
ISO = International Organization for Standardization
IUCLID = International Uniform Chemical Information Database
IUPAC = International Union of Pure and Applied Chemistry
kg = Kilogram
Kow = Distribution coefficient between n-octanol and water
kPa = KiloPascal (unit of pressure)
LC50 = Concentration required to kill 50% of test organisms
LD50 = Dose required to kill 50% of test organisms
LEL = Lower Explosive Limit/Lower Explosion Limit
LOAEL = Lowest observed adverse effect level
mg = Milligram
min = Minute(s)
ml = Milliliter
mmHg = Pressure equivalent to 1 mm of mercury (133.3 Pa)
mp = Melting point
MRL = Maximum Residue Limit
MSDS = Material Safety Data Sheet
n.o.s. = Not Otherwise Specified
NIOSH = National Institute for Occupational Safety and Health (US)
NOAEL = No Observed Adverse Effect Level
NOEC = No observed effect concentration
NOEL = No Observable Effect Level
NOx = Oxides of Nitrogen
OECD = Organization for Economic Cooperation and Development
OEL = Occupational Exposure Limits
Pa = Pascal (unit of pressure)
PBT = Persistent, Bioaccumulative or Toxic
pH = -log10 hydrogen ion concentration
pKa = -log10 acid dissociation constant
PNEC = Previsible Non Effect Concentration
POPs = Persistent Organic Pollutants
ppb = Parts per billion
PPE = Personal Protection Equipment
ppm = Parts per million
ppt = Parts per trillion
PVC = Polyvinyl Chloride
QSAR = Quantitative Structure-Activity Relationship
REACH = Registration, Evaluation and Authorization of CHemicals (EU, see NCP) SI = International System of Units
STEL = Short-Term Exposure Limit

tech. = Technical grade
TSCA = Toxic Substances Control Act (US)
TWA = Time-Weighted Average
vPvB = Very Persistent and Very Bioacccumulative
WHO = World Health Organization = OMS
y = Year(s)

Bedienungsanleitung
Operating Instructions
Notice d’utilisation



Beispielhafte Darstellung
Exemplary illustration

DE: page 2
EN: page 10
FR: page 18

Bezeichnung **Type** **Type**	**Wasser-Vollentsalzer DIA** **Water Demineralizer DIA** **Déminéralisateur d’eau DIA**
Ausführungen **Models** **modèles**	**DIA 600, DIA 1100, DIA 2000, DIA 2800, DIA 4000, DIA 6000,** **DIA 7000, DIA 9000, DIA 11.000, DIA 12500 und DIA 15.000**

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Stand: 03/2019

DE Betriebsanleitung

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Gut zu wissen!

- **Bevor Sie die Installation vornehmen und das Gerät benutzen:** Beachten Sie bitte die entsprechenden Installations- und Bedienhinweise in dieser Bedienungsanleitung.
- **Bitte beachten Sie:** Bei nicht bestimmungsgemäßem Gebrauch und unsachgemäßer Bedienung ist der Hersteller von jeglicher Haftung freigestellt.
- Veränderungen an der Anlage dürfen ohne die Rücksprache und Zustimmung mit uns nicht vorgenommen werden, bei Schäden übernehmen wir sonst keine Gewährleistung.
- Die Überprüfung der qualitativen Merkmale obliegt dem Betreiber der Anlage. Ebenso eine umgehende Abschaltung bei Überschreitung der Grenzwerte.
- Die Temperatur im Betriebsraum der Anlage muss **mindestens 5 °C** betragen.
- Vor Montagebeginn prüfen Sie bitte die Statik der Wände, Decken und Böden. Diese müssen statisch belastbar sein.
- Beachten Sie die am Aufstellort der Anlage jeweils gültigen allgemeinen Verordnungen und Vorschriften. Ebenso gelten die **Unfallverhütungsvorschriften**.
- Der Aufstellort muss so beschaffen sein, dass keine Wasserschäden verursacht werden (z.B. durch einen vorhandenen **Bodenablauf**). Diese werden nicht vom Hersteller getragen.
- Wichtig für alle Rückfragen und Ersatzteilbestellungen ist die richtige Angabe der Gerätebezeichnung. Nur so ist eine einwandfreie und schnelle Bearbeitung möglich.
- Wasserberührende Teile nach der Wasseraufbereitung müssen aus einem beständigen Material wie PE, PP oder V2A / V4A sein und in Verarbeitung und Verlegung den Anforderungen entsprechen.

1. Sicherheitshinweise

Bitte beachten Sie während aller Arbeiten an dieser Anlage zu Ihrem eigenen Schutz die auf der folgenden Seite aufgeführten Sicherheitshinweise. Jede Person, die im Betrieb des Anwenders mit der Montage, Inbetriebnahme, Bedienung und Instandhaltung der Anlage befasst ist, muss die komplette Bedienungsanleitung gelesen und verstanden haben. Die Anlage darf nur von autorisiertem, ausgebildetem und eingewiesenem Personal bedient, gewartet und instandgesetzt werden.

Wartungen und Reparatur dürfen nur von ausgebildetem autorisiertem Fachpersonal (Installateure und Elektrofachkräfte) ausgeführt werden.

	**Gefahr eines elektrischen Stromschlages!** **(bei Option Leitfähigkeits-Messgerät)**
GEFAHR	Installations- und Reparaturarbeiten dürfen nur von einer Elektrofachkraft ausgeführt werden! Vor Installationsarbeiten die Stromversorgung vom Netz trennen! Vorsicht bei offenen Abdeckungen. Es können Teile unter gefährlichen Spannungen stehen!

	**Kein Trinkwasser!**
WARNUNG	Der Verzehr von aufbereitetem Wasser ist gesundheitsschädlich!

	**Rutschgefahr!** **Vorsicht bei losen Schläuchen. Verletzungsgefahr!** **Rutschgefahr!**
VORSICHT	Wechseln Sie defekte Dichtungsringe gegen passende Dichtungsringe aus. Undichtigkeiten umgehend beseitigen. Rohrverschraubungen nur handfest anziehen.

2. Transport und Verpackung

EnviroFALK-Systeme und -Anlagen werden vor Versand sorgfältig verpackt und geprüft, jedoch sind Beschädigungen durch den Transport nicht auszuschließen. Daher sind **Eingangskontrollen** unbedingt erforderlich.

- Bei beschädigter **Verpackung** sofort eine **Sichtprüfung** der Ware durchführen. Dies auf den **Versandpapieren** der Spedition **vermerken**. Machen Sie bitte den Zusatz, dass Sie sich das Recht für **verdeckte Schäden** offen halten, die sich erst bei der Inbetriebnahme zeigen. Setzen Sie sich **sofort mit der Spedition in Verbindung.** Ansonsten kann die Transportversicherung nicht herangezogen werden. Bewahren Sie die Verpackung für eine eventuelle Überprüfung durch den Spediteur oder die Versicherung auf.
- Kontrollieren Sie die **Vollständigkeit** der Warenlieferung anhand des Lieferscheins.
- Verpacken Sie die Ware für den Rückversand stoßsicher.
- Für den Versand das Wasser aus dem System entfernen. Dadurch können Sie Versandkosten sparen.

3. Wasseraufbereitungsanlagen vom Typ DIA

Überall dort, wo Reinwasser unter Druck zu einer Anwendung oder einem Verbraucher geführt werden muss, sind druckfeste Patronen erforderlich. Unsere aus korrosionsbeständigem V_4A- Edelstahl oder glasfaserverstärktem Kunststoff (GKF) gefertigten Patronen entsprechen diesen Anforderungen vollständig.

3.1 Wasser- Vollentsalzung

Die **Wasser- Vollentsalzer vom Typ DIA** entfernen Wasserinhaltsstoffe (d.h. leitfähige Salze und Mineralien wie beispielsweise Kalzium, Magnesium, Sulfate, etc.) aus dem Wasser und senken somit dessen Leitfähigkeit. Sie sind mit regenerierfähigem Mischbett-Ionenaustauscherharz höchster Qualität gefüllt und entfernen die ionogen vorliegenden Wasserinhaltsstoffe zuverlässig. Je nach Mineralgehalt des aufzubereitenden Wassers (i.d.R. Trinkwasser oder Brunnenwasser) wird der Wasservollentsalzer beladen. Das aufbereitete Wasser wird VE-Wasser (voll-entsalztes Wasser) genannt.

3.2 Bestimmung der Wasserqualität- die Messung der Leitfähigkeit (DIA MB)

Die Wasserqualität wird mit Hilfe der sog. Leitfähigkeit gemessen. Sie ist ein Maß für die im Wasser enthaltenen Inhaltsstoffe. Je geringer die Leitfähigkeit ist, desto besser ist die Wasserqualität. Typische Leitfähigkeitswerte nach der Aufbereitung mit einem Wasser-Vollentsalzer vom Typ DIA MB sind Werte < 1 µS/cm erreichbar. Steigt die Leitfähigkeit über den durch den Anwender festgelegten Wert, müssen die Entsalzungs-Patronen gewechselt werden, zum Schutz vor Verkeimung aber spätestens halbjährlich.

Option: Leitfähigkeits-Messgerät

Zum Wasser-Vollentsalzer kann optional das für Ihre Anwendung notwendige Gerät separat bestellt werden. Weitere Informationen zu diesem Gerät finden sich in der Messgeräte- Anleitung.

3.2.1 Bestimmung der Wasserqualität- die Messung der Leitfähigkeit (DIA KR)

Die Wasserqualität wird mit Hilfe der sog. Leitfähigkeit gemessen. Sie ist ein Maß für die im Wasser enthaltenen Inhaltsstoffe. Je geringer die Leitfähigkeit ist, desto besser ist die Wasserqualität. Typische Leitfähigkeitswerte nach der Aufbereitung mit einem Wasser-Vollentsalzer vom Typ DIA KR sind Anfangswerte von 0,055 µS/ cm erreichbar. Steigt die Leitfähigkeit über den durch den Anwender festgelegten Wert, müssen die Entsalzungs- Patronen gewechselt werden, zum Schutz vor Verkeimung aber spätestens halbjährlich.

Option: Leitfähigkeits-Messgerät

Zum Wasser-Vollentsalzer kann optional das für Ihre Anwendung notwendige Gerät separat bestellt werden. Weitere Informationen zu diesem Gerät finden sich in der Messgeräte- Anleitung

4. Montage und Betrieb



Die Anlage wird wie folgt in Betrieb genommen. Sollten Sie bei der beschriebenen Prozedur unsicher sein oder Fragen haben, so wenden Sie sich bitte an unseren Customer- Service (Telefon: 02663- 9908-22).

4.1 Montage- Vorbereitung

1. Alle Anschlüsse (Wasser, Elektrizität) anschlussbereit herstellen.
2. Die Anlage waagerecht aufstellen.

4.2 Montage des Leitfähigkeits-Messgerätes (optional)

Das Messgerät wird mit einem Anschluss-Stück geliefert, welches auf die Vollentsalzer- Patrone montiert wird.

1. Das Messgerät gerade auf den **AUSGANG** des Anschlussgewindes setzen und handfest andrehen. Ein- und Ausgang der Patronen sind markiert (s. Abb.).
2. Bei der Montage auf den korrekten Sitz der Dichtung achten (sofern im Lieferumfang enthalten). U.U. das Gewinde der Patrone zusätzlich mit Teflonband umwickeln.
3. Messgerät mit einer Steckdose verbinden. Das Messgerät ist nun eingeschaltet.
4. Optional: Am Messgerät - sofern möglich (ist geräteabhängig) - den Wert (Grenzwert) festlegen, ab welchem die Wasserqualität zu schlecht ist und die Patrone gewechselt werden muss. Dazu die separate Anleitung zum Messgerät beachten!



Eingang und Ausgang sind markiert

4.3 Inbetriebnahme

1. Die Zuleitung für das aufzubereitende Wasser am **EINGANG** anschließen.
2. Die Ableitung für das aufbereitete Wasser (VE-Wasser) am **Ausgang des Messgerätes** anschließen.
3. Patrone entlüften: Entlüftungsschraube vorsichtig lösen. Sobald ein konstanter Wasserstrahl austritt die Entlüftungsschraube wieder schließen.
4. Die korrekte Leitfähigkeit wird erst nach einigen Minuten angezeigt.



Anschluss- Beispiel: Edelstahl-Patrone mit Messgerät Typ D100





Entlüftungsschrauben

➔ Weitere Informationen zum Messgerät finden sich in der separaten Anleitung.

4.4 Tausch der Patronen

Übersteigt die Leitfähigkeit im aufbereiteten Wasser den eingestellten Grenzwert, so ist die Vollentsalzer- Patrone erschöpft und muss getauscht werden. Kontaktieren Sie dazu den Hersteller EnviroFALK. Er wird den Wechsel der Patronen für Sie organisieren.

EN Operation Instructions

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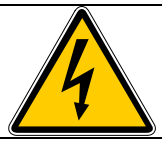
General Notes

- **Before commissioning and/or using the installation:** Please observe the respective installation and operation instructions in this manual.
- **Please note:** Incorrect usage and improper operation shall void the manufacturer's liability.
- Changes in the installation may not be carried out without consultation and sanction with us, otherwise damages are not covered by our guarantee.
- The temperature in the operating room of the unit must be at least **5 °C**.
- The static suitability of walls, ceilings and floors must be proven before assembling the installation.
- Respect all valid, general decrees and regulations on the installation site. **Accident prevention regulations** also apply.
- The installation site must be constructed so that no water damage arises (e.g. by means of an existing **floor drain**). The manufacturer may not be held responsible for water damage.
- In case of queries and orders for replacement parts, it is vital to state the correct installation name and the installation no. in order to facilitate correct and quick order processing.
- Parts exposed to treated water must be made of a pure water resistant material, like PE, PP or V2A / V4A.

1. Safety Instructions

The operating instructions given here are to be regarded as part of the product and are to be kept for the complete life duration of the product.
The installation may only be serviced, maintained and repaired by authorised, qualified and responsible staff.
Any member of the technical staff instructed by the plan operator must be able to operate the installation and to maintain it in operating condition. Make operating staff aware of the consequences of wrong settings.

Maintenance and repair work may only be carried out by qualified and approved technical staff (fitters and electricians).

	**Danger of high voltage! (for optional conductivity meter)**
DANGER	Use caution when handling electric installation parts. Only qualified electricians are authorised to carry out these tasks. Use caution when covers are open: Components may be live. Before operating the installation, disconnect the power supply from the National Grid. Before commencing maintenance work, the installation must be switched off and there must be no tension in the pipe system.

	**The consumption of conditioned water poses a health danger!**
WARNING	Don’t drink water of the system.

	**Danger of wet floors!**
CAUTION	Use caution when tubes are loose. Danger of injuries. Floor may be slippery. Only tighten tube connections by hand. Eliminate leaks immediately. Danger of water damage/ injuries on slippery floors. Defective O-rings must be replaced by appropriate, new O-rings.

2. Shipment and Packaging

Our installations are carefully packaged and tested before shipment. Since damages caused during transit may nevertheless occur, it is indispensable to **check the installation upon receipt**.

- If the packaging is damaged, the goods must **immediately be inspected** visually. This is to be noted on the haulage company's transportation documents. Keep in mind that you are responsible for hidden damages that only appear during start-up. Contact the haulage company immediately, otherwise transportation insurance cannot be claimed. Keep the packaging, in case of any possible checks by the haulage or insurance companies.
- Check the delivery for **completeness** against the bill of delivery.
- Pack up the goods so they are shock-proof for returning them.
- Drain the installation before shipment in order to save packaging weight.

3. Water Treatment Plants Type DIA

Wherever pure water needs to be delivered to technical applications or other consumers by the use of pressure, pressure-proof cartridges are necessary. Our pressure-proof cartridges made of corrosion-resistant V_4A-high quality stainless steel or glass-fibre reinforced plastic (GFK) completely comply to these requirements.

3.1 Water Demineralization

The **water demineralisation cartridges type DIA** remove conductive matter (salts and minerals like calcium, magnesia, sulphate, etc.) from water, thus decreasing its conductivity. All cartridges are filled with high quality regenerable mixed-bed cation exchange resin, reliably removing the ionogenic water components. The higher the quantity of water components materials, the quicker the water demineralisation cartridge becomes depleted.

3.2 Determination of the Water Quality- Measuring the Conductivity (DIA MB)

The water quality is measured by means of the so called conductivity. It is an indicator of the amount of substances contained in the water. The lower the conductivity, the better the water quality. Typical conductivity values after treatment with a water demineralization of type DIA MB are values <1 µS / cm. As soon as the conductivity has exceeded the limit (defined by the operator), the demineralisation cartridges have to be replaced. Replace them at least every 6 months in order to avoid bacterial contamination.

Option: Conductivity Meter:

The conductivity meter required for your application can be ordered separately. More information about this device can be found in the **separate conductivity meter manual.**

3.2.1 Determination of the Water Quality- Measuring the Conductivity (DIA KR)

The water quality is measured by means of the so called conductivity. It is an indicator of the amount of substances contained in the water. The lower the conductivity, the better the water quality. Typical conductivity values after treatment with a water demineralization of type DIA KR are values 0,055 µS / cm. As soon as the conductivity has exceeded the limit (defined by the operator), the demineralisation cartridges have to be replaced. Replace them at least every 6 months in order to avoid bacterial contamination.

Option: Conductivity Meter:

The conductivity meter required for your application can be ordered separately. More information about this device can be found in the **separate conductivity meter manual.**

4. Assembly Installation and Operation

Commission the plant as explained in the following sections. If unsure about the procedure or you have questions, please call our Customer Service at +49 2663 99 08 22.

4.1 Preparations

1. All supply connections (water, electricity) are to be set up, ready for installation.
2. Set up the installation so that it is level.

4.2 Mounting the conductivity Meter (optional)

The meter is delivered with a connection piece, which has to be mounted on the cartridge.

1. Place the meter straight on the OUTLET of the connection thread and turn it hand-tight. The cartridge's input and output are marked (see figure).

2. When mounting, ensure that the sealing (if included in the delivery of the meter) is correctly seated. If necessary apply additional teflon tape.

4. Connect the meter to an electrical outlet . The meter is now switched on.

5. Option: Depending on the type of conductivity meter is used: Set the value (limit value) of the meter at which the water quality is too bad and the cartridge has to be replaced. Please observe the separate instructions for the measuring instrument!



Inlet and outlet are clearly marked

4.3 Commissioning

1. Connect the inlet piping to the cartridge INLET.
2. Connect the pure water piping to the outlet of the conductivity meter.
3. Ventilating the cartridge: Carefully open the air bleed valve on the cartridges' lid. As soon as a constant water jet flows out, close the air bleed valve again.
4. Correct conductivity is displayed after a few minutes.



Example: connection of stainless steel cartridge with meter type “D100”





air bleed valves

➔ Further information on the measuring instrument can be found in the separate manual.

4.4 Exchange of Cartridges

If the conductivity in the treated water exceeds the set limit value, the demineralization cartridge is exhausted and must be replaced. Please contact the manufacturer EnviroFALK. He will organize the exchange of cartridges for you.

FR Mode de emploi

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Remarques générales

- **Avant la mise en service et/ou l'utilisation de l'installation :** Veuillez respecter les instructions d'installation et d'utilisation contenues dans ce manuel.
- **Important :** Le fabricant ne peut être tenu responsable de toute utilisation incorrecte du produit.
- Toute modification de l'installation ne peut être effectuée qu'après nous avoir consultés et avoir obtenu notre accord préalable, sans quoi les dommages éventuels ne sont pas couverts par notre garantie.
- Installer l'unité dans un espace à une température d'au moins **5 °C**.
- Vérifier la stabilité des murs, des plafonds et des sols avant le montage de l'installation.
- Respecter la réglementation en vigueur sur le site d'installation. Les **règles de prévention des accidents** s'appliquent également.
- Le site d'installation doit être aménagé de manière à éviter tout dégât des eaux (par exemple au moyen d'un **siphon de sol**). Le fabricant ne peut être tenu responsable des dommages causés par l'eau.
- En cas de questions ou de commandes de pièces de rechange, indiquer impérativement le nom et le numéro de l'installation afin de faciliter le traitement de la commande.
- Les pièces exposées à l'eau traitée doivent être fabriquées dans un matériau résistant à l'eau pure, comme le PE, le PP ou le V2A/V4A.

1. Consignes de sécurité

La présente notice d'utilisation fait partie intégrante du produit et doit être conservée pendant toute la durée de vie du produit.
L'entretien, la maintenance et la réparation de l'installation ne peuvent être réalisés que par du personnel habilité, qualifié et responsable.
Le personnel technique chargé de l'exploitation doit être en mesure de faire fonctionner l'installation et de la maintenir en état de marche. Le personnel d'exploitation doit être sensibilisé aux conséquences de mauvais réglages.

Les travaux d'entretien et de réparation ne peuvent être effectués que par du personnel technique qualifié et agréé (monteurs et électriciens).

	**Danger : haute tension ! (concerne l'appareil de mesure de la conductivité, en option)**
DANGER	Manipulez les pièces de l'installation électrique avec précaution. Ces tâches ne doivent être effectuées que par des électriciens qualifiés. Soyez prudent lorsque les couvercles sont ouverts : les composants peuvent être sous tension. Avant de faire fonctionner l'installation, coupez l'alimentation électrique du réseau. Avant de commencer les travaux d'entretien, veillez à ce que l'installation soit arrêtée et qu'il ne subsiste pas de tension dans les conduites.

	**La consommation d'eau conditionnée présente un danger pour la santé !**
AVERTISSEMENT	Ne buvez pas l'eau du système.

	**Risque de sols mouillés !**
ATTENTION	Soyez prudent lorsque les tubes sont desserrés. Risque de blessures. Le sol peut être glissant. Serrez les raccords de tubes uniquement à la main. Éliminez les fuites immédiatement. Risque de dégâts des eaux / de blessures sur les sols glissants. Remplacez les joints toriques défectueux par des joints toriques neufs appropriés.

2. Expédition et emballage

Nos installations sont soigneusement emballées et testées avant expédition. Des dommages pouvant néanmoins survenir lors du transport, **vérifiez impérativement l'installation dès sa réception**.

- Si l'emballage est endommagé, **procédez immédiatement à un contrôle** visuel des marchandises, comme indiqué sur les documents du transporteur. Gardez à l'esprit que vous êtes responsable des dommages cachés qui n'apparaissent qu'au moment de la mise en service. Contactez immédiatement le transporteur, faute de quoi l'assurance transport ne pourra pas être invoquée. Conservez l'emballage en cas de contrôle de la part du transporteur ou de la compagnie d'assurance.
- Vérifiez que la livraison est **complète** par rapport au bordereau de livraison.
- Emballez soigneusement les marchandises avant de les renvoyer.
- Vidangez l'installation avant expédition afin de réduire le poids de l'emballage.

3. Dispositifs de traitement de l’eau de type DIA

Partout où des installations techniques ou d’autres consommateurs nécessitent un approvisionnement par de l’eau pure sous pression, des cartouches résistantes à la pression sont requises. Nos cartouches répondent parfaitement à cette exigence : elles sont fabriquées en acier inoxydable de haute qualité V_4A résistant à la corrosion ou en plastique renforcé de fibres de verre (GFK).

3.1 Déminéralisation de l’eau

Les **cartouches de déminéralisation de l’eau de type DIA** éliminent les matières conductrices (sels et minéraux tels que le calcium, la magnésie, le sulfate, etc.) de l’eau, réduisant ainsi sa conductivité. Toutes les cartouches sont remplies de résine échangeuse de cations à lit mixte régénérable de haute qualité, qui élimine de manière fiable les composants ionogènes de l’eau. Plus il y a de composants dans l’eau, plus la cartouche de déminéralisation de l’eau s’épuise rapidement.

3.2 Détermination de la qualité de l’eau – Mesure de la conductivité (DIA MB)

La conductivité permet de mesurer la qualité de l’eau. Il s’agit d’un indicateur de la quantité de substances contenues dans l’eau. Plus la conductivité est faible, meilleure est la qualité de l’eau. Après un traitement de déminéralisation de l’eau de type DIA MB, les valeurs de conductivité sont généralement inférieures à <1 µS/cm. Dès que la conductivité dépasse la limite définie par l’opérateur, les cartouches de déminéralisation doivent être changées. Remplacez-les au moins tous les 6 mois afin d’éviter toute contamination bactérienne.

<u>En option : Conductimètre</u>

Le conductimètre nécessaire à votre installation peut être commandé séparément. Vous trouverez plus d’informations sur cet appareil dans le **manuel dédié**.

3.2.1 Détermination de la qualité de l’eau – Mesure de la conductivité (DIA KR)

La conductivité permet de mesurer la qualité de l’eau. Il s’agit d’un indicateur de la quantité de substances contenues dans l’eau. Plus la conductivité est faible, meilleure est la qualité de l’eau. Après un traitement de déminéralisation de l’eau de type DIA KR, les valeurs de conductivité sont généralement de 0,055 µS/cm. Dès que la conductivité dépasse la limite définie par l’opérateur, les cartouches de déminéralisation doivent être changées. Remplacez-les au moins tous les 6 mois afin d’éviter toute contamination bactérienne.

En option : Conductimètre

Le conductimètre nécessaire à votre installation peut être commandé séparément. Vous trouverez plus d’informations sur cet appareil dans le **manuel dédié**.

4. Installation et fonctionnement



Mettez le dispositif en service comme expliqué dans les sections suivantes. En cas de doute sur la procédure à suivre ou si vous avez des questions, veuillez contacter notre service clientèle au +49 2663 99 08 22.

4.1 Préparations

3. Tous les raccordements (eau, électricité) doivent être prêts pour l'installation.
4. L'installation doit être de niveau.

4.2 Montage du conductimètre (en option)

Le conductimètre est livré avec un raccord à monter sur la cartouche.

1. Placez le conductimètre droit sur la SORTIE du filetage de raccordement et serrez-le à la main. L'entrée et la sortie de la cartouche sont marquées (voir image).

2. Lors du montage, assurez-vous que le joint d'étanchéité (s'il est inclus dans la livraison) est correctement placé. Appliquez une bande de Téflon supplémentaire si nécessaire.

4. Branchez le conductimètre sur une prise électrique. Le conductimètre est maintenant allumé.

5. <u>En option :</u> Selon le type de conductimètre utilisé : Réglez la valeur (valeur limite) à partir de laquelle la qualité de l'eau est trop faible et la cartouche doit être remplacée. Respectez également le mode d'emploi de l'appareil de mesure !



L'entrée et la sortie sont clairement indiquées

4.3 Mise en service

5. Raccordez le tuyau d'entrée à l'ENTRÉE de la cartouche.
6. Raccordez le tuyau d'eau pure à la sortie du conductimètre.
7. Ventilation de la cartouche : ouvrez avec précaution le robinet de purge situé sur le couvercle de la cartouche. Dès qu'un jet d'eau continu s'écoule, refermez le robinet de purge.
8. La conductivité correcte s'affiche après quelques minutes.



Exemple : raccordement de cartouches de purge d'air en acier inoxydable avec un conductimètre de type D100

➔ Vous trouverez plus d'informations sur l'appareil de mesure dans le manuel dédié.

4.4 Remplacement des cartouches

Si la conductivité de l'eau traitée dépasse la valeur limite fixée, la cartouche de déminéralisation est épuisée et doit être remplacée. Veuillez contacter le fabricant EnviroFALK, qui organisera pour vous le remplacement des cartouches.

Ligne d'assistance EnviroFALK



ENVIROFALK

+49 2663 9908-0

Für Fragen rund um die Anlagentechnik von EnviroFALK stehen wir Ihnen gerne zur Verfügung. Unter dieser Nummer ist das EnviroFALK- Team gerne für Sie erreichbar.

The EnviroFALK Customer Service is at hand to offer advice and practical help. Just give us a call!

N’hésitez pas à nous contacter pour toute question relative aux installations EnviroFALK. L’équipe d’EnviroFALK est à votre disposition à ce numéro.

Le service clientèle d’EnviroFALK est à votre disposition pour vous fournir des conseils et une aide pratique. N’hésitez pas à nous appeler !

Montag bis Donnerstag / Monday to Thursday / Du lundi au jeudi

08.00 bis 12.00 Uhr und

12.45 bis 16.30 Uhr

Freitag / Friday / Vendredi

08.00 bis 12.00 Uhr und

12.45 bis 15.00 Uhr

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Article number: 425075, 425080
Product name: Mixed Embed Resine
UFI: A562-60QQ-100S-982X

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Ion exchange, resins and catalysts for industrial use.

1.3 Details of the supplier of the safety data sheet:

EnviroFALK GmbH
Prozesswasser-Technik
Gutenbergstraße 7
56457 Westerburg
Germany
Tel.: +49 2663 9908-0
Fax.: +49 2663 9908-50
http://www.envirofalk.com
Email: sdb@envirofalk.com

Office hours (CET/GMT+1h):
Monday - Thursday: 7:45 am – 4:45 pm
Friday: 7:45 am – 3:15 pm

1.4 Emergency telephone number:

Europe: in case of acute emergency: 112
USA: in case of acute emergency: 911
NRCC (China): + 86 532 8388 9090
Further emergency information Germany: +49 (0) 2663 9908-23 (EnviroFALK hotline only during office hours)

2. Hazards identification

2.1 GHS-Classification of the mixture

SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1; H318 Causes serious eye damage

2.2 Label elements:



GHS05

Signal word: DANGER
Hazard statements: H318 - Causes serious eye damage

Precautionary statements
P280 Prevention: Wear protective gloves and eye/face protection. Wash hands thoroughly after handling.
P305+P351+P338+P310 Response: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
Storage: Not applicable.
Disposal: Dispose of contents and container in accordance with all local, regional, national and international regulations

2.3 Other hazards:
Physical and chemical hazards
Not classified based on available information.
Health hazards
Causes serious eye damage.
Environmental hazards
Not classified based on available information.
Other hazards which do not result in classification
None known.

3. Composition/information on ingredients

3.1 Substance:
The product is a mixture.

3.2 Mixture:

Ingredient name	% (w/w)	CAS number
Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, chloromethylated, trimethylamine-quaternized	20 - 50	69011-18-3
styrene-divinylbenzene-copolymer with sulphonic acid groups in H-form	20 - 30	69011-20-7
Water	20 - 60	7732-18-5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.
Occupational exposure limits, if available, are listed in Section 8.

4. First aid measures

4.1 Description of first aid measures:
General advice: Do not leave the victim unattended.
After inhalation: Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing

apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

In case of skin contact: Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash contaminated clothing before reuse. Clean shoes thoroughly before reuse.

After eye contact: Get medical attention immediately. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

After swallowing/ingestion: Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately.

Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

4.2 Most important symptoms and effects, both acute and delayed:

Eye contact: Causes serious eye damage.

Inhalation: May give off gas, vapour or dust that is very irritating or corrosive to the respiratory system.

Skin contact: No known significant effects or critical hazards.

Ingestion: No known significant effects or critical hazards.

4.3 Indication of any immediate medical attention and special treatment needed:

Notes to physician : No specific treatment.

Specific treatments : No specific treatment

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11).

5. Firefighting measures

5.1 Suitable extinguishing media:

In case of fire, use water spray (fog), foam, dry chemical or CO_2.
Unsuitable extinguishing media: None known.

5.2 Special hazards arising from the substance or mixture:

No specific fire or explosion hazard.
Decomposition products may include the following materials: carbon dioxide, carbon monoxide, nitrogen oxides.

5.3 Advice for firefighters:

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Specific extinguishing methods: Standard procedure for chemical fires.
Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Provide adequate ventilation. Put on appropriate personal protective equipment.
For emergency responders: If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions:

Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the responsible authorities if the product has caused environmental pollution (sewers, waterways, soil or air) and or in case of gas leakage.

6.3 Methods and materials for containment and cleaning up:

Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of wastes in an approved waste disposal facility.

6.4 Reference to other sections:

Sections 8 and 13

7. Handling and storage

7.1 Precautions for safe handling:

Protective measures: Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous.

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Avoidance of contact: No specific data.

7.2 Conditions for safe storage, including any incompatibilities: Store between the following temperatures: -10 to 40°C (14 to 104°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific end use(s):

Ion exchange, resins and catalysts, only for industrial use.

Remarks: Take precautionary measures against electrostatic discharges. Do not allow the resin to dry out.

8. Exposure controls/personal protection

8.1 Control parameters:

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures: Good general ventilation should be sufficient to control work-er exposure to airborne contaminants.

8.2 Exposure controls:

Individual protection measures:

Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.

Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.
Recommended: safety glasses with side-shields.

Skin protection:

Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. After contamination with product change the gloves immediately and dispose of them according to relevant national and local regulations Recommended: (< 1 hour) Polyvinyl chloride - PVC , Nitrile rubber - NBR , Polychloroprene – CR.

Body/other skin protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Recommended: Wear protective clothing.

Respiratory protection: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Recommended: Dust-protection mask if there is a risk of dust formation.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Form and ohysical state:	solid beats
Colour:	Black. Brown. Light
Odour:	not available.
pH:	6 to 9 [Conc. (% w/w): 10%]
Melting point:	not available
Boiling point/boiling range:	not available
Flash point:	Closed cup: >150°C (>302°F)
Flammability (solid, gas):	not available
Lower explosion limit:	not available
Upper explosion limit:	not available
Vapour pressure:	not available
Relative vapour density:	not available
Density:	1,1 kg/L (20℃)
Bulk density:	650 - 750 kg/m³
Water solubility:	Insoluble in the following materials: cold water.
Auto-ignition temperature:	>500°C (>932°F)
Viscosity, dynamic:	Not available
Explosive properties:	Not available
Oxidizing properties:	Not available

9.2 Other data:
Not available.

10. Stability and reactivity

10.1 Reactivity:
No specific test data related to reactivity available for this product or its ingredients.
10.2 Chemical stability:
The product is chemically stable.
10.3 Possibility of hazardous reactions:
No dangerous reaction known under conditions of normal use.
10.4 Conditions to avoid:
Take precautionary measures against static discharges. Contact with strong oxidizing agents may cause hazardous reactions.
10.5 Incompatible materials:
No specific data.
10.6 Hazardous decomposition products:
Stable under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. Toxicological information

Information on toxicological effects+
Acute toxicity
Product:
Acute oral toxicity: LD50 (Rat): > 5,000 mg/kg
Remarks: Test results on an analogous product
Components:
Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, chlorometh-ylated, trimethylamine-quaternized, hydroxide:
Acute oral toxicity: LD50 (Rat): > 5,000 mg/kg
Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, sulphonated:
Acute oral toxicity: LD50 (Rat): > 5,000 mg/kg

Skin corrosion/irritation
Not classified based on available information.
Product:
Result: No skin irritation
Remarks: Test results on an analogous product
Components:
Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, chlorometh-ylated, trimethylamine-quaternized, hydroxide:
Result: No skin irritation
Remarks: Test results on an analogous product

Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, sulphonated:
Result: No skin irritation
Remarks: Test results on an analogous product

Serious eye damage/eye irritation
Causes serious eye damage.
Product:
Result: Risk of serious damage to eyes.
Remarks: Test results on an analogous product

Components:
Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, chlorometh-ylated, trimethylamine-quaternized, hydroxide:
Assessment: Risk of serious damage to eyes.
Remarks: Test results on an analogous product

Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, sulphonated:
Assessment: Risk of serious damage to eyes.
Remarks: Test results on an analogous product

Respiratory or skin sensitisation
Skin sensitisation
Not classified based on available information.
Respiratory sensitisation
Not classified based on available information.
Germ cell mutagenicity
Not classified based on available information.
Carcinogenicity
Not classified based on available information.
Reproductive toxicity
Not classified based on available information.
STOT - single exposure
Not classified based on available information.
STOT - repeated exposure
Not classified based on available information.
Aspiration toxicity
Not classified based on available information.

12. Ecological information

12.1 EcoToxicity:
No data available.
12.2 Persistence and degradability:
No data available
12.3 Bioaccumulative potential:
No data available

12.4 Mobility in soil:
Soil/water partition coefficient (K_{OC}): Not available
12.5 Results of PBT and vPvB assessment:
Results of PBT and vPvB assessment: Not applicable.
12.6 Other adverse effects:
No known significant effects or critical hazards.
Remarks: Ecotoxicological studies on the product are not available. No known significant effects or critical hazards.

13. Disposal considerations

The generation of waste should be avoided or minimised wherever possible.
Disposal methods
Waste from residues:
Examine possibilities for re-utilisation.
Product residues and uncleaned empty containers should be packaged, sealed, labelled, and disposed of or recycled according to relevant national and local regulations.
Where large quantities are concerned, consult the supplier.
Do not dispose of waste into sewer.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Send to a licensed waste management company.
Where possible recycling is preferred to disposal or incineration.
This material and its container must be disposed of in a safe way.
Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Contaminated packaging:
The generation of waste should be avoided or minimized wherever possible.
If recycling is not practicable, dispose of in compliance with local regulations.

14. Transport information

Not classified as dangerous in the meaning of transport regulations.
International Regulations
IATA-DGR
Not regulated as a dangerous good
IMDG-Code
Not regulated as a dangerous good
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.
National Regulations China
GB 6944/12268

Hazard notes:
Not dangerous cargo.
Risk of serious damage to eyes. Avoid heat above +40 °C.
Avoid temperatures below -10 °C. Keep separated from foodstuffs.

14.7 Bulk goods transport (MAPROL) and IBC-Code:
Not available

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:
Standard Uniform Schedule of Medicine and Poisons
Not regulated.

Model Work Health and Safety Regulations - Scheduled Substances
No listed substance.
Australia inventory (AICS): All components are listed or exempted.

15.2 Chemical safety assessment (Europe):
For Europe: For this product a chemical safety assessment was not carried out.

15.3 National regulatory information China

Hazardous Chemicals for Priority Management under SAWS:

Not applicable

China Severely Restricted Toxic Chemicals for Import and Export:

Not applicable

Catalogue of Hazardous Chemicals:

Not applicable

Catalogue of Highly Toxic Chemicals:

Not applicable

Regulations on Safety Management of Hazardous Chemicals
Identification of Major Hazard Installations for Hazardous Chemicals (GB 18218)

Not applicable

The components of this product are reported in the following inventories:

China. Inventory of Existing Chemical Substances in China (IECSC):

On the inventory, or in compliance with the inventory.

16. Other information

The information contained herein is based on the present state of our knowledge. It characterises the product with regard to the appropriate safety precautions. It does not represent a guarantee of any properties of the product.

Revision/edition 1.03 is completely revised with the new data of the manufacturer.

Abbreviations and acronyms

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized Sys-tem; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory con-centration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemi-cal Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Or-ganisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Con-centration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Develop-ment; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumu-lative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substanc-es; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evalua-tion, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Tem-perature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Trans-portation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - Unit-ed Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials In-formation System

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Article number: 475254
Product name: CO2 adsorber

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Carbon dioxide absorbent
For industrial use only.

1.3 Details of the supplier of the safety data sheet:

EnviroFALK GmbH
Prozesswasser-Technik
Gutenbergstraße 7
56457 Westerburg
Germany
Tel.: +49 2663 9908-0
Fax.: +49 2663 9908-50
http://www.envirofalk.com
Email: sdb@envirofalk.com

Office hours:	Monday - Thursday:	7:45 am – 16:45 pm
	Friday:	7:45 am – 15:15 pm

1.4 Emergency telephone number:

+49 (0) 2663 9908-23
(EnviroFALK hotline only during office hours)

2. Hazards identification

2.1 Classification of the substance or mixture

Classification in accordance with paragraph (d) of 29 CFR 1910.1200. and EU No.1272/2008 CLP:
H318 Causes serious eye damage
H315 Causes skin irritation
Skin Corrosion/Irritation - Category 2
Serious Eye Damage/Eye irritation - Category 1

2.2 Label elements:



Signal word: DANGER
Hazard Statement(s)
H315 Causes skin irritation.

H318 Causes serious eye damage
Precautionary Statement(s)
P102: Keep out of reach of children.
P103: Read label before use.

Prevention
P280 Wear protective gloves/protective clothing/eye protection/face protection
Wash thoroughly after handling
P260: Do not breathe dust/fumes/gas/mist/vapours/spray

Response
P301+330+331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P302+352: IF ON SKIN: Wash with plenty of water
P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do –continue rinsing.

Storage
P410: Protect from sunlight.
P411: Store at temperatures not exceeding 50 °C.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Other hazards:
No information available.

3. Composition/information on ingredients

3.1 Substance:

Product is a mixture

3.2 Mixture:

CAS-No.	EG-No.		Weight%	Class.	REACH No.
2390-59-2	219-231-5	Ethylviolett	< 0.1%	STOT SE3, R335/ Skin Irrit. 2 H315 / Eye Dam. 1 H318	-
7732-18-5	231-791-2	Water	14 – 18	-	-
1305-62-0	215-137-3	Calciumhydroxid	78 – 84	Skin Irrit. 2 H315/ Eye Dam. 1 H318 / STOT SE 3 H335	01-2119475151-45-033
1305-73-2	215-185-5	Natriumhydroxid	2 – <4	Skin Corr 1A H314 / Metal Corr. 1 H290	01-2119457892-27-xxxx Skin Corr. 1A; H314: C>=5% Skin Corr. 1B; H314: 2%<=C<5% Skin Irrit. 2; H315: 0.5%<=C<2% Eye Irrit. 2; H319: 0.5%<=C<2%

Notes: no further notes.

4. First aid measures

4.1 Description of first aid measures:

After inhalation: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor if you feel unwell.

In case of skin contact: Wash with plenty of water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

After eye contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

After swallowing: Rinse mouth. Do NOT induce vomiting.

4.2 Most important symptoms and effects, both acute and delayed:

Acute

Causes serious eye damage. Causes skin irritation.

Delayed

No information on significant adverse effects.

4.3 Indication of any immediate medical attention and special treatment needed:

Note to Physicians

May cause perforation of esophagus and stomach.

5. Firefighting measures

5.1 Extinguishing media:

Suitable Extinguishing Media

Use any media suitable for the surrounding fires.

Unsuitable Extinguishing Media

carbon dioxide.

5.2 Special hazards arising from the substance or mixture:

Non reported.

5.3 Advice for firefighters:

Fire Fighting Measures

Move container from fire area if it can be done without risk. Dike for later disposal. Do not scatter spilled material with high-pressure water streams. Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Avoid generation of dust. Wear personal protective clothing and equipment, see Section 8.

6.2 Environmental precautions:

Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Avoid release to the environment. Collect spillage.

6.3 Methods and materials for containment and cleaning up:

Avoid generation of dust. Eliminate all sources of ignition. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if safe to do so. Prevent entry into waterways, sewers, basements, or confined areas.

6.4 Reference to other sections:

Sections 13.

7. Handling and storage

7.1 Precautions for safe handling:

Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling. Avoid generation of dust. Do not return to original containers. Avoid contact with eyes, skin and clothing.

7.2 Conditions for safe storage, including any incompatibilities:

None needed according to classification criteria

Keep only in original container. Store in a well-ventilated place. Keep cool. Do not store together with acids. Keep container tightly closed. Store below 50 C. Lagerklasse (VCI): 10 – 13.

7.3 Specific end use(s):
Carbon dioxide absorbent, only for industrial use.

8. Exposure controls/personal protection

8.1 Control parameters:
Component Exposure Limits

Calcium hydroxide Ca(OH)2	1305-62-0
ACGIH:	5 mg/m³ TWA
NIOSH:	5 mg/m³ TWA
Europe:	5 mg/m³ TWA (existing scientific data on health effects appear to be particularly limited)
OSHA (US):	15 mg/m³ TWA total dust; 5 mg/m³ TWA respirable fraction
Mexico:	5 mg/m³ TWA LMPE-PPT
Sodium hydroxide NaOH	1310-73-2
ACGIH:	2 mg/m³ Ceiling
NIOSH:	2 mg/m³ Ceiling 10 mg/m³ IDLH
OSHA (US):	2 mg/m³ TWA
Mexico:	2 mg/m³ Ceiling

8.2 Exposure controls:

Individual protection measures:
Biological limit value
There are no biological limit values for any of this product's components.
Engineering Controls
Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.
Individual Protection Measures, such as Personal Protective Equipment
Eye/face protection
Wear safety goggles with a faceshield. Do not wear contact lenses. Provide an emergency eye wash
fountain and quick drench shower in the immediate work area.
Skin Protection
Wear appropriate chemical resistant clothing.
Respiratory Protection
A NIOSH approved respirator with a dust, mist, and fume filter may be permissible under ce1iain circumstances where airborne concentrations are expected to exceed exposure limits or when symptoms have been observed that are indicative of overexposure.
Glove Recommendations
Wear appropriate chemical resistant gloves.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Form:	solid
Colour:	white
Odour:	no
pH:	12 in suspension with water
Melting point:	not available
Boiling point/boiling range:	not available
Flash point:	not available
Flammability (solid, gas):	not available
Lower explosion limit:	not available
Upper explosion limit:	not available
Vapour pressure:	not available
Relative vapour density:	not available
Density:	not available
Bulk density:	approx.. 730 – 930 kg/m³
Water solubility:	1g/l
Auto-ignition temperature:	not available
Decomposition temperature:	not available
Viscosity, dynamic:	not available
Explosive properties:	not available
Oxidizing properties:	not available
Water content:	approx.. 14 – 18 %

9.2 Other data:

not available

10. Stability and reactivity

10.1 Reactivity:

not determined

10.2 Chemical stability:

not determined

10.3 Possibility of hazardous reactions:

not determined

10.4 Conditions to avoid:

Avoid contact with incompatible materials. Exothermic reaction with strong acids. The product develops hydrogen in an aqueous solution in contact with metals.

10.5 Incompatible materials:

Light metals, acids, base metals.

10.6 Hazardous decomposition products:

No data available.

11. Toxicological information

11.1 Acute and Chronic Toxicity

Component Analysis - LDSO/LCSO

The components of this material have been reviewed in various sources and the following selected endpoints are published:

Immediate Effects

Causes serious eye damage: (rabbit) OECD 405.

No significant skin irritating (rabbit) OECD 404

Delayed Effects

No information on significant adverse effects.

Irritation/Corrosivity Data

Causes skin irritation. Causes serious eye damage.

Respiratory Sensitization

No information available for the product.

Dermal Sensitization

No information available for the product.

Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA

Germ Cell Mutagenicity

No information available for the product.

Tumorigenic Data

No information available for the product.

Reproductive Toxicity

No information available for the product.

Specific Target Organ Toxicity - Single Exposure

No target organs identified

Specific Target Organ Toxicity - Repeated Exposure

No target Organs identified

Aspiration hazard

No information available for the product.

Medical Conditions Aggravated by Exposure

No data available.

12. Ecological information

12.1 Eco toxicity

No data available.

12.2 Persistence and degradability:

Data about degradability is not available.

12.3 Bioaccumulative potential:

Due to the consistency, disperse distribution in the environment is not possible. Negative ecological effects are therefore not to be expected; due to the consistency and the low water solubility, bioavailability is not likely.

12.4 Mobility in soil:

No data available.

12.5 Results of PBT and vPvB assessment:
No PBT and vPvB assessment available.
12.6 Other adverse effects:
During intended use no ecologically problems are expected.
Further data about component Analysis - Aquatic Toxicity

Calcium chloride CaC12	10043-52-4
Fish	LC50 96 h Lepomis macrochirus 10650 mg/L [static]
Inveliebrate	LC50 48 h Daphnia magna 2400 mg/L ECHA
Sodium hydroxide NaOH	1310-73-2
Fish	LC50 96 h Oncorhynchus mykiss 45.4 mg/L [static]

13. Disposal considerations

Disposal Methods
Dispose of contents/container in accordance with local/regional/national/ international regulations.

For Germany:

160303	inorganic wastes containing dangerous substances.
160507	used inorganic chemicals that consist of or contain dangerous substances.
180106	Chemicals that consist of or contain dangerous substances.

Waste is dangerous waste according to 2008/98/EU.

14. Transport information

No dangerous goods in the sense of the transport regulations.
14.1 UN-No:

14.2 UN proper shipping name:

14.3 Transport hazard class(es):

14.4 Packing group:

14.5 Environmental hazards:

14.6 Special precautions for user:
no
14.7 Bulk goods transport (MAPROL) and IBC-Code:
Not applicable. For all transport ADR/RID; IMDG ; ICAO-TI/IATA-DGR not classified. Product contents less 4% NaOH. It is not regulated under UN1907.

US DOT Information: UN/NA #: Not Regulated

TDG Information: UN#: Not Regulated.

15. Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

ZH 1/124

ZH 1/129

15.2 Chemical safety assessment:

No assessment available

16. Other information

The information contained herein is based on the present state of our knowledge. It characterises the product with regard to the appropriate safety precautions. It does not represent a guarantee of any properties of the product.

Changes in Rev. 3.0:
Chapt. 3.1: Data corrected and added.
Chapt. 14.7: Text added.

NFPA Ratings
Health: 2 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe
Summary of Changes

Possible used abbreviations and acronyms
ACGIH - American Conference of Governmental Industrial Hygienists;
ADR - European Road Transport;
AU - Australia;
BOD - Biochemical Oxygen Demand;
C - Celsius;
CA - Canada;
CAS - Chemical Abstracts Service;
CERCLA - Comprehensive Environmental Response, Compensation, and Liability
Act; CLP - Classification, Labelling, and Packaging;
CN - China;
CPR - Controlled Products Regulations;
DFG - Deutsche Forschungsgemeinschaft;
DOT - Depmiment of Transpotiation;
DSD - Dangerous Substance DireCtive;
DSL - Domestic Substances List;
EEC - European Economic Community;
EINECS - European Inventory of Existing Commercial Chemical Substances;
EPA - Environmental Protection Agency;
EU - European Union;
F - Fahrenheit;
IARC - International Agency for Research on Cancer;

IATA - International Air Transpoti Association;
ICAO - International Civil Aviation Organization;
IDL - Ingredient Disclosure List;
IDLH - Immediately Dangerous to Life and Health;
IMDG - International Maritime Dangerous Goods;
JP - Japan;
Kow - Octanol/water pmiition
coefficient;
KR - Korea;
LEL - Lower Explosive Limit;
LLV - Level Limit Value;
LOLI - List Of Lists™- ChemADVISOR's Regulatory Database;
MAK - Maximum Concentration Value in the Workplace;
MEL - Maximum Exposure Limits;
NFPA - National Fire Protection Agency;
NIOSH - National Institute for Occupational Safety and Health;
NJTSR - New Jersey Trade Secret Registry;
NTP - National Toxicology Program;
NZ - New Zealand;
OSHA - Occupatinal Safety and Health Administration;
PH - Philippines;
RCRA - Resource Conservation and Recovery Act;
REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals;
RID - European Rail Transpo1i;
SARA - Superfund Amendments and Reauthorization Act;
STEL - Sho1i-term Exposure Limit;
TDG - Transpotiation of Dangerous Goods;
TSCA - Toxic Substances Control Act;
TWA - Time Weighted Average;
UEL - Upper Explosive Limit;
US - United States.
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Dokumentation / Documentation

UV-Bestrahlungsanlage / UV-Radiation System

Anlagentyp / Type:	EL-TOC 038
UV-Überwachung / UV-Control Unit:	UE-D1-LPFK
Seriennummer / Serial Number:	06.02.6237; 06.02.6238; 06.02.6239

Beinhaltete Dokumente / Included Documents

UV-Anlage / UV-System

Betriebsanleitung / Operating Manual	☑
Datenblatt / Data Sheet	☑
Ersatzteilliste / Spare Part List	☑
Reaktorzeichnung / Reactor Drawing	☑
Stromlaufplan / Circuit Diagram	☑

UV-Überwachung / UV-Control Unit

Betriebsanleitung / Operating Manual	☑
Datenblatt / Data Sheet	☑
Ersatzteilliste / Spare Part List	☑
Kalibrierzertifikat UV-Sensor / Calibration Certificate of UV-Sensor	☐
Sensorgrenzwerte / Limiti Value of UV-Sensor	☐

Zusätzliche Dokumente / Additional Documents

Materialzeugnisse / Material Inspection Certificates	☐
Kalibrierzertifikat UV-Sensor / Calibration Certificate of UV-Sensor	☐
Konformitätserklärung Dichtungen / Declaration of Conformity of Seals	☐
Rauigkeitsnachweis / Proof of Roughness	☐
Messung Deltaferrit / Proof of Delta-Ferrite Concentration	☐
EG-Konformitätserklärung / EC declaration of conformity	☐

Betriebsanleitung / operating manual

FÜR UV-EINSTRAHLERANLAGEN /
FOR SINGLE LAMP UV SYSTEMS

- Edelstahl /stainless steel
- CE-Konform / CE conformity

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D-1 WARNHINWEISE



Sicherheitshinweise



Diese Anlage arbeitet mit UV-Strahlung. Die Strahlung kann Schäden an Augen und Haut verursachen, die Anlage darf daher nur betrieben werden, wenn der Reaktormantel unversehrt ist. Niemals ungeschützt in die Strahlung blicken und die Haut nicht der Strahlung aussetzen!



Das Öffnen und Installieren des Gerätes darf nur im strom- und drucklosen Zustand erfolgen!
Der Reaktor steht unter Druck. Bei unsachgemäßer Handhabung besteht die Gefahr des Berstens des Tauchrohres und des Austrittes des Mediums aus dem Reaktor.
Vor der Reinigung, Wartung oder Austauschen von Teilen, muss das Gerät von allen Spannungsquellen getrennt werden.
Die Anlage nie im ungefüllten Zustand oder bei unterbrochenem Wasserzufluss betreiben.
Die einschlägigen Vorschriften über den Umgang mit elektrischen Geräten sind einzuhalten.



Das zu behandelnde Wasser/Abwasser kann gefährliche Inhaltsstoffe enthalten. Bitte beachten Sie die entsprechenden Handhabungs- und Sicherheits-vorschriften!
Das zu behandelnde Medium darf keinen schädigenden Einfluss (z. Bsp. Korrosion) auf die UV-Anlage haben. Schäden unterliegen nicht der Gewährleistung. Materialspezifikationen entnehmen Sie dem Datenblatt!



Im Betrieb kommt es zu einer Erwärmung der Komponenten und des Mediums – Betrieb nur mit Durchfluss und ordnungsgemäßer Entlüftung des Reaktors! Schäden an der UV-Anlage oder an fremden Komponenten durch Übertemperatur unterliegen nicht der Gewährleistung oder Garantie!

HINWEIS

Lesen Sie die Betriebsanleitung gründlich und vor der Installation!

Keine Garantie bei falscher Betriebsweise oder falscher Bedienung!

WICHTIG

Die technologische Auslegung und korrekte Funktion der Anlage gilt nur für die vom Hersteller verwendeten Komponenten.

Beim Einsatz von Fremdteilen (auch Ersatz- und Verschleißteile) erlischt jeglicher Anspruch auf eine technologisch korrekte Funktion der Anlage.

D-2 ALLGEMEINE HINWEISE

Diese Betriebsanleitung beinhaltet Informationen, die benötigt werden, um die UV-Anlage korrekt und sicher in Betrieb zu nehmen und zu betreiben. Lesen Sie bitte die gesamte Betriebsanleitung, bevor Sie die Anlage nutzen. Beachten Sie bei Arbeiten an der Anlage immer die Sicherheitshinweise in der Betriebsanleitung, darüber hinaus die allgemein gültigen Sicherheitsvorschriften sowie Vorschriften und Hinweise zum Arbeitsschutz. Bei unsachgemäßer Handhabung oder Installation kann die Lieferfirma keine Gewährleistungs- und Garantieansprüche annehmen.

Für den Betrieb der Anlage gelten die folgenden Grundsätze:

- Sollten durch den Transport Schäden an der Anlage entstanden sein, so nehmen Sie ein Schadensprotokoll mit der Lieferfirma auf und senden Sie dies binnen 24 Stunden an den Hersteller.
- Der Anlagenbetreiber ist für die ordnungsgemäße Montage und Installation der Anlage entsprechend den Installationsvorschriften verantwortlich. Er trägt die Verantwortung dafür, dass die Anlage stets in betriebssicherem Zustand gehalten wird.
- Inbetriebnahme, Bedienung und Reparaturen der Anlage dürfen nur durch befugtes und dafür unterwiesenes Personal erfolgen.
- Sollte eine in dieser Betriebsanleitung enthaltene Vorschrift, insbesondere in Bezug auf Sicherheit nicht den örtlichen gesetzlichen Bestimmungen entsprechen, so gilt die jeweils strengere Vorschrift.

D-3 ANLAGENTYPEN

D-3.1 Bestimmungsgemäßer Gebrauch

Die UV-Anlagen vom Typ „MIP / VAP“ und vom Typ „EL“ können für die Behandlung von Wasser auf folgenden Gebieten eingesetzt werden:



1. Desinfektion
   UV-Strahlung mit einer Wellenlänge von 254 nm inaktiviert Mikroorganismen.
2. Restozonvernichtung
   UV-Strahlung mit einer Wellenlänge von 254 nm zerstört im Wasser befindliches Ozon.
3. TOC-Abbau
   Durch den Einsatz ozonbildender UV-Strahler werden im Wasser befindliche organische Stoffe oxidiert.

Die erreichbare Reduzierung von Keimen, Restozon bzw. TOC ist von verschiedenen Faktoren abhängig:

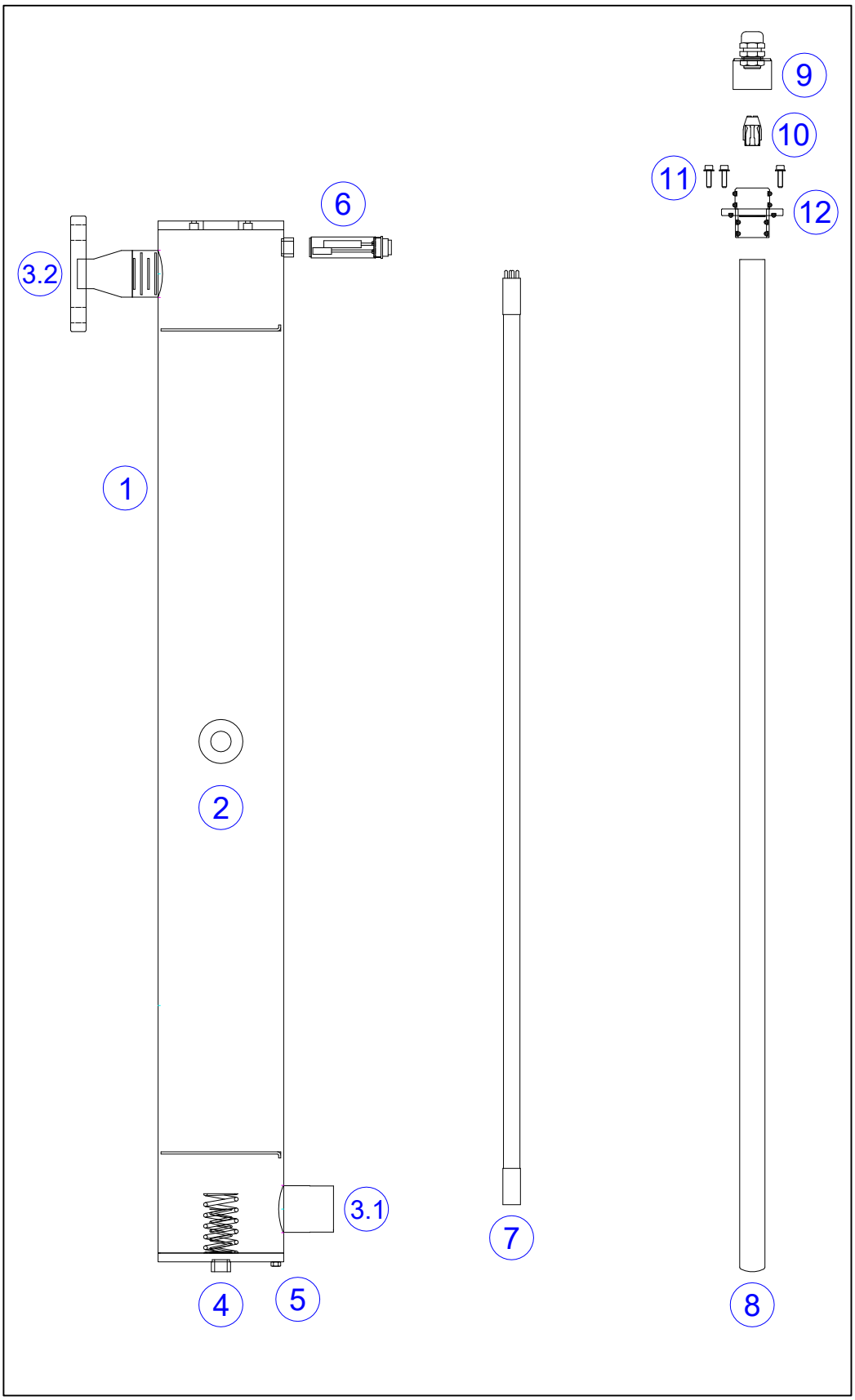


- Trübung und UV-C-Transmission des Wassers
- Durchflussmenge des zu behandelnden Wassers
- Betriebsstundenzahl / Lebensdauer der Strahler
- Reinigungszustand des Tauchrohrs
- Keimzahl, Ozon-Konzentration bzw. TOC-Konzentration im zu behandelnden Wasser.

Eine Wirkung ist nur gegeben, wenn die UV-Anlage kontinuierlich betrieben wird.

D-3.2 UV-Anlagen vom Typ „MIP / VAP“

D-3.2.1 prinzipieller Reaktoraufbau



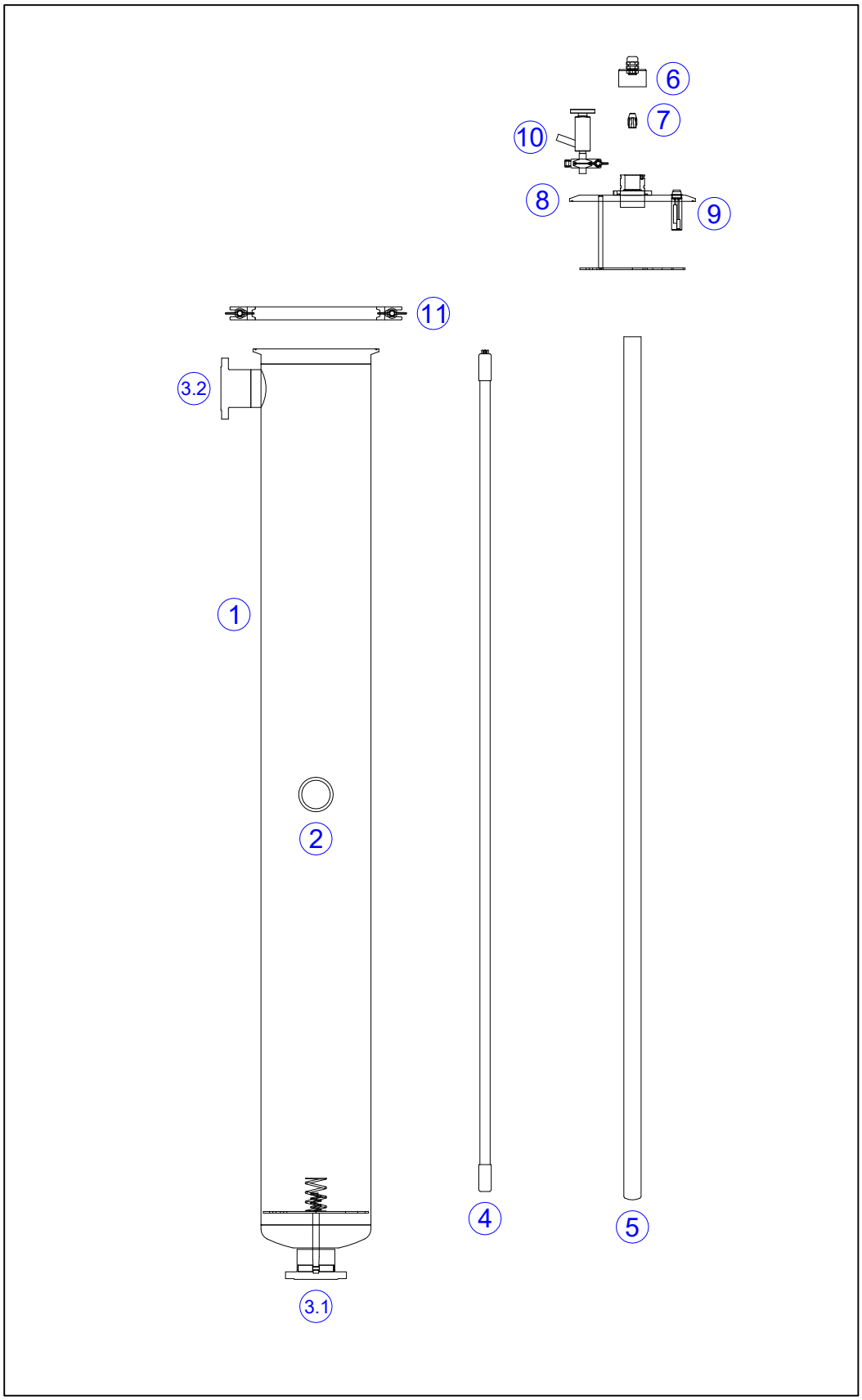
1	Reaktor – genaue Abmaße und Aufbau sind der Reaktorzeichnung bzw. dem Datenblatt zu entnehmen (siehe Anhang)
2	Muffe für Sensor (1/4“) bzw. für Messfenster (1“) – je nach Typ der UV-Überwachungseinheit und UV-Anlage
3	Anschlüsse des Reaktors – Größe, Art und Position kundenspezifisch
3.1	Zulauf Medium Beispiel für Anschluss Innen/Außengewinde ohne Lichtfalle
3.2	Ablauf Medium Beispiel für Anschluss Glattflansch mit Lichtfalle zum direkten Übergang auf Kunststoffleitungen
4	Entleerung 1/4" – bei vertikalem Einbau Ohne Funktion – bei horizontalem Einbau
5	Angeschweißte Sechskantmutter zum Anschluss des Erdungskabels – Falls nicht vorhanden oder schwer erreichbar, ist ein Erdungsband zur Erdung des Reaktors zu verwenden!
6	Temperatursensor – Notabschaltung bei Temperatur Medium über 70°C. Standard ab 300W Strahlerleistung oder auf Anfrage.
7	UV-Strahler
8	Tauchrohr aus Quarzglas
9	Strahlerkappe zur Abschirmung der UV-Strahlung nach Außen und zur Realisierung des IP-Schutzgrades
10	Strahlerstecker ist verpolungssicher, da rechteckig
11	Innensechskantschrauben (3 Stück) – zur Befestigung des Tauchrohrkopfes **(12)**
12	Tauchrohrkopf zur Halterung des Tauchrohres **(8)** inkl. Dichtungen

D-3.2.2 Schaltkasten

Technische Daten entnehmen Sie bitte den elektrotechnischen Unterlagen (siehe Anhang) und der Betriebsanleitung der UV-Überwachungseinheit (optional).

D-3.3 UV-Anlagen vom Typ „EL“

D-3.3.1 prinzipieller Reaktoraufbau



1	Reaktor – genaue Abmaße und Aufbau sind der Reaktorzeichnung bzw. dem Datenblatt zu entnehmen (siehe Anhang)
2	Muffe für Sensor (1/4“) bzw. für Messfenster (bei kalibriertem Sensor) – je nach Typ der UV-Überwachungseinheit und UV-Anlage
3	Anschlüsse des Reaktors – Größe, Art und Position kundenspezifisch
3.1	Zulauf Medium: Lichtfalle zum direkten Übergang auf Kunststoffleitungen kann integriert werden
3.2	Ablauf Medium: Lichtfalle zum direkten Übergang auf Kunststoffleitungen kann integriert werden
4	UV-Strahler
5	Tauchrohr aus Quarzglas
6	Strahlerkappe zur Abschirmung der UV-Strahlung nach Außen und zur Realisierung des IP-Schutzgrades
7	Strahlerstecker ist verpolungssicher, da rechteckig
8	Reaktordeckel mit integriertem Strömungsblech und Tauchrohraufnahme inkl. Dichtungen
9	Temperatursensor – Notabschaltung bei Temperatur Medium über 70°C. Standard ab 300W Strahlerleistung oder auf Anfrage. In Abhängigkeit vom Analgentyp auch mit Voralarmschwelle bei 50°C möglich (siehe Datenblatt).
10	Entlüftungsventil – kann je nach Anlagentyp von Zeichnung abweichen.
11	TriClamp-Klammer inkl. Dichtung zur Befestigung und Abdichtung von Reaktordeckel **(8)**

D-3.3.2 Schaltkasten

Technische Daten entnehmen Sie bitte den elektrotechnischen Unterlagen (siehe Anhang) und der Betriebsanleitung der UV-Überwachungseinheit (optional).

D-4 INSTALLATION / INBETRIEBNAHME

D-4.1 Installations- und Betriebshinweise

Die Installations- und Inbetriebnahmearbeiten dürfen nur durch unterwiesenes Fachpersonal vorgenommen werden. Der Betreiber ist verpflichtet, die ordnungsgemäße Installation zu ermöglichen.

Vor der erstmaligen Inbetriebnahme ist die Anlage auf Dichtheit zu prüfen, die elektrische Verbindung zum Netz herzustellen sowie ein Probelauf durchzuführen.



Hinweis für den Einsatz im Desinfektionsbereich:

Die gewünschte Keimreduzierung im gesamten System (einschließlich Rohrleitungen, Vorlagebehälter) kann erst nach einer Einlaufphase der UV-Anlage erreicht werden. U. U. kann es notwendig sein, vor der Erstinbetriebnahme das Rohrleitungssystem einmalig zu desinfizieren (thermisch oder chemisch).



- Bei der Platzauswahl auf Freiraum für den Strahlerwechsel achten (siehe Technisches Datenblatt der Anlage).
- Anlage vor direkter Sonneneinstrahlung und vor Frost schützen.
- Die Anlage darf nicht im Freien aufgestellt werden!
- Der Standort für die Anlage sollte so gewählt werden, dass Wasser, welches u.a. beim Entleeren oder Spülen der Anlage anfällt, abfließen kann.
- Ein direkter Übergang vom Reaktor auf Kunststoffrohrleitungen sollte vermieden werden. UV-Strahlung schädigt das Material. Im Falle von Übertemperaturen durch Störungen kann es ebenfalls zu Schäden am Rohrleitungssystem kommen.
- In Abhängigkeit von Länge und Zustand des Rohrleitungssystems sollte vor Erstinbetriebnahme eine ausreichende Reinigung/Spülung durchgeführt werden.
- Eine ausreichende elektrische Versorgung sollte sichergestellt sein.
- Das Kabel vom Strahler zum Schaltschrank hat eine standardmäßige Länge von 2,9 m. Die mitgelieferten Kabel dürfen nicht verlängert oder gekürzt werden (dies stellt einen unsachgemäßen Eingriff in die Anlage dar und führt zum Erlöschen der Garantie). Ein Aufrollen von Kabeln, sowie das Einziehen von übriger Kabellänge in den Schaltkasten sind zu unterlassen. Selbiges gilt für das optional mitgelieferte Sensorkabel der Überwachungseinheit. Grundsätzlich sollten keine Kabel miteinander verdrillt werden.





- Bei erforderlichem Entfernen von Kabeln aus dem Schaltschrank (z.B. für Verlegearbeiten der Kabel im Kabelschacht) ist unbedingt darauf zu achten, dass die Anschlüsse des Kabels beim Wiederanklemmen nicht verwechselt werden, da dies definitiv zu einer Schädigung elektronischer Komponenten führt.
- Der Strahlerstecker ist verpolungssicher, da das Steckerbild nicht quadratisch ist. Wird der Stecker um 90° gedreht, passt er nicht mehr! Eine Verpolung verursacht Schäden am Vorschaltgerät und Strahler!
- Informationen über die Anschlüsse des Strahlekabels am Vorschaltgerät, des optionalen UV-Sensors an der Überwachungs-einheit und des optionalen Kabels der Temperaturüberwachung finden Sie in den Schaltunterlagen.

  Bei Unklarheiten/Rückfragen oder im Zweifelsfall ist der Hersteller zu kontaktieren!
- **Der Zugang für notwendige Arbeiten während Betrieb und Wartung muss jederzeit gewährleistet sein.**
- Beim Betrieb des Strahlers kommt es zu einer Erwärmung. Die Wärme muss unbedingt abgeführt werden. Bei einem Wärmestau heizt sich das System auf und eine Schädigung des Strahlers, elektronischen Vorschaltgerätes (EVG) und der optionalen UV-Überwachungseinheit ist die Folge.



- Für den optional mitgelieferten Sensor darf die Temperatur des Reaktors 70° C nicht überschreiten. Übertemperaturen führen zur Schädigung des Überwachungssystems.

  Daher gilt folgendes:

  Bei Strahlerbetrieb ständige Wärmeabfuhr über die Reaktorwand (Reaktormantel nicht isolieren!) und das Medium (permanente Durchströmung im Betrieb!) gewährleisten.

  Der Testbetrieb ohne Medium sollte vermieden oder so gering wie möglich gewählt und nur unter Aufsicht durchgeführt werden.
- Für den störungsfreien und zuverlässigen Betrieb ist es wichtig, dass Schwingungen erzeugende Maschinen (z. Bsp. Pumpen) vom Rohrleitungsnetz entkoppelt werden.



  Schwingungen die sich auf die UV-Anlage übertragen, können zum frühzeitigen Ausfall oder zu verminderter UVC-Ausbeute des Strahlers führen. Eine ausreichende Wirkung der UV-Anlage ist dann nicht mehr gegeben.

  Neben dem Ausfall des Strahlers kann es außerdem zu mechanischen Schäden an der UV-Anlage kommen:

  Bildung von Rissen im Tauchrohr durch Stöße des Strahlers gegen das Quarzglas, somit Wasseraustritt zum Strahler hin und Gefahr von Kurzschlüssen sowie Beschädigungen an der Elektronik

Übermäßiger Beanspruchung der Schweißnähte des UV-Reaktors sowie der Rohrleitungen, bis hin zum Aufbrechen der Nähte.

- Der Schaltkasten ist vor Über- und Unterspannung, starken Störimpulsen und Netzrückwirkungen (z. Bsp.: Oberschwingungen) zu schützen.
- Die Umgebungsparameter für Reaktor und Schaltkasten sind einzuhalten (siehe Datenblatt)
- Bei chemischer Reinigung des Reaktors oder der Rohrleitungen ist unbedingt der UV-Strahler abzuschalten. Chemische Reinigungsmittel in Kombination mit UV-Strahlung schädigen die verbauten Dichtungen der UV-Anlage!
- Während einer Sanitisierung ist die Gesamte UV-Anlage abzuschalten. Zusätzlich ist der UV-Sensor aus dem Messfenster zu entnehmen (bei kalibrierter UV-Überwachung)!

D-4.2 Installation und Inbetriebnahme

1. Einbinden der UV-Anlage in das bestehende Rohrleitungssystem.

   Vor der Einbindung ist das Tauchrohr zu entnehmen um Glasschäden zu verhindern! (Hinweise siehe Tauchrohrwechsel)

   Beim Einbau des Reaktors ist darauf zu achten, dass sich das Entlüftungsventil oben befindet. Die Durchströmungsrichtung des Mediums von unten nach oben muss gewährleistet sein.

   Wird der Reaktor horizontal eingebaut, darf der UV-Sensor (optionale Ausführung) nicht oben stehen, da Luftblasen das Messsignal verfälschen können.

   Um die Bildung unerwünschter Luftblasen zu verhindern sowie eine optimale Entlüftung zu gewährleisten, ist bei der horizontalen Einbauweise des Reaktors eine Neigung von ca. 2° von Vorteil. Das System entlüftet sich dann selbst.

2. Das Tauchrohr ist vorsichtig in den Reaktor einzuführen. (Hinweise siehe Tauchrohrwechsel)

HINWEIS Bei Verschraubungen von Edelstahl in Edelstahl ist die Verwendung eines geeigneten Schmiermittels erforderlich.

3. Prüfung, ob das Tauchrohr in der Führung liegt. Es muss ein leichter Gegendruck der Aufnahmefeder (siehe Zeichnung) spürbar sein.

   Bei „MIP/VAP-Anlagen“ muss der O-Ring des Tauchrohrkopfes komplett in der Nut liegen und darf nicht herausquetschen.

Bei „EL-Anlagen“ mit fester Verbindung von Tauchrohraufnahme und Deckel ist darauf zu achten, dass die Dichtung des Tri-Clamp-Flansches exakt in der Nut liegt.

4. System auf hydraulische Dichtheit überprüfen!
5. Strahler mit elektrischer Verkabelung vorsichtig in das Tauchrohr einführen (Siehe nachfolgende Hinweise!)

ACHTUNG

Schon durch geringe Luftfeuchtigkeit kann es zu Kondensationsvorgängen im Tauchrohr kommen. (Während des Betriebes erwärmte Luft strömt am Strahler nach oben und kondensiert oberhalb des Strahlers am Stecker. Kurzschlüsse können die Folge sein).

ACHTUNG

Tauchrohr und Strahler müssen vor Inbetriebnahme trocken sein. Es wird empfohlen, dass Tauchrohr mit Stickstoff oder trockener Luft zu spülen bzw. sollte die Anlage einige Minuten ohne Schutzkappe betrieben werden um die Feuchtigkeit auszutragen (Achtung: Während dieser Zeit kein IP-Schutz!).

6. Schutzkappe mit leichter Drehbewegung bis zum Anschlag aufstecken. Kabelverschraubung fest verschrauben um den IP-Schutzgrad zu realisieren.

   Beim Einsatz einer UV-Überwachungseinheit ist darauf zu achten, dass die Rückführlitzen des Strahlers nicht in Richtung Sensor liegen. Die UV-Intensitätsmessung wird sonst beeinträchtigt!
7. Erdungskabel des Schaltkastens am **Reaktor** anbringen!

   An vorgesehener Erdungsmutter (MIP/VAP-Anlagen) oder über Erdungsschelle (EL-Anlagen).
8. UV-Sensor und Temperatursensor (wenn vorhanden) anschließen.



9. Netzverbindung herstellen! Eine Festverdrahtung der Anlage darf nur durch eine Elektrofachkraft erfolgen! Seitens des Betreibers ist die Anlage mit einem FI-Schutzschalter abzusichern.
10. Anlage einschalten! Schalter befindet sich an der rechten Seite des Kastens (bei Thermoplastkasten) oder in der Tür (Stahlblechkästen).

    Verfügt die Anlage über eine Remote-Ansteuerung ist vor dem Einschalten der Wahlschalter auf Handmodus oder auf Automodus (Remote) zu stellen. Ein Schalten während des Betriebes ist zu unterlassen!
11. Funktion überprüfen! Die Belegung der Fehlerkontakte ist den Schaltunterlagen zu entnehmen oder beim Hersteller zu erfragen.



Vor der Inbetriebnahme des Gerätes muss sichergestellt sein, dass alle Verschraubungen und Anbindungen montiert sind und somit keine UV-C-Strahlung an Haut und Augen gelangen kann.

Die Funktionskontrolle der UV-Anlage erfolgt je nach Ausführung über die LED am Schaltkasten oder direkt am EVG. Bei Einsatz einer UV-Überwachungseinheit sind die entsprechenden Hinweise der zugehörigen Betriebsanleitung zu beachten.

Der Schaltkasten wird je nach verwendetem EVG mit bis zu zwei verschiedenen LED´s ausgerüstet:

Anlage	***LED EVG – grün***	***LED EVG – rot***
EVG 11/16W	-	-
EVG 25W	x	x
EVG 36 W	x	-
EVG (übrige)	x	x

Abweichungen im Sinne des technischen Fortschrittes oder zum Erhalt der Lieferfähigkeit vorbehalten.

LED	***Bedeutung***
LED grün - blinkt	Strahler wird vorgeheizt
LED grün - leuchtet	Strahler gezündet und in Betrieb
LED rot - leuchtet	Strahlerausfall / kein Strahler angeschlossen

Nach einer Anlaufzeit von mehreren Minuten (abhängig von Umgebungsbedingungen) erreicht der Strahler seine in Abhängigkeit der Betriebsstunden volle UV-Intensität.

Die erreichte UV-Bestrahlung ist vom Reinigungszustand des Tauchrohres (Belagbildung!) und der UV-Transmission des Mediums abhängig. Zudem sinkt die UV-C-Leistung des Strahlers mit zunehmender Betriebsdauer. Ein Wechsel des Strahlers nach der im Datenblatt angegebenen Betriebsstunden wird empfohlen. Eine Reinigung sollte in sinnvollen und regelmäßigen Abständen erfolgen.

Bevor an der UV-Anlage Arbeiten durchgeführt werden (z.B. Wartung), ist diese unbedingt abzuschalten und gegen Wiedereinschalten zu sichern. Dasselbe gilt für den Havariefall. Wird ein Fehler an der UV-Anlage festgestellt, gleich welcher Art (Wasseraustritt, Schaden an der Elektrik, etc.), ist die Anlage sofort außer Betrieb zu setzen und der Schaden durch eine Fachkraft zu beheben.



Bei chemischer Reinigung des Reaktors oder der Rohrleitungen ist unbedingt der UV-Strahler abzuschalten. Chemische Reinigungsmittel in Kombination mit UV-Strahlung schädigen die verbauten Dichtungen der UV-Anlage!



Während einer Sanitisierung ist die Gesamte UV-Anlage abzuschalten. Zusätzlich ist der UV-Sensor aus dem Messfenster zu entnehmen (bei kalibrierter UV-Überwachung)!

D-4.3 Anlage außer Betrieb nehmen

1. Anlage am Hauptschalter ausschalten.
2. Anlage vom Stromnetz trennen – Sicherheitsvorschriften beachten!
3. Anlage ausreichend abkühlen lassen.
4. Durchfluss unterbrechen und Reaktor entleeren.
5. Reinigung durchführen.

D-5 INSTANDHALTUNG / WARTUNG / STÖRUNGEN

Die Anlage ist abgesehen von der in Abhängigkeit der Wasserqualität notwendigen regelmäßigen Reinigung des Tauchrohrs und des Messfenster des Sensors (kalibriert), sowie dem Strahlerwechsel weitgehend wartungsfrei.

Für einen störungsfreien Betrieb ist auf Folgendes zu achten:

- Die Anschlüsse dürfen mechanischen Scherkräften nicht ausgesetzt werden.
- Mechanische Beschädigungen der Anlage sind auszuschließen.
- Regelmäßige Kontrolle des Reaktors bzw. des Tauchrohres und Reinigung von visuell erkennbaren Verschmutzungen mittels Bürste bzw. mittels Reinigungsmittel.
- Regelmäßige Kontrolle auf Dichtheit der Anlage. Bei UV-Anlagen mit kalibrierter UV-Überwachung ist das Messfenster regelmäßig auf Dichtheit zu überprüfen. Andernfalls kann der UV-Sensor geschädigt werden.
- Strahlerwechsel nach empfohlener Betriebsstundenzahl bzw. Ausfall vornehmen.
- Bei Anlagen zum TOC-Abbau ist das Tauchrohr, sowie der zugehörige Dichtungssatz spätestens nach 2 Jahren Betrieb zu tauschen!
- Kommt ein Kunststoff-Schauglas zum Einsatz, so wird empfohlen dies bei jedem Strahlerwechsel mit zu wechseln.



HINWEIS Beachten Sie zusätzlich die Hinweise aus der Betriebsanleitung für die optional gelieferte Überwachungseinheit!

D-5.1 Elektrische Komponenten

An den elektrischen Komponenten ist eine Wartung nicht erforderlich. Um eine hohe Lebensdauer und Effizienz zu erreichen sollte die Temperatur des Schaltkastens nicht über 40°C liegen. Schaltvorgänge sollten so gering wie möglich gehalten werden.

Der Schaltkasten sollte vor Über- und Unterspannung geschützt und mit einem FI-Schutzschalter abgesichert werden.

Die Erdung des Systems ist regelmäßig zu kontrollieren.

D-5.2 Strahlerwechsel

Um die Funktion der UV-Anlage und die notwendige UV-Intensität zu gewährleisten, sollte der Strahler regelmäßig getauscht werden (Empfehlung: nach der im Datenblatt angegebenen Betriebsstundenzahl). Sofern keine UV-Überwachungseinheit integriert ist, sollten die Strahler nicht länger als empfohlen betrieben werden.

Ein Strahlerausfall kann über die rote LED am Schaltschrank (oder das Alarmsignal bei optionaler Ausführung mit UV-Überwachungseinheit) festgestellt werden.

Ersatzstrahler können beim Hersteller dieser Anlage als Ersatzteil bestellt werden. Für einen ordnungsgemäßen Betrieb der Anlage dürfen nur die vom Hersteller vorgesehenen Strahler eingesetzt werden. Bei Verwendung anderer als der vom Hersteller vorgesehenen Strahler erlischt jeglicher Garantie- und Gewährleistungsanspruch.

Im Zuge eines Strahlerwechsels sollte eine Wartung und Reinigung der gesamten UV-Anlage eingeplant werden.



ACHTUNG Die maximalen Betriebsstunden für den Strahler gelten nur bei maximal einem Schaltvorgang pro 8 h Betriebsdauer. Bei häufigeren Ein- und Ausschaltvorgängen verkürzt sich die Strahlerlebensdauer drastisch.



VORSICHT Beim Betrieb der Anlage kommt es zur Erwärmung der Komponenten. Wird unmittelbar nach dem Abschalten ein Strahlerwechsel durchgeführt, ist darauf zu achten, dass der Strahler noch heiß ist!

Strahlerwechsel durchführen:



1. Anlage ausschalten und von der Stromversorgung trennen bzw. spannungsfrei schalten und gegen Wiedereinschalten sichern.

2. Anlage ausreichend abkühlen lassen.
3. Kabelverschraubung **vorsichtig** an der Kappe des Tauchrohres lösen.
4. Schutzkappe mit leichter Drehbewegung vom Strahlerkopf abziehen.
5. Strahler ca. 20 cm vorsichtig (Bruchgefahr) herausziehen und vom Steckkontakt lösen.
6. Strahler entnehmen; vorsichtig und sicher Ablegen.



VORSICHT Verletzungsgefahr beim Brechen des Quarzrohres!



HINWEIS Es wird empfohlen, auch bei einem Strahlerwechsel, den Durchfluss durch den Reaktor zu unterbrechen.



ACHTUNG Ein plötzliches Herabfallen des Strahlers kann zur Zerstörung des Tauchrohres führen!

7. Neuen Strahler an den Enden (nicht am Glas!) umfassen. Direkte Berührung mit dem Quarzmaterial sollte vermieden werden oder nur mit sauberen Baumwollhandschuhen geschehen. Verschmutzungen des Strahlers führen zu einer Beeinträchtigung der Funktion. Verschmutzungen auf dem Strahler brennen sich in das Quarzglas ein.
8. Strahler geradlinig in das Tauchrohr einführen.
9. Strahler mit dem 4-Stiftstecker fest verbinden.



HINWEIS Das Steckerbild ist nicht quadratisch, d. h. eine axiale 90° Drehung kann notwendig sein!



HINWEIS Bei Verwendung einer UV-Überwachungseinheit darf die Rückführlitze des Strahlers nicht vor dem UV-Sensor liegen. Dies beeinträchtigt die Messung der UV-Intensität!

10. Strahler bei vertikalem Einbau des Reaktors vorsichtig auf dem Boden des Tauchrohres aufsetzen.
11. Schutzkappe mit gelockerter Kabelverschraubung mittels Drehbewegung auf den Tauchrohrflansch aufbringen.
12. Strahlerkabel fixieren, Kabelverschraubung bis zum festen Haften des Kabels anziehen.
13. Kontrolle auf Dichtheit und feste Schraubverbindungen.
14. Inbetriebnahme des Gerätes; Funktionstest der Anlage kann durchgeführt werden.



Vor der Wiederinbetriebnahme des Gerätes muss sichergestellt sein, dass alle Verschraubungen und Anbindungen montiert sind und somit keine UV-C-Strahlung an Haut und Augen gelangen kann.

D-5.3 Reinigung und Wechsel Tauchrohr

Feste Reinigungszyklen können nicht vorgegeben werden, da die Belagbildung am Tauchrohr wesentlich von der Qualität des zu behandelnden Wassers abhängt.

Das Tauchrohrsystem ist über 3 Schrauben mit dem Reaktordeckel verschraubt oder direkt mit diesem verschweißt. Das Tauchrohr wird auf einer Feder, die sich auf dem Reaktorboden befindet, gelagert (siehe Zeichnung). Es steht damit unter einem leichten Druck.

Bei Anlagen zum **TOC**-Abbau sind das Tauchrohr, sowie der zugehörige Dichtungssatz **spätestens nach 2 Jahren Betrieb** zu tauschen!

Bei der Reinigung ist wie folgt vorzugehen:

1. Vorgang wie Strahlerwechsel Pos. 1 – 6.
2. Durchfluss unterbrechen, Druck von der Anlage nehmen und entleeren.
3. Verschraubung (3 Innensechskantschrauben) mit geeignetem Werkzeug vorsichtig lösen/entfernen. Dabei den Flansch parallel zur Dichtfläche des Reaktors halten. Das Tauchrohr bewegt sich durch den Federdruck nach außen.

   Bei einer festen Verbindung von Tauchrohraufnahme und Deckel ist die Klammer zu öffnen. Der Deckel drückt durch den Federdruck nach außen.
4. Tauchrohrsystem vorsichtig aus Reaktor nehmen.

VORSICHT Verletzungsgefahr beim Brechen des Quarzrohres!

HINWEIS Direkte Berührung mit dem Quarzmaterial sollte vermieden werden. Das kann zu einer Verschmutzung des Strahlers/Tauchrohres führen und damit zu einer Beeinträchtigung der Funktion.

5. Tauchrohr unter Verwendung einer milden Seifenlösung oder organischen Säure (Zitronensäure) reinigen.

   Spezielle Reinigungsmittel können beim Hersteller der Anlage bestellt werden (Gebindegröße: 1 Liter-Flasche zum Sprühen oder 5 Liter-Kanister für eine Umwälzreinigung).
6. Muss das Tauchrohr getauscht werden, sollte dies nur von geschultem Personal ausgeführt werden. VERLETZUNGSGEFAHR!

   Das Tauchrohr ist durch leichte Drehbewegungen aus dem Tauchrohrkopf zu lösen. Durch längeren Betrieb kann es vorkommen, dass sich das Tauchrohr nicht löst. In diesem Falle muss es aus dem Tauchrohrkopf ausgeschlagen werden. Dies darf nur mit Handschuhen und Schutzbrille geschehen!

   Bei jedem Tauchrohrwechsel sollten die Dichtungen getauscht werden! Die Dichtungen sind mit einem geeigneten Schmiermittel zu benetzen.

Das neue Tauchrohr wird mit einer leichten Drehbewegung in den Tauchrohrkopf eingebracht. Anschließend ist es zu reinigen.

7. Montage des Tauchrohrsystems in umgekehrter Reihenfolge:

   Nach dem geradlinigen zentrischen Einführen des Tauchrohres wird dieses mit einer Hand vorsichtig niedergedrückt, und wieder befestigt (Schrauben bzw. Klammer).



ACHTUNG

- Tauchrohr nicht zerkratzen!
- Reinigung nur mit weichem Tuch!
- Das Tauchrohr muss vor dem Wiedereinbau sowohl Innen als auch Außen trocken und sauber sein.

D-5.4 Wartungsplan

	monatlich	6 – 12 Monate	12 – 24 Monate
Visuelle Kontrolle			
- UV-Intensität und Betriebsstunden ablesen und hinterlegen	■		
- Dichtheit der Anlage und Leitungsanschlüsse überprüfen	■		
- Dichtheit des Messfensters überprüfen (bei kalibrierter UV-Überwachungseinheit)	■		
- Zustand des Kunststoffschauglases überprüfen, ggf. Tausch	■		
- Betriebszustand der Anlage überprüfen	■		
UV-Strahler			
- Überprüfen der Intensität	■		
- Ersetzen (nach erreichter Betriebstundenzahl oder Ausfall)		■	
Reinigen der Anlage			
- Reinigen des Reaktors		■	
- Wechsel/Reinigen des Tauchrohres		■	■
- Reinigen des Messfensters		■	
Dichtungen			
- Ersetzen (oder bei Tauchrohrwechsel)			■
UV-Sensor			
- Überprüfen der Messung		■	
- Nachkalibrierung			■
Messfenster (bei kalibrierter UV-Überwachung)			
- Auf Dichtheit prüfen	■		
- Ersetzen (oder bei Undichtigkeit)			■

Je nach Betriebsbedingungen kann es notwendig sein, die Wartungsarbeiten öfters als im Plan angegeben durchzuführen.

HINWEIS

Verwenden Sie ausschließlich Originalersatzteile. Bei Verwendung fremder Ersatzteile (inkl. UV-Strahler) erlischt jeder Gewährleistungsanspruch. Der Hersteller kann für den ungenügenden Wirkungsgrad der UV-Anlage bei mangelnder Wartung der Anlage oder Verwendung fremder Ersatzteile nicht haftbar gemacht werden.

D-6 LAGERUNG UND TRANSPORT

Die UV-Anlage ist sicher vor Stoß, Schlag und mechanischer Beanspruchung zu transportieren. Der Strahler ist bei jedem Transport dem Reaktor zu entnehmen.

VORSICHT Verletzungsgefahr beim Brechen von Glasbauteilen!

Die Reaktor und das Tauchrohr sind vor der Lagerung gründlich zu reinigen. Alle Komponenten der UV-Anlage sind trocken, staubfrei und geschützt vor mechanischer Beschädigung aufzubewahren. Es empfiehlt sich das Tauchrohr außerhalb des Reaktors und losgelöst vom Tauchrohrkopf zu lagern.
Besonders die elektrotechnischen Komponenten sind bei einer möglichst konstanten Temperatur aufzubewahren. Empfehlung 15-25°C.

D-7 GEWÄHRLEISTUNG UND HAFTUNG

Grundsätzlich gelten für Gewährleistungen unsere AGB.

Ein Gewährleistungsanspruch besteht für 12 Monate ab Lieferung bzw. ab Inbetriebnahme, wenn diese durch den Hersteller erfolgt ist.

Gewährleistungs- und Haftungsansprüche bei Personen- und Sachschäden sind ausgeschlossen, wenn sie auf eine oder mehrere der folgenden Ursachen zurückzuführen sind:

- Nicht bestimmungsgemäße Verwendung der Anlage
- Nichtbeachten der Hinweise in der Betriebsanleitung bezüglich Transport, Lagerung, Montage, Inbetriebnahme und Wartung der Anlage
- Mangelhafte Überwachung des Anlagenbetriebes bzw. unsachgemäße Eingriffe in den Anlagenbetrieb
- Unsachgemäß durchgeführte Reparaturen, Wartung und Instandhaltungsmaßnahmen
- Katastrophenfälle durch Fremdkörpereinwirkung und höhere Gewalt
- Umbauarbeiten oder sonstige Eingriffen ohne Rücksprache und Genehmigung des Herstellers.

HINWEIS Verwenden Sie ausschließlich Originalersatzteile.

HINWEIS

Bei Störungen kontaktieren Sie bitte unseren Kundendienst unter Angabe des aufgetretenen Fehlers.

Halten Sie den Anlagentyp und die Seriennummer der Anlage bereit.

E-1 WARNINGS



Safety notices



This facility works with UV radiation. Radiation may harm eyes and skin; hence, the facility must only be operated if the reactor shell is undamaged. Do not look into the radiation unprotected and do not expose skin to radiation!



Open and install the device only with power OFF and in its non-pressurised state! The reactor is pressurised. If handled inappropriately, there is the risk for the quartz tube to burst and the medium may leak from the reactor.
Prior to cleaning, maintenance or the replacement of parts, the device must be disconnected from all sources of power supply.
Do not operate the facility in a condition when it is not filled with water or when water supply is interrupted.
Respectively applicable regulations for the handling of electrical devices must be observed.



The water to be treated/waste water may contain hazardous substances. Please follow the respective handling and safety regulations!
The medium to be treated must not have any damaging influence (e.g. corrosion) on the UV system. Damage is not covered by the warranty. Material specifications can be found in the data sheet!



During operation, components and the medium will heat up. Use it only in flowing operation and with proper venting of the reactor! Damage to the system or to other components by overheating is not covered by warranty or guarantee!

HINT

Read this operation manual carefully and before installation!

No warranty in case of wrong operation mode or incorrect use!

IMPORTANT

The technological dimensioning and proper functioning of the system only applies to the components used by the manufacturer.

The use of 3rd party material (including spare parts and wear parts) will void any claim to a technologically correct function of the system.

E-2 GENERAL REMARKS



This Operating Manual contains information that is required to correctly and safely take the UV facility into operation and handle it Please read the entire Operating Manual prior to operating the facility. When working on the facility, always observe the safety notices in the Operating Manual as well as the additionally and generally applicable safety regulations and notices on safety at work. In the event of inappropriate operation or installation, the supplying company cannot be held liable for any warranty and guaranty claims.

The following principles apply to operating the facility:



- If there is a damage in case of the transport, a damage report has to be written with the supplier and sent via fax or e-mail to the seller within 24 hours.
- The facility operator is responsible for proper assembly and installation of the facility in accordance with the Installation Instructions. He bears responsibility for maintaining the facility in an operationally safe state at all times.
- The facility must only be commissioned, operated and repaired by authorised and appropriately instructed personnel.
- Should any regulation contained in this Operating Manual, particularly with regard to safety, not correspond with local statutory provisions, the respectively more stringent provision will apply.

E-3 TYPES OF SYSTEMS

E-3.1 Intended Use

The UV facilities of the type “MIP / VAP” and of the type “EL” can be used for water treatment in the following areas:

4. Disinfection
   UV radiation of a wavelength of 254 nm deactivates microorganisms



5. elimination of remaining ozone
   UV radiation of a wavelength of 254 nm destroys water-borne ozone
6. TOC degradation
   ozone-generating UV lamps oxidise organic compounds suspended in water

The achievable reduction of germs, remaining ozone and TOC is dependent on several factors:

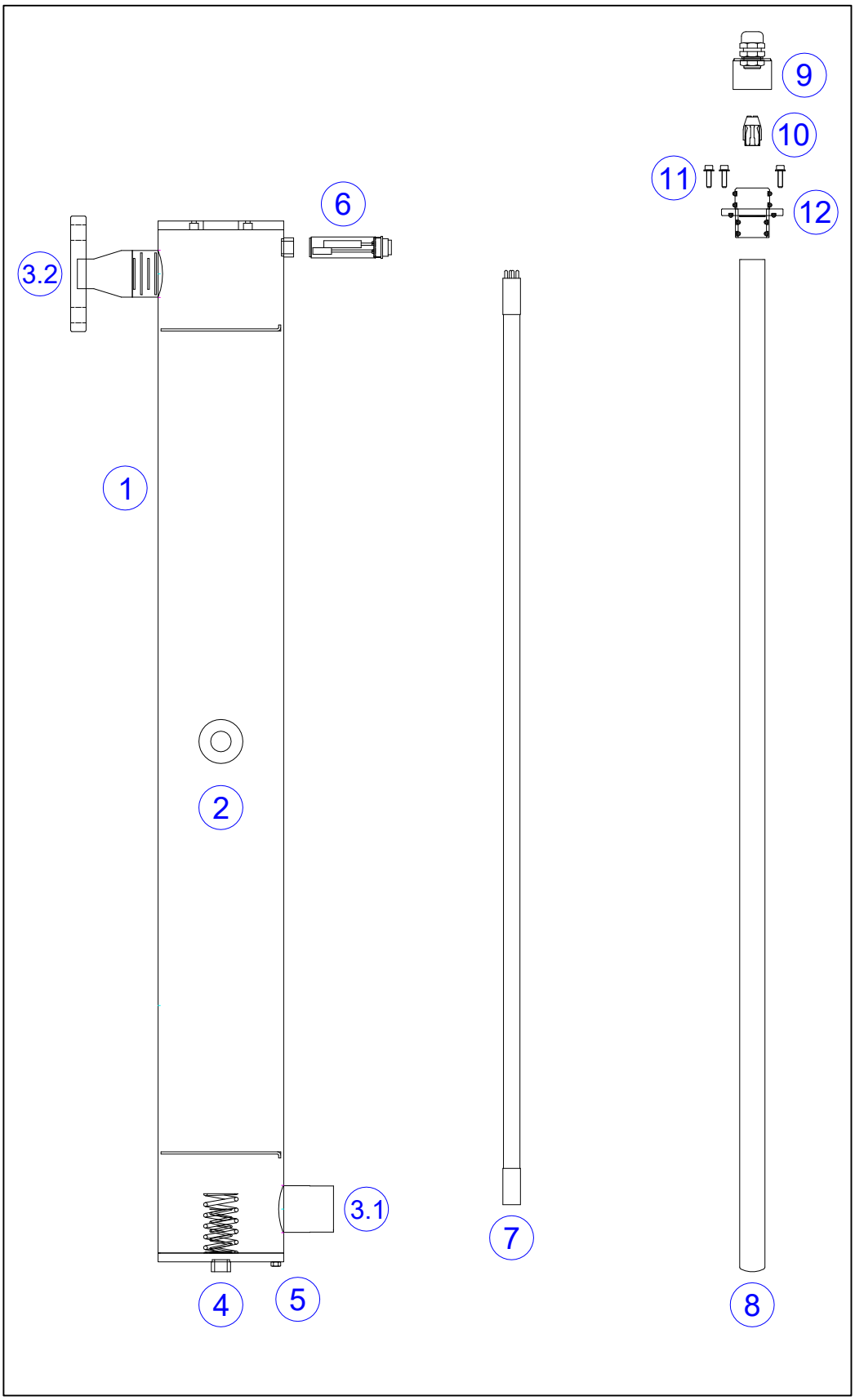


- turbidity and UV-C transmission of the water
- The flowrate of the water to be treated
- The number of operating hours / life-time of the UV lamp
- The state of cleanliness of the quartz tube
- The germ count in the water to be treated; the ozone concentration or TOC concentration, respectively.

The UV facility is only effective if operated continuously.

E-3.2 UV systems of Type „MIP / VAP“

E-3.2.1 Basic Structure of the UV reactor



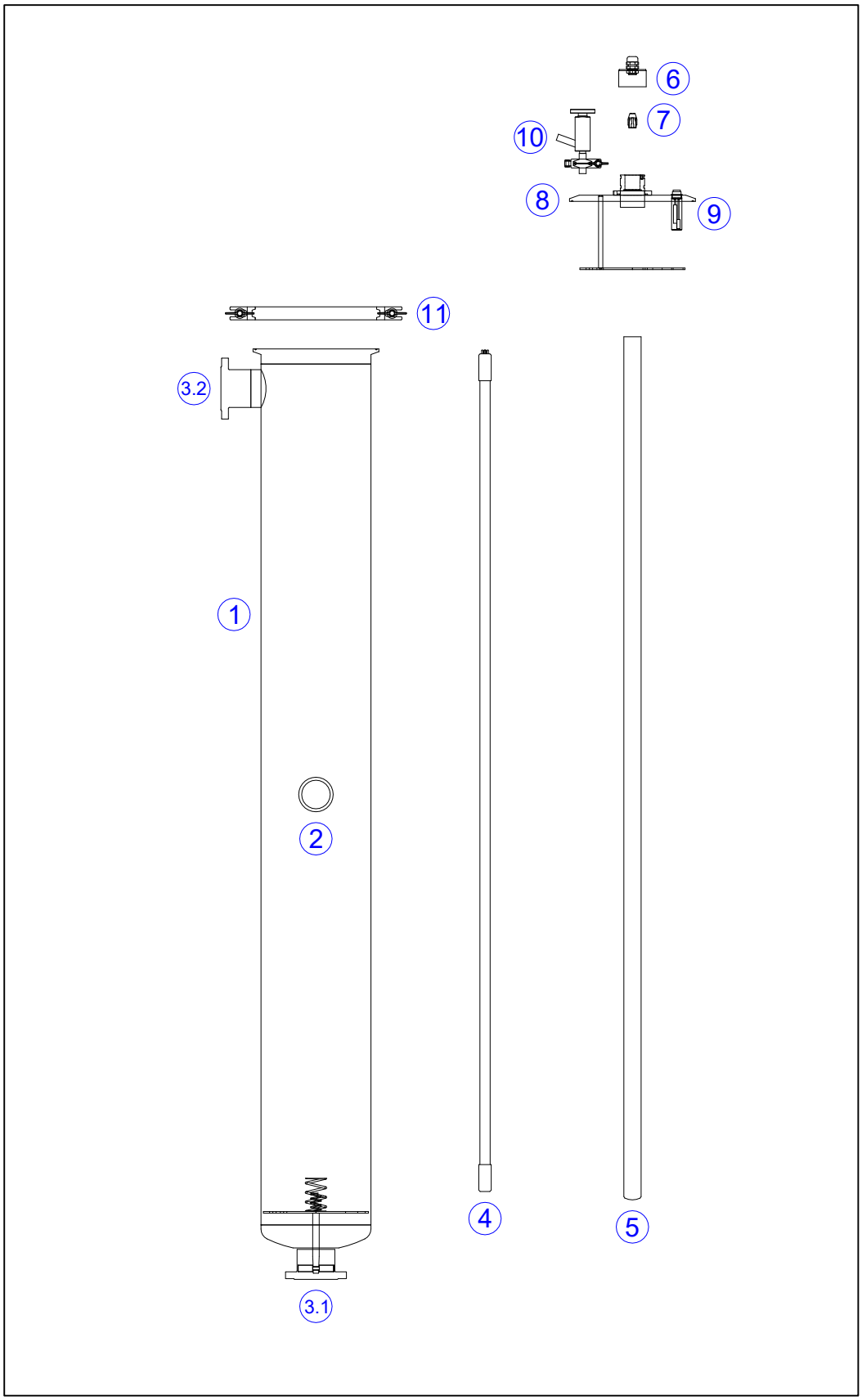
1	UV reactor – exact dimensions and construction can be found on the reactor drawing or the data sheet (see appendix)
2	Fitting for UV sensor (1/4”) or measurement window (1”) – according to the used UV monitoring unit and UV system
3	Connections of the UV reactor – size, type and position customized
3.1	Input medium Example for connection: fitting with internal/external thread without light trap
3.2	Output medium Example for connection: flange with light trap for direct connection to a plastic pipe
4	Draining 1/4" – for vertical use of the UV reactor Without function – for horizontal use of the UV reactor
5	Hex nut welded at UV reactor for connection of the earthing cable – if not available or difficult to achieve, use an earth strip at the UV reactor for earthing!
6	Temperature sensor – emergency off if temperature of medium over 70°C. Standard at UV systems with power up to 300W.
7	UV lamp
8	Quartz tube
9	Cap at lamp cable to realize the degree of protection.
10	Lamp plug - is reverse-pole protected, because rectangular.
11	Allen screws (3 pieces) – for mounting of the quartz tube insertion (12)
12	quartz tube insertion incl. seals to hold the quartz tube (8)

E-3.2.2 Switch Box

Technical dates can be found in the circuit documents (see appendix) and in the operating manual of the UV monitoring (optional).

E-3.3 UV Systems of the Type „EL“

E-3.3.1 Basic Structure of the UV Reactor



1	UV reactor – exact dimensions and construction can be found on the reactor drawing or the data sheet (see appendix)
2	Fitting for UV sensor (1/4”) or measurement window (calibrated sensor) – according to the used UV monitoring unit and UV system
3	Connections of the UV reactor – size, type and position customized
3.1	Input medium: Light trap for direct connection to a plastic pipe can be integrated.
3.2	Output medium: Light trap for direct connection to a plastic pipe can be integrated.
4	UV lamp
5	Quartz tube
6	Cap at lamp cable to realize the degree of protection.
7	Lamp plug - is reverse-pole protected, because rectangular.
8	Clamp cover with integrated flow plate and quartz tube insertion incl. seals.
9	Temperature sensor – emergency off if temperature of medium over 70°C. Standard at UV systems with power up to 300W. Depending on the type of UV system a pre alarm at 50°C temperature of medium is available (see data sheet).
10	Air valve – according to the UV system differences are possible.
11	Clamp clip and seals to fix and seal the clamp cover (8).

E-3.3.2 Switch Box

Technical dates can be found in the circuit documents (see appendix) and in the operating manual of the UV monitoring (optional).

E-4 INSTALLATION / START-UP

E-4.1 Installation and operating instructions

Installation and commissioning must only be performed by instructed specialists. The operator is obliged to provide for proper installation.

Prior to its first taking into operation, the facility is to be checked for leak tightness, it is to be connected to power supply and a test run is to be performed.



Note on application in the field of disinfection:

The desired reduction in the germ count in the entire system (including piping, reservoir) can only be achieved after a running-in phase of the UV facility. It may be necessary to disinfect the piping system once before taking the facility into operation (thermally or chemically).



- When choosing a site of installation, provide for sufficient space for exchanging UV lamp (please refer to Technical Specifications as annexed)!
- Keep protected against direct sun radiation and frost!
- The facility must not be set up outdoors!
- Such site should be selected for the facility that allows water which accumulates during draining or rinsing, for example, to flow off.
- A direct transition from the reactor to plastic pipes should be avoided. UV radiation damages the material. In the case of excessive temperatures because of failures, it can also cause damages at the piping system.
- Depending on the length and condition of the piping system, it should be cleaned/rinsed thoroughly prior to commissioning.
- Sufficient electrical supply should be provided for.
- The lamp cable has a length of 2,9m. The included cables must not be extended or shortened (this represents an inappropriate interference with the facility and results in guaranty to expire). Do not roll up any cable and do not pull any excess lengths of cable into the switch box. The same applies to the included sensor cable for the monitoring unit. Cables should principally not be twisted with each other.





- If removal of the lamp cable from the switch box is required (e.g., when laying the cable in a cable duct) extreme care must be taken that the cable ends will not get mixed up when re-connecting them, since this may result in damaging electronic components.
- The UV lamp plug is reverse-pole protected, since the plug is not square. Turned by 90°, the plug does not fit any more. Reverse poling causes damage to the electronic ballast and the UV lamp!
- Information's about connection of lamp cable at the electronic ballast, the optional UV sensor at the UV monitoring and the cable of the temperature sensor can be found in the circuit documents.

  If anything is unclear or if you have questions, please contact the manufacturer.
- **Access must be guaranteed at any time during operation and maintenance.**
- Operating the UV lamp results in heating up. This heat must at any rate be allowed to escape. If heat builds up, the device will heat up resulting in damaging the UV lamp, electronic ballast and the optional UV monitoring unit.



- Regarding the included UV sensor, the temperature of the reactor must not exceed 70°C. Excess temperature leads to damaging the UV monitoring.

  Therefore, the following applies:

  During operation of the UV lamp, guaranty permanent heat removal via the reactor wall (Do not insulate the reactor shell!) and allow the medium to permanently flow.

  Select the time for the test run without the medium as short as possible and perform it under supervision.
- For trouble-free and reliable operation, it is important that vibrations generating equipment (eg. Pumps) are decoupled from the pipe network.

  Vibrations which are transmitted to the UV system can lead to premature failure or to reduced UVC output of the UV lamp. Flawless operation of the UV system is not guaranteed anymore.



  In addition to the failure of the UV lamp, it may also lead to mechanical damage to the UV system:

  Formation of cracks in the quartz tube by knocks of the UV lamp against the quartz tube. As a result, water leakage and cause a short circuit and may damage the electronics.

  Excessive stress on the welds of the UV reactor and the pipes, to the breaking of the seams.
- The switch box is from over- and undervoltage, strong glitches and system perturbations (eg.: Harmonics) to protect.





- Ambient temperatures of UV reactor and switch box must be observed (see data sheet)
- If chemical cleaning of the piping or of the reactor is performed, the UV facility or the UV lamps, respectively, must be taken out of operation. Chemical cleaning agents in combination with UV radiation accelerate the ageing process of seals to a great extent!
- In the event of sanitising, the UV-system also has to be switched OFF (overheating). And the UV sensor has to be removed from the measurement window (in case of calibrated UV monitoring unit)!

E-4.2 Installation and Start-Up

1. Hook-up the UV facility with the existing piping system.

   Before linking it in, the quartz tube is to be disassembled in order to avoid damage! (see – Replacement of the quartz tube)

   When installing the reactors, care must be taken that the bleeding valve is at the top. The flow direction of the medium from the bottom up must be ensured.

   If the reactor is mounted horizontal, it is not allowed that the UV sensor is at the top of the UV reactor. Air bubbles can influence the UV measurement.

   In order to prevent undesired air bubbles and to guarantee optimal bleeding, a slant of 2° is of advantage when mounting the UV reactor horizontally. The system vent by its own.

2. The quartz tube is to be inserted carefully into the reactor. (see – Replacement of the quartz tube)



HINT

Bolting stainless steel into stainless steel requires the use of an appropriate lubricant.

3. Check whether the quartz tube is exactly positioned in its guidance. At the bottom of the reactor, there is a spring system that serves as a counter bearing for the quartz tube.

   At “MIP/VAP systems” the O-ring between UV reactor and quartz tube insertion must fit tightly.

   At “EL systems“ the tri-clamp seal between UV reactor and clamp cover must fit tightly.

4. Check the facility for hydraulic tightness!
5. Carefully insert the UV lamp with its electrical wiring into the quartz tube (cf. the following notes!)

WARNING

Even low humidity can cause condensation processes occur in the quartz tubes. (Air heated during operation moves along the UV lamp to the top and condenses above the UV lamp at the plug, which may result in short-circuiting).

WARNING

The quartz tube and the UV lamp must be dry prior to commissioning. The quartz tube and the UV lamp must be dry prior to commissioning. It is recommended to rinse the quartz tube with nitrogen or dried air or to run the facility for a few minutes with the protection cap off in order to allow humidity to escape (Warning: During this process, there is no IP protection!).

6. Attach the protection cap by careful rotational movement until it stops. The PG-threaded connector must be firmly bolted.

   In case of using an UV monitoring, check that the cords of the UV lamp don't show to the UV sensor. Otherwise the measurement is influenced.

7. Connect the earthing cable with the reactor.

   Use the screw at the reactor (MIP/VAP systems) or an earthing strip (EL systems).

8. Connect UV sensor and temperature sensor, if available.

9. Connect UV sensor and temperature sensor, if available.



10. Connect to power supply! A permanent connection must only be performed by an expert electrician! The operator has to fuse the UV system with an RCD.

11. Switch ON the UV system. In case of a thermoplastic switch box is a green switch on the right side. In case of a steel sheet switch box you find the switch in the front.

    In case of remote control, choose your mode (HAND or AUTO) before start. Don't switch during operation!

12. Check functionality! To connect Potential free fault contacts look at the circuit diagrams or contact the manufacturer.



Prior to taking the device into operation, make sure that all threaded connections and tie-ins have been fitted and, therefore, skin and eyes will not be exposed to any UV-C radiation.

The functional check of the UV system is (depending on type) made visually via LED at the front of the switch box or at the electronic ballast. In case of using an UV monitoring look at the operating manual of UV monitoring.

According to the used electronic ballast, the electronic ballast (EVG) can have two different LEDs.

UV system	***LED EVG – green***	***LED EVG – red***
EVG 11/16W	-	-
EVG 25W	x	x
EVG 36 W	x	-
EVG (rest)	x	x

Changes of construction and/or technical characteristics of the products in favor of technical progress or for the preservation of deliverability are reserved.

LED	***meaning***
LED green - blinks	UV lamp heats up
LED green - lights	UV lamp works
LED red - lights	UV lamp not connected / defect

After a run-up time of several minutes (depending on the operating parameters and on the operating hours), the UV lamp reaches its full UV intensity.



The achieved UV radiation is dependent on the state of cleanliness of the quartz tube (formation of deposits!). The UV-C performance of the UV lamp decreases with increasing operating time. Exchange the UV lamp after the maximum operating hours, as written in the data sheet. Cleaning should be done in a reasonable and regular intervals.

Before works are carried out on the UV system (e.g., maintenance), it is imperative to switch it OFF. The same applies to cases of emergency. If a fault of whatever nature is detected in the UV system, (leaking water, damage in the electrical system, etc.), the system must be taken out of operation.



If chemical cleaning of the piping or of the reactor is performed, the UV facility or the UV lamps, respectively, must be taken out of operation. Chemical cleaning agents in combination with UV radiation accelerate the ageing process of seals to a great extent!



In the event of sanitising, the UV-system also has to be switched OFF (overheating). And the UV sensor has to be removed from the measurement window (in case of calibrated UV monitoring unit)!

E-4.3 Switch the UV system OFF

1. Switch the UV system OFF by the main switch.
2. Disconnect the system from the power supply – Keep attention to security instructions!
3. Let the system cool down.
4. Interrupt the flow of the medium and drain the UV reactor.
5. Clean the UV system.

E-5 MAINTENANCE / CARE / FAULTS

The UV system is except for cleaning of the quartz tube and the measurement window of the UV sensor (calibrated) in dependence of the water quality largely maintenance-free.

For a trouble-free operation has to be respected the following:

- The flanges may not be exposed to mechanical lateral forces.
- Mechanical damages of the installation have to be excluded.
- Regular control of the reactor, quartz tube and cleaning of visually recognizable fouling by a brush or by cleaner.
- Regular control of tightness of reactor. The measurement window for systems with UV measurement unit (calibrated) must be checked periodically for leaks. Otherwise the UV sensor may be damaged.
- Change UV lamp after maximum of operating hours.
- The quartz tube and the seals of UV systems for TOC decomposition are to exchange after no more than 2 years!
- If a plastic sight glass is used, it is recommended that you replace this with every UV lamp change.

HINT Please observe the hints of the operating manual for the UV monitoring unit.

E-5.1 Electronic Components

Maintenance of the electronic components is not necessary For a higher lifetime and a high efficiency it is necessary, that the temperature of the switch box should not rise above 40°C. Avoid too much switching operations.

Protect the switch box against overvoltage and undervoltage and fuse the UV system with an RCD.

Check the earthing at regular intervals.

E-5.2 Replace UV lamp

To ensure the function of the UV system and the necessary UV intensity, the lamp should be changed regularly (Recommendation: by the number of hours specified in the data sheet). If no UV control unit is integrated, the lamps should not be operated for longer than recommended.

Failure of a lamp can be detected by the LED at the switch box or electronic ballast. If using an UV monitoring you get an alarm signal.

Spare UV lamps can be ordered from the manufacturer of this facility as spare parts. For proper operation of the facility, only UV lamps as specified by the manufacturer must be used. In the event of using other UV lamps than those as specified by the manufacturer, any claims for reasons of warranty or guaranty will expire.

If the UV lamp has to be replaced, it is recommended to clean and check the whole UV system.



WARNING The maximum operating hours for UV lamps apply with a maximum of one switching process per 8 hrs of operating time. If switched ON and OFF more frequently, the lifetime of UV lamps will drastically decrease.



CAUTION When operating the facility, components will heat up. Should a UV lamp be replaced immediately after shutting the facility OFF, be aware that the UV lamp is still hot!

Replace UV lamp:



1. Shut OFF the module and disconnect it from power or voltage supply, and make sure it cannot be switched ON again.
2. Let the system cool down.
3. **Carefully** loosen the screwed cable gland at the cap of the quartz tube and withdraw it.
4. Pull the protector cap from the UV lamp head by slightly turning it.
5. Pull the UV lamp carefully 20 cm out (risk of rupture) and disconnect it from the plug contact.
6. Put the UV lamp aside carefully and store it safely!



CAUTION There is a hazard of injury if the quartz pipe breaks!

HINT It is recommended to interrupt the flow through the reactor, even when a UV lamp needs to be replaced.

WARNING Suddenly dropping the UV lamp when removing it may result in destroying the quartz tube!

7. Grip the new UV lamp at its base only. Use textile gloves! Direct contact with the quartz material should be avoided. This may lead to soiling the UV lamp impairing its function. Soil on the UV lamp will burn in into the quartz glass!
8. Insert the new UV lamp into the quartz tube in a straight movement.
9. Tightly connect the new UV lamp to the 4-pin plug.

HINT The plug is reverse-pole protected. If the plug does not fit the UV lamp, it might be required to turn the plug axially by 90°!

HINT If an UV monitoring is used, the cords of the lamp should not lie in front of the UV sensor, otherwise the measurement is influenced.

10. Place the lamp carefully on the bottom of the quartz tube, if the reactor is mounted vertical.
11. The protection cap is put on the quartz tube flange by means of a loosened screwed cable gland and by turning it.
12. Fix the UV lamp cable and tighten the screwed cable gland until the cable is properly fastened.
13. Check for tightness and fastened screwed connections.
14. Commissioning of the device; a functional test of the facility can be performed.

Prior to recommissioning the device, it must be made sure that all screwed connections and tie-ins have been assembled and thus no UV-C radiation can come in contact with skin and eyes.

E-5.3 Cleaning and Replacement of the Quartz Tube

Depending on the water quality, the quartz tube needs to be cleaned at different intervals.

The quartz tube system is bolted to the reactor lid by three bolts or welded with the reactor lid. The quartz tube is suspended on a counter spring at the bottom of the reactor (see drawings). Because of this, the quartz tube is pressurized.

The quartz tube and the seals of UV systems for TOC decomposition are to exchange after no more than 2 years!

For cleaning purposes, proceed as follows:

1. As for replacement of the UV lamp, steps 1 – 6.

2. Interrupt flow and depressurise the facility.
3. Carefully loosen and remove the bolting (three hexagon socket head screws) using appropriate tools. While keeping the flange parallel to the sealing surface of the reactor. Forced by the spring, the quartz tube system is pressed upwards.

   If the quartz tube system is welded with the lid, open the clamp and remove the whole system. Forced by the spring, the quartz tube system is pressed upwards.
4. Carefully remove the quartz tube system from the reactor.



CAUTION There is a hazard of injury if the quartz pipe breaks!



HINT Directly touching the quartz material should be avoided. This can result in soiling the quartz tube, thus impairing the function of the facility.

5. Clean the quartz tube using an appropriate cleaning agent.

   A special cleaning agent for UV systems can be ordered from the manufacturer (batch: 1 litre bottle for spraying or 5 liter canister for circulating).
6. If the quartz tube does not allow cleaning any more, a new one needs to be installed. Repairs may be carried out by qualified persons only. RISC OF INJURY!

   Loosen the quartz tube by slightly turning and pulling it from the quartz tube head. After a long period of working, it is possible that the quartz tube do not solve. In that case, the quartz tube needs to be destroyed. Just do it with gloves and safety glasses!

   Thereby it is also imperative to replace the seals. Cover seals in permissible lubricant.

   Push the new quartz tube, by slightly turning and pressing it, into the quartz tube head. Afterwards clean the quartz tube.
7. Assembly inside the reactor in reverse sequence:

   After inserting it in a straight line and centrally, the quartz tube is gently pressed down and fixed again (bolted or with clamp).



WARNING

- Do not scratch the quartz tube!
- Clean it by using only soft cloth or kitchen towel tissue!
- Prior to re-inserting, the quartz tube must be dry (especially in its interior) and clean.

E-5.4 Maintenance Schedule

	monthly	6 – 12 month	12 – 24 month
Visual check			
- read off UV intensity and operating hours and file them	■		
- check tightness of the facility and pipe connections	■		
- check tightness of the measurement window (calibrated sensor)	■		
- Check the condition of the plastic sight glass, replace if necessary	■		
- check operating state of the facility	■		
UV lamp			
- check intensity	■		
- replace (after reaching operating hours or failure)		■	
Cleaning of the facility			
- clean the reactor		■	
- replace/clean the quartz tube		■	■
- clean the measurement window		■	
Seals			
- replace (or when exchanging the quartz tube)			■
UV sensor			
- check the measurement		■	
- recalibrate			■
Measurement window (calibrated sensor)			
- check for tightness	■		
- replace (or when leaking)			■

Depending on operating conditions, it might be required to perform maintenance more frequently than scheduled.

HINT

Use genuine spare parts only. Upon the use of third-party spare parts (incl. the UV lamp), any warranty claim expires. The manufacturer cannot be held liable for the insuffient efficiency of the UV facility due to deficient maintenance of the facility or to the use of third-party spare parts.

E-6 STORAGE AND TRANSPORT

Transport the UV system carefully. Beware for chock, strokes and mechanical stress. Before every transport, remove the UV lamp.

CAUTION There is a hazard of injury if the glass components break!

Clean the reactor and the quartz tube before storage. All components of the UV system have to be stored dry, dust-free and protected against mechanical damage. It recommends storing the quartz tube solved from the quartz tube head and outside of the reactor.
Electronic components should be stored at constant conditions (temperature 15-25°C).

E-7 WARRANTY AND LIABILITY

Principally, our General Terms and Conditions apply to warranty.

Claims for reasons of warranty can be made for twelve months from delivery or commissioning, respectively, if it has been commissioned by the manufacturer.

Warranty and liability claims for personal and material damage are excluded, if they can be traced back to one or several of the following causes:

- Inappropriate use of the facility
- Non-observance of the notes in the Operating Manual with view of transport, storage, assembly, commissioning and maintenance of the facility
- Faulty monitoring of facility operation or inappropriate interference with facility operation
- Inappropriately performed repair and maintenance works
- Emergencies caused by foreign matter and force majeure
- Retrofitting or other interference, without consultation the manufacturer or obtaining approval from him.

HINT Use genuine spare parts only.

HINT In the event of disturbances, please contact our Customer Service by specifying the fault occurred.

Keep the system type and serial number ready.

Datenblatt / Data Sheet

Anlagentyp / Type: EL-TOC 038

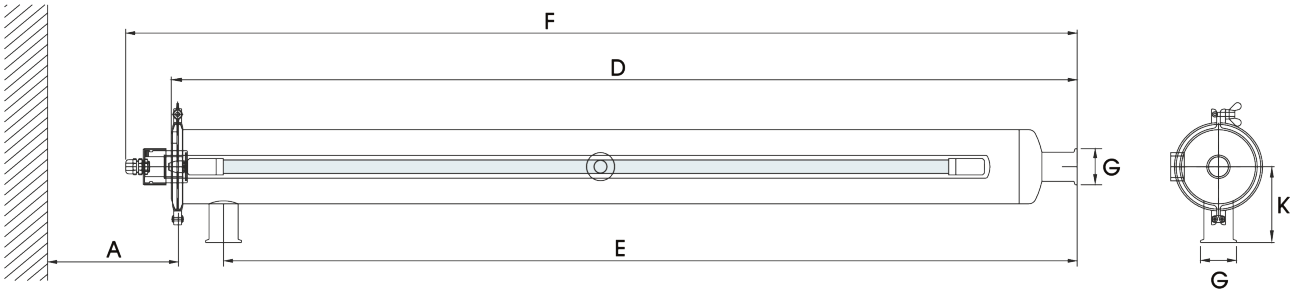
Kenndaten / Specifications

Hauptanwendung main application		TOC-Abbau TOC reduction
Fluenz fluence		1200 J/m² [1]
Maximaler Volumenstrom bei einer UV-Transmission von: max. flow rate at the transmission of:	**98 %/cm** [2]	3,80 m³/h
Maximaler Volumenstrom bei einer UV-Transmission von: max. flow rate at the transmission of:	**100 %/cm**	4,00 m³/h
Wassertemperatur water temperature		5 … 60 °C
min. Durchfluss gegen Überhitzung min. flow rate to prevent overheating		23,5 L/h
maximaler Druckverlust maximal pressure loss		<0,1 bar [3]

[1] kundenspezifische Fluenz möglich / customer-specific UV doses are feasible
[2] darf im einmaligen Durchlauf nicht unterschritten werden / must not fall below in single passage
[3] Druckverlust kann bei kundenspezifischen Flanschen variieren / pressure loss may vary with custom flanges

Reaktor / Reactor

Einbau installation	vertical / horizontal	**Maximaler Druck** max. pressure	10 bar
Anzahl Reaktoren number of reactors	1	**Gesamtlänge F** total length F	1338 mm
Gewicht weight	8,5 kg	**Reaktorlänge D** reactor length D	1264 mm
Werkstoff material	Edelstahl 1.4404	**Standardanschluss G** standard connection G	DN 50
Oberfläche surface	innen gebeizt; außen elektropoliert inside pickled; outside electropolished	**Flanschabstand E** flange distance E	1200 mm
Dichtungen seals	FPM	**Flanschmaß K** flange dimension K	150 mm
Schutzgrad degree of protection	IP 65 (EN 60529)	**Platz für Strahlerwechsel A** space for changing UV-lamp A	1250 mm



UV - Strahler / UV Lamp

Strahleranzahl number of lamps	1	**Strahlerleistung** power of UV lamp	170 W
Strahlertyp type of lamp	Hg - Niederdruck (ozonbildend) Hg low pressure (ozone generating)	**UV-C - Leistung des Strahlers** UV-C power of lamp	31 W
Artikelnummer article number	7852000116	**Strahlernutzungsdauer** lamp lifetime	8000 h

Die Strahlernutzungsdauer ist abhängig von der Betriebsweise (Anzahl der Schaltzyklen; s. ggf. Zusatzinformationen).
The lamp lifetime depends on the operating mode (mainly on number of cycles, vide added information if appropriate).

Schaltkasten / Switch Cabinet

Ausrüstung equipment	Schaltkasten mit EVG, Schuko-Stecker, Schalter, Funktionsanzeige, und Betriebsstundenzähler	Switch box with electronic ballast, Schuko-plug, switch, operating time counter and operating display (LED)	
Material material	pulverbeschichtetes Stahlblech [4] powder-coated steel sheet	**Anschlussleistung** connected power	200 W
Abmaße (BxHxT) dimensions (WxHxD)	300 x 300 x 210 mm	**Anschlussspannung** supply voltage	230 V
Gewicht weight	11 kg	**Netzfrequenz** mains frequency	50/60 Hz
Schutzgrad degree of protection	IP 54 (EN 60529)	**Umgebungstemperatur** ambient air temperature	5 … 35 °C

[4] kundenspezifische Ausführungen möglich (siehe Schaltungsunterlagen) / customer-specific execution feasible (see circuit documents)

UV - Überwachung / UV Control Unit

Standard UV - Überwachung standard UV control unit	keine / none
Optionale UV - Überwachung 1 optional UV control unit 1	UE-D1-LPFK
Optionale UV - Überwachung 2 optional UV control unit 2	UE-DZ-LPFK

Ersatzteilliste / Spare Part List

Anlagentyp / Type: EL-TOC 038

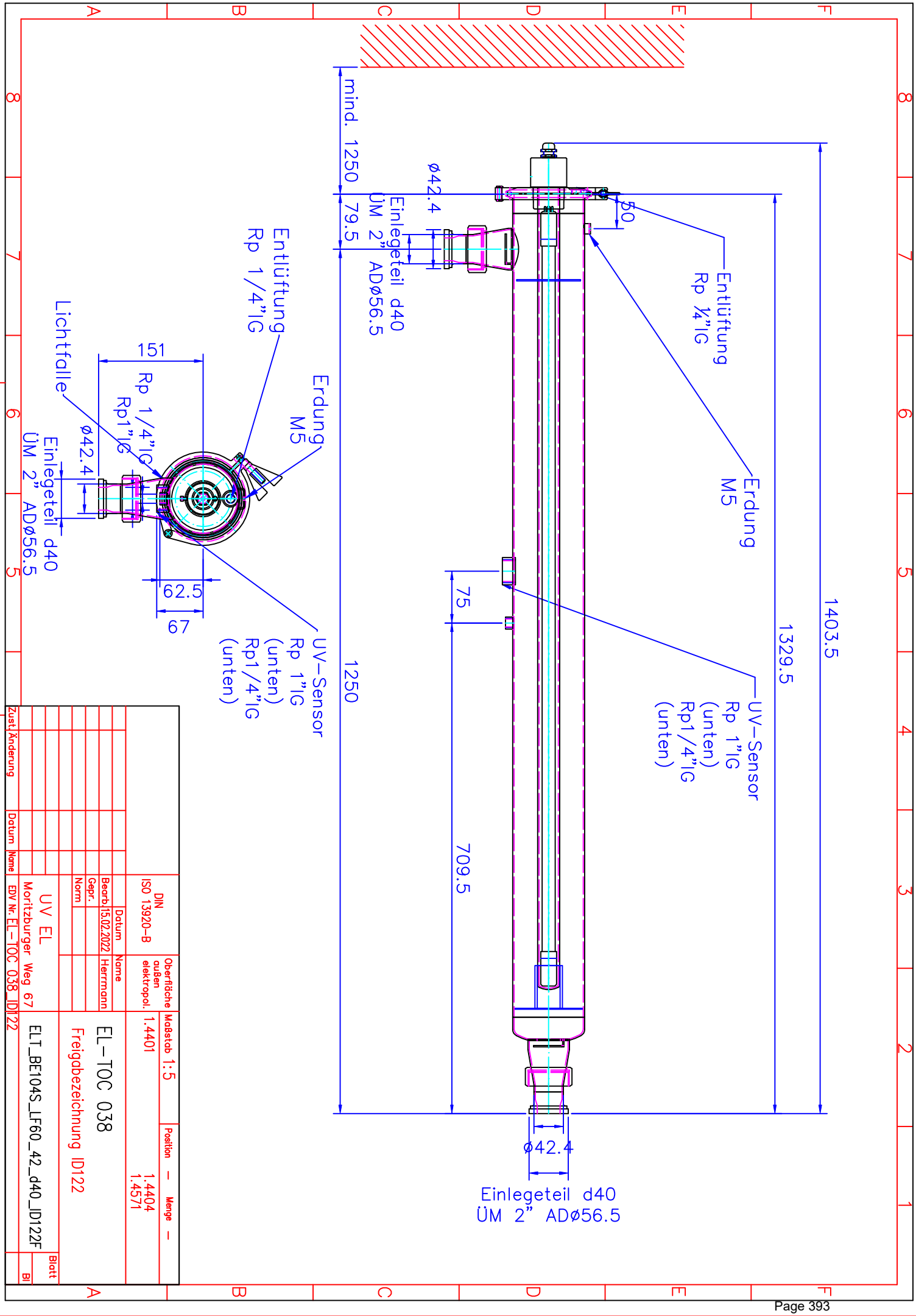
Ersatzteile / Spare Parts

Artikelnummer Article Number	Bezeichnung Description	Anzahl Quantity
7960000005	**Elektronisches Vorschaltgerät 200W** electronic ballast 200W	1
UT7852000069	**Tauchrohrkopf mit Flansch aus Edelstahl für TRS 32** quartz tube insertion (stainless steel) for TRS 32	1
7708000009	**Tauchrohr aus Quarz (BE)** quartz tube (BE)	1
00011000079	**Strahlerkabel mit Schutzkappe und Keramiksockel für TRS 32 (3m)** lamp cable with cap and ceramic base for TRS 32 (3m)	1
00011000136	**Entlüftungsventil ¼" 1.4404-316L** air valve ¼" 1.4404-316L	1

Verschleißteile / Wear Parts

Artikelnummer Article Number	Bezeichnung Description	Anzahl Quantity
7852000116	**UV-Strahler 200 W (TOC)** UV lamp 200 W (TOC)	1
7852000130	**Dichtungssatz TRS32** seal set TRS32	1
8008300028	**Clampdichtung TC DN 100** seal for clamp TC DN 100	1

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Zust.	Änderung	Datum	Name				
				DIN ISO 13920–B	Oberfläche außen elektropol.	Maßstab 1:5	Position – Menge –
				Bearb. 15.02.2022	Herrmann	1.4401	1.4404 1.4571
				Gepr.			
				Norm			

UV EL
Moritzburger Weg 67
EDV Nr. EL–TOC 038_ID122

EL–TOC 038
Freigabezeichnung ID122

ELT_BE104S_LF60_42_d40_ID122F

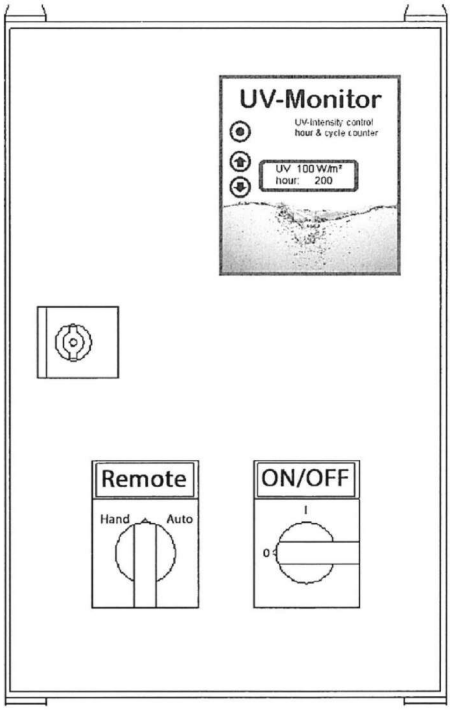
Blatt Bl

Schaltungsunterlagen
circuit documents

Anlagentyp / UV system	**EL TOC 038**
Schaltkasten / switch box	**SB 300 x 300 x 210 mm**

-P1: UV-überwachung UV-monitoring unit	**UE-D1-LPFK**
Leitungseinführung / cable entry	unten / below
Schutzart / protection class	IP54 nach / according EN60529
Betriebsspannung / supply voltage	230V 50 / 60Hz
Umgebungstemperatur / ambient temperature	+5°C...+30°C
optional: - Temperatursensor - Fern Ein/Aus	-- **24 V DC**
Revision / revision	24.10.2022

				Datum	24.10.2022													=	
				Bearb.														+	
				Gepr.															
Zustand	Änderung	Datum	Name	Norm		Urspr.		Ers. f.		Ers. d.		Schaltplan				Projekt Nr. SB_ES_P16_P30_P11-1			
																Zeichnung: >		Bl.1	von 7



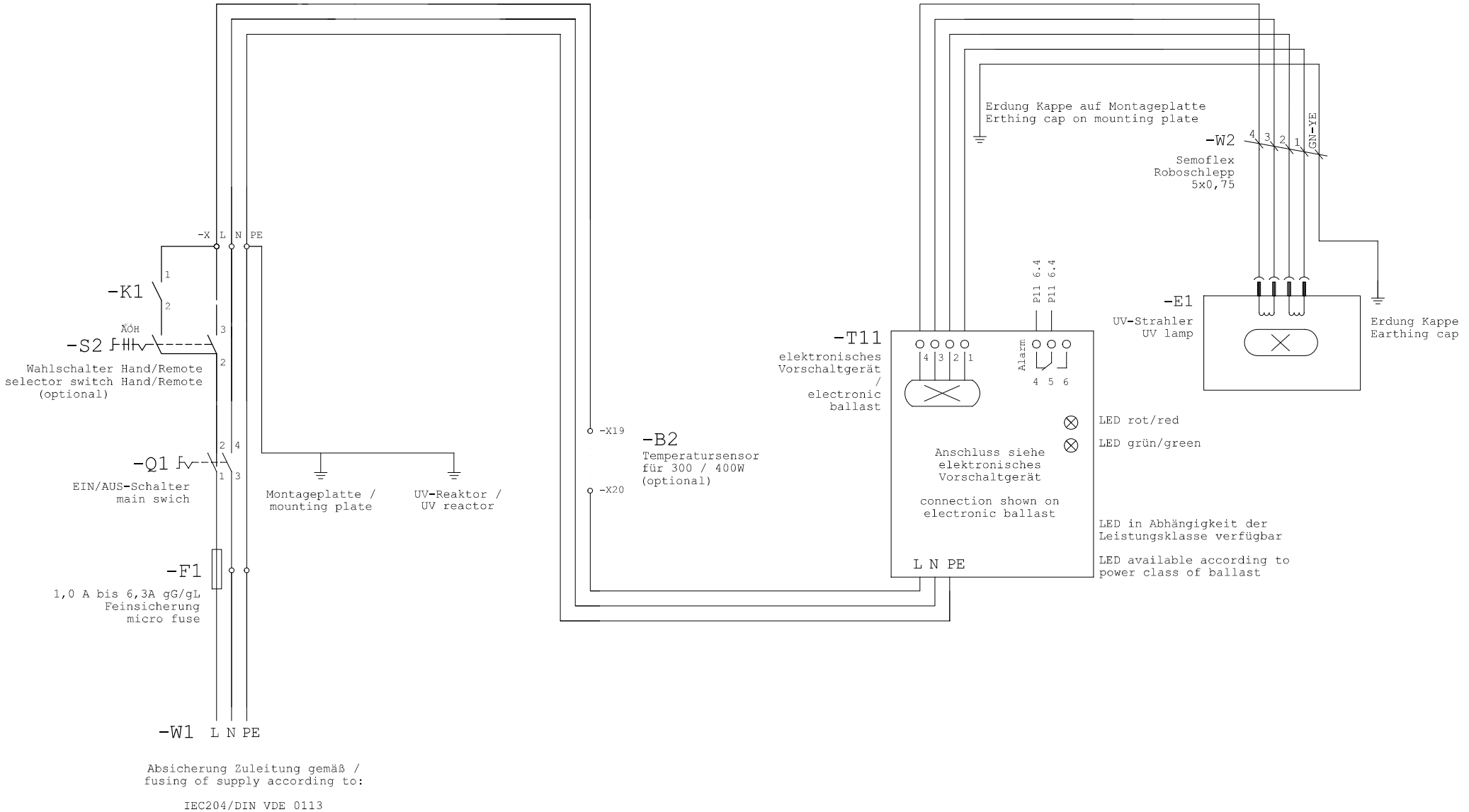
Stahlblech
Edelstahl
variable Abmessungen

Betriebsstunden- und Impulszähler

example of switchbox for UV system with 25 to 200W

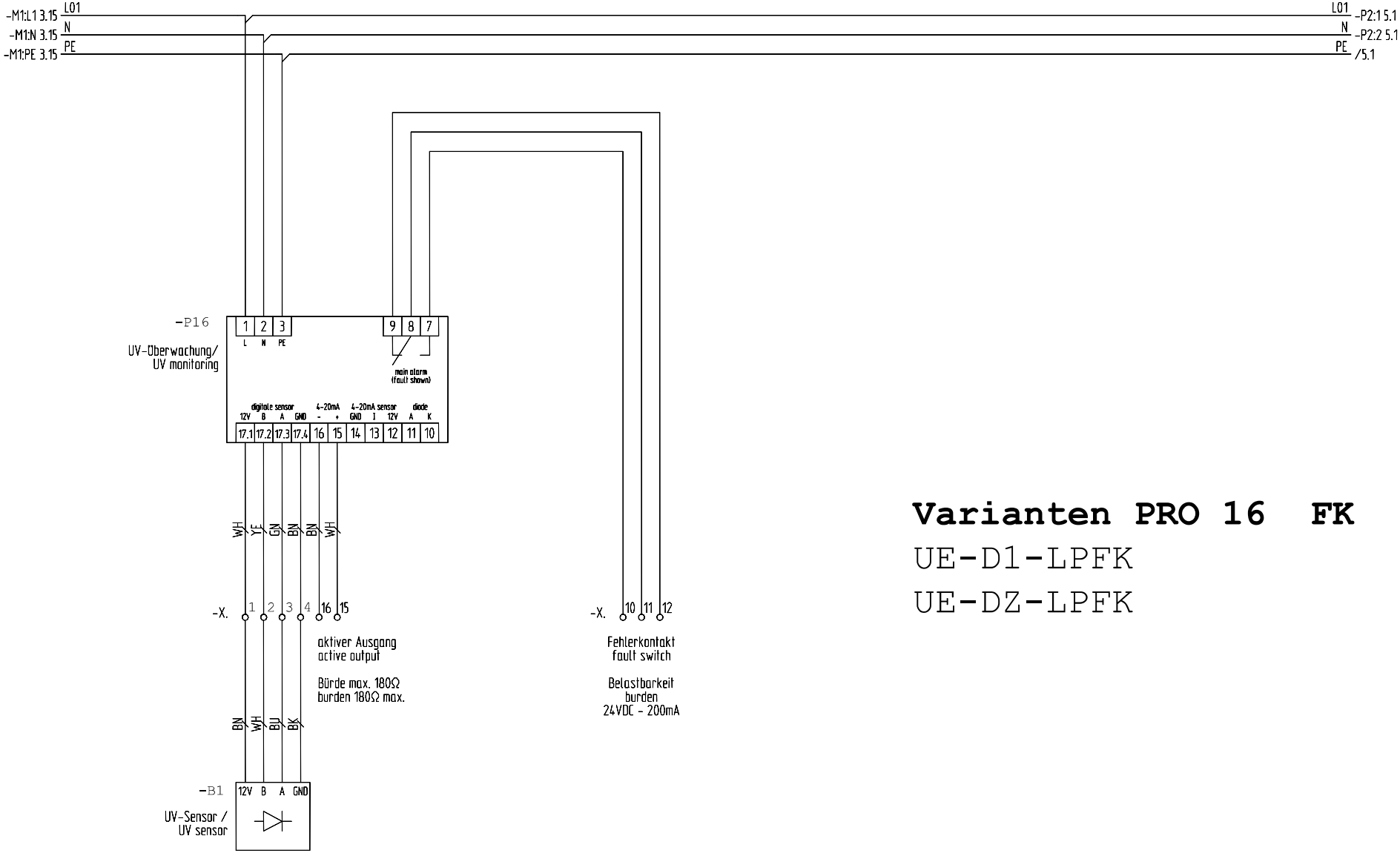
operating hours counter and impuls counter

				Datum	24.10.2022	UV-EL®	Projekt: UV system	Schaltungsunterlagen circuit documents		=	
				Bearb.						+	
				Gepr.					Projekt Nr. SB_ES_P16_P30_P11		
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Schaltplan	Zeichnung:	Bl. 2 von 7



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				Gepr.															
Zustand	Änderung	Datum	Name	Norm		Urspr.		Ers. f.	Ers. d.	Schaltplan									

Projekt Nr. SB_ES_P16_P30_P11
Zeichnung:
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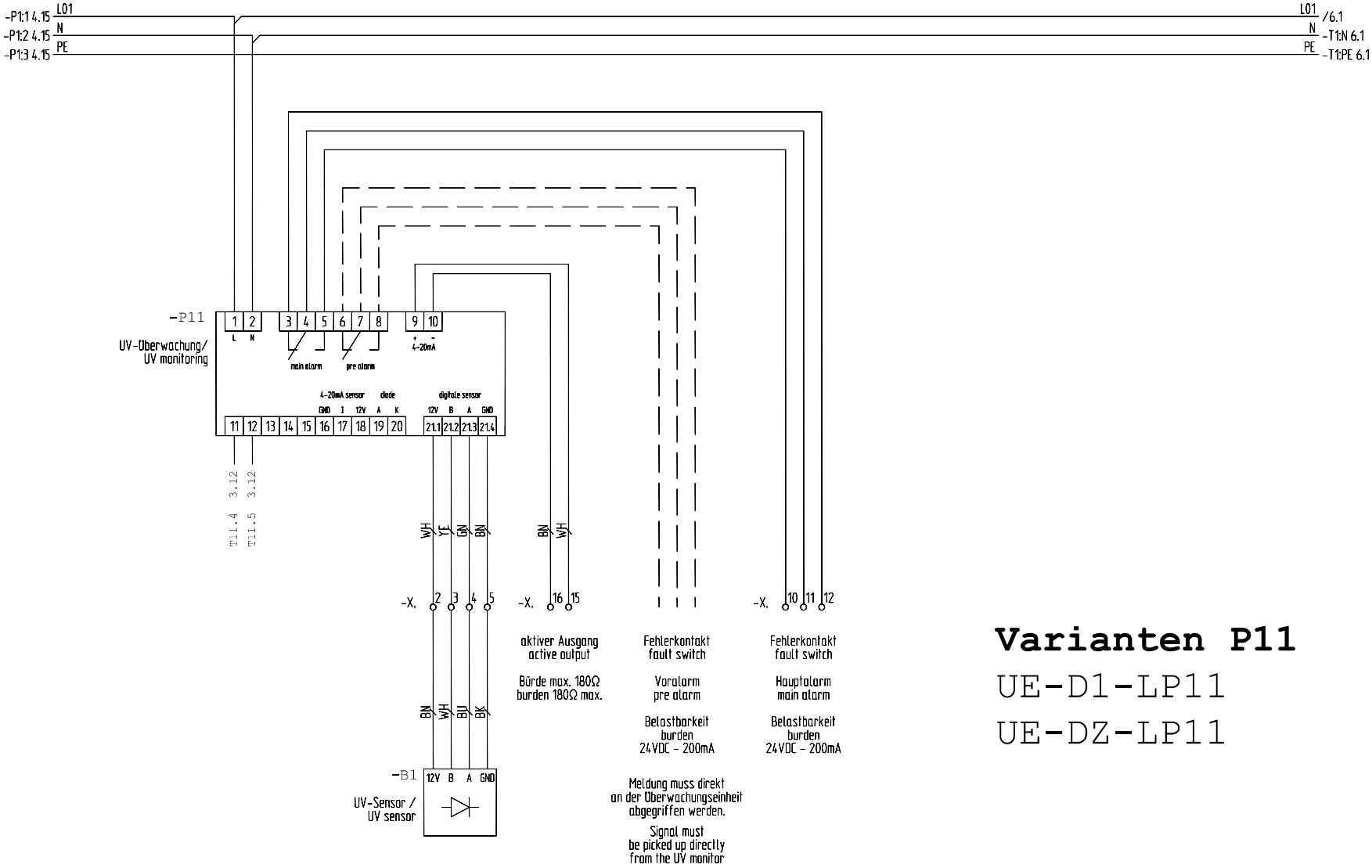


Varianten PRO 16 FK

UE-D1-LPFK

UE-DZ-LPFK

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				Bearb.						+	
				Gepr.					Projekt Nr.	SB_ES_P16_P30_P11	
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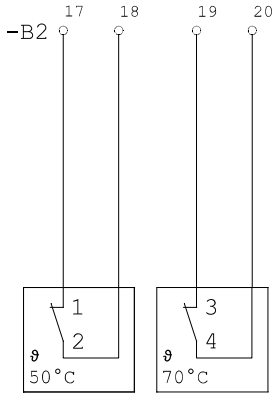
Varianten P11

UE-D1-LP11

UE-DZ-LP11

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L01 -P1:1 4.1
N -P1:2 4.1
PE -P1:3 4.1



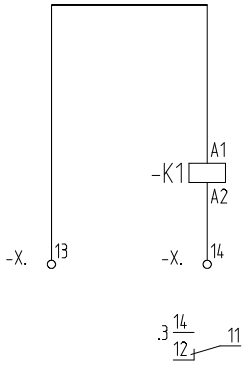
Temperatursensor
Reaktor

-NO 50°C/70°C

-NC 50°C/70°C

-optional-

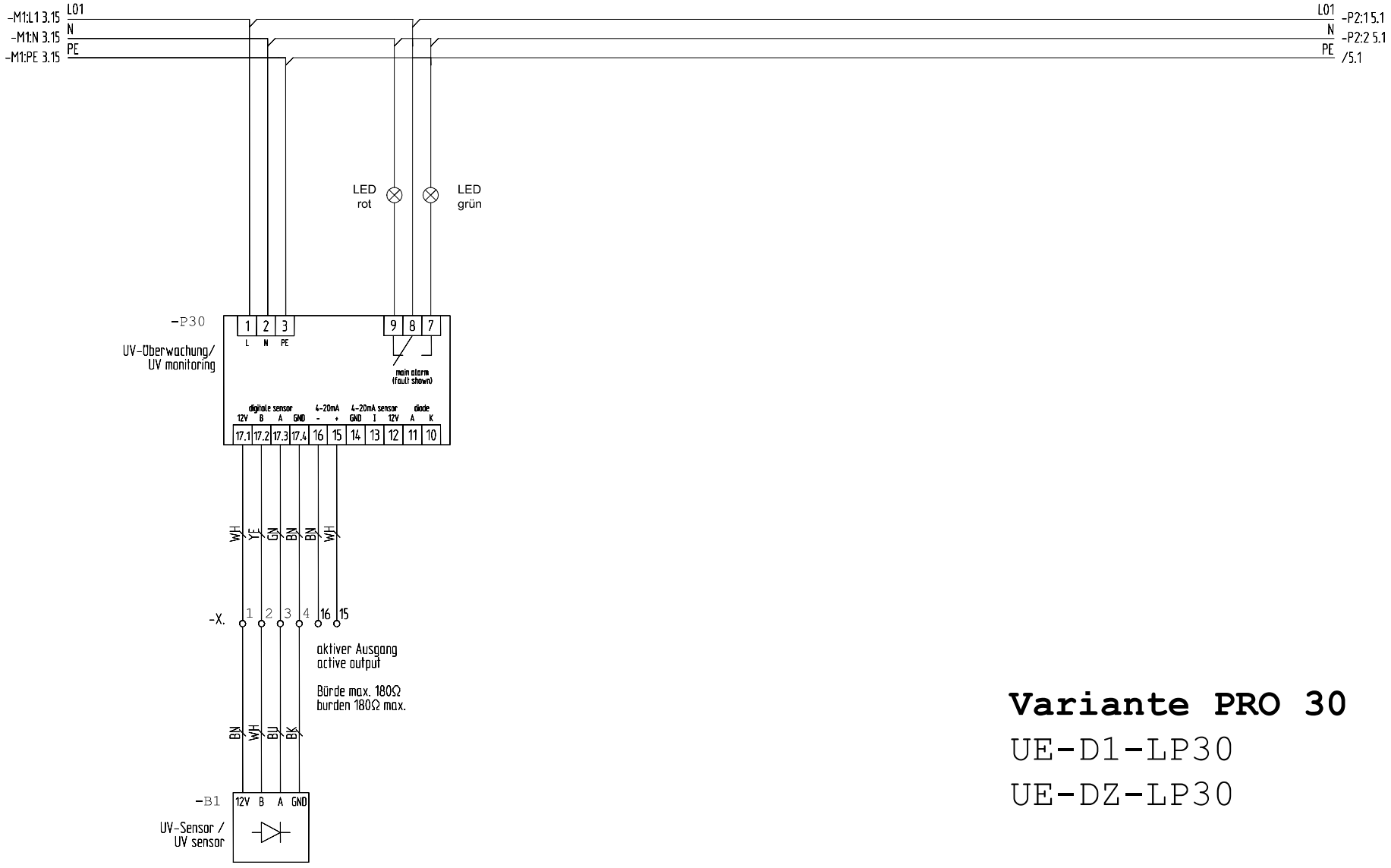
unterschiedliche
Ausführungen



FERN EIN/AUS
Kontakt potentialfrei
Versorgung: 24VDC / 230 VAC / 100mA
24VDC = ON
0V = OFF

REMOTE ON/OFF
contact potential free
supply: 24VDC / 230 VAC / 100mA
24VDC = ON
0V = OFF

| | | |



Variante PRO 30

UE-D1-LP30

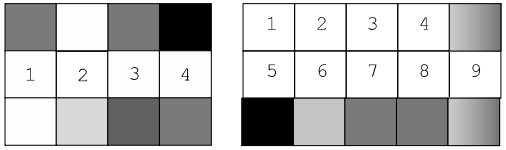
UE-DZ-LP30

F					Datum	24.10.2022	UV-EL®		Projekt: UV system	Schaltungsunterlagen circuit documents							=		F
					Bearb.													+	
					Gepr.											Projekt Nr.	SB_ES_P16_P30_P11		
	Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Schaltplan						Zeichnung:		Bl. 7 von 7	

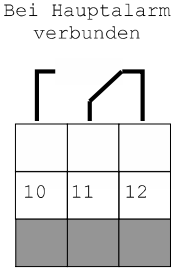
Klemmenplan

Niederdruck - Einstrahler

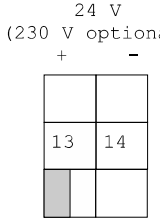
Extern
X1
Intern



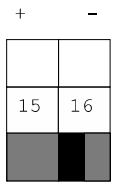
UV Sensor



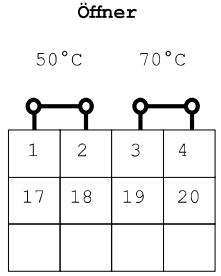
UV Hauptalarm



Fern E/A



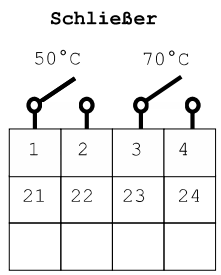
4-20mA



Vor-Alarm | Haupt-Alarm

N EVG

Reaktortemperatur



Vor-Alarm | Haupt-Alarm

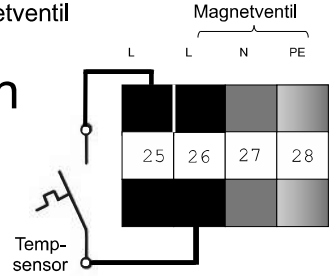
N EVG

Reaktortemperatur

250V AC / 5A

Option Temp. Sensor
Magnetventil

Extern
X1
Intern



| | | |

Betriebsanleitung / operating manual

FÜR UV-ÜBERWACHUNGSEINHEITEN -
FOR UV MONITORING UNIT

- CE-Konform / CE conformity

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D-1. WARNHINWEISE



Sicherheitshinweise



Diese Anlage arbeitet mit UV-Strahlung. Die Strahlung kann Schäden an Augen und Haut verursachen, die Anlage darf daher nur betrieben werden, wenn der Reaktormantel unversehrt ist. Niemals ungeschützt in die Strahlung blicken und die Haut nicht der Strahlung aussetzen!



Das Öffnen und Installieren des Gerätes darf nur im strom- und drucklosen Zustand erfolgen!
Der Reaktor steht unter Druck. Bei unsachgemäßer Handhabung besteht die Gefahr des Berstens des Tauchrohres und des Austrittes des Mediums aus dem Reaktor.
Vor der Reinigung, Wartung oder Austauschen von Teilen, muss das Gerät von allen Spannungsquellen getrennt werden.
Die Anlage nie im ungefüllten Zustand oder bei unterbrochenem Wasserzufluss betreiben.
Die einschlägigen Vorschriften über den Umgang mit elektrischen Geräten sind einzuhalten.



Das zu behandelnde Wasser/Abwasser kann gefährliche Inhaltsstoffe enthalten. Bitte beachten Sie die entsprechenden Handhabungs- und Sicherheitsvorschriften!



Im Betrieb kommt es zu einer Erwärmung der Komponenten und des Mediums – Betrieb nur mit Durchfluss!



Bei Verschraubungen von Edelstahl in Edelstahl (Sensor/Messfenster in Reaktor) ist die Verwendung eines geeigneten und für den Anwendungszweck zulässigen Schmiermittels erforderlich! Ansonsten kann es dazu kommen, dass sich die Verbindung nicht mehr lösen lässt.

Die Messfenster dürfen nicht im Unterdruckbereich eingesetzt werden, z.B. Saugleitungsbereich einer Pumpe, die ist auch bei der Sanitisierung bei Pharmaanlagen zu beachten.

HINWEIS

Lesen Sie die Betriebsanleitung gründlich und vor der Installation!
Keine Garantie bei falscher Betriebsweise oder falscher Bedienung!

D-2. ANWENDUNG

Die UV-Überwachungseinheit bestehend aus einem UV-Monitor, einem UV-Sensor und ggf. einem Messfenster (bei kalibriertem Sensor noch ÖNORM) ist ein abgestimmtes System zur komfortablen Überwachung der UV-Intensität von UV-Anlagen.

Der Sensor misst die Bestrahlungsstärke. Dessen Signal wird vom Monitor ausgewertet und visualisiert. Damit werden Verschmutzungen, Alterung der Strahlungsquelle und andere Veränderungen angezeigt, so dass entsprechende Gegenmaßnahmen eingeleitet werden können.

Der UV-Monitor beinhaltet als Zusatzfunktion einen digitalen Betriebsstundenzähler für den Strahler und die Gesamtstunden der UV-Anlage, sowie einen digitalen Zähler für die Einschaltvorgänge.

Neben einem UV-Hauptalarm, gibt es zusätzlich einen UV-Voralarm. Je nach Monitor können die Alarme über einen Relaiskontakt abgegriffen werden.

Alle Monitore verfügen über einen aktiven Analogausgang mit 4-20mA. Die genauen Kontakte zum Abgriff des Signals sind dem Schaltplan der jeweiligen Anlage zu entnehmen.

D-3. ÜBERSICHT UV-ÜBERWACHUNGSEINHEITEN

Je nach verbauter UV-Überwachungseinheit besteht das System aus unterschiedlichen Komponenten. Dementsprechend verfügt die Einheit über unterschiedliche Eigenschaften. Die nachfolgende Tabelle zeigt einen Überblick der UV-Überwachungseinheiten und deren einzelner Komponenten.

Bezeichnung	UE-D1-LPFK	UE-DZ-LPFK	UE-D1-LP11	UE-DZ-LP11
Monitor	 Bedienung an Front-seite	 Bedienung an Frontseite	 Bedienung an Front-seite	 Bedienung an Frontseite
UV-Sensor	 ¼“ Einschraubgewinde ohne Messfenster	 Kalibrierter Sensor nach ÖNORM mit Messfenster	 ¼“ Einschraub-gewinde ohne Messfenster	 Kalibrierter Sensor nach ÖNORM mit Messfenster

Bezeichnung	UE-D1-LP30	UE-DZ-LP30
Monitor	 Bedienung im Schalt-kasten	 Bedienung im Schaltkasten
UV-Sensor	 ¼“ Einschraub-gewinde ohne Messfenster	 Kalibrierter Sensor nach ÖNORM mit Messfenster

D-4. BEDIENUNG DER UV-ÜBERWACHUNG

Nach Zuschalten der Netzversorgung erfolgt der Funktionstest des UV-Monitors. Danach geht das Gerät selbständig in die Normalfunktion über, sofern keine Verzögerungszeit eingestellt ist (siehe Monitormenü).

Nach Ablauf der Verzögerung beginnt die UV-Messung. Kurz nach dem Einschalten ist die UV-Emission des Strahlers noch gering, es findet ein Einbrennvorgang statt, der einige Minuten dauern kann. Die UV-Emission des Strahlers steigt auf den Nennwert (abh. von Strahleralter, Verschmutzung Anlage,…). Der vom Sensor gemessene Wert ist der, der unter den gegebenen Bedingungen (Verschmutzungsgrad Tauchrohr/Quarzfenster) an der Reaktorwand eintrifft.

Mit sinkender Intensität werden bei Unterschreitung der eingestellten Alarmschwelle erst der Voralarm (sofern eingestellt, Display gelb blinkend, ggf. Relaiskontakt) und später der Hauptalarm ausgelöst (Display rot/ Relaiskontakt schaltet).

In Zeile 1 des Displays wird die aktuelle UV-Intensität angezeigt. Die Betriebsstunden werden in Zeile 2 des Displays permanent dargestellt. Zur Anzeige der Schaltvorgänge ist im Menü der entsprechende Punkt auszuwählen. Liegt ein Fehler an, so wird dieser im Wechsel mit der Standardanzeige dargestellt. Das Display hat dann eine andere Hintergrundfarbe.

Die Überwachungseinheit ist durch einen 4-stelligen Code gegen Manipulationen geschützt. Dieser kann durch den autorisierten Bediener frei gewählt werden (bei Auslieferung „**0602**“).

Die Monitore verfügen über eine im Menü eingestellte Haupt-Alarmschwelle die an die gewählte UV-Bestrahlungsstärke gebunden ist. Diese schaltet den Relaiskontakt – WECHSLER, potenzialfrei. Voreingestellt ist diejenige Bestrahlungsstärke ab der eine ausreichende Bestrahlung nicht mehr gewährleistet ist – in [%] bezogen auf den 100%-Wert der UV-Intensität bei Inbetriebnahme.

Über den Relaiskontakt kann eine Alarmmeldung abgegriffen werden (Hupe, Leuchtmelder am Schaltschrank bzw. in ein Prozessleitsystem). Für den Störmeldekontakt gelten folgende Belastungsgrenzen: **50 - 500mA bei 5 - 60VDC**

Weitere technische Angaben sind dem Schaltplan der jeweiligen Anlage zu entnehmen.

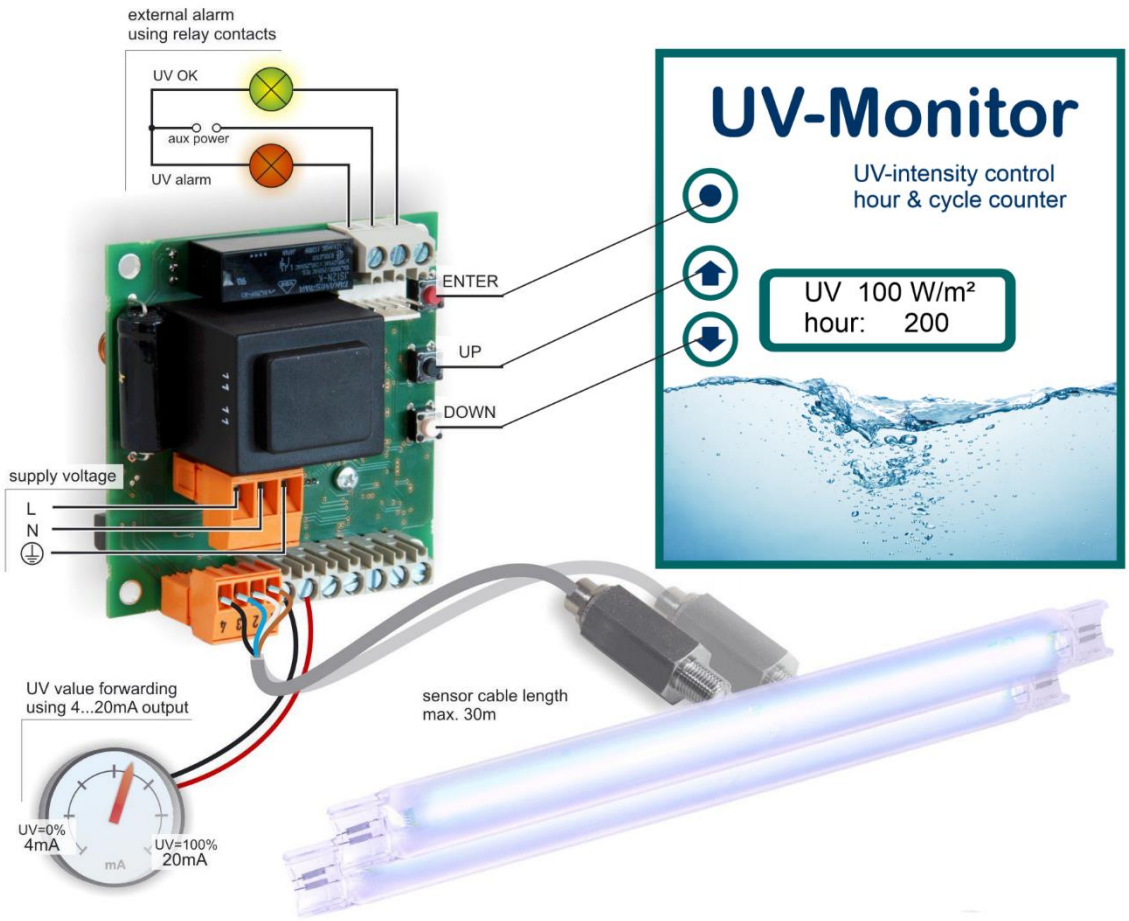
Alle Monitore verfügen über einen aktiven Analogausgang mit **4-20mA** und einer maximalen Bürde von **180 Ω**.

Die genauen Kontakte zum Abgriff des Signals sind dem Schaltplan der jeweiligen Anlage zu entnehmen.

Für die Nutzung des Signals, ist ein geeigneter Signalaufnehmer in Abhängigkeit der jeweils übergeordneten Steuerung zu verwenden.

D-4.1 UE-D1-LPFK

Prinzipdarstellung:



Bedienung:

Zugriff über das Menü erhält man über die drei Tasten auf der Frontseite des Monitors. Der Monitor muss dazu eingeschaltet sein. Wird der Taster ⊙ für mindestens 3 Sekunden gedrückt, erscheint der erste Menüpunkt.

Funktion der Taster:

- ⊙ - Aktivieren des Menüs / nächster Menüpunkt / geänderten Wert bestätigen
- ▲ - Wert erhöhen, Optionswahl
- ▼ - Wert vermindern, Optionswahl

Menüpunkte:

Die Menüpunkte des Monitors sind fortlaufend. Durch drücken des Tasters gelangt man zum nächsten Punkt und kann diesen mit dem oder Taster ändern. Änderungen werden erst nach Durchlaufen des letzten Menüpunktes gespeichert.

Bei einer Wartezeit von >20 s erfolgt eine Umschaltung in den Betriebsmodus. Änderungen (Werte) werden nicht gespeichert. Änderungen treten erst in Kraft, wenn das Menü nach dem Durchlaufen aller Punkte beendet wurde (Display: „config o.k.“)

Nummer	Menüpunkt/Anzeige	Beschreibung
1	Freigabe 0000	Eingabe des Zugriffscodes **0602** mittels oder Taster. Um in das weitere Menü zu gelangen ist die Eingabe mit zu bestätigen.
2	Messpause	Bei JA wird das aktuell anliegende Sensorsignal eingefroren. Fehlermeldungen werden nicht ausgelöst. Sensor kann zur Überprüfung demontiert werden.
3	Sprache	Deutsch oder Englisch
4	Zeit	Zeit + Datum Damit die Betriebsstunden gezählt werden, müssen die aktuelle Zeit und das aktuelle Datum eingestellt sein.
5	Freigabe ändern	Ändern des Zugriffscodes (Voreinstellung **0602**) Bei Einstellung eines Codes, unbedingt sicher-stellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!
6	Ein-Anzahl	Zählung der Einschaltvorgänge
7	Anlaufzeit	Verzögerung der Alarme nach Einschalten (Voreinstellung 5 Sek.)
8	Kontrast	Display-Einstellung
9	Nutzer-h	Entspricht der Laufzeit des UV-Strahlers / **muss nach Strahlerwechsel rückgesetzt werden um die Fehlermeldung zu löschen.** Dazu diesen Punkt aufrufen und mit / Taster auf JA umstellen und mit bestätigen.
10	Gesamt-h	Gesamtbetriebsstunden UV-Anlage/Monitor
11	Lampentausch	Einstellung Lampenlebensdauer (siehe Datenblatt – nach Ablauf der eingestellten Stunden wird ein Alarm am Relaiskontakt und im Display auf Zeile 2 ausgelöst)

12	Eingang	„digital“ anwählen
12.1	Digital-Eingang	
12.2	Anzahl Sensoren	„**1**“ auswählen (an einem Monitor können bis 2 Sensoren angeschlossen werden)
12.3	Sensor ID	AUTOMATISCH: Beim Anschluss von nur einem Sensor wird dessen ID-Nummer automatisch erkannt. MANUELL: Falls die automatische Erkennung nicht funktioniert oder 2 Sensoren angeschlossen sind, ist die ID-Kennnummer des Sensors einzugeben. Die Nummer befindet sich auf dem Sensor.
12.4	Sensortyp	Nur bei Sensor-ID MANUELL nötig: Sensortyp D-SiC einstellen, sonst Fehlmessungen und Fehleralarme
12.5	Maßeinheit	Einheit: [%] oder [W/m²] – **%** durch Hersteller voreingestellt
12.6	100 %-Wert	Zum Abgleich des Analogausganges und der Anzeige – siehe „Abgleich UV-Monitor bei Inbetriebnahme/Strahlerwechsel“
13	Hauptalarm	Unterer Grenzwert der Bestrahlungsstärke in %, bezieht sich auf den 100 % Wert (Punkt 12.6), im Fehlerfall ist Display rot hinterlegt, der Relaiskontakt für Hauptalarm schaltet (siehe Stromlaufplan). Die UV-Intensität ist nicht mehr ausreichend um den Zweck der Anlage zu erfüllen!
14	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
15	Voralarm	Alarmstufe zur Vorwarnung (Wert frei wählbar), im Fehlerfall blinkt Display gelb
16	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
17	Konfig schreiben	Speicherung aller Einstellungen Wird dieser Punkt nicht durchlaufen, gehen alle Einstellungen verloren.

Damit die Zählung der Betriebsstunden erfolgt, ist unbedingt die Uhrzeit einzustellen. Die Uhr ist für eine Laufzeit von 8 Jahren ausgelegt (Batterie!).

Wird der UV-Sensor getauscht, muss das Menu des Monitors einmal vollständig durchlaufen werden. Erst während der Meldung „Konfig Schreiben!“ wird die ID des Sensors eingelesen.

Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Her-steller freigeschaltet werden!

Abgleich des UV-Monitors bei Inbetriebnahme/Strahlerwechsel:

Um eine korrekte Anzeige der UV-Intensität zu erhalten, die Grenzwerte zu fixieren sowie den Analogausgang einzustellen, muss das UV-Messsystem an die örtlichen Gegebenheiten angepasst werden. Dazu wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu den Punkt „100%-Wert“ aufrufen und den Wert „automatisch“ abrufen - aktueller UV-Wert wird nun angezeigt
- Mit dem Taster ⦿bis Punkt „Config schreiben“

Funktioniert der automatische Abruf nicht, wie folgt vorgehen:

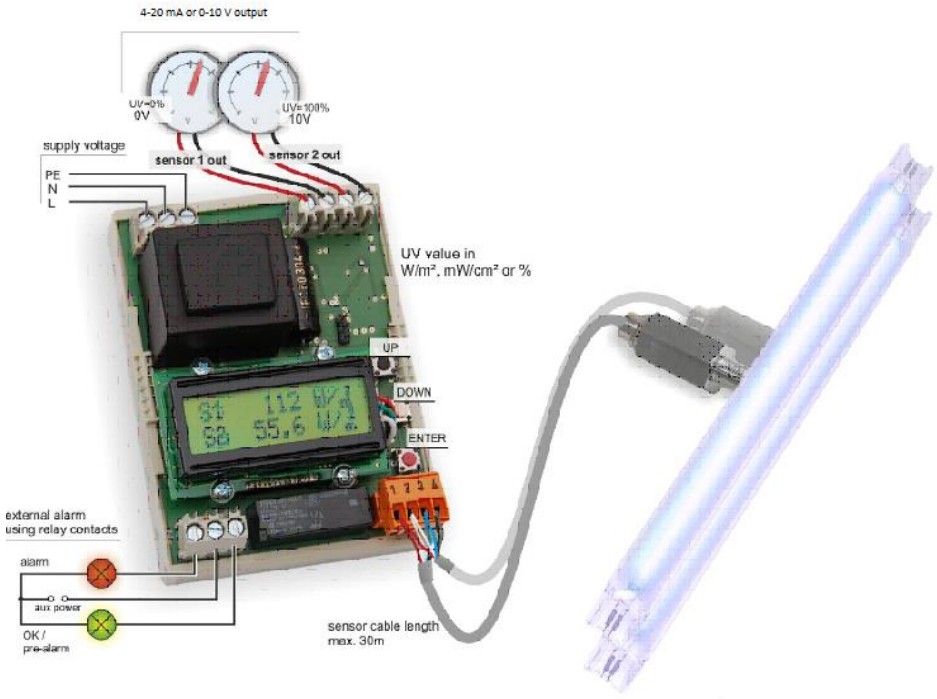
- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu unter Punkt „Maßeinheit“ auf [W/m²] umstellen
- mit Taster ⦿bis Punkt „Config schreiben“
- angezeigten Messwert ablesen und notieren
- im Monitormenu unter Punkt „100% Wert“ den notierten Wert eintragen
- „Maßeinheit“ auf [%] umstellen
- Mit Taster ⦿ bis Punkt „Config schreiben“

Auf dem Display werden 100 % angezeigt, der Analogausgang gibt nun 20 mA aus. Die Alarme werden nun korrekt ausgelöst. Nach einem Strahlerwechsel wird der Ursprungswert wieder gemessen, sofern die Bedingungen (Reinigungszustand, Transmission) noch den Vorgaben entsprechen. Ist dies nicht der Fall, muss die Anlage gereinigt werden und der Abgleich wiederholt werden.

Die Strahler unterliegen Fertigungstoleranzen, die sich auf deren Emission auswirken. Dies kann ebenfalls zu Abweichungen im Vergleich zur Inbetriebnahme führen.

D-4.2 UE-D1-LP30

Prinzipdarstellung:



Bedienung:

Zugriff über das Menü erhält man über die drei Taster an der Frontseite des Monitors. Der Monitor muss dazu eingeschaltet sein. Wird der **rote Taster** für mindestens 3 Sekunden gedrückt, erscheint der erste Menüpunkt.

Funktion der Taster:

ROT	-	Aktivieren des Menüs / nächster Menüpunkt / geänderten Wert bestätigen
SCHWARZ	-	Wert erhöhen, Optionswahl
WEISS	-	Wert vermindern, Optionswahl

Menüpunkte:

Die Menüpunkte des Monitors sind fortlaufend. Durch Drücken des roten Tasters gelangt man zum nächsten Punkt und kann diesen mit dem schwarzen und weißen Taster ändern. Änderungen werden erst nach Durchlaufen des letzten Menüpunktes gespeichert.

Bei einer Wartezeit von >20 s erfolgt eine Umschaltung in den Betriebsmodus. Änderungen (Werte) werden nicht gespeichert. Änderungen treten erst in Kraft, wenn das Menü nach dem Durchlaufen aller Punkte beendet wurde (Display: „config o.k.“)

Nummer	Menüpunkt/Anzeige	Beschreibung
1	Freigabe 0000	Eingabe des Zugriffscodes **0602** mittels schwarzem und weißen Taster. Um in das weitere Menü zu gelangen ist die Eingabe mit Rot zu bestätigen.
2	Messpause	Bei JA wird das aktuell anliegende Sensorsignal eingefroren. Fehlermeldungen werden nicht ausgelöst. Sensor kann zur Überprüfung demontiert werden.
3	Sprache	Deutsch oder Englisch
4	Zeit	Zeit + Datum Damit die Betriebsstunden gezählt werden, müssen die aktuelle Zeit und das aktuelle Datum eingestellt sein.
5	Freigabe ändern	Ändern des Zugriffscodes (Voreinstellung **0602**) Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!
6	Ein-Anzahl	Zählung der Einschaltvorgänge
7	Anlaufzeit	Verzögerung der Alarme nach Einschalten (Voreinstellung 5 Sek.)
8	Kontrast	Display-Einstellung
9	Nutzer-h	Entspricht der Laufzeit des UV-Strahlers / **muss nach Strahlerwechsel rückgesetzt werden um die Fehlermeldung zu löschen.** Dazu diesen Punkt aufrufen und mit schwarzem/weißem Taster auf JA umstellen und mit Rot bestätigen.
10	Gesamt-h	Gesamtbetriebsstunden UV-Anlage/Monitor
11	Lampentausch	Einstellung Lampenlebensdauer (siehe Datenblatt – nach Ablauf der eingestellten Stunden wird ein Alarm am Relaiskontakt und im Display auf Zeile 2 ausgelöst)
12	Eingang	„digital“ anwählen
12.1	Digital-Eingang	
12.2	Anzahl Sensoren	„**1**“ auswählen (an einem Monitor können bis 2 Sensoren angeschlossen werden)
12.3	Sensor ID	AUTOMATISCH: Beim Anschluss von nur einem Sensor wird dessen ID-Nummer automatisch erkannt. MANUELL: Falls die automatische Erkennung nicht funktioniert oder 2 Sensoren angeschlossen

		sind, ist die ID-Kennnummer des Sensors einzugeben. Die Nummer befindet sich auf dem Sensor.
12.4	Sensortyp	Nur bei Sensor-ID MANUELL nötig: Sensortyp D-SiC einstellen, sonst Fehlmessungen und Fehleralarme
12.5	Maßeinheit	Einheit: [%] oder [W/m²] – **%** durch Hersteller voreingestellt
12.6	100 %-Wert	Zum Abgleich des Analogausganges und der Anzeige – siehe „Abgleich UV-Monitor bei Inbe-triebnahme/Strahlerwechsel“
13	Hauptalarm	Unterer Grenzwert der Bestrahlungsstärke in %, bezieht sich auf den 100 % Wert (Punkt 12.6), im Fehlerfall ist Display rot hinterlegt, der Relaiskontakt für Hauptalarm schaltet (siehe Stromlaufplan). Die UV-Intensität ist nicht mehr ausreichend um den Zweck der Anlage zu erfüllen!
14	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
15	Voralarm	Alarmstufe zur Vorwarnung (Wert frei wählbar), im Fehlerfall blinkt Display gelb
16	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
17	Konfig schreiben	Speicherung aller Einstellungen Wird dieser Punkt nicht durchlaufen, gehen alle Einstellungen verloren.

Damit die Zählung der Betriebsstunden erfolgt, ist unbedingt die Uhrzeit einzustellen. Die Uhr ist für eine Laufzeit von 8 Jahren ausgelegt (Batterie!).

Wird der UV-Sensor getauscht, muss das Menu des Monitors einmal vollständig durchlaufen werden. Erst während der Meldung „Konfig Schreiben!“ wird die ID des Sensors eingelesen.

Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!

Abgleich des UV-Monitors bei Inbetriebnahme/Strahlerwechsel:

Um eine korrekte Anzeige der UV-Intensität zu erhalten, die Grenzwerte zu fixieren sowie den Analogausgang einzustellen, muss das UV-Messsystem an die örtlichen Gegebenheiten angepasst werden. Dazu wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu den Punkt „100%-Wert“ aufrufen und den Wert „automatisch“ abrufen - aktueller UV-Wert wird nun angezeigt
- Mit roten Taster bis Punkt „Config schreiben“

Funktioniert der automatische Abruf nicht, wie folgt vorgehen:

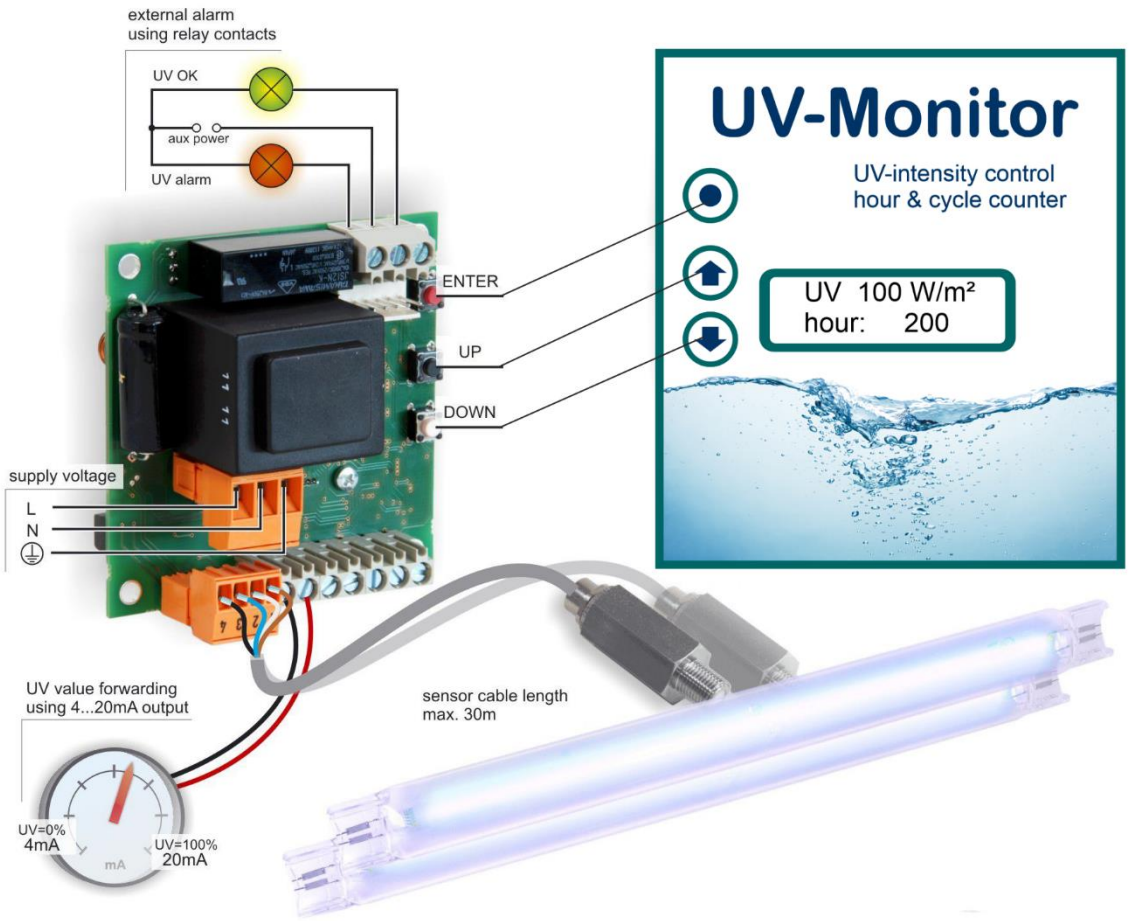
- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu unter Punkt „Maßeinheit“ auf [W/m²] umstellen
- mit rotem Taster bis Punkt „Config schreiben“
- angezeigten Messwert ablesen und notieren
- im Monitormenu unter Punkt „100% Wert“ den notierten Wert eintragen
- „Maßeinheit“ auf [%] umstellen
- Mit roten Taster bis Punkt „Config schreiben“

Auf dem Display werden 100 % angezeigt, der Analogausgang gibt nun 20 mA aus. Die Alarme werden nun korrekt ausgelöst. Nach einem Strahlerwechsel wird der Ursprungswert wieder gemessen, sofern die Bedingungen (Reinigungszustand, Transmission) noch den Vorgaben entsprechen. Ist dies nicht der Fall, muss die Anlage gereinigt werden und der Abgleich wiederholt werden.

Die Strahler unterliegen Fertigungstoleranzen, die sich auf deren Emission auswirken. Dies kann ebenfalls zu Abweichungen im Vergleich zur Inbetriebnahme führen.

D-4.3 UE-DZ-LPFK

Prinzipdarstellung:



Bedienung:

Zugriff über das Menü erhält man über die drei Taster an der Frrontseite des Monitors. Der Monitor muss dazu eingeschaltet sein. Wird der Taster ⊙ für mindestens 3 Sekunden gedrückt, erscheint der erste Menüpunkt.

Funktion der Taster:

- ⊙ - Aktivieren des Menüs / nächster Menüpunkt / geänderten Wert bestätigen
- ▲ - Wert erhöhen, Optionswahl
- ▼ - Wert vermindern, Optionswahl

Menüpunkte:

Die Menüpunkte des Monitors sind fortlaufend. Durch drücken des Tasters gelangt man zum nächsten Punkt und kann diesen mit dem oder Taster ändern. Änderungen werden erst nach Durchlaufen des letzten Menüpunktes gespeichert.

Bei einer Wartezeit von >20 s erfolgt eine Umschaltung in den Betriebsmodus. Änderungen (Werte) werden nicht gespeichert. Änderungen treten erst in Kraft, wenn das Menü nach dem Durchlaufen aller Punkte beendet wurde (Display: „config o.k.“)

Nummer	Menüpunkt/Anzeige	Beschreibung
1	Freigabe 0000	Eingabe des Zugriffscodes **0602** mittels oder Taster. Um in das weitere Menü zu gelangen ist die Eingabe mit zu bestätigen.
2	Messpause	Bei JA wird das aktuell anliegende Sensorsignal eingefroren. Fehlermeldungen werden nicht ausgelöst. Sensor kann zur Überprüfung demontiert werden.
3	Sprache	Deutsch oder Englisch
4	Zeit	Zeit + Datum Damit die Betriebsstunden gezählt werden, müssen die aktuelle Zeit und das aktuelle Datum eingestellt sein.
5	Freigabe ändern	Ändern des Zugriffscodes (Voreinstellung **0602**) Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!
6	Ein-Anzahl	Zählung der Einschaltvorgänge
7	Anlaufzeit	Verzögerung der Alarme nach Einschalten (Voreinstellung 5 Sek.)
8	Kontrast	Display-Einstellung
9	Nutzer-h	Entspricht der Laufzeit des UV-Strahlers / **muss nach Strahlerwechsel rückgesetzt werden um die Fehlermeldung zu löschen.** Dazu diesen Punkt aufrufen und mit / Taster auf JA umstellen und mit bestätigen.
10	Gesamt-h	Gesamtbetriebsstunden UV-Anlage/Monitor
11	Lampentausch	Einstellung Lampenlebensdauer (siehe Datenblatt – nach Ablauf der eingestellten Stunden wird

		ein Alarm am Relaiskontakt und im Display auf Zeile 2 ausgelöst)
12	Eingang	„digital“ anwählen
12.1	Digital-Eingang	
12.2	Anzahl Sensoren	„**1**“ auswählen (an einem Monitor können bis 2 Sensoren angeschlossen werden)
12.3	Sensor ID	AUTOMATISCH: Beim Anschluss von nur einem Sensor wird dessen ID-Nummer automatisch erkannt. MANUELL: Falls die automatische Erkennung nicht funktioniert oder 2 Sensoren angeschlossen sind, ist die ID-Kennnummer des Sensors einzugeben. Die Nummer befindet sich auf dem Sensor.
12.4	Sensortyp	Nur bei Sensor-ID MANUELL nötig: Sensortyp D-SiC einstellen, sonst Fehlmessungen und Fehleralarme
12.5	Maßeinheit	Einheit: [%] oder [W/m²] – **W/m²** durch Hersteller voreingestellt
12.6	100 %-Wert	Zum Abgleich des Analogausganges und der Anzeige – siehe „Abgleich UV-Monitor bei Inbetriebnahme/Strahlerwechsel“
13	Hauptalarm	Unterer Grenzwert der Bestrahlungsstärke in %, bezieht sich auf den 100 % Wert (Punkt 12.6), im Fehlerfall ist Display rot hinterlegt, der Relaiskontakt für Hauptalarm schaltet (siehe Stromlaufplan). Die UV-Intensität ist nicht mehr ausreichend um den Zweck der Anlage zu erfüllen!
14	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
15	Voralarm	Alarmstufe zur Vorwarnung (Wert frei wählbar), im Fehlerfall blinkt Display gelb
16	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
17	Konfig schreiben	Speicherung aller Einstellungen Wird dieser Punkt nicht durchlaufen, gehen alle Einstellungen verloren.

Damit die Zählung der Betriebsstunden erfolgt, ist unbedingt die Uhrzeit einzustellen. Die Uhr ist für eine Laufzeit von 8 Jahren ausgelegt (Batterie!).

Wird der UV-Sensor getauscht, muss das Menu des Monitors einmal vollständig durchlaufen werden. Erst während der Meldung „Konfig Schreiben!“ wird die ID des Sensors eingelesen.

Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Her-steller freigeschaltet werden!

Abgleich des UV-Monitors bei Inbetriebnahme/Strahlerwechsel:

Um eine korrekte Anzeige der UV-Intensität zu erhalten, die Grenzwerte zu fixieren, sowie den Analogausgang einzustellen, muss das UV-Messsystem an die örtlichen Gegebenheiten angepasst werden. Dazu wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu den Punkt „100%-Wert“ aufrufen und den Wert „automatisch“ abrufen - aktueller UV-Wert wird nun angezeigt
- Mit Taster bis Punkt „Config schreiben“

Funktioniert der automatische Abruf nicht, wie folgt vorgehen:

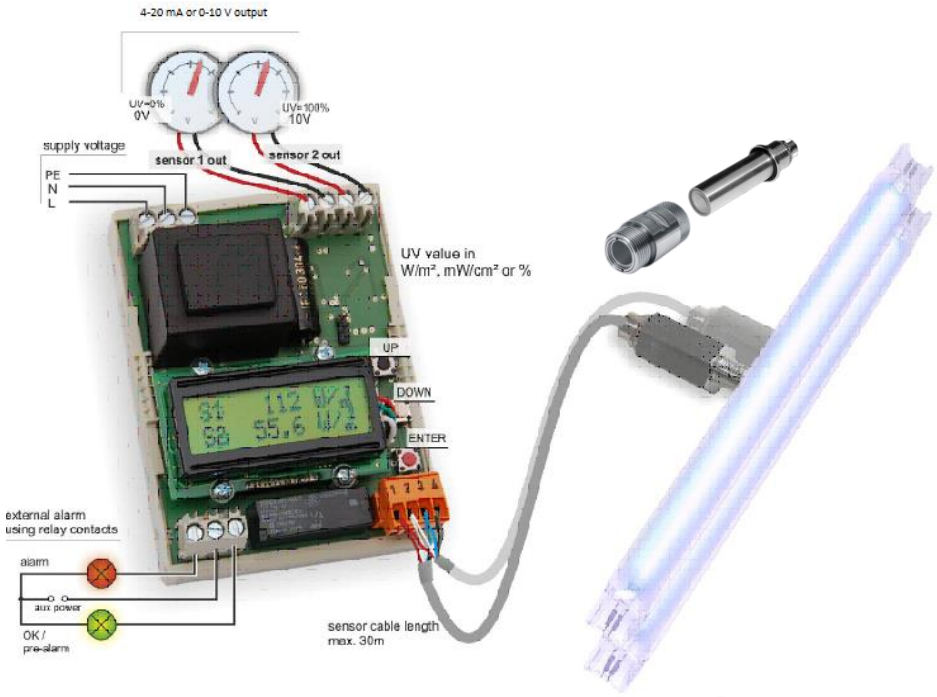
- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- angezeigten Messwert ablesen und notieren
- im Monitormenu unter Punkt „100% Wert“ den notierten Wert eintragen
- Mit Taster bis Punkt „Config schreiben“

Der Analogausgang gibt nun 20 mA aus. Die Alarme werden nun korrekt ausgelöst. Nach einem Strahlerwechsel wird der Ursprungswert wieder gemessen, sofern die Bedingungen (Reinigungszustand, Transmission) noch den Vorgaben entsprechen. Ist dies nicht der Fall, muss die Anlage gereinigt werden und der Abgleich wiederholt werden.

Die Strahler unterliegen Fertigungstoleranzen, die sich auf deren Emission auswirken. Dies kann ebenfalls zu Abweichungen im Vergleich zur Inbetriebnahme führen.

D-4.4 UE-DZ-LP30

Prinzipdarstellung:



Bedienung:

Zugriff über das Menü erhält man über die drei Taster an der Front des Monitors. Der Monitor muss dazu eingeschaltet sein. Wird der rote Taster für mindestens 3 Sekunden gedrückt, erscheint der erste Menüpunkt.

Funktion der Taster:

ROT	-	Aktivieren des Menüs / nächster Menüpunkt / geänderten Wert bestätigen
SCHWARZ	-	Wert erhöhen, Optionswahl
WEISS	-	Wert vermindern, Optionswahl

Menüpunkte:

Die Menüpunkte des Monitors sind fortlaufend. Durch drücken des **roten Tasters** gelangt man zum nächsten Punkt und kann diesen mit dem schwarzen und weißen Taster ändern. Änderungen werden erst nach Durchlaufen des letzten Menüpunktes gespeichert.

Bei einer Wartezeit von >20 s erfolgt eine Umschaltung in den Betriebsmodus. Änderungen (Werte) werden nicht gespeichert. Änderungen treten erst in Kraft, wenn das Menü nach dem Durchlaufen aller Punkte beendet wurde (Display: „config o.k.“)

Nummer	Menüpunkt/Anzeige	Beschreibung
1	Freigabe 0000	Eingabe des Zugriffscodes **0602** mittels schwarzem und weißen Taster. Um in das weitere Menü zu gelangen ist die Eingabe mit Rot zu bestätigen.
2	Messpause	Bei JA wird das aktuell anliegende Sensorsignal eingefroren. Fehlermeldungen werden nicht ausgelöst. Sensor kann zur Überprüfung demontiert werden.
3	Sprache	Deutsch oder Englisch
4	Zeit	Zeit + Datum Damit die Betriebsstunden gezählt werden, müssen die aktuelle Zeit und das aktuelle Datum eingestellt sein.
5	Freigabe ändern	Ändern des Zugriffscodes (Voreinstellung **0602**) Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!
6	Ein-Anzahl	Zählung der Einschaltvorgänge
7	Anlaufzeit	Verzögerung der Alarme nach Einschalten (Voreinstellung 5 Sek.)
8	Kontrast	Display-Einstellung
9	Nutzer-h	Entspricht der Laufzeit des UV-Strahlers / **muss nach Strahlerwechsel rückgesetzt werden um die Fehlermeldung zu löschen.** Dazu diesen Punkt aufrufen und mit schwarzem/weißem Taster auf JA umstellen und mit Rot bestätigen.
10	Gesamt-h	Gesamtbetriebsstunden UV-Anlage/Monitor
11	Lampentausch	Einstellung Lampenlebensdauer (siehe Datenblatt – nach Ablauf der eingestellten Stunden wird ein Alarm am Relaiskontakt und im Display auf Zeile 2 ausgelöst)
12	Eingang	„digital“ anwählen
12.1	Digital-Eingang	
12.2	Anzahl Sensoren	„**1**“ auswählen (an einem Monitor können bis 2 Sensoren angeschlossen werden)
12.3	Sensor ID	AUTOMATISCH: Beim Anschluss von nur einem Sensor wird dessen ID-Nummer automatisch erkannt. MANUELL: Falls die automatische Erkennung nicht funktioniert oder 2 Sensoren angeschlossen

		sind, ist die ID-Kennnummer des Sensors einzugeben. Die Nummer befindet sich auf dem Sensor.
12.4	Sensortyp	Nur bei Sensor-ID MANUELL nötig: Sensortyp D-SiC einstellen, sonst Fehlmessungen und Fehleralarme
12.5	Maßeinheit	Einheit: [%] oder [W/m²] – **W/m²** durch Hersteller voreingestellt
12.6	100 %-Wert	Zum Abgleich des Analogausganges und der Anzeige – siehe „Abgleich UV-Monitor bei Inbe-triebnahme/Strahlerwechsel“
13	Hauptalarm	Unterer Grenzwert der Bestrahlungsstärke in %, bezieht sich auf den 100 % Wert (Punkt 12.6), im Fehlerfall ist Display rot hinterlegt, der Relaiskontakt für Hauptalarm schaltet (siehe Stromlaufplan). Die UV-Intensität ist nicht mehr ausreichend um den Zweck der Anlage zu erfüllen!
14	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
15	Voralarm	Alarmstufe zur Vorwarnung (Wert frei wählbar), im Fehlerfall blinkt Display gelb
16	Verzögerungszeit Alarm	Unterdrückt den Alarm während der eingestellten Zeit. Einstellbar zw. 0 und 600 Sekunden.
17	Konfig schreiben	Speicherung aller Einstellungen Wird dieser Punkt nicht durchlaufen, gehen alle Einstellungen verloren.

Damit die Zählung der Betriebsstunden erfolgt, ist unbedingt die Uhrzeit einzustellen. Die Uhr ist für eine Laufzeit von 8 Jahren ausgelegt (Batterie!).

Wird der UV-Sensor getauscht, muss das Menu des Monitors einmal vollständig durchlaufen werden. Erst während der Meldung „Konfig Schreiben!“ wird die ID des Sensors eingelesen.

Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Her-steller freigeschaltet werden!

Abgleich des UV-Monitors bei Inbetriebnahme/Strahlerwechsel:

Um eine korrekte Anzeige der UV-Intensität zu erhalten, die Grenzwerte zu fixieren, sowie den Analogausgang einzustellen, muss das UV-Messsystem an die örtlichen Gegebenheiten angepasst werden. Dazu wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)

- Im Monitormenu den Punkt „100%-Wert“ aufrufen und den Wert „automatisch“ abrufen - aktueller UV-Wert wird nun angezeigt
- Mit roten Taster bis Punkt „Config schreiben“

Funktioniert der automatische Abruf nicht, wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- angezeigten Messwert ablesen und notieren
- im Monitormenu unter Punkt „100% Wert“ den notierten Wert eintragen
- Mit roten Taster bis Punkt „Config schreiben“

Der Analogausgang gibt nun 20 mA aus. Die Alarme werden nun korrekt ausgelöst. Nach einem Strahlerwechsel wird der Ursprungswert wieder gemessen, sofern die Bedingungen (Reinigungszustand, Transmission) noch den Vorgaben entsprechen. Ist dies nicht der Fall, muss die Anlage gereinigt werden und der Abgleich wiederholt werden.

Die Strahler unterliegen Fertigungstoleranzen, die sich auf deren Emission auswirken. Dies kann ebenfalls zu Abweichungen im Vergleich zur Inbetriebnahme führen.

D-4.5 UE-D1-LP11

Bedienung:

Zugriff über das Menü erhält man über die drei Taster an der Front des Monitors. Der Monitor muss dazu eingeschaltet sein. Ein Öffnen der Schaltschranktür ist nicht notwendig. Wird der Enter-Taster für mindestens 3 Sekunden gedrückt, erscheint der erste Menüpunkt.

Funktion der Taster:

ENTER	-	Aktivieren des Menüs / nächster Menüpunkt / geänderten Wert bestätigen
AUF	-	Wert erhöhen, Optionswahl
AB	-	Wert vermindern, Optionswahl

Menüpunkte:

Die Menüpunkte des Monitors sind fortlaufend. Durch drücken des Enter-Tasters gelangt man zum nächsten Punkt und kann diesen mit dem Auf- und Ab-Taster ändern. Änderungen werden erst nach Durchlaufen des letzten Menüpunktes gespeichert.

Bei einer Wartezeit von >20 s erfolgt eine Umschaltung in den Betriebsmodus. Änderungen (Werte) werden nicht gespeichert. Änderungen treten erst in Kraft, wenn das Menü nach dem Durchlaufen aller Punkte beendet wurde (Display: „config o.k.“)

Nummer	Menüpunkt/Anzeige	Beschreibung
1	Freigabe 0000	Eingabe des Zugriffscodes **0602** mittels Auf- und Ab-Taster. Um in das weitere Menü zu gelangen ist die Eingabe mit Enter zu bestätigen.
2	Messpause	Bei JA wird das aktuell anliegende Sensorsignal eingefroren. Fehlermeldungen werden nicht ausgelöst. Sensor kann zur Überprüfung demontiert werden.
3	Sprache	Deutsch oder Englisch
4	Zeit	Zeit + Datum Damit die Betriebsstunden gezählt werden, müssen die aktuelle Zeit und das aktuelle Datum eingestellt sein.
5	Freigabe ändern	Ändern des Zugriffscodes (Voreinstellung **0602**) Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!
6	Ein-Anzahl	Zählung der Einschaltvorgänge
7	Anlaufzeit	Verzögerung der Alarme nach Einschalten (Voreinstellung 5 Sek.)
8	Kontrast	Display-Einstellung
9	Nutzer-h	Entspricht der Laufzeit des UV-Strahlers / **muss nach Strahlerwechsel rückgesetzt werden um die Fehlermeldung zu löschen.** Dazu diesen Punkt aufrufen und mit Auf- und Ab-Taster auf JA umstellen und mit Enter bestätigen.
10	Gesamt-h	Gesamtbetriebsstunden UV-Anlage/Monitor
11	Lampentausch	Einstellung Lampenlebensdauer (siehe Datenblatt h – nach Ablauf der eingestellten Stunden wird ein Alarm am Relaiskontakt und im Display auf Zeile 2 ausgelöst)
12	Eingang	„digital“ anwählen
12.1	Digital-Eingang	
12.2	Anzahl Sensoren	„**1**“ auswählen (an einem Monitor können bis 2 Sensoren angeschlossen werden)

12.3	Sensor ID	AUTOMATISCH: Beim Anschluss von nur einem Sensor wird dessen ID-Nummer automatisch erkannt. MANUELL: Falls die automatische Erkennung nicht funktioniert oder 2 Sensoren angeschlossen sind, ist die ID-Kennnummer des Sensors einzugeben. Die Nummer befindet sich auf dem Sensor.
12.4	Sensortyp	Nur bei Sensor-ID MANUELL nötig: Sensortyp D-SiC einstellen, sonst Fehlmessungen und Fehlalarme
12.5	Maßeinheit	Einheit: [%] oder [W/m²] – **%** durch Hersteller voreingestellt
12.6	100 %-Wert	Zum Abgleich des Analogausganges und der Anzeige – siehe „Abgleich UV-Monitor bei Inbe-triebnahme/Strahlerwechsel“
13	Hauptalarm	Unterer Grenzwert der Bestrahlungsstärke in %, bezieht sich auf den 100 % Wert (Punkt 12.6), im Fehlerfall ist Display rot hinterlegt, der Relaiskontakt für Hauptalarm schaltet (siehe Stromlaufplan). Die UV-Intensität ist nicht mehr ausreichend um den Zweck der Anlage zu erfüllen!
14	Voralarm	Alarmstufe zur Vorwarnung (Wert frei wählbar), im Fehlerfall blinkt Display gelb
15	Konfig schreiben	Speicherung aller Einstellungen Wird dieser Punkt nicht durchlaufen, gehen alle Einstellungen verloren.

Damit die Zählung der Betriebsstunden erfolgt, ist unbedingt die Uhrzeit einzustellen. Die Uhr ist für eine Laufzeit von 8 Jahren ausgelegt (Batterie!).

Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Her-steller freigeschaltet werden!

Abgleich des UV-Monitors bei Inbetriebnahme/Strahlerwechsel:

Um eine korrekte Anzeige der UV-Intensität zu erhalten, die Grenzwerte zu fixieren, sowie den Analogausgang einzustellen, muss das UV-Messsystem an die örtlichen Gegebenheiten angepasst werden. Dazu wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu den Punkt „100%-Wert“ aufrufen und den Wert „automatisch“ abrufen - aktueller UV-Wert wird nun angezeigt
- Mit Taster Enter bis Punkt „Config schreiben“

Funktioniert der automatische Abruf nicht, wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu unter Punkt „Maßeinheit“ auf [W/m²] umstellen
- mit Enter-Taster bis Punkt „Config schreiben“
- angezeigten Messwert ablesen und notieren
- im Monitormenu unter Punkt „100% Wert“ den notierten Wert eintragen
- „Maßeinheit“ auf [%] umstellen
- Mit Enter-Taster bis Punkt „Config schreiben“

Auf dem Display werden 100% angezeigt, der Analogausgang gibt nun 20 mA aus. Die Alarme werden nun korrekt ausgelöst. Nach einem Strahlerwechsel wird der Ursprungswert wieder gemessen, sofern die Bedingungen (Reinigungszustand, Transmission) noch den Vorgaben entsprechen. Ist dies nicht der Fall, muss die Anlage gereinigt werden und der Abgleich wiederholt werden.

Die Strahler unterliegen Fertigungstoleranzen, die sich auf deren Emission auswirken. Dies kann ebenfalls zu Abweichungen im Vergleich zur Inbetriebnahme führen.

D-4.6 UE-DZ-LP11

Bedienung:

Zugriff über das Menü erhält man über die drei Taster an der Front des Monitors. Der Monitor muss dazu eingeschaltet sein. Ein Öffnen der Schaltschranktür ist nicht notwendig. Wird der Enter-Taster für mindestens 3 Sekunden gedrückt, erscheint der erste Menüpunkt.

Funktion der Taster:

ENTER	-	Aktivieren des Menüs / nächster Menüpunkt / geänderten Wert bestätigen
AUF	-	Wert erhöhen, Optionswahl
AB	-	Wert vermindern, Optionswahl

Menüpunkte:

Die Menüpunkte des Monitors sind fortlaufend. Durch drücken des Enter-Tasters gelangt man zum nächsten Punkt und kann diesen mit dem Auf- und Ab-Taster ändern. Änderungen werden erst nach Durchlaufen des letzten Menüpunktes gespeichert.

Bei einer Wartezeit von >20 s erfolgt eine Umschaltung in den Betriebsmodus. Änderungen (Werte) werden nicht gespeichert. Änderungen treten erst in Kraft, wenn das Menü nach dem Durchlaufen aller Punkte beendet wurde (Display: „config o.k.“)

Nummer	Menüpunkt/Anzeige	Beschreibung
1	Freigabe 0000	Eingabe des Zugriffscodes **0602** mittels Auf- und Ab-Taster. Um in das weitere Menü zu gelangen ist die Eingabe mit Enter zu bestätigen.
2	Messpause	Bei JA wird das aktuell anliegende Sensorsignal eingefroren. Fehlermeldungen werden nicht ausgelöst. Sensor kann zur Überprüfung demontiert werden.
3	Sprache	Deutsch oder Englisch
4	Zeit	Zeit + Datum Damit die Betriebsstunden gezählt werden, müssen die aktuelle Zeit und das aktuelle Datum eingestellt sein.
5	Freigabe ändern	Ändern des Zugriffscodes (Voreinstellung **0602**) Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Hersteller freigeschaltet werden!
6	Ein-Anzahl	Zählung der Einschaltvorgänge
7	Anlaufzeit	Verzögerung der Alarme nach Einschalten (Voreinstellung 5 Sek.)
8	Kontrast	Display-Einstellung
9	Nutzer-h	Entspricht der Laufzeit des UV-Strahlers / **muss nach Strahlerwechsel rückgesetzt werden um die Fehlermeldung zu löschen.** Dazu diesen Punkt aufrufen und mit Auf- und Ab-Taster auf JA umstellen und mit Enter bestätigen.
10	Gesamt-h	Gesamtbetriebsstunden UV-Anlage/Monitor
11	Lampentausch	Einstellung Lampenlebensdauer (siehe Datenblatt – nach Ablauf der eingestellten Stunden wird ein Alarm am Relaiskontakt und im Display auf Zeile 2 ausgelöst)
12	Eingang	„digital“ anwählen
12.1	Digital-Eingang	
12.2	Anzahl Sensoren	„**1**“ auswählen (an einem Monitor können bis 2 Sensoren angeschlossen werden)

12.3	Sensor ID	AUTOMATISCH: Beim Anschluss von nur einem Sensor wird dessen ID-Nummer automatisch erkannt. MANUELL: Falls die automatische Erkennung nicht funktioniert oder 2 Sensoren angeschlossen sind, ist die ID-Kennnummer des Sensors einzugeben. Die Nummer befindet sich auf dem Sensor.
12.4	Sensortyp	Nur bei Sensor-ID MANUELL nötig: Sensortyp D-SiC einstellen, sonst Fehlmessungen und Fehlalarme
12.5	Maßeinheit	Einheit: [%] oder [W/m²] – **W/m²** durch Hersteller voreingestellt
12.6	100 %-Wert	Zum Abgleich des Analogausganges und der Anzeige – siehe „Abgleich UV-Monitor bei Inbe-triebnahme/Strahlerwechsel“
13	Hauptalarm	Unterer Grenzwert der Bestrahlungsstärke in %, bezieht sich auf den 100 % Wert (Punkt 12.6), im Fehlerfall ist Display rot hinterlegt, der Relaiskontakt für Hauptalarm schaltet (siehe Stromlaufplan). Die UV-Intensität ist nicht mehr ausreichend um den Zweck der Anlage zu erfüllen!
14	Voralarm	Alarmstufe zur Vorwarnung (Wert frei wählbar), im Fehlerfall blinkt Display gelb
15	Konfig schreiben	Speicherung aller Einstellungen Wird dieser Punkt nicht durchlaufen, gehen alle Einstellungen verloren.

Damit die Zählung der Betriebsstunden erfolgt, ist unbedingt die Uhrzeit einzustellen. Die Uhr ist für eine Laufzeit von 8 Jahren ausgelegt (Batterie!).

Bei Einstellung eines Codes, unbedingt sicherstellen, dass dieser jederzeit verfügbar ist. Bei Vergessen des Codes muss der Monitor kostenpflichtig beim Her-steller freigeschaltet werden!

Abgleich des UV-Monitors bei Inbetriebnahme/Strahlerwechsel:

Um eine korrekte Anzeige der UV-Intensität zu erhalten, die Grenzwerte zu fixieren, sowie den Analogausgang einzustellen, muss das UV-Messsystem an die örtlichen Gegebenheiten angepasst werden. Dazu wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- Im Monitormenu den Punkt „100%-Wert“ aufrufen und den Wert „automatisch“ abrufen - aktueller UV-Wert wird nun angezeigt
- Mit roten Taster bis Punkt „Config schreiben“

Funktioniert der automatische Abruf nicht, wie folgt vorgehen:

- UV-Strahler einschalten und einbrennen lassen (bis Wert stabil)
- angezeigten Messwert ablesen und notieren
- im Monitormenu unter Punkt „100% Wert“ den notierten Wert eintragen
- Mit Enter-Taster bis Punkt „Config schreiben“

Der Analogausgang gibt nun 20 mA aus. Die Alarme werden nun korrekt ausgelöst. Nach einem Strahlerwechsel wird der Ursprungswert wieder gemessen, sofern die Bedingungen (Reinigungszustand, Transmission) noch den Vorgaben entsprechen. Ist dies nicht der Fall, muss die Anlage gereinigt werden und der Abgleich wiederholt werden.

Die Strahler unterliegen Fertigungstoleranzen, die sich auf deren Emission auswirken. Dies kann ebenfalls zu Abweichungen im Vergleich zur Inbetriebnahme führen.

D-5. FEHLERAUSWERTUNG

Neben den Fehlermeldungen im Display stehen dem Nutzer je nach Überwachungseinheit verschiedene Relaiskontakte zur Nutzung für eine übergeordnete Steuerung zur Verfügung. Diese können an der Klemmleiste (siehe Schaltplan) abgegriffen werden.

Alarmmeldung	**Information**
UV-Voralarm	Tritt auf bei Unterschreitung des eingestellten Grenzwertes. Der Grenzwert sollte kundenseitig definiert werden und über dem Hauptalarm liegen. Im Fehlerfall blinkt das Display gelb und das Relais für den Voralarm schaltet - wenn vorhanden (siehe Schaltplan).
UV-Hauptalarm	Erscheint bei Unterschreitung der minimal benötigten Bestrahlungsstärke zur Desinfektion. (Grenzwert voreingestellt, darf nicht verändert werden!) Im Fehlerfall ist das Display rot und das Relais für den Hauptalarm schaltet.
Lampe NEU!	Strahler hat eingestellte Betriebsstundenzahl überschritten. Strahler muss getauscht werden und „Nutzer-h“ muss zurückgesetzt werden um Fehler zu löschen. Im Fehlerfall schaltet das Relais für den Hauptalarm.

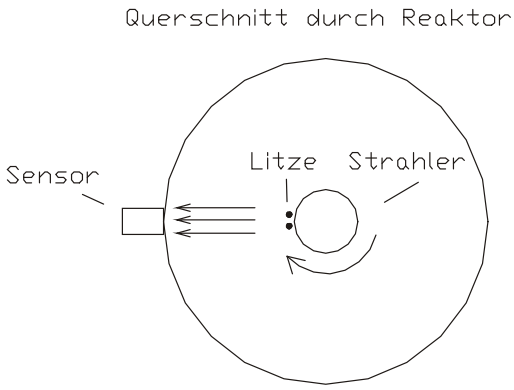
Analogausgang	**Information**
4-20 mA, aktiv, 180 Ω	Ausgabe eines 4-20mA-Signals entsprechend der gemessenen UV-Bestrahlungsstärke: - 4 mA = 0 W/m² bzw. 0% - 20 mA = eingetragener „100%-Wert“



Wird eine Fehlermeldung ausgelöst, so schalten die Relais (siehe Schaltplan). Über den Relaiskontakt werden keine direkten Fehlermeldungen bezüglich der abgelaufenen Lebensdauer des Strahlers oder von fehlerhaften elektronischen Bauteilen ausgegeben. Diese Fehlerbilder sind im Hauptalarm enthalten.

D-5.1 Mögliche Ursachen für einen Voralarm

- Transmissionswerte entsprechen nicht den Auslegungsgrößen
- Einbrennvorgang nach Einschalten noch nicht abgeschlossen
- Verschmutzung des Quarzes am Sensor/Messfenster (Anlage reinigen)
- Verschmutzung des Tauchrohres (Anlage reinigen)
- Strahler hat das Ende seiner Lebensdauer erreicht (siehe Datenblatt)
- Litze des Strahlers liegt zwischen Sensor und Strahler (Strahler um Längsachse verdrehen (vgl. Skizze))



D-5.2 Mögliche Ursachen für einen Hauptalarm

- Siehe Voralarm
- UV-Anlage nicht eingeschaltet (Prüfen der Netzzuleitung, Schalter)
- Strahler defekt oder am Ende seiner Lebensdauer (Strahlerwechsel)
- Elektronisches Vorschaltgerät defekt (Wechsel des Vorschaltgerätes)
- Sensor defekt oder falsch angeschlossen (Tausch des Sensors, Kontrolle der Anschlüsse)
- Monitor defekt (Tausch des Monitors und Neueinstellung der Parameter)
- Strahler hat die eingestellten Betriebsstunden überschritten (Strahlertausch und „Nutzer-h“ zurücksetzen)

D-6. ANLAGEN

- Technisches Datenblatt
- Ersatzteilliste

E-1. WARNINGS



Safety notices



This facility works with UV radiation. Radiation may harm eyes and skin; hence, the facility must only be operated if the reactor shell is undamaged. Do not look into the radiation unprotected and do not expose skin to radiation!



Open and install the device only with power OFF and in its non-pressurised state! The reactor is pressurised. If handled inappropriately, there is the risk for the quartz tube to burst and the medium may leak from the reactor.
Prior to cleaning, maintenance or the replacement of parts, the device must be disconnected from all sources of power supply.
Do not operate the facility in a condition when it is not filled with water or when water supply is interrupted.
Respectively applicable regulations for the handling of electrical devices must be observed.



The water to be treated/waste water may contain hazardous substances. Please follow the respective handling and safety regulations!



During operation, components and the medium will heat up. Use it only in flowing operation!



Bolting stainless steel into stainless steel (sensor / measurement window in reactor) requires the use of an appropriate and approved lubricant. Otherwise it may happen that the connection can no longer be solved.

HINT

Read this operation manual carefully and before installation!

No warranty in case of wrong operation mode or incorrect use!

E-2. USAGE

The UV monitoring unit consists of an UV monitor, an UV sensor and optionally a measurement window (if a calibrated sensor is used). It is an aligned system for a comfortable measuring of the UV intensity at UV systems.

The sensor measures the UV irradiance. This signal is evaluated and displayed by the monitor. So pollution, aging of the UV lamp and other changes can be noticed.

Additionally the monitor has the features counting operation hours from the lamp and the UV system, and counting of switching cycles.

The monitor has an UV main alarm and an UV pre alarm. Depending on the monitor, the alarms can be picked up via a relay contact.

All monitors have an analogues output signal from 4-20mA. The clamps for the connection can find in the circuit documents.

E-3. OVERVIEW UV MONITORING UNITS

Depending on the used UV monitoring unit, the system consists of different parts. So the units have different features. The table below provides an overview of the UV monitoring units and the different components.

description	UE-D1-LPFK	UE-DZ-LPFK	UE-D1-LP11	UE-DZ-LP11
monitor	 Buttons on the front side	 Buttons on the front side	 Buttons on the front side	 Buttons on the front side
UV sensor	 ¼“ thread without measurement window	 Calibrated sensor according ÖNORM with measurement window	 ¼“ thread without measurement window	 Calibrated sensor according ÖNORM with measurement window

Bezeichnung	UE-D1-LP30	UE-DZ-LP30
monitor	 Botton inside	 Botton inside
UV sensor	 ¼“ thread without measurement window	 Calibrated sensor according ÖNORM with measurement window

E-4. HANDLING OF THE UV MONITORING UNIT

After switch ON the system, the monitor completes a self test. Then the monitor automatically goes into the normal function, if no delay time is set (see menu of the monitor).

The UV monitor starts measuring the UV intensity. Immediately after switching ON, the UV emission of the lamp is still low. There is a warm-up process that may take a few minutes. In this time the UV intensity increases to nominal value (depending on aging). The measured value represents the UV intensity at the reactor wall (depending on pollution and UV transmission).

When UV intensity decreases falling below the defined threshold level, a pre-alarm will be triggered first (if adjusted, display blinks yellow, if applicable a relay contact switches), subsequently followed by the main alarm (display is red / relay switches).

In the first line of the display the UV intensity is shown. The operating hours are shown at line 2. To see the switch cycles you have to look in the menu of the monitor. In case of a failure, a message is shown in the display and the colour of the display is changed.

The Monitor can be protected against manipulation. Choose menu item 4, to change the lock-code (default **“0602”).**

The UV monitors have an UV main alarm, which belongs to the UV intensity. The threshold switches the relay contact - changer, potential free. The main alarm is this value, where the UV intensity is too low for a correct function of the UV system – the threshold [%] accords to the 100% value of the UV intensity at start up.

The relay contact can be used for a process control system, indication light or a horn. The burden of the contacts: **50 - 500mA at 5 - 60VDC.**

Further technical details can be found in the circuit documents of the UV system.

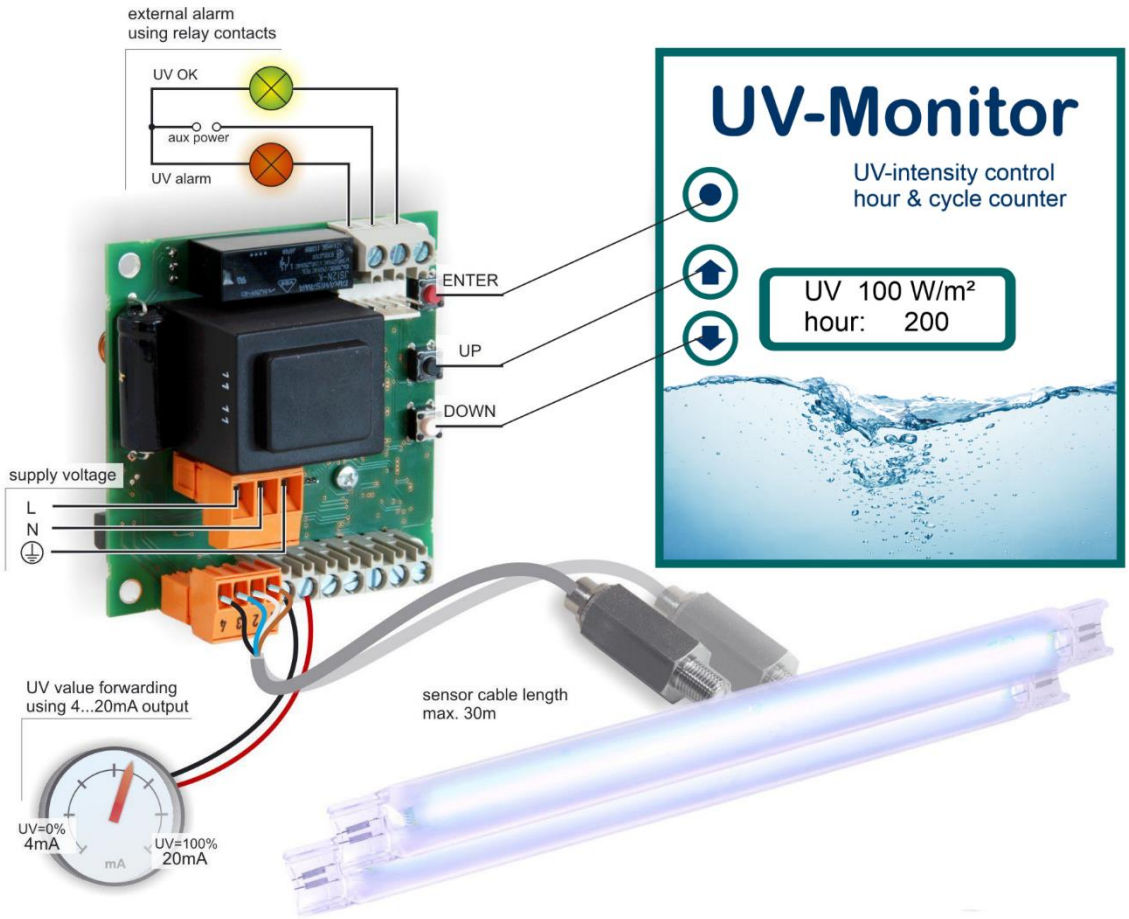
All monitors have an active analogues output **4-20mA**. The burden is maximum **180 Ω**.

More technical details can be found in the circuit documents of the UV system.

If using the analogous signal for a superior control, use an applicable reading recorder.

E-4.1 UE-D1-LPFK

Principle illustration:



Handling:

Access on the menu is achieved with three buttons at the front side of the monitor. The Monitor has to be switched on. If the ⦿ button is pressed for 3 seconds, the first menu point appears.

Function of the buttons:

⦿ - enter menu / select next item / accept changed parameter

🔼 - value increase / change option

🔽 - value decrease / change option

Menu points:

The menu of the monitor is continuous. By pressing the ⊙ button of the monitor the next point appears. The point can be changed through pressing the ⊙ or ⊙ button. Settings will be saved after reaching the last menu point.

☞ Is the attendance time > 20 s the monitor switches into the operation mode. Modifications (parameters) will not be saved. Modifications come into force at a complete pass-through and termination of the menu (display: „config o.k.“).

number	Menu point / display	description
1	lock code 0000	Enter the lock code (‘**0602**’ at delivery) with ⊙ and ⊙ buttons. Confirmation with ⊙. Next menu point appears.
2	freeze	If „YES“ is chosen, the value is freeze. Alarms will not release. Sensor can be dismounted for inspection.
3	language	German or English
4	time	Time + date If time and date are not adjusted, the operating hours will not count.
5	change lock code	Lock code can be changed (‘0602’ at delivery). In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!
6	Switch cycles	Counting of switching cycles
7	start up time	Delay in switching of the alarms (default 5 sec.)
8	contrast	Display-settings
9	user counter	Complies with the runtime of the UV lamp. Set to zero after change the UV lamp to delete the shown failure. For set to zero: go to this menu point and press the ⊙/⊙ button. YES appears. Confirm with ⊙.
10	abs. counter	Total operation hours of the UV system.
11	lamp	Lamp lifetime (see datasheet – after these operation hours a failure appears at display and relay contact – change lamp!)

12	Input	chose „digital“
12.1	digital input	
12.2	number of sensors	„**1**“ (at one monitor can be connected two sensors)
12.3	sensor ID	AUTOMATICALLY: If a digital sensor is connected, the system finds the ID by itself. MANUAL: If the automatically indication does not work or 2 sensors are connected, enter the ID number of the UV sensor manual. The ID is written on the body of the sensor.
12.4	sensortype	Necessary if the sensor ID is adjusted manual. Choose D-SiC, otherwise failure of measurement and alarms can happen.
12.5	Scale unit	Unit: [%] or [W/m²] – default **[%]**
12.6	100 % value	For setting the analogues output and the display – see: „Adjustment of the UV monitor after Start-up/ replacement UV lamp“
13	main alarm	Lower limit of the irradiance in %, refers to the 100 % value (point 12.6), in case of failure the display is red and the relay contact is switched (see circuit diagram) The UV intensity is too low for a correct function of the UV system.
14	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
15	pre alarm	Threshold for pre alarm (value can be chosen by customer); in case of failure the display blinks yellow.
16	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
17	config write	Safe all settings If you don’t reach this point all done settings will not be saved!



For counting the operation hours synchronize watch time. The battery (watch) has a life time of 8 years.



If the UV sensor is changed, you have to go through the whole menu of the UV monitoring. After passing the point “config write!” the ID of the UV sensor is implemented in to the software and the system works.



In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!

Adjustment of the UV monitor after Start-up / replacement UV lamp:

For correctly displaying UV intensity, for fixing the threshold levels and setting the analog output, the UV measuring system needs to be adjusted to on-site conditions:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Go to menu point “100%-value” and retrieve value “automatically” – the actual value will be shown
- Go with the ⊙ button to “Config write” and save the setting.

If it does not work automatically, try it this meadow:

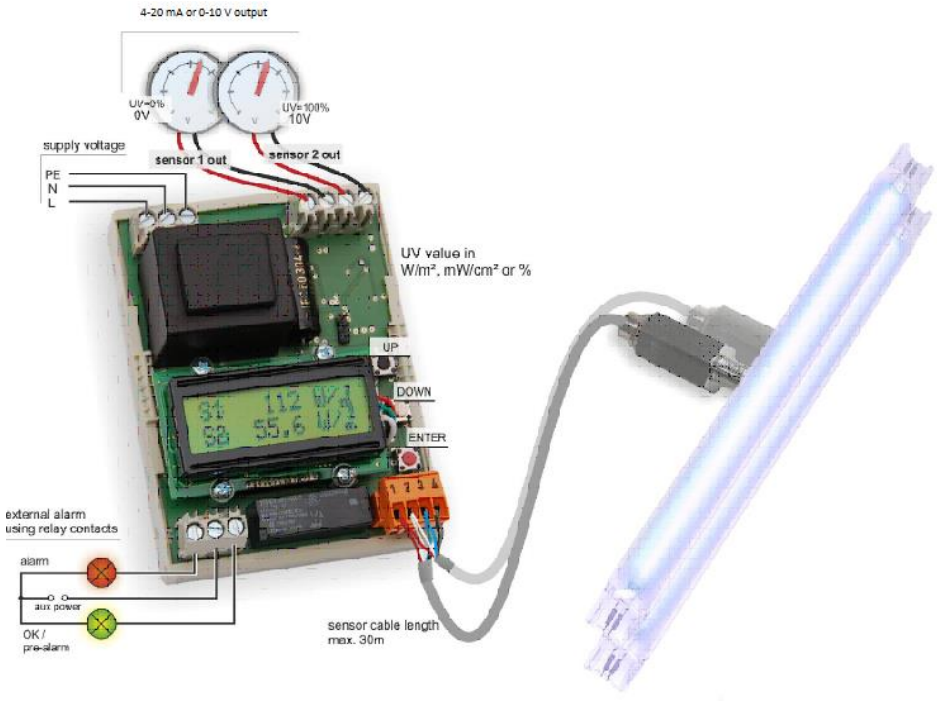
- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Change menu point “value” from [%] to [W/m²]
- Go with the ⊙ button to “Config write” and save the setting.
- Note the shown value [W/m²] you see at the display
- Enter the noted value at menu point “100% value”
- Change menu point “value” from [W/m²] to [%]
- Go with the ⊙ button to “Config write” and save the setting.

After this the display shows 100% and the analogues output has now 20mA. The pre and main alarm are working now correct. After replace of the UV lamp the display shows 100% again, unless the ambient conditions are the same (system is clean, water quality is the same) If not, clean the system and repeat the adjustment.

The UV lamp is subject to production tolerances, which influences the UV intensity. This can also be a deviation to the start up.

E-4.2 UE-D1-LP30

Principle illustration:



Handling:

Access on the menu is achieved with three buttons inside switch cabinet. Pro 30. The Monitor has to be switched on. If the red button is pressed for 3 seconds, the first menu point appears.

Function of the buttons:

RED	-	enter menu / select next item / accept changed parameter
BLACK	-	value increase / change option
WHITE	-	value decrease / change option

Menu points:

The menu of the monitor is continuous. By pressing the red button of the monitor the next point appears. The point can be changed through pressing the white or black button. Settings will be saved after reaching the last menu point.

☞ Is the attendance time > 20 s the monitor switches into the operation mode. Modifications (parameters) will not be saved. Modifications come into force at a complete pass-through and termination of the menu (display: „config o.k.“).

number	Menu point / display	description
1	lock code 0000	Enter the lock code (‘**0602**’ at delivery) with black and white buttons. Confirmation with red. Next menu point appears.
2	freeze	If „YES“ is chosen, the value is freeze. Alarms will not release. Sensor can be dismounted for inspection.
3	language	German or English
4	time	Time + date If time and date are not adjusted, the operating hours will not count.
5	change lock code	Lock code can be changed (‘0602’ at delivery). In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!
6	Switch cycles	Counting of switching cycles
7	start up time	Delay in switching of the alarms (default 5 sec.)
8	contrast	Display-settings
9	user counter	Complies with the runtime of the UV lamp. Set to zero after change the UV lamp to delete the shown failure. For set to zero: go to this menu point and press the white/black button. YES appears. Confirm with red.
10	abs. counter	Total operation hours of the UV system.
11	lamp	Lamp lifetime (see datasheet – after these operation hours a failure appears at display and relay contact – change lamp!)
12	Input	chose „digital“
12.1	digital input	
12.2	number of sensors	„**1**“ (at one monitor can be connected two sensors)
12.3	sensor ID	AUTOMATICALLY: If a digital sensor is connected, the system finds the ID by itself. MANUAL: If the automatically indication does not work or 2 sensors are connected, enter the ID number of the UV sensor manual. The ID is written on the body of the sensor.

12.4	sensortype	Necessary if the sensor ID is adjusted manual. Choose D-SiC, otherwise failure of measurement and alarms can happen.
12.5	Scale unit	Unit: [%] or [W/m²] – default **[%]**
12.6	100 % value	For setting the analogues output and the display – see: „Adjustment of the UV monitor after Start-up/ replacement UV lamp“
13	main alarm	Lower limit of the irradiance in %, refers to the 100 % value (point 12.6), in case of failure the display is red and the relay contact is switched (see circuit diagram) The UV intensity is too low for a correct function of the UV system.
14	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
15	pre alarm	Threshold for pre alarm (value can be chosen by customer); in case of failure the display blinks yellow.
16	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
17	config write	Safe all settings If you don’t reach this point all done settings will not be saved!



For counting the operation hours synchronize watch time. The battery (watch) has a life time of 8 years.



If the UV sensor is changed, you have to go through the whole menu of the UV monitoring. After passing the point “config write!” the ID of the UV sensor is implemented in to the software and the system works.



In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!

Adjustment of the UV monitor after Start-up / replacement UV lamp:

For correctly displaying UV intensity, for fixing the threshold levels and setting the analog output, the UV measuring system needs to be adjusted to on-site conditions:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Go to menu point “100%-value” and retrieve value “automatically” – the actual value will be shown
- Go with the red button to “Config write” and save the setting.

If it does not work automatically, try it this meadow:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)

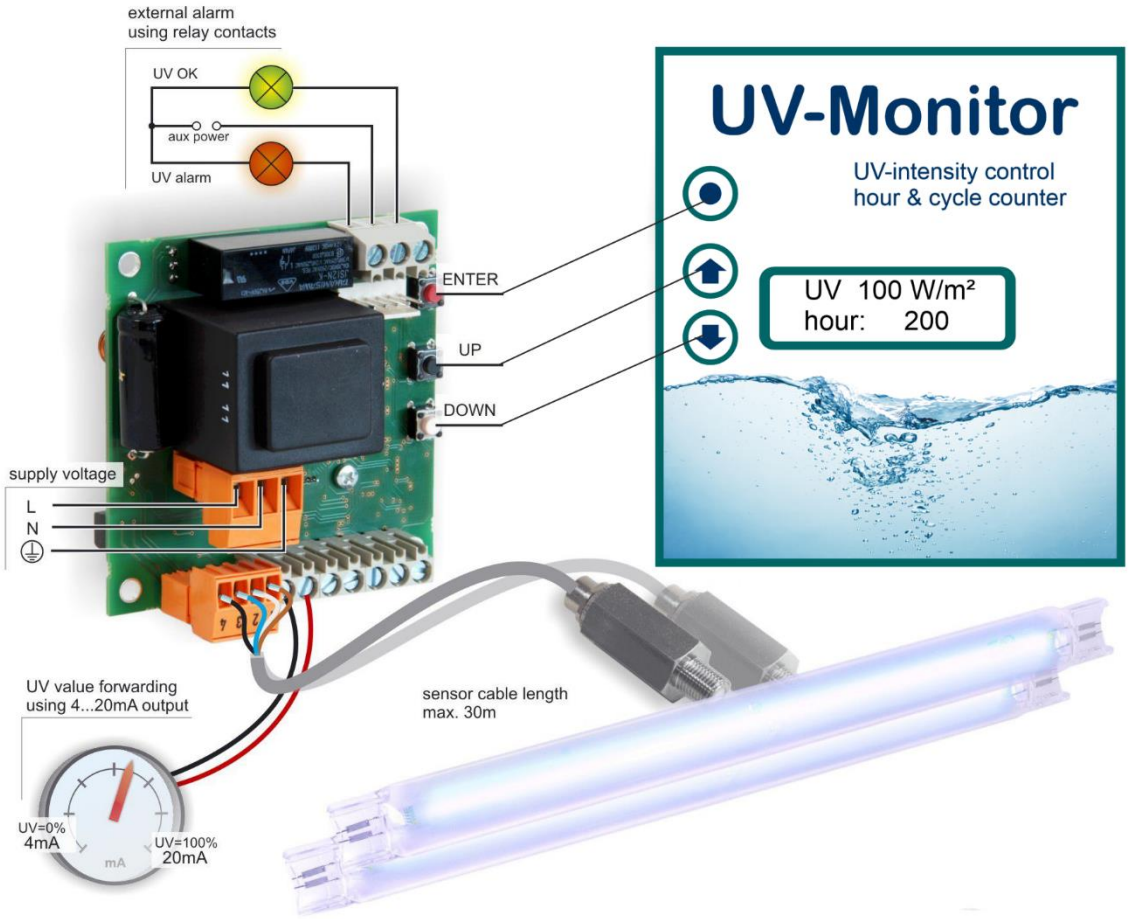
- Change menu point “value” from [%] to [W/m²]
- Go with the red button to “Config write” and save the setting.
- Note the shown value [W/m²] you see at the display
- Enter the noted value at menu point “100% value”
- Change menu point “value” from [W/m²] to [%]
- Go with the red button to “Config write” and save the setting.

After this the display shows 100% and the analogues output has now 20mA. The pre and main alarm are working now correct. After replace of the UV lamp the display shows 100% again, unless the ambient conditions are the same (system is clean, water quality is the same) If not, clean the system and repeat the adjustment.

The UV lamp is subject to production tolerances, which influences the UV intensity. This can also be a deviation to the start up.

E-4.3 UE-DZ-LPFK

Principle illustration:



Handling:

Access on the menu is achieved with three buttons at the back side of the monitor. The Monitor has to be switched on. If the red button is pressed for 3 seconds, the first menu point appears.

Function of the buttons:

RED	-	enter menu / select next item / accept changed parameter
BLACK	-	value increase / change option
WHITE	-	value decrease / change option

Menu points:

The menu of the monitor is continuous. By pressing the button of the monitor the next point appears. The point can be changed through pressing the or button. Settings will be saved after reaching the last menu point.

Is the attendance time > 20 s the monitor switches into the operation mode. Modifications (parameters) will not be saved. Modifications come into force at a complete pass-through and termination of the menu (display: „config o.k.“).

number	Menu point / display	description
1	lock code 0000	Enter the lock code (‘**0602**’ at delivery) with and buttons. Confirmation with Next menu point appears.
2	freeze	If „YES“ is chosen, the value is freeze. Alarms will not release. Sensor can be dismounted for inspection.
3	language	German or English
4	time	Time + date If time and date are not adjusted, the operating hours will not count.
5	change lock code	Lock code can be changed (‘0602’ at delivery). In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!
6	Switch cycles	Counting of switching cycles
7	start up time	Delay in switching of the alarms (default 5 sec.)
8	contrast	Display-settings
9	user counter	Complies with the runtime of the UV lamp. Set to zero after change the UV lamp to delete the shown failure. For set to zero: go to this menu point and press the / button. YES appears. Confirm with .
10	abs. counter	Total operation hours of the UV system.
11	lamp	Lamp lifetime (see datasheet – after these operation hours a failure appears at display and relay contact – change lamp!)
12	Input	chose „digital“

12.1	digital input	
12.2	number of sensors	„**1**“ (at one monitor can be connected two sensors)
12.3	sensor ID	AUTOMATICALLY: If a digital sensor is connected, the system finds the ID by itself. MANUAL: If the automatically indication does not work or 2 sensors are connected, enter the ID number of the UV sensor manual. The ID is written on the body of the sensor.
12.4	sensortype	Necessary if the sensor ID is adjusted manual. Choose D-SiC, otherwise failure of measurement and alarms can happen.
12.5	Scale unit	Unit: [%] or [W/m²] – default **[W/m²]**
12.6	100 % value	For setting the analogues output and the display – see: „Adjustment of the UV monitor after Start-up/ replacement UV lamp“
13	main alarm	Lower limit of the irradiance in %, refers to the 100 % value (point 12.6), in case of failure the display is red and the relay contact is switched (see circuit diagram) The UV intensity is too low for a correct function of the UV system.
14	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
15	pre alarm	Threshold for pre alarm (value can be chosen by customer); in case of failure the display blinks yellow.
16	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
17	config write	Safe all settings If you don’t reach this point all done settings will not be saved!



For counting the operation hours synchronize watch time. The battery (watch) has a life time of 8 years.



If the UV sensor is changed, you have to go through the whole menu of the UV monitoring. After passing the point “config write!” the ID of the UV sensor is implemented in to the software and the system works.



In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!

Adjustment of the UV monitor after Start-up / replacement UV lamp:

For correctly displaying UV intensity, for fixing the threshold levels and setting the analog output, the UV measuring system needs to be adjusted to on-site conditions:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Go to menu point “100%-value” and retrieve value “automatically” – the actual value will be shown
- Go with the ◉ button to “Config write” and save the setting.

If it does not work automatically, try it this meadow:

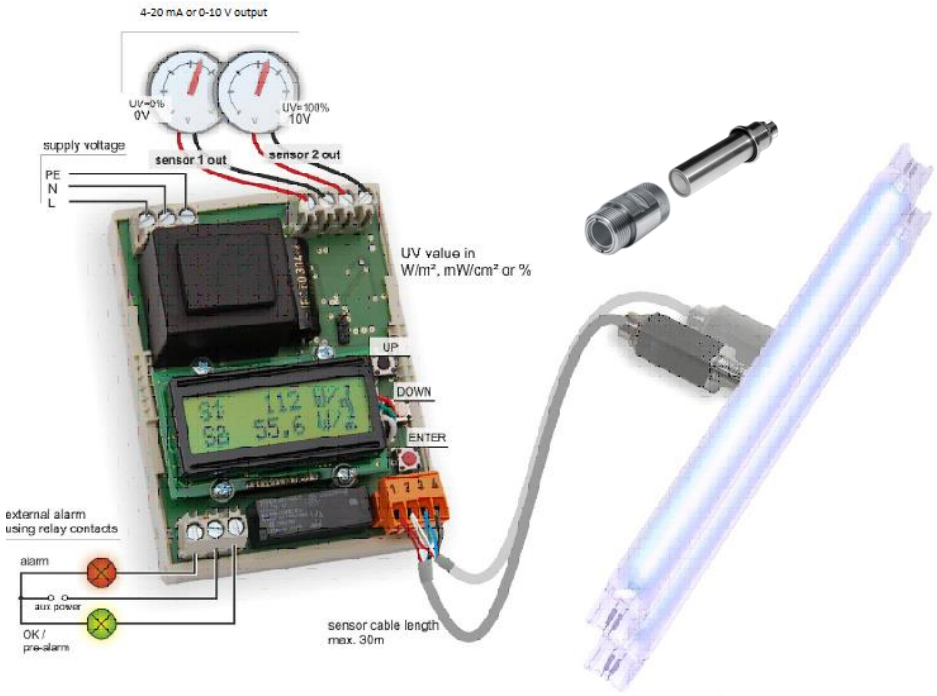
- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Note the shown value [W/m²] you see at the display
- Enter the noted value at menu point “100% value”
- Go with the ◉ button to “Config write” and save the setting.

After this the analogues output has now 20mA. The pre and main alarm are working now correct. After replace of the UV lamp the display shows 100% again, unless the ambient conditions are the same (system is clean, water quality is the same) If not, clean the system and repeat the adjustment.

The UV lamp is subject to production tolerances, which influences the UV intensity. This can also be a deviation to the start up.

E-4.4 UE-DZ-LP30

Principle illustration:



Handling:

Access on the menu is achieved with three buttons inside switch cabinet. The Monitor has to be switched on. If the red button is pressed for 3 seconds, the first menu point appears.

Function of the buttons:

RED	-	enter menu / select next item / accept changed parameter
BLACK	-	value increase / change option
WHITE	-	value decrease / change option

Menu points:

The menu of the monitor is continuous. By pressing the red button of the monitor the next point appears. The point can be changed through pressing the white or black button. Settings will be saved after reaching the last menu point.

Is the attendance time > 20 s the monitor switches into the operation mode. Modifications (parameters) will not be saved. Modifications come into force at a complete pass-through and termination of the menu (display: „config o.k.“).

number	Menu point / display	description
1	lock code 0000	Enter the lock code (‘**0602**’ at delivery) with black and white buttons. Confirmation with red. Next menu point appears.
2	freeze	If „YES“ is chosen, the value is freeze. Alarms will not release. Sensor can be dismounted for inspection.
3	language	German or English
4	time	Time + date If time and date are not adjusted, the operating hours will not count.
5	change lock code	Lock code can be changed (‘0602’ at delivery). In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!
6	Switch cycles	Counting of switching cycles
7	start up time	Delay in switching of the alarms (default 5 sec.)
8	contrast	Display-settings
9	user counter	Complies with the runtime of the UV lamp. Set to zero after change the UV lamp to delete the shown failure. For set to zero: go to this menu point and press the white/black button. YES appears. Confirm with red.
10	abs. counter	Total operation hours of the UV system.
11	lamp	Lamp lifetime (see datasheet – after these operation hours a failure appears at display and relay contact – change lamp!)
12	Input	chose „digital“
12.1	digital input	
12.2	number of sensors	„**1**“ (at one monitor can be connected two sensors)
12.3	sensor ID	AUTOMATICALLY: If a digital sensor is connected, the system finds the ID by itself.

		MANUAL: If the automatically indication does not work or 2 sensors are connected, enter the ID number of the UV sensor manual. The ID is written on the body of the sensor.
12.4	sensortype	Necessary if the sensor ID is adjusted manual. Choose D-SiC, otherwise failure of measurement and alarms can happen.
12.5	Scale unit	Unit: [%] or [W/m²] – default **[W/m²]**
12.6	100 % value	For setting the analogues output and the display – see: „Adjustment of the UV monitor after Start-up/ replacement UV lamp“
13	main alarm	Lower limit of the irradiance in %, refers to the 100 % value (point 12.6), in case of failure the display is red and the relay contact is switched (see circuit diagram) The UV intensity is too low for a correct function of the UV system.
14	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
15	pre alarm	Threshold for pre alarm (value can be chosen by customer); in case of failure the display blinks yellow.
16	delay alarm	Suppresses the alarm for the set time. Adjustable between. 0 and 600 seconds.
17	config write	Safe all settings If you don’t reach this point all done settings will not be saved!



For counting the operation hours synchronize watch time. The battery (watch) has a life time of 8 years.



If the UV sensor is changed, you have to go through the whole menu of the UV monitoring. After passing the point “config write!” the ID of the UV sensor is implemented in to the software and the system works.



In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!

Adjustment of the UV monitor after Start-up / replacement UV lamp:

For correctly displaying UV intensity, for fixing the threshold levels and setting the analog output, the UV measuring system needs to be adjusted to on-site conditions:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Go to menu point “100%-value” and retrieve value “automatically” – the actual value will be shown

- Go with the red button to “Config write” and save the setting.

If it does not work automatically, try it this meadow:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Note the shown value [W/m²] you see at the display
- Enter the noted value at menu point “100% value”
- Go with the red button to “Config write” and save the setting.

After this the analogues output has now 20mA. The pre and main alarm are working now correct. After replace of the UV lamp the display shows 100% again, unless the ambient conditions are the same (system is clean, water quality is the same) If not, clean the system and repeat the adjustment.

The UV lamp is subject to production tolerances, which influences the UV intensity. This can also be a deviation to the start up.

E-4.3 UE-D1-LP11

Handling:

Access on the menu is achieved with three buttons at the front of the monitor. The Monitor has to be switched on. To open the switch box is not necessary. If the enter button is pressed for 3 seconds, the first menu point appears.

Function of the buttons:

ENTER	-	enter menu / select next item / accept changed parameter
UP	-	value increase / change option
DOWN	-	value decrease / change option

Menu points:

The menu of the monitor is continuous. By pressing the enter button of the monitor the next point appears. The point can be changed through pressing the up or down button. Settings will be saved after reaching the last menu point.



Is the attendance time > 20 s the monitor switches into the operation mode. Modifications (parameters) will not be saved. Modifications come into force at a complete pass-through and termination of the menu (display: „config o.k.“).

number	Menu point / display	description
1	lock code 0000	Enter the lock code (‘**0602**’ at delivery) with black and white buttons. Confirmation with red. Next menu point appears.
2	freeze	If „YES“ is chosen, the value is freeze. Alarms will not release. Sensor can be dismounted for inspection.
3	language	German or English
4	time	Time + date If time and date are not adjusted, the operating hours will not count.
5	change lock code	Lock code can be changed (‘0602’ at delivery). In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!
6	Switch cycles	Counting of switching cycles

7	start up time	Delay in switching of the alarms (default 5 sec.)
8	contrast	Display-settings
9	user counter	Complies with the runtime of the UV lamp. Set to zero after change the UV lamp to delete the shown failure. For set to zero: go to this menu point and press the white/black button. YES appears. Confirm with red.
10	abs. counter	Total operation hours of the UV system.
11	lamp	Lamp lifetime (see datasheet – after these operation hours a failure appears at display and relay contact – change lamp!)
12	Input	chose „digital“
12.1	digital input	
12.2	number of sensors	„**1**“ (at one monitor can be connected two sensors)
12.3	sensor ID	AUTOMATICALLY: If a digital sensor is connected, the system finds the ID by itself. MANUAL: If the automatically indication does not work or 2 sensors are connected, enter the ID number of the UV sensor manual. The ID is written on the body of the sensor.
12.4	sensortype	Necessary if the sensor ID is adjusted manual. Choose D-SiC, otherwise failure of measurement and alarms can happen.
12.5	Scale unit	Unit: [%] or [W/m²] – default **[%]**
12.6	100 % value	For setting the analogues output and the display – see: „Adjustment of the UV monitor after Start-up/ replacement UV lamp“
13	main alarm	Lower limit of the irradiance in %, refers to the 100 % value (point 12.6), in case of failure the display is red and the relay contact is switched (see circuit diagram) The UV intensity is too low for a correct function of the UV system.
14	pre alarm	Threshold for pre alarm (value can be chosen by customer); in case of failure the display blinks yellow.
15	config write	Safe all settings If you don’t reach this point all done settings will not be saved!



For counting the operation hours synchronize watch time. The battery (watch) has a life time of 8 years.

In case of changing the standard code, note the code so that he is available at every time. Without the code you can't change parameters in the menus. Monitor has to send back to the producer and unlock at the owner's expense!!!

Adjustment of the UV monitor after Start-up / replacement UV lamp:

For correctly displaying UV intensity, for fixing the threshold levels and setting the analog output, the UV measuring system needs to be adjusted to on-site conditions:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Go to menu point "100%-value" and retrieve value "automatically" – the actual value will be shown
- Go with the red button to "Config write" and save the setting.

If it does not work automatically, try it this meadow:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Change menu point "value" from [%] to [W/m²]
- Go with the enter button to "Config write" and save the setting.
- Note the shown value [W/m²] you see at the display
- Enter the noted value at menu point "100% value"
- Change menu point "value" from [W/m²] to [%]
- Go with the enter button to "Config write" and save the setting.

After this the display shows 100% and the analogues output has now 20mA. The pre and main alarm are working now correct. After replace of the UV lamp the display shows 100% again, unless the ambient conditions are the same (system is clean, water quality is the same) If not, clean the system and repeat the adjustment.

The UV lamp is subject to production tolerances, which influences the UV intensity. This can also be a deviation to the start up.

E-4.3 UE-DZ-LP11

Handling:

Access on the menu is achieved with three buttons at the front of the monitor. The Monitor has to be switched on. To open the switch box is not necessary. If the enter button is pressed for 3 seconds, the first menu point appears.

Function of the buttons:

ENTER	-	enter menu / select next item / accept changed parameter
UP	-	value increase / change option
DOWN	-	value decrease / change option

Menu points:

The menu of the monitor is continuous. By pressing the enter button of the monitor the next point appears. The point can be changed through pressing the up or down button. Settings will be saved after reaching the last menu point.



Is the attendance time > 20 s the monitor switches into the operation mode. Modifications (parameters) will not be saved. Modifications come into force at a complete pass-through and termination of the menu (display: „config o.k.“).

number	Menu point / display	description
1	lock code 0000	Enter the lock code (‘**0602**’ at delivery) with black and white buttons. Confirmation with red. Next menu point appears.
2	freeze	If „YES“ is chosen, the value is freeze. Alarms will not release. Sensor can be dismounted for inspection.
3	language	German or English
4	time	Time + date If time and date are not adjusted, the operating hours will not count.
5	change lock code	Lock code can be changed (‘0602’ at delivery). In case of changing the standard code, note the code so that he is available at every time. Without the code you can’t change parameters in the menus. Monitor has to send back to the producer and unlock at the owner’s expense!!!
6	Switch cycles	Counting of switching cycles
7	start up time	Delay in switching of the alarms (default 5 sec.)

8	contrast	Display-settings
9	user counter	Complies with the runtime of the UV lamp. Set to zero after change the UV lamp to delete the shown failure. For set to zero: go to this menu point and press the white/black button. YES appears. Confirm with red.
10	abs. counter	Total operation hours of the UV system.
11	lamp	Lamp lifetime (see datasheet – after these operation hours a failure appears at display and relay contact – change lamp!)
12	Input	chose „digital“
12.1	digital input	
12.2	number of sensors	„**1**“ (at one monitor can be connected two sensors)
12.3	sensor ID	AUTOMATICALLY: If a digital sensor is connected, the system finds the ID by itself. MANUAL: If the automatically indication does not work or 2 sensors are connected, enter the ID number of the UV sensor manual. The ID is written on the body of the sensor.
12.4	sensortype	Necessary if the sensor ID is adjusted manual. Choose D-SiC, otherwise failure of measurement and alarms can happen.
12.5	Scale unit	Unit: [%] or [W/m²] – default **[W/m²]**
12.6	100 % value	For setting the analogues output and the display – see: „Adjustment of the UV monitor after Start-up/ replacement UV lamp“
13	main alarm	Lower limit of the irradiance in %, refers to the 100 % value (point 12.6 in case of failure the display is red and the relay contact is switched (see circuit diagram) The UV intensity is too low for a correct function of the UV system.
14	pre alarm	Threshold for pre alarm (value can be chosen by customer); in case of failure the display blinks yellow.
15	config write	Safe all settings If you don’t reach this point all done settings will not be saved!



For counting the operation hours synchronize watch time. The battery (watch) has a life time of 8 years.

In case of changing the standard code, note the code so that he is available at every time. Without the code you can't change parameters in the menus. Monitor has to send back to the producer and unlock at the owner's expense!!!

Adjustment of the UV monitor after Start-up / replacement UV lamp:

For correctly displaying UV intensity, for fixing the threshold levels and setting the analog output, the UV measuring system needs to be adjusted to on-site conditions:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Go to menu point "100%-value" and retrieve value "automatically" – the actual value will be shown
- Go with the red button to "Config write" and save the setting.

If it does not work automatically, try it this meadow:

- Switch ON the UV system and wait till value is stable (burn in cycle of the lamp)
- Note the shown value [W/m²] you see at the display
- Enter the noted value at menu point "100% value"
- Go with the enter button to "Config write" and save the setting.

After this the analogues output has now 20mA. The pre and main alarm are working now correct. After replace of the UV lamp the display shows 100% again, unless the ambient conditions are the same (system is clean, water quality is the same) If not, clean the system and repeat the adjustment.

The UV lamp is subject to production tolerances, which influences the UV intensity. This can also be a deviation to the start up.

E-5. ERROR ANALYSIS

Additionally to the failures at the display, the user has relay contacts for a process control system. More information's can be found in the circuit diagram.

failure	**information**
UV pre alarm	Appears if the UV intensity has fallen below the preset threshold pre alarm. The threshold can set by the customer. It should be higher than the main alarm. The display blinks yellow in case of a failure and the optionally relay for the pre alarm switches (see circuit diagram).
UV main alarm	Appears if the UV intensity is not enough for a correct function of the UV system. (Threshold should not be changed by the costumer!) The display is red in case of a failure and the relay for the main alarm switches (see circuit diagram).
Lamp NEW!	Lamp life time is exceeded. Replace UV lamp and set the user counter back to zero. The display is red in case of a failure and the relay for the main alarm switches (see circuit diagram).

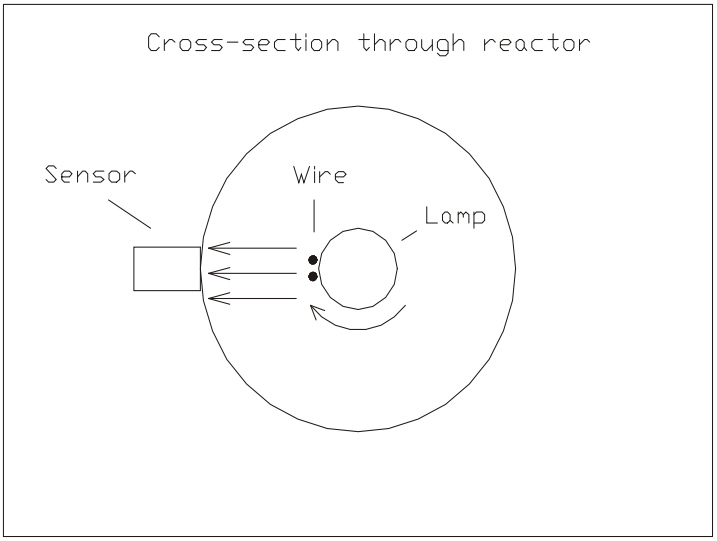
analogues output	**information**
4-20 mA, active, 180 Ω	Output of an active analogues signal according to the UV intensity: - 4 mA = 0 W/m² or 0% - 20 mA = entered „100%-value“



In case of a failure the relay for the alarm switches (see circuit diagram). Failures according to lamp life time or a defect of electronic components are integrated in the UV main alarm relay.

E-5.1 Reasons for pre alarm

- Lower transmission as calculated
- Burn-in after switching on not ended up yet
- Pollution of the quartz window (clean plant)
- Pollution of the quartz tube (clean plant)
- UV lamp is older than the defined life time (see datasheet)
- Wire of the lamp between sensor and lamp – turn the lamp around long axis



E-5.2 Reasons for main alarm

- Look at pre-alarm
- UV facility is not switched on. (check the mains supply)
- UV lamp defect or at the end of the life time (replace UV lamp)
- Electronic ballast defect (replace electronic ballast)
- Sensor defect or incorrectly connected (replace UV sensor, check the connections)
- Monitor defect (replace monitor and new setting of parameters)

E-6. APPENDICES

- Technical data sheet
- Spare part list

Datenblatt / Data Sheet

UV-Überwachung / UV-Control Unit: UE-D1-LPFK

UV - Sensor

Sensitives Element sensitive element	SiC-Diode (digital)	**Zertifizierung** certification	-
Spektralbereich spectral range	220 … 290 nm	**Abmaße** dimensions	ø = 25 mm; L = 70 mm
Öffnungswinkel aperture angle	160°	**Gehäusematerial** sensor housing material	Edelstahl 1.4404 stainless steel 1.4404
Messbereich measurement range	0 … 500 W/m²	**Druckbeständigkeit** max. pressure	10 bar
Betriebstemperatur operating temperature	0 … 70 °C	**Einbau** mounting	G 1/4" (Einschrauben in Reaktor) G 1/4" (screw in reactor)
Temperaturdrift temperature drift	<0,1 %/K	**Kabellänge** cable length	2,9 m

Messfenster / Measurement Window

Material material	-
Einbau mounting	-
empfohlener Wechsel recommended change	-

Beim Einbau und Inbetriebnahme von Messfenstern und Sensoren sind mitgelieferte Vorschriften und Betriebsanleitungen zu beachten.

Please observe the providet regulations and operating manuals during installation and commissioning of sensors and measurement windows.

UV - Monitor

Einbau mounting	integriert in Schaltkasten integrated in switch cabinet	**Bedienung** handling	3 Tasten außen 3 keys at front side
Abmaße (BxHxT) dimensions (WxHxD)	72,5 x 72,5 x 53 mm	**Funktionen**	Gesamt- und Nutzerstunden; Schaltzyklen; Hauptalarm
Schutzgrad degree of protection	IP 00 / IP 54 (Front)	functions	total and lamp operating hours; switch cycles; main alarm
Betriebstemperatur operating temperature	+0 … 40 °C	**Relaisausgänge**	Hauptalarm (potentialfrei)
Stromversorgung power supply	230 V AC; 50/60 Hz	relay outputs	main alarm (potential free)
Anzeige display	Display 2*12 digits	**Relaisbelastbarkeit** connected load	50 … 500 mA at 24 V … 230 V AC, 100 … 500 mA at 24 V … 60 V DC
Sprachen languages	Deutsch, English, French	**sonstige Ausgänge** other outputs	4 … 20 mA (aktiv, max. 200 Ω)

Ersatzteilliste / Spare Part List

UV-Überwachung / UV Control Unit: UE-D1-LPFK

Ersatzteile / Spare Parts

Artikelnummer Article Number	Bezeichnung Description	Anzahl Quantity
7960000114	**UV-Sensor SiC131 (digital)** UV sensor SiC131 (digital)	1
7960000081	**UV-Sensorkabel** cable for UV sensor	1
7960000171	**UV-Monitor PRO16 FK** UV monitor PRO 16 FK	1

Verschleißteile / Wear Parts

Artikelnummer Article Number	Bezeichnung Description	Anzahl Quantity

SIEMENS



Edition 09/2021

OPERATING INSTRUCTIONS

SINAMICS

SINAMICS IOP-2

Intelligent Operator Panel 2
Intelligent commission/configuration tool

www.siemens.com/drives

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SINAMICS

Intelligent Operating Panel 2 (IOP-2)

Operating Instructions

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Edition 09/2022, Firmware IOP-2 V2.7 SP2

09/2022, FW V2.7 SP2

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Changes in this manual

1

Changes to this manual - Edition 09/22

Listed below and the specific changes that have been incorporated in this new version of the IOP-2 Operating Instructions.

Changes

- The Jog function in the Control Menu as been updated:  Jog (Page 43)
- I/O simulation guidance has been updated in the Diagnostics Menu:  Diagnostics (Page 52)

Fundamental safety instructions 2

2.1 General safety instructions

⚠ WARNING

Danger to life if the safety instructions and residual risks are not observed

If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- Consider the residual risks for the risk evaluation.

⚠ WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

2.2 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

2.3 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert (https://www.siemens.com/cert).

Further information is provided on the Internet:

Industrial Security Configuration Manual
(https://support.industry.siemens.com/cs/ww/en/view/108862708)

⚠ WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

Safety notes 3

3.1 Warnings and cautions

Warnings and cautions

⚠DANGER

Ensuring a safe and stable state

During commissioning of the converter it is essential to ensure that the system is in a safe and stable state, as some commissioning processes have the potential to start the motor. Therefore it is important to secure any loads and ensure that should the motor start, no potentially dangerous conditions exist.

⚠WARNING

The converter will stop if the IOP-2 is removed when in Hand mode

When the IOP-2 is in Hand mode, that is, when the command source is switched to Hand and all OFF and RUN commands are given via the IOP-2 buttons.

When in the Hand mode, if the IOP-2 is removed from the converter, the converter will stop within a few seconds of the IOP-2 being removed.

Before removing the IOP-2, ensure that the IOP-2 is placed in AUTO mode and receiving its command source from the PLC.

⚠WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing files onto exchangeable storage media amounts to an increased risk of infection of the commissioning PCs, e.g. with viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software using appropriate protection measures, e.g. virus scanners.

⚠WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing the parameterization (incl. Safety Integrated parameterization) on exchangeable storage media carries the risk that the original parameterization (with Safety Integrated) will be overwritten, for example, by the IOP-2 of another drive without Safety Integrated. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Ensure that only the IOP-2 that belongs to the respective converter is used.
- Ensure that only trained or authorized personnel have access to the enclosures, cabinets or electrical equipment rooms.

Note

- The IOP-2 can be fitted to and removed from the converter while power is applied.
- The IOP-2 will set the USS PZD (P2012) length to 4 when connected to the converter.

Overview

4

4.1 Introduction

Compatibility

The Intelligent Operator Panel 2 (IOP-2) has been designed to enhance the interface and communications capabilities of SINAMICS Inverters.

The IOP-2 connects to the Inverter through an RS232 interface. It has been designed to automatically recognize the following devices from the SINAMICS range:

- SINAMICS G120 CU230P-2
- SINAMICS G120 CU240B-2
- SINAMICS G120 CU240E-2
- SINAMICS G120 CU250S-2
- SINAMICS G120C
- SINAMICS G120D-2 CU240D-2*
- SINAMICS G120D-2 CU250D-2*
- SINAMICS ET 200pro FC-2*
- SINAMICS G110D*
- SINAMICS G110M*
- SINAMICS G120X
- SINAMICS G120XA

*Denotes Control Units that require the IOP-2 Hand-Held Kit and the optical cable to connect the IOP to the Control Unit.

Hand-Held Kit order number: 6SL3255-0AA00-4HA1.
Optical cable order number: 3RK1922-2BP00

For information on firmware and language updates, please see  Updating the IOP-2 firmware (Page 27).

Note

IOP functional support

- Drives with SINAMICS firmware 4.7 SP3 or above will support the new commission processes of "Quick Setup" and "Advanced Setup".
- Drives with GP firmware prior to version 3.4 are not fully supported by the IOP-2.
- The actual menu structure and functionality of the IOP-2 will be influenced by the following factors:
  - The software version and type of Control Unit and Power Module to which the IOP-2 is fitted.
  - The firmware and software version of the IOP-2.
  - The selected functional group filtering of the parameters.

General Data Protection Regulation (GDPR) compliance

Siemens observes the principles of data protection, in particular the principle of data minimization (privacy by design). For this product, the IOP-2, this means: The product does not process / store any personal data, only technical functional data (e.g. time stamp). If the user links this data with other data (e.g. shift plans) or stores personal data on the same medium (e.g. hard disk) and thus establishes a personal reference, the user must ensure compliance with data protection regulations.

4.2 Layout and functions

Overview

The physical layout of the IOP-2 is shown below:

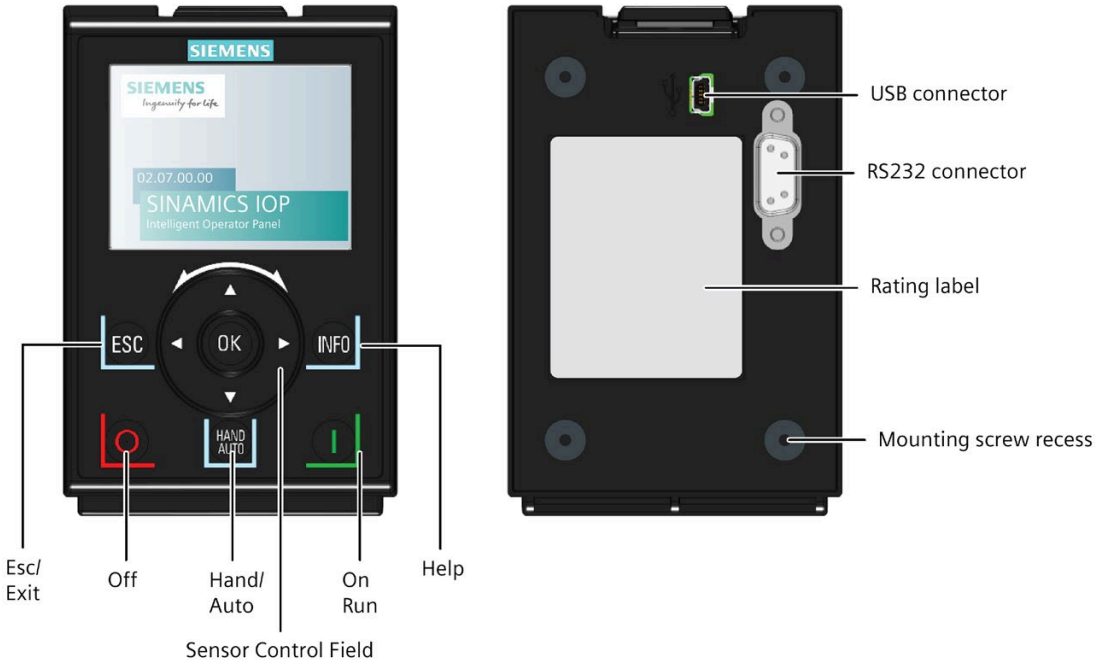


Figure 4-1 Layout of the IOP-2

The IOP-2 is operated by using a Sensor Control Field and five additional buttons. The specific functions of the Sensor Control Field and buttons are shown in the table below.

Table 4- 1 Function of the IOP-2 controls

Key	Function
	The Sensor Control Field has the following functions: • In a menu, sliding your finger around the Sensor Control Field changes the selection. • When a selection is highlighted, pressing the OK button in the centre of the Sensor Control Field confirms the selection. • When editing a parameter, sliding your finger around the Sensor Control Field changes the displayed value; clockwise increases the value and anti-clockwise decreases the displayed value. • When editing parameter or search values there is a choice to edit individual digits using the arrow keys or an entire value using the Sensor Control Field. The speed with which you slide your finger around the Sensor Control Field increases or decreases the speed of movement of the cursor. • The Sensor Control Field has integrated arrows which can be used to navigate through the menus and individual digits in the inputs fields.
	The ON key has the following functions: • In AUTO mode can be changed by pressing the HAND/AUTO key. • In HAND mode the converter is started - the converter status icon starts turning. Notes: For Control Units with firmware versions less than 4.0: When running in AUTO mode, HAND mode cannot be selected unless the converter is stopped. For Control Units with firmware versions 4.0 or greater: When running in AUTO mode, HAND mode can be selected and the motor will continue to run at the last selected setpoint speed. When the converter is running in HAND mode, the motor stops when switched to AUTO.
	The OFF key has the following functions: • If pressed for longer than 3 seconds the converter will perform an OFF2; the motor will then coast down to a standstill. Note: 2 presses of the OFF key within 3 seconds will also perform and OFF2. • If pressed for less than 3 seconds the following actions will be performed: – If in AUTO mode the screen will display an information screen stating that the command sources is AUTO and can be changed using the HAND/AUTO key. The converter will not be stopped. – If in HAND mode the converter will perform an OFF1; the motor will come to a standstill in the ramp-down time set in parameter P1121.
	The ESC key has the following functions: • If pressed for less than 3 seconds the IOP-2 returns to the previous screen or if a value has been edited, the new value is not saved. • If pressed longer than 3 seconds the IOP-2 returns to the status screen. When using the ESC key in the parameter editing mode, no data is saved unless the OK key is pressed first.

Key	Function
	The INFO key has the following functions: • Displays additional information for the currently selected item. • Pressing the INFO key again will display the previous screen. • Pressing the INFO key for >= 2 seconds will display the "Footer Symbol Guide" with more icon descriptions on most screens.
	The HAND/AUTO key switches the command source between HAND and AUTO mode. • HAND sets the command source to the IOP-2. • AUTO sets the command source to an external source, for example, fieldbus. Note: When switching from the HAND mode back to the AUTO mode, the setpoint screen will change back to the standard status screen.

Locking and unlocking the keypad

The keypad can only be locked once the power-up cycle has been completed. If the keys are activated before the power-up cycle is completed, the IOP-2 will enter the DEMO mode.

To lock the IOP-2 keypad press **ESC** and **INFO** simultaneously for 3 seconds or more. To unlock the keypad press **ESC** and **INFO** simultaneously for 3 seconds or more.

4.3 Screen icons

Overview

The IOP-2 displays a number of icons at the top right-hand edge of the display to indicate various states or current conditions of the converter. These icons are explained in the table below.

Table 4- 2 Screen icons

Function	Icon	Remarks
Command source		Auto - the converter receives the command signals from the network controller
	JOG	Displayed when the JOG function is active
		Hand - the converter is under control of the IOP-2
Inverter status		
		Icon rotates when the motor is running
Fault pending		
Alarm pending		
Saving to RAM		Indicates that all recent changes to parameters have been saved in RAM only. In the event of a power failure, then all recent changes saved to RAM will be lost. To prevent loss of parameter data a RAM-to-ROM save must be performed.

Function	Icon	Remarks
PID autotuning		
Hibernation mode		
Write Protection		Parameters cannot be modified.
Know How Protection		Parameters cannot be viewed or modified.
ESM		Essential Services Mode
Battery condition		The battery status is only shown when the IOP-2 Hand-held kit is used.

Screen faults and alarm indicators

When a fault or an alarm is active on the converter the top label on the screen will change. The top label will remain red until the fault or warning has been acknowledged or rectified.

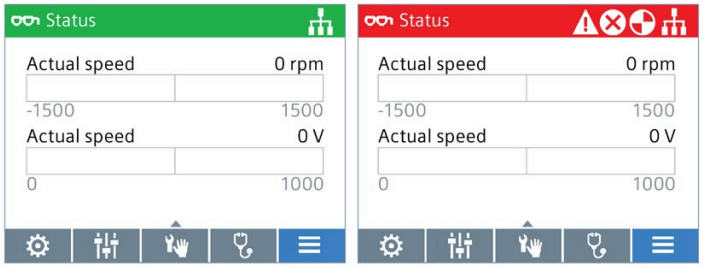


Figure 4-2 Fault and alarm notifications

Use of screen colours

A brief explanation of the use of the different colours on the screen is given below:

Red Error status: Indicates a fault is active and the Control Unit is in an error condition.

White Neutral status: The IOP-2 has no connection to the Control Unit.

Green Run status: The converter is running with no active faults. Active alarms will be displayed on the status bar.

Blue Blue denotes the selected item on the screen.

4.4 Menu structure

Overview

The Menu structure of the IOP-2 is shown in the figure below.

NOTICE
Variation of menu structure The structure and content of the menus will vary depending on the firmware version of the IOP-2 and the Control Unit and Power Module to which the IOP-2 is attached.

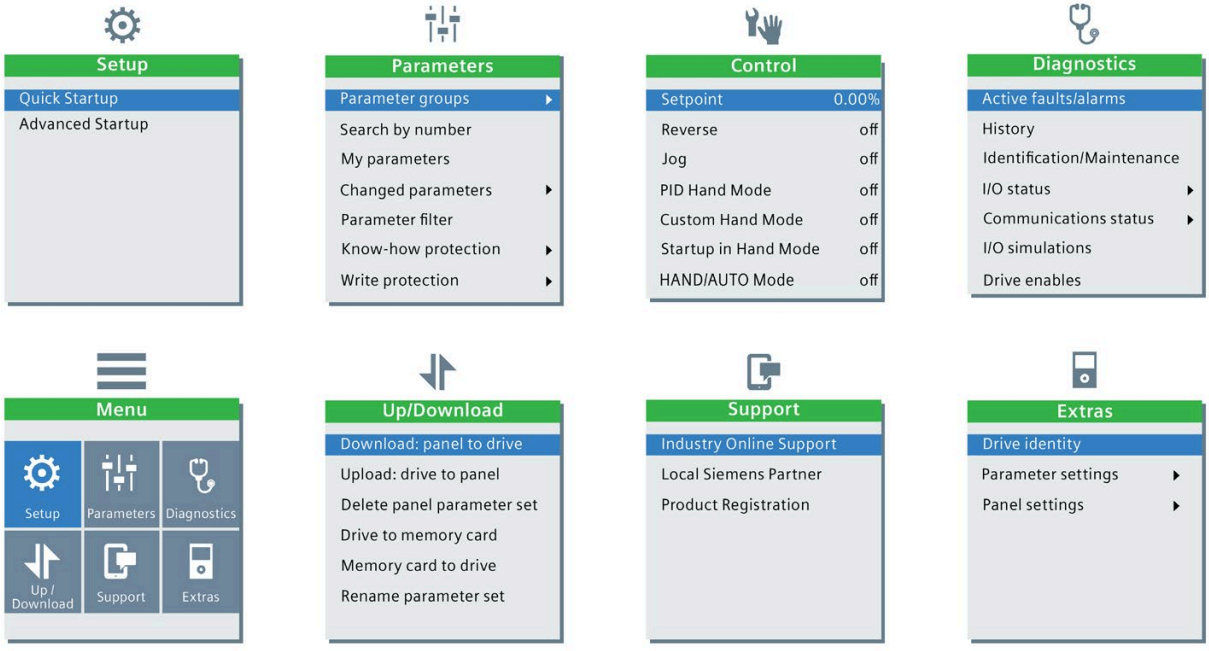


Figure 4-3 IOP-2 menu structure

Installation

5

5.1 Fitting the IOP-2

Fitting the IOP-2 to the Control Unit

Note

IOP-2 power supply

The IOP-2 has no internal power supply and derives its power directly from the Control Unit of the converter through the RS232 interface. The IOP-2 can also be connected to a PC and derives its power through the USB connection.

To fit the IOP-2 to the converter Control Unit the following procedure should be performed:

1. Place the bottom edge of the IOP-2 casing into the lower recess of the Control Unit housing.
2. Push the IOP-2 forward until the top fastening clicks into place on the Control Unit housing.

To use the IOP-2 with a decentralized drive, for example an ET200pro FC-2, an IOP-2 Handheld kit is required and an optical cable. The IOP-2 Handheld kit and optical cable are fitted as shown in the following figure.

The order details of both the IOP-2 Handheld kit and the optical cable are given in the Introduction (Page 11).



Figure 5-1 Fitting IOP-2 on CU and ET200pro FC-2

5.2 Initial set-up

Initial set-up sequence

Once the IOP-2 is fitted and powered-up it will automatically detect the type of Control Unit and Power Module to which it has been fitted. On first-time use, the IOP-2 automatically displays the option to select the default language and allow the time and date to be set (if the Control Unit to which the IOP-2 is fitted has a real-time clock). The IOP-2 will then display the choice between "Quick Setup" or Advanced Setup"; "Quick Setup" is the recommended selection. The procedure is outlined below.

Note

Saving and cloning of the IOP-2 configuration data

All changes made to an IOP-2 configuration, included all saved parameter sets, are stored in the IOP-2 file structure in the "user" folder.

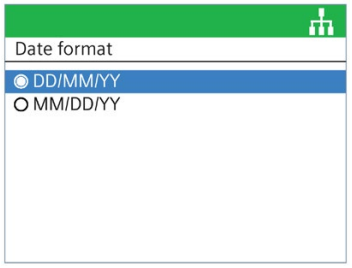
To copy/clone all this data to another, or multiple IOP-2s, the procedures are shown in  Customer parameter sets (Page 71).



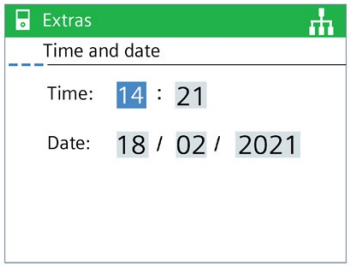
Splash screen is displayed



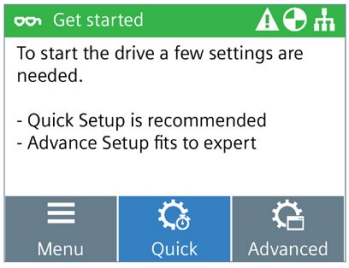
Select the required language



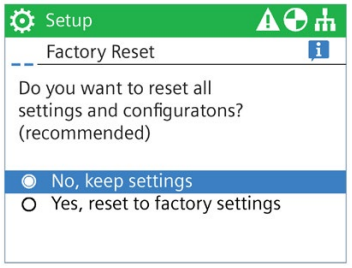
Select date format



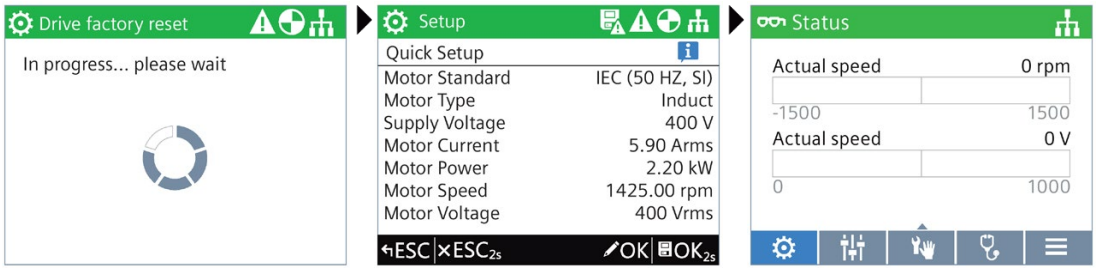
Set correct date and time



Select Quick Setup



Select "Yes, reset to factory settings"



Wait until the factory reset is finished

Change or confirm settings

Status screen on completion

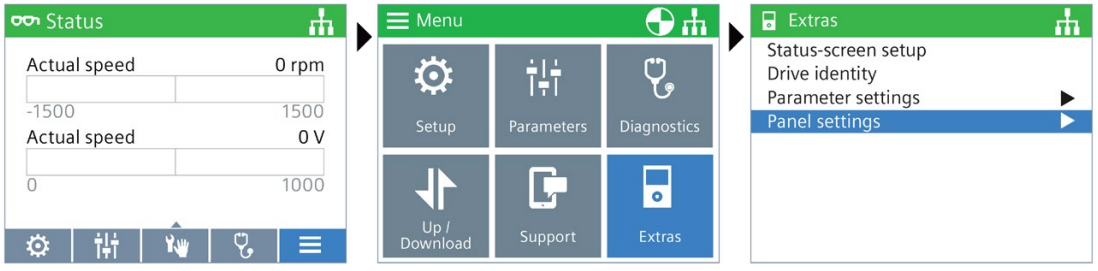
Note

The IOP-2 is delivered with all available languages and the Quick Setup and Advanced Setup functions. For information on Firmware upgrades, please see Updating the IOP-2 firmware (Page 27).

The status screen can be reconfigured to show a number of different views and types of values; these can be configured using the "Status Screen Setup" in the "Extras" menu, see Extras Menu (Page 76).

Language selection

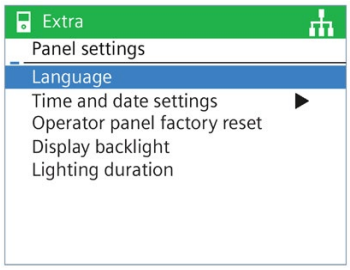
The IOP-2 on first start-up will display the language screen for the user to select their required language, should you wish to select your language manually, the following actions should be performed:



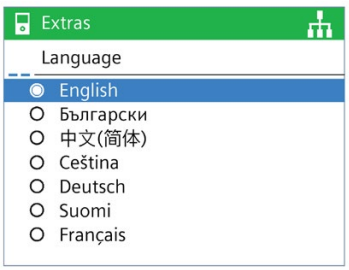
Select Menu

Select Extras

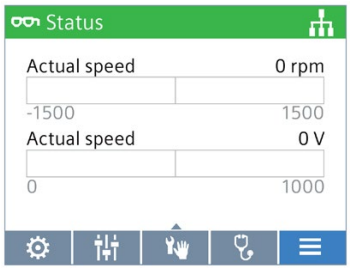
Select Panel settings



Select language



Select required language

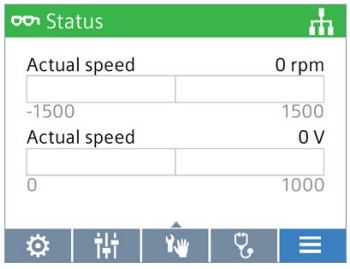


Press and hold down ESC for Status Screen

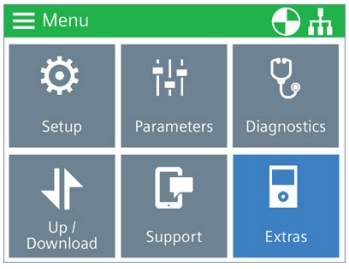
All available languages are delivered with the IOP-2.

Setting time and date

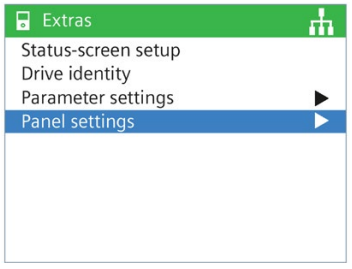
When the IOP-2 is first fitted to a Control Unit, which has a real-time clock, it will automatically display the time and date screen. Should you wish to manually set the time on the IOP-2, the following actions should be performed:



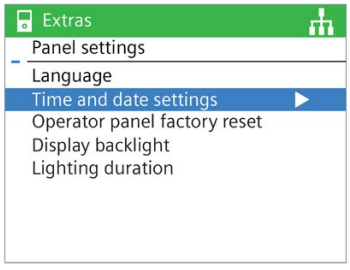
Select Menu



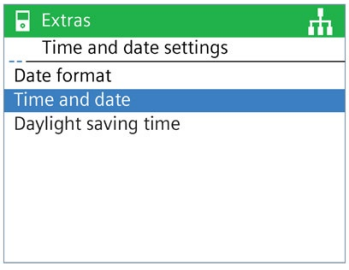
Select Extras



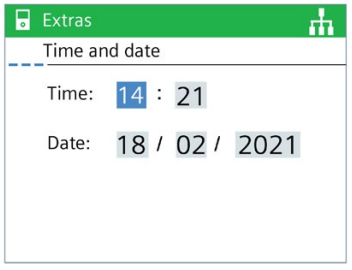
Select Panel settings



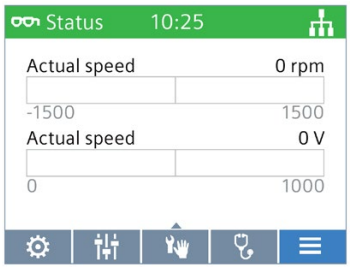
Select Time and date settings



Set the Time and date settings



Set time and date

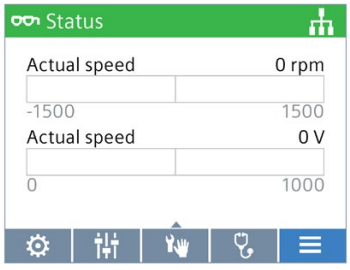


Press and hold down ESC for Status Screen

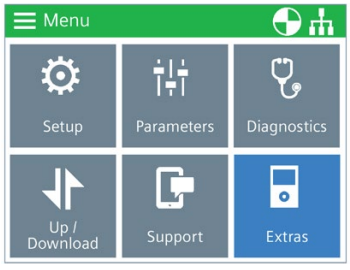
The settings for time are normally done on the Control Unit if it has a Real-time Clock (RTC). If the Inverter has an RTC the IOP-2 will take its settings from the Control Unit.

Lighting duration

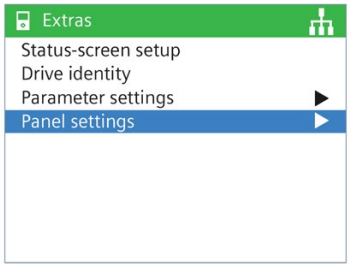
To set the length of time that the display remains lit, the following actions should be performed:



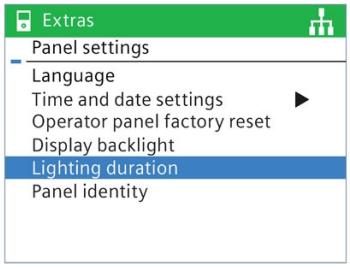
Select Menu



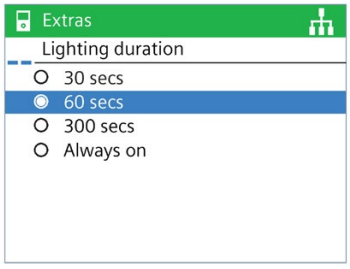
Select Extras



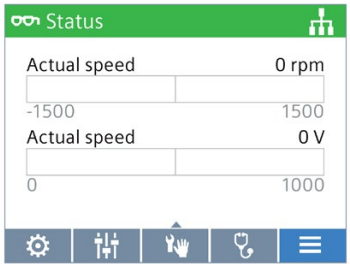
Select Panel settings



Select Lighting duration



Select Lighting duration time



Press and hold down ESC for Status Screen

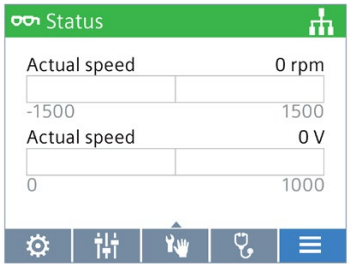
Note

Screen will flash when an active fault condition exists

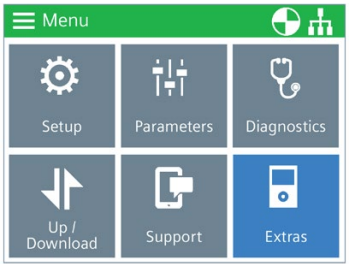
When an active fault condition exists on the IOP-2, the screen will only flash when the IOP-2 is displaying either the status screen or the active fault and alarm screen.

Display backlight

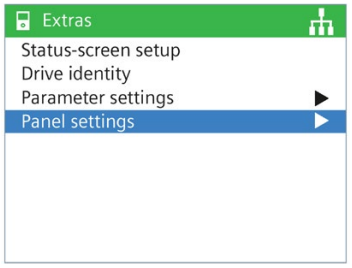
To change the intensity of the backlight, the following actions should be performed:



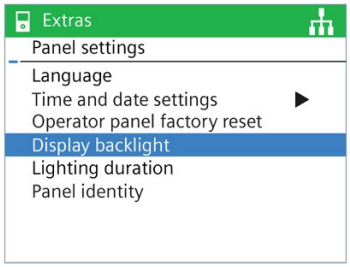
Select Menu



Select Extras



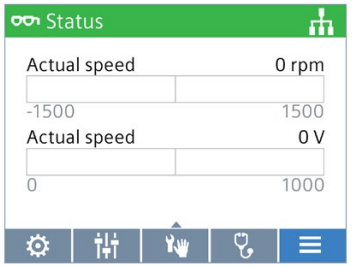
Select Panel settings



Select Display backlight



Select display backlight level



Press and hold down ESC for Status Screen

The display backlight setting will be automatically changed to the "Low" setting after 60 seconds from the last key press to extend the life of the display. When any key is pressed the backlight setting will automatically return to the user setting.

5.3 Changing the Status screens

Changing the status screens

The status screens of the IOP-2 can show three different styles of screens.

- **Bar graph view** - This shows the selected data on up to two separate sliding bar scales.
- **Scalar view** - This shows the selected data as numerical values in four separate quadrants on the screen.
- **Trend view** - This shows the selected data as two separate real-time plots on the screen.

Select a different status screen

To select a different status screen the following procedure should be performed:

1. When the status screen is displayed, use the UP arrow key to enter the screen selected mode.
2. Using the LEFT and RIGHT arrow keys, select the required status screen.
3. Press ESC or the DOWN arrow key to accept the new status screen and exit the screen selection mode.

Modify the display data

To modify the data that is displayed on the status screen, the following procedure should be performed:

1. Use the UP key to enter the status screen selection mode.
2. Press OK to edit the displayed data.
3. Use the arrow keys to navigate around the screen until the data you wish to change is highlighted. Press OK to edit the highlighted data.
4. Press OK to edit the parameter to be displayed.
5. Select the new parameter you wish to be displayed. Press OK to accept the new selection.
6. The new parameter selection is shown in the list. Press ESC or the DOWN arrow key to return to normal functions of the IOP-2.
7. The status screen is shown with the new data values and the screen menu is shown.

An overview of the basic procedures is shown in the figure below.



Figure 5-2 Selecting and modifying the IOP-2 status screens

5.4 User definable labels on status screen

User definable labels

User defined labels allow the user to customize the labels that appear on the status screen of the IOP-2.

There are a maximum of four labels that can be defined and they are located on the IOP-2 in the "config" folder. The IOP-2 must be connected to the PC via the USB connection to access

the files on the IOP-2.The files are basic text files and can be opened with any basic text editor. The default label names are "default", when the labels have the "default" text, the IOP-2 will ignore the labels. There are the following restrictions when creating your own labels:

- A maximum of 20 characters for each label name.
- The characters that can be used conform to the normal windows file naming conventions.

The four files are named:

- BotLeft.txt
- BotRight.txt
- TopLeft.txt
- TopRight.txt

The file names relate to the area of the status where they will appear.

Simply selected the file you wish to use as a label; open it with a text editor, change the name and then save it back to the same location in the IOP-2 file system. If the file name itself is changed the IOP-2 will not recognize the label.

An example of the status screen with new label names (using all four text files) is shown in the figure below.

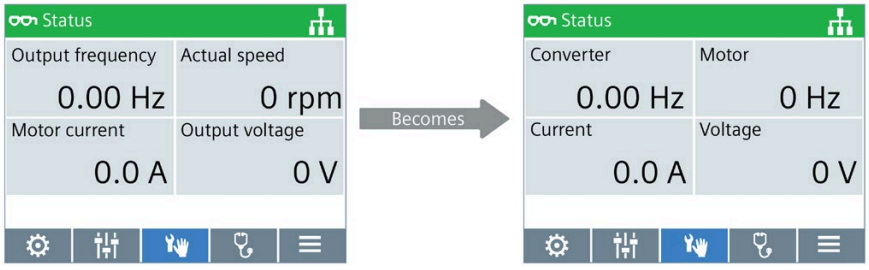


Figure 5-3 Example of defining your own labels

5.5 Updating the IOP-2 firmware

Updating the IOP-2 firmware

The IOP-2 contains firmware, which can be updated by the user by means of a firmware update. To perform the update of the IOP-2 firmware the following steps should be performed.

1. Plug the IOP-2 into a PC using the USB connection. Note: Connect the IOP-2 only to an internal USB interface. Do not use an USB interface which is connected to your PC externally (e.g. via a docking station, external USB-Hub or desktop PCs with front sockets).
2. The IOP-2 will automatically enter the "Mass Storage" mode.
3. Open the file explorer on the PC.

4. Navigate to the IOP-2 (removable media). Note: Back up data (e.g., readme, parameter records) that you will need later on the connected PC.
5. Format the IOP-2 (do not use quick formatting). Set the size of the allocation units to 2048 bytes (FAT Standard).
6. Go to the Service and Support site at the link shown below.
7. Download the zip file with the current firmware of the IOP-2 into a folder on the PC and unpack it into a separate directory.
8. Copy the downloaded files from the PC directory directly into the IOP-2 folder (the copying process takes approximately 6 minutes).
9. When the copying has been completed, wait approximate 5 seconds before disconnecting the IOP-2 from the USB port. The new firmware is now available on the IOP-2 and you can now connect the IOP-2 to a SINAMICS G inverter.
10. When you turn on the SINAMICS G inverter, the IOP-2 will automatically update.

Only IOP-2 firmware update packages obtained through the Siemens Service and Support website at the following link should be used:



IOP-2 firmware download: IOP-2 Firmware update (https://support.industry.siemens.com/cs/ww/en/view/109762019)

Reading the OSS License

The IOP-2 contains open-source software (OSS). The OSS comprises open-source text and satisfies special license terms. If you wish to read the license terms, see: efs/readme_OSS.zip on the IOP-2.

Setup Menu

6

Overview

The IOP-2 Setups are question-driven environment that assist the user to set-up various functions and applications of the converter.

⚠WARNING

Motor Identification (Motor ID) function will run automatically

Using the "Standard Drive Control" or "Dynamic Drive Control" in Quick Setup, the Motor ID function, if selected, is activated at the end of the commissioning sequence.

The motor identification (motor ID) function, after the completion of the Quick Setup, upon the first startup, will start automatically after approx. 8 to 30 s and accelerate the motor to the setpoint speed.

This action must be taken into account when the Quick Setup procedure has been completed, to ensure that the first ON/RUN command when given for your application, does not produce an unpredicted or unsafe effect on personnel, equipment or premises.

⚠WARNING

Safe and stable state of the converter

During the setup of the converter it is essential to ensure that the system is in a safe and stable state, as some setup processes have the potential to start the motor. Therefore it is important to secure any loads and ensure that should the motor start, no potentially dangerous conditions exist.

⚠CAUTION

Default datasets

The Setups use the default Drive datasets (DDS0 and CDS0), if the default datasets are changed to the other datasets, the Setups may not function correctly.

6.1 Example Setups

Overview of Setup

The following examples of how Setup works on the IOP-2 are purely for demonstration purposes only.

⚠ CAUTION
Before setting up an application Prior to using Setup, it is essential that the user's Control Unit and Power Module have been installed and wired correctly, in accordance with the requirements of the user's application. This is extremely important in the case of setting up safety-integrated applications. All inputs and outputs must be defined and configured before any setting up can take place, including the observation and adherence of all local, national and international safety regulations required for the user's application and all devices utilized by the user's application.

Quick Setup/Advanced Setup

Quick Setup

The Quick Setup procedure is all the user needs to setup the converter quickly and easily. The Quick Setup allows the user to configure the following converter data:

- Motor Standard
- Motor Type
- Supply Voltage
- Motor Current
- Motor Power
- Motor Speed
- Motor Voltage
- Motor Frequency
- Minimum Frequency
- Maximum Frequency
- Ramp-up Time
- Ramp-down Time
- I/O Setup

The default settings of the converter will be automatically read into the IOP-2, but it is recommended that you check that these settings are correct for your converter by comparing the settings with the data from the converter and motor rating labels.

Advanced Setup

The Advanced Setup provides the user with a more comprehensive range of settings that can be configured for specific requirements and applications. The settings that are available are as follows:

- Drive Information: This displays detailed information about the connected Control Unit and Power Module.
- Factory Reset: This allows the converter to be reset to the factory default settings.
- Hardware options: This allows the configuring of an Output Filter and a Braking Resistor.
- Control Type: This allows the selection of the control types, Standard Drive Control, Dynamic Drive Control and Expert. A brief explanation of each Control Type is given below.
- Motor Data: This allows the user to configure the Motor settings which consist of the data presented in the Quick Setup.
- Limit Settings: This gives the user the opportunity to setup the dynamic settings of the converter.
- Optimization: This allows the user to optimize the converter for technological applications and ensure that the correct motor data will be used.
- I/O Setup: The I/O configuration is pre-assigned using macros so that no further settings are necessary. Should the user want to reconfigure the Input and Output settings of the converter, the I/O Setup can be used to perform this function.
- Fieldbus Setup: This allows the user to configure the interface settings.
- Application Setup: This allows the user to configure the application specific functions of the converter.

For more detailed information of the application classes, see the document at the link below:



Application classes (https://support.industry.siemens.com/cs/ww/en/view/109480663)

Control Types

Standard Drive Control

- Standard Drive Control is preset for the Power Modules PM240, PM240-2 and G120C in frame sizes FSA-C. This application class can, for example, be used for the following applications:
  - Pumps, fans and compressors with flow characteristic
  - Wet or dry beam technology, mills, mixers, kneaders, crushers, agitators
  - Horizontal conveyor technology (conveyor belts, roller conveyors, chain conveyors)
  - Basic spindles

Dynamic Drive Control

- Dynamic Drive Control is preset for the Power Modules PM240, PM240-2 and PM330 in frame sizes ≥ FSD. This application class can, for example, be used for the following applications:
  - Pumps and compressors with displacement machine
  - Rotary furnaces
  - Extruders
  - Centrifuges

Expert

- Expert is fixed assigned configuration for the Power Modules PM230, PM250 and PM260 and will soon be available for the G120D, G110M and ET200pro FC-2. This setting corresponds to the existing Setup and will also be assigned to existing projects. It allows the flexible setup of the converter, but requires a detailed understanding of the drive.

⚠WARNING

Motor data identification (motor ID)

When selecting motor data identification (motor ID) with subsequent ramp-up to the setpoint speed (p1900 = 11 or 12; 12 = standard setting based on SINAMICS Firmware V4.7 SP3 with "Standard Drive Control" and "Dynamic Drive Control"), the motor is, upon the first Power ON command, directly accelerated to the setpoint speed, following a short delay time caused by the motor ID (approx. 15 to 30 s). From SINAMICS Firmware V4.7 SP6 the default setting for p1900 = 2.

Note

Macro source selection

During the Quick Setup process, the user will be presented with a list of preset macros that determine the configuration of the converter. Every Control Unit Operating Instructions contain a list of the macros that are specific for that particular Control Unit and show the wiring configurations for each macro. For further information, see the relevant Operating Instructions.

INFO Screens

INFO Screens (Information Screens) are accessed with a press of the INFO button. There may be multiple INFO screens and you can navigate between each screen using the arrow keys.

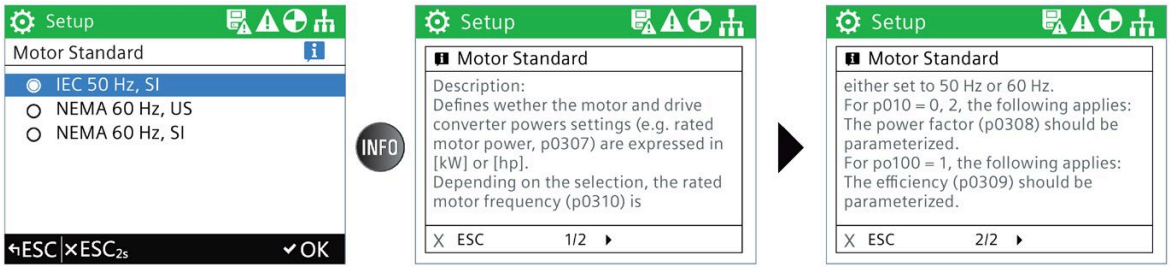
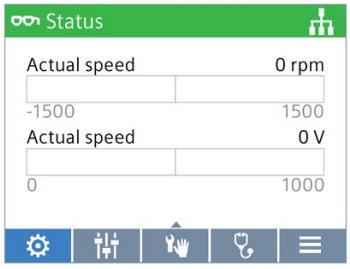


Figure 6-1 Using the INFO button

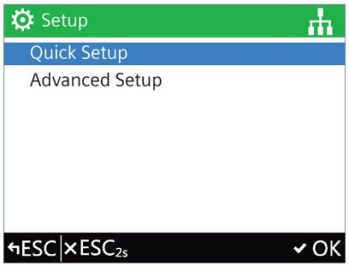
6.1.1 Quick Setup with the IOP-2

Quick Setup

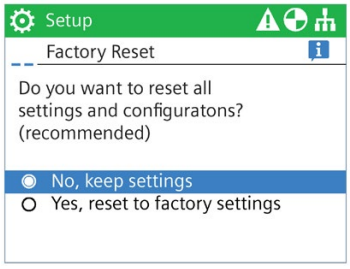
NOTICE
Requirements prior to using the Quick Setup • The user must be fully conversant with all safety instructions as detailed in the "Fundamental Safety Instructions" section of the Operating Instructions for your converter. • The converter must be installed and checked as per the relevant instructions in the "Installation" sections of the converter Operating Instructions. • Macro source selection: During the Quick Setup process, the user will be presented with a list of preset macros that determine the configuration of converter. Every Control Unit Operating Instructions contain a list of the macros that are specific for that particular Control Unit and show the wiring configurations for each macro. For further information, see the relevant Operating Instructions. • The information required to be input into the Quick Setup process can be found on the motor rating label, an example of which is included in the Operating Instructions for your converter. • If the motor is to operate with the "87 Hz characteristic"; You need to use the "Advanced Setup" process and you need to connect the motor in Delta (Δ), this is shown in the "Installation" section of the Operating Instructions for your converter.



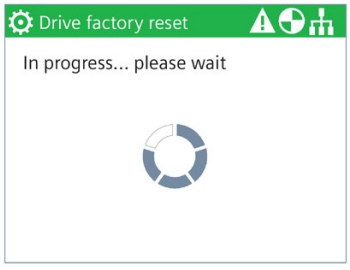
Select Setup



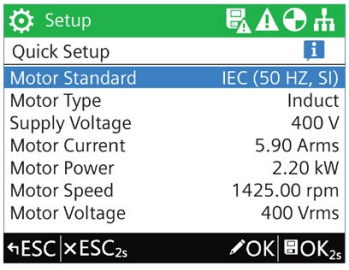
Select Quick Setup



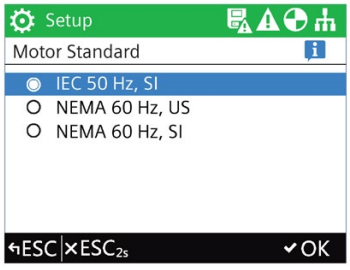
Select Factory Reset (yes or no)



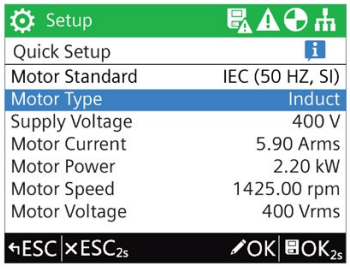
Factory Reset begins



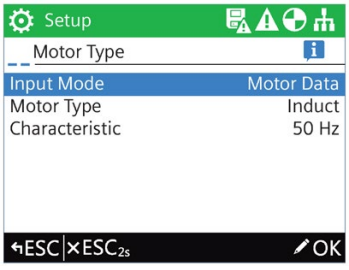
Select Motor Standard



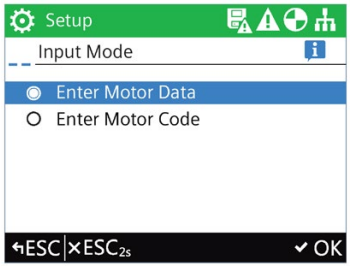
Select mains frequency and units



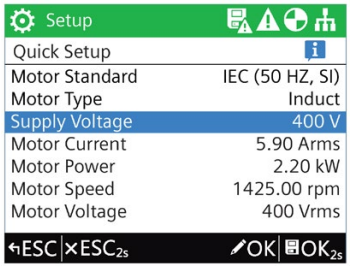
Select Motor Type



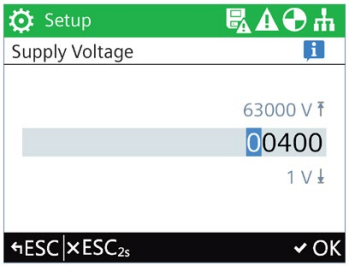
Select Input Mode



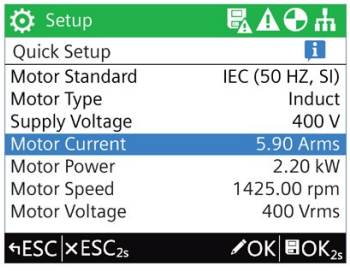
Enter Motor Data or Motor Code



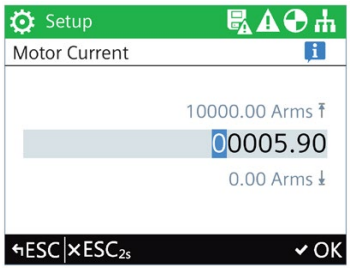
Select Supply Voltage



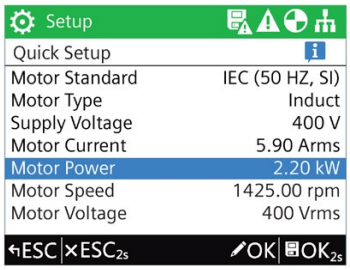
Enter Supply Voltage from rating label



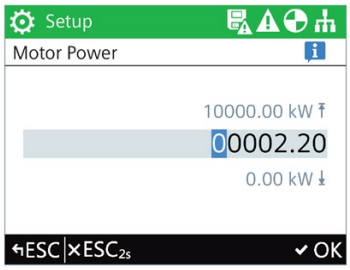
Select Motor Current



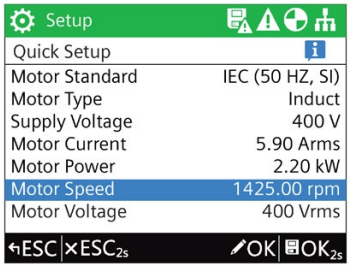
Enter Motor Current from rating label



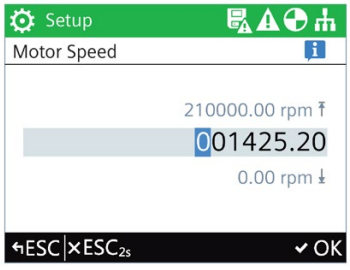
Select Motor Power



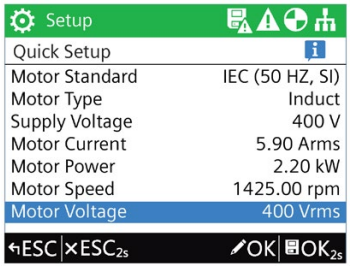
Enter Motor Power from rating label



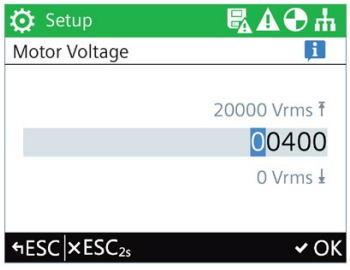
Select Motor Speed



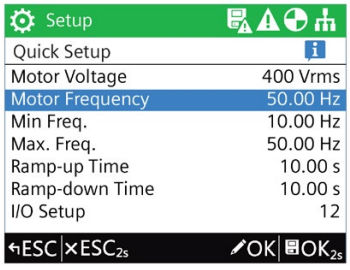
Enter Motor Speed from rating label



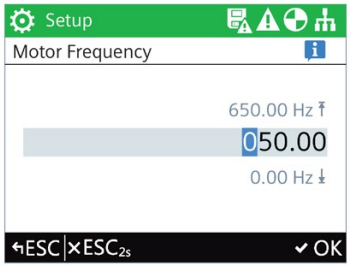
Select Motor Voltage



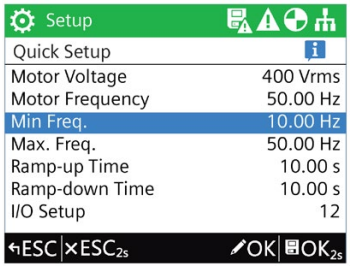
Enter Motor Voltage from rating label



Select Motor Frequency



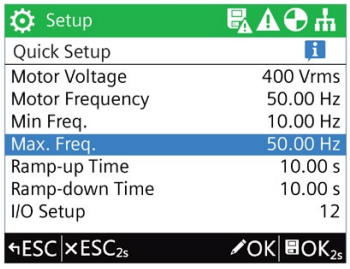
Enter Motor Frequency



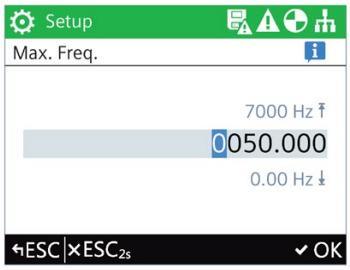
Select Min. Freq.



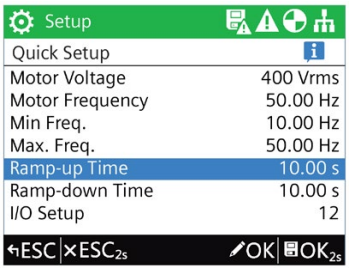
Enter the required Min. Freq.



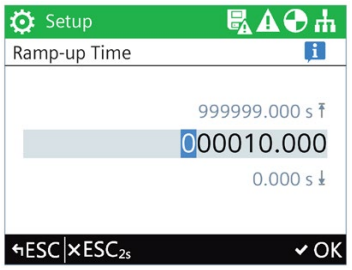
Select Max. Freq.



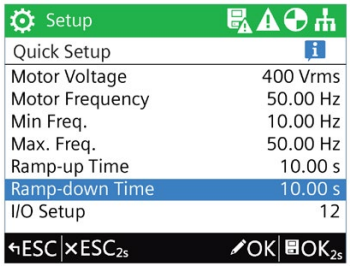
Enter the required Max. Freq.



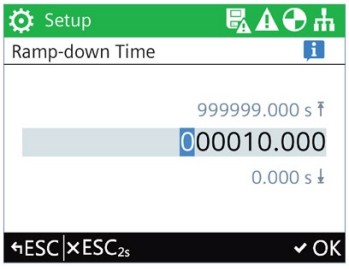
Select Ramp-up Time



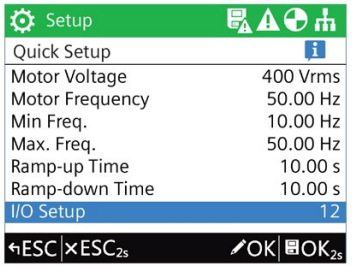
Enter required Ramp-up Time



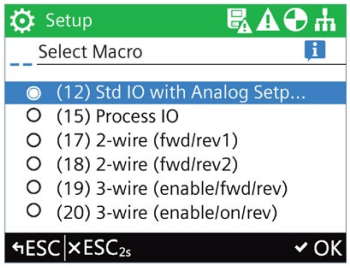
Select Ramp-down Time



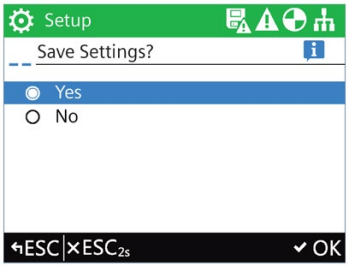
Enter required Ramp-down Time



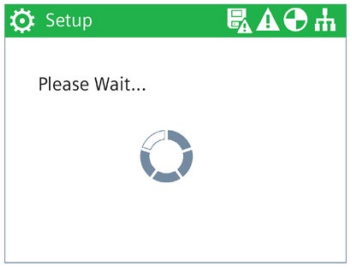
Select I/O Setup



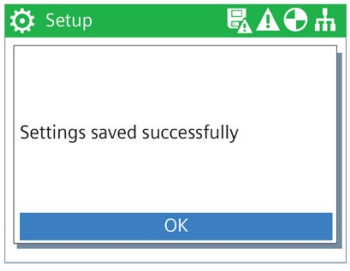
Select the required Macro



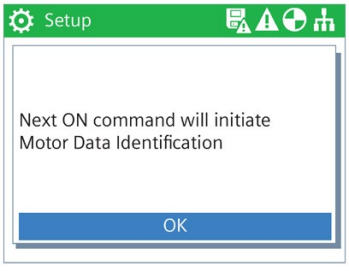
Save the Settings



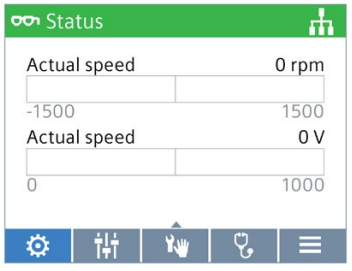
Saving Settings in progress



Settings have been saved



Motor ID ran on next ON command



Setup up completed

6.1.2 Advanced Setup with the IOP-2

Advanced Setup overview

Advanced Setup is a commissioning process for all applications which provides a high degree of flexibility when dealing with the converter settings. The provided settings allow an optimized adaption of the converter to the target application.

The setup process will guide the user through the commissioning process by presenting a number of categories where the user can choose the necessary options and values to commission the converter and motor.

At the conclusion of the setup process, the data can be saved to the converter's memory.

Setup Icons

The setup process uses a number of very important icons to indicate the status of the settings. A description of the various icons is given below.


The settings for the function at the default settings.


The settings for the function have been changed and saved.


The settings for the function must be checked to ensure the safety settings are correct.


The settings for the function must be checked and corrected if necessary.

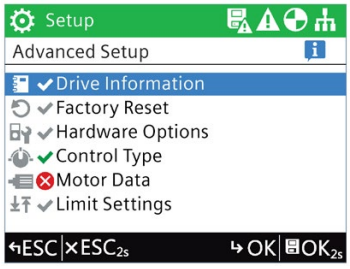

This icon indicates that information is available on the selected function by pressing the INFO key.

Advanced Setup

The Advanced Setup process is outlined below and it should be remembered that the screenshots are for example purposes only and may vary from your own IOP-2 display, depending on the firmware version and the actual converter that is being commissioned.

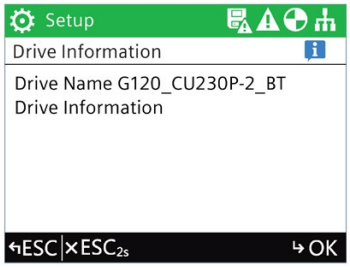
Advanced Setup Menu

This screen lists all the advanced settings that are available for the user to modify for their specific application.



Drive Information

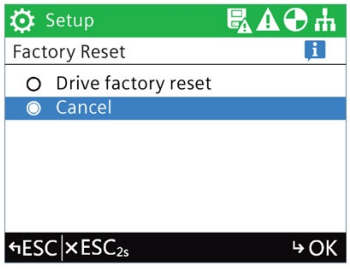
This screen provides general information concerning the used converter configuration (Power Module, Control Unit and the Intelligent Operator Panel IOP-2).



Factory Reset

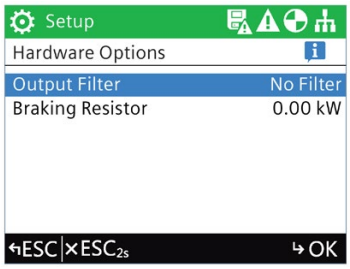
This function resets all the parameters to their factory default settings. Any safety parameters that have been modified will not be reset.

It is recommended that you reset to the factory settings before commissioning the converter.



Hardware Options

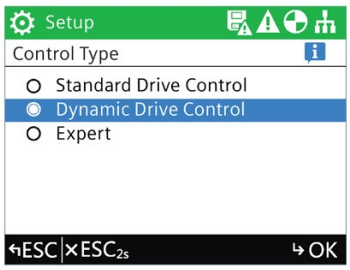
This screen gives the user the opportunity to setup the converter options, for example, an Output Filter or a Braking Resistor.



Control Type

This screen allows the application class to be set.

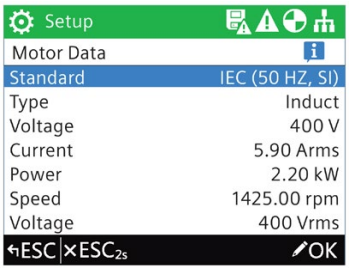
Depending on the particular Power Module, the converter selects the right application class and assigns the motor control the appropriate default settings.



Motor Data

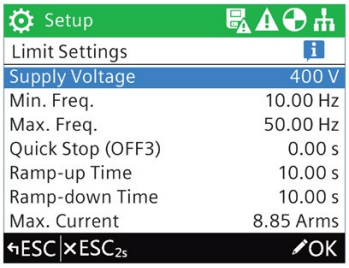
The motor data stored here corresponds to the 4-pole SIEMENS standard motor with the same converter power.

For dynamic applications and when other OEM motors are in operation, adaptation of the settings will need to be made.



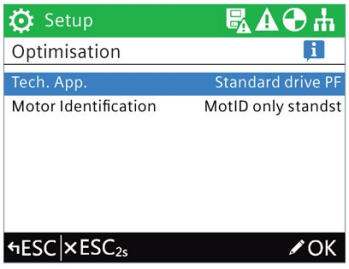
Limit Settings

This screen gives the user the opportunity to setup the dynamic settings of the motor, for example, minimum and maximum motor speed, ramp-up and ramp-down timings and OFF-3 ramp-down time.



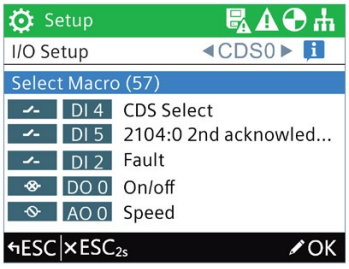
Optimization

This screen allows the optimization the converter for the technological applications and ensures that the correct motor data will be used.



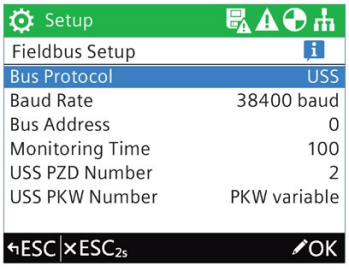
I/O Setup

The I/O Setup allows the pre-assigned configurations (macros) to be modified if necessary.



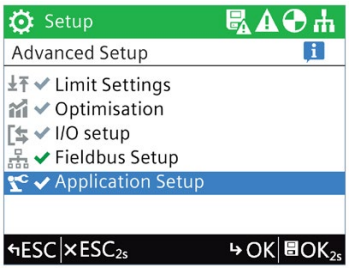
Fieldbus Setup

This screen allows the communications interface settings on the converter to be configured.



Application Setup

This screen allows the application specific functions to be configured. When "Application Setup" is selected, the user is presented with some default application functions, depending on the type of Control Unit that is being used. A grey tick is displayed beside the functions that have not been configured using the IOP-2 and when a function has been configured using the IOP-2, a green tick is shown beside the function in the list.



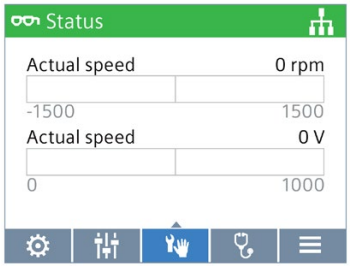
Control menu 7

Overview

The Control menu allows the user to change the following settings in real-time:

- Setpoint
- Reverse
- Jog
- Custom Hand mode
- Startup in Hand mode
- Hand/Auto disable
- PID Hand Mode

The control menu is accessed from the menu at the bottom-centre of the Status screen, as shown below.

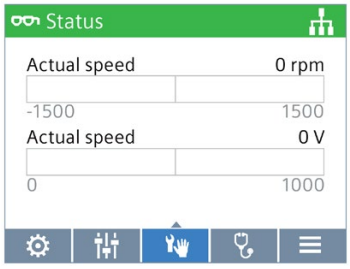


7.1 Setpoint

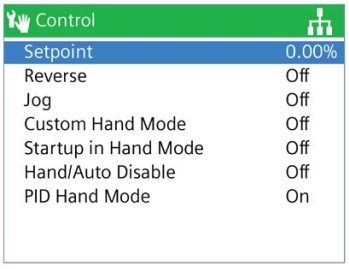
Setting the Setpoint

The setpoint value determines the speed at which the motor runs as a percentage of its full range of motion.

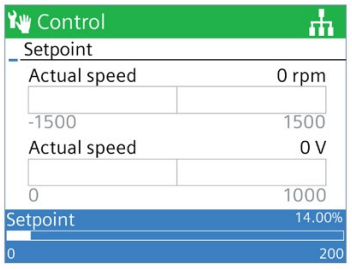
To change the setpoint, the following actions should be performed:



Select Control



Select Setpoint



Use Touch-wheel to set the Setpoint

Note

Setpoint in Hertz (Hz) for SINAMICS CU230P-2

The setpoint screen by default displays the motor speed as a percentage of the total possible speed of the motor.

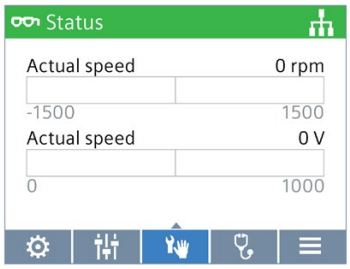
This behaviour changes for the SINAMICS CU230P-2 and SINAMICS G120X where the default setpoint value is displayed in Hertz (Hz).

7.2 Reverse

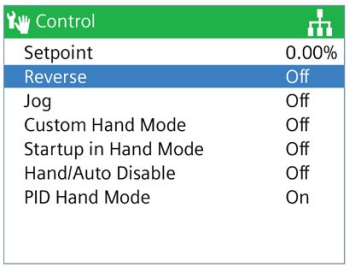
Setting Reverse

The function of the reverse command is to set the direction of rotation of the motor from its normal forward motion.

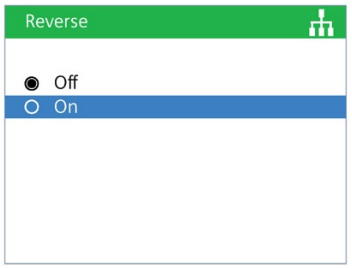
To reverse the direction of the motor, the following actions should be performed:



Select Control



Select Reverse



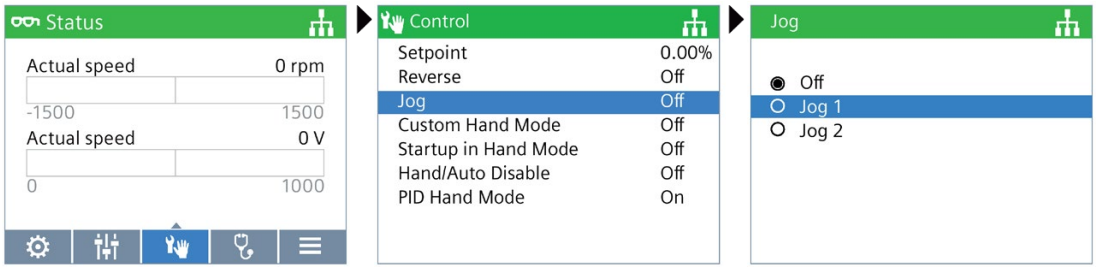
Select Off or On

7.3 Jog

Setting Jog

The Jog function, when selected will allow the motor to be manually rotated by a pre-determined value with each press of . If is pressed continuously, the motor will rotate continuously until is released.

To enable or disable the Jog function, the following actions should be performed:



Select Control | Select Jog | Select Off or On

Note

Selection of Jog frequencies / rpm

It is important that the Jog parameters P1058 and P1059 are set to the required frequencies / rpm for the users application.

7.4 Custom Hand mode

Overview

The custom hand mode allows the user to setup a command source and setpoint source directly from the Intelligent Operator Panel 2 (IOP-2).

When the custom hand mode has been set, the IOP-2 Sensor Control Field can be used as the setpoint source.

The Auto mode is unaffected by any changes made by the custom hand mode function.

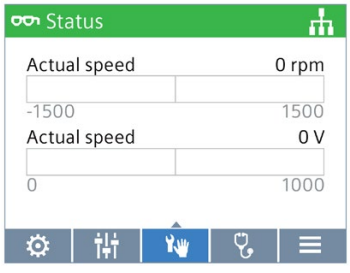
A breakdown of all the interconnection inputs is given in the table below.

An example of setting up the custom hand mode is given in the instructions below.

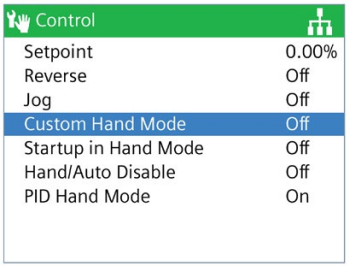
Table 7- 1 Interconnection inputs for Status Word 1 in Custom Hand mode

Standard interconnection				
r8540	**STW 1 from IOP-2**	**Binector Inputs (BI)**	**p8542**	**Effective STW1 in Custom Hand mode**
Bit0	ON/OFF key	->	Bit0	ON/OFF1
Bit1	Two quick press of the OFF key	->	Bit1	OFF2
Bit2	A long press of the OFF key	->	Bit2	OFF3
Bit3	Reserved	->	Bit3	Inhibit/enable operation
Bit4	Reserved	->	Bit4	Ramp-function generator enable
Bit5	Reserved	->	Bit5	Continue ramp-function generator
Bit6	Reserved	->	Bit6	Setpoint enable
Bit7	Alarms menu acknowledge all faults	->	Bit7	Acknowledge faults
Bit8	Jog 1 (Control menu)	->	Bit8	Jog 1
Bit9	Jog 2 (Control menu)	->	Bit9	Jog 2
Bit10	Reserved	->	Bit10	Control by PLC
Bit11	Change direction (Control menu)	->	Bit11	Direction of rotating - reversed
Bit12	Reserved	->	Bit12	Speed control enable
Bit13	Reserved	->	Bit13	Motorized potentiometer, setpoint, increase
Bit14	Reserved	->	Bit14	Motorized potentiometer, setpoint, decrease
Bit15	Reserved	->	Bit15	CDS selection
Standard interconnection				
r8541	**Speed setpoint from IOP-2**	**Connector Inputs (CI)**	**p8543**	**Effective speed setpoint in Custom Hand mode**
	N_soll OP	->		Speed setpoint

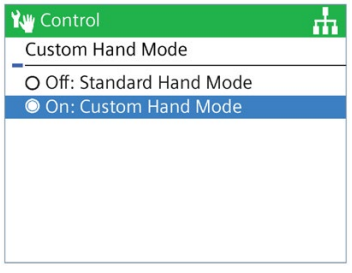
Setting up Custom Hand mode example



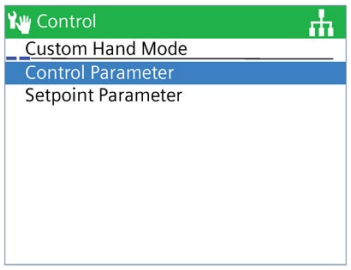
Select Control



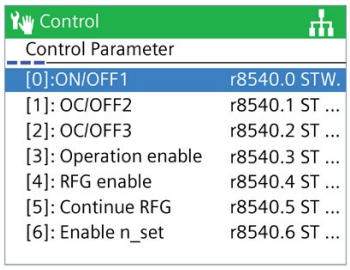
Select Custom Hand Mode



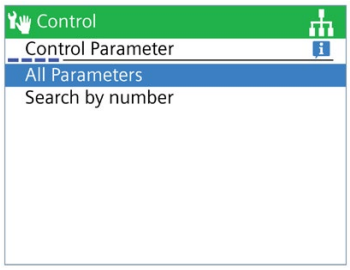
Select On: Custom Hand Mode



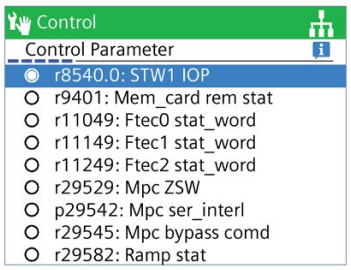
Select Control Parameter



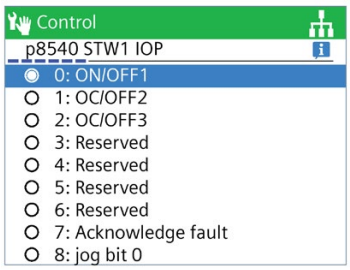
Press OK to search for parameter



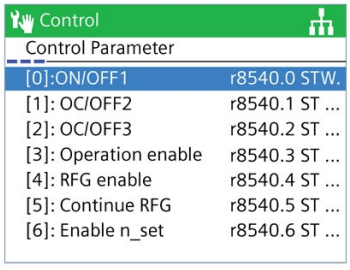
Select All parameters



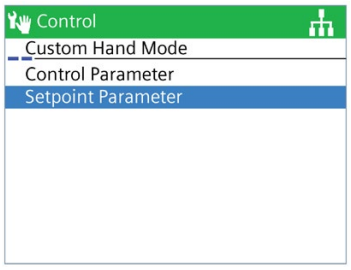
Select the required control parameter



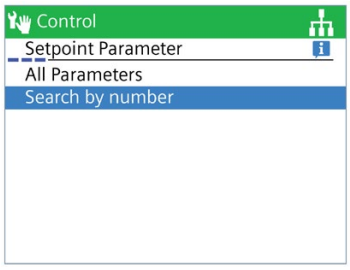
Select the required digital input



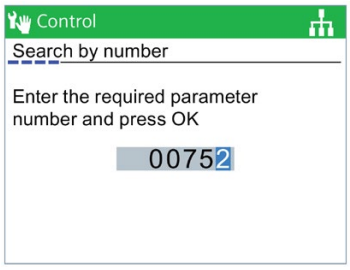
Select another control parameter or press ESC to return to the control parameter screen



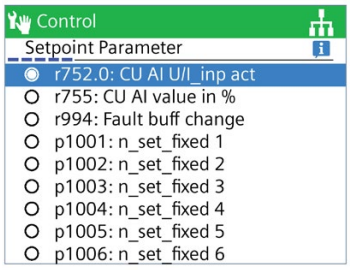
Select Setpoint Parameter



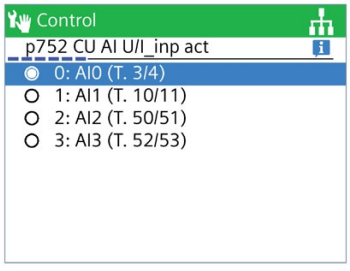
Select search by number



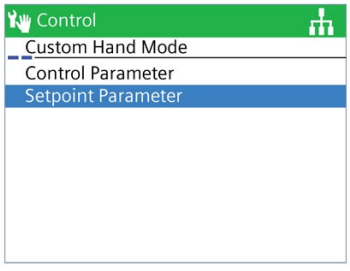
Enter the required parameter number and press OK



Select the setpoint parameter input



Select the required setpoint parameter input signal



Press ESC to finish editing and return to the Control Menu

Once the setpoint signal input has been selected, the IOP-2 will return to the Custom Hand Mode screen then press ESC for >3 secs, to return to the status screen..

In this example, the converter is now setup to receive the ON/OFF1 command from p8540[0] and the speed setpoint from Analog Input 0 (AI0), from the controlling PLC.

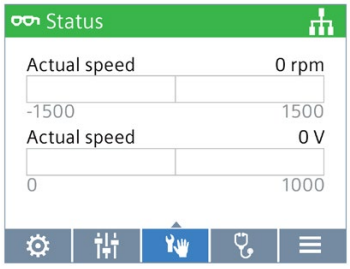
7.5 Startup in Hand mode

Overview

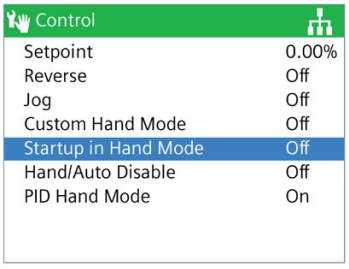
Startup in Hand mode allows the converter, under the control of the Intelligent Operator Panel (IOP-2), to startup in Hand mode automatically. The command source is then taken from the off and on buttons of the IOP-2.

An example of setting up the Startup in Hand mode is given in the instructions below.

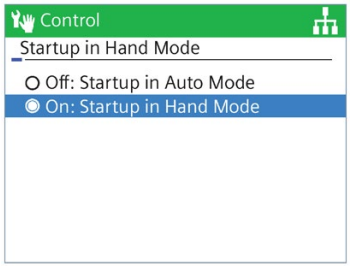
Startup in Hand mode example



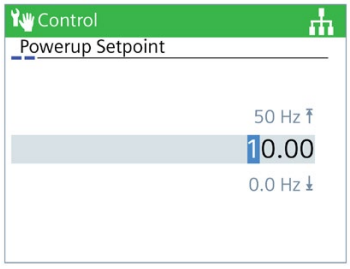
Select Control



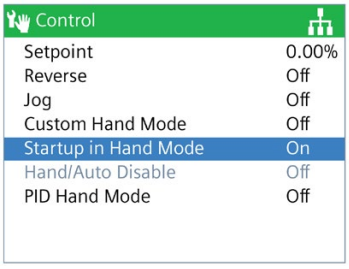
Select Startup in Hand Mode



Select On: Startup in Hand Mode



Set the required Powerup Setpoint speed



Startup in Hand Mode is "On" and Hand/Auto Disable is not selectable

The IOP-2 will automatically return to the Control menu and show that "**Startup in Hand Mode**" is "**On**". "Hand/Auto Disable" is greyed out as it cannot be enabled when "Startup in Hand Mode" has been configured.

The converter, after a power-cycle will automatically startup in Hand mode, but the attached motor will not run until the run command is given by the buttons on the IOP-2.

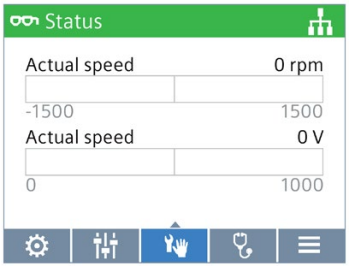
7.6 HAND/AUTO disable

Overview

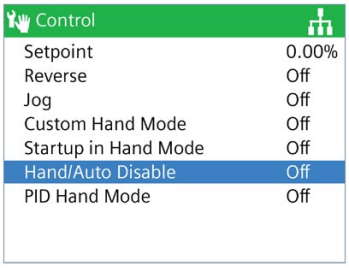
The HAND/AUTO disable function disables the HAND/AUTO key on the Intelligent Operator Panel (IOP-2) and pressing the key will not produce any action by the IOP-2.

An example of setting up the Hand/Auto disable mode is given in the instructions below.

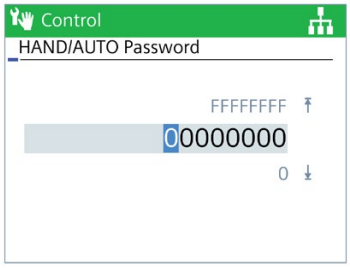
Setting up the HAND/AUTO disable function



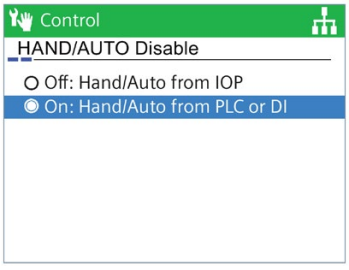
Select Control



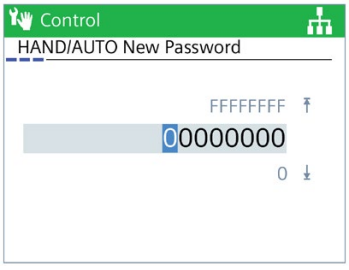
Select Hand/Auto Disable



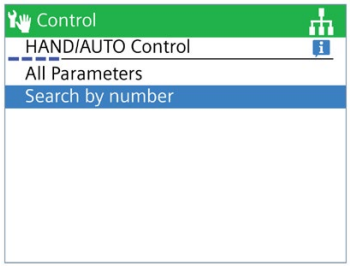
Enter password (default: 00000000)



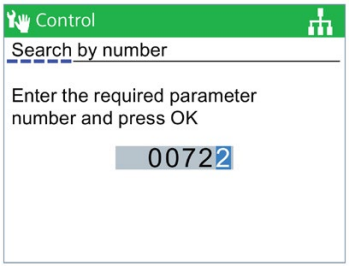
Select On: Hand/Auto from PLC or DI



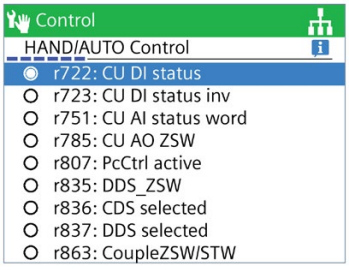
Enter password again or create a new password



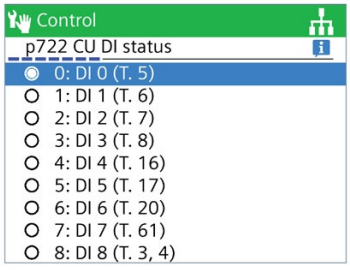
Select Search by number



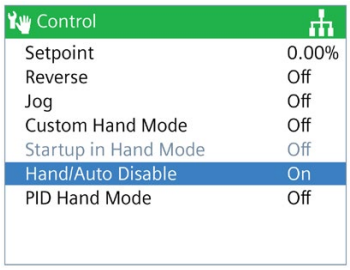
Enter the signal source parameter



Select the signal source



Select the digital input source



Hand/Auto is now enabled. Startup in Hand Mode cannot be selected

The HAND/AUTO button is now disabled and local control of the IOP-2 cannot be activated by the HAND/AUTO button. In this example, the converter is now setup to receive the HAND/AUTO command from Digital Input 0 (DI0).

Note

Power-cycle required to complete the HAND/AUTO disable function

When the HAND/AUTO disable function is initiated the function will not become active until a power-cycle of the IOP-2 has been performed. When the HAND/AUTO disable function is turned off, again, a power-cycle of the IOP-2 is required to complete the deactivation of the function.

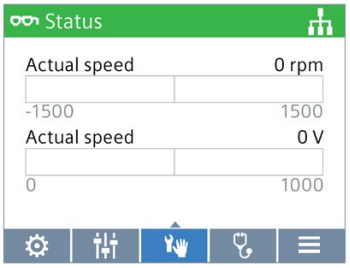
7.7 PID Hand Mode

Overview

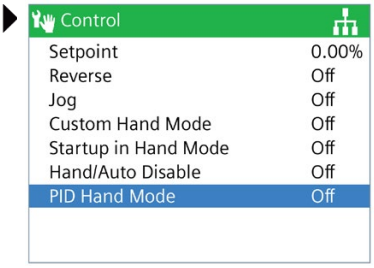
NOTICE
PID Hand Mode is only available for the SINAMICS G120X range of products Currently PID Hand Mode is only available for the SINAMICS G120X (firmware version 1.04 or later) range of products. If you are not using an SINAMICS G120X product, the PID Hand Mode will not be visible on your IOP-2.

The PID Hand Mode of the IOP-2 allows the setting up of a precise process control utilizing the PID controller within the Converter that is driving a motor. The PID loop is used to maintain a process variable, such as the speed setpoint. The desired setpoint speed can be set using the IOP-2 PID Hand Mode function as shown in the example procedure.

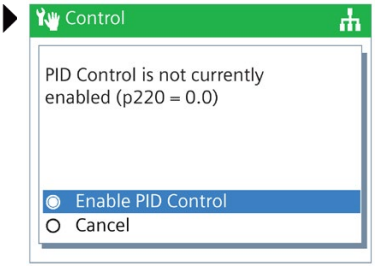
Setting up the PID Hand Mode example



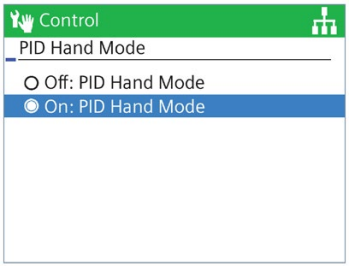
Select Control Menu



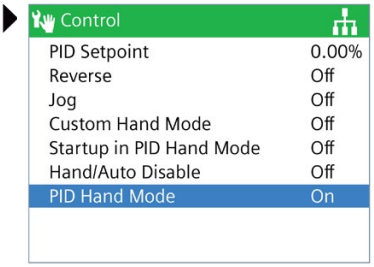
Select PID Hand Mode



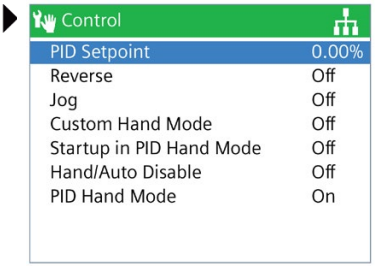
Select Enable PID Control



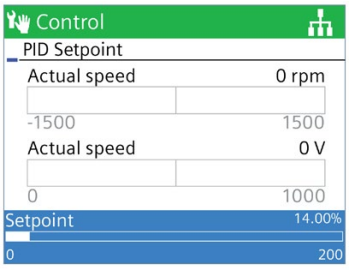
Select On: PID Hand Mode



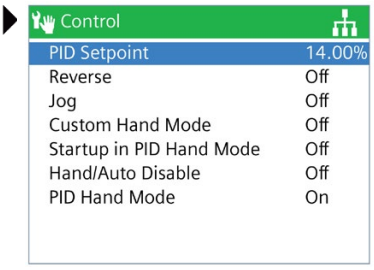
IOP-2 returns to Control Menu



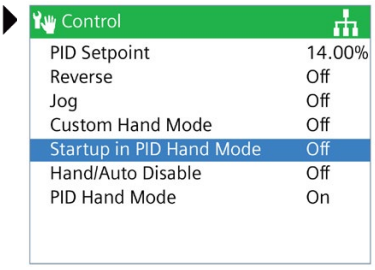
Select PID Setpoint



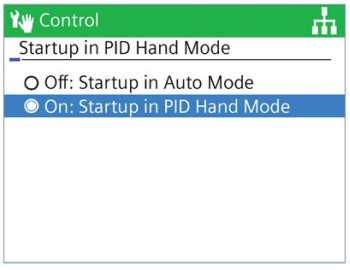
Set the required PID Setpoint



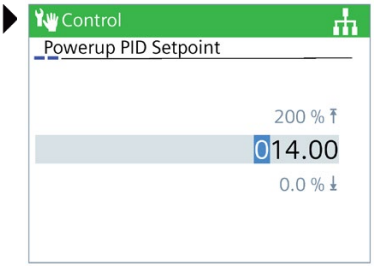
IOP-2 returns to Control Menu



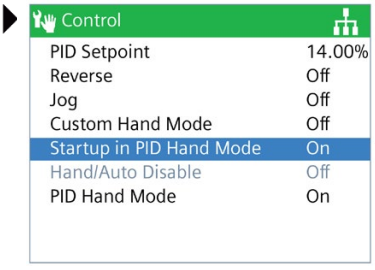
Select Startup in PID Hand Mode



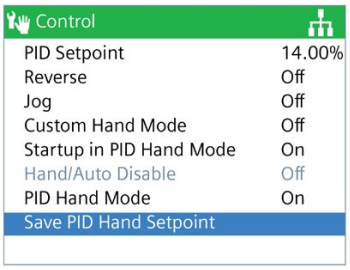
Select On: Startup in PID Hand Mode



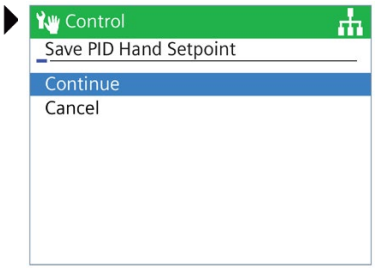
Set the required Powerup PID Setpoint



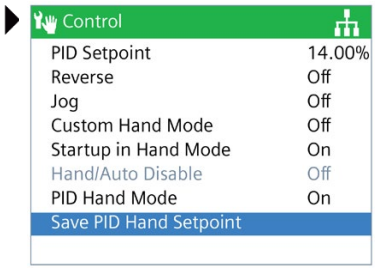
IOP-2 returns to Control Menu



Select save PID Hand Setpoint[1]



Select Continue



IOP-2 returns to the Control Menu

To cancel all PID Hand Mode functions, select PID Hand Mode and turn the function OFF. This will cancel all PID Setpoint functions, including Startup in PID Hand Mode.

[1]"Save PID Hand Setpoint" – This saves the current PID hand setpoint as the Startup in PID Hand setpoint. For example, if the customer has already set a Startup in PID Hand setpoint and has started up their drive and tweaked the setpoint from the PID setpoint screen, this option would save the tweaked value as the new Startup in PID Hand setpoint.

Menu 8

8.1 Menu overview

Overview

⚠ WARNING

Protection of project data files from unauthorized usage

Transportation of project data files have to be secured by technical means, for example, encrypted/signed emails, encrypted/signed USB-sticks etc., especially in the public internet.

Project data files have to be stored with restricted access within the OEM/end customer area, for example, access restrictions to SharePoints, databases, etc. by user management with, for example, the use of credentials.

The "Menu" is selected from the five menu options at the bottom of the IOP-2 screen.

When the "Menu" option is selected the following functions are displayed:

- Setup
- Parameters
- Diagnostic
- Up/Download
- Support
- Extras

By sliding your finger around the Sensor Control Field or using the arrow keys, the required function can be highlighted. Pushing the OK confirms the selection and further sub-menus will be displayed. Pressing ESC once will return the IOP-2 to the previous screen, a longer press will return the display to the "Status" screen.

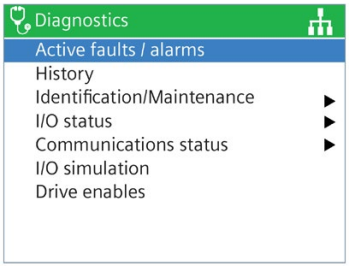
For information on the IOP-2 compatibility, see  Introduction (Page 11).

8.2 Diagnostics

Diagnostics menu

When the diagnostic function is selected the following options are presented:

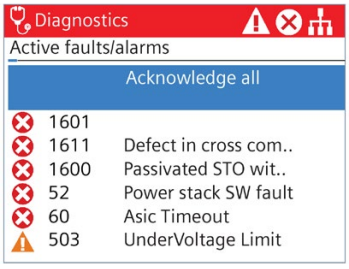
- Active faults/alarms
- History
- Identification/Maintenance
- I/O status
- Communications status
- I/O simulation
- Drive enables



Active faults/alarms

When this option is selected the screen will display any active faults and alarms that have not yet been acknowledged.

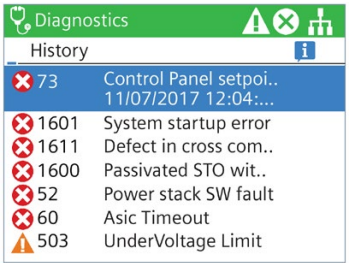
Each fault and alarm can be selected and by pressing the INFO key or the OK key, an explanation of the fault or alarm will be displayed.



History

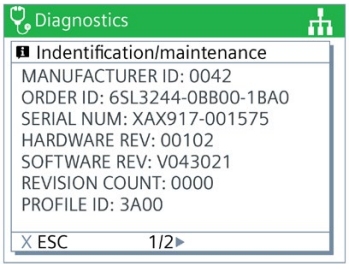
When this option is selected the screen will display a list of all previous faults and alarms with the time that they occurred.

Each fault and alarm can be selected and by pressing the INFO key or the OK key, an explanation of the fault or alarm will be displayed.



Identification/Maintenance

Displays specific technical information regarding the Control Unit and Power Module to which the IOP-2 is attached will be displayed. The actual information displayed depends on the type of Control Unit and Power Module to which the IOP-2 is connected.



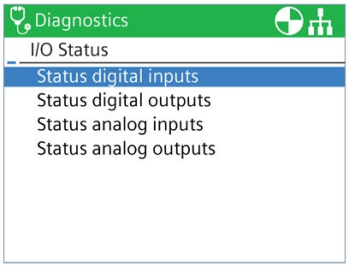
I/O status

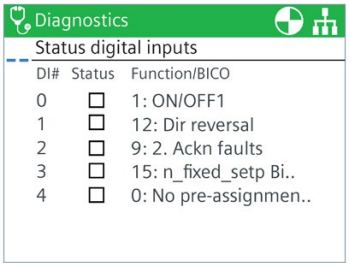
This option displays a list of the digital and analog inputs and outputs of the converter and their current status.

This is an information screen and cannot be changed.

Pressing ESC will return the display to the previous menu.

In the example shown opposite, the status of the digital inputs are displayed.

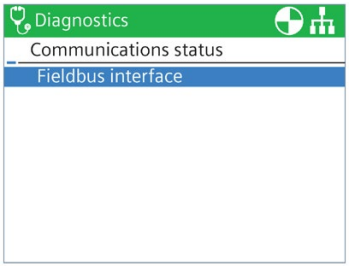


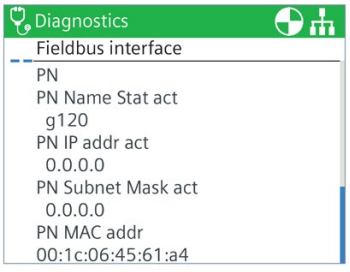


Communications status

This option displays the status of the fieldbus interface and the details of the settings for the data exchange, for example status words and control word lengths.

In the example shown opposite, the status of the fieldbus communications is shown.



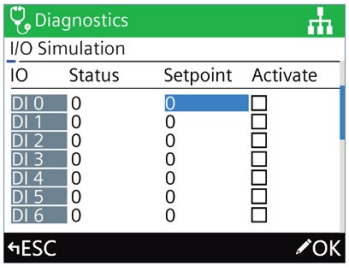


I/O simulation

⚠ WARNING

Loss of control of the converter

- If the converter is started using the I/O simulation and the IOP-2 is removed from the converter it will not be possible to stop the converter running the motor. If the I/O simulation is activated, then only the I/O simulation can be used to stop the converter.
- The simulation is performed in the converter itself and is also retained when the connection with the IOP-2 is interrupted. Therefore, there must be an emergency stop circuit in the hardware. The appropriate measures must be taken by the user.
- Parameter connections for the Analog Outputs and Digital Outputs will be overwritten by the I/O simulation. These parameters should be checked to ensure they have been reinstated after leaving the I/O simulation.



The IOP-2 simulation screen allows digital and analog I/Os to be simulated without the requirement for external signals. These features are of great benefit during commissioning and fault finding, as the user can quickly simulate a situation without using wires, tools and external equipment.

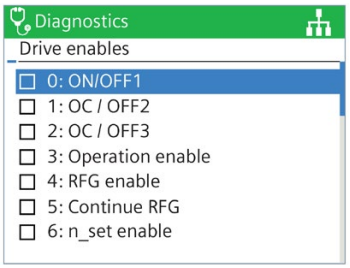
For example:

- A digital input can be made high without any wires in the terminals.
- An analog input or output can be driven to any value without any wires in the terminals.
- A simulation can be overridden and made high.

The screen presents the following options:

- I/O - all I/Os can be simulated individually.
- Status - this indicates the real-time status of the input or output.
- Setpoint - this column displays the editable value that will be simulated.
- Activate - this column will activate / deactivate the simulation for the corresponding I/O.

Drive enables



The drive enables screen displays a list of all the current enabling signals for the converter. If the enable signal is present and active it will be selected ■. If the enable signal is not present and is not active it will be unselected ☐.

This screen is read-only and is for information purposes only.

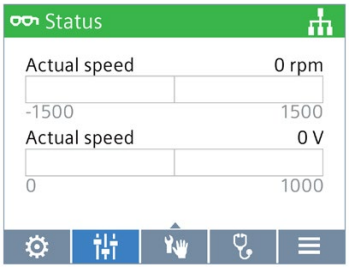
8.3 Parameters

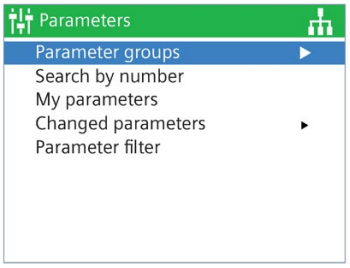
Parameter menu

For information on IOP-2 compatibility, see Introduction (Page 11).

The parameter menu allows the user extensive functionality and access to all the converter parameters. When this option is selected the user is given the opportunity to perform parameter orientated functions grouped in the following manner:

- Parameter groups
- Search by number
- My parameters
- Changed parameters
- Parameter filter

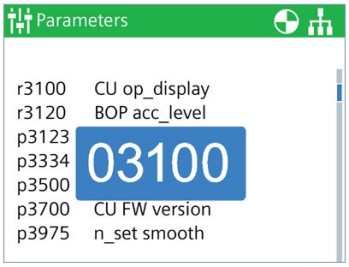




Fast scroll

When searching through any large parameter list, the Fast scroll function will automatically start when the user slides their finger around the Sensor Control Field in a fast motion.

A large blue box will appear on the screen, showing the current parameter number, with each scroll the number will increase by 1000. When the user stops scrolling, the parameter number nearest to the number displayed will be selected.



Parameter groups

All parameters

This option allows the user access to the individual parameters of the converter. The default filter is "Standard" which allows the user access to the most frequently used parameters.

Commissioning

This screen displays a complete listing of all the parameters required for quick commissioning. The parameters are listed in numerical order and can be accessed to either confirm the set values or modified should there be a need to fine tune the application or correct any errors in the parameter values.

Commissioning interface

Allows the communications settings to be configured for the commissioning interface.

Saving & reset

This option allows the user access to all the parameters regarding the saving and reset functions of the converter. Each parameter displays it's currently set value and these can be modified if required.

System information

This screen displays all the parameters that contain system information regarding the converter. The majority of these parameters are read-only and are for information purposes only.

Basic settings

Displays the effective Drive Data Set (DDS). Each basic setting can be selected and modified if necessary.

Inputs/outputs

This option allows access to all the available parameters to configure the digital and analog I/Os.

The user can navigate through the various inputs and outputs to see the current configuration of the inputs and outputs and, if necessary access the parameters directly to modify their values.

Setpoint channels

This option allows the user to display and modify the setpoint parameters.

Operating mode

This option allows the user to display and modify the operating mode parameters.

Drive functions

This option allows the user direct access to the parameters regarding the drive functions.

It is important that if any parameters concerning the above mentioned functions are to be modified, that the converter/motor system is in a safe state prior to the parameter changes.

Communications

This option allows the user direct access to the parameters that control and configure the communications fieldbus of the converter. The parameters can be viewed to confirm their settings and values, they can also be modified if they are not read-only parameters.

Diagnostics

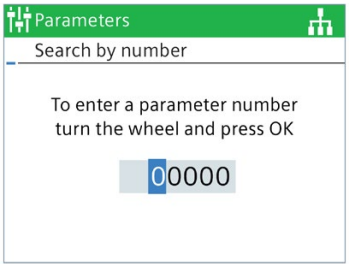
This option allows the user direct access to the parameters that monitor the state of the system.

All the parameters under these groupings are read-only and cannot be modified.

Search by number

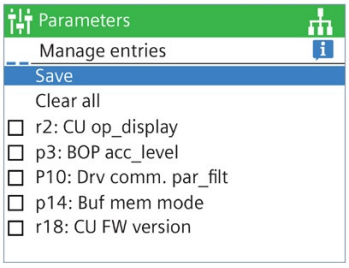
This option allows the user to search for a specific parameter number.

If the parameter number does not exist, the screen will display a choice between "Select a new number" or "Go to the nearest parameter number".



My parameters

This option allows the user to select the parameters that they wish to list. The user is presented with a list of parameters that can be selected. Once selected - only those parameters are displayed when the "My Parameters" option is selected. There are additional options that allow the user to manage their list of parameters.

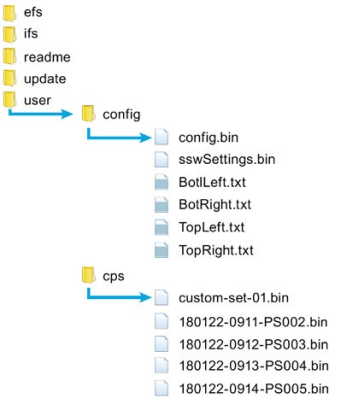


Copying the "My Parameters" list to another IOP-2

When a "My Parameters" list is created, it saves the lists in the **config.bin** file on the IOP-2.

To copy the config.bin, the following procedure should be performed:

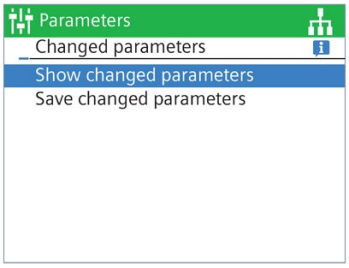
1. Connect the IOP-2 via the USB to your PC (the IOP-2 will enter "Mass Storage" mode.
2. Navigate to the **config** folder (shown in the screenshot).
3. Copy the **config.bin** file to a suitable location on your PC.
4. Disconnect the IOP-2 and connect a new IOP-2 and copy the **config.bin** file to the new IOP-2.



Changed parameters

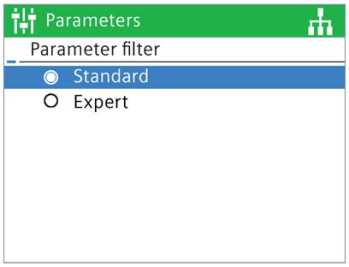
When the "Changed parameters" option is selected the IOP-2 will search the converter parameter list for all the parameters that have had their values changed from the factory default settings.

The list of changed parameters can either be displayed on the IOP-2 screen or it can be saved to a ".CSV" file in the "\user\cps\" folder on the IOP-2.



Parameter filter

This option allows the user to select the parameter access level. Standard is the default access level, which gives the user access to the most frequently used parameters. Expert level gives access to all available parameters.



8.4 Protecting the converter settings

Overview

Once the converter has been fully commissioned for the required application, it is possible to protect the final settings with one of the three different protection modes:

- Know-how protection - Allows the settings of the converter to be protected against unauthorized viewing or changes. It can be configured in a number of different ways, which will be explained in the relevant section in this chapter.
- Absolute Know-protection - Allows the settings of the converter to be permanently protected against unauthorized viewing or changes. Once configured you can only gain access to the settings by performing a drive factory reset; causing all settings to be returned to their factory default setting.
- Write protection - Prevents accidental changes to the settings of the converter.

Know-how protection

CAUTION

Know-how protection should be enabled last

Before enabling the Know-how protection function, all commissioning and configuration of the converter must first be completed. If Know-how protection is enabled prior to the completion of all the necessary commissioning and configuration steps, it may prohibit the completion of the commissioning and configuration process.

Know-how protection is designed to prevent unauthorized viewing or changes to the parameter settings of the converter. It can also be configured to allow or prohibit the copying of the parameters from one converter to another converter.

There are four different types of protection available in the configuration menu:

- **Know-how protection without copy protection** - You can transfer the converter settings to other converter using a memory card (MMC), If no selection is made in the 'Configure' screen, then 'Know-how protection without copy protection' is the default method that will be implemented.
- **Know-how protection with basic copy protection** - After replacing a converter, to be able to operate the new converter with the settings of the replaced converter without knowing the password, the memory card must be inserted in the new converter.
- **Know-how protection with extended copy protection** - It is not possible to insert and use the memory card in another converter without knowing the password.
- **Permit trace** - Allows the diagnostic trace and measurement functions to be performed on the converter. This option will only appear if your converter has trace function capability.

When know-how protection is active the following protections are provided:

- The values and setting of parameters are invisible.
- Read-only (r) parameters remain visible.
- In addition, you can define an exception list which will allow parameters to be viewed or changed by the user.
- Adjustable parameters cannot be changed using any of the commissioning tools
- Locked functions:
  - Automatic controller optimization
  - Stationary or rotating measurement of the motor data identification
  - Deleting the alarm history and the fault history
  - Generating acceptance documents for safety functions
- Executable functions:
  - Restoring factory settings
  - Acknowledge faults
  - Displaying faults, alarms, fault history and alarm history
  - Reading out the diagnostic buffer

When know-how protection is active, support can only be provided (from Technical Support) after prior agreement from the machine manufacturer (OEM).

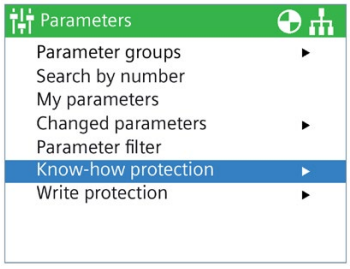
⚠CAUTION

Copy protection will not work without the correct memory card

If the copy protection functions are selected/enabled and the correct type of memory card is not inserted into the converter, the copy protection function will fail.

To use copy protection the following memory card must be used: **Siemens MMC card, order number: 6SL3054-4AG00-2AA0**

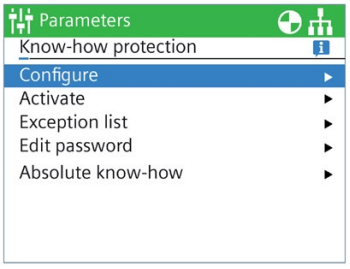
Example of enabling Know-how protection



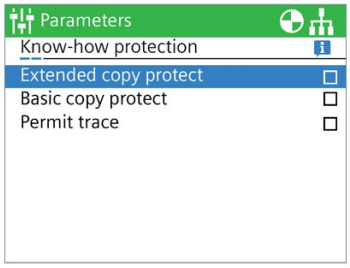
Select 'Know-how protection'



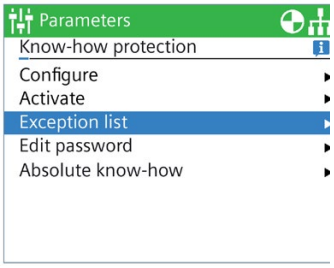
Password warning is displayed. Press OK to continue



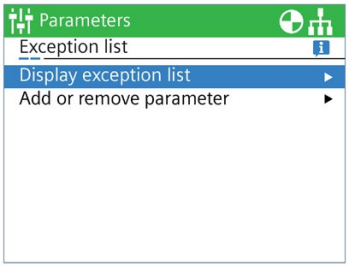
Select 'Configure'



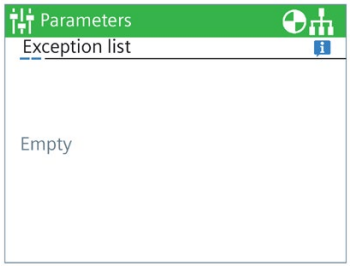
Select the required functions. Press OK to continue



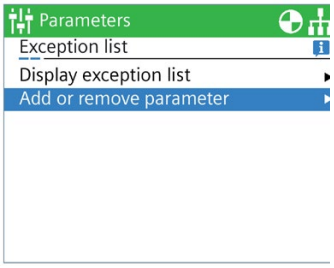
Select 'Exception list'



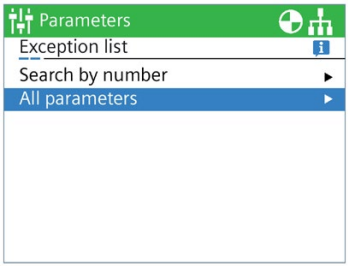
Select 'Display exception list'



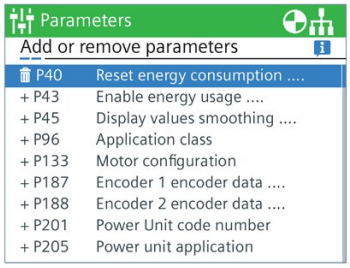
Parameters contained in the exception list are displayed. Press ESC

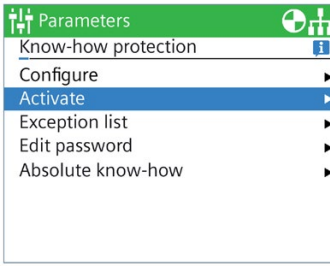


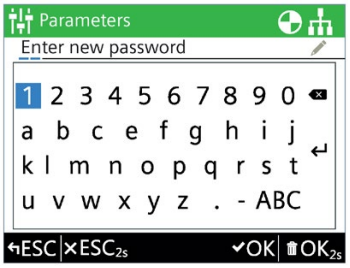
Select 'Add or remove parameter'



Select 'All parameters'



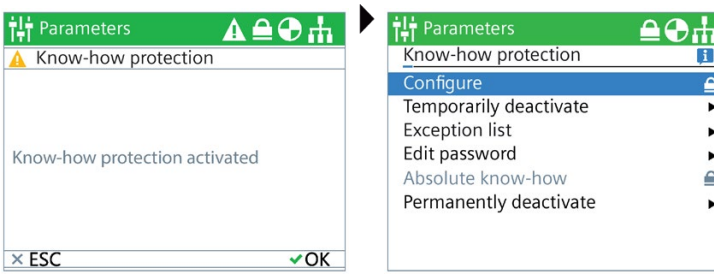




Select required parameters and add or delete by pressing OK

Select 'Activate'

Enter a new password and then confirm password



Know-how protection is now activated. Press OK

Menu now contains additional options that can be selected.

Temporarily deactivate and Permanently deactivate Know-how protection

Once Know-how protection has been activated two additional options appear in the menu, these are:

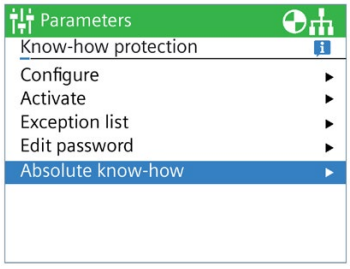
- Temporarily deactivate - This allows the Know-how protection to be deactivated, for example, a parameter change is required. When the converter is restarted, Know-how protection will be fully activated.
- Permanently deactivate - This allows the Know-how protection to be deactivated as if know-how protection was never active.

If you select 'Temporarily deactivate' the password must be entered before deactivation can occur. If you then select 'Permanently deactivate' the password is not required. If you only select 'Permanently deactivate' the password is required.

Absolute Know-how protection

Absolute Know-protection allows the settings of the converter to be permanently protected against unauthorized viewing or changes. Once configured you can only gain access to the setting by performing a drive factory reset; causing all settings to be returned to their factory default setting.

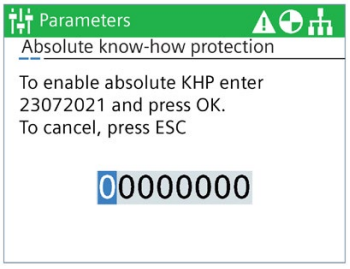
Example of enabling Absolute Know-how protection



Select 'Absolute Know-how'



Absolute KHP warning is displayed



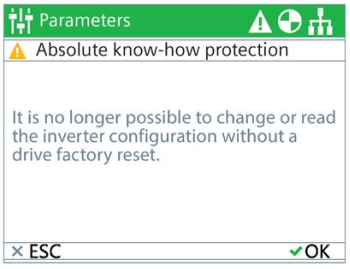
Enter 23072021 to confirm activation



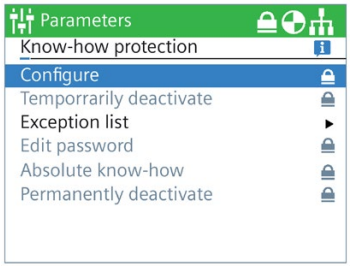
Absolute KHP warning is displayed. Press OK to continue



Enter password and confirm password



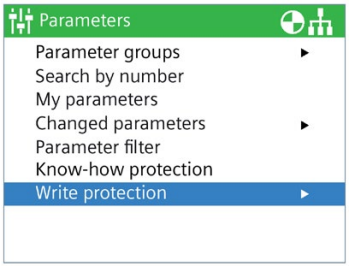
Absolute KHP notice is displayed. Press OK to continue



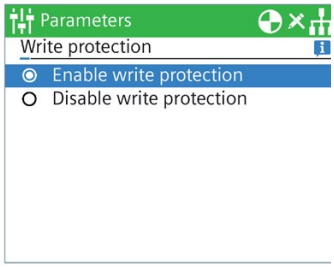
KHP menu is now displayed with the locked functions greyed out.

Write protection

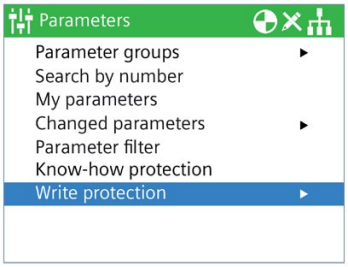
Write protection, when enabled, stops all writeable parameters from being changed. All parameters can still be viewed and no password is required to activate or deactivate this function. Write protection can be turned off by selecting 'Disable write protection'.



Select 'Write Protection'



Select 'Enable write protection' and press ESC



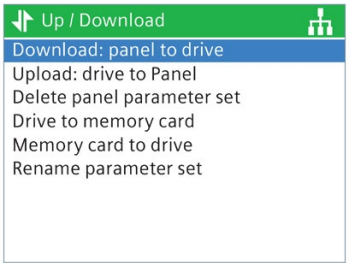
Write protection is activated and the write protect symbol is displayed

8.5 Up/Download

Overview

The upload and download options allow the user to save parameter sets to the various memory storage that is available to the system.

For further information on saving, copying, cloning and creating custom parameter sets, see Customer parameter sets (Page 71).



⚠WARNING

Unexpected behavior of converter

During the transfer of data to and from the converter, it is essential that the transfer is not interrupted and the process is allowed to be completed. If the process is interrupted, it is possible that the data could be corrupted and the system may behave in an unexpected manner. Should an interruption of the transfer process occur, then it is highly recommended that a factory reset of the converter is performed prior to any further parameterization or giving the converter control of the application.

Fault screen during up/download

If during the up/download process a fault occurs and the fault screen is displayed, press ESC if you wish the up/download to be continued. If OK is pressed, it will cancel the up/download process.

Safety Parameters

If safety parameters are to be downloaded a function test of the safety functions has to be performed. Please refer to the "Safety Integrated Function Manual" which can be found at the hyperlink below:



Safety Integrated Function Manual
(http://support.automation.siemens.com/WW/view/en/50736819)

Using the IOP-2

The IOP-2 must be handled with particular care for all SINAMICS devices that use an IOP-2 so that no malicious software or erroneous parameterizations are spread between different commissioning PCs or inverters.

⚠WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing files onto exchangeable storage media amounts to an increased risk of infection of the commissioning PCs, e.g. with viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software using appropriate protection measures, e.g. virus scanners.

⚠WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing the parameterization (incl. Safety Integrated parameterization) on exchangeable storage media carries the risk that the original parameterization (with Safety Integrated) will be overwritten, for example, by the IOP-2 of another drive without Safety Integrated. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Ensure that only the IOP-2 that belongs to the respective converter is used.
- Ensure that only trained or authorized personnel have access to the enclosures, cabinets or electrical equipment rooms.

NOTICE

Only changed parameters will be copied

When using the 'Panel to drive' or the 'Drive to panel' functions of the IOP-2, only those parameters that have been changed/modified will be copied. Parameters that are set at their default settings will not be copied.

Command Line Interface (CLI)

Overview

The CLI function allows the user to create a custom parameter listing and download the listing directly to the drive using the IOP-2 download process.

The CLI file can be created using a suitable text editor, for example, the Windows Notepad application. The format of the CLI is as follows:

wrp <number> <index> <value>

Where wrp is the command to write a parameter, followed by the parameter number, the parameter index and the parameter value. For example, to write a parameter to the drive to set the Ramp-up time to 5 seconds, the following format would be used:

wrp 1120 0 5.0

Each parameter in the listing must be on its own line, with no excess spaces between the individual components of the command line, followed by a return.

Once the file has been created, the file should be stored on the IOP-2 in the "*user/cps*" folder with the file extension cli, for example, ramp.cli.

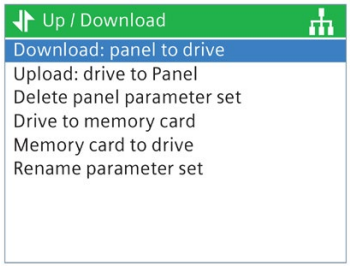
The naming of the file follows the normal conventions and is restricted to only the ASCII character set, but it is suggested that the file name should be in lower case with only numbers and letters without spaces, followed by the correct file extension.

List of commands

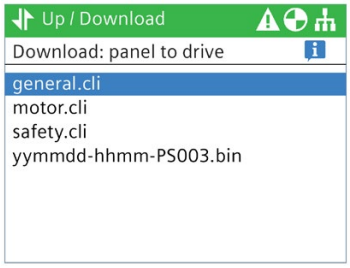
Command	Format	Example	Remarks
Write a parameter	wrp <number> <index> <value>	wrp 1120 0 5.0	Set P1120 to 5 seconds
Read a parameter	rdpw <param> <index> <value> <timeout ms>	rdpw 10 0 0 5000	Wait 5 seconds for p10 to go back to 0
Read a BICO parameter	rdpw <param> <index> <param> <index> < timeout ms>	rdpw 840 0 722 5 1	Allows 1 ms to confirm the OFF1 signal is set to Digital Input 5
Write a BICO parameter	wrp <param> <index> <param> <index/bit>	wrp 840 0 722 0	Set on/off to Digital Input 0
Write a BICO parameter 1 or 0	wrp <param> <index> <1/0>	wrp 1070 0 1 1	Set signal source is set 100%
To set parameter index bit high or low	<wrpbit><param><index><bit><0/1>	wrpbit 108 0 18 1	Activate Free Function Blocks
Comment	rem <text>	rem This is a comment line	Only one comment on each line

Downloading procedure

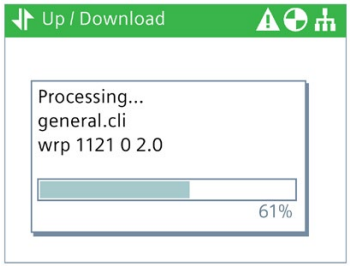
1. Navigate to the Up/Download screen and select "Download: panel to drive".



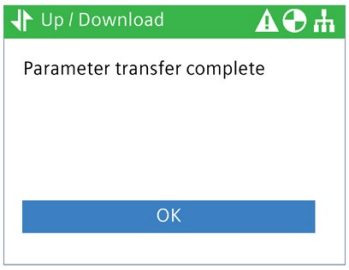
2. Select the CLI file to be downloaded to the drive.



3. A progress screen will be displayed, indicating the status of the download.

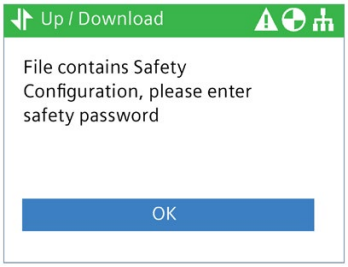


4. When the download is completed, the "Parameter transfer completed" will be displayed. Press OK to return to the main download screen.

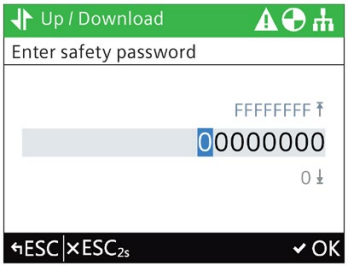


Safety parameter download

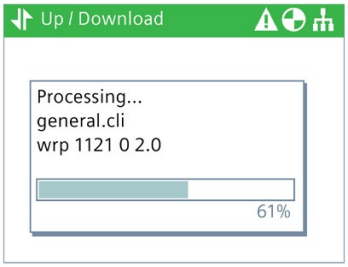
1. If Safety parameters are contained within the CLI file, the user will be prompted to enter the safety password.



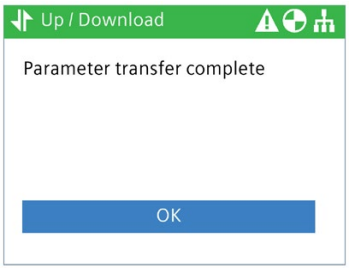
2. Enter the safety password and press OK.
   If the correct password has not been entered, the download process will be stopped.



3. A progress screen will be displayed, indicating the status of the download.



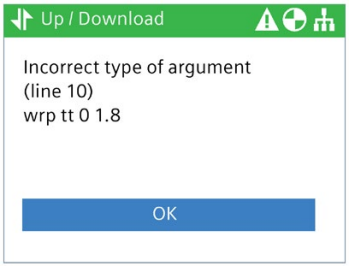
4. When the download is completed, the "Parameter transfer completed" with be displayed.
   Press OK to return to the main download screen.



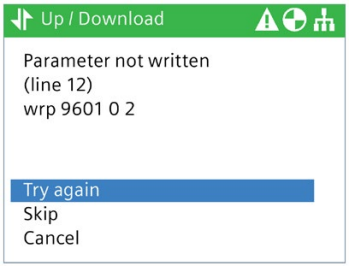
Error messages

> **WARNING**
>
> **Unexpected behavior**
>
> If the download process is canceled for any reason, all parameters that have been overwritten by the download process will remain changed. The drive may be in an unknown state and its behavior may not be as expected. A factory reset should be performed to ensure that the drive is in a known, safe state.

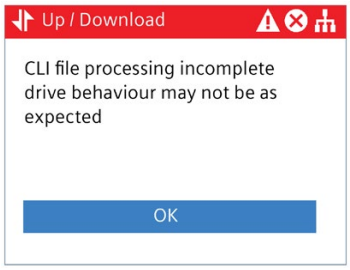
1. **Incorrect type of argument**
   The format of the parameter in the file does not conform to the required format.
   Press OK will return the IOP-2 to the download screen.
   Remedy
   Edit the CLI file and correct the formatting of the parameter, in this case, delete the "tt" and replace it with the correct parameter number then restart the download process.



2. **Parameter not written**
   The parameter could not be written to the drive because the parameter was not set to the correct value or range of the index.
   The user has three options:
   Try again: The IOP-2 will attempt to write the parameter to the drive again, but if it is a restricted parameter it will fail again. If successfully written, the download process will continue until it has completed.
   Skip: Ignore the parameter and do not attempt to write it to the drive. The download will continue until it is completed.
   Cancel: The download process will be canceled and the IOP-2 will return to the normal download screen.



3. The download of the parameters to the drive was not completed successfully.
   Press OK to return to the normal download screen.



8.6 Support

Overview

The Support function on the IOP-2 allows the user to access Siemens Customer Support assistance and information in a number of ways depending upon the individual requirements.

Industry Online Support

The Online Support option gives the user the ability to gather technical information about the connected whole system, or an individual component of the system, such as Order number, Serial number, firmware version, active alarms.

When the generated 2D matrix code is scanned (in the example below, using the Siemens app) the user is presented with all the available technical information for their device, for example, Serial numbers, Version numbers, FAQs, Manuals, Certificates, Product Notes, Downloads and Application examples, plus the ability to initiate a Technical Support request.

Local Siemens Partner Support

This option takes the user to the Siemens online Industrial automation help site.

After completing some very simple dropdown menu selections, the contact details of the Local Siemens Partner for your region is displayed.

Download the Siemens App

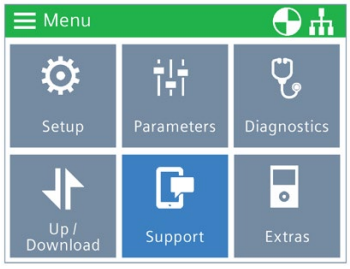
You can download the necessary Siemens app using the menu item "Download the Siemens App" which will take you to the appropriate Siemens site that will direct the user to the correct site for either Android or iPhone Smartphone platforms.

The Siemens mobile app site is given at the link below:

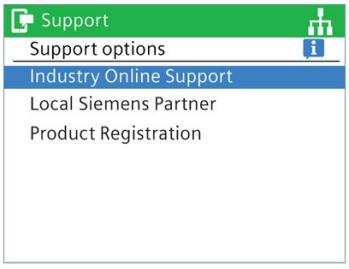
Siemens mobile app (https://support.industry.siemens.com/cs/ww/en/sc/2067)

Industry Online Support example

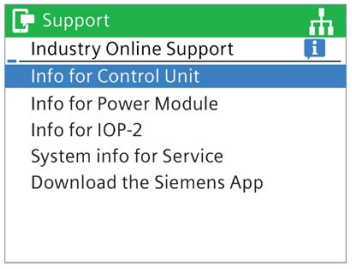
A brief example of the various options is shown below:



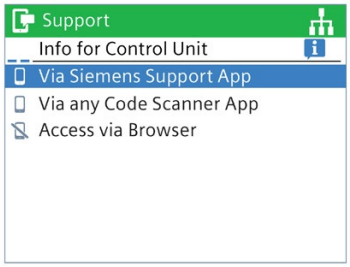
Select "Support" option from menu



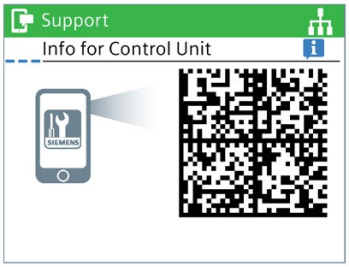
Select "Industry Online Support"



Select the information you wish to provide



Select the device used to scan the code

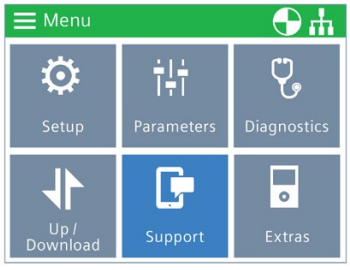


Scan the code

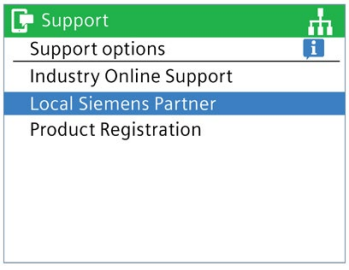
Once scanned with the Siemens app, the user is presented with the product information for their device.

The product information includes, Serial numbers, Version numbers, FAQs, Manuals, Certificates, Product Notes, Downloads and Application examples, plus the ability to initiate a Technical Support request.

Local Siemens Partner example



Select "Support" option from menu



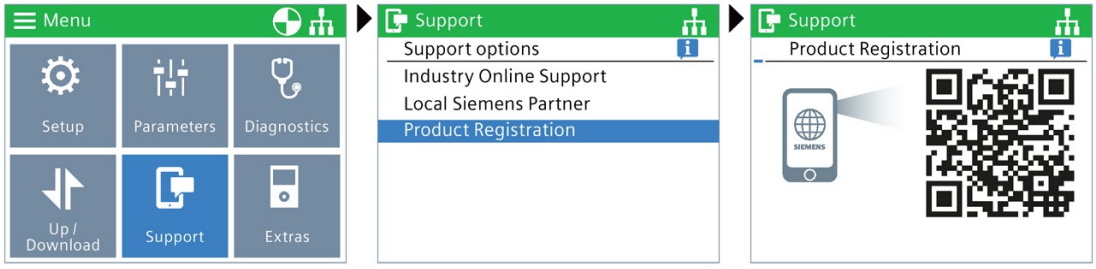
Select "Local Siemens Partner"



Scan the QR code

When the QR code is scanned, the user is taken to the Siemens Industrial support site. After selecting the correct country, region, the user is given the contact details of their Local Service Partner.

Product Registration example



Select "Support" option from menu

Select "Product Registration"

Scan the QR code

When the QR code is scanned, the user is taken to the Siemens Industrial support site, where the registration information for your product can be entered and submitted to complete the registration process.

8.7 Customer parameter sets

Overview

Custom parameter sets can now be created and stored on the Intelligent Operator Panel (IOP-2).

The IOP-2 can store up to 255 parameter sets with customized names.

The steps to create and store a custom parameter set on the IOP-2 is given in the procedure outlined below.

Note

Custom parameter set filename limitations

Although the filename for a custom parameter set can be up to 96 characters in length, if all the filenames are 96 characters long, it will eventually limit the number of parameter sets that can be saved on the IOP-2.

This is due to the specialized nature of the IOP-2's internal memory system.

Standard parameter set access

New standard parameter sets can be uploaded from the drive to the IOP-2, these files will be stored in the "user/cps" folder on the IOP-2.

Parameter set naming convention

The IOP-2 automatically names the uploaded parameter sets using the following naming convention:

yymmdd-hhmm-PS???, where ??? is the sequential parameter set number.

When the IOP-2 is connected to a Control Unit with a Real-Time Clock (RTC), it will display the parameter set filename with the current time and date stored on the IOP-2, for example, 180125-1126-PS001.

When the IOP-2 is connected to a Control Unit without a RTC, it will display the parameter set filename as yymmdd-hhmm-PS001, so only the parameter set number will be changed.

Deletion of characters or filename

When editing the filename with the on-screen keyboard the following actions should be noted:

- When the name is displayed, typing any character will append the character to the filename automatically.
- When the filename is first displayed, the whole filename can be deleted by a two second press of the OK button.
- If individual characters need to be deleted, then use the on-screen keyboard backspace icon.

Using the IOP-2

The IOP-2 must be handled with particular care for all SINAMICS devices that use an IOP-2 so that no malicious software or erroneous parameterizations are spread between different commissioning PCs or inverters.

WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing files onto exchangeable storage media amounts to an increased risk of infection of the commissioning PCs, e.g. with viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software using appropriate protection measures, e.g. virus scanners.

WARNING

Risk of death due to software manipulation when using exchangeable storage media

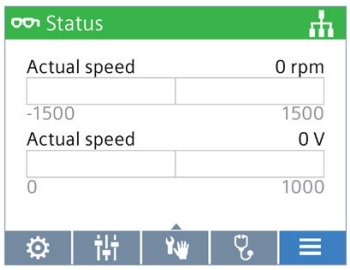
Storing the parameterization (incl. Safety Integrated parameterization) on exchangeable storage media carries the risk that the original parameterization (with Safety Integrated) will be overwritten, for example, by the IOP-2 of another drive without Safety Integrated. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Ensure that only the IOP-2 that belongs to the respective converter is used.
- Ensure that only trained or authorized personnel have access to the enclosures, cabinets or electrical equipment rooms.

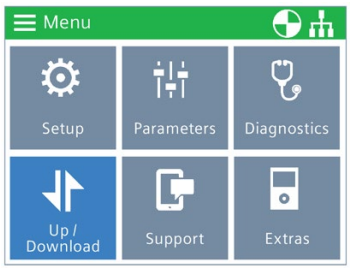
Creating a custom parameter set

This procedure makes the following assumptions:

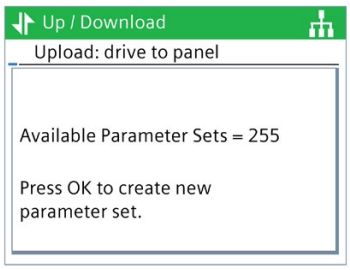
- The user is conversant with the copying and renaming of files in the Windows environment
- The user is conversant with commissioning the converter
- The user has already changed all the relevant parameters for their application



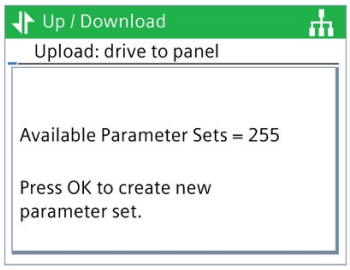
Select Menu



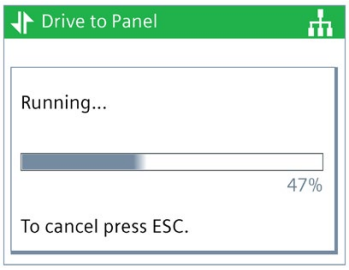
Select Up/Download



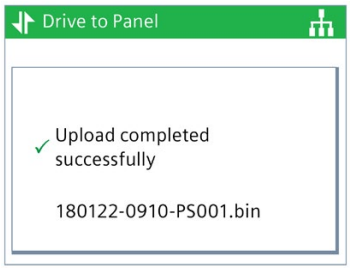
Select Upload: Drive to Panel



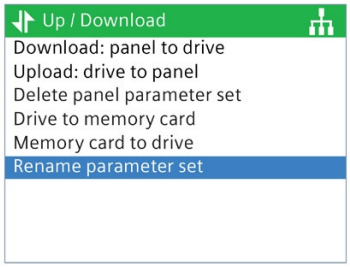
The number of available parameter sets are displayed



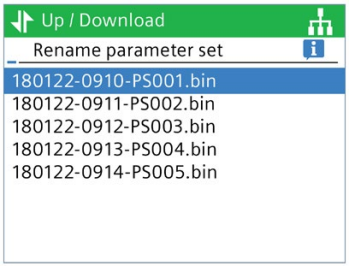
The drive parameter settings are uploaded



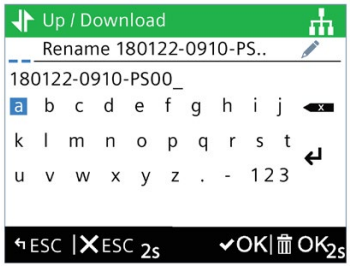
The filename of the parameter set is displayed



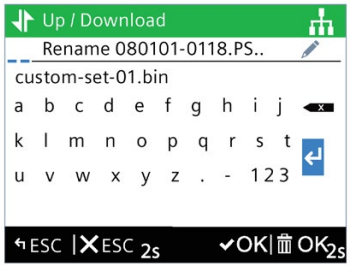
Select rename parameter set



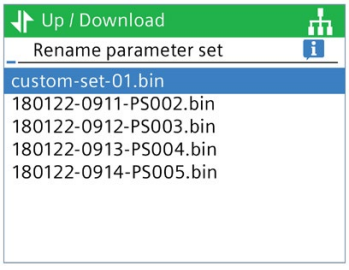
Select the parameter set to be renamed



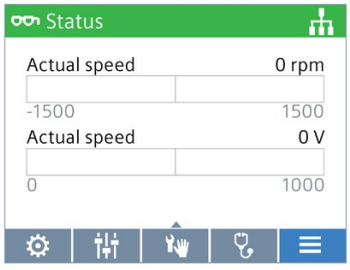
Rename the file using on-screen keyboard



Select return icon to accept new name



The new file name is displayed



Long press of ESC returns user to Status Screen

Copying IOP-2 parameter sets and configuration data

WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing files onto exchangeable storage media amounts to an increased risk of infection of the commissioning PCs, e.g. with viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software using appropriate protection measures, e.g. virus scanners.

WARNING

Risk of death due to software manipulation when using exchangeable storage media

Storing the parameterization (incl. Safety Integrated parameterization) on exchangeable storage media carries the risk that the original parameterization (with Safety Integrated) will be overwritten, for example, by the IOP-2 of another drive without Safety Integrated. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Ensure that only the IOP-2 that belongs to the respective converter is used.
- Ensure that only trained or authorized personnel have access to the enclosures, cabinets or electrical equipment rooms.

The IOP-2 file structure has been designed to allow the easy copying of parameter sets and other configuration data from one IOP-2 to another by using the Windows File Explorer function.

This is accomplished by simply copying the "user" folder from the IOP-2 to any number of other IOP-2 operator panels. The IOP-2 file structure is shown below.

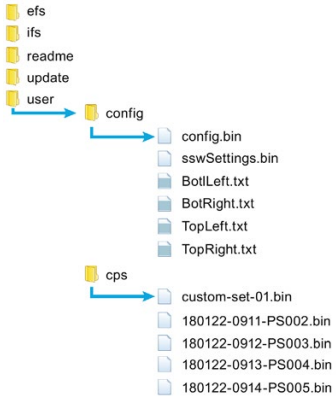


Figure 8-1 File structure of the IOP2

The "config" folder contains all the settings that have been changed on the IOP-2 itself, for example, the language settings, lighting duration and the date/time settings, etc.

The "cps" folder contains all the downloaded or customised parameters sets and the text files used for customising the screen labels when using the Screen Wizard.

Copying specific parameter sets

When you have saved a number of parameter sets to an IOP-2, it is possible to copy your saved parameter sets to another IOP-2 using the simple process outlined below.

1. Connect the IOP-2 via the USB connector to a PC.
2. The IOP-2 will enter the "Mass Storage Device" Mode.
3. On the PC, navigate to the "user/cps" folder.
4. Select the parameter sets you require and save them to a new folder on the local drive of the PC.

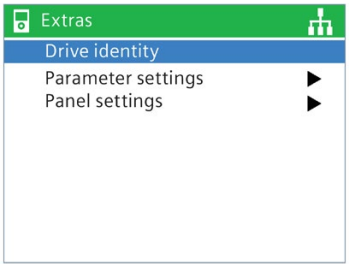
5. Disconnect the IOP-2 from the PC.
6. Connect another IOP-2 and copy the saved parameter sets to the "user/cps" on the new IOP-2.

This procedure can be repeated for any number of IOP-2s.

8.8 Extras Menu

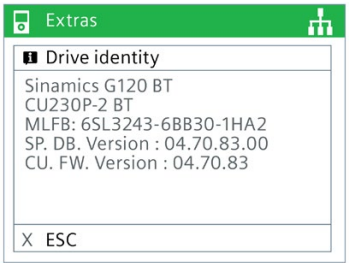
Overview

The Extras menu presents a number of options for the configuration of the IOP-2, these are explained in this section.



Drive identity

This option allows the user to display the technical details of the components that comprise the converter system. This includes the details of the Control Unit and Power Module. This is a read-only screen and cannot be modified.



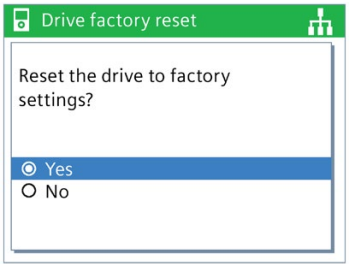
Parameter settings

Drive factory reset

There are two factory reset options:

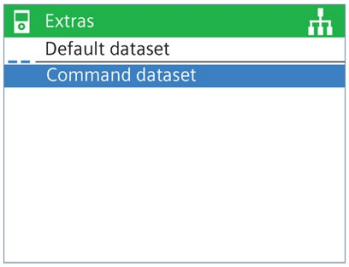
Factory reset - This option resets all parameters to their factory default settings. Any safety parameters that have been modified will not be reset.

Safety factory reset - This option resets all the safety parameters back to the factory default settings. No other parameters will be changed.



Default dataset

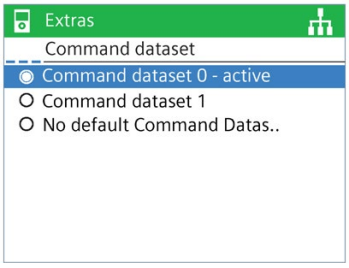
This option allows the user to determine which is the default command dataset when viewing or selecting a new default dataset from the options provided.



Note:

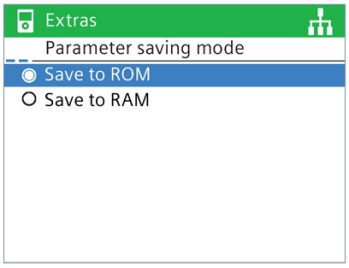
Some applications require that both command datasets be used at the same time. On the IOP-2 to access the parameters for both command datasets, then the command datasets screen must be set to "No default Command Dataset".

If the IOP-2 is not set to "No default Command Dataset" then only one command dataset will be visible to the IOP-2 in the parameter settings.



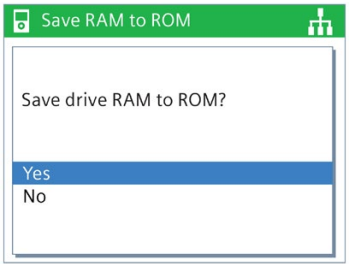
Parameter saving mode

This option allows the user to set the default location for any save function performed on the converter.



Save RAM to ROM

This option allows the user to manually save all drive data from the converters internal memory to the internal non-volatile memory - allowing the data to be retained until it is overwritten.



Panel settings

Language

This option allows the user to select the language that will be used to display information and text on the IOP-2. This option has been previously described in the initial set-up section of this manual.



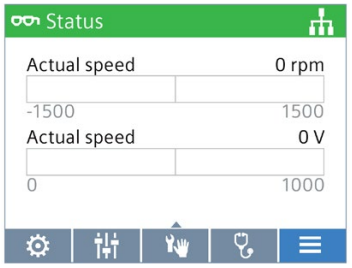
For details of selecting this function see Initial set-up (Page 20)

Time and date settings (including Daylight saving time)

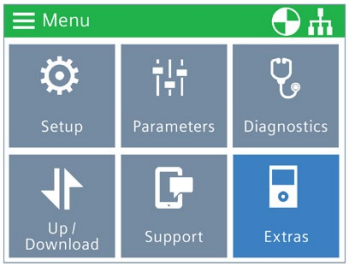
If the CU to which the IOP-2 is fitted has a real-time clock, then the option to set the correct date and time (including daylight saving time) is presented in the "Panel settings" menu.

The Time and date settings allow you to setup up the following:

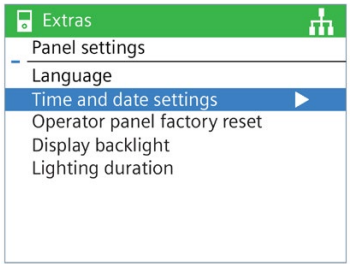
- **Date format**- This allows the date format to be select either DD/MM/YY or MM/DD/YY.
- **Time and date settings**- This allows the user to set the required date and time of the internal real-time clock of the Control Unit.
- **Daylight saving time**- This allows the user to setup the daylight saving time difference on the Control Unit (CU230P-2) real-time clock. The daylight saving time is set to take into account not only the time difference but also the date and time of the change to and from daylight saving time. The setup of the DST function is shown in the following procedure.



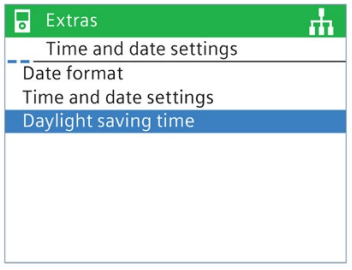
Select Menu



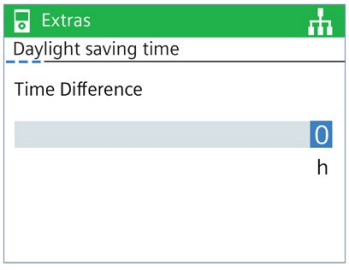
Select Extras



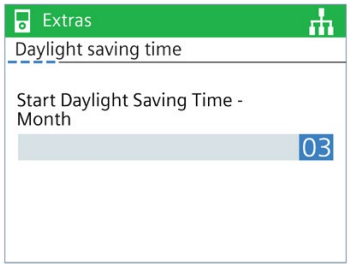
Select Time and date settings



Select Daylight saving time



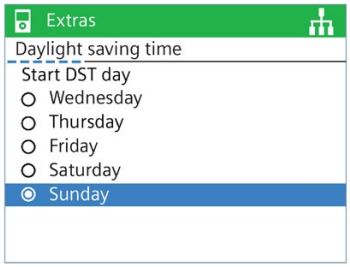
Set DST time difference



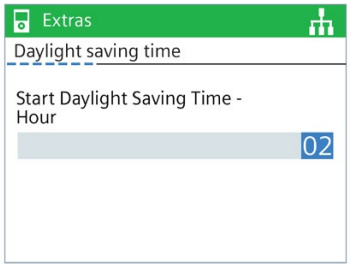
Set month DST starts



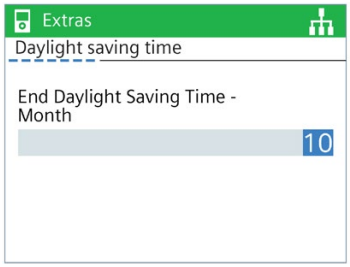
Set week DST starts



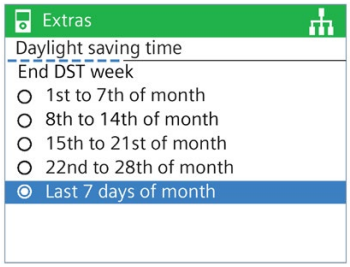
Set day DST starts



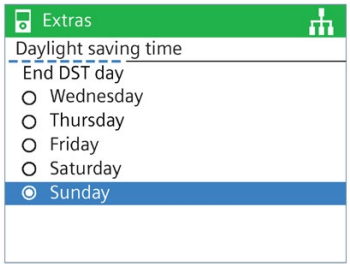
Set time DST starts



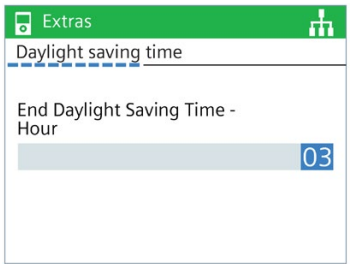
Set month DST ends



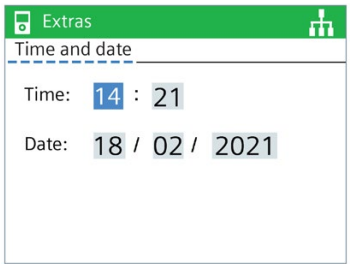
Set week DST ends



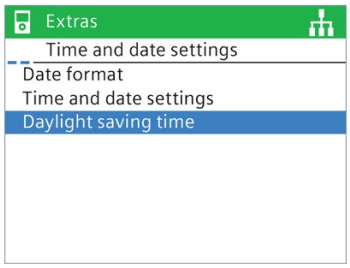
Set day DST ends



Set time DST ends



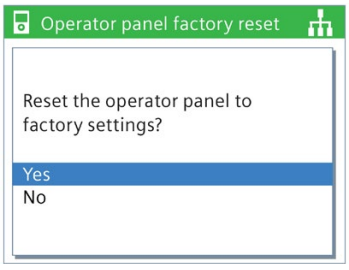
Set date and time



IOP-2 returns to previous screen (this may take a few seconds)

Operator panel factory reset

This option resets the IOP-2 to its default factory settings. All previous settings stored on the IOP-2 will be lost. Any parameter sets stored on the IOP-2 will not be deleted.



Display backlight

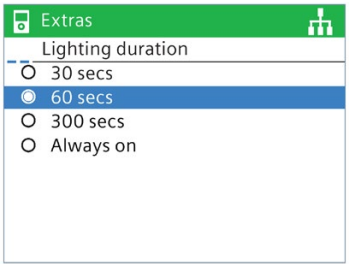
This option allows the user to change intensity of the display lighting.



For details of selecting this function see Initial set-up (Page 20)

Lighting duration

The backlight display, by default, is set to automatically dim after 60 seconds from the last key press. This time can be adjusted to 30 seconds, 60 seconds, 300 seconds or permanently on.

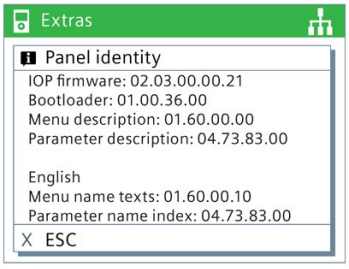


For details of selecting this function see Initial set-up (Page 20)

Panel identity

The panel identity screen displays the following technical information regarding the IOP-2:

- IOP-2 firmware version
- Bootloader version
- menu description version
- Parameter description version
- Menu texts version
- Parameter name index version
- Wizard description version.



Options

9

9.1 Door mounting kit

Door mounting kit

The door mounting kit (DMK) has been designed to allow the IOP, IOP-2 or BOP-2 to be mounted into the door of a cabinet.

The Operator Panels (OP), when installed correctly in the door of the cabinet, provide the following IP ratings around the DMK:

- IOP: IP54
- IOP-2: IP55
- BOP-2: IP55

There are two types of mounting screws, one is designed for use with the brass insert on the back of the OP and the other is thread-forming screws which is to be used on the OP without the Brass inserts.

The fitting of the DMK is accomplished as shown in the figures below.

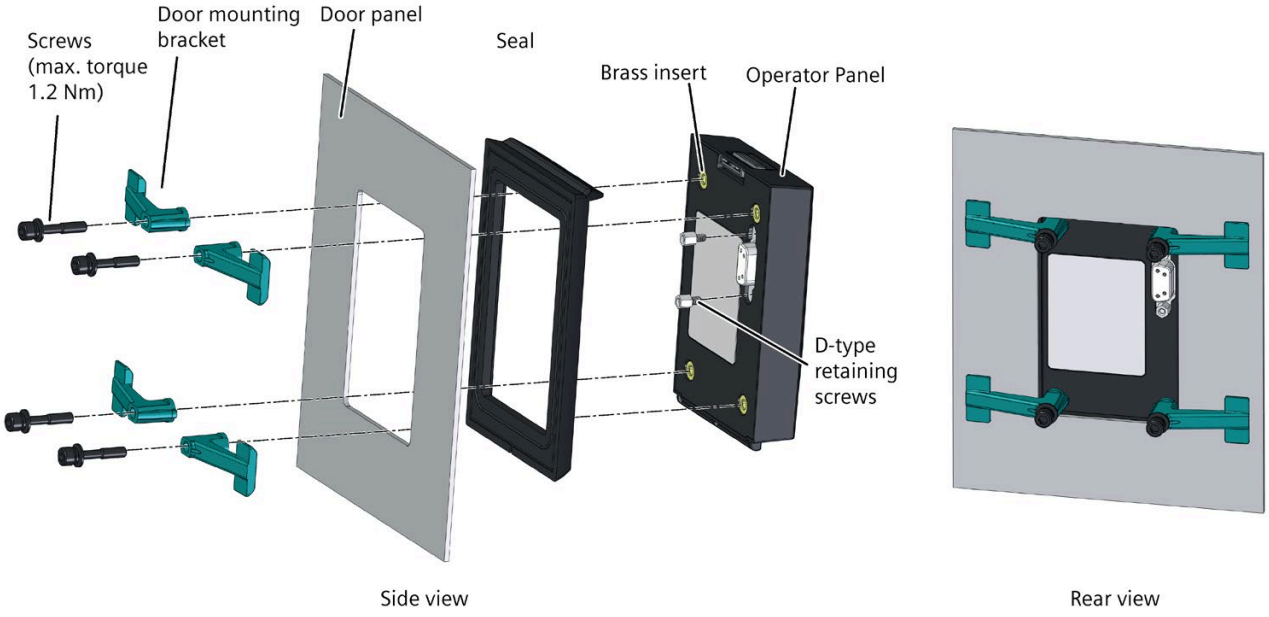


Figure 9-1 Fitting Operator Panel (brass inserts)

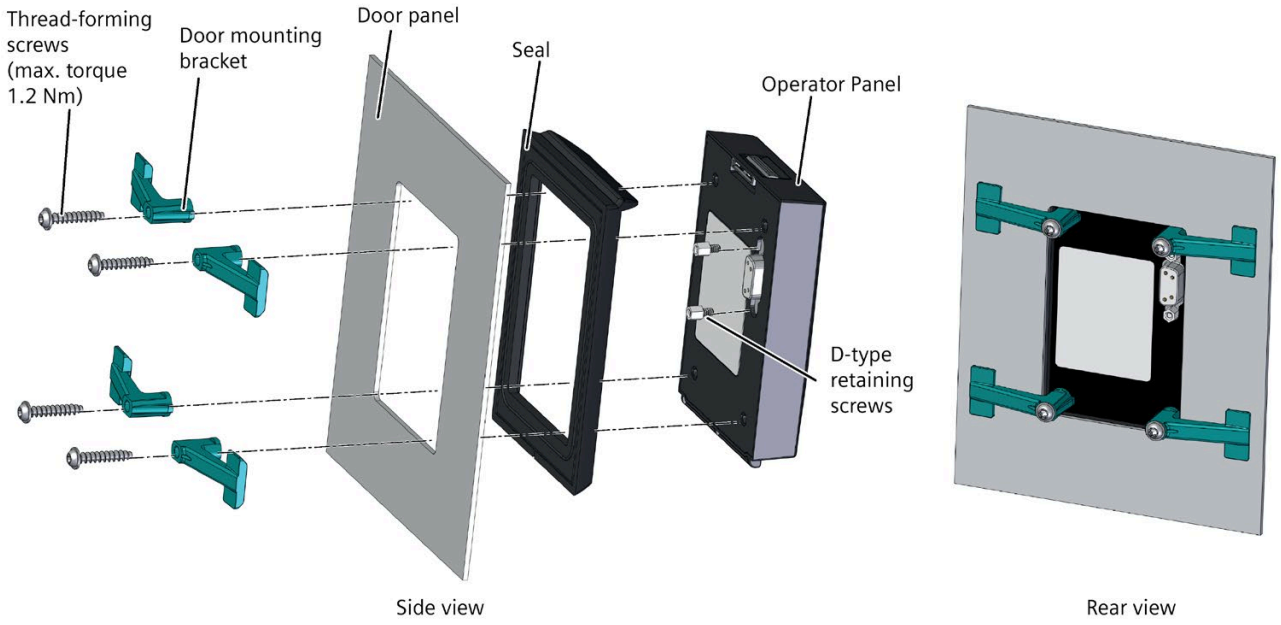
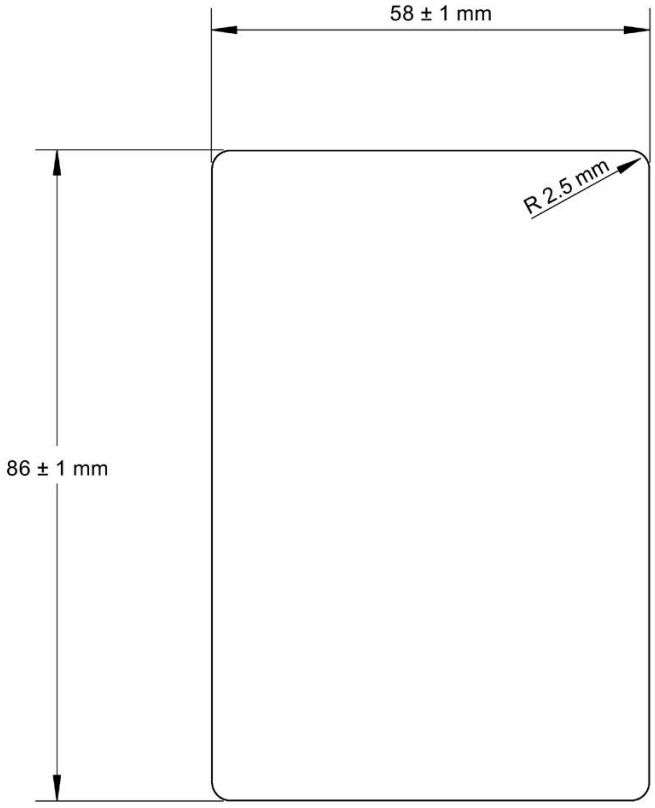


Figure 9-2 Fitting Operator Panel DMK (thread-forming screws)

⚠ CAUTION
Thread-forming screws maximum torques Using a torque greater than 1.2 Nm with the thread-forming screws may lead to permanent damage of the threads. The thread-forming screws must be correctly aligned with the holes on the back of the OP; the thread-forming screws must not be used with the OPs with the brass inserts.

Prior to the installation of the DMK, it is necessary to create a hole in the panel or cabinet with the dimensions as shown in the figure below:



Scale 1:1

Notes:
1. The page must be printed at full size to maintain the 1:1 scale.
2. When printing from a PDF file do not select the "fit to page" option as this will reduce the page to 97% of the true size.

The depth of the panel or cabinet door should be between 1 mm to 3 mm.

The IOP-2 Door Mounting Kit can be ordered using the following order number:

6SL3256-0AP00-0JA0

The DMK contains the following items:

- Door seal
- Door mounting brackets (x 4)
- Retaining screws (x 4)
- RS232 Straight-through cable (5 m)

9.2 Hand-held device

Hand-held device

⚠ WARNING

Charging unit

- The charging unit for the rechargeable batteries is contained within the hand-held device for the sole purpose of charging rechargeable batteries.
- The charging unit contained within the hand-held device should not be used with standard "AA" batteries as this will result in damage to the batteries and the hand-held device.
- Only the supplied power supply unit should be used with the IOP-2. The use of any other power supply units could seriously damage the hand-held kit.

⚠ CAUTION

General precautions

- There is a risk of explosion if battery is replaced by incorrect type.
- Overcharging, short circuiting, reverse charging, mutilation, or incineration of the cells and the batteries must be avoided to prevent one or more of the following occurrences; release of toxic materials, release of hydrogen and/or oxygen gas, rise in surface temperature.
- If a cell or a battery has leaked or vented, it should be replaced immediately using protective gloves.
- If and when necessary, these cells or batteries must be replaced with identical new ones from the same manufacturer. If a cell or a battery to be replaced is connected with other cells or batteries in series, it is recommended that the other cells or batteries be replaced with new ones at the same time.
- Battery compartments containing these cells or batteries must be provided with means of ventilation to prevent possible accumulation of any released gases under abnormal conditions.

Note

Battery lifetime

With the supplied rechargeable batteries in a fully-charged state they should last for approximately 10 hours; the use of normal "AA" batteries may last considerably less time.

Industrial environment

The IOP-2 has been designed for use within a Class A Industrial environment only.

Disposal of batteries

The batteries supplied with the IOP-2 must be disposed of in accordance with local and national environmental policies.

Battery status

The battery status is displayed at the top right-hand corner of the IOP-2 display.

Battery charging

If the batteries are put on charge and the batteries are fully discharged; the charging unit will enter a 'pre-charge' state. During the pre-charge state the LED will not be lit, therefore there may be a delay before the charging LED lights up.

The IOP-2 has no internal power source, so to increase the IOP-2's versatility, the hand-held device has been designed.

The complete list of converters that work with the IOP-2 are listed in  Introduction (Page 11). The following list comprises the converters that require the hand-held kit and the optical cable because the IOP-2 cannot be mounted directly on the converter:

- SINAMICS G120D-2 CU240D-2
- SINAMICS G120D-2 CU250D-2
- SINAMICS ET 200pro FC-2
- SINAMICS G110D
- SINAMICS G110M

Table 9- 1 Hand-held device order information

Order number	Item quantity	Item	Remarks
6SL3255-0AA00-4HA1	1	IOP-2	
	1	Hand-held module	
	1	Power supply unit	
	4	Rechargeable batteries	1.2 V 2100 mAh NiMH (see note below)
	1	RS232 cable	3 m

Note

Battery order information

The batteries supplied with the IOP-2 Hand-held Kit should be replaced with exactly the same type of batteries. The batteries that have been tested for use with the IOP-2 are given below:

Company: GP Batteries

Order Number: GP210AAHC

The batteries can be ordered from the following website: GP Batteries (https://uk.gpbatteries.com/products/recyko-aa-2100mah-rechargeable-battery-pack-of-4)

The layout of the IOP-2 hand-held device is shown in the figure below.



Figure 9-3 IOP-2 Handheld kit layout

1. Intelligent Operator Panel (IOP-2)
2. IOP-2 release catch
3. ON/OFF switch
4. Charging LED - ON when charging, OFF when charged
5. 9-pin Sub-D male connector (RS232)

6. Charging unit input
7. Battery compartment cover
8. IOP-2 retaining screw

Fitting the batteries

The hand-held device is powered by four 'AA' rechargeable batteries; these batteries are supplied with the hand-held kit. The batteries are fitted as shown in the figure below.



Figure 9-4 Installing batteries for handheld kit

Technical data

10

10.1 Technical specifications

IOP-2-2 Technical data

Table 10- 1 IOP-2 and Door mounting kit specifications

Feature	IOP-2 only	Door mounting kit
Protection	Depending upon the Control Unit IP rating to a max. of IP55 / UL Type 12 enclosure	
Dimensions (HxWxD)	106.86 mm x 70 mm x 19.65 mm	
Net weight	0.134 Kg (0.295 lbs)	
Gross weight	0.206 Kg (0.454 lbs) - includes packaging	
Screw torque	-	Max. 1 Nm to 1.25 Nm
Operating ambient temperature	0 - 50 °C (32 - 122 °F) when directly connected to the converter. 0 - 55 °C (32 - 131 °F) when using the Door Mounting Kit.	
Transport and storage ambient temperature	-40 - +70 °C (-40 - 158 °F)	
Humidity	Relative humidity <95% non-condensing	

Table 10- 2 Hand-held specifications

Feature	IOP-2 Hand-held kit
Protection	IP20
Dimensions (HxWxD)	195.04 mm x 70 mm x 37.58 mm
Net weight	0.724 Kg (0.1.59 lbs)
Gross weight	0.970 Kg (2.14 lbs) - Inlcudes packaging
Operating ambient temperature	0 - 40 °C (32 - 104 °F) [charging 10 - 40 °C]
Transport and storage ambient temperature	-20 - +55 °C (-4 - 131 °F)
Humidity	Relative humidity <95% non-condensing

Further Information

Siemens:
www.siemens.com

Industry Online Support (Service und Support):
www.siemens.com/online-support

IndustryMall:
www.siemens.com/industrymall

Siemens AG
Digital Industries
Motion Control
Postfach 3180
91050 Erlangen
Deutschland

Scan the QR-Code for product information

Weitere Informationen

SINAMICS Umrichter:
www.siemens.com/sinamics

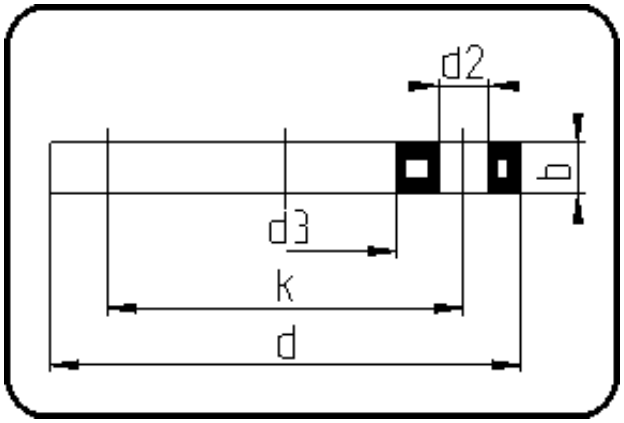
Safety Integrated
www.siemens.com/safety-integrated

PROFINET
www.siemens.com/profinet

Siemens AG
Digital Factory
Motion Control
Postfach 3180
91050 ERLANGEN
Deutschland

Für weitere Info zu SINAMICS G120 den QR-Code scannen.

Backing Rings, Accessories



Code: 11.013

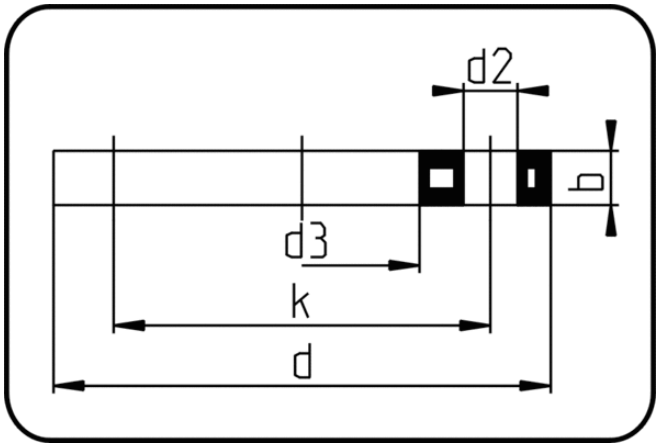
- **Backing Ring ANSI**
- steel insert
- injection moulded
- **Flange connection**
- **PP-FRP grey**

The torques nm[NM] specified in the technical catalogue are to be used as maximum values.

Dimension	Code	Detail	Weight
25	11.013.0025.11	25 - 3/4" - MOP 16 bar	0.23

	Unit	Nominale	Tol+	Tol-
da(OD)	mm	25	0.00	0.00
b	mm	12	1.50	1.50
numb	pc	4	0.00	0.00
d	mm	102	1.50	1.50
d3	mm	34	2.25	0.00
nm	[NM]	20	0.00	0.00
d2	mm	16	0.75	0.75
p	bar	16	0.00	0.00
da	inch	0,75	0.00	0.00
k	mm	69,85	0.75	0.75

Backing Rings, Accessories



Code: 11.013

- **Backing Ring ANSI**

- steel insert
- injection moulded
- **Flange connection**
- **PP-FRP grey**

The torques nm[NM] specified in the technical catalogue are to be used as maximum values.

Dimension	Code	Detail	da(OD) mm	d mm	d2 mm	d3 mm	b mm	k mm	Weight
20	11.013.0020.11	20 - 1/2" - MOP 16 bar	20	95	16	28	12	60,45	0.21
25	11.013.0025.11	25 - 3/4" - MOP 16 bar	25	102	16	34	12	69,85	0.23
32	11.013.0032.11	32 - 1" - MOP 16 bar	32	114	16	42	16	79,25	0.38
40	11.013.0040.11	40 - 1 1/4" - MOP 16 bar	40	130	16	51	16	88,9	0.56
50	11.013.0050.11	50 - 1 1/2" - MOP 16 bar	50	133	16	62	18	98,55	0.55
63	11.013.0063.11	63 - 2" - MOP 16 bar	63	162	20	78	18	120,65	0.81
75	11.013.0075.11	75 - 2 1/2" - MOP 16 bar	75	184	20	92	18	139,7	1.09
90	11.013.0090.11	90 - 3" - MOP 16 bar	90	194	20	111	18	152,4	1.06
110/125	11.013.0110.11	110/125 - 4" - MOP 16 bar	110	229	20	133	18	190,5	1.54
140	11.013.0140.11	140 - 5" - MOP 16 bar	140	258	22	158	24	215,9	2.25
160	11.013.0160.11	160 - 6" - MOP 16 bar	160	283	22	178	24	241,3	2.36
200/225	11.013.0200.11	200/225 - 8" - MOP 16 bar	200	345	22	236	24	298,45	3.89
250/280	11.013.0250.11	250/280 - 10" - MOP 16 bar	250	412	25	288	26	361,95	6.09
315	11.013.0315.11	315 - 12" - MOP 16 bar	315	487	25	338	32	431,8	12.94

C63-OVI-QIX-002

OVIVO - SAT ACCEPTANCE TEST

01	*1st Issue*	*07-FEB -2024*	*OVI*	*LPA*	*LDG*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Client Document Number	

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COMMISSIONING PLAN

ELOGEN CROSSWIND

DEMINERALISATION PLANT

REVISION	PREPARED BY	CHECKED BY	APPROVED BY	DATE
1	*PHIL BERISFORD*	*STEVE BERRY*	*SHAUN SWINBOURNE*	***23/01/2025***
2	*PHIL BERISFORD*	*DANIEL FRENCH*	*SHAUN SWINBOURNE*	***24/01/2025***
3	*PHIL BERISFORD*	*DANIEL FRENCH*	*SHAUN SWINBOURNE*	***30/01/2025***

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1 Background

A factory acceptance test (FAT) has been successfully completed on the equipment in Germany on 6th August 2024 and reference should be made to the issued document detailing the tests completed.

2 Commissioning Schedule

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
Safety check on site	***Flush the conservation fluid to the drain***	***Filling of the permeate tank***	***Training and troubleshooting the whole day***	***Training and troubleshooting the whole day***	***Take photos of the plant and sign off commissioning***
Check the entire system for completeness and damage	***Start pumps of the RO***	***Start the polishing loop booster pump***			
Check all pipework connections	***Check and adjust the flowrates of RO***	***Check the entire system for leakage***			
Complete plant by install of filter elements and UV-lamps	***Check and adjust the flowrates of EDI***	***Check the quality and flowrates***			
**** Check the feedwater quality***	***Check the water quality of RO and EDI***	***Record quality and flowrates***			

** Feedwater quality to conform to Elogen specification, see extract in section 9 appendix.*

3 Preliminary Checks

3.1 Commissioning Environment

Checks to be made to ensure that,

- the area assigned for the onshore commissioning activities is suitable and is barriered off to control unauthorised access. Signage to be in place to advise of PPE requirements.
- suitable drains are available for disposal of preservation water and drainage of equipment after completion of commissioning tests

- customer has provided utilities required for operation of the plant including, but not limited to, feedwater, power and air.

3.2 Equipment checks

- The positioning and condition of the plant is to be checked to ensure that no damage has occurred during transit from the FAT facility to Italy. Reference should be made to the plant O&M section 2 “Transport, Packaging and Storage” as necessary. Any damage is to be noted and photographic evidence taken.
- Checks are to be made that all ancillary equipment (such as filter elements, reverse osmosis membranes and UV lamps) has been delivered safely and is available for installation.
- All valves and instruments are to be checked against the plant P&IDs (see Appendix 1). It is suggested that these are marked off as correct on a physical set of drawings.
- Ensure that all pipework connections are tight and screwed connections and bolts could have loosened during transit.

3.3 Temporary supplies

Reference should be made to the plant O&M section 4 “Installation” at this point.

- Connect temporary water supply to feed terminal point 1E local to prefilter.
- Connect temporary air supply to terminal point 3E local to membrane degasser.
- Connect temporary pipework to common drain pipework from first pass RO reject and membrane degasser drip separator at terminal point 4A.
- Connect temporary pipework to diaphragm pump discharge at terminal point 3A local to drip separator.
- Connect temporary pipework to final treated water pipework at terminal point 5A.
- Connect temporary pipework to reject tank drain at terminal point 4A.
- Connect power supply (3 phase 400v, 50Hz as shown on P&ID) to Master Control Cabinet at terminal point 1EL.

4 Pre-Commissioning

4.1 Pre-filter element installation

- Open prefilter drain (1F) to ensure that no pressure is contained within the vessel
- Open filter housing (1FEV1).
- Locate and install filter elements to suit housing.
- Close housing (1FEV1) and drain valve (1F).

4.2 Reverse Osmosis membrane installation

- Locate the required membranes for both the first and second pass RO tubes ensuring that the correct element type is installed in the correct location.
- Open first pass RO tubes and install membranes from the feed end.

- Before closing up feed end of tube, ensure that membranes are tightly packed and if not install spacers as required.
- Repeat for 2nd pass RO tubes.

4.3 UV lamp installation

- Install UV lamps according to manufacturer's instructions taking care to not to touch the glass as any fingerprints will reduce the efficiency of the unit.

4.4 EDI unit

- All EDI bolts must be tightened before initial commissioning. Refer to issued plant O&M section 4.4 for full details of procedure and recommended torque. Note – each bolt must only be tightened by a maximum of 2Nm per tightening sequence.

4.5 Centrifugal pumps

- Rotation directions of all centrifugal pumps must be confirmed via a short bump test after connection of power supply. The pumps must not be run dry for any longer than 1 second at this time.
- If any pump motors are found to be rotating in the wrong direction, then Elogen electrical engineers shall correct.

4.6 HMI

- Power up the HMI and check that the unit boots up successfully and is operational.
- Check through each screen to ensure that all individual plant is available and that any standing alarms are cleared.
- Check that all initial setpoints are acceptable.
- Note that full testing of the software was completed during the FAT.

4.7 Temporary feedwater quality

- Check that the temporary softened water supply to be used for the initial onshore start-up of the plant meets the plant design specification.*
- Record the feedwater conductivity, total hardness, supply pressure and temperature. If these are outside of the plant design criteria then the plant will not perform as designed and Ovivo reserves the right to stop tests until a suitable supply is available.

** Feedwater quality to conform to Elogen specification, see extract in section 9 appendix.*

5 Commissioning

5.1 Drain Preservation Fluid from System

- The RO membrane containers are filled with preservation fluid.
- This fluid should be disposed of safely and not passed to the site drains.
- Bypass drain to 100L containers provided by Elogen, to be disposed of by Elogen.
- RO Membrane flush via 1ROBV1 and 2ROBV1 to the 100L tank provided by Elogen.

5.2 Filling of system

- Ensure that any preservation fluid has been drained from the plant by checking that no fluid passes to drain when successive drain valves are opened.
- Check and confirm that the Permeate Demin Tank and the Reject Tank are empty and clean.
- Check and confirm that all valves are in the closed position before proceeding.
- Open valves to allow the temporary softened water supply to enter the plant.
- By using available drains and vents ensure that each section of the plant is flooded before continuing to the next part.
- As the raw water is supplied at a pressure of 4barg (measured on PI 1RO7 at first pass RO inlet) it will be possible to achieve a low permeate flow without the use of the RO booster pumps. Once water is seen at the Permeate tank stop the raw water flow by closing of the automatic plant inlet valve 1EBV1.

5.3 Energise the system

- Coordinate with Elogen for system energisation.
- Visual check of wiring to confirm safe operation.
- When approval / permit in place, turn on supply and main isolator of panel.

5.4 Initial system operation

- From the HMI, select the plant to on-line operation and check that all required valves and equipment enters operation. All automatic operation has been confirmed during the FAT.
- Adjust first pass RO reject (*1ROBV1*) and recycle (*1ROSV3*) valves to obtain design flows.
- Repeat for second pass RO reject and recycle valves.
- Check and record permeate quality and flow together with reject/recycle flows and pressures.*
- Ensure that UV module is operational and there are no lamp warning alarms.
- Ensure that membrane degasser is functional, and air flow is correct. Adjust if required.
- Check that EDI unit is powered up and automatic control is functional. Adjust concentrate flow as required using rate set valve 1EDSV1. Confirm reject flows are *acceptable. Record feed flow, concentrate flows, pressures, supply voltage and current and permeate quality.

** nominal system flows and water qualities listed in extract from IOM in section 9 appendix.*

- Allow the plant to operate to fill the permeate tank with acceptable quality water.
- Ensure that sufficient photographs are taken of plant equipment and operational data.
- Whilst in operation check the plant for any leaks. If minor address whilst plant in operation, if major then the plant should be immediately taken out of service.
- Check that when the Permeate tank reaches high level the plant returns to the standby state.

5.4 Polishing loop operation

- Open up manual valves and flood the polishing loop pipework progressively through to the final 5µm filter (2F) via the UV unit (2Z) and non-regenerable mixed bed (1C).
- Select loop operation from the HMI.
- Check correct operation and control of the booster pump (1PSP1) and UV unit. Both the booster pump and UV unit should be in operation.
- Ensure that sufficient photographs are taken of plant equipment and operational data.
- Whilst in operation check the plant for any leaks. If minor address whilst plant in operation, if major then the plant should be immediately taken out of service.
- Record system flows, pressures and conductivity.

5.5 Plant Functional Operation

- Functional testing of the system has been completed during the FAT but a selection of tests can be repeated as necessary to prove correct operation of the plant under various fault scenarios.
- Record details of any testing completed and outcome of tests.

Flow quantity	Setpoint	actual value
Inlet 1E (soft water) l/h	approx. 670	
Concentrate back flow 1RO (FI1RO6) l/h	approx. 800	
Concentrate flow 1RO (FIR1RO3) l/h	approx. 197	
Permeate flow 2RO (FIR2RO5) l/h	approx. 530	
Concentrate back flow 2RO (FI2RO6) l/h	approx. 800	
Concentrate flow 2RO (FIR1RO3) l/h	approx. 177	
Diluate flow 1ED (FIR1ED1) l/h	approx. 500	
Concentrate flow 1ED (FSA-/FI1ED3 l/h	approx. 50	
Electrode rinsing water 1ED (FI1ED5) l/h	approx. 5	
Feed outlet 1A to 1E l/h	approx. 500	
Feed EDI reject 2A to 4E l/h	approx. 80	
Reject water from 1RF 6A to 2E l/h	approx. 50	

Conductivity values	Setpoint	
Conductivity 1RO (QISA+1RO4) µS/cm	< 20	
Conductivity 2RO (QISA+2RO4) µS/cm	< 10	
Conductivity 1ED (QIA1ED7) µS/cm	< 2	
Conductivity circulation system (QIA1C1) µS/cm	< 0,1	

6 Preparation for Long term storage and offshore shipping (if required)

6.1 System draining

- Ensure that the plant is selected to out of service at the HMI.
- Open drain and vent valves are necessary and allow the plant to drain to the provided local floor drains.
- Disconnect all temporary hoses, power and air supplies.

6.2 Removal of installed elements

- Open pre-filters and remove all installed elements. These can either be dried and stored for later use or disposed of.
- Open all RO tubes and remove installed membranes. These could be re-used if returned to air-tight packaging, but the recommendation is that a new set is installed offshore to prevent the risk of bacteriological contamination.
- Remove installed UV lamps and return to manufacturer's packaging.
- Covers to be fitted at all terminal points in preparation for onward shipping.

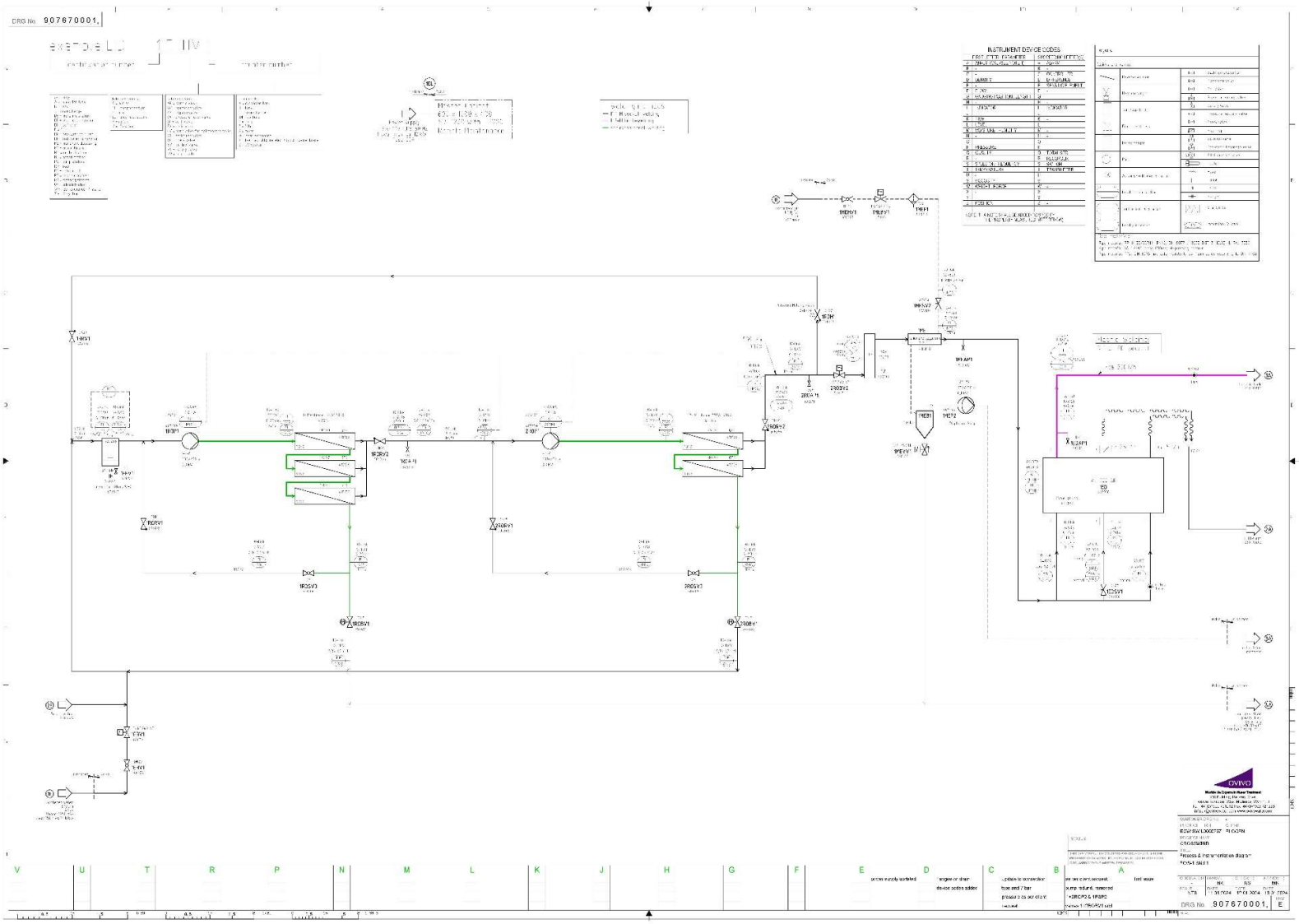
7 Commissioning Training acceptance

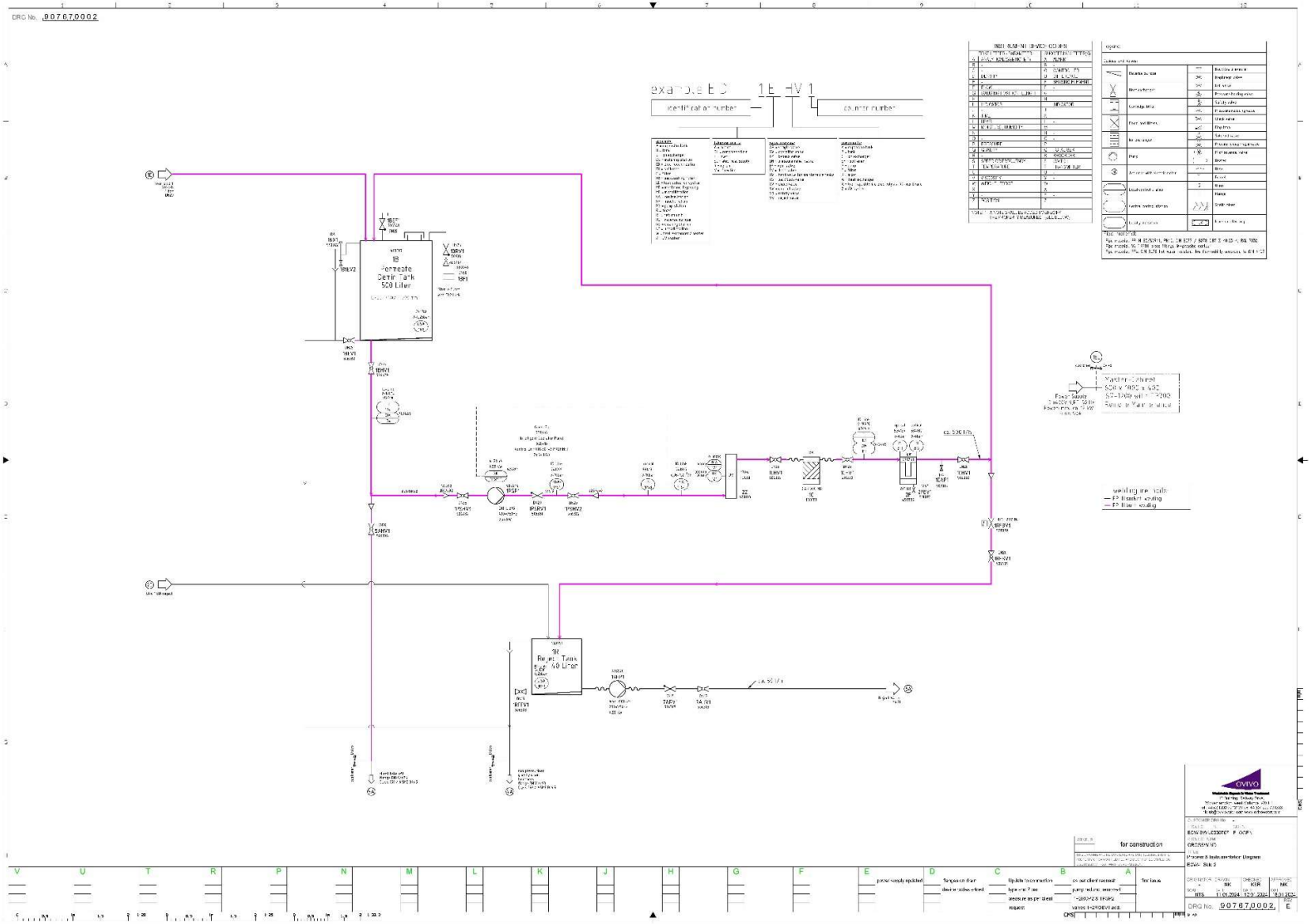
Upon completion of the onshore commissioning training activities the below should be signed off by all parties to signify acceptance.

Commissioning activities as identified above have been completed successfully and plant operation confirmed as acceptable.

	OVIVO COMMISSIONING ENGINEERS		ELOGEN ENGINEERS		
NAME	Peter Kasperski	Mark Cousins	Luc Paoletti	Maxime Lafargue	Fray Moufouma
SIGN	P. Kasperski		Luc Paoletti	Maxime Lafargue	Fray Moufouma
DATE	31/01/25	31/01/25	31/01/25	31/01/25	31/01/25

8 Appendix 1 P&ID'S


DRG No. 907670001,
INSTRUMENT DEVICE CODES
DRG No. 907670001, E


DRG No. 90767.0002
example ID
1E HV 1
identification number
component number
18
Permeate
Carrier Tank
500 Liter
91
Reject Tanks
40 Liter
for construction
DRG No. 90767.0002

9 Appendix 2 – Water Quality Criteria

Extract from IOM Manual – Revision 0 – 5/9/2024 – Page 27

Flow quantity

Inlet 1E (soft water) l/h	approx. 670
Concentrate back flow 1RO (FI1RO6) l/h	approx. 800
Concentrate flow 1RO (FIR1RO3) l/h	approx. 197
Permeate flow 2RO (FIR2RO5) l/h	approx. 530
Concentrate back flow 2RO (FI2RO6) l/h	approx. 800
Concentrate flow 2RO (FIR1RO3) l/h	approx. 177
Diluate flow 1ED (FIR1ED1) l/h	approx. 500
Concentrate flow 1ED (FSA-/FI1ED3 l/h	approx. 50
Electrode rinsing water 1ED (FI1ED5) l/h	approx. 5
Feed outlet 1A to 1E l/h	approx. 500
Feed EDI reject 2A to 4E l/h	approx. 80
Reject water from 1RF 6A to 2E l/h	approx. 50

Conductivity values

Conductivity 1RO (QISA+1RO4) µS/cm	< 20
Conductivity 2RO (QISA+2RO4) µS/cm	< 10
Conductivity 1ED (QIA1ED7) µS/cm	< 2
Conductivity circulation system (QIA1C1) µS/cm	< 0,1

Extract from Specification, C63-DTP-007 - Technical Specifications for Water Purification Package (WP) – Elogen Document – Revision 1

Feed Water Specification

Table 1

Water Composition

PARAMETER	VALUE	UNIT	PARAMETER	VALUE	UNIT
PH	7,9	-	TDS (total disolved solid)	540	mg/l
TEMPERATURE	10-25	°C	Fouling index (SDI)	<3	-
TURBIDITY	<0,3	NTU	M-Alkalinity (HCO3)	255,1	mg/l
CONDUCTIVITY	<703	µS/cm	P-Alkalinity (CO3)	0,4	mg/l
HARDNESS	<0,9	°F	Carbonic gas (CO2)	15	mg/l
			Chlorides (Cl)	67,48	mg/l
BACTERIOLOGY			Fluor (F)	0	mg/l
ESCHERICHIA COLI	<1	/100ml	Silica (SiO2)	12,5	mg/l
ENTEROCOCCUS	<1	/100ml	TOC (total organic carbon)	<3	mg/l
			DOC (dissolved organic carbon)	<10	mg/l
SALT CONTENTS					
CALCIUM	0,1	mg/l			
MAGNESIUM	0,1	mg/l			
SODIUM	160	mg/l			
POTASSIUM	0	mg/l			
SULFATES (SO4)	42,03	mg/l			
Free chlorine	<0,01	mg/l			
Total chlorine	<0,6	mg/l			
Nitrates (NO3)	0,32	mg/l			
Ammonium (NH4)	<0,050	mg/l			
IRON	<0,1	mg/l			
ALUMINIUM	<0,05	mg/l			
MANGANESE	<0,05	mg/l			

Bringing water to life	**METHOD STATEMENT**	Number	**SWL0841/MS01**	
		Revision	**3**	
		Date	**24/01/2025**	
		Page number	**1**	of **8**

Ovivo UK Limited		**Project name:**		**Ovivo Project No:**
Ogilvie House 760 The Crescent Colchester Business Park Colchester Essex CO4 9YQ	i10 Building Railway Drive Wolverhampton England WV1 1LH	CROSSWIND		**SWL0000767**
		Site address:	ITALY	**COMMISSIONING**

Brief description of work to be carried out and timescales

Onshore commissioning of demineralisation equipment.

Start date	27th January 2025	**Finish date**	1st February 2025

Ovivo contact details

	Title	Name	Contact numbers	Specific responsibilities
Office	Senior Manager	Daniel French	+44 7821 681722	Overall Aftermarket Management
	Project Manager	Shaun Swinbourne	+44 7795 236642	Project Management
	H & S Manager	Pete Nicholls	+44 7795 236638	Aspects of H&S which affect Ovivo
	Head of Service	Robin Peckston	+44 7860 686606	Management of Site Engineers
Site	Site Manager	Mark Cousins	+44 7801 633222	Commissioning Engineer
	Service Engineer	Peter Kasperski	+49 171 8384442	Commissioning Engineer
	Site Engineer			Fitter
	Site Engineer			Fitter
	Site Engineer			

All other contact details

Title	Name	Company	Contact details
Client (Project Manager)	Lancelot Di Giulio	Elogen	
Client Support	Hugo Rosenbaum	Elogen	
Client Site Manager	Maxime Lafargue	Elogen	+33 658431788
First Aid provision	Mark Cousins		
Authorised Person for PTW			

Design: Drawings schedule other applicable documents

Ovivo G A drawing	Number	907670003	Issue	C
General Arrangement	Number	907670003	Issue	C
Other drawings or sketches	Number	907670002 & 907670004	Issue	E

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Neither it nor any part thereof may be copied, reproduced, or used for any purpose other than that for which it is disclosed, and save as reasonably necessary for the evaluation of the scope of work.
No part thereof may be disclosed to any third party, without our prior consent in writing.

Specific health and safety requirements

Compliance with Ovivo Health and Safety procedures and site-specific requirements are mandatory.

1. All operatives to be site inducted by client.
2. All operatives to sign and adhere to the contents of the method statement.
3. OVIVO Site Manager to review the working area BEFORE PRE-JOB BRIEFING to make sure RAMS are still applicable and correct.
4. RAMS and Working Procedure to be discussed before “Each Stage & Next Step” in the Operational Sequence and/or phase of work.

   Morning Briefing to Include:
   - Review of previous day,
   - Review work for the day.
   - Complete point of work risk assessment.
   - Confirm isolation of water source and electrical supplies are in force.
   - The prevention of pedestrians entering work and laydown areas.
   - OVIVO Site Manager to Confirm MS & RA is signed by all members of the working team and that the days operations including associated risks and control measures are understood.
   - Washing of Hands before eating and drinking.

5. All operatives to be trained and competent in tasks allocated.
6. All personnel to wear the appropriate PPE as per the associated Risk Assessment, to include hard hat, safety boots (steel plate or composite mid sole safety boots), high visibility long-sleeve clothing, suitable gloves (Cut Level 5 minimum where sharp edges/cutting is involved), and eye protection as a minimum. Hearing protection must be available and worn as required by site mandatory signage and as identified in the Risk Assessment.
7. Access to Site Welfare facilities i.e. Toilets, Kitchen, etc. by client. If these are not provided Ovivo reserves the right to stop site works and demobilise.
8. Restoration of Services (ROS) and general permit procedures by client
9. Vehicles and Mobile machinery should be separated from personnel, this is generally achieved by the client by providing designated routes for Vehicles/ mobile machinery and personnel with designated crossing points. During deliveries of material and equipment the client shall ensure temporary procedures are in place to prevent accidents, these include:
   - Exclude setting up temporary barriers to exclude people during deliveries,
   - Banks man to be used from vehicles that are reversing,
   - Ensuring site rules on speed limits are adhered to,
   - Assisting the vehicle driver with positioning and direction for blind spots, and non-visible obstructions.

Compliance with Client and Ovivo procedures are mandatory.

Schedule of portable electrical tools (excluding battery operated)					
All portable electric power tools must be tested by a competent person every three months and have a valid and legible PAT label attached. Each time a tool is used it shall be subjected to a pre-use inspection and only used for its intended purpose, maximum voltage 230v. **NOTE: Tools without a valid PAT label must not be used for work under any circumstance.**					
Extension lead	N/A	100mm Disc grinder	N/A	Nut runner	N/A
Transformer	N/A	230mm Disc grinder	N/A	Floodlight	N/A
Splitter box	N/A	SDS Rotary drill	N/A	13mm Hammer drill	N/A
Confined Space Equipment	N/A			Portable generator & tray	N/A

Special tools and equipment required					
Camera for Report Pics	✓	Hand tools	✓	Multi meter	✓
Handheld Analytical Instruments	✓	Gas monitors (by client)	N/A	Extinguisher (type TBC)	N/A

Emergency arrangements, contingency plans / procedures

FIRE ACTION PLAN

Fire Action Plan is operated and managed by the client at all times, and the application of the Fire Action Plan shall be discussed and agreed at the Site Induction.

Ovivo Personnel to raise the alarm for fire when identified and evacuate safely to the nearest safety point and adhere to and follow site rules as advised during site induction.

FIRST AID ACTION PLAN.

Adhere to and follow site rules as advised during site induction including customer appointed first aider(s) contact details.

NEAREST A & E HOSPITAL.

Ovivo will be informed of this at the site induction.

Emergency Preparedness Plan.

Ovivo will be informed of this at the site induction.

Environmental arrangements / waste disposal arrangements

- All waste must be disposed of in the correct waste bins provided by client, locations to be communicated during site induction.
- Area to be kept clean and tidy at all times.
- Use site power supply in preference to use of a portable generator whenever possible.
- Always place a drip tray under a portable generator/compressor
- The waste management plan is documented, actioned and agreed with the client at commencement.
- Turn off vehicle engines as soon as it is practical to do so.
- Impact of noise on the surrounding environment and neighbours to be considered.
- Impact of dust or smoke on the surrounding environment and neighbours to be considered.
- Impact of artificial lighting on the surrounding environment and neighbours to be considered.
- Impact of any site activities on the surrounding flora or fauna to be considered.

Preparatory by others

1. Office induction of site personnel.
2. Availability of personnel to issue permits.
3. Availability of personnel for inspection/witness hold points.
4. Welfare facilities, provided by client.
5. Safe access route will be provided by the client into the working area, where the equipment is installed.
6. Designated laydown areas as defined by the client.
7. Waste handling, segregation, and disposal.
8. Local 220v & 415v supplies (for equipment commissioning and lighting).
9. All water supplies and wastewater removal as required for commissioning.

Site induction of site personnel

This is to include:

- Site specific hazards
- Operation procedures
- Welfare facilities
- Restricted mobile phone use
- Safe system of work
- Method Statement review and sign off
- Permits issued to Ovivo engineers, including hot work etc.

Site Working

Points to note:

- Site Engineers Working time 08:00 to 18:00 Monday to Saturday.
- Weekend working as per contract.
- Working area lighting by client.
- Electrical supplies for equipment commissioning.
- Cables to be run to avoid tripping hazards.

Description of works to be completed

Scope of work: Step by step sequence of the working methods listing all the key stages of site activity including shut down, isolation, and return to duty procedures
(This method statement is to be read in conjunction with the risk assessment)

Any deviations, due to site conditions or other circumstances, should be agreed with the customer and noted in the amendment's pages after Ovivo office authorisation.

IF IN DOUBT, CONTACT OVIVO OFFICE FOR CLARIFICATION

NOTE:	**Each morning, equipment in scope is to be checked to ensure condition of power supplies, isolations and pipe connections are known/safe before commissioning tasks are undertaken.**
NOTE:	**Daily Point of Work Assessment to be completed in conjunction with the above.**
NOTE:	**The following tasks are to be completed in conjunction with SWL0841 Elogen Crosswind – Commissioning Plan.**
Task/ Sequence	**Description**

A	**Pre-commissioning.**
1	Arrive on site & contact Site Representative.
2	Complete any necessary site inductions and site orientation. To include nearest emergency services and emergency preparedness plan.
3	Prior to commencing the works, all personnel are to review the content of the Method Statement and Risk Assessment in the pre-job briefing. Attendees are to record onto a sign on sheet that they have understood the works to be carried out and the sequence as defined and will comply with the Health and Safety requirements as set out. Any personnel arriving later during the works must be similarly briefed and added to the sign on list.
4	Discuss planned activities with client commissioning team, to ensure availability for witness points.
5	Receive permit to work for commissioning activities
6	Check overall system for completeness and any damage.
7	Check all pipework connections.
8	Manual valve operation confirmation. All non-return valves to have installation directions checked.
9	Pneumatic valve operation checks.
10	Pump check and initial commissioning (rotation checks).
B	**Commissioning**
1	Complete plant with filter elements and UV-lamps
2	Check the feedwater quality
3	Flush the conservation fluid to the drain
4	Pre-Energisation checks will be completed in conjunction with client Electrical Commissioning and subcontractor Main Electrical.
5	PLC input/output checks (once HMI installed and operational). PLC communications set up will occur during the above activities to allow completion of I/O checks.
6	Start pumps of the RO
7	Check and adjust the flowrates of osmosis
8	Check and adjust the flowrates of EDI
9	Check the water quality of osmosis and EDI
10	Fill the permeate tank ensuring no spillage. Clean any spillage as required.
11	Start the polishing loop booster pump
12	Check entire system for leakage. Clean any spill and dispose of waste as per site procedure.
13	Check the quality and flow rates
14	Record the quality and flowrates
C	**Post-Commissioning**
1	Document and photograph system noting flowrates

Site activities / hazards with the potential to cause foreseeable harm					
This section identifies hazards involved in working IN/NEAR/ON and is recorded following a site survey, usually with the person responsible for site safety or his/her agent.					
Pressure systems	✓	Excessive noise	✓	Chemicals	✓
Piped services	✓	Moving machinery	✓	Biological hazards	✓

Documents appended to method statement (Drawings, Risk Assessment etc.)			
Item	Reference	Issue	Date
Site specific risk assessment	SWL0841/RA01	3	24/01/2025
Risk Assessments & Safe Systems of Work	As listed in section below	various	various
Permit to work			

Risk Assessments and Safe Systems of Work (SSOW)			
Hazard	Number	Hazard	Number
Manual handling	**ARA003**	Using step ladders	**ARA007/SSOW004**
Noise at work	**ARA004**	Aluminium tower and scaffold	**ARA008/SSOW008**

LOLER – Lifting equipment

All lifting equipment used on site shall have a valid test certificate. Prior to use all lifting equipment must be subjected to a user inspection, carry a unique identifying mark and a rating capacity. Defective equipment will not be used. All equipment will be used correctly and within its rated capacity. Complete list of the certified lifting equipment shall be available for review.

Not applicable in scope of work

Control of substances hazardous to health (COSHH)

All substances to which employees are exposed that may be hazardous to health must be used in accordance with a valid COSHH risk assessment. Ovivo subscribes to Sevron CMS, an internet based COSHH risk assessment service, to assist with compliance to these regulations.

An index list and relevant COSHH assessments will be maintained in relevant file. All substances covered by these regulations must be used in accordance with a valid, suitable and sufficient risk assessment and comply with the Integrated Management procedure UK HSEA 23.

Documentation, authorisation and briefing

Prepared By	Robin Peckston	Print	Robin Peckston	Date	24/01/2025
Checked By	Daniel French	Print	Daniel French	Date	24/01/2025
Approved By		Print	Peter Nicholls	Date	24/01/2025

I have read and understood this method Statement and associated lift plans and risk assessments

Sign	Luc Paoletti	Print	LP	Date	27/01/25
Sign	Maxime Lafargue	Print	ML	Date	28/01/25
Sign	Fray Moufouma	Print	FM	Date	28/01/25
Sign	Sebastien depheimer	Print	SD	Date	28/01/25
Sign	P. Kasperski	Print	P. K	Date	28/01/25
Sign		Print	MC	Date	28/01/25
Sign		Print		Date	
Sign		Print		Date	
Sign		Print		Date	

Note: - Due to site conditions, weather or other unforeseen circumstance, this method statement and associated risk assessments may need to be altered. This will only be carried out by Ovivo's site supervisor in consultation with the method statement author and a representative of the customer. Any changes that are agreed must be noted on this method statement and signed by both parties.

Agreed amendments

Name	Signed	Name	Signed

Abnahmeprotokoll
Final Acceptance Certificate (FAC)

Projekt / *Project*: **Crosswind 23004680**

Anlagenart / *Type of plant*: **GEO-EDI 500 P**

Aufstellungsort / *Place of installation*: **The Hollandse Kust Nord (HKN) located 18,5km off the coast of the Netherlands near the town of Egmond aan Zee**.

Auftraggeber / *Buyer (Customer)*: **Ovivo UK Ltd.**

Auftragnehmer / *Supplier*: **EnviroFALK GmbH**

Anlagenbetreiber / *Operator:* **Crosswind / Elogen**

Auftrags-Nr. / *Project No.* **23004680** Datum / *Date:* **15.12.2023**

Nachtrags- Nr. / *Modification No.* _____ Datum / *Date:* __/___/_____

Nachtrags- Nr. / *Modification No.* _____ Datum / *Date:* __/___/_____

Auftragsbestätigung (Datum) / *Order confirmation (date)*: **15.12.2023**

Örtliche Inaugenscheinnahme und Prüfung am / *Visual inspection and walk through on*: 28/01/2025

Teilnehmer bei der Abnahme / *Participants at the Acceptance Test:*:

Auftraggeber / *Buyer (Customer)*: **Mark Cousins - Ovivo**



Auftragnehmer / *Supplier*: **Peter Kasperski – EnviroFALK GmbH**

Anlagenbetreiber / *Operator*: **Martin Taylor - Crosswind / Maxime Lafargue, Luc Paoletti - Elogen**

Verteiler Abnahmeprotokoll / *Mailing List Final Acceptance Certificate (FAC)*: **Gerry McCann – Crosswind / Lancelot di Giulio - Elogen**

Abnahmeprotokoll
Final Acceptance Certificate (FAC)

Probebetrieb durchgeführt ***Test run***	Anlage, Einrichtungen, Komponenten *Plant, equipment and components*	Vertraglich zugesicherte Leistungen *Obligations according to the contract*
29.01.2025 **01.02.2025** von / *from* bis / *until*	Vollständig / *complete* ☒ Nicht vollständig / *incomplete* ☐	Erbracht / fulfilled ☒ Nicht erbracht / *not fulfilled* ☐

Die Anlage wurde gemäß den Festlegungen im Vertrag, einschließlich aller in diesem Dokument benannten Nachtragsaufträge geliefert, montiert und in Betrieb genommen.

The equipment has been delivered, erected and commisioned according to the contract, including all modifications mentioned in this document.

Mängel / *Deficiencies*

Bei der Abnahme wurden folgende Mängel festgestellt (strittige Mängel sind zu markieren):

List of deficiencies reported during the final acceptance test (please mark disputable deficiencies):

Changes updated on the P&ID needed :

- 1CHV1 => 1CHV2, 1CHV1 => 1CHV3, 1RSHV1 => 1AHV1
- Change the P&ID in accordance with the sketch provide by OVIVO

OVIVO needs to provide the tag of 1C tank and tag of conductivity sensor QIA-1B4

Der Auftraggeber besteht auf der Beseitigung der aufgeführten unstrittigen Mängel bis zum:

The customer demands a remediation of the deficiencies above reported by the latest on: ___/___/_____

Abnahmeprotokoll
Final Acceptance Certificate (FAC)

Bemerkungen / *Remarks*:

After commissioning and before transport from Italy to the Netherlands, the entire system must be drained and the membranes removed from the pressure pipes. To drain, all pipe connections must be opened at the lowest point so that the water can escape. A link with access to a cloud will be created by February 5, 2025, on which all photos of the commissioning and the calibration certificate of the reference measuring device can be found.

2 UV Lamp, 3 Filters, 1 filter key was left on site (spares for recommissionning)

Abnahme / *Acceptance*

Das Betriebsmittel/die Anlage gilt als abgenommen:
The plant/equipment shall be considered as accepted (FAC): JA / *YES* ☒ NEIN / *NO* ☐

Ein erneuter Abnahmeversuch ist erforderlich:
A secon final acceptance test has been demanded: JA / *YES* ☐ NEIN / *NO* ☒

Die vom Auftraggeber zur Verfügung gestellten und vom Auftragnehmer benutzten Werkseinrichtungen wurden in ordnungsgemäßem Zustand übergeben.
The equipment supplied by the customer and used by the constructor (supplier) was delivered in proper conditions. JA / *YES* ☒ NEIN / *NO* ☐

Eingewiesenes Personal / *Trained personnel*

Abnahmeprotokoll
Final Acceptance Certificate (FAC)

Das nachstehend aufgeführte Bedienungspersonal ist in die Anlage und die Sicherheitseinrichtungen eingewiesen worden (s. „Protokoll zur Personaleinweisung“)

The following list shows the personnel which has been trained to operate the plant and instructed on all safety questions (please see the “Report on the Instruction of Customer’s Personnel“)

Martin Taylor - CROSSWIND

Jamie Mc Allister - CROSSWIND

Alem Brdakic

Fray Moufouma

Maxime Lafargue

Dokumentation / *Documentation*

Die technischen Unterlagen (Beschreibung der Anlage, Bedienungsanleitung, Wartungsvorschriften etc.) sind gemäß Vertrag geliefert.

All technical documentation (description of the plant, operating manual, maintainance instructions, etc.) has been delivered according to the contract. : JA / *YES* ☒ NEIN / *NO* ☐

Falls nicht, sie werden am ___/___/_____ geliefert (einzeln aufführen).

Should this not be the case, they will be delivered on: ___/___/_____ (please indicate each item)

Abnahmeprotokoll
Final Acceptance Certificate (FAC)

Unterschriften / *Signatures*

Die nachstehenden Unterschriften bestätigen die ordnungsgemäße Abnahme und Übergabe.

The following signatures confirm the final acceptance and a correct end of commissioning.

Auftraggeber / *Buyer (Costumer)*

Ovivo UK Ltd.

Firma/*Company*

Bevollmächtigter /*Representative*

Auftragnehmer / *Constructor (Supplier*)

EnviroFALK GmbH

Firma/*Company*

P. Kasperski

Bevollmächtigter /*Representative*

Anlagenbetreiber / *Operator*

Crosswind / Elogen

Firma/*Company*

Luc Paoletti

Bevollmächtigter /*Representative*

Ort / *Place*: Marina di Ravenna

Datum / *Date*: 01/02/2025

Abnahmeprotokoll

Final Acceptance Certificate (FAC)

Prozesswerte / process values:

Flow quantity	Setpoint	actuall value	witnessed by
Inlet 1E (soft water) l/h	min. 670	≈1000	Martin Taylor
Concentrate back flow 1RO (FI1RO6) l/h	approx. 800	≈930	Martin Taylor
Concentrate flow 1RO (FIR1RO3) l/h	approx. 197	≈300	Martin Taylor
Permeate flow 2RO (FIR2RO5) l/h	approx. 530	≈600	Martin Taylor
Concentrate back flow 2RO (FI2RO6) l/h	approx. 800	≈936	Martin Taylor
Concentrate flow 2RO (FIR2RO3) l/h	approx. 177	≈102	Martin Taylor
Diluate flow 1ED (FIR1ED1) l/h	approx. 500	≈552	Martin Taylor
Concentrate flow 1ED (FSA-/FI1ED3 l/h	min. 25	≈30	Martin Taylor
Electrode rinsing water 1ED (FI1ED5) l/h	min. 5	≈10	Martin Taylor
Feed outlet 1A to 1E l/h	approx. 500	≈512	Martin Taylor
Feed EDI reject 2A to 4E l/h	approx. 80	≈40	Martin Taylor
Reject water from 1RF 6A to 2E l/h	approx. 50	≈50-100	Martin Taylor

Conductivity values

Conductivity 1RO (QISA+1RO4) µS/cm	< 20	0.8	Martin Taylor
Conductivity 2RO (QISA+2RO4) µS/cm	< 10	0.8	Martin Taylor
Conductivity 1ED (QIA1ED7) µS/cm	< 2	0.056	Martin Taylor
Conductivity circulation system (QIA1C1) µS/cm	< 0,1	0.06	Martin Taylor

DRG No. 907670001

example EID: 1E HV 1

- identification number
- counter number

assembly:
A = expansion tank
B = tank
C = ion exchanger
DS = metering station
ED = electrodeionization
EH = softener
F = filter
FR = backwashing filter
LE = leak detection system
ME = membrane degassing
MF = microfiltration
NA = neutralization
NF = nanofiltration
PS = pump station
R = mixer
RF = return unit
RO = reverse osmose
RS = cleaning station
UF = ultrafiltration
W = heat exchanger / heater
Z = UV system

takeover points:
A = outlet
DL = compressed air
E = inlet
EL = electrical supply
R = return
V = flow line

valve overview:
AP = sample valve
BV = operation valve
BY = bypass valve
DH = pressure relief valve
EF = vent valve
EV = drain valve
HV = hand valve for maintenance tasks
RS = backflush valve
RV = check valve
SV = control valve
VS = safety valve
VV = reject valve

components:
A = expansion tank
B = tank
C = ion exchanger
EH = softener
P = pump
F = filter
R = mixer
W = heat exchanger
X = lye trap, chlorine electrolysis, RO-membrane
Z = UV system

1EL customer / Ovivo
Power Supply
3 x400V,N,PE, 50 Hz
Power: max. ca. 12 kW
Fuse: 50A
Master-Cabinet
600 x 1000 x 400
S7-1200 with TP700
Remote Maintenance

welding methods:
PP-H socket-welding
PP-H butt-welding
stainless steel-welding

INSTRUMENT DEVICE CODES			
FIRST LETTER - PARAMETER		SUCCEEDING LETTER(S)	
A	ANALYTICAL (SEE NOTE 1)	A	ALARM
B	-	B	-
C	-	C	CONTROLLER
D	DENSITY	D	DIFFERENCE
E	-	E	SENSING ELEMENT
F	FLOW	F	-
G	GAUGING POSITION , LENGTH	G	-
H	-	H	-
I	INDICATOR	I	INDICATOR
J	-	J	-
K	TIME	K	-
L	LEVEL	L	-
M	MOISTURE , HUMIDITY	M	-
N	-	N	-
O	-	O	-
P	PRESSURE	P	-
Q	QUALITY	Q	TOTALISER
R	-	R	RECORDER
S	SPEED OR FREQUENCY	S	SWITCH
T	TEMPERATURE	T	TRANSMITTER
U	-	U	-
V	VISCOSITY	V	-
W	WEIGHT , FORCE	W	-
X	-	X	-
Y	-	Y	-
Z	POSITION	Z	-

NOTE: 1 - A NOTE SHALL BE ADDED TO SPECIFY THE PROPERTY MEASURED (SEE BELOW)

Legend:

Devices and Valves:

- Reverse osmose
- Heat exchanger
- Cartridge filter
- Fixed-bed filters
- Ion exchanger
- Pump
- Actuator with electric motor
- Local control station
- Central control station
- Locally indication
- Backflow preventer
- Diaphragm valve
- Ball valve
- Pressure holding valve
- Safety valve
- Pressure reducing valve
- Check valve
- Flap trap
- Solenoid valve
- Pneumatic diaphragm valve
- Pilot solenoid valve
- Heater
- Hose
- Funnel
- Union
- Flange
- Static mixer
- UV Immersion UV lamp

Pipe material:
Pipe material: PP-H S5/SDR11; PN10; DIN 8077 / 8078 DIBT Z-40.23-4; RAL 7032
Pipe material: VA 1.4401 press fittings; M-pressing contour
Pipe material: PPs; DIN 8078 hot water resistant; low flammability according to DIN 4102

2E Reject Water from 6A

DN20 1RRV1 506366

530 l/h DN20

3E instrument air 1.7 Nm³/h 7 bar 1/2" male
customer / Ovivo
DN15 1MEHV1 506308
1/2" 24V NC 1MEBV1 528127
1/2" 1MEF1 528201

3/4"a 1MESV2 506386
optical 727859 1-10Nm³/h Air FI 1ME3
IO-Link 741709 0-10bar PI 1ME2 1/4"a

Pressure Holding Valve 0-10 bar
DN20 1RDH1 728617

IO-Link 741807 0,06-1,2m³/h FIR 2RO2
1/4" 2ROAP1 502015
IO-Link 741709 0-10bar PI 2RO8 1/4"a
IO-Link 742405 µS/cm QISA- 2RO4
DN20 2RORV2 506366

0-100% binary QIA 1Z1
000000 binary QE 1Z1
1/2" 24V NC 2ROBV2 528171
UV 170W TOC38 1Z 420103

1ME Membrane degassing 6 x 13" 410148
1/4" 1MEAP1 502015
YP-70 230V/50Hz 0,1 kW 405547 1MEP1 Diaphragm Pump
402104 1MEB1
1/2" 24V NC 1MEVV1 528128

PC
IO-Link 741709 0-10bar PI 1F1
IO-Link 741709 0-10bar PISA- 1F2
6751/h 2-4bar DN20
1/4"a
Sym 729263
1/4"a
20" BB 1F 450005 wrench for filters SW2 450023
1/4" 1FEV1 518097

4-20mA 4,0 kW 625401 QE 1ROP1 405639 1ROP1 V420 400V/50Hz 3,0 kW

IO-Link 741708 0-25bar TI 1RO7 PI 1RO7 1/4"a
3x Membrane ESPA1 4040 410016
1ROX1 GFK 415138 4040
1ROX2 GFK 415138 4040
1ROX3 GFK 415138 4040

IO-Link 742405 µS/cm QISA- 1RO4
IO-Link 741807 0,06-1,2m³/h FIR 1RO8
DN20 1RORV2 506366
1/4" 1ROAP1 502015

590l/h 2-6 bar DN20
IO-Link 741709 0-10bar PSA- 1RO2 1/4"a

4-20mA 4,0 kW 625401 QE 2ROP1 405639 2ROP1 V420 400V/50Hz 3,0 kW

IO-Link 741708 0-25bar TI 2RO7 PI 2RO7 1/4"a
2x Membrane ESPA1 4040 410016
2ROX1 GFK 415138 4040
2ROX2 GFK 415138 4040

DN15 1RORV1 506365
DN15 2RORV1 506365

IO-Link 737961 0,12-2,4m³/h FI 1RO6 800 l/h
IO-Link 741708 0-25bar PI 1RO5 1/4"a
1/2" 1RORV3 518006

IO-Link 737961 0,12-2,4m³/h FI 2RO6 800 l/h
IO-Link 741708 0-25bar PI 2RO5 1/4"a
1/2" 2RORV3 518006

DN15 1RORV2 506365
DN15 1ROBV1 744851
DN15 2ROBV1 744852
IO-Link 741807 0,06-1,2m³/h FIR 1RO3
IO-Link 741807 0,06-1,2m³/h FIR 2RO3

3/4" 24V NC 1EBV1 528117
DN20 1EHV1 506306
customer / Ovivo
1E softened water 670 l/h 4 bar flange DN20/d25 Class 150 / ASME B16.5

Plastic-Welding: IR from EDI-product

IO-Link 0-100°C µS/cm TI 1ED7 QIA 1ED7 742405
ca. 500 l/h
orifice
1A to demin tank 2314900003

optical 534128 0-6bar PI 1ED6
1/4" 1EDAP1 502015
ca. 25 l/h
ca. 5 l/h
80l/h

662379 662378 AI 1ED11 UI 1ED11
XL-300-SR 1ED 402078
Power Supply 739303 + 739304

IO-Link 741709 0-10bar PI 1ED2 1/4"a
IO-Link 741709 0-10bar PI 1ED4 1/4"a
IO-Link 741807 0,06-1,2m³/h FIR 1ED1
526019 526049 binary 10 - 100 l/h FI 1ED3 FSA- 1ED3 optical optical
526153 2-25 l/h FI 1ED5
DN08 1EDSV1 506386 orifice 1 mm

2A EDI Reject 2314900003

Ovivo / customer
3A vent outside container

Ovivo / customer
4A non pressurised gravity drain by others flange DN50/d63 Class 150 / ASME B16.5

V		U		T		R		P		N		M		L		K		J		H		G	

F		updated to as built	E		power supply updated	D		flanges on drain	C		Update to connection	B		as per client request:	A		first issue						
								device codes added			type and 7 bar			pump redund. removed									
											pressure as per client			1+2ROP2 & 1PSP2									
											request			valves 1+2ROBV1 add.									

0 0,5 1 1,5 2 1:20 | 0 0,5 1 1,5 2 1:25 | 0 0,5 1 1,5 2 1:33,3

CMS

OVIVO
Worldwide Experts in Water Treatment
I10 Building, Railway Drive,
Wolverhampton, West Midlands, WV1 1LH
Tel: .44 (0)1902 721212 Fax: 44 (0)1902 721333
info.uk@ovivowater.com www.ovivowater.com

CUSTOMER DRG No.	-
PROJECT REF.	ECW SW L0000767
CLIENT	ELOGEN
PROJECT NAME	CROSSWIND
TITLE	Process & Instrumentation diagram
	ECW-1 Skid 1

STATUS

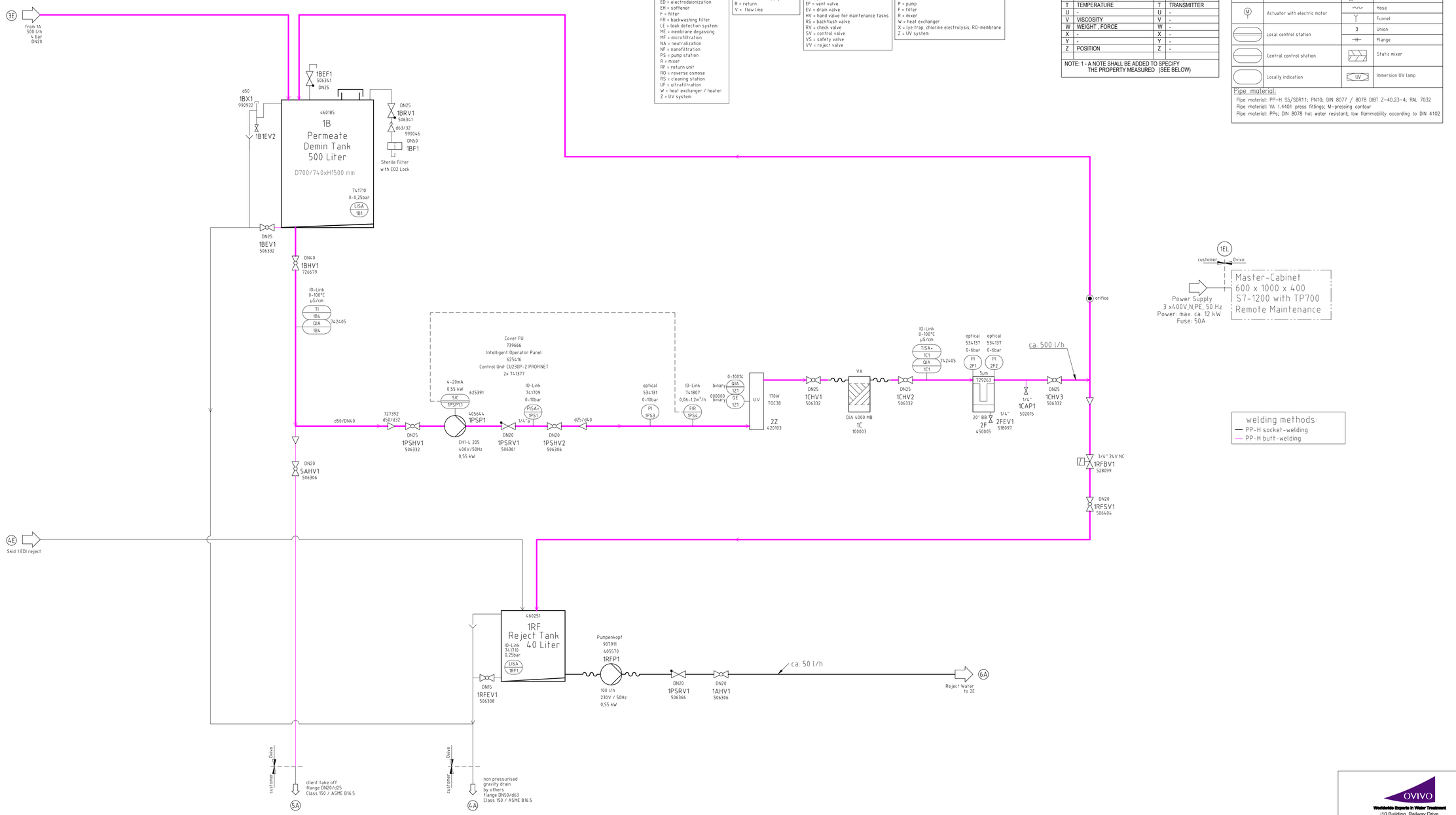
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ORIGINATOR	DRAWN	CHECKED	APPROVED
-	NK	NS	MK
SCALE	DATE	DATE	DATE
NTS	11.01.2024	12.01.2024	18.01.2024

DRG No. 907670001 REV F

M A0

DRG No. 907670002



INSTRUMENT DEVICE CODES

FIRST LETTER - PARAMETER		SUCCEEDING LETTER(S)	
A	ANALYTICAL (SEE NOTE 1)	A	ALARM
B	-	B	-
C	-	C	CONTROLLER
D	DENSITY	D	DIFFERENCE
E	-	E	SENSING ELEMENT
F	FLOW	F	-
G	GAUGING POSITION , LENGTH	G	-
H	-	H	-
I	INDICATOR	I	INDICATOR
J	-	J	-
K	TIME	K	-
L	LEVEL	L	-
M	MOISTURE , HUMIDITY	M	-
N	-	N	-
O	-	O	-
P	PRESSURE	P	-
Q	QUALITY	Q	TOTALISER
R	-	R	RECORDER
S	SPEED OR FREQUENCY	S	SWITCH
T	TEMPERATURE	T	TRANSMITTER
U	-	U	-
V	VISCOSITY	V	-
W	WEIGHT , FORCE	W	-
X	-	X	-
Y	-	Y	-
Z	POSITION	Z	-

NOTE: 1 - A NOTE SHALL BE ADDED TO SPECIFY THE PROPERTY MEASURED (SEE BELOW)

example EID: 1E HV 1

identification number

counter number

assembly:
A = expansion tank
B = tank
C = ion exchanger
DS = metering station
ED = electrodeionization
EH = softener
F = filter
FR = backwashing filter
LE = leak detection system
ME = membrane degassing
MF = microfiltration
NA = neutralization
NF = nanofiltration
PS = pump station
R = mixer
RF = return unit
RO = reverse osmose
RS = cleaning station
UF = ultrafiltration
W = heat exchanger / heater
Z = UV system

takeover points:
A = outlet
DL = compressed air
E = inlet
EL = electrical supply
R = return
V = flow line

valve overview:
AP = sample valve
BV = operation valve
BY = bypass valve
DH = pressure relief valve
EF = vent valve
EV = drain valve
HV = hand valve for maintenance tasks
RS = backflush valve
RV = check valve
SV = control valve
VS = safety valve
VV = reject valve

components:
A = expansion tank
B = tank
C = ion exchanger
EH = softener
P = pump
F = filter
R = mixer
W = heat exchanger
X = lye trap, chlorine electrolysis, RO-membrane
Z = UV system

Legend:

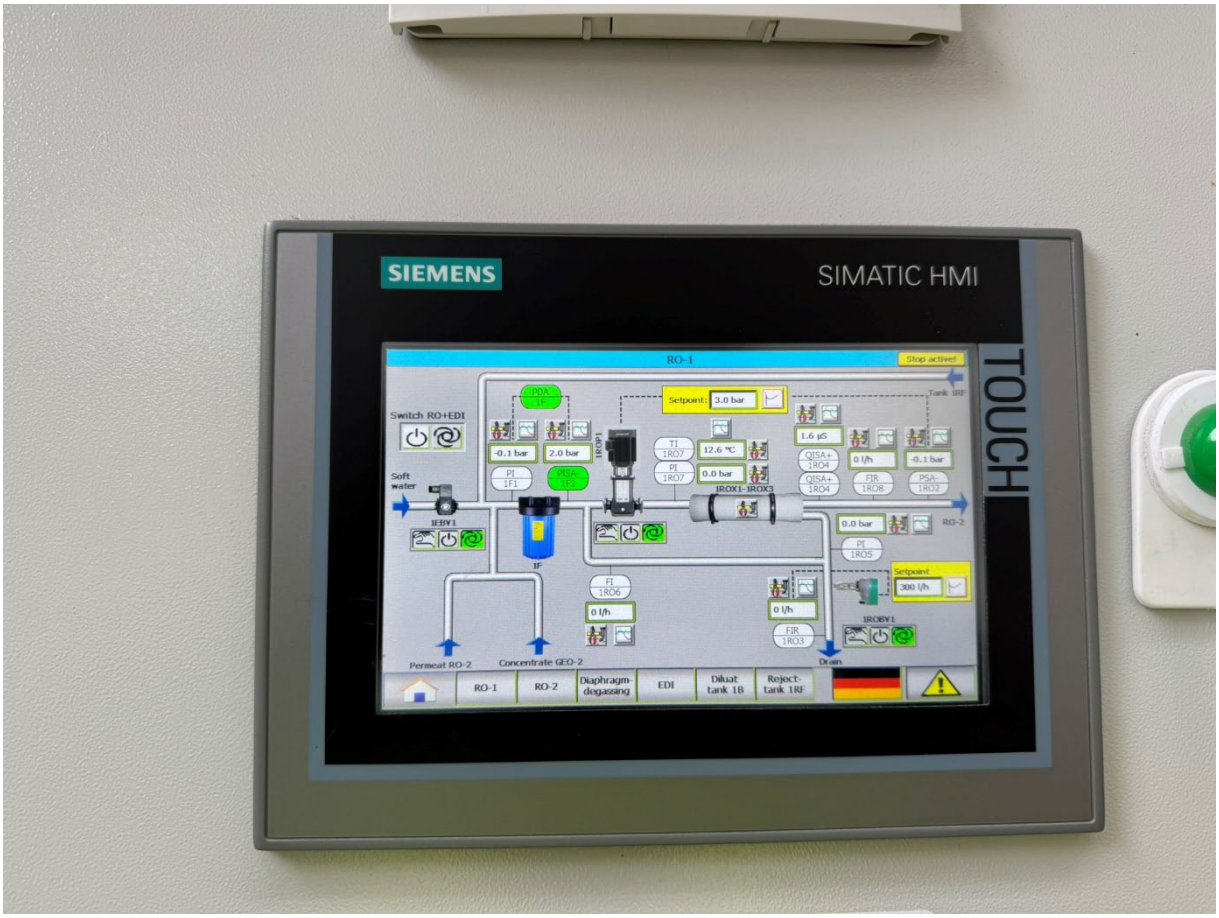
Devices and Valves:

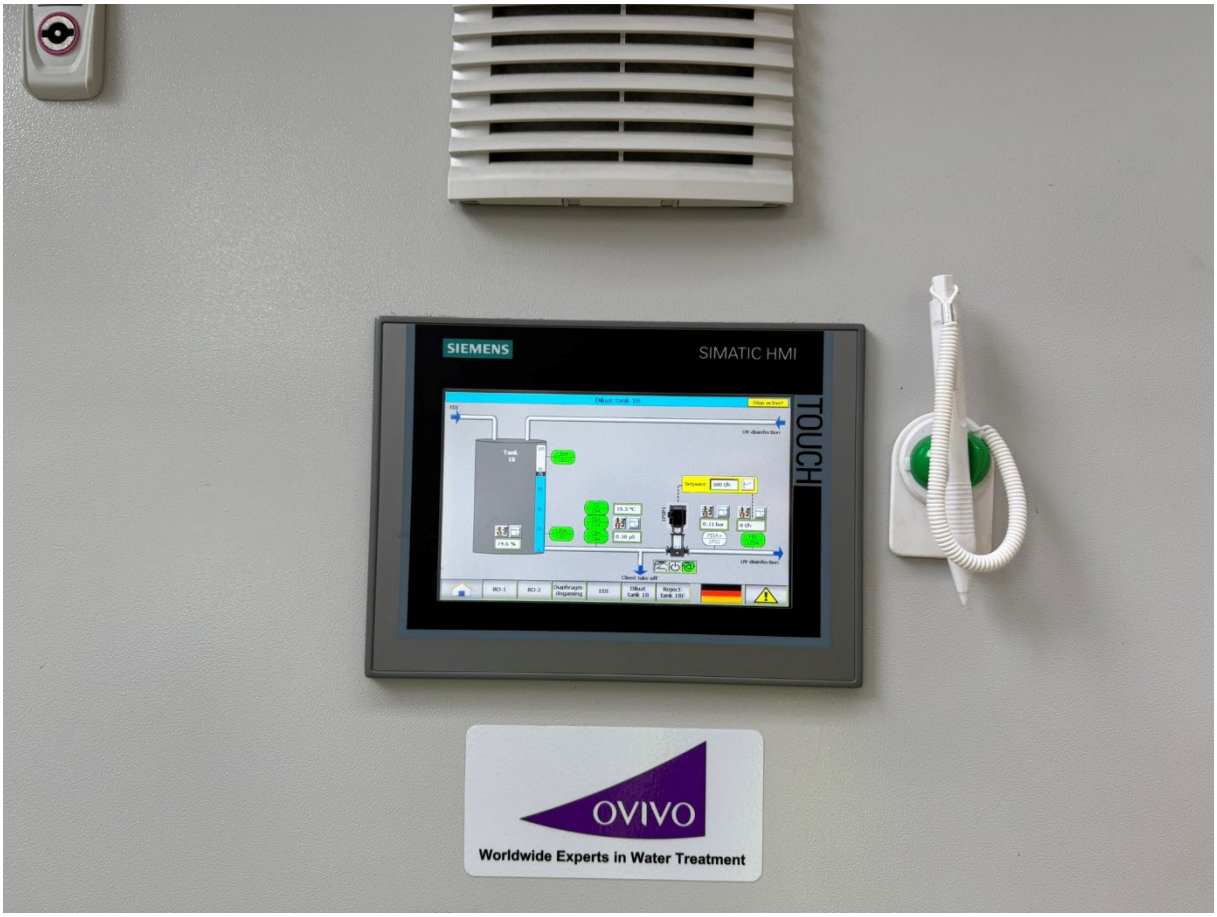
	Reverse osmose		Backflow preventer
			Diaphragm valve
	Heat exchanger		Ball valve
			Pressure holding valve
	Cartridge filter		Safety valve
			Pressure reducing valve
	Fixed-bed filters		Check valve
			Flap trap
	Ion exchanger		Solenoid valve
			Pneumatic diaphragm valve
	Pump		Pilot solenoid valve
			Heater
M	Actuator with electric motor		Hose
			Funnel
	Local control station		Union
			Flange
	Central control station		Static mixer
	Locally indication	UV	Immersion UV lamp

Pipe material:
Pipe material: PP-H S5/SDR11; PN10; DIN 8077 / 8078 DIBT Z-40.23-4; RAL 7032
Pipe material: VA 1.4401 press fittings; M-pressing contour
Pipe material: PPs; DIN 8078 hot water resistant; low flammability according to DIN 4102

welding methods:
PP-H socket-welding
PP-H butt-welding

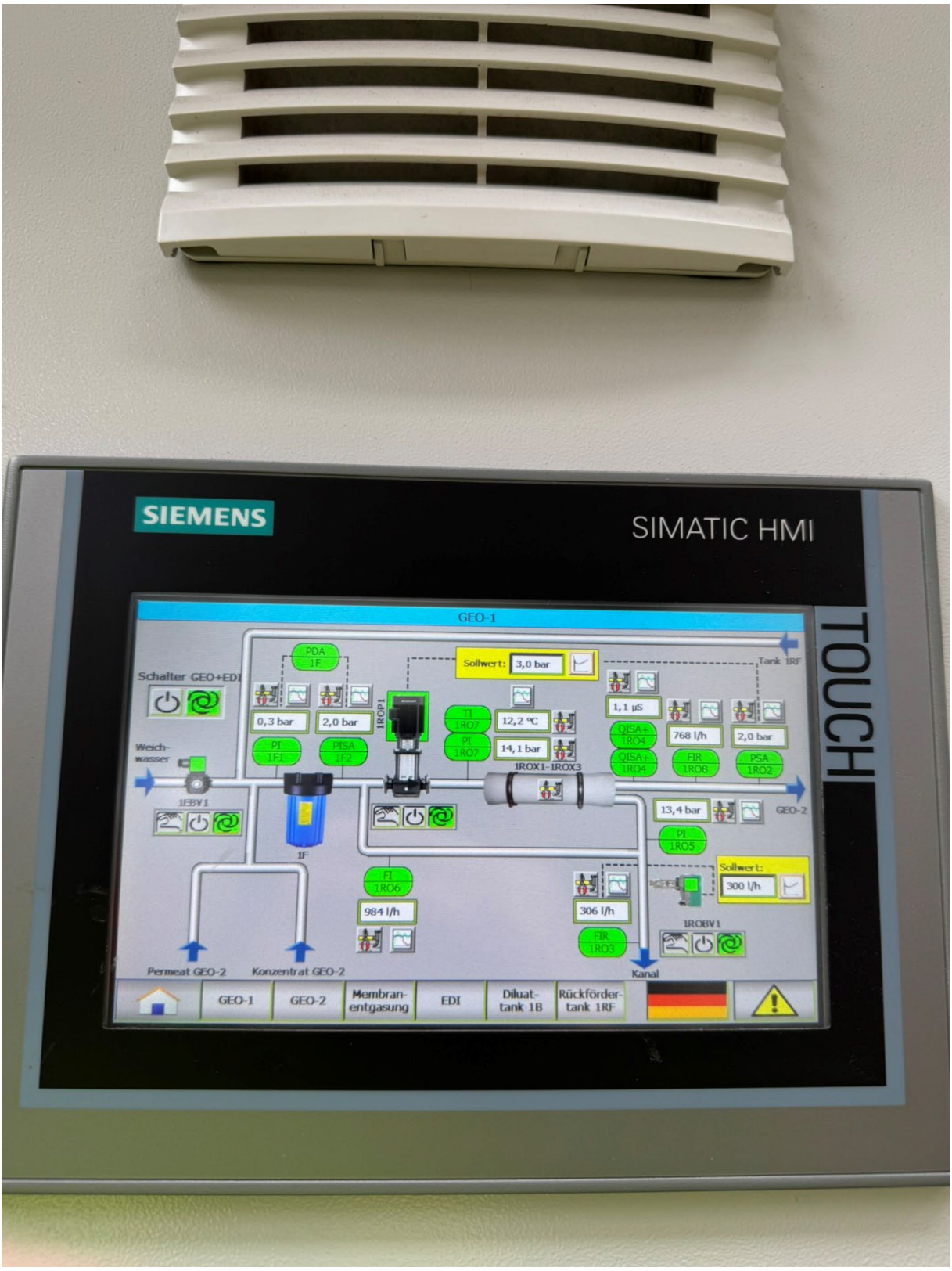
PICTURES


SIEMENS
SIMATIC HMI
TOUCH
RO-1
Stop active!
Switch RO+EDI
Soft water
Setpoint 3.0 bar
1.6 µS
12.6 °C
0.0 bar
1ROX1-1ROX3
0.0 bar
RO-2
Setpoint
300 l/h
0 l/h
0 l/h
Permeat RO-2
Concentrate GEO-2
Drain
RO-1
RO-2
Diaphragm-degassing
EDI
Dilut tank 1B
Reject-tank 1RF

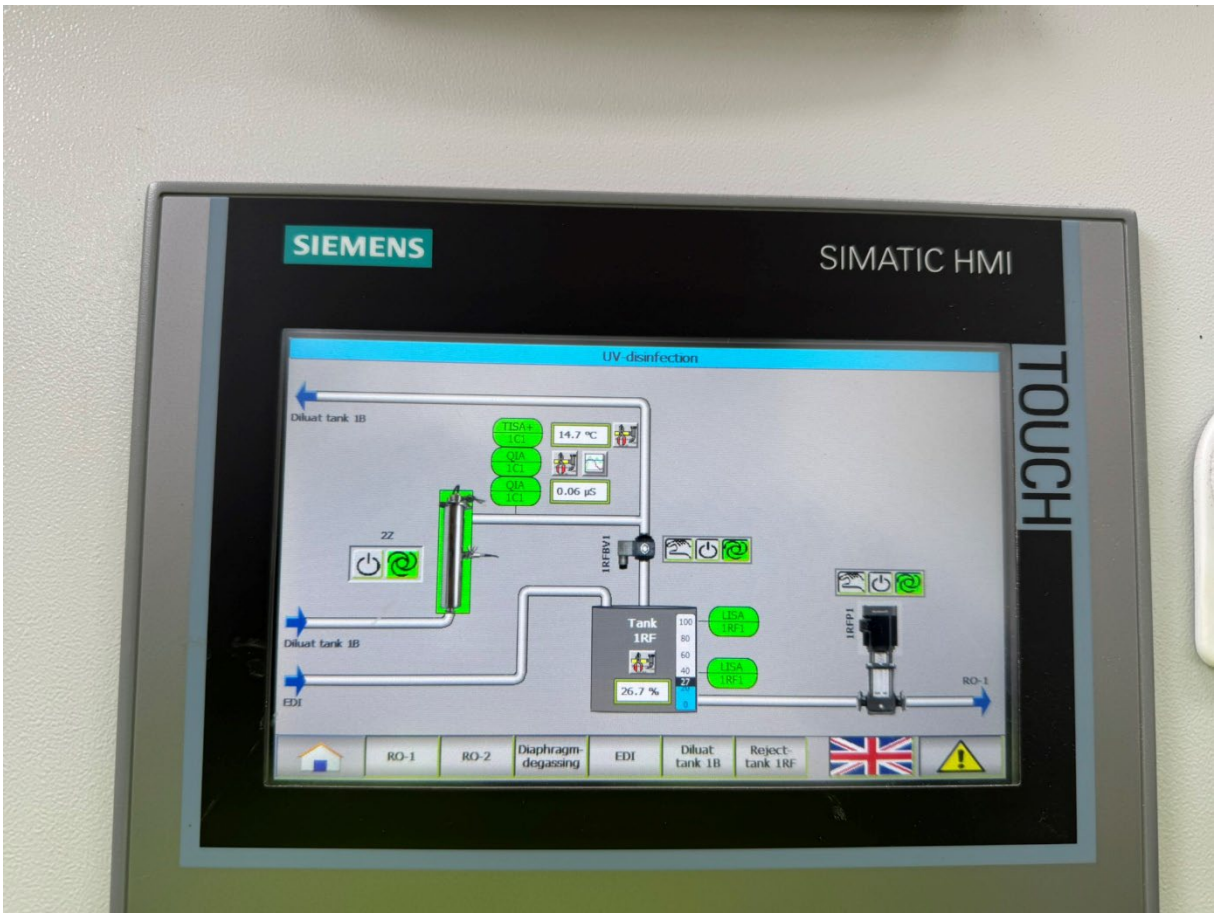

SIEMENS
SIMATIC HMI
TOUCH
OVIVO
Worldwide Experts in Water Treatment


RITTAL
SIEMENS
SIMATIC HMI
TOUCH
Elektrodeionisation
Schalter GEO+EDI
13,6 °C
0,05 µS
1,8 A
150 V
1,8 bar
0,0 bar
576 l/h
Diluatttank 1B
Membranentgasung
Tank 1RF
GEO-1
GEO-2
Membran-entgasung
EDI
Diluat-tank 1B
Rückförder-tank 1RF


wilo
SINAMICS
PI
1ED6
1EDAP
CAL
ENTER


SIEMENS
SIMATIC HMI
TOUCH
GEO-1
Schalter GEO+EDI
PDA 1F
Sollwert: 3,0 bar
Tank 1RF
0,3 bar
2,0 bar
PI 1F1
PISA 1F2
1ROP1
TI 1RO7
12,2 °C
PI 1RO7
14,1 bar
1ROX1-1ROX3
1,1 µS
QISA+ 1RO4
768 l/h
FIR 1RO8
2,0 bar
PSA 1RO2
Weich-wasser
1EBV1
1F
13,4 bar
GEO-2
PI 1RO5
Sollwert:
300 l/h
FI 1RO6
984 l/h
306 l/h
FIR 1RO3
1ROBV1
Permeat GEO-2
Konzentrat GEO-2
Kanal
GEO-1
GEO-2
Membran-entgasung
EDI
Diluat-tank 1B
Rückförder-tank 1RF


WTW
1.165 µS/cm
13.4 °C
F1
F2
M
CAL
AR
RCL
STO
ENTER
pH/Cond 3320


SIEMENS
SIMATIC HMI
TOUCH
UV-disinfection
Diluat tank 1B
TISA+ 1G1
14.7 °C
QIA 1G1
QIA 1G1
0.06 µS
2Z
1AB4V1
Tank 1RF
26.7 %
LISA 1RF1
LISA 1RF1
1RFP1
RO-1
Diluat tank 1B
EDI
RO-1
RO-2
Diaphragm-degassing
EDI
Diluat tank 1B
Reject-tank 1RF


WTW
pH 7.666
25 °C
χ 0.062 µS/cm
[Tr25] [nLF]
[0.010 1/cm]
14.8 °C
30.01.2025
11:40
USB-Ausgabe
F1
F2
M
CAL
AR
STO
RCL
ENTER

Comment Response Sheet Hollandse Kust Noord

CRS document name / Aconex unique number: C63-PAU-SAT-001_01 - HVAC SAT PROCEDURE CRS	
Reviewed Document(s) / Aconex unique number(s): ELO-CMM-BPH-PRD-00014 01 C63-PAU-SAT-001_01 - HVAC SAT Procedure **Reference Document(s) / Aconex unique numbers(s):**	
Interface information:	
Remarks on transmittal:	
Document review status (by Engineer / Engineer's Assistant(s)):	**CODE 2 - MINOR COMMENTS**

No.	Reference	Comment	Comment made by	Comment status
1.	CH2, HCU	HCU-400 (Hydraulic Cooling Unit) of Rectifiers are also cooled by HVAC, please include in pre-requisites. Additionally, where is the commissioning for HCU-400 done? Rectifier of part of this scope. **HCU-400 is NIDEC Scope Of Work, Nevertheless I added the note in pre-requisites "HCU-400 (Hydraulic Cooling Unit) of Rectifiers are also cooled by HVAC. Therefore, this equipment must be ready for Commissioning prior to HVAC SAT."**	TP	OPEN
2.	CH2,	For Leak Test, please divide between Gross Air Leak Test and Leak Test and refer to CH4.1. **We only do a leak check that prior to Glycoled water filling. the leak test with dry air is more than enough to prove the tightness of the system prior to glycol filling.** **This HVAC system is a low-pressure system, GALT is the final LT.** **Of course, during operation, the guys on filed should have a look during the service test if any leak is present, it will be visible anyway due the pink color of the fluid.**	TP	OPEN
3.	Section 4.2	Due to potential damage to the heat exchangers and other sensitive parts of the cooling system the glycol/water mix should be dosed with biocide and corrosion inhibitor. Can you please include this as part of the procedure or alternatively justify why these are not required? **Yes, it will be added with glycol, I added it in the procedure** **"1) Add corrosion inhibitor and biocide into the glycoled water mix"**	GM	OPEN

Comment Response Sheet Hollandse Kust Noord

No.	Reference	Comment	Comment made by	Comment status
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

Paumier

HVAC SAT Procedure

C63-PAU-SAT-001

02	*2nd Issue*	*27-JAN-2025*	*MSA*	*HRO*	*DWA*
01	*1st Issue*	*14-JAN-2025*	*MSA*	*HRO*	*DWA*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Subcontractor Document Number	
Client Document Number	

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SUMMARY OF REVISION

REV.	DESCRIPTION
Rev 01	First issue
Rev 02	Issue after CWD Comments

REFERENCE DOCUMENTS

DOC NUMBER	REV.	DESCRIPTION
P.0608871.L.02.405	0	Operating and maintenance manual for AHU
P.0608871.L.02.406	0	Operating and maintenance manual for Chiller
P.0608871.L.02.407	0	Operating and maintenance manual for Damper
P.0608871.L.02.408	0	Operating and maintenance manual for Fan Coil Units (FCUs)
P.0608871.L.02.409	0	Operating and maintenance manual for hydraulic system
P.0608871.L.02.410	0	Operating and maintenance manual for pumps
P.0608871.L.02.302	A	Electrical cabinet & Wiring diagram Chiller n°1 &2 (PAU001 & PAU002)
P.0608871.L.02.303	0	Electrical cabinet & Wiring diagram HVAC (PAU003)

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3. E&I Pre-Commissioning 4
4. Piping & Mechanical Pre-Commissioning 5
   - 4.1 Leak Testing 5
   - 4.2 Glycoled Water Filling 5
   - 4.3 Valve Pre-settings 5
5. SAT's documents 6
   - 5.1 Hydraulic & Aeraulic Drawings 6
   - 5.2 HVAC Leak Test Packs 6
   - 5.3 Item List 6
   - 5.4 SAT's 6

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1. Introduction

This document is the SAT document for HVAC as per PAUMIER documentation.
It includes:

- Loop testing: checking that the sensors are working properly with correct wiring and display on the HMI.
- Control for the operation of pump, drive, instrumentation settings, fan drive settings, pressure relief valve setting and all necessary functional and safety tests to be ready for the operational test.
- Leak testing: Control of the tightness of chilled water piping & condensation water piping networks.
- Filling with glycol water for the chilled water & water condensation loops.
- Fill the chillers with R513a.
- Final acceptance tests of all piping & equipment's networks.

2. Pre-requisites

- Wiring of all instrumentation to the electrical cabinet PAU001 & PAU002 has been completed.
- Power is available in all 3 cabinets, and cable communication between the cabinet done.
- All the instruments listed in the list in next section are connected and ready to be powered up.
- All the equipments listed in the next section are connected and ready to be powered up (FCUs, skids pumps, AHU, Chillers, HVAC electrical cabinet, Drycooler, modulating damper, wall heater).
- HCU-400 (Hydraulic Cooling Unit) of Rectifiers are also cooled by HVAC. Therefore this equipment must be ready for Commissioning prior to HVAC SAT.
- Access free to all the installation (including Dry cooler).
- All piping completed, pressure test, cleaning and reinstatement are done.
- Mechanical Completion (RFC) for the sub-system 66-06 has been signed by all parties.
- Assembly of all equipment has been done in accordance with the PID P.0608871.L.02.104.
- The assembly of duct finalized and with its accessories (modulating damper, exhaust damper).
- Presence of Elogen (and CWD if necessary) during the test is necessary to certify their correct execution.

For the filling with glycol water:

- Leak Test has been completed.
- Glycol for network charging has been provided (total volume estimated => 2800 L of MPG 40%).
- Power supply of 230V for connection of the glycol charging pump is available.
- Installation of purges valves at the low point and an airs bleeder at the high point of the pipes are done.
- The chiller at Level 01 is accessible.
- Power supply 230V for connection of refrigerated charging station (Paumier material) is available.
- The charge of R513a is supply scope Paumier.

3. E&I Pre-Commissioning

See the Appendix for the Item List. Proceed with all the necessary individual checks & tests.

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4. Piping & Mechanical Pre-Commissioning

4.1 Leak Testing

All Glycoled water loops must be tested for tightness prior to the filling with Glycoled water.
Follow the steps given by ELOGEN Leak Test Procedure in Method Statement, use a pressure of 2 barg with Dry Air.
Line Up as per the HVAC Leak Test P&ID Mark Up in Appendix.
Fill the ITR given by ELOGEN.

4.2 Glycoled Water Filling

Here the steps:

For the Glycol charge:

1) Add corrosion inhibitor and biocide into the glycoled water mix
2) Checking the tightness of the pipes
3) Glycol filling is done via a filling valve and hose
4) Purge the air from the piping at a high point with the air bleeder.
5) Make sure there are no water leaks.
6) Open the valves of each equipment one by one (AHU, FCU, ..)
7) Let the pumps run for a few hours to continue to purge the air from the piping

Here the procedure Chiller charge:

1) Place the bottle on a scale to check the weight of the charge introduced.
2) Connect the bottle charging tap to the system charging tap without tightening the nut on the latter.
3) Open the bottle tap slightly to expel the air from the connecting pipe, then tighten the nut on the system tap.
4) Open the liquid charging tap on the fluid bottle.

During these operations, monitor the discharge pressure gauge. If the pressure rises abnormally due to an accumulation of fluid in the condenser, check the charge level using the level on the reservoir bottle.

5) Empty the charging pipe before dismantling by loosening its connection on the system charging tap (after closing the bottle tap). Let the compressor run for a few minutes to check the operation of the system.

4.3 Valve Pre-settings

Some manual valves need to be set at a certain position for operation, here the list, completion date is to be filled:

Valve Tag	Setting	Completion Date
MV-152	Set by PAUMIER	
MV-168	Set by PAUMIER	
MV-174	Set by PAUMIER	

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MV-208	Set by PAUMIER	
MV-314	Set by PAUMIER	
MV-315	Set by PAUMIER	
MV-316	Set by PAUMIER	
MV-317	Set by PAUMIER	
MV-318	Set by PAUMIER	
MV-319	Set by PAUMIER	
MV-320	Set by PAUMIER	
MV-406	To be set with a portable ultrasonic flowmeter at 1.6 m3/h	
MV-408	To be set with a portable ultrasonic flowmeter at 9.8 m3/h	
MV-420	Fully Open	

5. SAT's documents

5.1 Hydraulic & Aeraulic Drawings

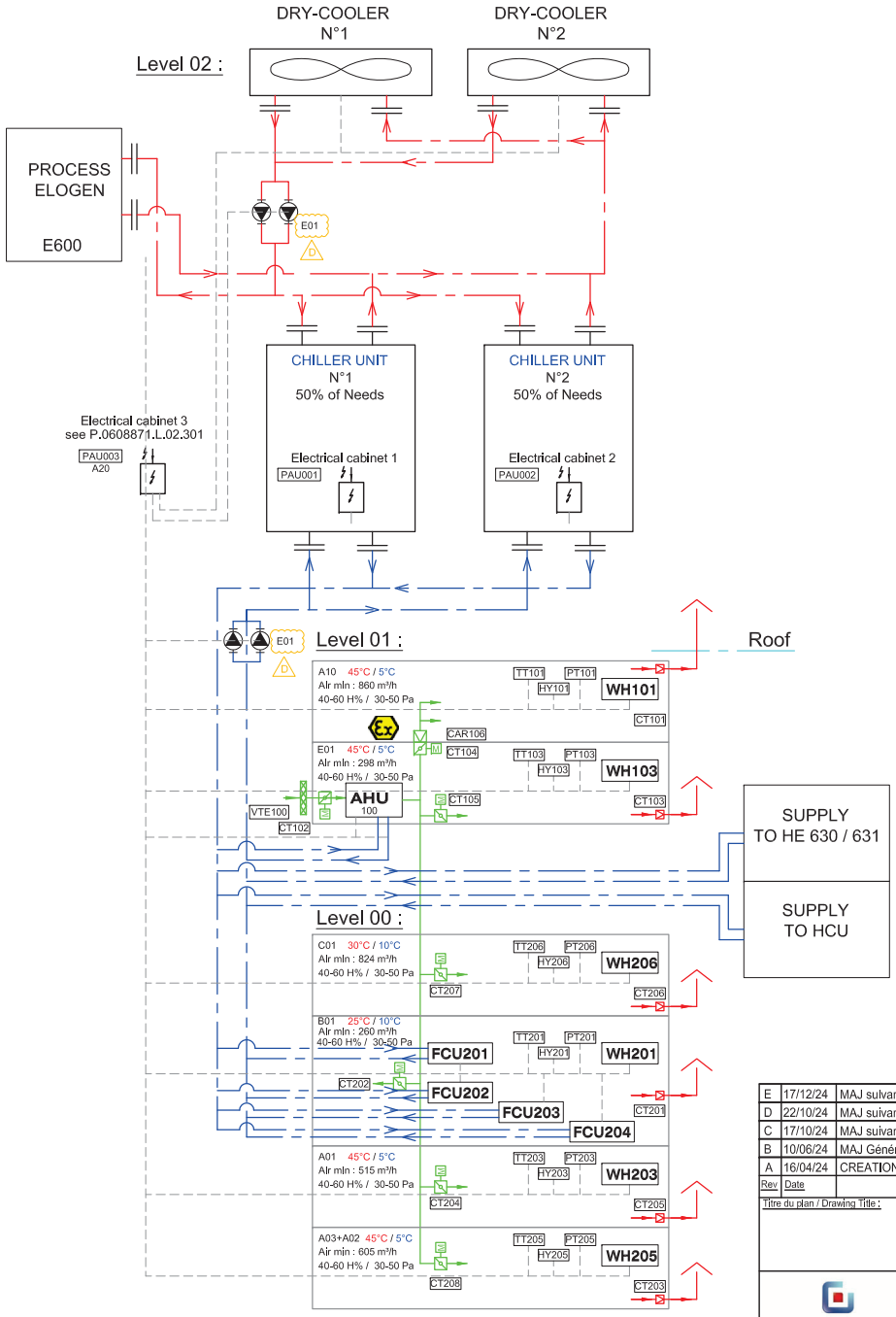
5.2 HVAC Leak Test Packs

5.3 Item List

5.4 SAT's

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ind	Equipement	Equipment	TAG
	Drycooler n°1	Drycooler n°1	DRY n°1
	Drycooler n°2	Drycooler n°2	DRY n°2
	Chiller n°1	Chiller n°1	CH n°1
	Chiller n°2	Chiller n°2	CH n°2
	Armoire n°1	Electrical cabinet n°1	PAU001
	Armoire n°2	Electrical cabinet n°2	PAU002
	Armoire n°3	Electrical cabinet n°3	PAU003
	Pompe réseau condensation n°1	Condensation circuit pump n°1	PMP n°1
	Pompe réseau condensation n°2	Condensation circuit pump n°2	PMP n°2
	Pompe réseau eau glacée n°1	Chilled water pump n°1	PMP n°3
	Pompe réseau eau glacée n°2	Chilled water pump n°2	PMP n°4
	Grille separatrice d'embrun air neuf AHU	AHU fresh air separating grille for sea generated spray	VTE 100
	Air Handling Unit (AHU)	Air Handling Unit (AHU)	AHU 100
	FCU B01 - Rectifier Room - T8	FCU B01 - Rectifier Room - T8	FCU 201
	FCU B01 - Rectifier Room - T8	FCU B01 - Rectifier Room - T8	FCU 202
	FCU B01 - Rectifier Room - T8	FCU B01 - Rectifier Room - T8	FCU 203
	FCU B01 - Rectifier Room - T8	FCU B01 - Rectifier Room - T8	FCU 204
	Wall heater A10 - Hydrogen Process Container - ATEX	Wall heater A10 - Hydrogen Process Container - ATEX	WH 101
	Wall heater E01 – AHU room	Wall heater E01 – AHU room	WH 103
	Wall heater B01 - Rectifier Room	Wall heater B01 - Rectifier Room	WH 201
	Wall heater A01 - Stack Room	Wall heater A01 - Stack Room	WH 203
C	Wall heater A03+A02 - H2 Process Room	Wall heater A03 - H2 Process Room	WH 205
	Wall heater C01 - Water Treatment Package	Wall heater C01 - Water Treatment Package	WH 206
	Sonde température A10 - Hydrogen Process Container - ATEX	Temperature sensor A10 - Hydrogen Process Container - ATEX	TT 101
	Sonde température E01 – AHU room	Temperature sensor E01 – AHU room	TT 103
	Sonde température B01 - Rectifier Room	Temperature sensor B01 - Rectifier Room	TT 201
	Sonde température A01 - Stack Room	Temperature sensor A01 - Stack Room	TT 203
C	Sonde température A03+A02 - H2 Process Room	Temperature sensor A03 - H2 Process Room	TT 205
	Sonde température C01 - Water Treatment Package	Temperature sensor C01 - Water Treatment Package	TT 206
	Sonde hygrométrie A10 - Hydrogen Process Container - ATEX	Sonde hygrométrie A10 - Hydrogen Process Container - ATEX	HY 101
	Sonde hygrométrie E01 – AHU room	Sonde hygrométrie E01 – AHU room	HY 103
	Sonde hygrométrie B01 - Rectifier Room	Sonde hygrométrie B01 - Rectifier Room	HY 201
	Sonde hygrométrie A01 - Stack Room	Sonde hygrométrie A01 - Stack Room	HY 203
	Sonde hygrométrie A03+A02 - H2 Process Room	Sonde hygrométrie A03 - H2 Process Room	HY 205
	Sonde hygrométrie C01 - Water Treatment Package	Sonde hygrométrie C01 - Water Treatment Package	HY 206
	Clapet anti-retour A10 - Hydrogen Process Container - ATEX	Exhaust dumper A10 - Hydrogen Process Container - ATEX	CT 101
	Clapet tout ou rien grille air neuf VTE100	On / Off Dumper fresh air grid VTE100	CT102
	Clapet d'extraction E01 – AHU room	Exhaust dumper E01 – AHU room	CT 103
	Clapet d'extraction B01 - Rectifier Room	Exhaust dumper B01 - Rectifier Room	CT 201
	Clapet d'extraction A01 - Stack Room	Exhaust dumper A01 - Stack Room	CT 203
C	Clapet d'extraction A03+A02 - H2 Process Room	Exhaust dumper A03 - H2 Process Room	CT 205
	Clapet d'extraction C01 - Water Treatment Package	Exhaust dumper C01 - Water Treatment Package	CT 206
	Transmetteur de pression A10 - Hydrogen Process Container - ATEX	Pressure transmitter A10 - Hydrogen Process Container - ATEX	PT 101
	Transmetteur de pression E01 – AHU room	Pressure transmitter E01 – AHU room	PT 103
	Transmetteur de pression B01 - Rectifier Room	Pressure transmitter B01 - Rectifier Room	PT 201
	Transmetteur de pression A01 - Stack Room	Pressure transmitter A01 - Stack Room	PT 203
C	Transmetteur de pression A03+A02 - H2 Process Room	Pressure transmitter A03 - H2 Process Room	PT 205
	Transmetteur de pression C01 - Water Treatment Package	Pressure transmitter C01 - Water Treatment Package	PT 206
	Clapet coupe-tirage motorisé A10 - Hydrogen Process Container - ATEX	Regulating dumper A10 - Hydrogen Process Container - ATEX	CT 102
	Clapet coupe-tirage motorisé E01 – AHU room	Regulating dumper E01 – AHU room	CT 105
	Clapet coupe-tirage motorisé A10 - Hydrogen Process Container - ATEX	Regulating dumper A10 - Hydrogen Process Container - ATEX	CT 104
	Clapet coupe-tirage motorisé B01 - Rectifier Room	Regulating dumper B01 - Rectifier Room	CT 202
	Clapet coupe-tirage motorisé A01 - Stack Room	Regulating dumper A01 - Stack Room	CT 204
C	Clapet coupe-tirage motorisé A03+A02 - H2 Process Room	Regulating dumper A03 - H2 Process Room	CT 208
	Clapet coupe-tirage motorisé C01 - Water Treatment Package	Regulating dumper C01 - Water Treatment Package	CT 207



General comment :
- For all hydraulic representations, see hydraulic PID : P.0608871.L.104
- All information concerning : temperature range / min fresh air / humidity .. are indicated in P.0608871.L.02.001 Thermal balances
-All information in the equipement table is taken from BOM Paumier, please refer to P.0608871.L.02.111

Légende

- Cablage électrique / electrical wiring
- Clapet coupe-tirage motorisé / Motorized shut-off damper
- ATEX
- FILTRE G4
- Pompe / Pump
- Grille separatrice d'embrun Entré air / Separating grid for sea generated spray Air intake
- Armoire électrique / Electrical cabinet
- Sortie d'air / Air outlet
- Clapet Anti retour / check valve
- WH Chauffage / Wall heater
- TH sonde température / temperature sensor
- HY sonde hygrométrie / hygrometry sensor
- PT sonde pression / pressure sensor
- Eau glacée / cooling water
- Eau condensation / condensing water
- Sortie d'air / air outlet
- Entrée d'air / air inlet

Rev	Date	Description	Dessiné par: Issued by:	Vérifié par: Cheked by:	Approuvé par: Approved by:	Statut: Status:
E	17/12/24	MAJ suivant commentaires / Updated according comments	P.Cailleux	O.Neveu	L.Degrenne	BPE
D	22/10/24	MAJ suivant commentaires / Updated according comments	O.Neveu	O.Neveu	L.Degrenne	BPE
C	17/10/24	MAJ suivant commentaires / Updated according comments	P.Cailleux	O.Neveu	L.Degrenne	B.P.A
B	10/06/24	MAJ Général / General update	P.Cailleux	O.Neveu	L.Degrenne	B.P.A
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Titre du plan / Drawing Title :

SCHEMA GLOBAL
GLOBAL DIAGRAM

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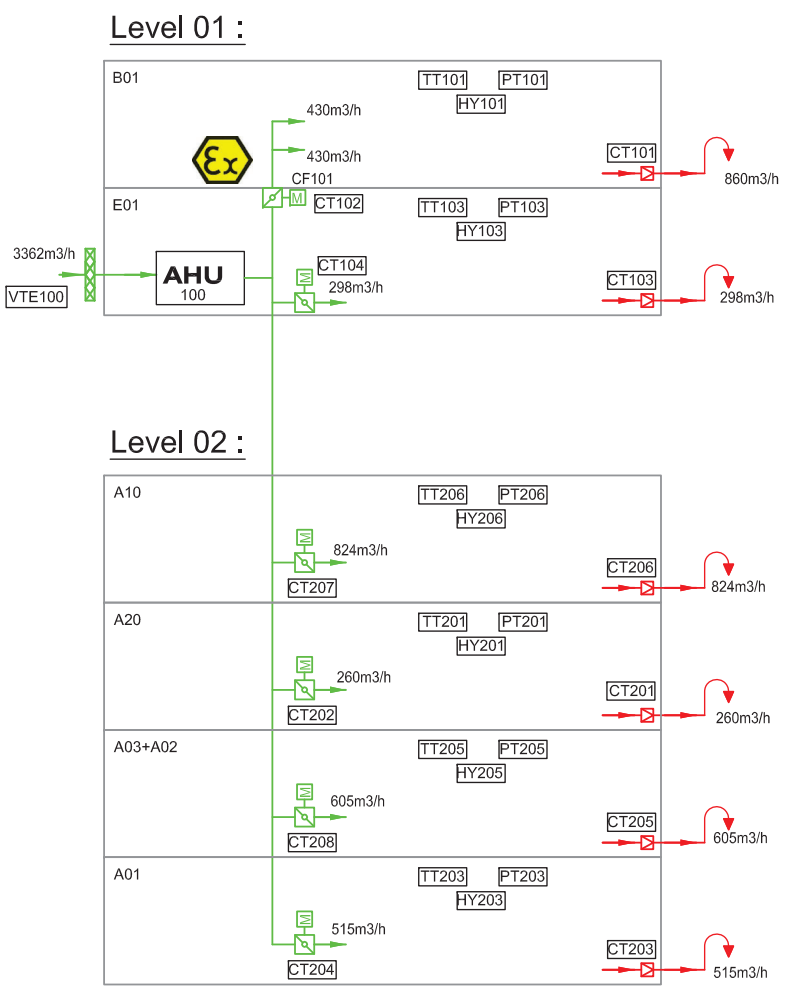
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N/A	A2	P.0608871.L.02.003	1/1	E

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ind	Equipement	Equipment	TAG
	Grille air neuf AHU	AHU fresh air grille	VTE 100
	Air Handling Unit (AHU)	Air Handling Unit (AHU)	AHU 100
	Sonde température B01 - Hydrogen Process Container - ATEX	Temperature sensor B01 - Hydrogen Process Container - ATEX	TT 101
	Sonde température E01 – AHU room	Temperature sensor E01 – AHU room	TT 103
	Sonde température A20 - Rectifier Room	Temperature sensor A20 - Rectifier Room	TT 201
	Sonde température A01 - Stack Room	Temperature sensor A01 - Stack Room	TT 203
B	Sonde température A03+A02 - H2 Process Room	Temperature sensor A03 - H2 Process Room	TT 205
	Sonde température A10 - Water Treatment Package	Temperature sensor A10 - Water Treatment Package	TT 206
	Sonde hygrométrie B01 - Hydrogen Process Container - ATEX	Sonde hygrométrie B01 - Hydrogen Process Container - ATEX	HY 101
	Sonde hygrométrie E01 – AHU room	Sonde hygrométrie E01 – AHU room	HY 103
	Sonde hygrométrie A20 - Rectifier Room	Sonde hygrométrie A20 - Rectifier Room	HY 201
	Sonde hygrométrie A01 - Stack Room	Sonde hygrométrie A01 - Stack Room	HY 203
	Sonde hygrométrie A03+A02 - H2 Process Room	Sonde hygrométrie A03 - H2 Process Room	HY 205
	Sonde hygrométrie A10 - Water Treatment Package	Sonde hygrométrie A10 - Water Treatment Package	HY 206
	Clapet anti-retour B01 - Hydrogen Process Container - ATEX	Check valve B01 - Hydrogen Process Container - ATEX	CT 101
	Clapet anti-retour E01 – AHU room	Check valve E01 – AHU room	CT 103
	Clapet anti-retour A20 - Rectifier Room	Check valve A20 - Rectifier Room	CT 201
	Clapet anti-retour A01 - Stack Room	Check valve A01 - Stack Room	CT 203
B	Clapet anti-retour A03+A02 - H2 Process Room	Check valve A03 - H2 Process Room	CT 205
	Clapet anti-retour A10 - Water Treatment Package	Check valve A10 - Water Treatment Package	CT 206
	Transmetteur de pression B01 - Hydrogen Process Container - ATEX	Pressure transmitter B01 - Hydrogen Process Container - ATEX	PT 101
	Transmetteur de pression E01 – AHU room	Pressure transmitter E01 – AHU room	PT 103
	Transmetteur de pression A20 - Rectifier Room	Pressure transmitter A20 - Rectifier Room	PT 201
	Transmetteur de pression A01 - Stack Room	Pressure transmitter A01 - Stack Room	PT 203
B	Transmetteur de pression A03+A02 - H2 Process Room	Pressure transmitter A03 - H2 Process Room	PT 205
	Transmetteur de pression A10 - Water Treatment Package	Pressure transmitter A10 - Water Treatment Package	PT 206
B	Clapet coupe-tirage motorisé B01 - Hydrogen Process Container - ATEX	Clapet Motorized shut-off damper B01 - Hydrogen Process Container - ATEX	CT 102
B	Clapet coupe-tirage motorisé E01 – AHU room	Clapet Motorized shut-off damper E01 – AHU room	CT 104
B	Clapet coupe-tirage motorisé A20 - Rectifier Room	Clapet Motorized shut-off damper A20 - Rectifier Room	CT 202
B	Clapet coupe-tirage motorisé A01 - Stack Room	Clapet Motorized shut-off damper A01 - Stack Room	CT 204
B	Clapet coupe-tirage motorisé A03+A02 - H2 Process Room	Clapet Motorized shut-off damper A03 - H2 Process Room	CT 208
B	Clapet coupe-tirage motorisé A10 - Water Treatment Package	Clapet Motorized shut-off damper A10 - Water Treatment Package	CT 207



Légende

- Clapet coupe-tirage motorisé / Motorized shut-off damper
- ATEX
- Grille Entré air / Grid air inlet
- Sortie d'air / Air outlet
- Clapet Anti retour / check valve
- HY — sonde hygrométrie / hygrometry sensor
- TH — sonde température / temperature sensor
- PT — sonde pression / pressure sensor
- Sortie d'air / air outlet
- Entrée d'air / air inlet

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Titre du plan / Drawing Title :

SCHEMA AERAULIQUE
AERAULIC DIAGRAM

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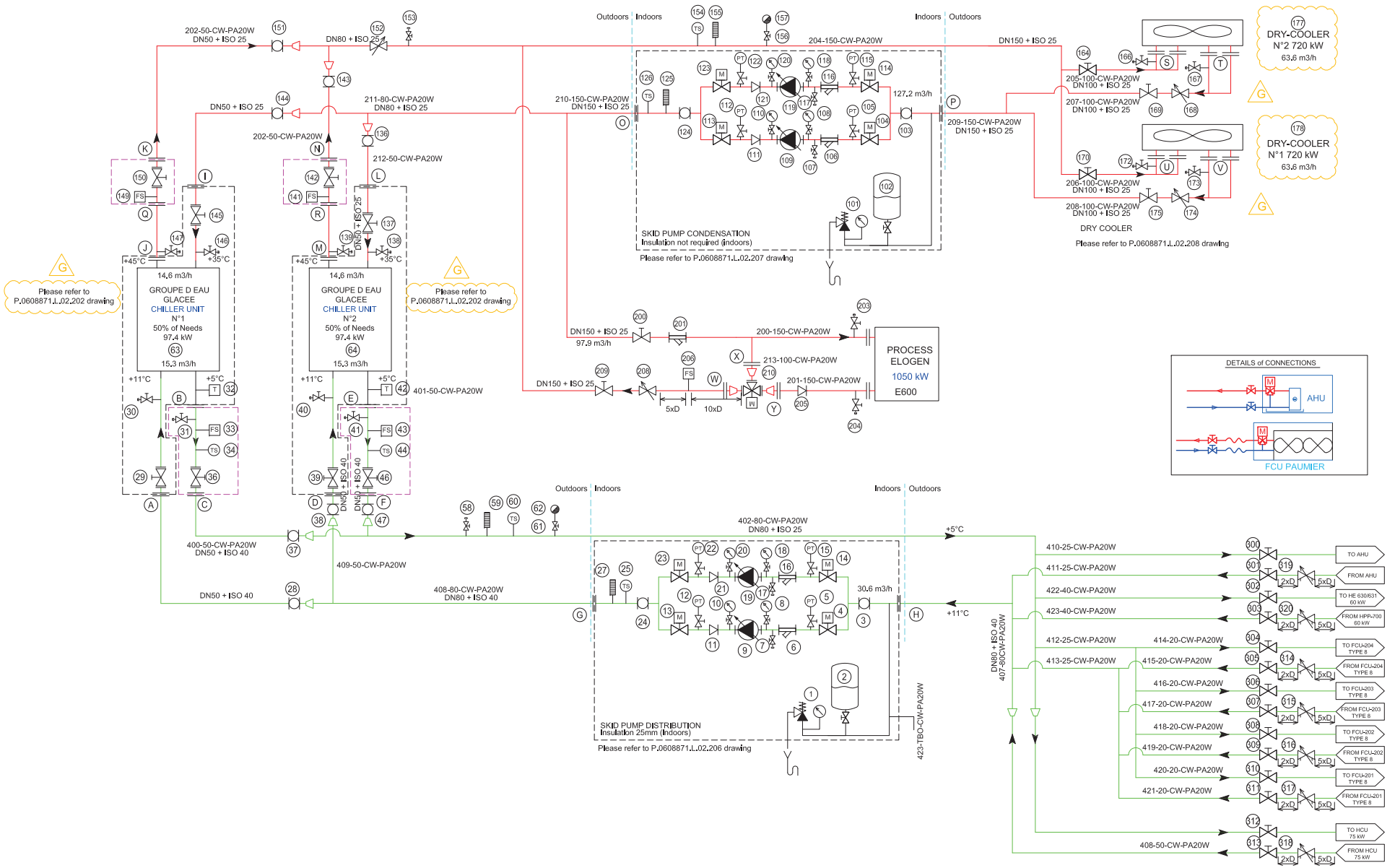
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PRESSION DE SERVICE : 3 BAR
OPERATING PRESSURE

-FLUIDE : MPG40%
FLUID

-ISOLATION : ARMAFLEX
INSULATION

-TUYAUTERIE : ACIER INOX 304L
PIPING : STAINLESS STEEL 304 L

NOTA:
-PREVOIR DES PURGUEURS D'AIR AUTOMATIQUES SUR CHAQUES POINTS HAUT DU RESEAU D'EAU GLACEE
-RACCORDEMENT A L'EVACUATION DE SOUPAPE ET STOCKAGE ASSOCIE HORS SCOPE PAUMIER
NOTE:
-PROVIDE AUTOMATIC AIR VENTS AT EACH HIGH POINT OF THE CHILLED WATER NETWORK
-CONNECTION TO THE VALVE DISCHARGE AND ASSOCIATED STORAGE EXCEPT PAUMIER SCOPE

LEGENDE:
LEGENDE:
CIRCUIT CONDENSATION
CONDENSATION CIRCUIT
NO INSULATION INDOORS
INSULATION 25mm OUTDOORS
SEE DRAWING P.0608871.L02.104
CIRCUIT EAU GLACEE
CHILLED WATER CIRCUIT
INSULATION 25mm INDOORS
INSULATION 40mm OUTDOORS
SEE FRAWING P.0608871.I02.104
Pièces fournies séparément par PAUMIER
Parts supplied separately by PAUMIER

NOTA:
-PREVOIR DES VANNES DE PURGES SUR CHAQUES POINTS BAS DU RESEAU
NOTE:
-PROVIDE DRAIN VALVE AT EACH LOW POINT OF THE WATER NETWORK

NOTA : Documents à consulter:
Documents to consult:
P.0608871.L.02.102 Chilled water diagram
P.0608871.L.02.001 Thermal and Ventilation balances
P.0608871.L.02.101 Pump pressure loss calculation

NOTA : Inertage des brassures et soudures
Nitrogen blanketing of brazing and welding

Rev	Date	Description	Dessiné par: Issued by	Vérifié par: Checked by	Approuvé par: Approved by	Statut: Status
H	17/12/24	UPDATED AS PER COMMENTS	P.Caillieux	O.Neveu	L.Degrenne	B.P.E
G	18/10/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	B.P.E
F	16/08/24	UPDATED OF NOMENCLATURE AND FLANGE TABLE	P.Caillieux	O.Neveu	L.Degrenne	B.P.E
E	06/06/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	BPA
D	28/05/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	BPA
C	23/05/24	DRY-COOLER UPDATED	V.Viviano	O.Neveu	L.Degrenne	BPA
B	21/05/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	BPA
A	16/04/24	CREATION DU DOCUMENT /FIRST ISSUED	P.Caillieux	O.Neveu	L.Degrenne	Provisoire

Titre du plan / Drawing Title :

SCHEMA HYDRAULIQUE
HYDRAULIC DIAGRAM AIR-COOLED UNIT

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Rep.	Dia.	EN Designation	Connection
		Chilled water circuit	
1	/	Safety valve	/
2	/	Expansion tank	/
3	DN65	Expansion sleeve	ISO classique
4	DN65	Motorized valve	ISO classique
5	/	Pressure transmitter	/
6	DN65	Filter sieve	ISO classique
7	15 x 21	Purge valve	ISO classique
8	DN15	Pressure gauges	/
9	/	Chilled water pump n°1	/
10	DN15	Pressure gauges	/
11	DN65	Check valve	ISO classique
12	/	Pressure transmitter	/
13	DN65	Motorized valve	ISO classique
14	DN65	Motorized valve	ISO classique
15	/	Pressure transmitter	/
16	DN65	Filter sieve	ISO classique
17	15 x 21	Purge valve	/
18	DN15	Pressure gauges	/
19		Chilled water pump n°2	/
20	DN15	Pressure gauges	/
21	DN65	Check valve	ISO classique
22	/	Pressure transmitter	/
23	DN65	Motorized valve	ISO classique
24	DN65	Expansion sleeve	ISO classique
25	/	Temperature sensor	/
27	/	Thermometer	/
28	DN50	Expansion sleeve	ASME 16.5
29	DN50	Block valve	ISO classique
30	15 x 21	Purge valve	/
31	15 x 21	Purge valve	/
32	/	Antifreeze thermostat	/
33	/	Flowswitch	/
34	/	Temperature sensor	/
36	DN50	Block valve	ISO classique
37	DN50	Expansion sleeve	ASME 16.5
38	DN50	Expansion sleeve	ASME 16.5
39	DN50	Block valve	ISO classique
40	15 x 21	Purge valve	/
41	15 x 21	Purge valve	/
42	/	Antifreeze thermostat	/
43	/	Flowswitch	/
44	/	Temperature sensor	/
46	DN50	Block valve	ISO classique
47	DN50	Expansion sleeve	ASME 16.5
58	15 x 21	Event valve	/
59	/	Thermometer	/
60	/	Temperature sensor	/
61	15 x 21	Block valve	/
62	15 x 21	Automatic air bleeder	/
63	/	Chiller n°1	/
64	/	Chiller n°2	/
		Condensation circuit	
101	/	Safety valve	/
102	/	Expansion tank	/
103	DN150	Expansion sleeve	ISO classique
104	DN150	Motorized valve	ISO classique
105	/	Pressure transmitter	/
106	DN150	Filter sieve	ISO classique
107	15 x 21	Purge valve	/
108	DN15	Pressure gauges	/
109	/	Condensation circuit pump n°1	/
110	DN15	Pressure gauges	/
111	DN150	Check valve	ISO classique
112	/	Pressure transmitter	/
113	DN150	Motorized valve	ISO classique
114	DN150	Motorized valve	ISO classique
115	/	Pressure transmitter	/
116	DN150	Filter sieve	ISO classique
117	15 x 21	Purge valve	/
118	DN15	Pressure gauges	/
119	/	Chilled water pump n°2	/
120	DN15	Pressure gauges	/
121	DN150	Check valve	ISO classique
122	/	Pressure transmitter	/
123	DN150	Motorized valve	ISO classique
124	DN150	Expansion sleeve	ISO classique
125	/	Thermometer	/
126	/	Temperature sensor	/
136	DN50	Expansion sleeve	ASME 16.5
137	DN50	Block valve	ISO classique
138	15 x 21	Purge valve	/
139	15 x 21	Purge valve	/
141	/	Flowswitch	/
142	DN50	Block valve	ISO classique
143	DN50	Expansion sleeve	ASME 16.5
144	DN50	Expansion sleeve	ASME 16.5
145	DN50	Block valve	ISO classique
146	15 x 21	Purge valve	/
147	15 x 21	Purge valve	/
149	/	Flowswitch	/
150	DN50	Block valve	ISO classique
151	DN50	Expansion sleeve	ASME 16.5
152	DN80	Control valve	ASME 16.5
153	15 x 21	Event valve	/
154	/	Temperature sensor	/
155	/	Thermometer	/
156	15 x 21	Block valve	/
157	15 x 21	Automatic air bleeder	/
164	DN100	Block valve	ISO classique
166	15 x 21	Purge valve	/
167	15 x 21	Purge valve	/
168	DN100	Control valve	ASME 16.5
169	DN100	Block valve	ISO classique
170	DN100	Block valve	ISO classique
172	15 x 21	Purge valve	/
173	15 x 21	Purge valve	/
174	DN100	Control valve	ASME 16.5
175	DN100	Block valve	ISO classique
176	/	Drycooler n°1	/
177	/	Drycooler n°2	/
200	DN150	Block valve	ISO classique
201	DN150	Filter sieve	ASME 16.5
203	15 x 21	Purge valve	/
204	15 x 21	Purge valve	/
205	DN150	Check valve	ASME 16.5
206	/	Flowswitch	/
208	DN150	Control valve	ASME 16.5
209	DN150	Block valve	ISO classique
210	DN150	Motorized valve	ASME 16.5
300	DN25	Block valve	/
301	DN25	Block valve	/
302	DN40	Block valve	/
303	DN40	Block valve	/
304	DN25	Block valve	/
305	DN25	Block valve	/
306	DN25	Block valve	/
307	DN25	Block valve	/
308	DN20	Block valve	/
309	DN20	Block valve	/
310	DN20	Block valve	/
311	DN20	Block valve	/
312	DN50	Block valve	/
313	DN50	Block valve	/
314	DN20	TA valve	ASME 16.5
315	DN20	TA valve	ASME 16.5
316	DN20	TA valve	ASME 16.5
317	DN20	TA valve	ASME 16.5
318	DN40	TA valve	ASME 16.5
319	DN32	TA valve	ASME 16.5
320	DN50	TA valve	ASME 16.5

REP	Flange	DN	Fluid	T°C
A	ASME 16,5	DN50	MPG 40%	+5/+11°C
B	ASME 16,5	DN50	MPG 40%	+5/+11°C
C	ASME 16,5	DN50	MPG 40%	+5/+11°C
D	ASME 16,5	DN50	MPG 40%	+5/+11°C
E	ASME 16,5	DN50	MPG 40%	+5/+11°C
F	ASME 16,5	DN50	MPG 40%	+5/+11°C
G	ASME 16,5	DN80	MPG 40%	+5/+11°C
H	ASME 16,5	DN80	MPG 40%	+5/+11°C
I	ASME 16,5	DN50	MPG 40%	+35/+45°C
J	ASME 16,5	DN50	MPG 40%	+35/+45°C
K	ASME 16,5	DN50	MPG 40%	+35/+45°C
L	ASME 16,5	DN50	MPG 40%	+35/+45°C
M	ASME 16,5	DN50	MPG 40%	+35/+45°C
N	ASME 16,5	DN50	MPG 40%	+35/+45°C
O	ASME 16,5	DN150	MPG 40%	+35/+45°C
P	ASME 16,5	DN150	MPG 40%	+35/+45°C
Q	ASME 16,5	DN50	MPG 40%	+35/+45°C
R	ASME 16,5	DN50	MPG 40%	+35/+45°C
S	DIN AISI	DN100	MPG 40%	+35/+45°C
T	DIN AISI	DN100	MPG 40%	+35/+45°C
U	DIN AISI	DN100	MPG 40%	+35/+45°C
V	DIN AISI	DN100	MPG 40%	+35/+45°C
W	ASME 16,5	DN150	MPG 40%	+35/+45°C
X	ASME 16,5	DN150	MPG 40%	+35/+45°C
Y	ASME 16,5	DN150	MPG 40%	+35/+45°C

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H	17/12/24	UPDATED AS PER COMMENTS	P.Cailleux	O.Neveu	L.Degrenne	B.P.E
G	18/10/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	B.P.E
F	16/08/24	UPDATED OF NOMENCLATURE AND FLANGE TABLE	P.Cailleux	O.Neveu	L.Degrenne	B.P.E
E	06/06/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	BPA
D	28/05/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	BPA
C	23/05/24	DRY-COOLER UPDATED	V.Viviano	O.Neveu	L.Degrenne	BPA
B	21/05/24	UPDATED AS PER COMMENTS	V.Viviano	O.Neveu	L.Degrenne	BPA
A	16/04/24	CREATION DU DOCUMENT /FIRST ISSUED	P.Cailleux	O.Neveu	L.Degrenne	Provisoire

Titre du plan / Drawing Title :

SCHEMA HYDRAULIQUE
HYDRAULIC DIAGRAM AIR-COOLED UNIT

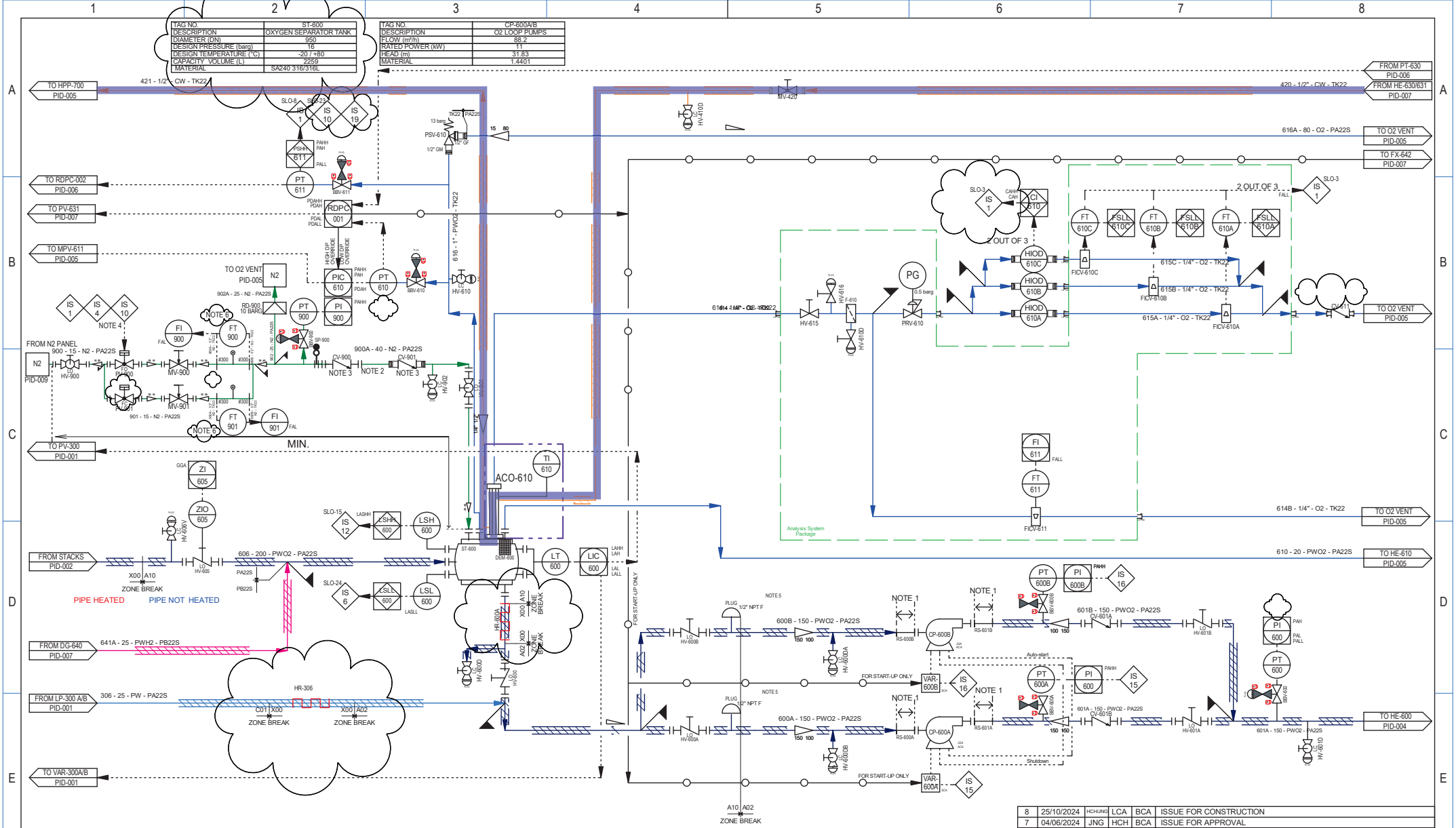
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N/A	A1	P.0608871.L.02.104	2	H

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8	25/10/2024	HCHUNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

HVAC Leak Test Pack 1

HVAC Leak Test Pack 2

Test pressure : 2 barg
Medium : Dry Air

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Responsible dept. PROCESS	Technical reference C63-PID-001-003	Created by HCH/JNG	Checked by LCA
Approved by BCA	Scale 1:1		
Licensor elogen		Document type P&ID	Document status DETAILED DESIGN
Client		Title, Supplementary title OXYGEN SEPARATION	Client reference -

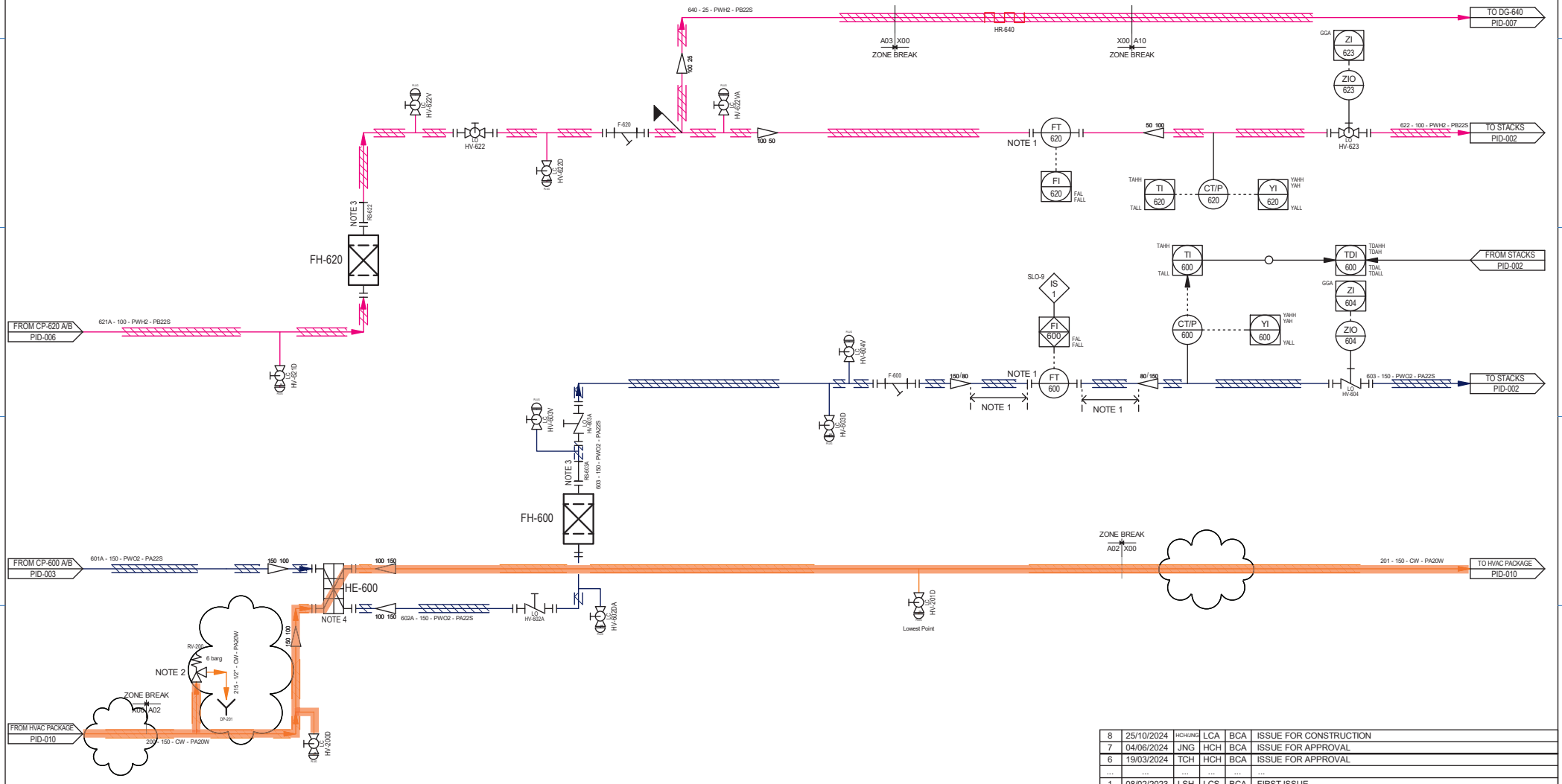
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	3/16

HVAC Glycoled Water Loop Leak Test Packs (1/8)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCHUNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Test pressure : 2 barg
Medium : Dry Air

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HVAC Leak Test Pack 2

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Client

Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

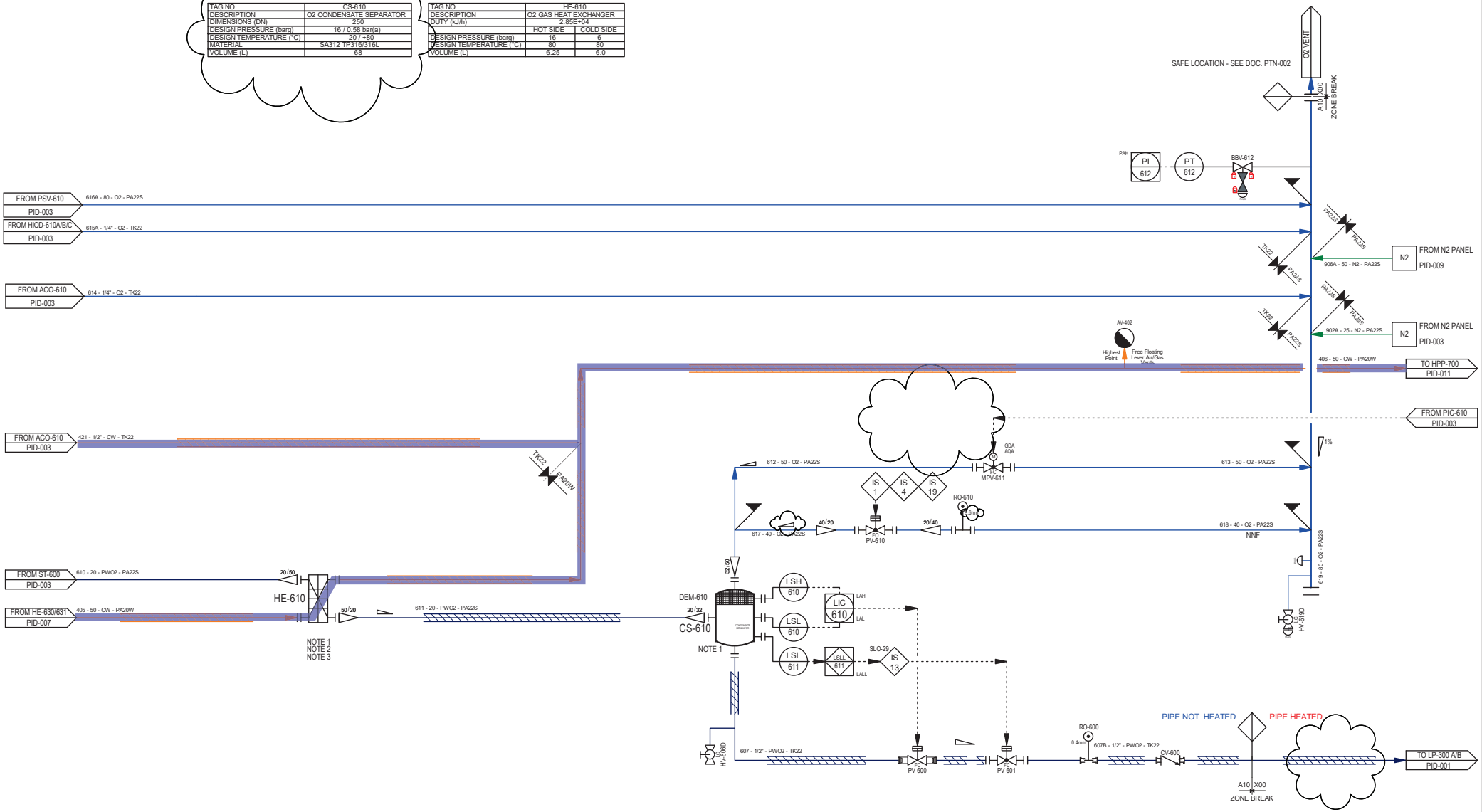
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

HVAC Glycoled Water Loop Leak Test Packs (2/8)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	2.85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCHUNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

HVAC Leak Test Pack 1

Test pressure : 2 barg
Medium : Dry Air

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

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Client

Document type: P&D

Document status: DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

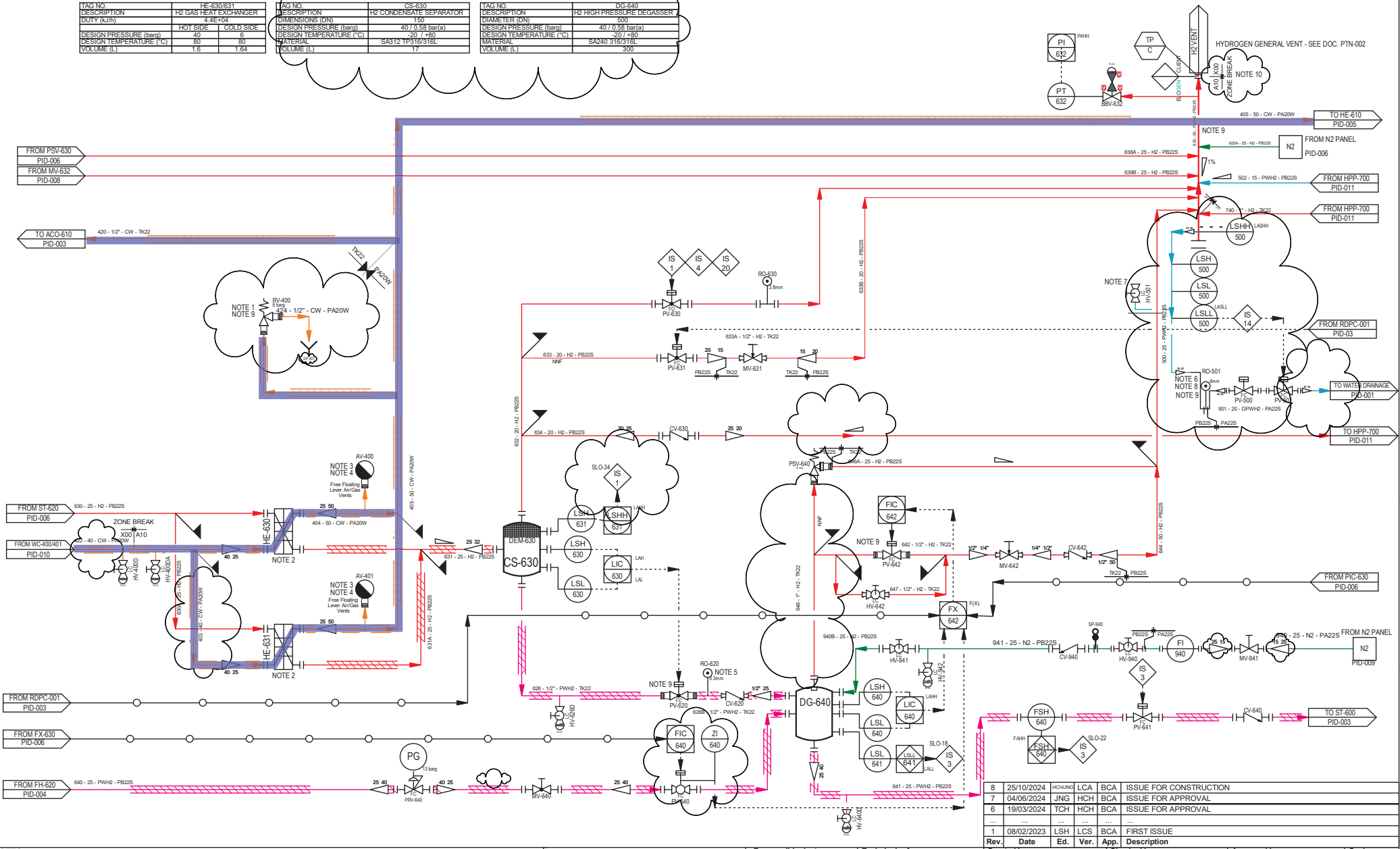
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

HVAC Glycoled Water Loop Leak Test Packs (3/8)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	4.4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. USLL AND LSL DISTANCE = 200MM. LSLL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONT

HVAC Leak Test Pack 1

Test pressure : 2 barg
Medium : Dry Air

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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Client:

Document type: P&D

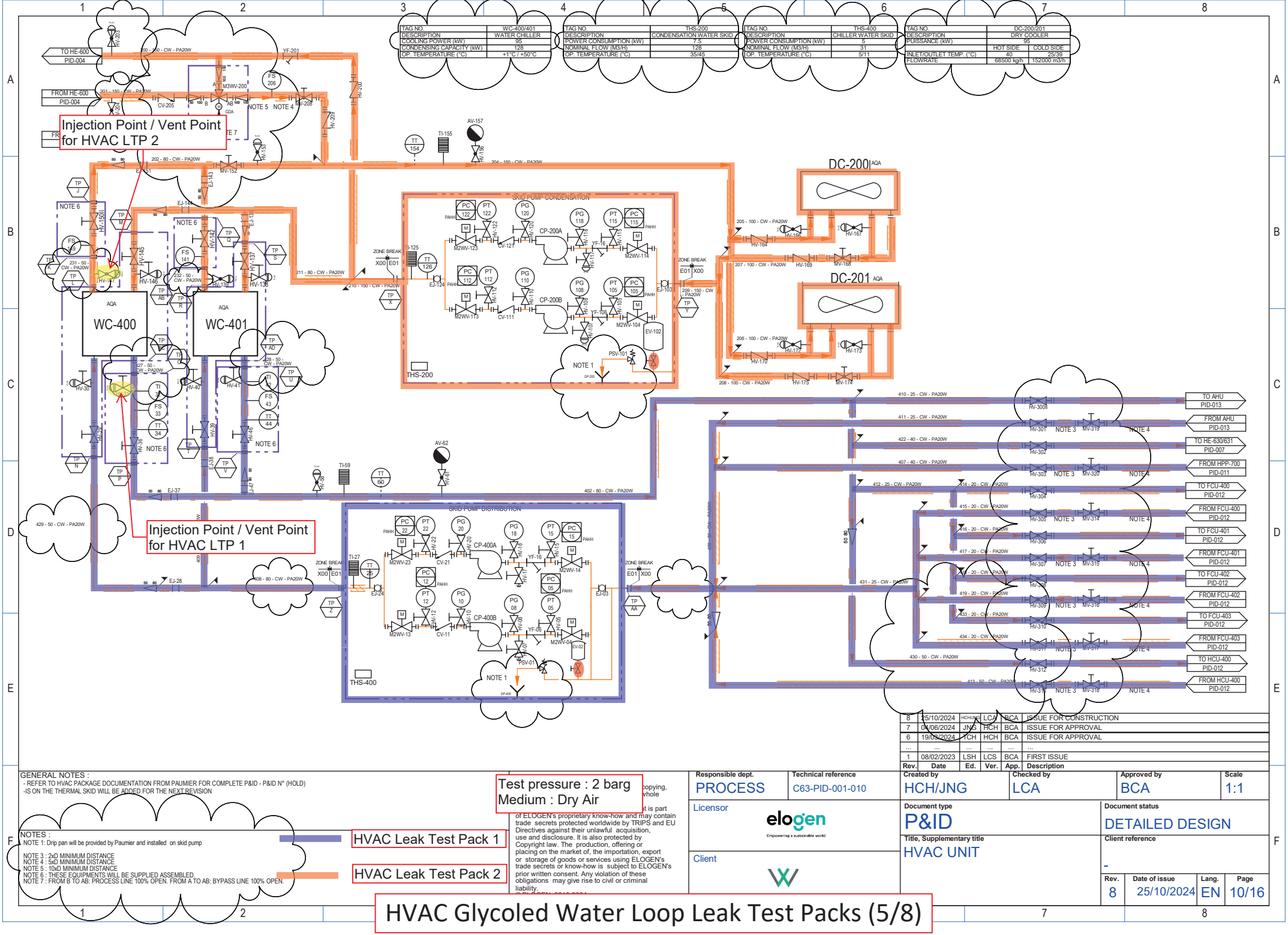
Document status: DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
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HVAC Glycoled Water Loop Leak Test Packs (4/8)



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/05/2024	HCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- REFER TO HVAC PACKAGE DOCUMENTATION FROM PAUMIER FOR COMPLETE P&ID - P&ID N° (HOLD)
-IS ON THE THERMAL SKID WILL BE ADDED FOR THE NEXT REVISION

NOTES :
NOTE 1: Drip pan will be provided by Paumier and installed on skid pump
NOTE 3 : 2xD MINIMUM DISTANCE
NOTE 4 : 5xD MINIMUM DISTANCE
NOTE 5 : 10xD MINIMUM DISTANCE
NOTE 6 : THESE EQUIPMENTS WILL BE SUPPLIED ASSEMBLED.
NOTE 7 : FROM B TO AB: PROCESS LINE 100% OPEN. FROM A TO AB: BYPASS LINE 100% OPEN.

HVAC Leak Test Pack 1

HVAC Leak Test Pack 2

Test pressure : 2 barg
Medium : Dry Air

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PROCESS	C63-PID-001-010	HCH/JNG	LCA	BCA	1:1

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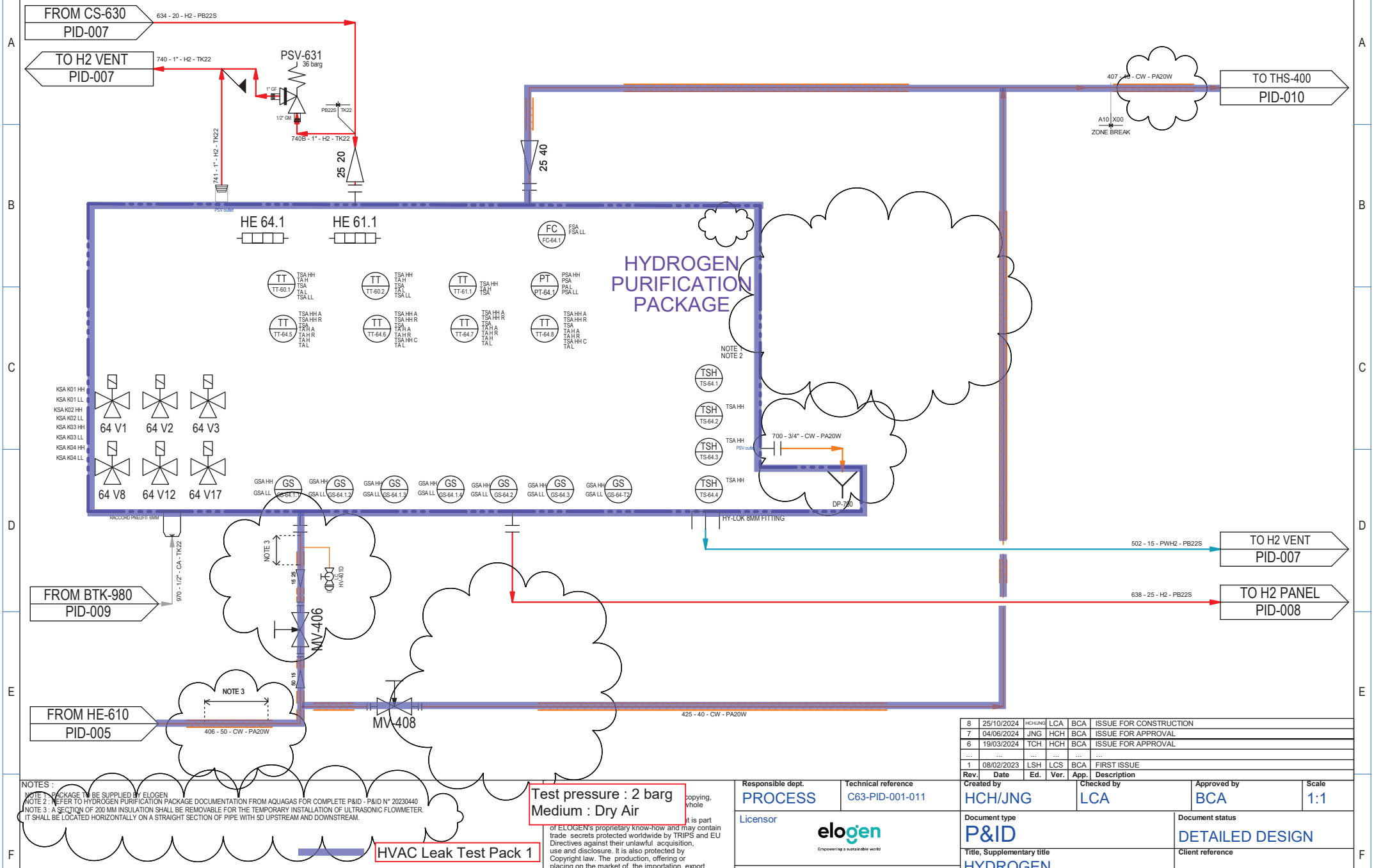
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HVAC UNIT

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	10/16

HVAC Glycoled Water Loop Leak Test Packs (5/8)



NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

Test pressure : 2 barg
Medium : Dry Air

HVAC Leak Test Pack 1

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-011	HCH/JNG	LCA	BCA	1:1

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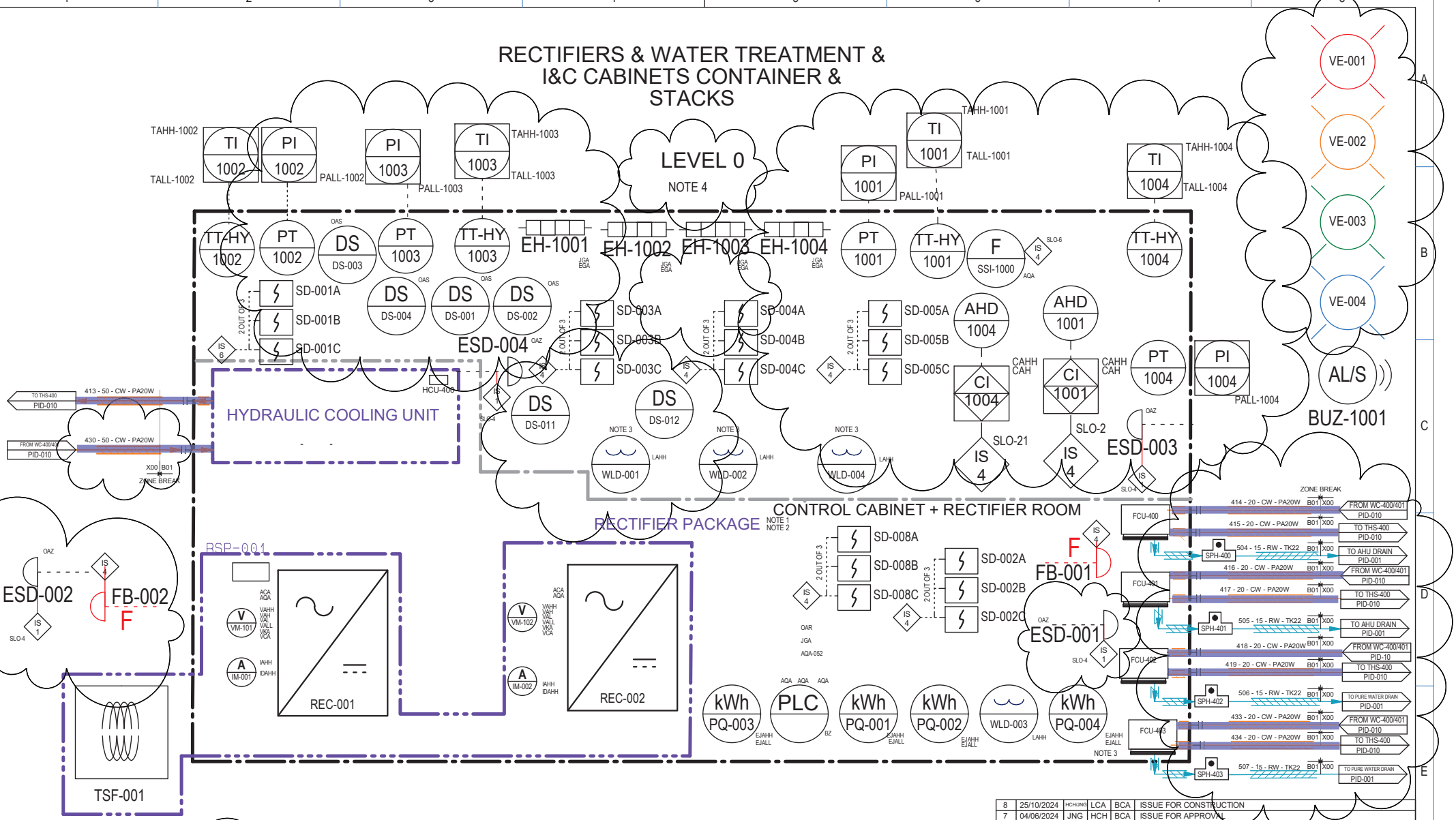
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Document type: P&ID
Document status: DETAILED DESIGN
Title, Supplementary title: HYDROGEN PURIFICATION PACKAGE
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	11/16

HVAC Glycoled Water Loop Leak Test Packs (6/8)

RECTIFIERS & WATER TREATMENT & I&C CABINETS CONTAINER & STACKS



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCHUNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO RECTIFIER SYSTEM PACKAGE DOCUMENTATION FOR FURTHER DETAILS
NOTE 3 : INSTALL AT THE LOWEST POINT
NOTE 4 : THE LOCATION OF AMBIENT INSTRUMENTS IS DESCRIBED ON C63-EAD-001_04

Test pressure : 2 barg
Medium : Dry Air

DRAFT

HVAC Leak Test Pack 1

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-012	HCH/JNG	LCA	BCA	1:1

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Document type: P&ID

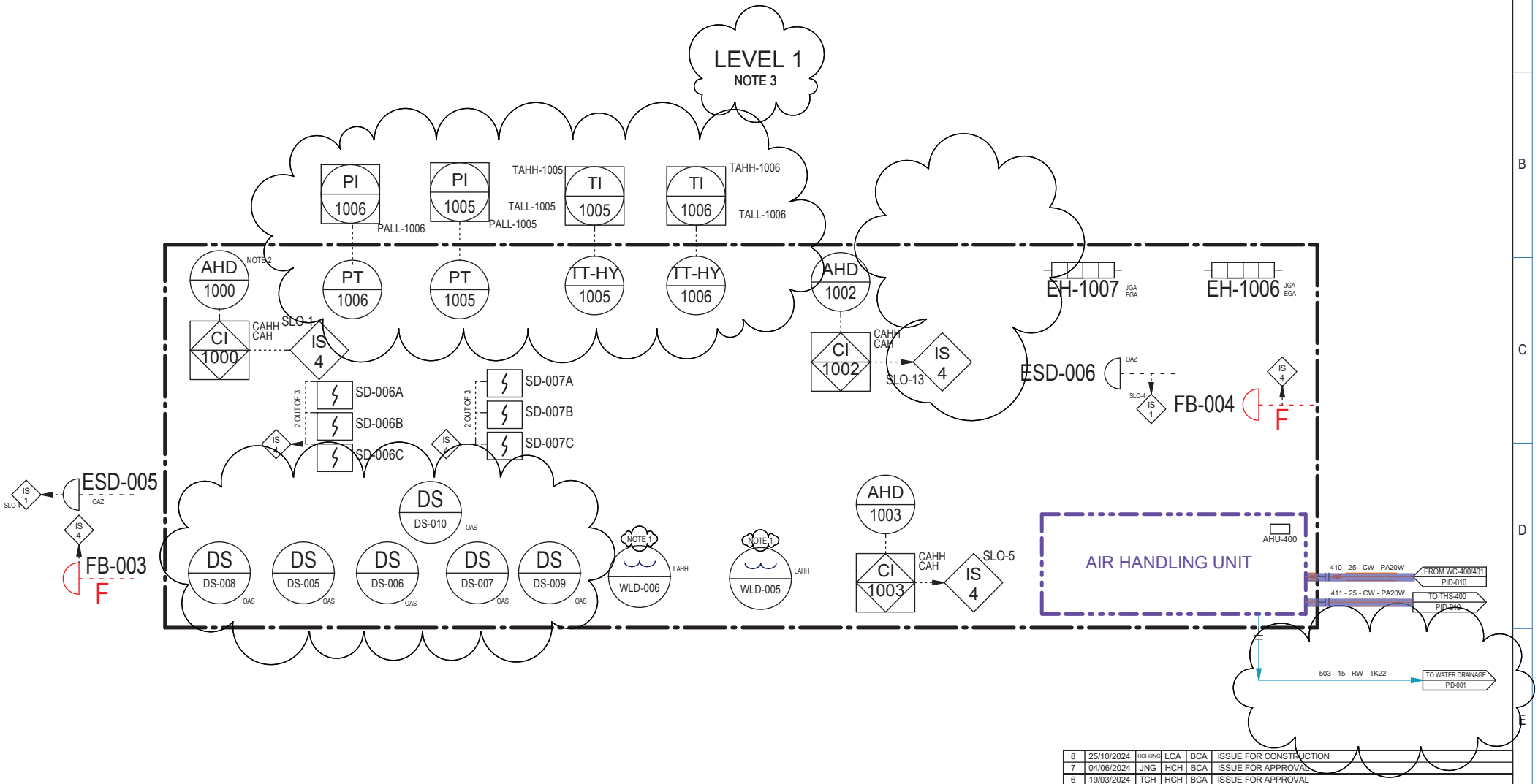
Document status: DETAILED DESIGN

Title, Supplementary title: CONTAINER - LEVEL 0

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	12/16

HVAC Glycoled Water Loop Leak Test Packs (7/8)



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCHUNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : INSTALL AT THE LOWEST POINT
NOTE 2 : CLOSE TO HPP-700
NOTE 3 : The location of ambient instruments is described on C63-EAD-001_04

HVAC Leak Test Pack 1

Test pressure : 2 barg
Medium : Dry Air

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-013	HCH/JNG	LCA	BCA	1:1

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Client

Document type: P&ID
Document status: DETAILED DESIGN
Title, Supplementary title: CONTAINER - LEVEL 1
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	13/16

HVAC Glycoled Water Loop Leak Test Packs (8/8)

Item Tag	Item Type	P&ID	Discipline	System Number	System Name	Completion Date
CP-400A	Centrifugal Pump	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
CP-400B	Centrifugal Pump	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WC-400	Water Chiller	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WC-401	Water Chiller	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
CP-200A	Centrifugal Pump	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
CP-200B	Centrifugal Pump	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
DC-200	Dry Cooler	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
DC-201	Dry Cooler	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
FCU-201	Fan Coil Unit	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
FCU-202	Fan Coil Unit	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
FCU-203	Fan Coil Unit	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
FCU-204	Fan Coil Unit	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
AHU-400	Air Handling Unit	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-101	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-103	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT- 201	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-203	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-205	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-206	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
HY-101	Hygrometer	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
HY-103	Hygrometer	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
HY-201	Hygrometer	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
HY-203	Hygrometer	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
HY-205	Hygrometer	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
HY-206	Hygrometer	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-101	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-103	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-201	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-203	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-205	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-206	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-102	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-105	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-104	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-202	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-204	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-208	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
CT-207	Damper	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
WH-101	Wall Heater	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WH-103	Wall Heater	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WH-201	Wall Heater	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WH-203	Wall Heater	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WH-205	Wall Heater	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
WH-206	Wall Heater	P.0608871.L.02.003	Electrical	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-05	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-12	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M2WV-13	Motorized Valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M2WV-23	Motorized Valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-15	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-22	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-25	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TI-32	Temperature Indicator	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
FS-33	Flowswitch	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-34	Temperature sensor	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TI-42	Temperature Indicator	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
FS-43	Flowswitch	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-44	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-60	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M2WV-104	Motorized Valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-105	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-112	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M2WV-113	Motorized Valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M2WV-114	Motorized Valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-115	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
PT-122	Pressure Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M2WV-123	Motorized Valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-126	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
FS-141	Flowswitch	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
FS-149	Flowswitch	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TT-154	Temperature Transmitter	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
TI-155	Temperature Indicator	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
FS-206	Flowswitch	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	
M3WV-200	Motorized three-way valve	P.0608871.L.02.003	Instrumentation	BLPH 66-06	ELECTROLYSER HVAC Package	

P.0608871.L.02.600

SAT FCU

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
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Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. :

Local	A20 - Rectifier Room
Reference number	FCU 201
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7424
Voltage (V)	230V / MONO

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control		
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)		
	Phase(s)	Ph1	Ph1
	fans measured current. (A)		
	Fans starting current. (A)		
	Fans insulation. (MΩ) *see nota		
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)		
	T° settings		
	T° measured		
B	T° Air entry (°C)		
A	T° Air exit (°C)		
T	T° Fluid entry (°C)		
T	T° Fluid exit (°C)		

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	
Comments :	
Name et Visa	

(PAUMIER)	Customer :

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. :

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control		
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)		
	Phase(s)	Ph1	Ph1
	fans measured current. (A)		
	Fans starting current. (A)		
	Fans insulation. (MΩ) *see nota		
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)		
	T° settings		
	T° measured		
BATT	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Local	A20 - Rectifier Room
Reference number	FCU 202
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7424
Voltage (V)	230V / MONO

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. :

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control		
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)		
	Phase(s)	Ph1	Ph1
	fans measured current. (A)		
	Fans starting current. (A)		
	Fans insulation. (MΩ) *see nota		
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)		
	T° settings		
	T° measured		
BATT	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Local	A20 - Rectifier Room
Reference number	FCU 203
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7424
Voltage (V)	230V / MONO

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	
Comments :	
Name et Visa	

(PAUMIER)	Customer :

Paumier

F.C.U Test Sheet

Customer	ELOGEN
Document number	P.0608871.L.02.600

Site	Project C63
Equipment	F.C.U

Test conditions	Ext T°. :

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	Rotational direction control		
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)		
	Phase(s)	Ph1	Ph1
	fans measured current. (A)		
	Fans starting current. (A)		
	Fans insulation. (MΩ) *see nota		
	Speed variation		
	Values (Hz)	50 Hz	
	Intended air flow (m3/h)	1200	
	Measured air flow (m3/h)		
	T° settings		
	T° measured		
B	T° Air entry (°C)		
A	T° Air exit (°C)		
T	T° Fluid entry (°C)		
T	T° Fluid exit (°C)		

Local	A20 - Rectifier Room
Reference number	FCU 204
Fluid	AIR / MPG 40%
Brand	PAUMIER
Reference	H8/EG-10
Seriel number	7424
Voltage (V)	230V / MONO

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	
Comments :	
Name et Visa	

(PAUMIER)	Customer :

P.0608871.L.02.601

SAT PUMP

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
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Paumier

Chilled water test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.601

Site	C63
Equipment	Chilled water pump

Test conditions	T° fluid :	T° ext. :

PAUMIER	Chilled water pump n°1 (Service)			Chilled water pump n°2 (Safety)		
Usage	Chilled water circulation			Chilled water circulation		
Type	Centrifugal			Centrifugal		
Brand	GRUNDFOSS			GRUNDFOSS		
Référence	NB 32-160/177 AASF2KESBQQELW1			NB 32-160/177 AASF2KESBQQELW1		
Serial number						
Rotational direction						
voltage (V) (Precise single or Triphase)	380-415D / 50Hz (Tri)			380-415D / 50Hz (Tri)		
Plated nominal current (A)	11,0 A			11,0 A		
Circuit Breaker settings (A)						
	Ph1	Ph2	Ph3	Ph1	Ph2	Ph3
Mesured intensity (A)						
Starting intensity (A)						
Insulation (MΩ) * see Nota						
Variable speed YES / NO	YES			YES		
Valeurs (Hz)	50 Hz			50 Hz		
Expected flow (m3/h)	29,7			29,7		
Noted flow (m3/h)						
Upstream pressure (bar)						
Downstream pressure (bar)						

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date :	
Observations :	
Name :	
(PAUMIER)	CLIENT

Paumier

Condesation pump test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.601

Site	C63
Equipment	Condensation pump

Test conditions	T° fluid :	T° ext. :

PAUMIER	Condensation pump n°1 (Service)			Condensation pump n°2 (Safety)		
Usage	CONDENSATION circulation			CONDENSATION circulation		
Type	Centrifugal			Centrifugal		
Brand	GRUNDFOSS			GRUNDFOSS		
Référence	NB 80-160/151 AASF2KESBQQEOW1			NB 80-160/151 AASF2KESBQQEOW1		
Serial number						
Rotational direction						
voltage (V) (Precise single or Triphase)	380-415D / 50Hz (Tri)			380-415D / 50Hz (Tri)		
Plated nominal current (A)	28,0-26,0 A			28,0-26,0 A		
Circuit Breaker settings (A)						
	Ph1	Ph2	Ph3	Ph1	Ph2	Ph3
Mesured intensity (A)						
Starting intensity (A)						
Insulation (MΩ) * see Nota						

Variable speed YES / NO	YES	YES
Valeurs (Hz)	50 Hz	50 Hz
Expected flow (m3/h)	122,3	122,3
Noted flow (m3/h)		
Upstream pressure (bar)		
Downstream pressure (bar)		

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date :	
Observations :	
Name :	
(PAUMIER)	CLIENT

Paumier	**SAT AHU**	elogen
Révision : A	Statut document : BPA	Date : 19/11/2024

P.0608871.L.02.602

SAT AHU

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

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Paumier

AHU TEST SHEET

Customer	ELOGEN
Business numer	P.0608871.L.02.602

Site	C63
Equipment	AHU

Test conditions	ext. T° :

Local	Locaux techniques
Local T°	N.C
Plan number	P.0608871.L.02.100
Type	AHU
Fluid	AIR / MPG 40%
Brand	PAUMIER
Serial number	7449
Voltage (V) / single or Triphase	400 V (Tri)
Heating power	22,5 kW
Refrigerating power	36,9 kW

VENTILATEUR	Fan(s)	Fan 1		
	Rotational direction control			
	Fans plaqued nominal current. (A)			
	Thermal circuit breaker fans settings. (A)			
	Phase(s)	Ph1	Ph2	Ph3
	fans measured current. (A)			
	Fans starting current. (A)			
	Fans insulation. (MΩ) *see nota			
	Speed variation	NO		
	Values (Hz)	50 Hz		
	Intended air flow (m3/h)	3362		
	Measured air flow (m3/h)			
	T° settings	3362		
	T° measured			

BATTERIE	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		
	Control open / close V3V (10V => 100% / 0V => 0%)		

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date :	
Comments :	
Name et Visa	
PAUMIER :	Customer :

P.0608871.L.02.604

SAT Chillers

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
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Chiller Safety Test Sheet (Circuit N°1)

Customer	ELOGEN
Business number	P.0608871.L.02

Site	C63
Installation	CHILLER N°1
Manufacturing number PAUMIER	7444

Usage	Chilled water loop cooling

Compressor N°1	
Brand	Bitzer
Type	Semi-hermétique
Serial number	

Refrigerant	R513a
Regime planned	+5°C / +11°C
Coolant / type	MPG 40%
T° de protection	-20°C

Control	Compressor
Voltage / Precise if single or Triphase	
Nominal Current Plated in A	
Thermal circuit breaker adjustment (A)	
Insulation (MΩ) *see nota	
Ground connection check	
Operation carter resistance	

	Planned settings	Recorded values	Conformity YES / NO	
BP Regulation Cut-off (Bars)				analog
Start BP Regulation (Bars)				
Anti short-cycle setting (seconds)				
Safety thermostat Antifreeze EG				

MECHANICAL	Planned settings	Recorded values	Conformity YES / NO
HP safety turn-off in bars			
Enclench HP safety in Bars			
Safety BP turn-off in Bars			
Safety BP engaging in Bars			
Oil pressure turn-off in Bars			
Oil pressure safety test (see nota)			

Other safety equipment	Planned settings	Recorded values	Conformity YES / NO
Mechanical flow controller safety test E.G			
Mechanical Antifreeze safety thermostat E.G			

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.
Nota (Oil pressure safety) : Mechanical forcing test of the cursor

Date :	
Comments :	
(PAUMIER)	Customer

Chiller Safety Test Sheet (Circuit N°2)

Customer	**ELOGEN**
Business number	**P.0608871.L.02**

Site	C63
Installation	CHILLER N°2
Manufacturing number PAUMIER	7445

Usage	Chilled water loop cooling

Compressor N°1	
Brand	**Bitzer**
Type	**Semi-hermétique**
Serial number	

Refrigerant	**R513a**
Regime planned	**+5°C / +11°C**
Coolant / type	**MPG 40%**
T° de protection	**-20°C**

Control	**Compressor**
Voltage / Precise if single or Triphase	
Nominal Current Plated in A	
Thermal circuit breaker adjustment (A)	
Insulation (MΩ) *see nota	
Ground connection check	
Operation carter resistance	

	Planned settings	**Recorded values**	**Conformity YES / NO**	
BP Regulation Cut-off (Bars)				**analog**
Start BP Regulation (Bars)				
Anti short-cycle setting (seconds)				
Safety thermostat Antifreeze EG				

MECHANICAL		**Planned settings**	**Recorded values**	**Conformity YES / NO**
	HP safety turn-off in bars			
	Enclench HP safety in Bars			
	Safety BP turn-off in Bars			
	Safety BP engaging in Bars			
	Oil pressure turn-off in Bars			
	Oil pressure safety test (see nota)			

Other safety equipment	**Planned settings**	**Recorded values**	**Conformity YES / NO**
Mechanical flow controller safety test E.G			
Mechanical Antifreeze safety thermostat E.G			

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.
Nota (Oil pressure safety) : Mechanical forcing test of the cursor

Date :
Comments :

(PAUMIER)	**Customer**

Paumier

Endurance sheet CHILLER N°1

Customer	ELOGEN
Doc n°	P.0608871.L.02.604

Site	C63
Installation	Groupe Eau Glacée (Circuit N°1)

Refrigeration diagram	P.0608871.L.02.103
GA Chiller	P.0608871.L.02.205

Refrigerant	R513a

Installation description: Each compression circuit provides 50% of requirements.
Chiller control based on chilled water temperature.

		COMPRESSOR										CONDENSER			EVAPORATOR		
Hours	Ext. T°	Frequency Hz	Press BP (bars)	T° BP °C	Press HP (bars)	T° HP °C	Aspi T°	Ref T°	Oil pressure	Oil level	Voltage	Air entry T°	Air exitT°	Air flow	Chilled water entry T°	Chilled water exit T°	Chilled water flow

Comments :

Name :		Date :	Visa	
(PAUMIER)			CUSTOMER	

Paumier

Endurance sheet CHILLER N°2

Customer	ELOGEN
Doc n°	P.0608871.L.02.604

Site	C63
Installation	Groupe Eau Glacée (Circuit N°2)

Refrigeration diagram	P.0608871.L.02.103
GA Chiller	P.0608871.L.02.205

Refrigerant	R513a

Installation description: Each compression circuit provides 50% of requirements.
Chiller control based on chilled water temperature.

		COMPRESSOR										CONDENSER			EVAPORATOR		
Hours	Ext. T°	Frequency Hz	Press BP (bars)	T° BP °C	Press HP (bars)	T° HP °C	Aspi T°	Ref T°	Oil pressure	Oil level	Voltage	Air entry T°	Air exitT°	Air flow	Chilled water entry T°	Chilled water exit T°	Chilled water flow

Comments :

Name :		Date :	Visa	
(PAUMIER)			CUSTOMER	

P.0608871.L.02.605

SAT Damper

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
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Designation Damper	Model	Local	End of course opening	End of course closing
CT 102	GLS150	B01 - Hydrogen Process Container - ATEX		
CT 104	GLS150	E01 - AHU Room		
CT 202	GLS150	A20 - Rectifier Room		
CT 204	GLS150	A01 - Stack Room		
CT 207	GLS150	A03+A02 - H2 Process Room		
CT 208	GLS150	A10 - Water Treatment package		

P.0608871.L.02.607

SAT Aeraulic Network

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
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Aeraulic network test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.607

Site	C63
Equipment	Aeraulic network

Test conditions	Ext T°. :

Local	B01
Local T°	
Reference number	
Fluid	AIR / MPG 40%
Brand	PAUMIER
Voltage (V) / Precise if single or Triphase	230V / MONO

	Ventilation	Network
	Theorical flow (m3/h)	860
	Measured flow (m3/h)	
	Dumper opening pourcentage	
	TAG Blow-Out Motorized Valve Test	CT104
	Theorical overpressure (Pa)	100
	Measured overpressure (Pa)	

Temperature / hygrometry		
	Theoretical hygrometric range	between 40 & 60%
	Measured hygrometric range	
	Theoretical temperature range (°C)	Between 5 & 45
	Measured temperature range (°C)	

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

Paumier

Aeraulic network test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.607

Site	C63
Equipment	Aeraulic network

Test conditions	Ext T°. :

Local	E01
Local T°	
Reference number	
Fluid	AIR / MPG 40%
Brand	PAUMIER
Voltage (V) / Precise if single or Triphase	230V / MONO

	Ventilation	Network
	Theorical flow (m3/h)	298
	Measured flow (m3/h)	
	Dumper opening pourcentage	
	TAG Blow-Out Motorized Valve Test	CT105
	Theorical overpressure (Pa)	100
	Measured overpressure (Pa)	

Temperature / hygrometry		
	Theoretical hygrometric range	between 40 & 60%
	Measured hygrometric range	
	Theoretical temperature range (°C)	Between 5 & 45
	Measured temperature range (°C)	

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

Paumier

Aeraulic network test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.607

Site	C63
Equipment	Aeraulic network

Test conditions	Ext T°. :

Local	A03+A02
Local T°	
Reference number	
Fluid	AIR / MPG 40%
Brand	PAUMIER
Voltage (V) / Precise if single or Triphase	230V / MONO

	Ventilation	Network
	Theorical flow (m3/h)	605
	Measured flow (m3/h)	
	Dumper opening pourcentage	
	TAG Blow-Out Motorized Valve Test	CT208
	Theorical overpressure (Pa)	100
	Measured overpressure (Pa)	

Temperature / hygrometry		
	Theoretical hygrometric range	between 40 & 60%
	Measured hygrometric range	
	Theoretical temperature range (°C)	Between 5 & 45
	Measured temperature range (°C)	

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

Paumier

Aeraulic network test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.607

Site	C63
Equipment	Aeraulic network

Test conditions	Ext T°. :

Local	A01
Local T°	
Reference number	
Fluid	AIR / MPG 40%
Brand	PAUMIER
Voltage (V) / Precise if single or Triphase	230V / MONO

	Ventilation	Network
	Theorical flow (m3/h)	515
	Measured flow (m3/h)	
	Dumper opening pourcentage	
	TAG Blow-Out Motorized Valve Test	CT204
	Theorical overpressure (Pa)	100
	Measured overpressure (Pa)	

Temperature / hygrometry		
	Theoretical hygrometric range	between 40 & 60%
	Measured hygrometric range	
	Theoretical temperature range (°C)	between 5 & 45
	Measured temperature range (°C)	

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

Paumier

Aeraulic network test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.607

Site	C63
Equipment	Aeraulic network

Test conditions	Ext T°. :

Local	A10
Local T°	
Reference number	
Fluid	AIR / MPG 40%
Brand	PAUMIER
Voltage (V) / Precise if single or Triphase	230V / MONO

	Ventilation	Network
	Theorical flow (m3/h)	824
	Measured flow (m3/h)	
	Dumper opening pourcentage	
	TAG Blow-Out Motorized Valve Test	CT207
	Theorical overpressure (Pa)	100
	Measured overpressure (Pa)	

Temperature / hygrometry		
	Theoretical hygrometric range	between 40 & 60%
	Measured hygrometric range	
	Theoretical temperature range (°C)	Between 10 & 30
	Measured temperature range (°C)	

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

Paumier

Aeraulic network test sheet

Customer	ELOGEN
Business number	P.0608871.L.02.607

Site	C63
Equipment	Aeraulic network

Test conditions	Ext T°. :

Local	A20
Local T°	
Reference number	
Fluid	AIR / MPG 40%
Brand	PAUMIER
Voltage (V) / Precise if single or Triphase	230V / MONO

	Ventilation	Network
	Theorical flow (m3/h)	260
	Measured flow (m3/h)	
	Dumper opening pourcentage	
	TAG Blow-Out Motorized Valve Test	CT202
	Theorical overpressure (Pa)	100
	Measured overpressure (Pa)	

Temperature / hygrometry		
	Theoretical hygrometric range	between 40 & 60%
	Measured hygrometric range	
	Theoretical temperature range (°C)	between 10 & 25
	Measured temperature range (°C)	

Nota (insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.

Date	

Comments :

Name et Visa

(PAUMIER)	Customer :

C63-PAU-QIX-001

FAT REPORT HVAC PAUMIER

01	*1st Issue*	*17-DEC-2024*	*PAU*	*ARA*	*IDI*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Client Document Number	**ELO-INN-BPH-RPT-00022**

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P.0608871.L.02.505
Project C63

Report FAT HVAC Paumier
Compilation of FAT project C63

		Name	Function	Visa
Checked by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	15/11/2024	Document creation	
B	13/12/2024	Comments taken into account	

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Siret 346 350 101 00041 – A.P.E. 2825Z – N° TVA FR 89 346350101

P.0608871.L.02.500
C63 HVAC

Report FAT n°1
FCU – Pump skid - Duct

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Checked by	PAUMIER	Théo GODARD	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	18/09/2024	Document creation	6
B	11/10/2024	Taking comments into account	6
C	13/12/2024	Taking comments into account	6

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Equipment Factory Acceptance Test – FCU :

1. General inspection :

List of point to review	OK	NOK	Comments
External dimension check of each unit	☑	☐	W
Type plate present	☑	☐	W
Hydrostatic tests completed	☑	☐	hydrotest carried out before the FAT
Check the presence of all components (filter, fan, instrumentation)	☑	☐	W
Verification of the datasheets of each component	☑	☐	R (Document code 2 to be prepared for code 1)
Assembly walks down completed to verify completeness and accuracy of the assembled system.	☑	☐	W
The equipment complies with the plans transmitted (position of cable gland, battery drain, air inlet, air blowing …)	☑	☐	R / W (Document code 2 to be prepared for code 1)
Inspection and control of the maintenance manual of the equipment	☑	☐	I
Checking the internal wiring of the equipment	☑	☐	I => checked before the FAT

2. Operation inspection :

☑ Operation check of the fan for one unit (ON/OFF)

☑ Voltage check (230 V / 1P / 50 Hz)

Temperature measurements were not made because the FCUs were not connected to the chilled water network.

Air Flow tests will be controlled during commissioning in the installation environment.

The opening and closing test of the regulation valve will be realised on site.

3. Comments receive from Elogen to consider by Paumier :

Comments	Justifications
Provide the completed and signed manufacturing sheets	See annexe 1.1
Send test procedure commissioning	See document P.0608871.L.02.600
Equipment maintenance sheet to be send	See document P.0608871.L.02.408
Add 3 supports on the FCU suction for the proper operation of the filter	Paumier will supply more resistant filters (on site)
External dimension check of the unit	Paumier has checked compliance with document P.0608871.L.02.201
FCU Internal wiring	See document P.0608871.L.02.304 Folio 17

List of people present:

Paumier	Elogen
Laurent DEGRENNE	Ahmed RAZGUI
Olivier DELAHAIS	Hassan HAMMAMI
Robin LAMBERT	Maxime LAFARGUE
Julie ANQUETIL	
Baptiste CHIROIS	

FAT carried out on Tuesday September 3

Equipment Factory Acceptance Test – Pump skid :

1. General inspection :

List of point to review	OK	NOK	Comments
External dimension check of each unit	☑	☐	W
Type plate present	☐	☑	Pau will place it as per FORES planning
Hydrostatic tests completed	☑	☐	hydrotest carried out before the FAT
Check the presence of all components (pump, speed variator, instrumentation, …)	☑	☐	W
Verification of the datasheets of each component (pump, speed variator	☑	☐	R
Assembly walk down completed to verify completeness and accuracy of the assembled system.	☑	☐	W
The equipment complies with the plans transmitted (position of cable gland, battery drain, air inlet, air blowing …)	☑	☐	W / R
Inspection and control of the maintenance manual of the equipment	☑	☐	I
Checking the internal wiring of the equipment (we opened the interior of the variators)	☑	☐	I => checked before the FAT
Flange bolt tightening control	☑	☐	I
Pipe support strength control	☑	☐	I
Equipment wiring check and junction box connection.	☑	☐	I

2. Operation inspection :

The operation test will be realised on site during the commissioning. For the operation of the pump skid we require :

- the pump skids need to be connected to the chilled water and condensation network.the frequency variator and the junction box need to be wired to the HVAC electrical cabinet.

3. Comments receive from Elogen to consider by Paumier :

Comments	Justifications
Provide the completed and signed manufacturing sheets	See annexe 2.1
Send test procedure commissioning	See document P.0608871.L.02.601
Equipment maintenance manual to be sent	See document P.0608871.L.02.410
Electrical diagrams of the junction box to be sent	See annexe 2.2
Flexible insulation towards the expansion tank to comply with the PID to do	See picture n°1
Sign plate to be installed	Pau will put it as per FORES planning (on site)
Change variator fixation screw too short for the condensation pump skid	See picture n°2
Add a temporary rail to hold the pipes during transport	See picture n°3
Paumier has to confirm the tightening torque for tightening the nuts & add marker trace to be sure that the tightening is always good	See annexe 2.3
Make a calculation note pump support + piping supports the weight well See	See annexe 2.4
External dimension check of the unit	Agreed and implanted, checked by Paumier

List of people present :

Paumier	**Elogen**
Laurent DEGRENNE	Ahmed RAZGUI
Olivier DELAHAIS	Hassan HAMMAMI
Robin LAMBERT	Maxime LAFARGUE
Julie ANQUETIL	
Baptiste CHIROIS	

FAT carried out on Tuesday September 3

Equipment Factory Acceptance Test – duct networks and accessories :

1. General inspection :

List of point to review	OK	NOK	Comments
External dimension check for each piece of duct	☑	☐	W
Check of the assembly of the duct dry assembly on the ground	☑	☐	R
Check the quality of the insulation and the finish in isoxal sheet metal	☑	☐	R
Dimensional control of exhaust damper (regulation damper were not delivered at time for the FAT)	☑	☐	W

2. Comments receive from Elogen to consider by Paumier :

Comments	Justifications
Procedure for mounting sheets to send to help Fores (send Italian translation)	See document P.0608871.L.02.212
Detailed plan of the mounting of ducts to send by Paumier for Fores	See document P.0608871.L.02.212

List of people present :

Paumier	Elogen
Laurent DEGRENNE	Ahmed RAZGUI
Olivier DELAHAIS	Hassan HAMMAMI
Robin LAMBERT	Maxime LAFARGUE
Julie ANQUETIL	
Baptiste CHIROIS	

FAT carried out on Tuesday September 3

Paumier

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ANNEX n°1.1

Paumier

MANUFACTURING APPROVAL CERTIFICATE - FCU

Référence	FAB-PR04 -FO02
Révision	A
Date	24/02/2024
Page	1 / 1

Recept FCU	PROJECT
Designation : FCU H8	Reference : P.0608871.L.02
Type : H8/EG-10	Designation : ELOGEN C63 HVAC
FCU drawing reference : 04-400-02-012	Business manager : L.DEGRENNE
Hydraulic diagram reference : P.0608871.L.02.102	Project manager : B.CHIROIS

Manufacturing number : 7427 **Reference :** FCU 204 **Marking :** **Marking :** Cabinet PAU 003

Marking :	*CE* ☐	*BV* ☐	*Without* ☑	Glycoled water ☑	Heaters ☐	
Category :	*I* ☐	*II* ☐	*III* ☐	Direct expansion ☐	Heating power :	
Quantity of fan motors : 2		Capacitors :		Thermostat :	Integrated ☐	Deported ☑
Compliance to drawings :	Yes ☑	No ☐	Observations :			

Mechanical part

	Non applicable	*Compliant to drawing*	*Non-compliant*	*Into compliance*	*Observations*
Frame	☐	☑	☐	☐	
Insulation	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	
Fittings	☐	☑	☐	☐	

Supply grille orientation	Up ☐	Down ☑	Front ☐	Return grille orientation	Up ☐	Down ☐	Front ☑	Back ☐

Fluidic part

	Non applicable	*Compliant to drawing*	*Non-compliant*	*Into compliance*	*Observations*
Pipes	☐	☑	☐	☐	
Electrical connection	☐	☑	☐	☐	
3-way valve	☐	☑	☐	☐	
Expension valve	☑	☐	☐	☐	☐
Servomotor	☐	☑	☐	☐	
Solenoid valve	☑	☐	☐	☐	

Tightness test : Water ☐ Air ☐ Nitrogen ☑ Pressure : 3 Bars Duration : 4 Days

Electrical test : Valves ☑ Motors ☑ Resistors ☐ Thermostat ☐

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered : Without condition ☑ With conditions ☐ Withdrawal of conditions ☐

Ready for commissioning : Without condition ☑ With conditions ☐ Withdrawal of conditions ☐

Controller

Name / Date / signature : CHIROIS 02/08/2024

Manufacturing manager

Name / Date / signature : 2/08/2024 DeMathis

Paumier

MANUFACTURING APPROVAL CERTIFICATE - FCU

Référence	FAB-PR04 -FO02
Révision	A
Date	24/02/2024
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Recept FCU	PROJECT
Designation : FCU H8	Reference : P.0608871.L.02
Type : H8/EG-10	Designation : ELOGEN C63 HVAC
FCU drawing reference : 04-400-02-012	Business manager : L.DEGRENNE
Hydraulic diagram reference : P.0608871.L.02.102	Project manager : B.CHIROIS
Manufacturing number : 7424 — Reference : FCU 201 — Marking :	Marking : Cabinet PAU 003

Marking :	CE ☐	BV ☐	Without ☑	Glycoled water ☑	Heaters ☐	
Category :	I ☐	II ☐	III ☐	Direct expansion ☐	Heating power :	
Quantity of fan motors : 2		Capacitors :		Thermostat :	Integrated ☐	Deported ☑
Compliance to drawings :	Yes ☑	No ☐	Observations :			

Mechanical part

	Non applicable	Compliant to drawing	Non-compliant	Into compliance	Observations
Frame	☐	☑	☐	☐	
Insulation	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	
Fittings	☐	☑	☐	☐	

Supply grille orientation	Up ☐	Down ☑	Front ☐	Return grille orientation	Up ☐	Down ☐	Front ☑	Back ☐

Fluidic part

	Non applicable	Compliant to drawing	Non-compliant	Into compliance	Observations
Pipes	☐	☑	☐	☐	
Electrical connection	☐	☑	☐	☐	
3-way valve	☐	☑	☐	☐	
Expension valve	☑	☐	☐	☐	☐
Servomotor	☐	☑	☐	☐	
Solenoid valve	☑	☐	☐	☐	

Tightness test :	Water ☐	Air ☐	Nitrogen ☑	Pressure : 3 Bars	Duration : 4 Days
Electrical test :	Valves ☑	Motors ☑	Resistors ☐	Thermostat ☐	

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered :	Without condition ☑	With conditions ☐	Withdrawal of conditions ☐
Ready for commissioning :	Without condition ☑	With conditions ☐	Withdrawal of conditions ☐

Controller	Manufacturing manager
Name / Date / signature : 02/09/2024 CHIROIS	2/08/2024 DETAILS

Paumier

MANUFACTURING APPROVAL CERTIFICATE - FCU

Référence	FAB-PR04 -FO02
Révision	A
Date	24/02/2024
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Recept FCU	PROJECT
Designation : FCU H8	Reference : P.0608871.L.02
Type : H8/EG-10	Designation : ELOGEN C63 HVAC
FCU drawing reference : 04-400-02-012	Business manager : L.DEGRENNE
Hydraulic diagram reference : P.0608871.L.02.102	Project manager : B.CHIROIS
Manufacturing number : 7425 — Reference : FCU 202 — Marking :	Marking : Cabinet PAU003

Marking :	CE ☐	BV ☐	Without ☑	Glycoled water ☑	Heaters	☐
Category :	I ☐	II ☐	III ☐	Direct expansion ☐	Heating power :	

Quantity of fan motors : 2	Capacitors :	Thermostat : Integrated ☐ Deported ☑
Compliance to drawings : Yes ☑ No ☐	Observations :	

Mechanical part

	Non applicable	Compliant to drawing	Non-compliant	Into compliance	Observations
Frame	☐	☑	☐	☐	
Insulation	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	
Fittings	☐	☑	☐	☐	

Supply grille orientation	Up ☐	Down ☑	Front ☐	Return grille orientation	Up ☐	Down ☐	Front ☑ Back ☐

Fluidic part

	Non applicable	Compliant to drawing	Non-compliant	Into compliance	Observations
Pipes	☐	☑	☐	☐	
Electrical connection	☐	☑	☐	☐	
3-way valve	☐	☑	☐	☐	
Expension valve	☑	☐	☐	☐	☐
Servomotor	☐	☑	☐	☐	
Solenoid valve	☑	☐	☐	☐	

Tightness test :	Water ☐	Air ☐	Nitrogen ☑	Pressure : 3 Bars — Duration : 4 Days
Electrical test :	Valves ☑	Motors ☑	Resistors ☐	Thermostat ☐

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered :	Without condition ☑	With conditions ☐	Withdrawal of conditions ☐
Ready for commissioning :	Without condition ☑	With conditions ☐	Withdrawal of conditions ☐

Controller	Manufacturing manager
Name / Date / signature : CHIROIS 02/08/2024	Name / Date / signature : 2/08/2024

Paumier

MANUFACTURING APPROVAL CERTIFICATE - FCU

Référence	FAB-PR04 -FO02
Révision	A
Date	24/02/2024
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Recept FCU	PROJECT
Designation : FCU H8	Reference : P.0608871.L.02
Type : H8/EG-10	Designation : ELOGEN C63 HVAC
FCU drawing reference : 04-400-02-012	Business manager : L.DEGRENNE
Hydraulic diagram reference : P.0608871.L.02.102	Project manager : B.CHIROIS

Manufacturing number : 7426 **Reference : FCU 203** **Marking :** **Marking : Cabinet PAU003**

Marking :	*CE* ☐	*BV* ☐	*Without* ☑	Glycoled water ☑	Heaters ☐	
Category :	*I* ☐	*II* ☐	*III* ☐	Direct expansion ☐	Heating power :	

Quantity of fan motors : 2	Capacitors :	Thermostat : Integrated ☐ Deported ☑

Compliance to drawings : Yes ☑ No ☐ Observations :

Mechanical part

	Non applicable	*Compliant to drawing*	*Non-compliant*	*Into compliance*	*Observations*
Frame	☐	☑	☐	☐	
Insulation	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	
Fittings	☐	☑	☐	☐	

Supply grille orientation	Up ☐	Down ☑	Front ☐	Return grille orientation	Up ☐	Down ☐	Front ☑	Back ☐

Fluidic part

	Non applicable	*Compliant to drawing*	*Non-compliant*	*Into compliance*	*Observations*
Pipes	☐	☑	☐	☐	
Electrical connection	☐	☑	☐	☐	
3-way valve	☐	☑	☐	☐	
Expension valve	☑	☐	☐	☐	☐
Servomotor	☐	☑	☐	☐	
Solenoid valve	☑	☐	☐	☐	

Tightness test : Water ☐ Air ☐ Nitrogen ☑ Pressure : 3 Bars Duration : 4 Days

Electrical test : Valves ☑ Motors ☑ Resistors ☐ Thermostat ☐

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered : Without condition ☑ With conditions ☐ Withdrawal of conditions ☐

Ready for commissioning : Without condition ☑ With conditions ☐ Withdrawal of conditions ☐

Controller	**Manufacturing manager**
Name / Date / signature : CHIROIS 02/08/2024	Name / Date / signature : 2/08/2024 DELAHAIS

Paumier

elogen

ANNEX n°2.1

Paumier

MANUFACTURING APPROVAL CERTIFICATE - SKID

SKID :	PROJECT
Designation : Skid pump condensation water circuit	Reference : P.0608871.L.02
SKID drawing reference : P.0608871.L.02.207	Designation : ELOGEN C63 HVAC
refrigeration drawing reference : P.0608871.L.02.103	Business manager : L.DEGRENNE
Electrical diagram reference : P.0608871.L.02.302	Project manager : B.CHIROIS
Manufacturing number : 7422 Reference :	Marking :

Marking : *CE* ☐ *BV* ☐ *Without* ☐	Pump :NB 32-160/177 AASF2KESBQQELW1 Flow :127,3 M³/H MPG 40%
	V : 2x380-415D V Current : 2x3 Ph Frequency : 2x 50 HZ
Compliance to drawings : Yes ☑ No ☐	Observations :

Mechanical Section

	Non applicable	*Compliant*	*Non-compliant*	*Into compliance*	*Observations*
Frame	☐	☑	☐	☐	
Paint	☐	☑	☐	☐	
Retention tank	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	

Fluidic Section

	Non applicable	*Compliant*	*Non-compliant*	*Into compliance*	*Observations*
Pump 1	☐	☑	☐	☐	
Pump 2	☐	☑	☐	☐	
Pipes	☐	☑	☐	☐	*Stainless steel 304L*
Connections ASME	☐	☑	☐	☐	*Stainless steel 304L*
Connections DIN AISI	☐	☑	☐	☐	*Stainless steel 304L*
Expension Sleeve	☐	☑	☐	☐	
Motorized valve	☐	☑	☐	☐	
Block valve	☐	☑	☐	☐	
TA valve	☑	☐	☐	☐	*adjusted* ☐ *to be adjusted* ☐
Filter	☐	☑	☐	☐	
Flow switch	☑	☐	☐	☐	
Thermometer	☐	☑	☐	☐	
Temp sensor	☑	☐	☐	☐	
Pressure transmitter	☐	☑	☐	☐	
Check valve	☐	☑	☐	☐	
Caps	☑	☐	☐	☐	
Expansion tank	☐	☑	☐	☐	
Pressure gauge	☐	☑	☐	☐	
Safety valve	☐	☑	☐	☐	

Draining valve	☐	☑	☐	☐

Leak test :	Air ☑ Water ☐	Pressure : 5 Bars	Duration : 30 min	*Operating Pressure 3 Bars*

Control equipements

Identification / Tag	Designation	Manufacturer	Model	Serial number
109	Pump 1	Grunfos	NB 32-160/177 AASF2KESBQQELW1	8742002910002856
119	Pump 2	Grunfos	NB 32-160/177 AASF2KESBQQELW1	8742002910002854
	Frequency converter	Danfoss	VLT® AQUA Drive FC 202 - 136X3801	010525G264
	Frequency converter	Danfoss	VLT® AQUA Drive FC 202 - 136X3801	010625G264
102	Expension tank	CGR	VRV 100	Z 8897779

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered : Without condition ☐ With conditions ☐ Withdrawal of conditions ☐

Ready for commissioning : Without condition ☐ With conditions ☐ Withdrawal of conditions ☐

Controller

Name / Date / signature : 30/08/2024 CHIROIS

Manufacturing manager

Name / Date / signature : 30 08 2024 DeMai

Paumier

MANUFACTURING APPROVAL CERTIFICATE - SKID

Référence	FAB-PR04 -FO03
Révision	A
Date	13/03/2024
Page	1 / 1

SKID :	PROJECT
Designation : Skid pump water chilled circuit	Reference : P.0608871.L.02
SKID drawing reference : P.0608871.L.02.206	Designation : ELOGEN C63 HVAC
refrigeration drawing reference : P.0608871.L.02.103	Business manager : L.DEGRENNE
Electrical diagram reference : P.0608871.L.02.302	Project manager : B.CHIROIS
Manufacturing number : 7421 Reference :	Marking :

Marking : CE ☐ BV ☐ Without ☑	Pump :NB 32-160/177 AASF2KESBQQELW1 Flow : 30,6 M³/H MPG 40%
	V : 2x380-415D V Current : 2x3 Ph Frequency : 2x 50 HZ
Compliance to drawings : Yes ☑ No ☐	Observations :

Mechanical Section

	Non applicable	Compliant	Non-compliant	Into compliance	Observations
Frame	☐	☑	☐	☐	
Paint	☐	☑	☐	☐	
Retention tank	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	

Fluidic Section

	Non applicable	Compliant	Non-compliant	Into compliance	Observations
Pump 1	☐	☑	☐	☐	
Pump 2	☐	☑	☐	☐	
Pipes	☐	☑	☐	☐	*Stainless steel 304L*
Connections ASME	☐	☑	☐	☐	*Stainless steel 304L*
Connections DIN AISI	☐	☑	☐	☐	*Stainless steel 304L*
Expension Sleeve	☐	☑	☐	☐	
Motorized valve	☐	☑	☐	☐	
Block valve	☐	☑	☐	☐	
TA valve	☑	☐	☐	☐	*adjusted* ☐ *to be adjusted* ☐
Filter	☐	☑	☐	☐	
Flow switch	☑	☐	☐	☐	
Thermometer	☐	☑	☐	☐	
Temp sensor	☑	☐	☐	☐	
Pressure transmitter	☐	☑	☐	☐	
Check valve	☐	☑	☐	☐	
Caps	☑	☐	☐	☐	
Expansion tank	☐	☑	☐	☐	
Pressure gauge	☐	☑	☐	☐	
Safety valve	☐	☑	☐	☐	

Draining valve	☐	☑	☐	☐

Leak test : Air ☑ Water ☐ Pressure : 5 Bars Duration : 30 min *Operating Pressure 3 Bars*

Control equipements

Identification / Tag	Designation	Manufacturer	Model	Serial number
9	Pump 1	Grunfos	NB 32-160/177 AASF2KESBQQELW1	8732222910011384
19	Pump 2	Grunfos	NB 32-160/177 AASF2KESBQQELW1	8732222910011385
	Frequency converter	Danfoss	VLT® AQUA Drive FC 202 - 136U7967	010526G264
	Frequency converter	Danfoss	VLT® AQUA Drive FC 202 - 136U7967	010425G264
2	Expension tank	CGR	VRV 50	Z 8886806

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered : Without condition ☐ With conditions ☐ Withdrawal of conditions ☐

Ready for commissioning : Without condition ☐ With conditions ☐ Withdrawal of conditions ☐

Controller

Name / Date / signature : 30.08.2024 CHIROIS

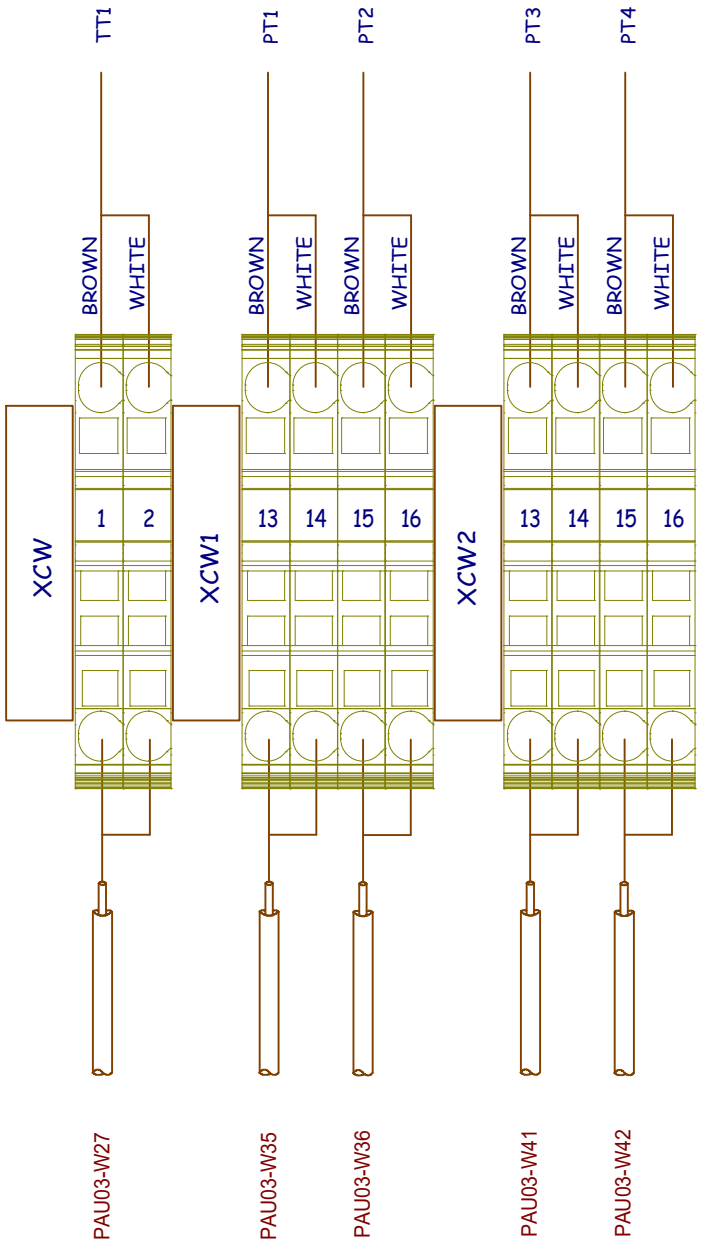
Manufacturing manager

Name / Date / signature : 30.08.2024 DeMathis

Paumier

elogen

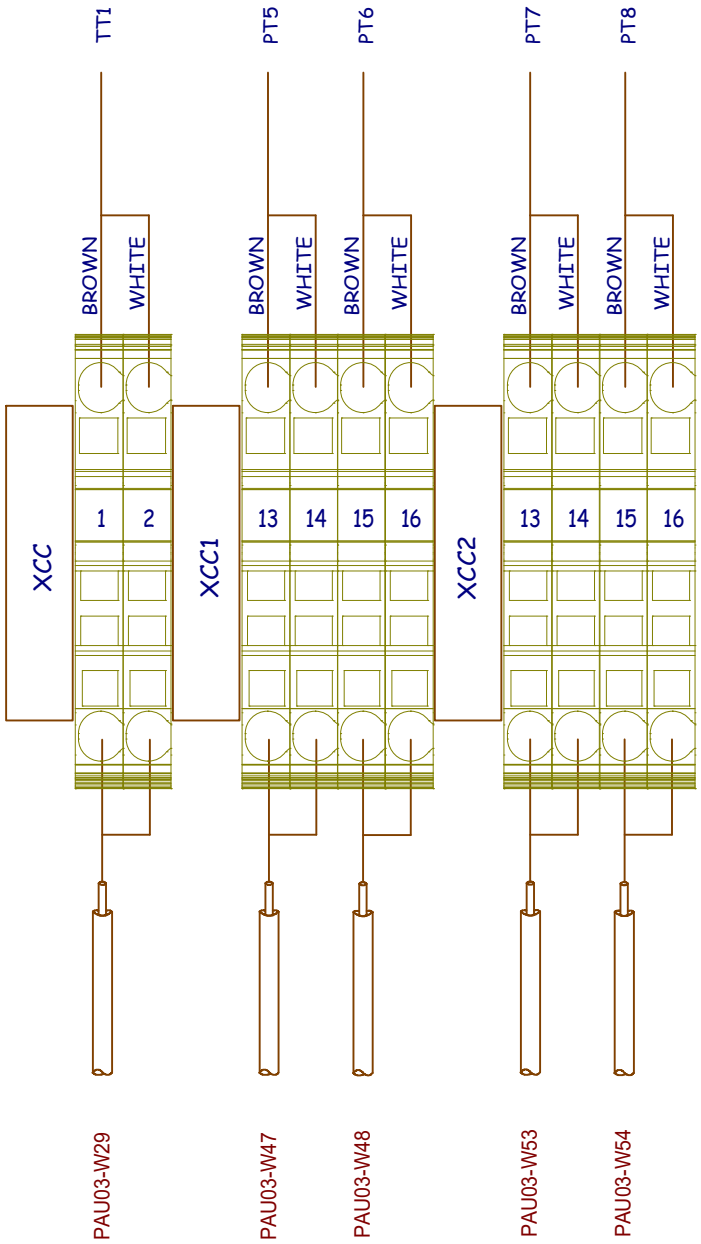
ANNEX n°2.2



elogen	JUNCTION BOX - CHILLED WATER	Paumier	JUNCTIONS BOX	04/09/2024
	JB		ELOGEN - C63	P.0608871.L.02.30X
				AGR

FOLIO 1 / 2

Indice

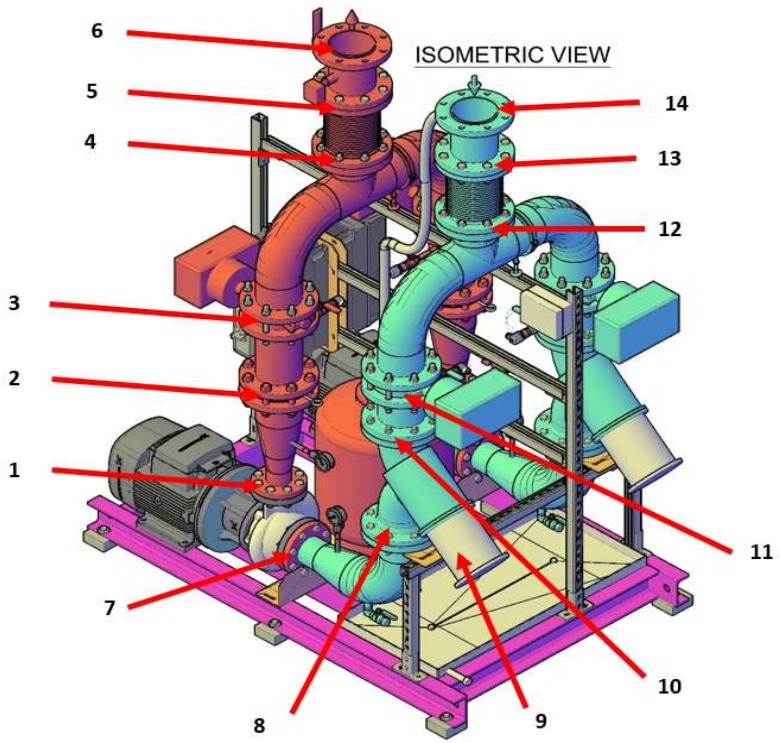


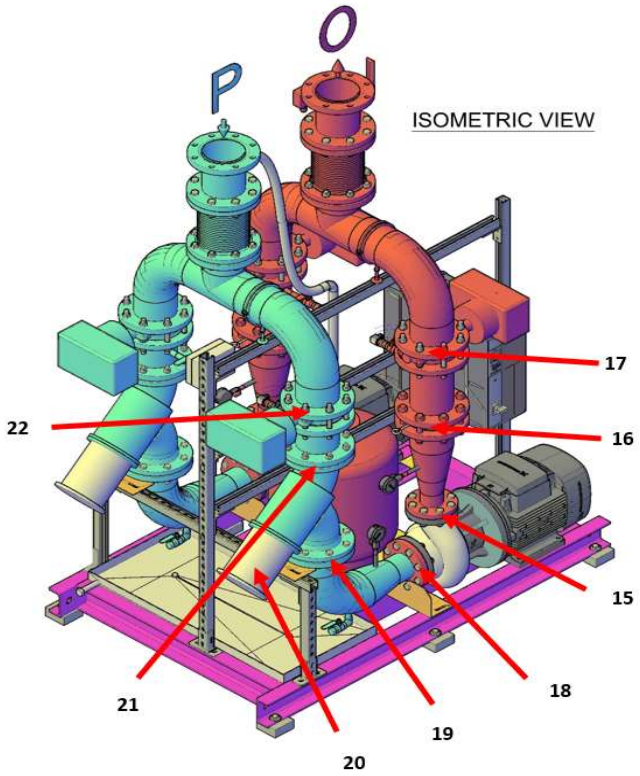
elogen	JUNCTION BOX - CONDENSATION WATER	Paumier	JUNCTIONS BOX	04/09/2024	FOLIO 2
	JB		ELOGEN - C63	P.0608871.L.02.30X	Indice
				AGR	

Paumier

elogen

ANNEX n°2.3





Groupe condensation		
N° de repère	**Dimension bride**	**Couple de serrage N.m**
1;15	DN65	40
7;18	DN100	50
2;8;9;10;16;19;20;21;22	DN150	60
3;11;17;22	DN150	80
4;5;12;13	DN150	150
6;14	6"	170

Paumier

elogen

ANNEX n°2.4

P.0608871.L.02.002
CALCULATION ACCELERATION

SKID PIPING CONDENSATION PUMP

		Name	Function	Visa
Created by	PAUMIER	Vincent BERNARD	Projector	✓
Checked by	PAUMIER	Olivier NEVEU	BE Manager	✓
Approved by	PAUMIER	Baptiste CHIROIS	Project manager	✓

Revision	Date	Modified description	Page nb
0	04/12/2024	Document creation	42

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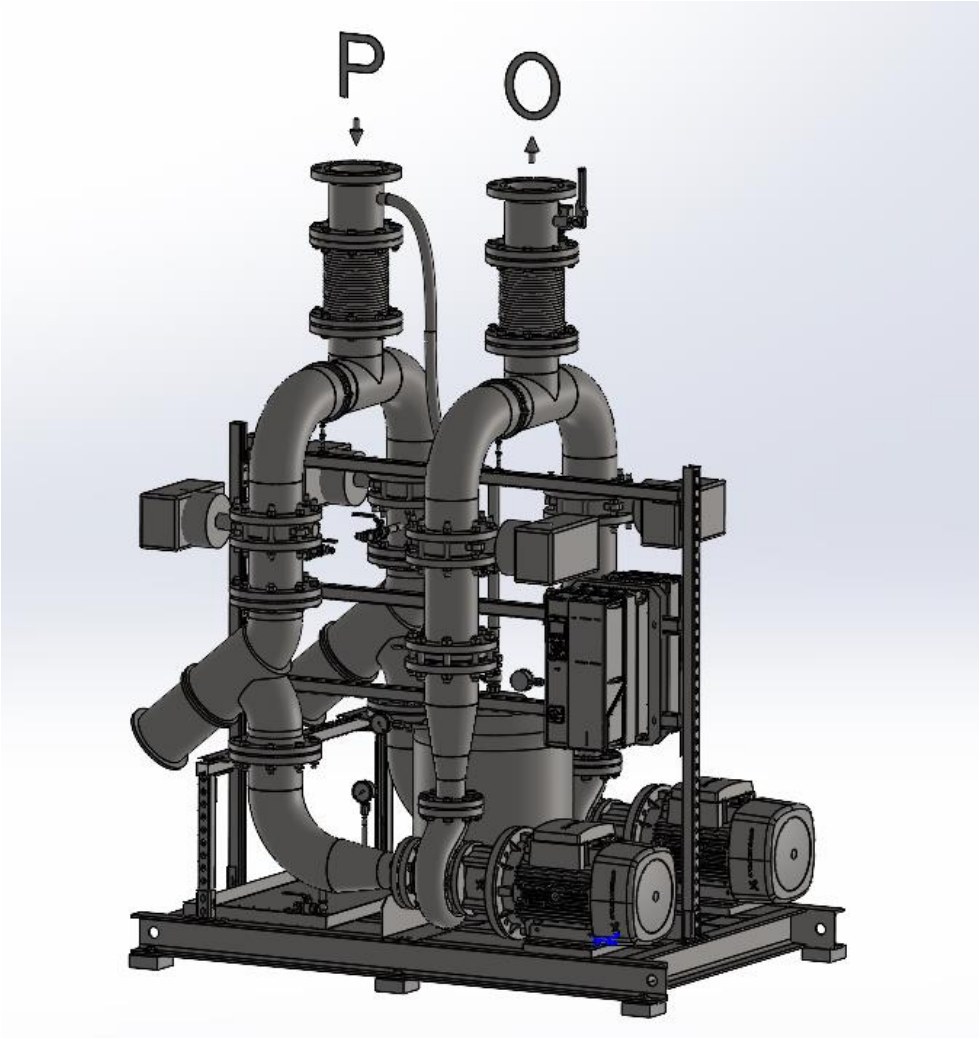
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1. Presentation.

This document deals with the accelerations undergone by the condensation skid, its aim is to demonstrate that the pump body will accept the forces undergone during its movement during transit between the construction site in Italy and the offshore site in the Netherlands.

Photo of the condensation skid.



1.1. Calculation hypothesis .

According to the document "CROSSWIND" we have applied the following values

Upper deck – roll	**+ / - 0.70 G**		**1G + / - 0.30 G**
Loadcase 1	-0.70 G in X		1.3 G Vertical
Loadcase 2	-0 .70 G in X		0.7 G vertical
Loadcase 3	+0.70 G in X		1.3 G Vertical
Loadcase 4	+0.70 G in X		0.7 G vertical
Upper deck -pitch		**+ / - 0.40 G**	**1G + / - 0.50 G**
Loadcase 5		-0.40 G in Y	1.5 G Vertical
Loadcase 6		-0.40 G in Y	0.5 G vertical
Loadcase 7		+0.40 G in Y	1.5 G Vertical
Loadcase 8		+0.40 G in Y	0.5 G vertical

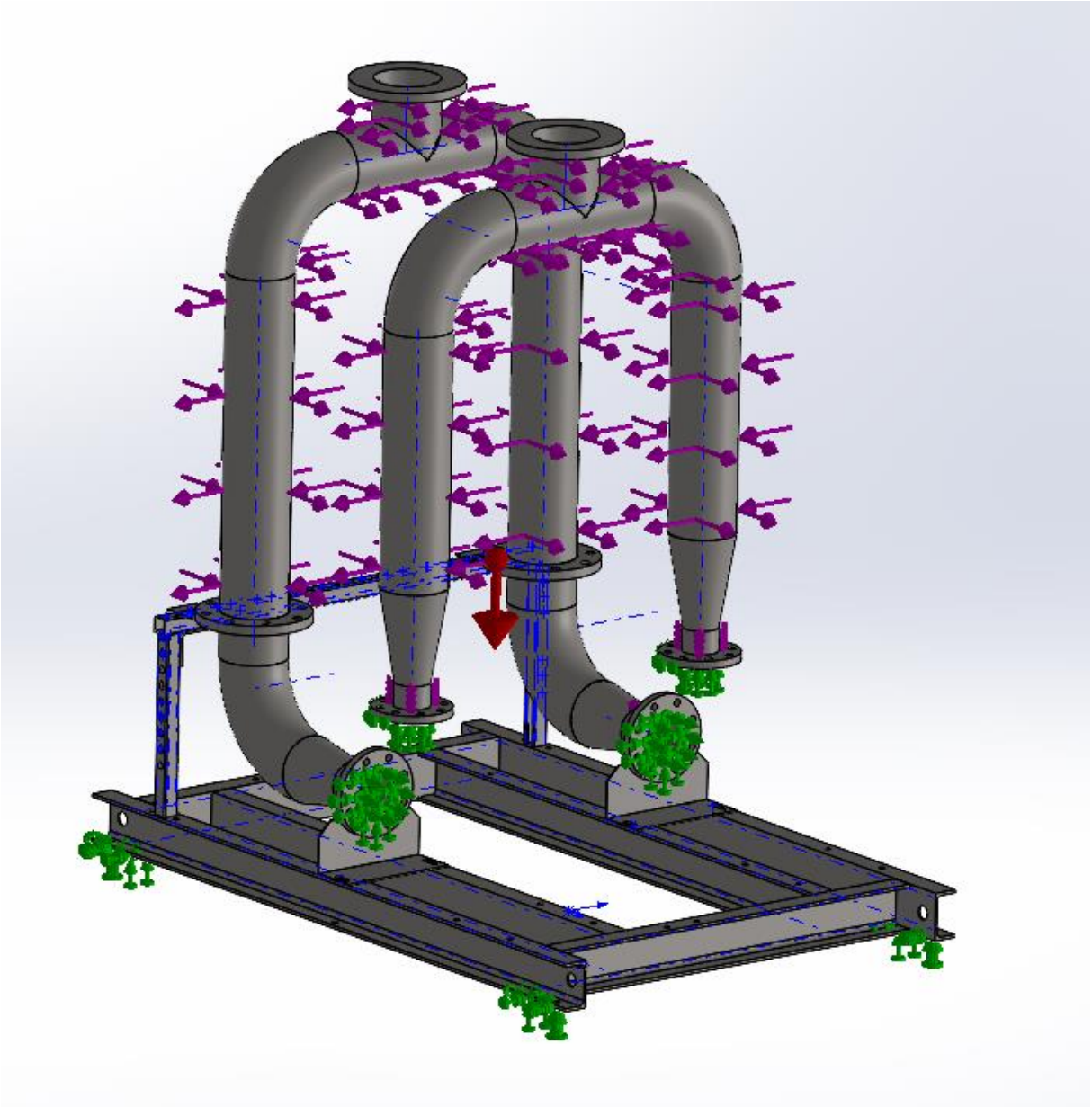
Assumption	Direction 1	Direction 2
1	-0.7G in X	-0.4G in Y
2	-0.7G in X	+0.4G in Y
3	+0.7G in X	+0.4G in Y
4	+0.7G in X	-0.4G in y
5	-0.7G in X	+1.5G in Z
6	+0.7G in X	+1.5G in Z
7	-0.4G in Y	+1.5G in Z
8	+0.4G in Y	+1.5G in Z

We will start with a calculation hypothesis without the upper support of the pipes (suction and discharge) but keeping the lower supports on the suction pipe, in order to have values as close as possible to reality.

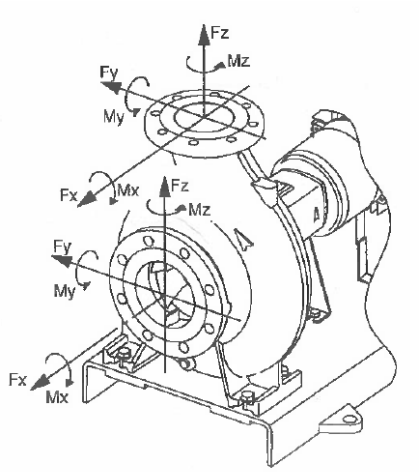
The efforts are applied to all the pipes

The two upper flanges are free without piping connected on top, the 4 flanges on the pump bodies will be fixed in order to be able to obtain the constraints at the foot of the pumps and to determine by hypothesis the moments applied to the pump body .

The study is carried out according to plan P.0608871.L.02.207.



2.Supplier data on the pump body.



Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
Horizontal pump, x-axis, inlet port	25	490	595	525	910	420	490	630	910
	32	595	735	630	1155	525	595	770	1120
	40	700	875	770	1365	630	735	910	1330
	50	945	1155	1050	1820	700	805	980	1435
	65	1190	1470	1295	2310	770	840	1050	1540
	80	1435	1750	1575	2765	805	910	1120	1645
	100	1890	2345	2100	3675	875	1015	1225	1820
	125	2240	2765	2485	4340	1050	1330	1470	2135
	150	2835	3500	3150	5285	1225	1435	1750	2555
	200	3780	4690	4200	7315	1610	1855	2275	3360

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
Horizontal pump, x-axis, outlet port	32	630	595	735	1155	525	595	770	1120
	40	770	700	875	1365	630	735	910	1330
	50	1050	945	1155	1820	700	805	980	1435
	65	1295	1190	1470	2310	770	840	1050	1540
	80	1575	1435	1750	2765	805	910	1120	1645
	100	2100	1890	2345	3675	875	1015	1225	1820
	125	2485	2240	2765	4340	1050	1330	1470	2135
	150	3150	2835	3500	5495	1225	1435	1750	2555
	200	4200	3780	4690	7315	1610	1855	2275	3360

3. Condensation pump skid data.

Pipe material: 304L stainless steel with a yield strength of 206.8MPa

Pipe diameter Ø168.3 thickness 2

Pump reference: NB 80-160/151 AASF2KESBQQEOW1



Weight of the vacuum suction pipe 100kg.

Weight of the discharge pipe when empty 40kg

Weight of suction piping with accelerations:

X: 100+(100x0.7) =170kg or 1700N

Y: 100+(100x0.4) =140kg or 1400 N

Z: 100+(100x1.5) = 250 or 2500 N

Weight of the discharge pipe with accelerations:

X: 40+(40x0.7) =68kg or 680 N

Y: 40+(40x0.4) =56kg or 560 N

Z: 40+(40x1.5) = 100kg or 1000 N

4. Hypothesis 1 (-X, -Y).

As a reminder, hypothesis 1 = -0.7G in X combined with -0.4G in Y.

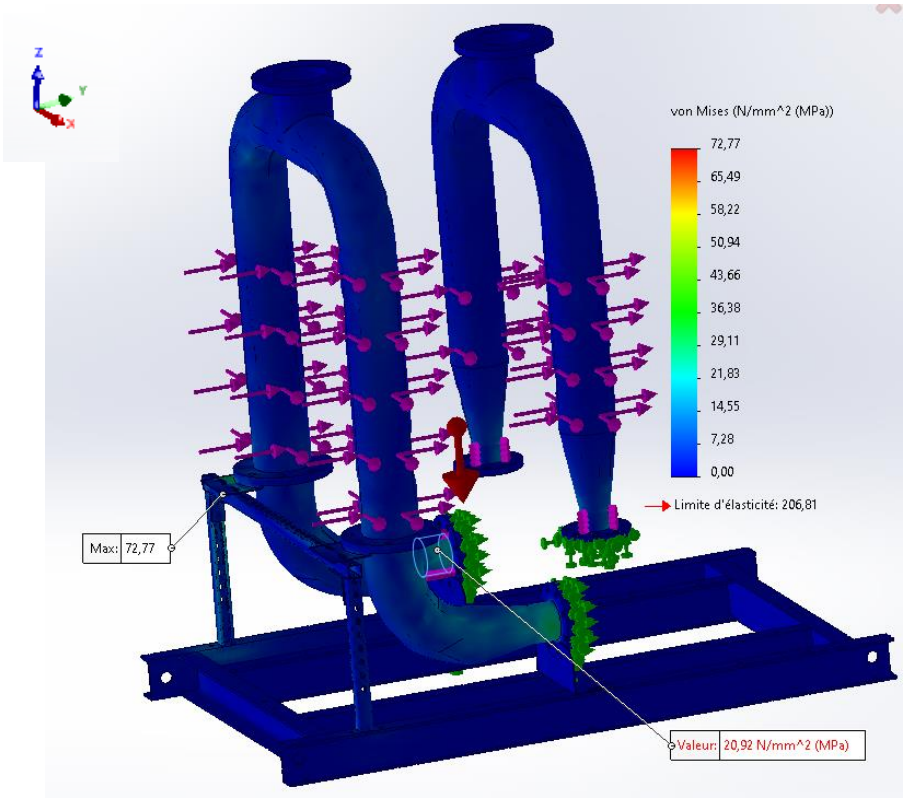
Which gives us:

	Suction piping	Discharge piping
X	-1700N	-680N
Y	-1400N	-560N

4.1 Calculation of the maximum stress on the suction pipe:

4.1.1 result on the suction pipe:

We can observe a maximum stress of 72.77 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 20.92 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



4.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 20.92MPa or 20.92N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{218}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 20.92 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5 mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 20.92 * 21.5$$

$$F = 449.78N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 516 * 0.0571$$

$$M = 25.68N/m$$

4.1.3 conclusions for the suction piping:

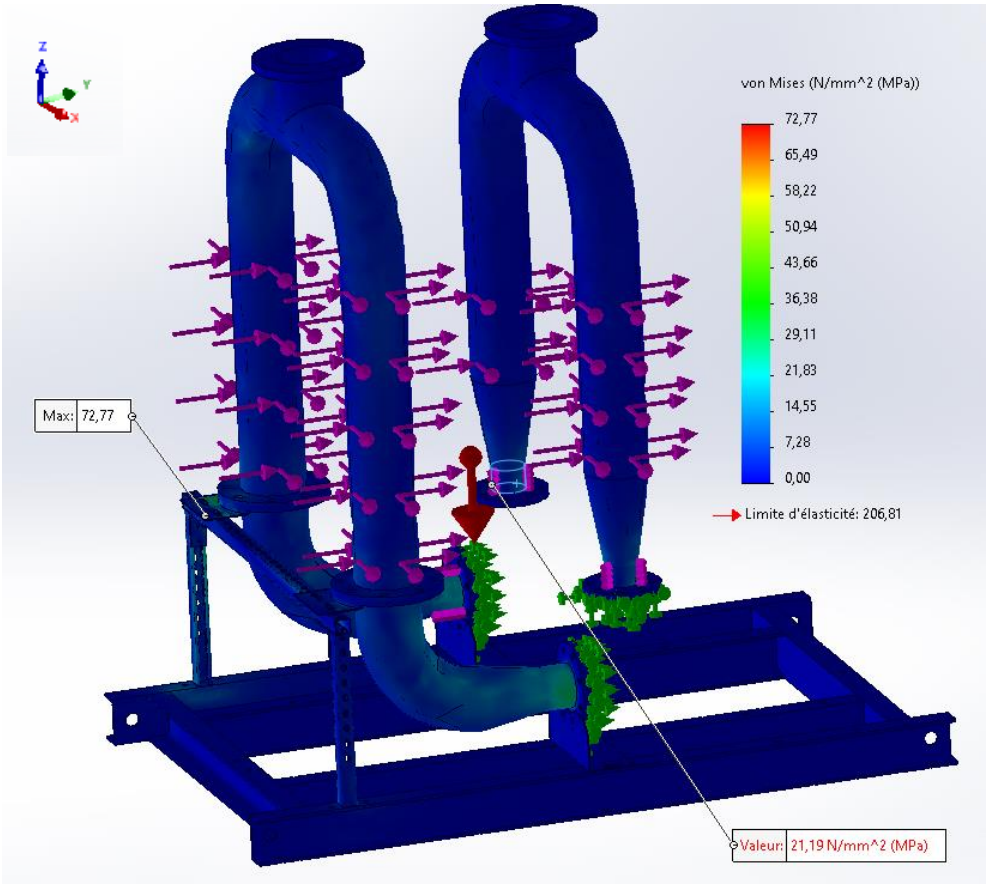
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

4.2 Calculation of the maximum stress on the discharge pipe:

4.2.1 result on the discharge pipe:

We can observe a maximum stress of 72.77 MPa, the stress is located at a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 21.19 MPa (maximum value exerted on the discharge sleeve at the foot of the pump).



4. 2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 21.19MPa or 21.19N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 21.19 MPa at the level of the cuff at the foot of the pump applied on a surface of 20mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 21.19 * 20$$

$$F = 423.8N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 423.8 * 0.04445$$

$$M = 18.83N/m$$

4.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

5. Hypothesis 2 (-X, +Y).

As a reminder, hypothesis 1 = -0.7G in X combined with +0.4G in Y.

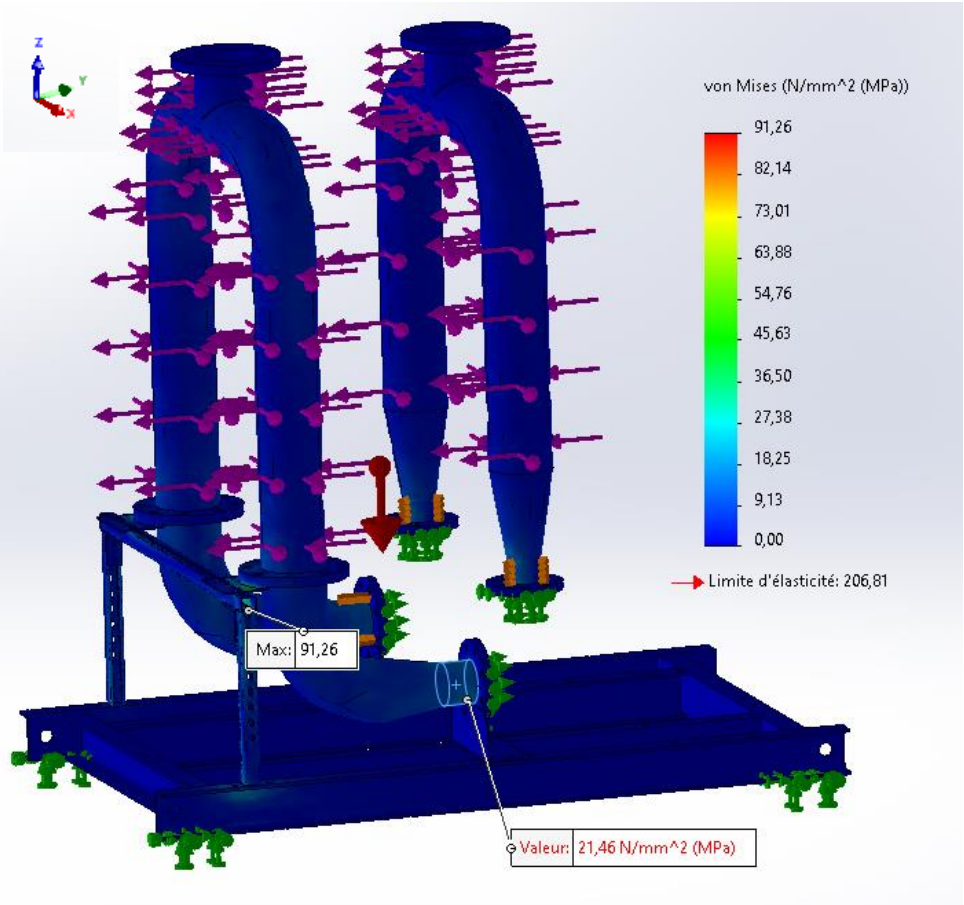
Which gives us:

	Suction piping	Discharge piping
X	-1700N	-680N
Y	+1400N	+560N

5.1 Calculation of the maximum stress on the suction pipe:

5.1.1 result on the suction pipe:

We can observe a maximum stress of 91.26 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 21.46 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



5.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 21.46MPa or 21.46N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 21.46 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 21.46 * 21.5$$

$$F = 461.4N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 461.4 * 0.0571$$

$$M = 26.3N/m$$

5.1.3 conclusions for the suction piping:

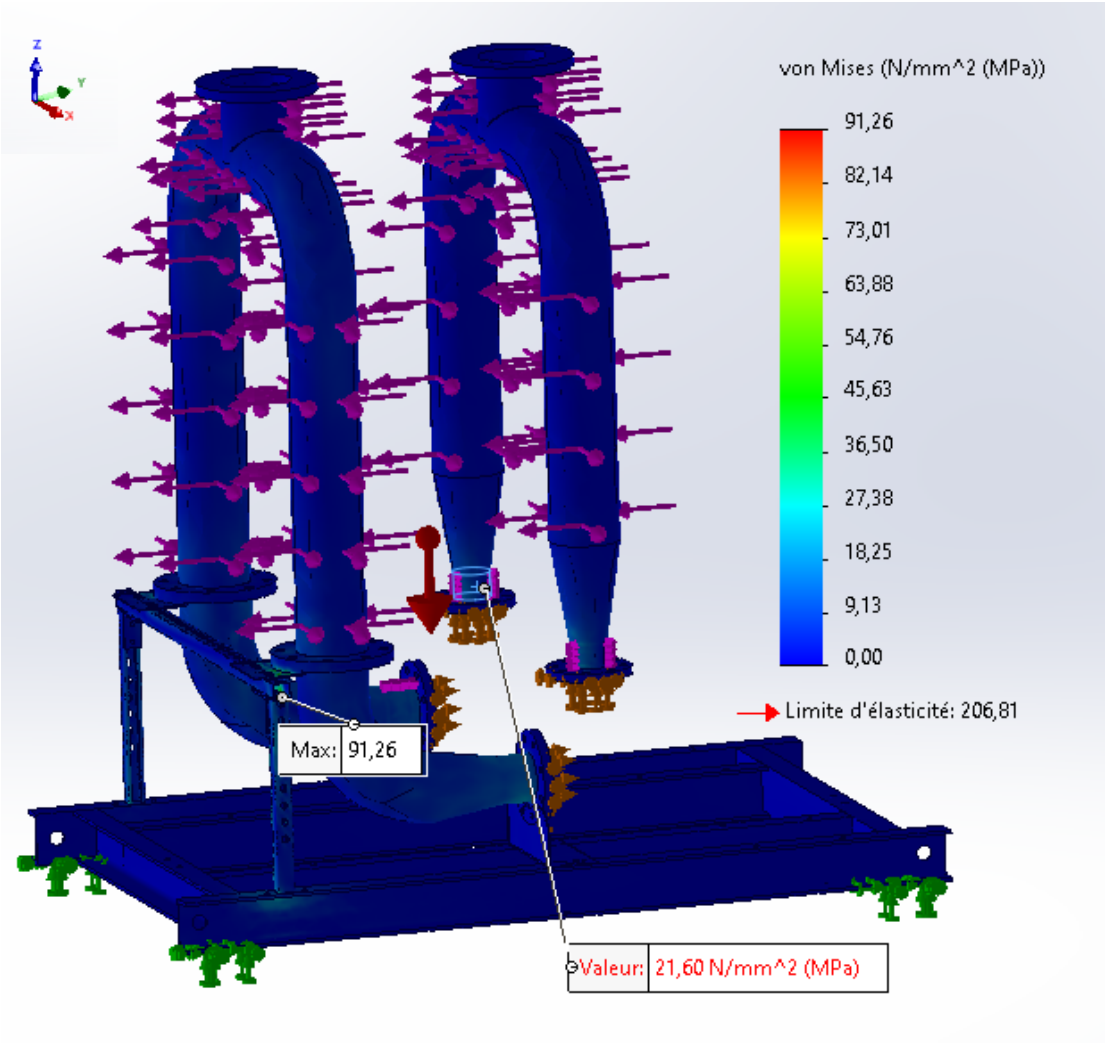
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

5.2 Calculation of the maximum stress on the discharge pipe:

5.2.1 result on the discharge pipe:

We can observe a maximum stress of 91.26 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 21.6 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



5.2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 21.6 MPa or 21.6 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 21.6 MPa at the cuff level on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 21.6 * 20.2$$

$$F = 436.3N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 436.3 * 0.04445$$

$$M = 19.39N/m$$

5.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

6. Hypothesis 3 (+X, +Y).

As a reminder, hypothesis 1 = +0.7G in X combined with +0.4G in Y.

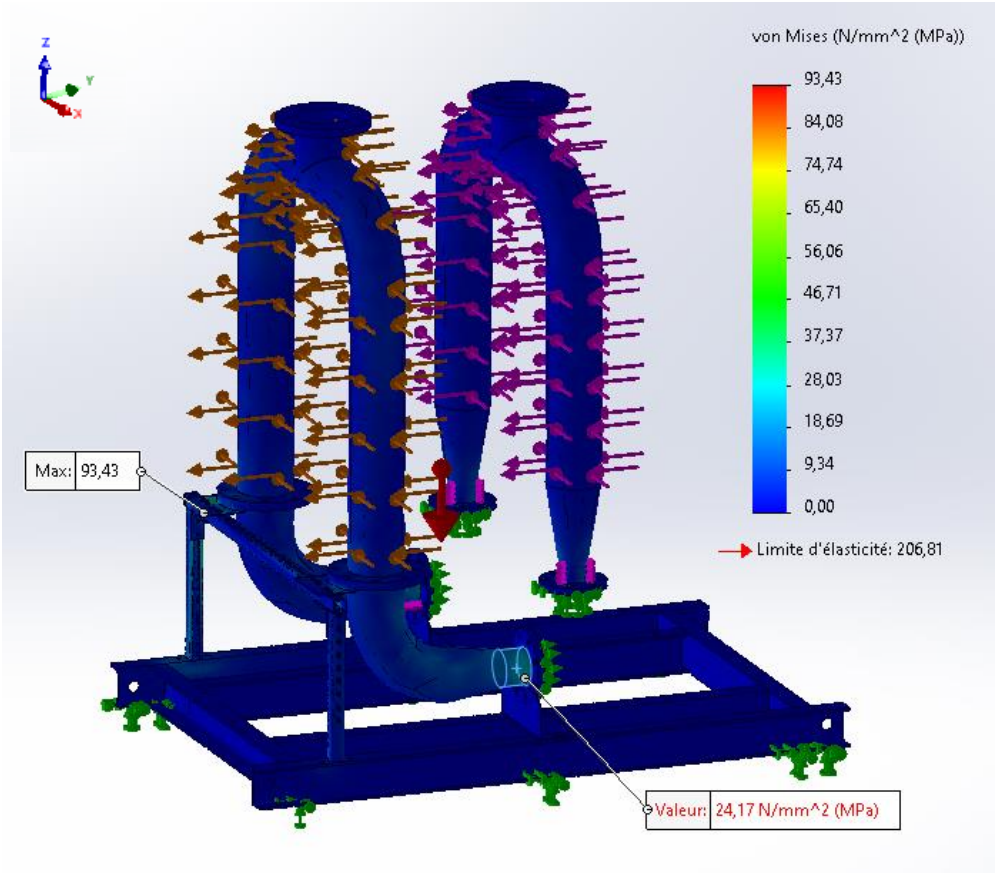
Which gives us:

	Suction piping	Discharge piping
X	+1700N	+680N
Y	+1400N	+560N

6.1 Calculation of the maximum stress on the suction pipe:

6.1.1 result on the suction pipe:

We can observe a maximum stress of 93.43 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 24.17 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



6.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 24.17MPa or 24.17N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 24.17 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 24.17 * 21.5$$

$$F = 519.65N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 519.65 * 0.0571$$

$$M = 29.67N/m$$

6.1.3 conclusions for the suction piping:

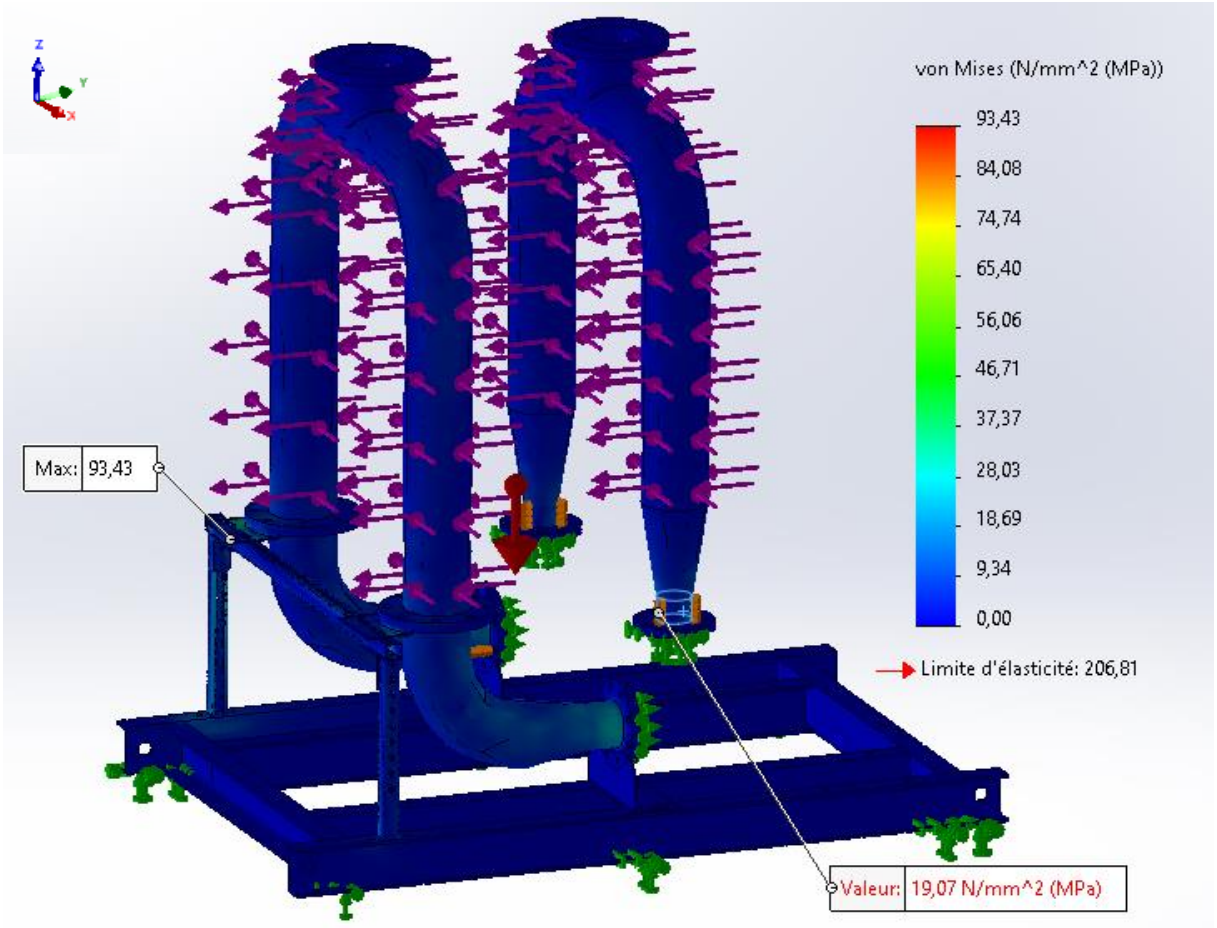
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

6.2 Calculation of the maximum stress on the discharge pipe:

6.2.1 result on the discharge pipe:

We can observe a maximum stress of 93.43 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 19.07 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



6. 2 . 2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 19.07 MPa or 19.07 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 19.07 MPa at the level of the cuff on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 19.07 * 20.2$$

$$F = 385.2N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 385.2 * 0.04445$$

$$M = 17.1N/m$$

6.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

7. Hypothesis 4 (+X, -Y).

As a reminder, hypothesis 1 = +0.7G in X combined with -0.4G in Y.

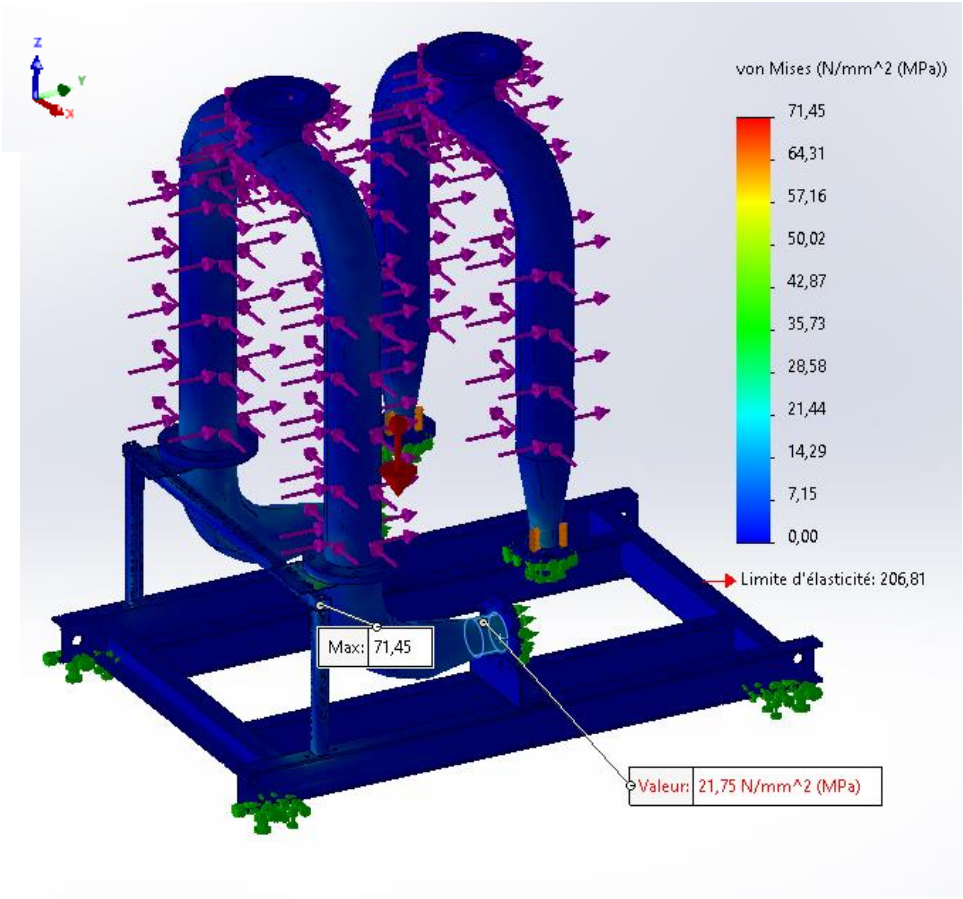
Which gives us:

	Suction piping	Discharge piping
X	+1700N	+680N
Y	-1400N	-560N

7.1 Calculation of the maximum stress on the suction pipe:

7.1.1 result on the suction pipe:

We can observe a maximum stress of 71.45 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 21.75 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



7.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 21.75MPa or 21.75 N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 24.17 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 21.75 * 21.5$$

$$F = 467.6N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 467.6 * 0.0571$$

$$M = 26.7N/m$$

7.1.3 conclusions for the suction piping:

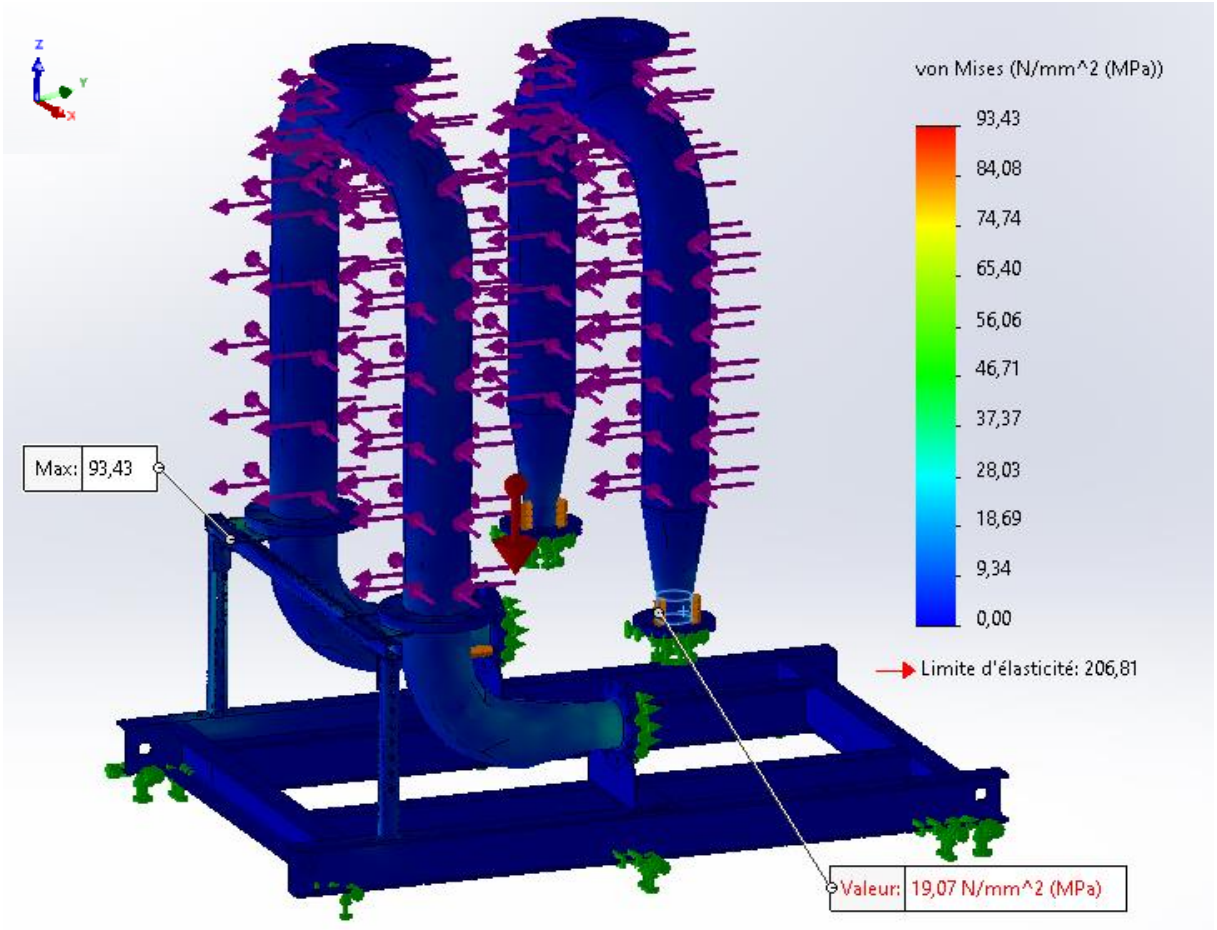
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

7.2 Calculation of the maximum stress on the discharge pipe:

7.2.1 result on the discharge pipe:

We can observe a maximum stress of 71.45 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 19.13 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



7.2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 19.13 MPa or 19.13 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 19.07 MPa at the level of the cuff on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 19.13 * 20.2$$

$$F = 386.4N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 386.4 * 0.04445$$

$$M = 17.17N/m$$

7.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

8. Hypothesis 5 (-X, +Z).

As a reminder, hypothesis 1 = -0.7G in X combined with +1.5G in Z.

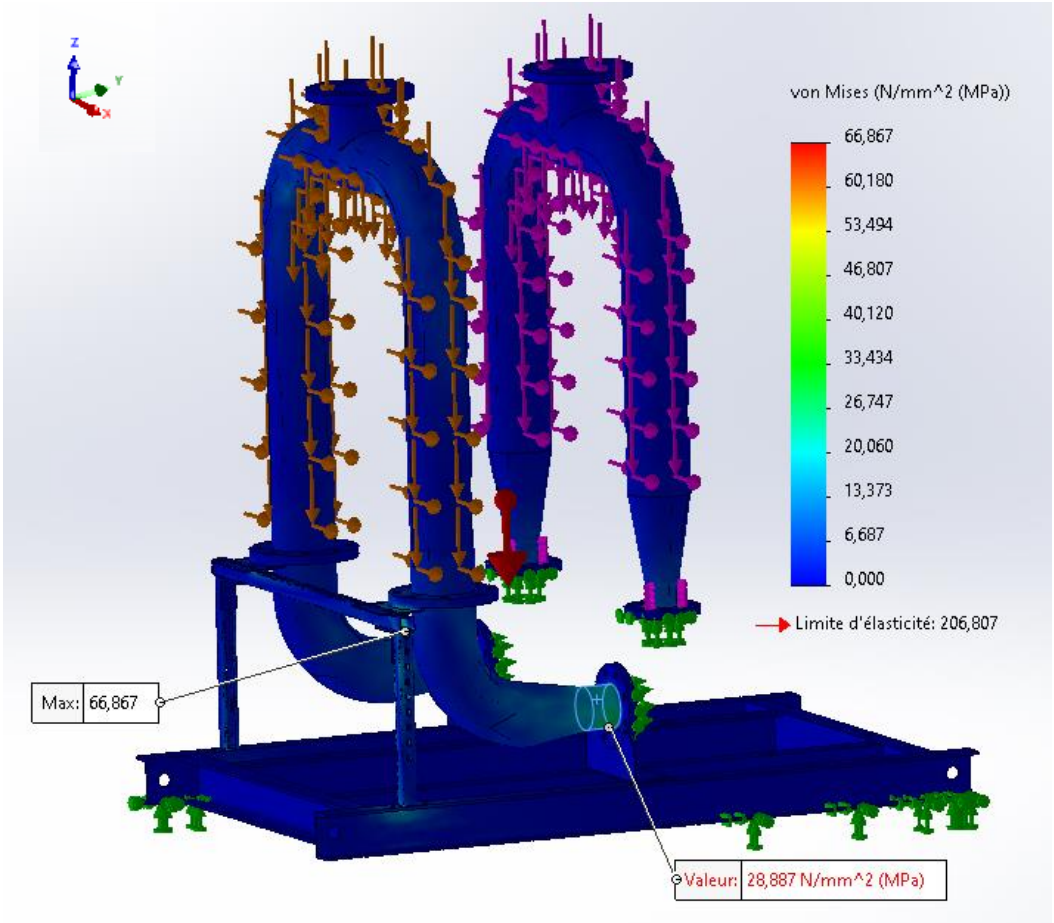
Which gives us:

	Suction piping	Discharge piping
X	-1700N	-680N
Z	+2500N	+1000N

7.1 Calculation of the maximum stress on the suction pipe:

7.1.1 result on the suction pipe:

We can observe a maximum stress of 66.87 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 28.89 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



7.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 28.89MPa or 28.89 N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 28.89 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 28.89 * 21.5$$

$$F = 621.1N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 621.1 * 0.0571$$

$$M = 35.4N/m$$

7.1.3 conclusions for the suction piping:

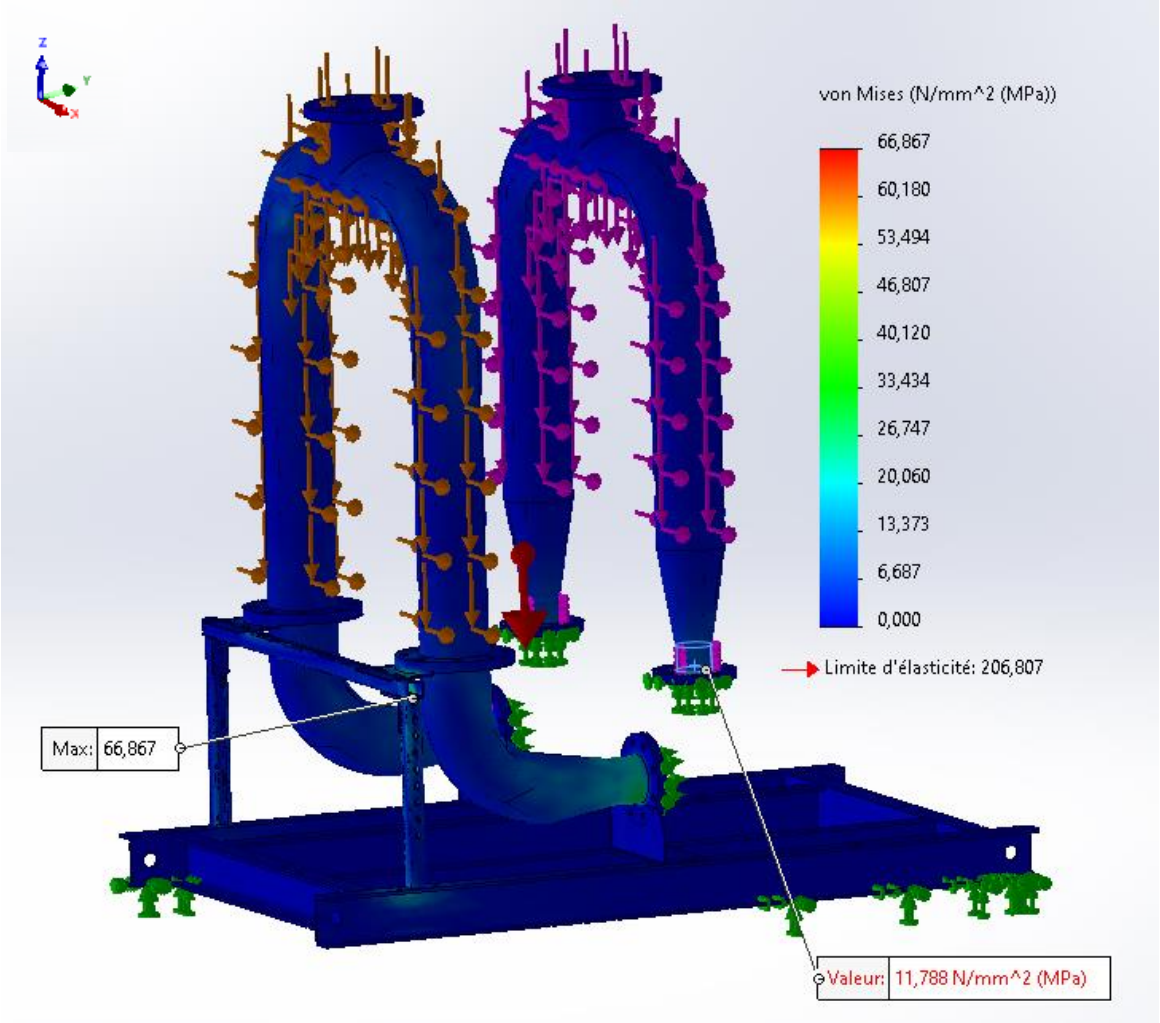
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

7.2 Calculation of the maximum stress on the discharge pipe:

7.2.1 result on the discharge pipe:

We can observe a maximum stress of 66.86 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 11.79 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



7.2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 11.78 MPa or 11.78 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 11.78 MPa at the level of the cuff on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 11.78 * 20.2$$

$$F = 237.96N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 386.4 * 0.04445$$

$$M = 10.58N/m$$

7.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

8. Hypothesis 6 (+X, +Z).

As a reminder, hypothesis 1 = +0.7G in X combined with +1.5G in Z.

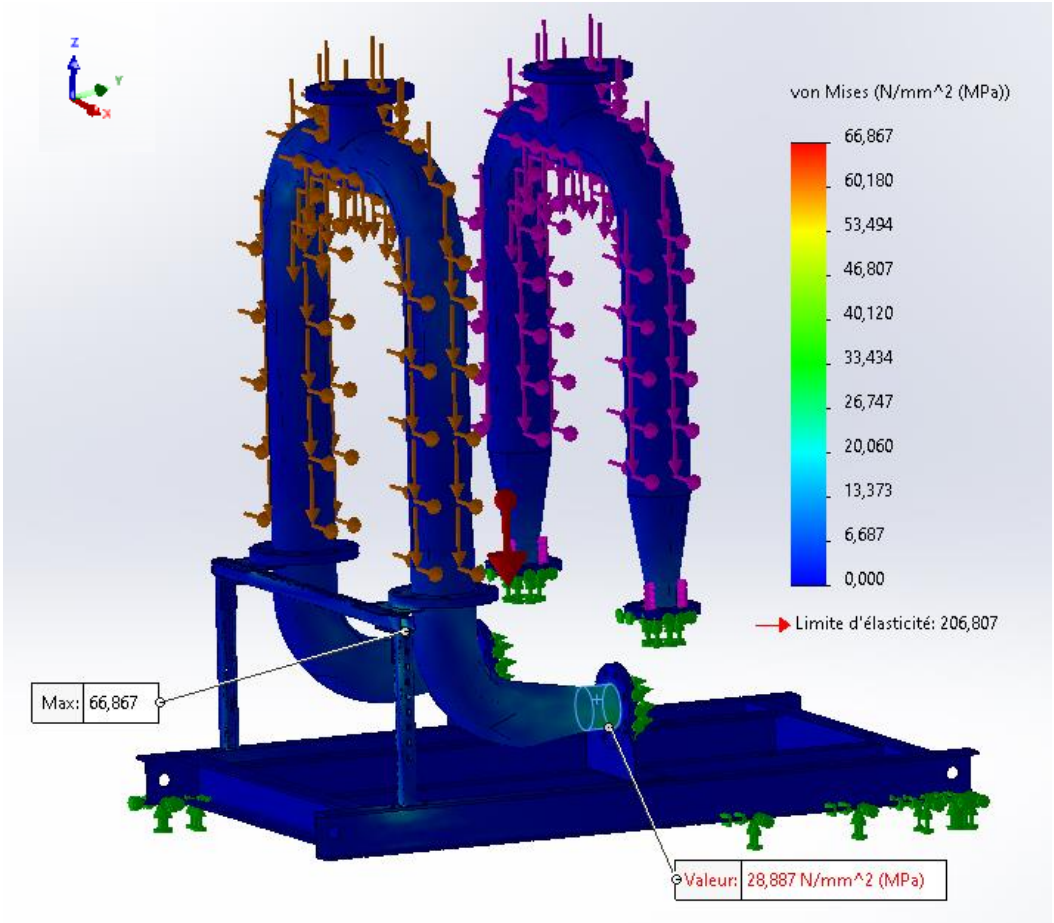
Which gives us:

	Suction piping	Discharge piping
X	+1700N	+680N
Z	+2500N	+1000N

8.1 Calculation of the maximum stress on the suction pipe:

8.1.1 result on the suction pipe:

We can observe a maximum stress of 68.05 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 22.18 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



8.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 22.18 MPa or 22.18 N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 28.89 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 22.18 * 21.5$$

$$F = 476.9N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 621.1 * 0.0571$$

$$M = 27.23N/m$$

8.1.3 conclusions for the suction piping:

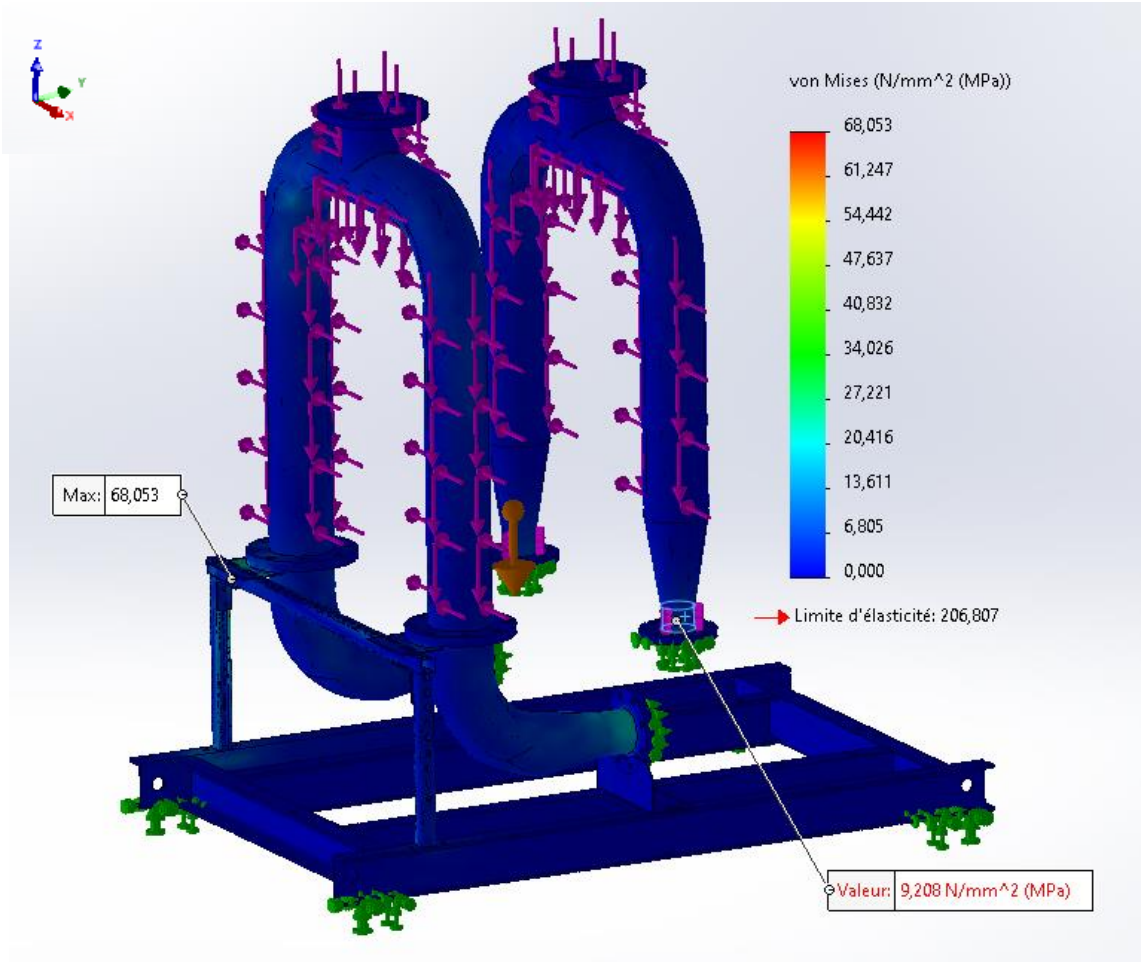
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

8.2 Calculation of the maximum stress on the discharge pipe:

8.2.1 result on the discharge pipe:

We can observe a maximum stress of 68.05 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 9.2 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



8.2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 9.2 MPa or 9.2 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 11.78 MPa at the level of the cuff on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 9.2 * 20.2$$

$$F = 185.8N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 185.8 * 0.04445$$

$$M = 8.26N/m$$

8.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

9. Hypothesis 7 (-Y, +Z).

As a reminder, hypothesis 1 = -0.4G in Y combined with +1.5G in Z.

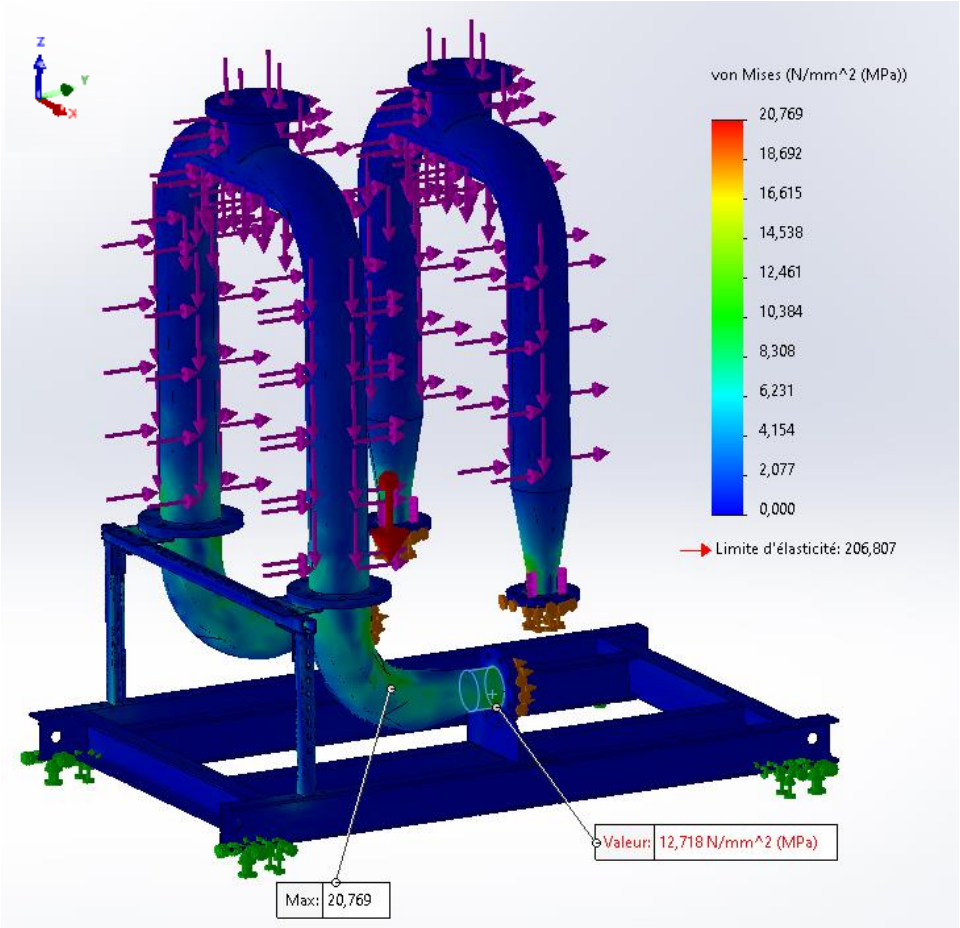
Which gives us:

	Suction piping	Discharge piping
Y	-1400N	-560N
Z	+2500N	+1000N

9.1 Calculation of the maximum stress on the suction pipe:

9.1.1 result on the suction pipe:

We can observe a maximum stress of 20.77 MPa, the stress is located on the suction elbow, the stress which interests us to determine if the pump body is capable of holding the required stress is 12.72 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



9.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 12.72 MPa or 12.72 N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 28.89 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 12.72 * 21.5$$

$$F = 273.48N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 273.48 * 0.0571$$

$$M = 15.62N/m$$

9.1.3 conclusions for the suction piping:

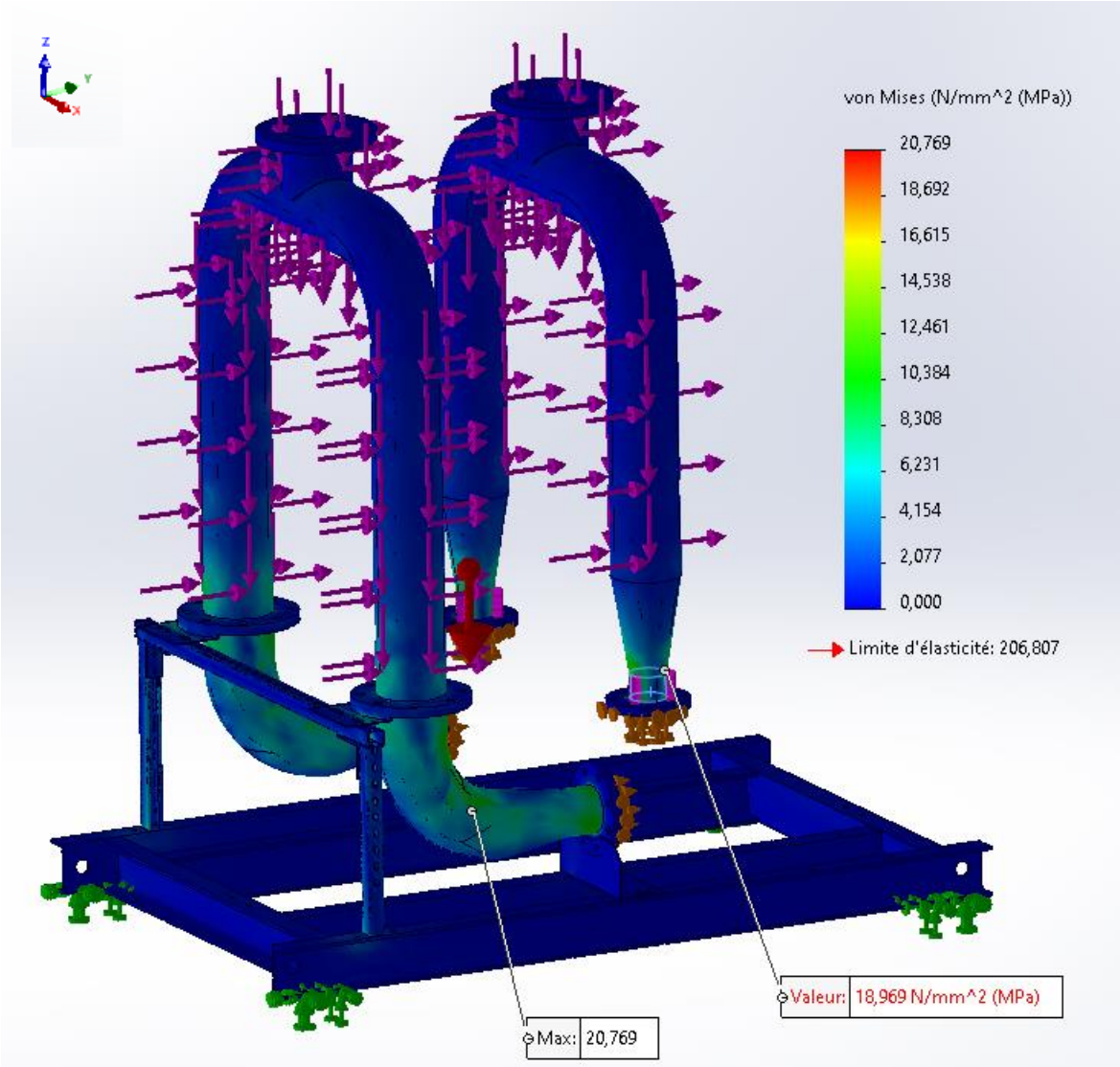
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

9.2 Calculation of the maximum stress on the discharge pipe:

9.2.1 result on the discharge pipe:

We can observe a maximum stress of 20.77 MPa, the stress is located on the suction elbow, the stress which interests us to determine if the pump body is capable of holding the required stress is 18.97 MPa (maximum value exerted on the suction sleeve at the foot of the pump)



9.2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 18.97 MPa or 18.97 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 11.78 MPa at the level of the cuff on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 18.97 * 20.2$$

$$F = 383.2N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 383.2 * 0.04445$$

$$M = 17N/m$$

9.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

10. Hypothesis 8 (+Y, +Z).

As a reminder, hypothesis 1 = +0.4G in Y combined with +1.5G in Z.

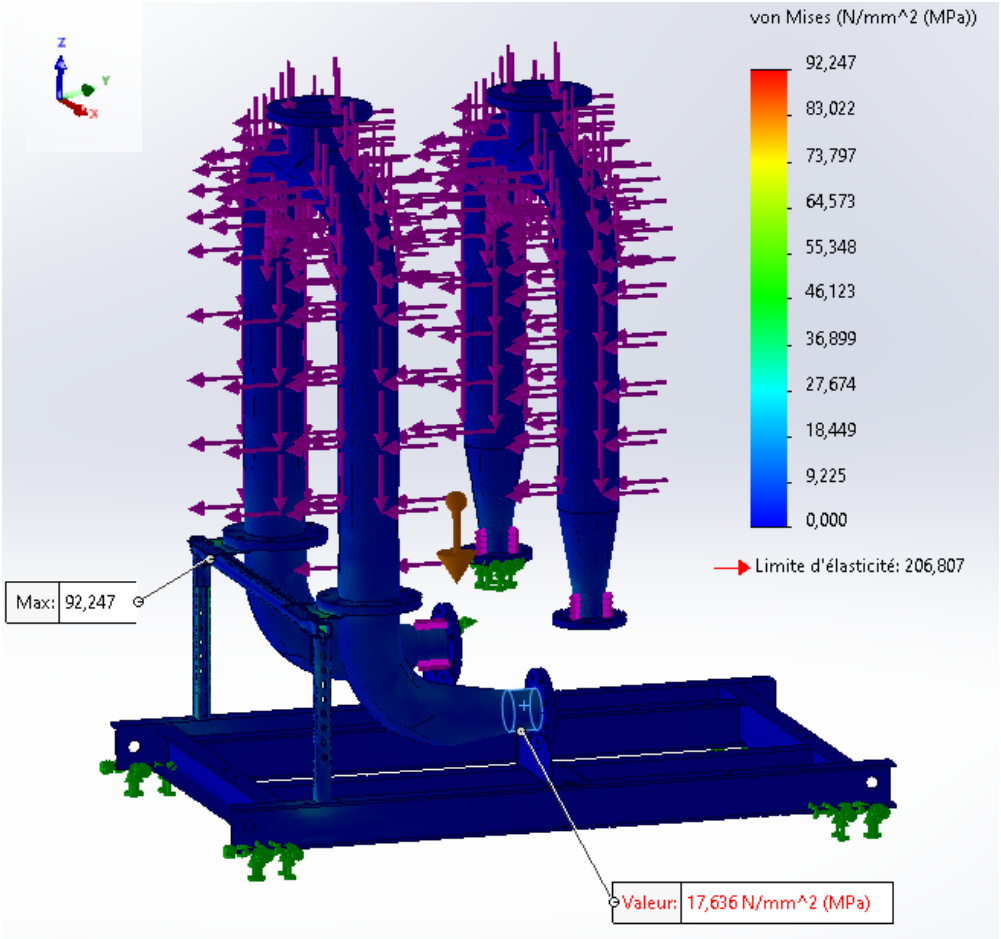
Which gives us:

	Suction piping	Discharge piping
Y	+1400N	+560N
Z	+2500N	+1000N

10.1 Calculation of the maximum stress on the suction pipe:

10.1.1 result on the suction pipe:

We can observe a maximum stress of 92.2 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 17.6 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



10.1.2 Calculation of the moment at the pump body inlet.

Input data:

σ = Maximum stress 17.6 MPa or 17.6 N/mm2

R= Radius of piping at the foot of the pump R= 57.15mm=0.0571m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 1300 points on a surface of 28008.6mm2

$$A = \frac{28008.6}{1300}$$

$$A = 21.5mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 28.89 MPa at the level of the cuff at the foot of the pump applied on a surface of 21.5mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 17.6 * 21.5$$

$$F = 378.4N$$

Knowing that the piping at the foot of the pump has a radius of 0.0571m we can deduce the distributed moment:

$$M = F * R$$

$$M = 378.4 * 0.0571$$

$$M = 21.6N/m$$

10.1.3 conclusions for the suction piping:

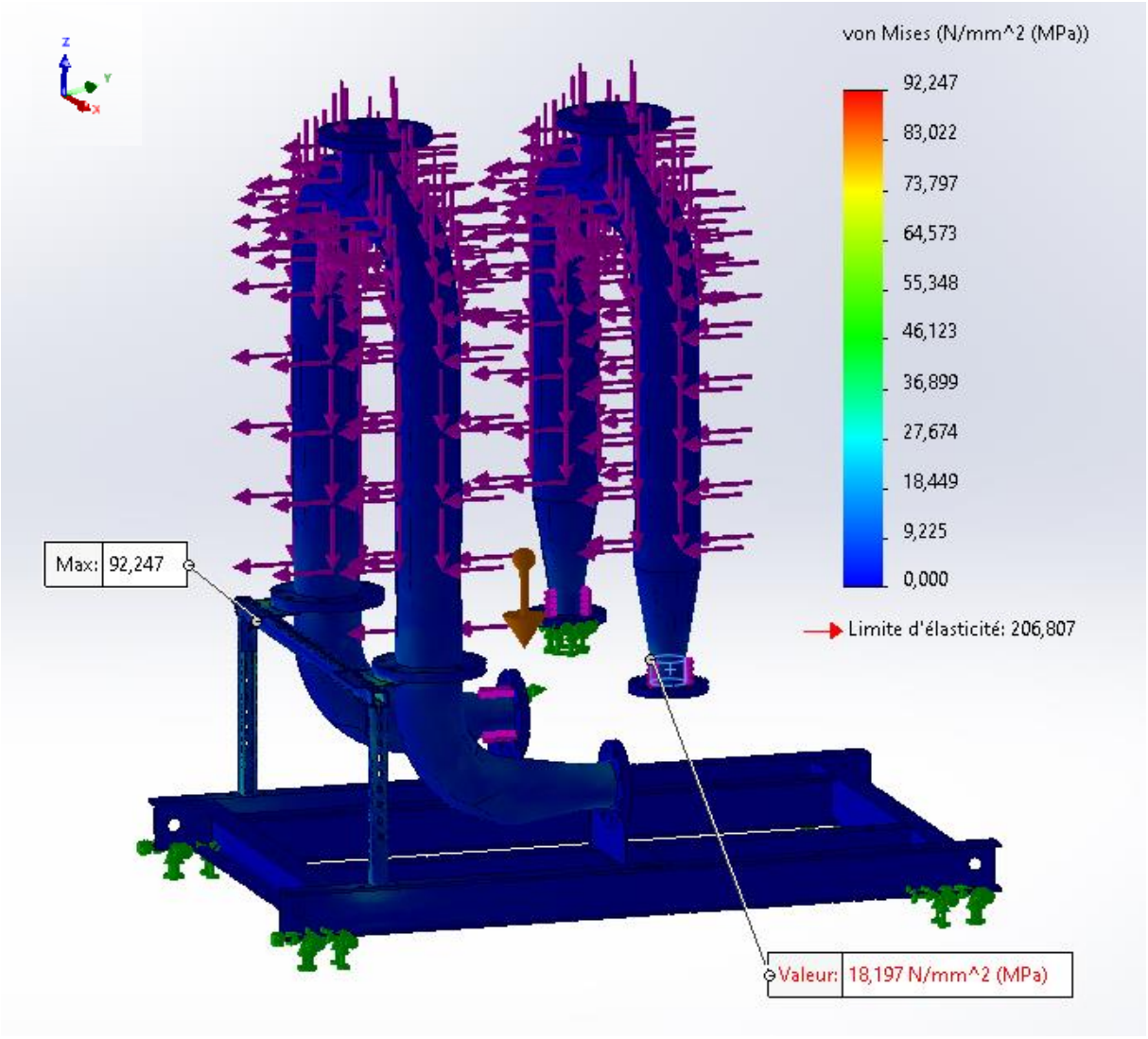
We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

10.2 Calculation of the maximum stress on the discharge pipe:

10.2.1 result on the discharge pipe:

We can observe a maximum stress of 92.2 MPa, the stress is located on a single point at the level of the angle iron which assembles the two profiles, the stress which interests us to determine if the pump body is capable of holding the required stress is 18.2 MPa (maximum value exerted on the discharge sleeve at the foot of the pump)



10.2.2 Calculation of the moment at the pump body inlet .

Input data:

σ = Maximum stress 18.2 MPa or 18.2 N/mm2

R= Radius of piping at the foot of the pump R= 44.45mm=0.04445m

M= moment in N/m

Hypothesis for calculating the stress application surface

The number of points distributed on the cuff is 816 points on a surface of 16478mm2

$$A = \frac{16478}{816}$$

$$A = 20.2mm2$$

Calculation hypothesis for determining the moment:

We obtain a maximum stress of 11.78 MPa at the level of the cuff on a surface of 20.2mm2, we can apply the formula:

$$\sigma = \frac{F}{A}$$

The missing value and F which gives us:

$$F = \sigma * A$$

$$F = 18.2 * 20.2$$

$$F = 367.6N$$

Knowing that the piping at the foot of the pump has a radius of 0.04445m we can deduce the distributed moment:

$$M = F * R$$

$$M = 367.6 * 0.04445$$

$$M = 16.3N/m$$

10.2.3 conclusions for the discharge piping:

We can observe in the calculation assumptions that the force (F) as well as the moment (M) is lower than the table provided by the pump supplier on all axes.

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

11. Conclusion:

We can conclude that from the results obtained the pump body does not suffer irreversible damage (breakage).

Summary table of results

Hypotheses	Direction	Aspiration		Repression	
		Result in N on cuff at pump foot	Result in N/m on cuff at pump foot	Result in N on cuff at pump foot	Result in N/m on cuff at pump foot
1	-0.7G in X -0.4G in y	449.78 N	25.68 N/m	423.8 N	18.83 N/m
2	-0.7G in X +0.4G in y	461.4 N	26.3N/m	436.3 N	19.39 N/m
3	+0.7G in X +0.4G in y	519.65 N	29.67 N/m	385.2 N	17.1 N/m
4	+0.7G in X -0.4G in y	467.6 N	26.7 N/m	386.4 N	17.17 N/m
5	-0.7G in X +1.5G in Z	621.1 N	35.4 N/m	237.96 N	10.58 N/m
6	+0.7G in X +1.5G in Z	476.9 N	27.23 N/m	185.8 N	8.26 N/m
7	-0.4G in Y +1.5G in Z	273.48 N	15.62 N/m	383.2 N	17 N/m
8	+0.4G in Y +1.5G in Z	378.4 N	21.6 N/m	367.6 N	16.3 N/m

Supplier table with accepted efforts without deterioration

Aspiration:

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	100	1890	2345	2100	3675	875	1015	1225	1820

Refoulement:

Stainless steel flanges	Diameter DN	Force [N]				Torque [N-m]			
		Fy	Fz	Fx	ΣF 2)	My	Mz	Mx	ΣM 2)
	80	1575	1435	1750	2765	805	910	1120	1645

Paumier

elogen

PICTURE







P.0608871.L.02.501
C63 HVAC

Report FAT n°2
AHU

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Checked by	PAUMIER	Théo GODARD	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	11/10/2024	Document creation	3

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Siret 346 350 101 00041 – A.P.E. 2825Z – N° TVA FR 89 346350101

Equipment Factory Acceptance Test – AHU :

1. General inspection :

List of point to review	OK	NOK	Comments
External dimension check of the unit	☑	☐	
Type plate present	☑	☐	
Check the presence of all components : • Pre filter • Filter • Cooling battery • Motorized fan • Speed variator • Temperature sensor on fresh air • Hygrometry and temperature sensor on the blowing • 3-way valves on the chilled water • Differential pressure switch for filter	☑	☐	
Hydrostatic tests on chilled network completed.	☑	☐	
Hydraulic connection conforms to the drawing	☑	☐	
Verification of the datasheets of each component	☑	☐	
The equipment complies with the plans transmitted (position of cable gland, battery drain, air inlet, air blowing …)	☑	☐	
Glands are securely tightened	☑	☐	
Cables are supported correctly	☑	☐	
Earth connection present	☑	☐	
Inspection and control of the maintenance manual of the equipment	☑	☐	
Checking the internal wiring of the equipment (junction box, speed variator of the fan)	☑	☐	
Unit internally and externally clean	☑	☐	
Internal bolts/screws correctly tightened	☑	☐	

2. Operation inspection :

The operation test will be realised on site during the commissioning. For the operation of the AHU we require :

- The variator to be wired to the HVAC electrical cabinet.
- The electrical heater can't operate without the fan in operation for safety reasons.
- The battery needs to be connected to the chilled water network.

3. Comments receive from Elogen to consider by Paumier :

Comments	Justifications
Provide the completed and signed manufacturing sheets	See annexe 1.1
Place a grid in the condensate tray to prevent objects from falling into it.	DONE
External dimension check of the unit	See annexe 1.2
Review the lifting plan	See annexe 1.3
Consider comments on plans	See annexe 1.4
Consider comments on the datasheets	See annexe 1.5

List of people present :

Paumier	Elogen
Olivier DELAHAIS	Ahmed RAZGUI
Robin LAMBERT	Hassan HAMMAMI
Baptiste CHIROIS	

FAT carried out on Tuesday September 20th.

AHU :	PROJECT
Designation : AHU Room E01	**Reference : P.0608871.L.02**
CTA drawing reference : P.0608871.L.02.200	**Designation : ELOGEN C63 HVAC**
fluidic drawing reference : P.0608871.L.02.003	**Business manager : L.DEGRENNE**
Electrical diagram reference : P.0608871.L.02.214	**Project manager : B.CHIROIS**

Manufacturing number : 7449 **Reference : AHU 100** **CTA : marking** **Electrical : cabinet marking PAU003**

Marking :	***CE*** ☐	***BV*** ☐	***Without*** ☑	**Chilled water** ☑ **Type : MPG 40%**	**Refrigeration fluid** ☐
Category :	***I*** ☐	***II*** ☐	***III*** ☐	**Air flow:3362 M³/H** **Cooling capacity:36,9 kW**	**Fluid type :**

Heating **Electric** ☑ **Hot water** ☐ **Heating Capacity : 22,5KW**

Compliance to drawings : Yes ☑ No ☐ **Observations :**

Mechanical part

	Non applicable	*Compliant to drawings*	*Non-compliant*	*Into compliance*	*Observations*
Frame (! Check the material's nature)	☐	☑	☐	☐	
Inner frame	☐	☑	☐	☐	
Panels (! Check the material's nature)	☐	☑	☐	☐	
Bolts tightening	☐	☑	☐	☐	
Doors insulation	☐	☑	☐	☐	
Retention tank (! Check the flow)	☐	☑	☐	☐	
Drain	☐	☑	☐	☐	
Installed on the CTA ☐		Provided ☐		Non provided ☑	
Fan	☐	☑	☐	☐	
Motor	☐	☑	☐	☐	
Identification plate		Voltage : 400V	Current :	Frequency :	
Pulley	☑	☐	☐	☐	
Belt (! Indicate if installed or not)	☑	☐	☐	☐	
Soft block	☐	☑	☐	☐	
Flexible sleeve	☐	☑	☐	☐	
Electrical connection	☐	☑	☐	☐	
Droplets separator	☑	☐	☐	☐	
Dumper	Manual ☑		Motorised ☐	Voltage :	**LTD100**
Filters	☐	☑	☐	☐	
Quantity / type	1st stage :	SPG G4	2nd stage :	MPC F7	
Overheating thermostat		Type : Danfoss		Model : KP	
Electrical resistance		Quantity : 9	Voltage : 400v	Unit power : 2500W	

Fluidic part

	Non applicable	*Compliant to drawings*	*Non-compliant*	*Into compliance*	*Assembly orientation*
Motorised valve	☐	☑	☐	☐	☐
Model :		Voltage :			
Stop valve	☑	☐	☐	☐	☐
Electrical connection	☐	☑	☐	☐	☐

Frigorific part (If direct expansion)

	Non applicable	*Compliant to drawings*	*Non-compliant*	*Into compliance*	*Assembly orientation*
Solenoid valves	☑	☐	☐	☐	☐
Stop valve	☑	☐	☐	☐	☐
Check valve	☑	☐	☐	☐	☐
Expansion valve	☑	☐	☐	☐	☐
Nozzle :		**Frame :**	**Train :**		
Electrical connection	☑	☐	☐	☐	☐
Cold battery		Nominal diameter In / Out : DN32		Test : pressure	4,5 Duration : 4 Days

Control equipements

Identification	Designation	Manufacturer	Model	Serial number
	motor	Elektror	D09/FU	
	Variator	Danfoss		
	Battery coil	DBM		

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered : Without condition ☑ With conditions ☐ Withdrawal of conditions ☐

Ready for commissioning : Without condition ☑ With conditions ☐ Withdrawal of conditions ☐

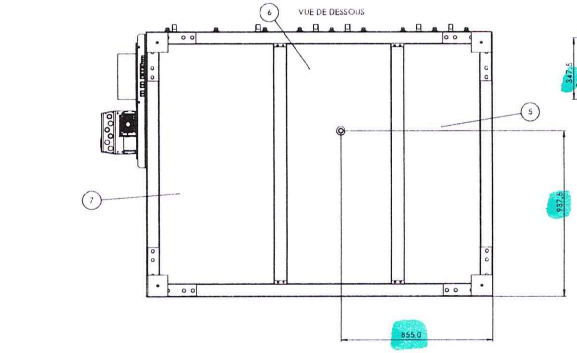
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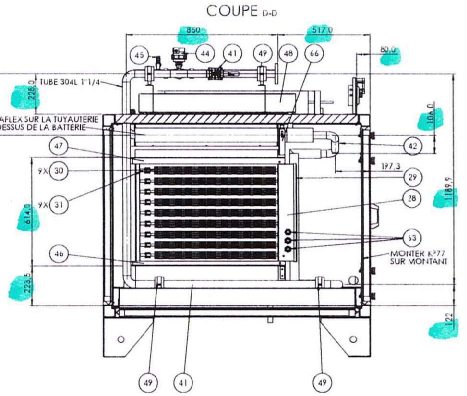
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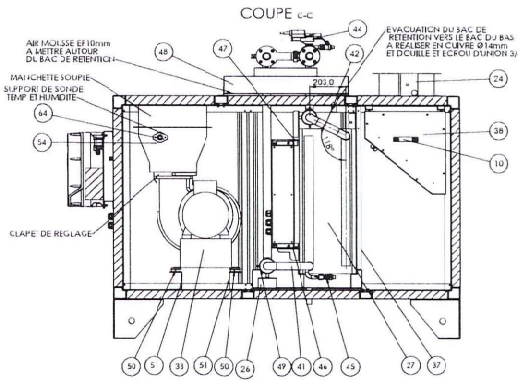
Manufacturing manager

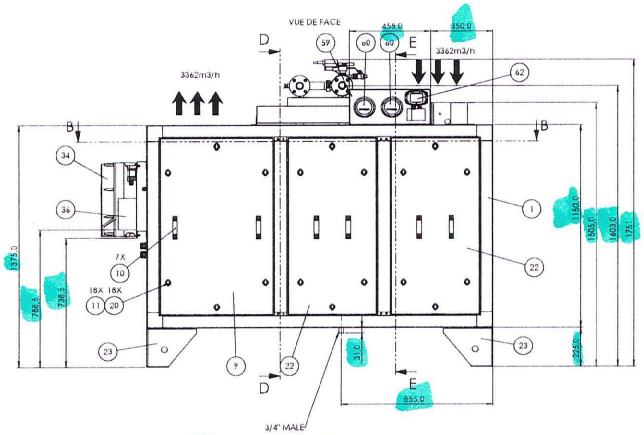
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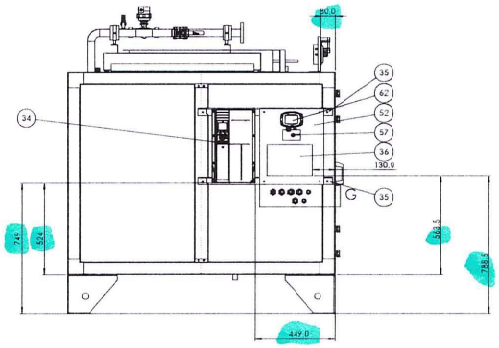
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2	P.0159177.S.07.009 PANNEAU SOUFFLAGE	PANNEAU FIXE	1
3	P.0159177.S.07.009 PANNEAU REPRISE	PANNEAU FIXE	1
4	P.0159177.S.07.009 PANNEAU SORTIE EAU	PANNEAU FIXE	1
5	P.0159177.S.07.009 PANNEAU DESSOUS 1	PANNEAU FIXE	1
6	P.0159177.S.07.009 PANNEAU DESSOUS 2	PANNEAU FIXE	1
7	P.0159177.S.07.009 PANNEAU DESSOUS 3	PANNEAU FIXE	1
8	P.0159177.S.07.009 PANNEAU 1	PANNEAU FIXE	3
9	P.0159177.S.07.009 PANNEAU DEMONTABLE 1	PANNEAU DEMONTABLE	1
10	POIGNEE	EMKA	7
11	1099-362	Stator EMKA	18
12	1099-	Ecrou EMKA	18
13	1099-367	Adaptateur EMKA	18
14	DIN3771_5X1_5	Joint Torique EMKA	18
15	1099-377-21	VIS EMKA	18
16	1099-20_prt	CAME EMKA	18
17	ACL 15 A1 1099-129	Papillon	18
18	ACL 15 A1 1099-128	Rotor	18
19	1099-93	Rondelle elastique EMKA	18
20	1099-23_prt	Joint plat EMKA	18
22	P.0159177.S.07.009 PANNEAU DEMONTABLE 2	PANNEAU DEMONTABLE	2
23	PAU02.22 - Pied CTA	Pied de CTA	4
24	REGISTRE LDT100 800X300		1
26	P.0159177.S.07.009 Bac Batterie		1
27	Batterie Cu-Cu-Fe2n P3012AR 9R-26f		1
28	P.0159177.S.07.009 Boite resistances		1
29	P.0159177.S.07.009 Couvercle Boite a resistances		1
30	RESISTANCE 40X80 400V 2500W lg 740mm	1TAK9A359016	9
31	fixation resistances 57014661		9
32	BRIDE INOX 316L ASME B 16.5 DN32		4
33	VENTILATEUR CENTRIFUGE D_09 400V 5.5kW		1
34	VARIATEUR DANFOSS-FC300-A5-010		1
35	U Vaitateur		2
36	fibox 255X150X100		1
37	P.0159177.S.07.009 CLOISON BATTERIE		1
38	P.0159177.S.07.009 CAISSON DE FILTRATION 38F		1
39	FILTRE G4 395X490X48	REF FR SPG G4	2
40	FILTRE F7 457X457X48	F7 457-457-48	2
41	E batterie		1
42	S batterie		1
43	VANNE 3 VOIES	ref: R3032-1e-S3	1
44	SERVOMOTEUR DE VANNE 3V	ref: NR24A-SR	1
45	vanne 1-4 tour 3-8 gaz M-F de vidange+bouchon		2
46	P.0159177.S.07.009 SUPPORT RESISTANCES		1
47	P.0159177.S.07.009 SUPPORT RESISTANCES HAUT		1
48	P.0159177.S.07.009 BAC VANNE 3V		1
49	COLLIER FROID D42.4 ep 19		7
50	PLOTDSD60 + coupelle	REF 1340312	4
51	P.0159177.S.07.009 SUPPORT VENTILATEUR		2
52	P.0159177.S.07.009 SUPPORT BJ		1
53	P.0159177.S.07.009 ADAPTATION GAINE REFOULEMENT		1
54	P.0159177.S.07.009 GAINE DE REFOULEMENT AIR		1
55	P.0159177.S.07.009 Panneau fixe vis 1	PANNEAU DEMONTABLE VIS	2
56	P.0159177.S.07.009 Panneau fixe vis 2	PANNEAU DEMONTABLE VIS	1
57	P.0159177.S.07.009 PANNEAU PE	PANNEAU FIXE	1
58	PE M16 PLASTIQUE	GAMME PERFECT DELAUNAY	8
59	P.0159177.S.07.009 SUPPORT MAGNEHELIC X2		1
60	Pressostat magnehelic series 2000		2
61	PE M20 PLASTIQUE	GAMME PERFECT DELAUNAY	5
62	SONDE TEMPERATURE/HYGROMETRIE	S+S REGELTECHNIK	2
63	PE M25 PLASTIQUE	GAMME PERFECT DELAUNAY	6
64	SUPPORT SONDE TEMPERATURE/HYGROMETRIE	S+S REGELTECHNIK	2
65	PE M 2 PLASTIQUE	GAMME PERFECT DELAUNAY	2
66	P.0159177.S.07.009 SUPPORT TUYAUTERIE HAUTE		1

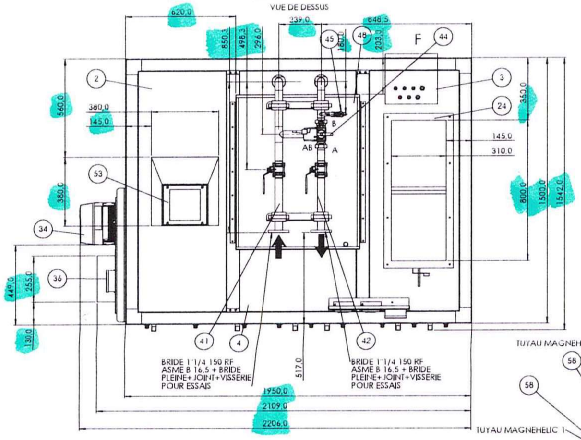


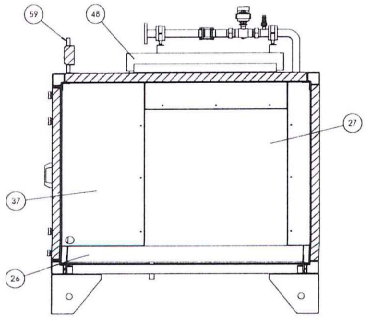


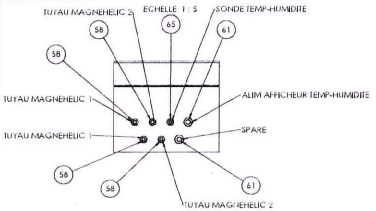


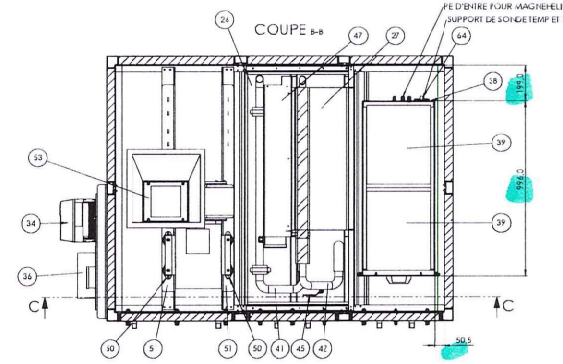


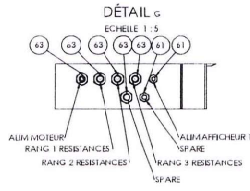






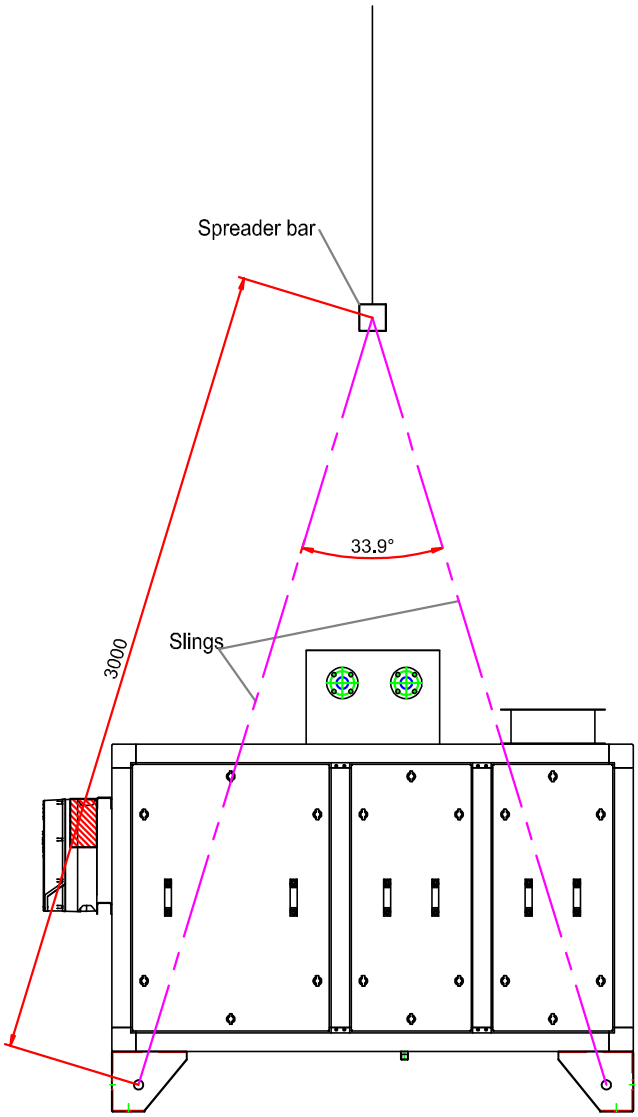




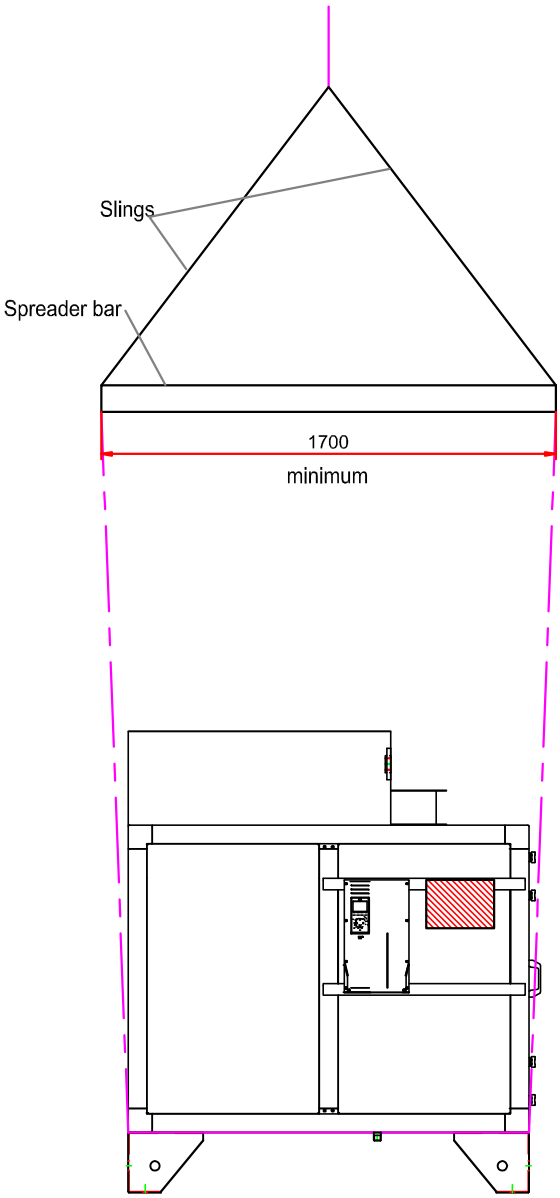


N° DE FABRICATION: 7449
POIDS ESTIMATIF 500kg

FRONT VIEW



LEFT VIEW



ESTIMATED WEIGHT: 500 KG

Rev	Date	Description	Dessiné par: Issued by:	Vérifié par: Cheked by:	Approuvé par: Approved by:	Statut: Status:
E	08/10/24	UPDATE LIFTING SYSTEM	O.Neveu	O.Neveu	L.Degrenne	BPE
D	01/07/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
C	26/06/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
B	20/06/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
A	10/06/2024	CREATION DU DOCUMENT /FIRST ISSUED	V.Bernard	O.Neveu	L.Degrenne	Provisoire

Titre du plan / Drawing Title :

PRINCIPLE DRAWING SLINGING AHU

Paumier

Parc d'Activités des Hautes Falaises
76400 FECAMP. FRANCE.
Tél. : 33 (0)2 35 10 42 90
Fax :33 (0)2 35 29 34 78
e-mail : paumier.fcp@ets-paumier.fr
http://www.paumier-sa.fr/

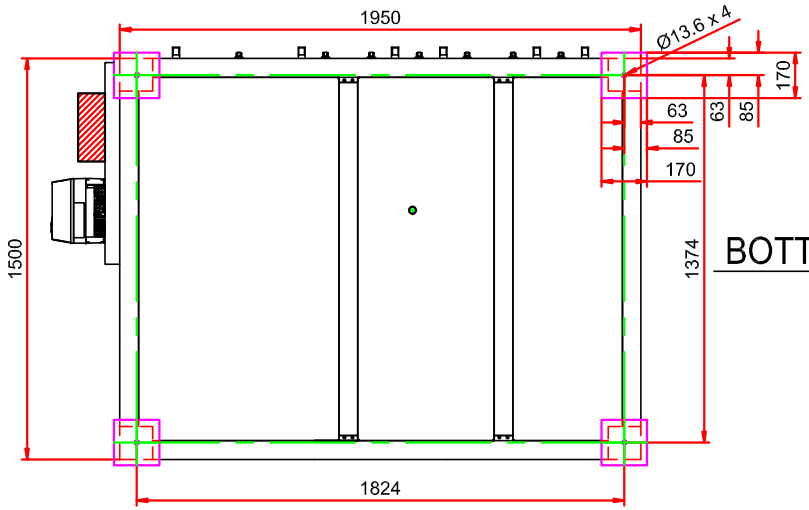
Ref client / Customer Reference :

ELOGEN C 63 AHU

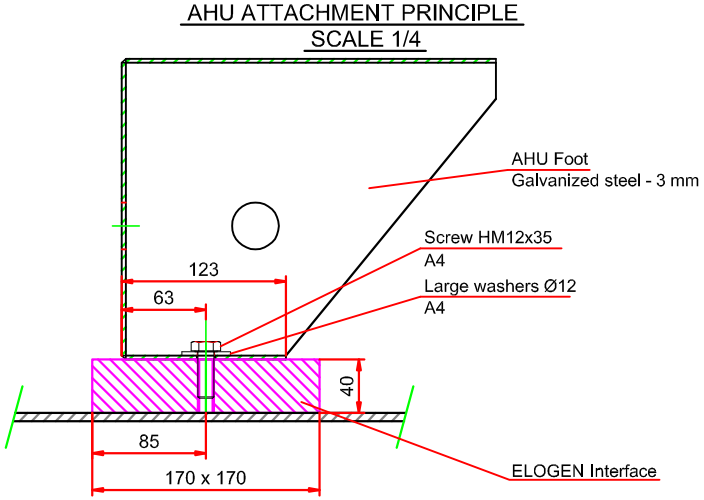
Sauf indications contraires, toutes les dimensions sont en mm. Unless otherwise specified, all dimensions are in mm.

Echelle /Scale	Format / Size	Plan N°: Drawing N°:	Page / Sheet:	Rev:
1/20	A3	P.0608871.L.02.200	PL2	E

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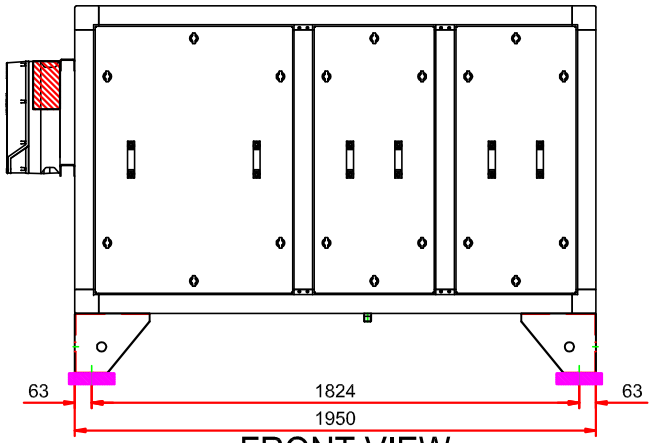


BOTTOM VIEW



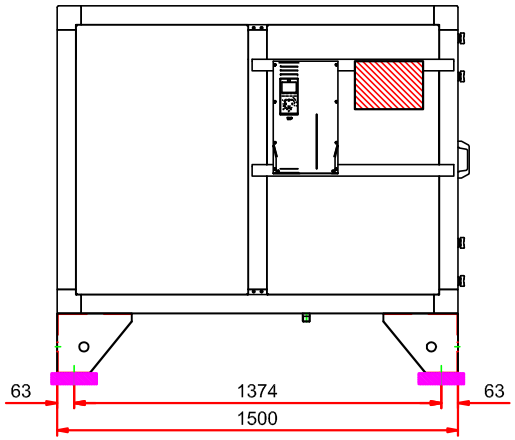
AHU ATTACHMENT PRINCIPLE
SCALE 1/4

Note:
Attachement AHU by 4 points



FRONT VIEW

LEFT VIEW



ESTIMATED WEIGHT: 500 KG

Rev	Date	Description	Dessiné par: Issued by:	Vérifié par: Cheked by:	Approuvé par: Approved by:	Statut: Status:
C	26/06/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
B	20/06/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
A	10/06/2024	CREATION DU DOCUMENT /FIRST ISSUED	V.Bernard	O.Neveu	L.Degrenne	Provisoire

Titre du plan / Drawing Title :

PRINCIPLE DRAWING ATTACHMENT AHU

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http://www.paumier-sa.fr/

Ref client / Customer Reference :

ELOGEN
C 63 AHU

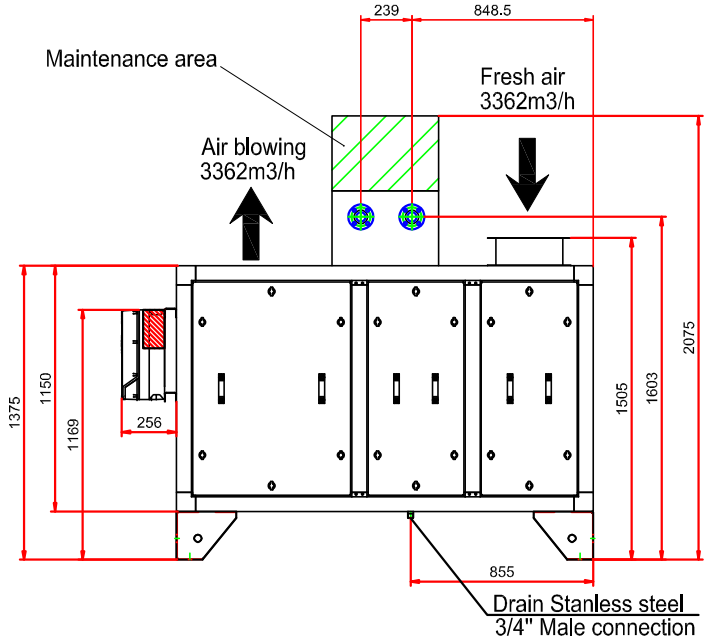
Echelle /Scale	Format / Size	Plan N°: Drawing N°:	Page / Sheet:	Rev:
1/20	A3	P.0608871.L.02.200	PL3	E

Sauf indications contraire, toutes les dimensions sont en mm. Unless otherwise specified, all dimensions are in mm.

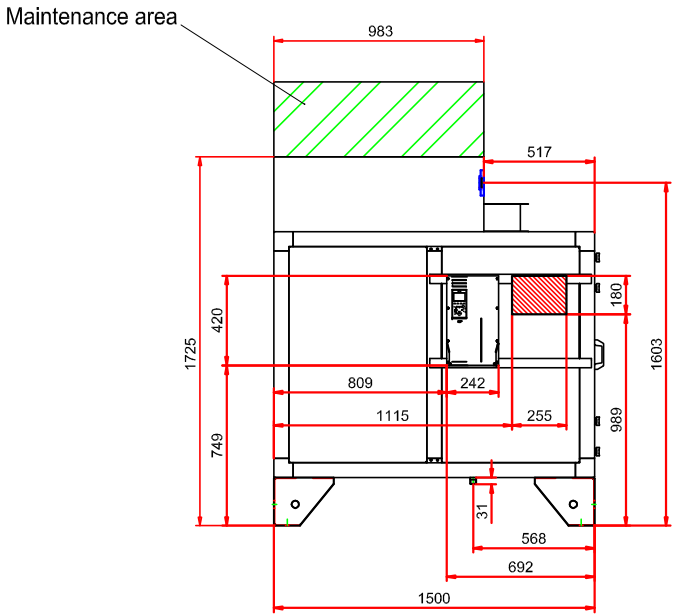
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E	08/10/24	UPDATE LIFTING SYSTEM	O.Neveu	O.Neveu	L.Degrenne	BPE
D	01/07/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire

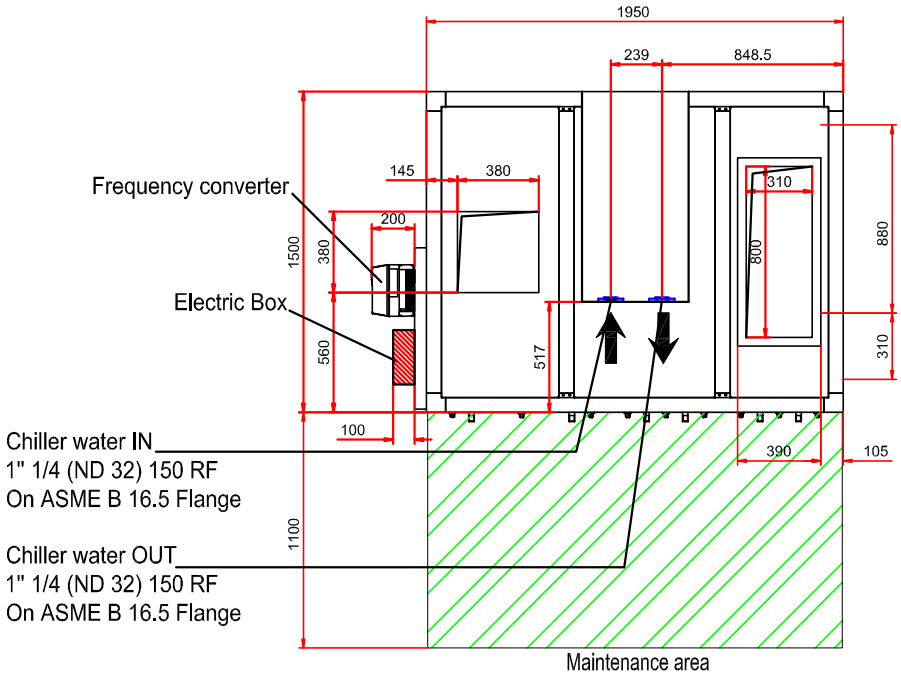
FRONT VIEW



LEFT VIEW



TOP VIEW



ESTIMATED WEIGHT: 500 KG

Rev	Date	Description	Dessiné par: Issued by:	Vérifié par: Cheked by:	Approuvé par: Approved by:	Statut: Status:
E	08/10/24	UPDATE LIFTING SYSTEM	O.Neveu	O.Neveu	L.Degrenne	BPE
D	01/07/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
C	26/06/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
B	20/06/2024	UPDATE	A.Lemaréchal	O.Neveu	L.Degrenne	Provisoire
A	10/06/2024	CREATION DU DOCUMENT /FIRST ISSUED	V.Bernard	O.Neveu	L.Degrenne	Provisoire

Titre du plan / Drawing Title :

AHU
GENERAL ARRANGEMENT DRAWING

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Ref client / Customer Reference :

ELOGEN C 63 AHU

Echelle /Scale	Format / Size	Plan N°: Drawing N°:	Page / Sheet:	Rev:
1/25	A3	P.0608871.L.02.200	PL1	E

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All fragile components (pressure switch relief valves…) must be removed for tests							
Pressure Test		**Test Fluid:**		**Nitrogen**			
Lines							
Date	12/09/2024						
Test duration	30Mn						
PS	3 Bars						
Diameter	Dn32						
material	316 L						
Pressure test	4,5 Bars						
DESP category	NA						
BV category	NA						
Résults							
Visa							
Tightness test		**Test Fluid:**		**Nitrogen**			
Lines							
Date	12/09/2024						
Pressure test	3 Bars						
Test duration	4 days						
Résults							
Visa							
Observations :							
Signature					**Date**		

Paumier

DÉCLARATION DE CONFORMITÉ CE

DECLARATION OF CONFORMITY

Nous, société PAUMIER, sous notre seule responsabilité, certifions que l'équipement sous pression, identifié ci-dessous, est conforme aux exigences de la directive des équipements sous pression n° 2014-68-CE qui lui sont applicables.

We, company PAUMIER, under our sole responsibility, certify that the pressure equipment identified below, complies with applicable requirements of the pressure equipment directive n°2014-68-CE.

Description de l'installation *Installation description*	SKID CHILLER N°1		
Classification de l'installation *Installation classification*	**II**		
Contrôle de conformité *Conformity control*	N°CE-0082-PED-G-PAM 001-21-FRA Module A	N°0082 8 cours du triangle 92800 PUTEAUX LA DEFENSE	
Plan *Drawing*	P.0608871.L.02-205-1		
Numéro de série *Serial number*	7444	**Année de fabrication** *Construction year*	2024
Norme harmonisée appliquée *Harmonized standard applied*	EN 378 1 à 4		
Autres normes utilisées *Other norms used*	EN 13136, EN 13480, EN12735-1		
Spécifications techniques *Technical specifications*			
Autres directives utilisées *Other directives used*			

Fait à Fécamp, *Fécamp, on 08/10/24*

M. Laurent DEGRENNE
Responsable d'affaires
Business Manager



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VINCI ENERGIES

DÉCLARATION DE CONFORMITÉ CE

DECLARATION OF CONFORMITY

Nous, société PAUMIER, sous notre seule responsabilité, certifions que l'équipement sous pression, identifié ci-dessous, est conforme aux exigences de la directive des équipements sous pression n° 2014-68-CE qui lui sont applicables.

We, company PAUMIER, under our sole responsibility, certify that the pressure equipment identified below, complies with applicable requirements of the pressure equipment directive n°2014-68-CE.

Description de l'installation *Installation description*	SKID CHILLER N°2		
Classification de l'installation *Installation classification*	**II**		
Contrôle de conformité *Conformity control*	N°CE-0082-PED-G-PAM 001-21-FRA Module A	N°0082 8 cours du triangle 92800 PUTEAUX LA DEFENSE	
Plan *Drawing*	P.0608871.L.02-205-2		
Numéro de série *Serial number*	7445	**Année de fabrication** *Construction year*	2024
Norme harmonisée appliquée *Harmonized standard applied*	EN 378 1 à 4		
Autres normes utilisées *Other norms used*	EN 13136, EN 13480, EN12735-1		
Spécifications techniques *Technical specifications*			
Autres directives utilisées *Other directives used*			

Fait à Fécamp, *Fécamp, on 08/10/24*

M. Laurent DEGRENNE
Responsable d'affaires
Business Manager



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P.0608871.L.02.502
C63 HVAC

Report FAT n°3
HVAC Electrical cabinet

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	24/09/2024	Document creation	2
B	13/12/2024	Comments taken in account	2

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Equipment Factory Acceptance Test – AHU :

1. General inspection :

List of point to review	OK	NOK	Comments
External dimension check of the unit	☑	☐	W
Check the presence of all components : • Circuit breaker Filter • Contactor • Switch on cabinet front • Indicator light • Extender RJ45 • Ethernet switch • Automaton & extension module • HMI screen • lighting	☑	☐	W
The cable glands are present according to the drawing	☑	☐	I => has been completed after the FAT
Cables are supported correctly	☑	☐	I
Earth connection present	☑	☐	I => has been completed after the FAT
Inspection and control of the maintenance manual of the equipment	☑	☐	I
Unit internally and externally clean	☑	☐	I

2. General inspection :

The screen HMI is functional	☐	☐	Has been checked before sending

3. Comments receive from Elogen to consider by Paumier :

Comments	Justifications
Update PAU003 cabinet plan	Agreed and implemented see document P.0608871.L.02.214
Provide pictogram	Agreed and implemented and done after the FAT (see picture attached)
Facade Cabinet light tags	Agreed and implemented and done after the FAT (see picture attached)
Send document to justify no ventilation	See annexe 1.1
Send the internal control document to the cabinet	See annexe 1.2
PAU must cut the whole cabinet not only the relays => Update of the electrical diagram to be provided	Agreed and implemented in the PLC program.
Put the “ground” tag on the cabinet	Have been done during the visit of Paumier in November
Provide SAT HVAC cabinet during commissioning	See document P.0608871.L.603
Put the “CE” logo on the cabinet	Have been done during the visit of Paumier in November
Put the electrical plan in the cabinet before expedition	Done before expedition
Make a CE declaration	See annexe 1.3
Redistribute GA of the HVAC cabinet	Agreed and implemented see document P.0608871.L.02.214
Provide Paumier calibration certificates used during testing	See annexe 1.4

List of people present:

Paumier	Elogen
Olivier DELAHAIS	Ahmed RAZGUI
Robin LAMBERT	Hassan HAMMAMI
Baptiste CHIROIS	

FAT carried out on Tuesday September 24th.

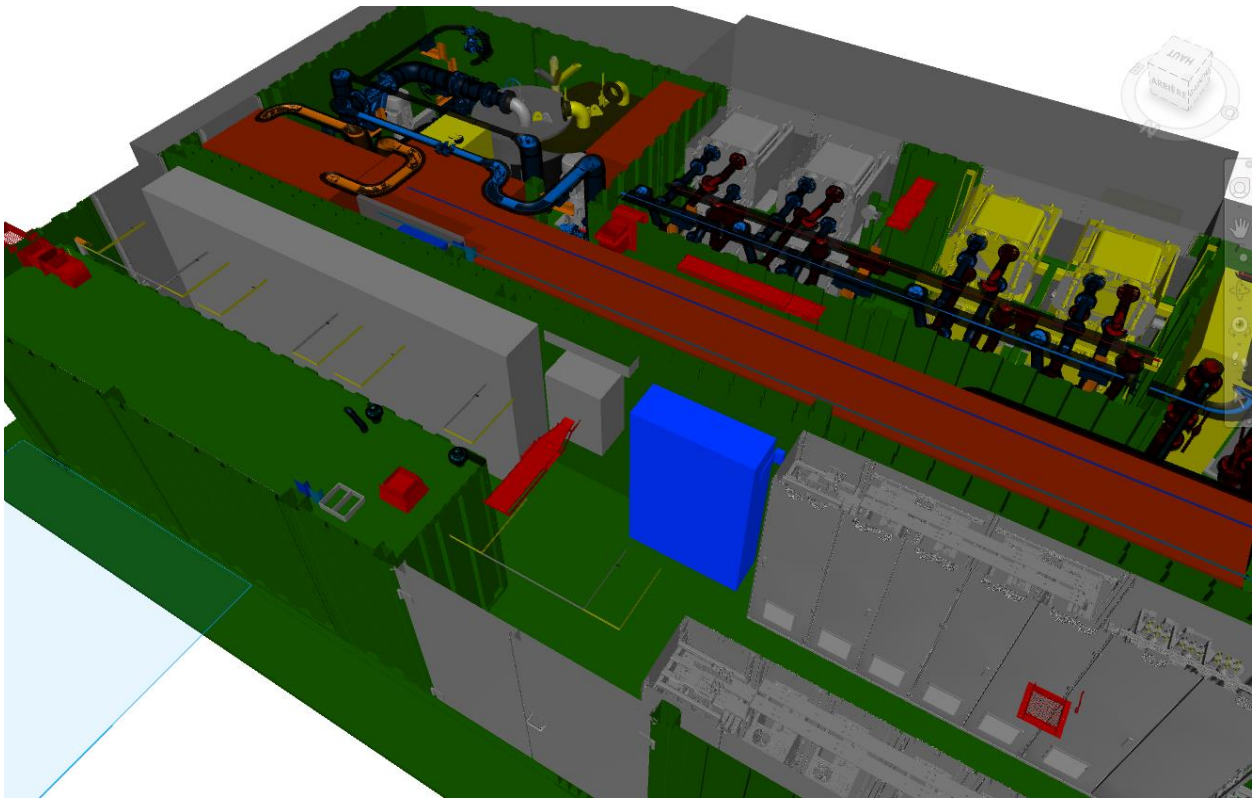
Paumier

elogen

ANNEX n°1.1

The HVAC electrical cabinet does not require a ventilation system to reduce the heat from these. The cabinet is located in an air-conditioned room, eliminating the need for additional heat reduction system.

Also, the electrical component of the cabinet (circuit-breaker, variator, etc …) have a little heat dissipation, which can be dealed with the climatization of the local.



3D model of the local with the HVAC electrical cabinet(in blue).

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ANNEX n°1.2

Paumier

MANUFACTURING APPROVAL CERTIFICATE - ELECTRICAL CABINET

Référence	FAB03-a01
Révision	A
Date	
Page	1 / 1

PRODUCT		PROJECT	
Designation :	HVAC cabinet	Reference :	P. 608871. L.02
Unit drawing reference :	P. 608871. L.02 . 304	Designation :	Elogen C63 HVAC
Electrical diagram reference :	P. 608871. L.02. 304	Business manager :	L. DEGREMNE
Manufacturing serial number :	/	Project manager :	B. CHIROIS

Electrical cabinet

	Compliant	Non-compliant	Non-applicable	Controller / Date
Cabinet / Support:				
Layout / Sizing	☒ / ☒	☐ / ☐	☐ / ☐	
Absence of scratches and/or dents	☒	☐	☐	
Absence of corrosion	☒	☐	☐	
Presence and reference of identification plates	☒	☐	☐	
Cleaning	☒	☐	☐	
Components:				
Reference of components	☒	☐	☐	
Layout and fixation of components	☒	☐	☐	
Presence and reference of identification labels	☒	☐	☐	
Wiring:				
Reference and color of wires	☒	☐	☐	
Absence of cuts	☒	☐	☐	
Routing on the support	☒	☐	☐	
Crimping of terminals	☒	☐	☐	
Absence of stress on electrical components	☒	☐	☐	
Presence and reference of wire markings	☒	☐	☐	
Wire-by-wire verification	☒	☐	☐	
Continuity test	☒	☐	☐	
Live testing:				
Resistance between electrical ground and 500Vdc power supply (≥0.5MΩ)	☒	☐	☐	
Dielectric test if the circuit > 250A	☒	☐	☐	
Safety devices	☒	☐	☐	
Power indicators	☒	☐	☐	
Fault indicators	☒	☐	☐	
Transformer voltages	Primary:	Secondary:		
Phase rotation direction of actuators	☒	☐	☐	
Voltages	L1: L2:	L3:		
Control panel configuration / test	☒ / ☒	☐ / ☐	☐ / ☐	
Firmware version:	V.0.C (Test Version)			
Controller configuration	☒	☐	☐	
Inputs / outputs test	☒	☐	☐	
Voltages test	☒	☐	☐	
HMI faults test	☒	☐	☐	
Program Version:				
Programming software:	☒ TIA Portal	☐ Control Expert	Version:	

Control equipments used

Identification	Designation	Manufacturer / Model	Serial number

Taking into account the results of the checks and tests notified above, the controller declares that the equipment :

Ready to be delivered :	Without conditions	☒	With conditions	☐	Withdrawal of conditions ☐
Ready for commissioning :	Without conditions	☒	With conditions	☐	Withdrawal of conditions ☐

Controller Name / Date / signature : CHIROIS 27/09/2024

Manufacturing manager Name / Date / signature : CHIROIS 27/9/2024

Paumier

elogen

ANNEX n°1.3

DÉCLARATION DE CONFORMITÉ CE

DECLARATION OF CONFORMITY

Nous, société PAUMIER, sous notre seule responsabilité, certifions que l'équipement sous pression, identifié ci-dessous, est conforme aux exigences de la directive des équipements sous pression n° 2014-68-CE qui lui sont applicables.

We, company PAUMIER, under our sole responsibility, certify that the pressure equipment identified below, complies with applicable requirements of the pressure equipment directive n°2014-68-CE.

Description de l'installation *Installation description*	HVAC		
Plan *Drawing*	P.0608871.L.02-205-2		
Numéro de série *Serial number*	7449	**Année de fabrication** *Construction year*	2024
Norme harmonisée appliquée *Harmonized standard applied*	EN 378 1 à 4		
Autres normes utilisées *Other norms used*	EN 13136, EN 13480, EN12735-1		
Spécifications techniques *Technical specifications*			
Autres directives utilisées *Other directives used*			

Fait à Fécamp, *Fécamp, on 08/10/24*

M. Laurent DEGRENNE
Responsable d'affaires
Business Manager

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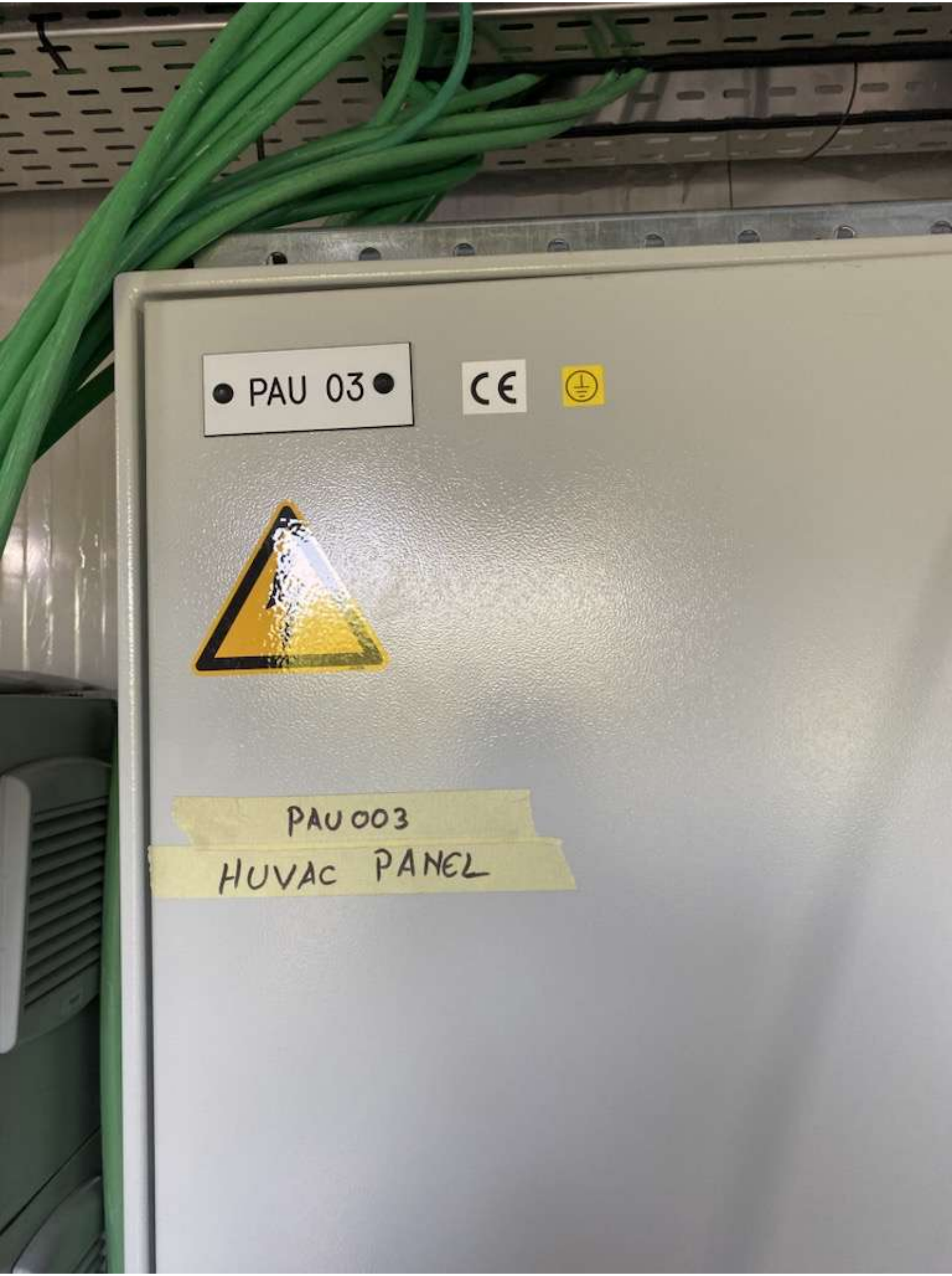
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Paumier

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PICTURE


• PAU 03 •
CE
PAU 003
HUVAC PANEL

P.0608871.L.02.503
C63

Report FAT n°4
Chiller

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	15/11/2024	Document creation	9
B	13/12/2024	Comments taken into account	9

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Siret 346 350 101 00041 – A.P.E. 2825Z – N° TVA FR 89 346350101

Equipment Factory Acceptance Test – Chiller :

1. General inspection :

List of point to review	OK	NOK	Comments
	☑	☐	I (Implemented after the FAT)
Nameplate in accordance with approved drawing(s)	☑	☐	W
Unit free from mechanical damage	☑	☐	W
Dimensional check, all measurements in accordance with GA drawing interfaces	☑	☐	W
Unit internally and externally clean	☑	☐	R
Check material datasheets	☑	☐	I (Implemented after the FAT)
CE marking done correctly	☑	☐	W
Warnings lables installed	☑	☐	
Electrical check points			
All instrumentation, including panels, are visible and accessible	☑	☐	W
All interface and termination points are correct and complete	☑	☐	I
Internal bolts/screws correctly tightened	☑	☐	I
Wire numbers are installed correctly	☑	☐	I
Check/verify electrical connections	☑	☐	I
Glands are securely tightend	☑	☐	I
Cables are supported correctly	☑	☐	I (Implemented before the FAT)
Cable numbers are installed correctly	☑	☐	I (Implemented before the FAT)
Switches/instrumentation correctly cabled and supported	☑	☐	I (Implemented before the FAT)

Correct earth bosses	☑	☐	W
Emergency stop	☑	☐	I Hatch has been added before expedition

2. Comments receive from Elogen to consider by Paumier :

Comments	Justifications
Updated ITP to be Provided (following comments)	ITP ind.B transmitted Friday 15/11, reviwed with Hassan the Monday 25/11/24
Close CRS of documents (CODE 2) / quality of documents to be improved	Paumier finalised the update of document
Group GAD drawings in the same document	Paumier finalised the update of document
Complete the number of gauges used for the test	Paumier used 1 manometer, serial number 23846
on the upper part of the envelope Space between central panel and side panels, How to ensure better sealing	PAU: The construction in principle avoids the rise of rainwater, but PAU suggests adding a silicone seal at the time of commissioning (on site)
Non-compliant drilling position, the drilling must be resumed at the position indicated in the GAD, chiller 2 (red cross on the capture: to be moved) Same observation on this drilling on the other side	Paumier will correct and redo drilling in the chassis, see picture attached
Non-compliant drilling position, the drilling must be resumed at the position indicated in the GAD, chiller 2 (red cross on the capture: to be moved) Same observation on this drilling on the other side Drillings to be made, recovery and specific retouching (touch up)	Paumier will correct and redo drilling in the chassis, see picture attached
The distance between the front face of the flange in relation to the wall of the envelope is less than 100mm: see scanned annotated plan (measured between 80 and 91 mm) Concerns all flanges, Furthermore, variations of 2 to 6 mm are noted relative to the axis during the measurements	Waiting for Fores to return on the subject. If this is a problem, as a last resort solution, Paumier can provide a flange with an elbow to connect my Fres piping on site. (on site)
Coiled probe cable, remove excess loop --> to avoid "coil effect"	Paumier will rectify and reduce cable lengths

Emergency stop behind the panel, difficulty of access	PAU: Proposes adding a quickly removable hatch on the plexis, see picture attached
Provide a small assembly guide for the central panel which connects the 2 chiller casings To help Fores assemble the central part of the envelope	See document P.0608871.L.02.220
Notified body plate on chillers missing	on site
Partial enclosure welding, please explain to highlight in the drawings	PAU: "standard " Spot welding type used (doucment internal resposability)
Compressor support/ Calculation note to be provided	On going
Add a message to indicate that HMI will be installed on site during commissioning	Paumier plan a note on the electrical cabinet
General comment : prevent any move or vibration du to transmportation and offshore transport	Paumier will see to put additional reinforcements to secure the installation during transport
Grounding, provide a small detail of mounting the braid between the 2 chassis, and indicate with a label the pressure of the nut for the braid must be fixed	See document P.0608871.L.02.220
Grounding, provide a small detail of mounting the braid	See document P.0608871.L.02.220
Updated ITP to be Provided (following comments)	ITP ind.B transmitted Friday 15/11, reviwed with Hassan the Monday 25/11/24
Close CRS of documents (CODE 2) / quality of documents to be improved	Paumier finalised the update of document
Group GAD drawings in the same document	Paumier finalised the update of document
Complete the number of gauges used for the test	Paumier used 1 manometer, serial number 23846
on the upper part of the envelope Space between central panel and side panels, How to ensure better sealing	PAU: The construction in principle avoids the rise of rainwater, but PAU suggests adding a silicone seal at the time of commissioning (on site)
Non-compliant drilling position, the drilling must be resumed at the position indicated in the GAD, chiller 2 (red cross on the capture: to be moved) Same observation on this drilling on the other side	Paumier will correct and redo drilling in the chassis, see picture attached
Non-compliant drilling position, the drilling must be resumed at the position indicated in the GAD, chiller 2 (red cross on the capture: to be moved) Same observation on this drilling on the other side Drillings to be made, recovery and specific retouching (touch up)	Paumier will correct and redo drilling in the chassis, see picture attached
The distance between the front face of the flange in relation to the wall of the envelope is less than 100mm:	Waiting for Fores to return on the subject. If this is a problem, as a last

see scanned annotated plan (measured between 80 and 91 mm) Concerns all flanges, Furthermore, variations of 2 to 6 mm are noted relative to the axis during the measurements	resort solution, Paumier can provide a flange with an elbow to connect my Fres piping on site. (on site)
Coiled probe cable, remove excess loop --> to avoid "coil effect"	Paumier will rectify and reduce cable lengths
Emergency stop behind the panel, difficulty of access	PAU: Proposes adding a quickly removable hatch on the plexis, see picture attached
Provide a small assembly guide for the central panel which connects the 2 chiller casings To help Fores assemble the central part of the envelope	See document P.0608871.L.02.220
Notified body plate on chillers missing	on site
Add a message to indicate that HMI will be installed on site during commissioning	PAU: "standard " Spot welding type used (document internal responsibility)
General comment : prevent any move or vibration due to transportation and offshore transport	On going
Grounding, provide a small detail of mounting the braid between the 2 chassis, and indicate with a label the pressure of the nut for the braid must be fixed	Paumier plan a note on the electrical cabinet
Grounding, provide a small detail of mounting the braid	Paumier will see to put additional reinforcements to secure the installation during transport

List of people present :

Paumier	**Elogen**
Laurent DEGRENNE	Ahmed RAZGUI
Olivier NEVEU	Hassan HAMMAMI
Robin LAMBERT	
Baptiste CHIROIS	

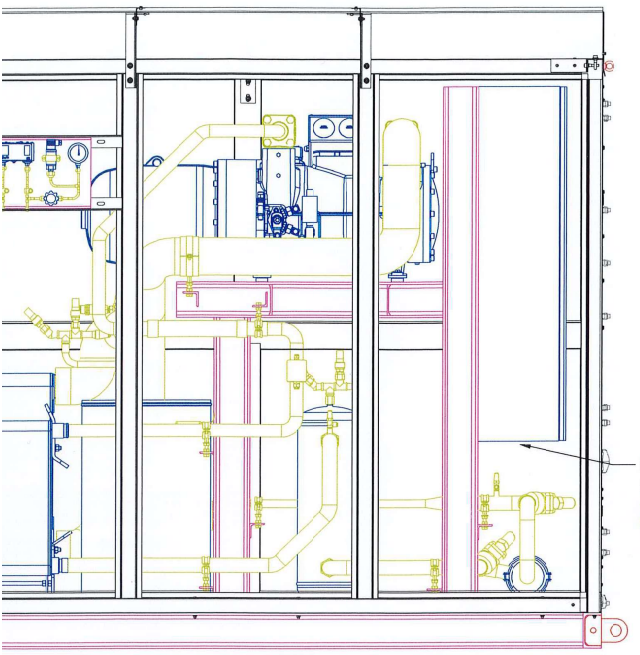
FAT carried out on Thursday November 14

Paumier

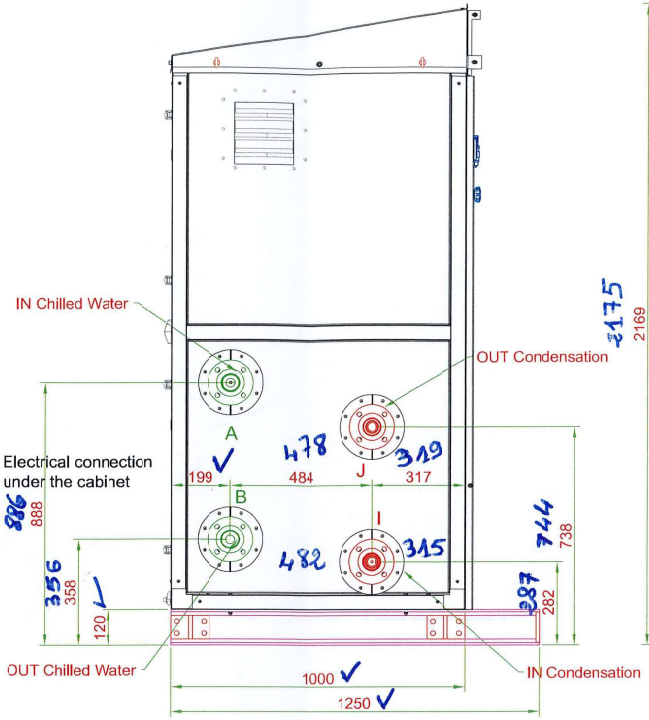
elogen

DRAWINGS ANNOTED

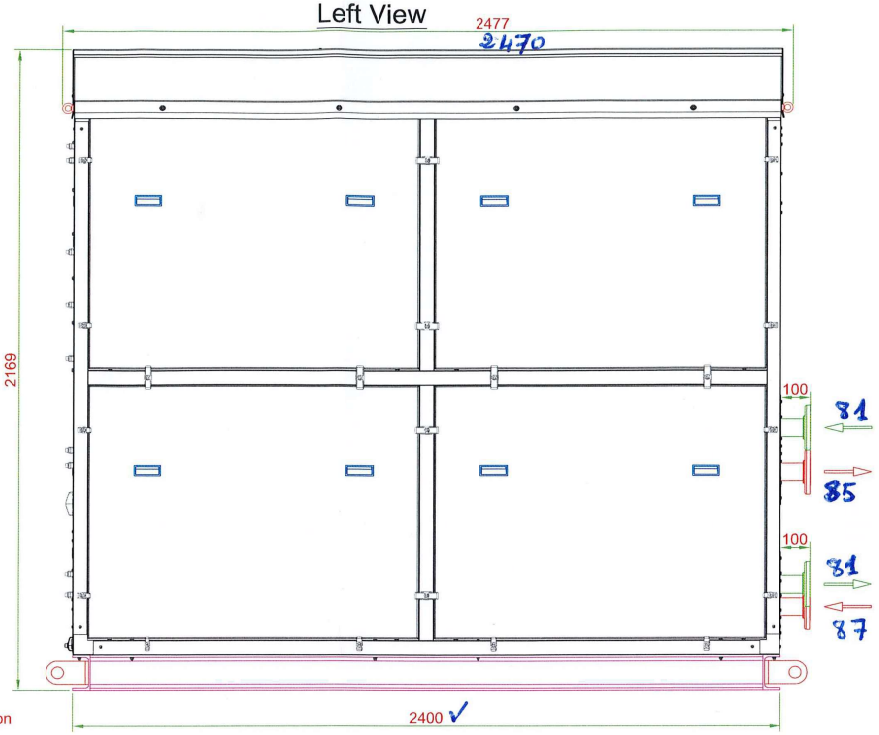
Right View

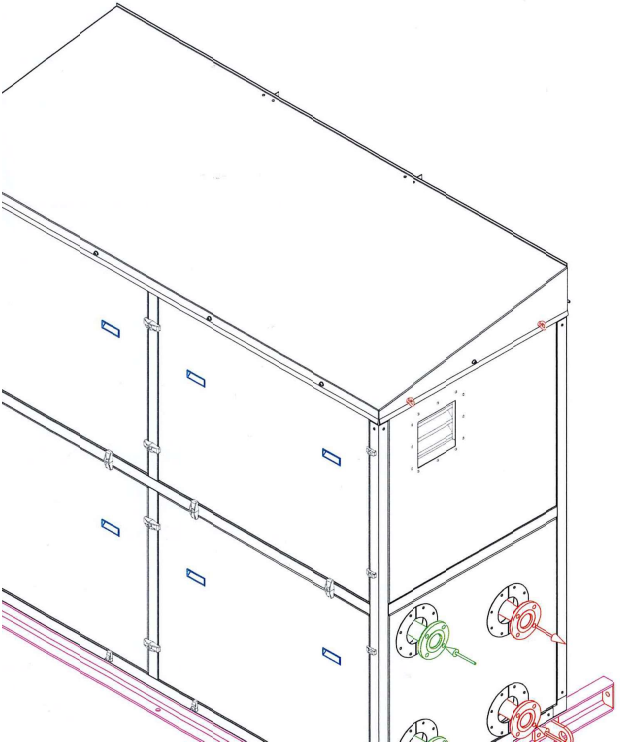


Front View

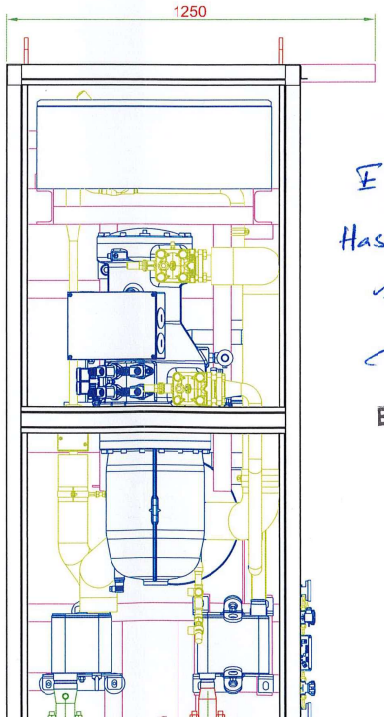


Left View





Plan View



ELOGEN

Hassan HATTIATI

14/11/2024

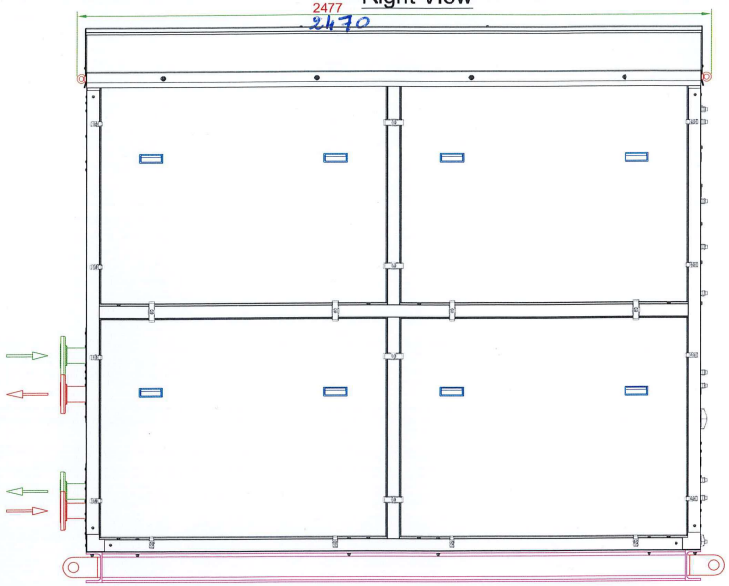
Inspector Christian HAUCHARD
X / W / H
On behalf of TW
Date: 14/11/2024 Signature

Ets. PAUMIER & FILS
PA des Hautes Falaises
76400 FECAMP
Tél. : 02 35 10 42 90
Siret : 346 350 101 00041

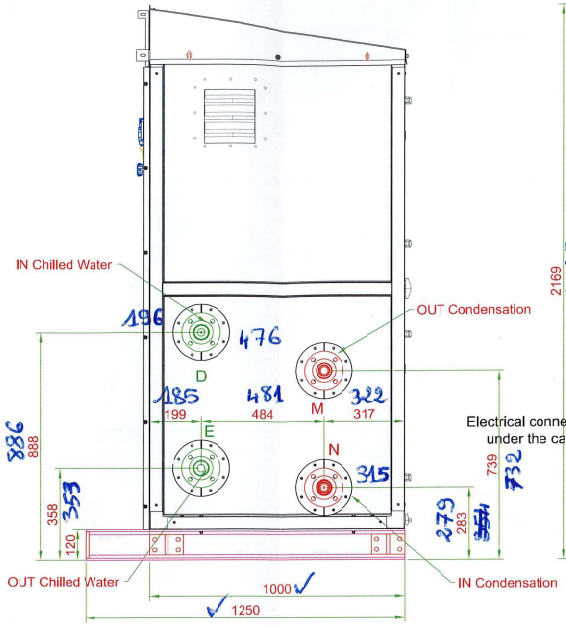
Baptiste CHIROIS

H	05/12/24	MODIFICATION OF THE RUDDER	P.Cailleux	O.Neveu	...Degreine	B.P.E
G	28/10/24	MODIFICATION OF THE RUDDER TO TYPE H	P.Cailleux	O.Neveu	...Degreine	B.P.E
F	17/10/24	ADDED CDG + ANTI-TILT POINT	P.Cailleux	O.Neveu	...Degreine	B.P.E
E	06/09/24	ADDED FOR MANUFACTURING	P.Cailleux	O.Neveu	...Degreine	B.P.E
D	24/06/24	ADDED FIXATION PRINCIPLE Folio 5	P.Cailleux	O.Neveu	...Degreine	B.P.E
C	20/06/24	ADDED SLINGING PRINCIPLE Folio 4	P.Cailleux	O.Neveu	...Degreine	BPA
B	31/05/24	UPDATED AS PER COMMENTS	P.Cailleux	O.Neveu	...Degreine	BPA
A	22/05/24	CREATION DU DOCUMENT /FIRST ISSUED	P.Cailleux	O.Neveu	...Degreine	Provisoire

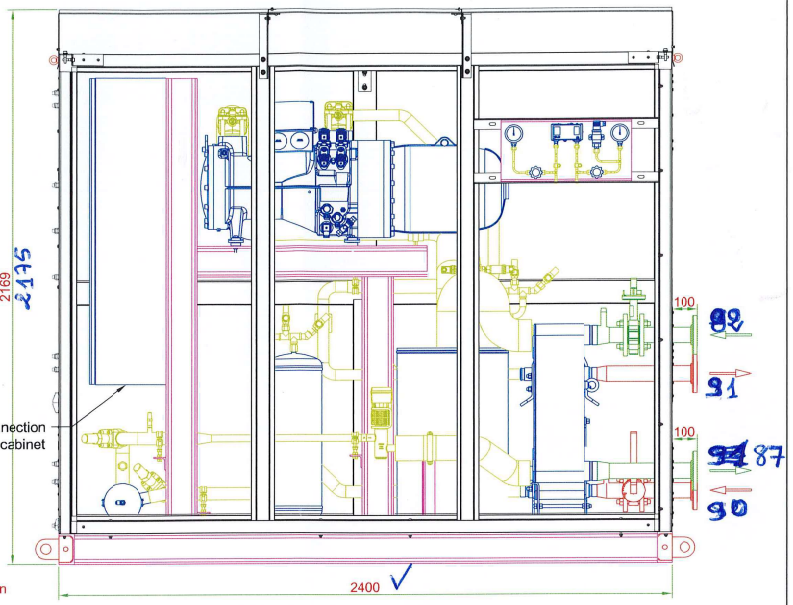
Right View



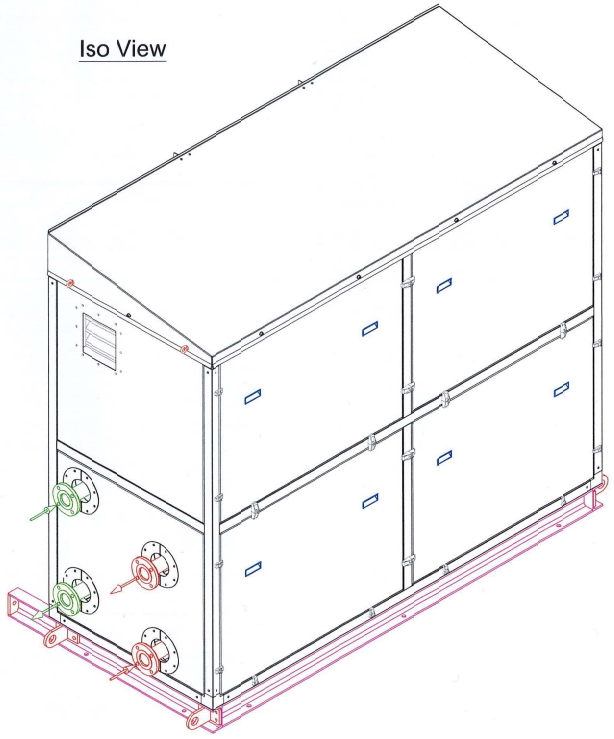
Front View



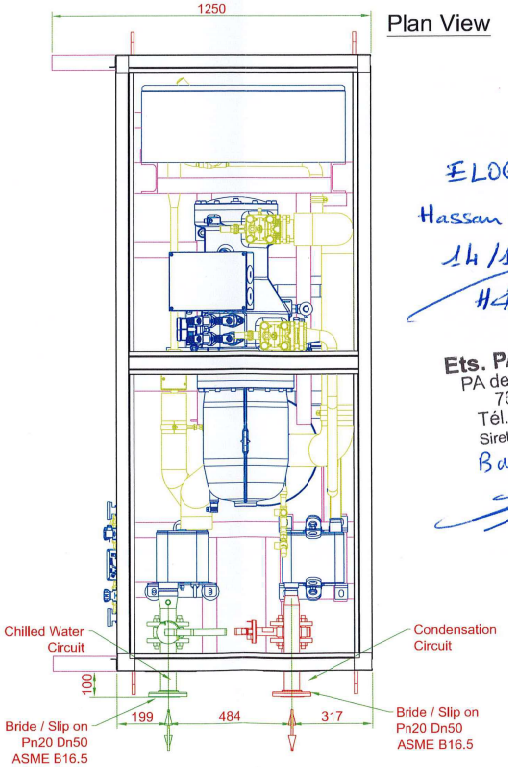
Left View



Iso View



Plan View



ELOGEN
Hassan HAMMADI
14/11/2024

Inspector Christian HAUCHARD
On behalf of TUV
Date: 14/11/2024 Signature

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Baptiste CHIROS

Rev	Date	Description	Drawing iss. / Issued by	Verifié par / Checked by	Approuvé par / Approved by	Statut / Status
H	05/11/24	MODIFICATION OF THE RUDDER	P.Cailleux	O.Neveu	L.Degrenne	B.P.E
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D	24/05/24	ADDED FIXATION PRINCIPLE Folio 5	P.Cailleux	O.Neveu	L.Degrenne	B.P.E
C	20/05/24	ADDED SLINGING PRINCIPLE Folio 4	P.Cailleux	O.Neveu	L.Degrenne	BPA
B	31/05/24	UPDATED AS PER COMMENTS	P.Cailleux	O.Neveu	L.Degrenne	BPA
A	22/05/24	CREATION DU DOCUMENT /FIRST ISSUED	P.Cailleux	O.Neveu	L.Degrenne	Provisoire

Titre du plan / Drawing Title :

détails Connexions G.E.G 2

CONNECTION DETAILS CHILLED WATER UNIT 2

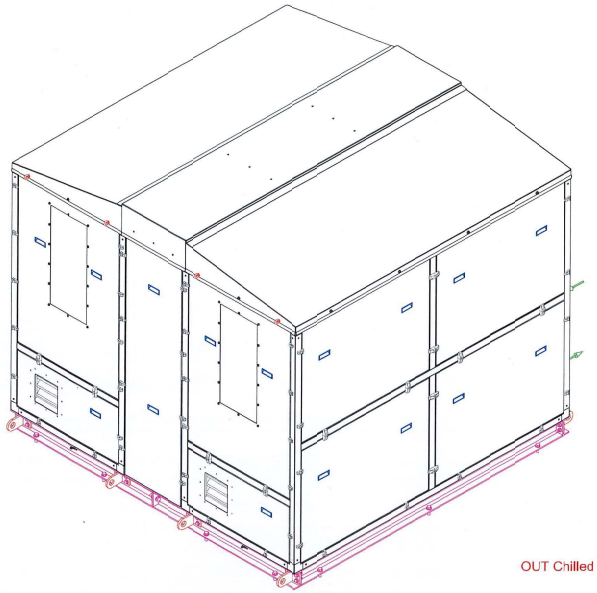
Paumier
Parc d'Activités des Hautes Falaises
76400 FECAMP. FRANCE.
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Fax :33 (0)2 35 29 34 73
e-mail : paumier.fcp@wanadoo.fr
http://www.paumier-sa.fr

Ref client / Customer Reference :

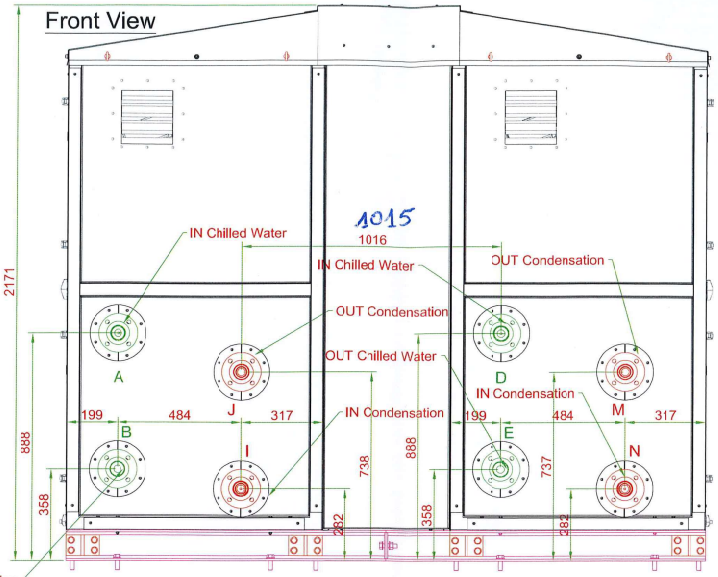
ELOGEN
C63 HVAC

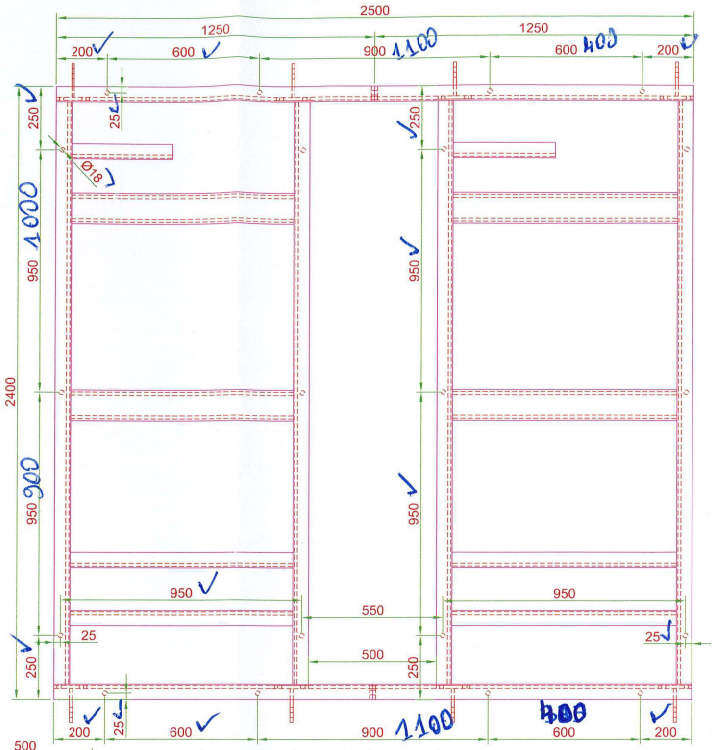
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Front View



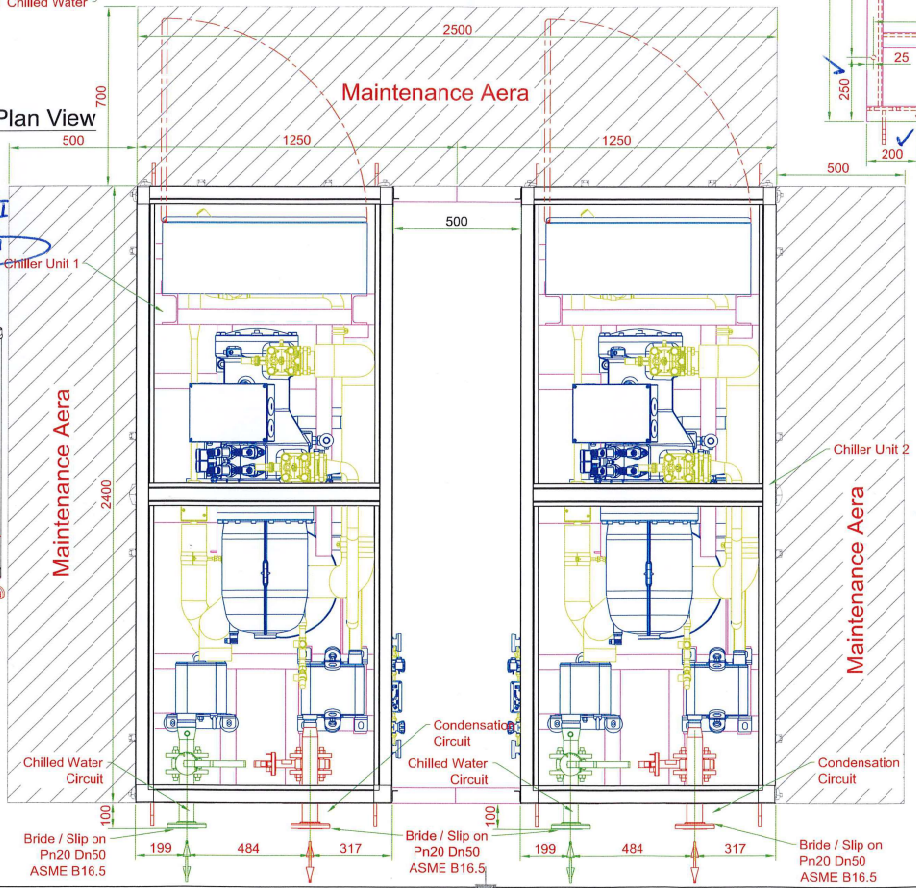


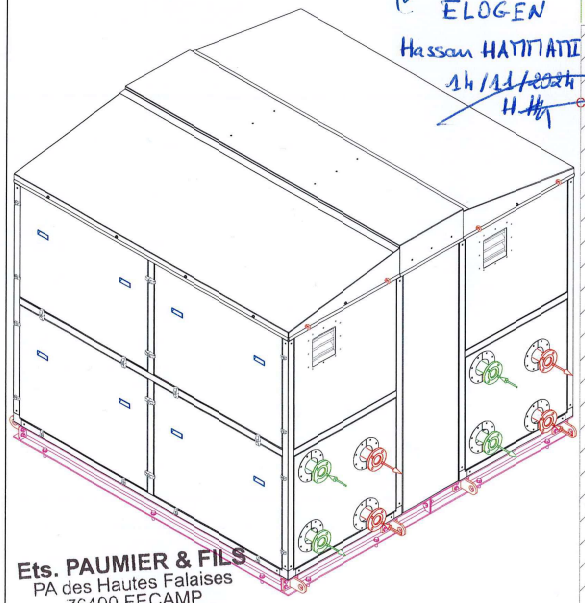
chassis fixing plan

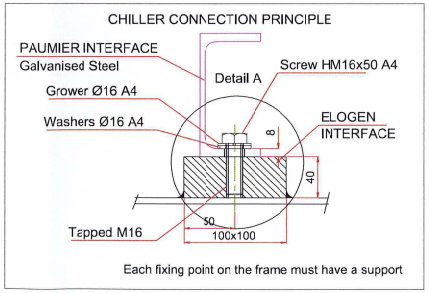
Inspector Christian HAUCHARD
N / W / H
On behalf of TUV
Date: 14/11/2024 Signature

ELOGEN
Hassan HATTIATTI
14/11/2024

Plan View







Nota :

Frame Material : painted Black Steel C5M
Casing Material : unpainted Stainless Steel
Loaded Weight : 2860 Kg

Rev	Date	Description	Issued by	Checked by	Approved by	Status
H	05/11/24	MODIFICATION OF THE RUDDER	P.Cailleux	O.Neveu	..Degranne	B.P.E
G	28/10/24	MODIFICATION OF THE RUDDER TO TYPE H	P.Cailleux	O.Neveu	..Degranne	B.P.E
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D	24/06/24	ADDED FIXATION PRINCIPLE Folio 5	P.Cailleux	O.Neveu	..Degranne	B.P.E
C	20/06/24	ADDED SLINGING PRINCIPLE Folio 4	P.Cailleux	O.Neveu	..Degranne	BPA
B	31/05/24	UPDATED AS PER COMMENTS	P.Cailleux	O.Neveu	..Degranne	BPA
A	22/03/24	CREATION DU DOCUMENT /FIRST ISSUED	P.Cailleux	O.Neveu	..Degranne	Provisoire

Titre du plan / Drawing Title :

Plan d'encombrement des 2 GEG
DIMENSIONS PLAN OF THE CHILLED WATER UNIT

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PA des Hautes Falaises
76400 FECAMP
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Baptiste CHIROIS

Parc d'Activités des Hautes Falaises
76400 FECAMP FRANCE
Tél. : 33 (0)2 3510 42 90
Fax : 33 (0)2 3529 34 78
e-mail : paumier.fga@etb-paumier.fr
http://www.paumier-sa.fr

Ref client / Customer Reference :
ELOGEN
C63 HVAC

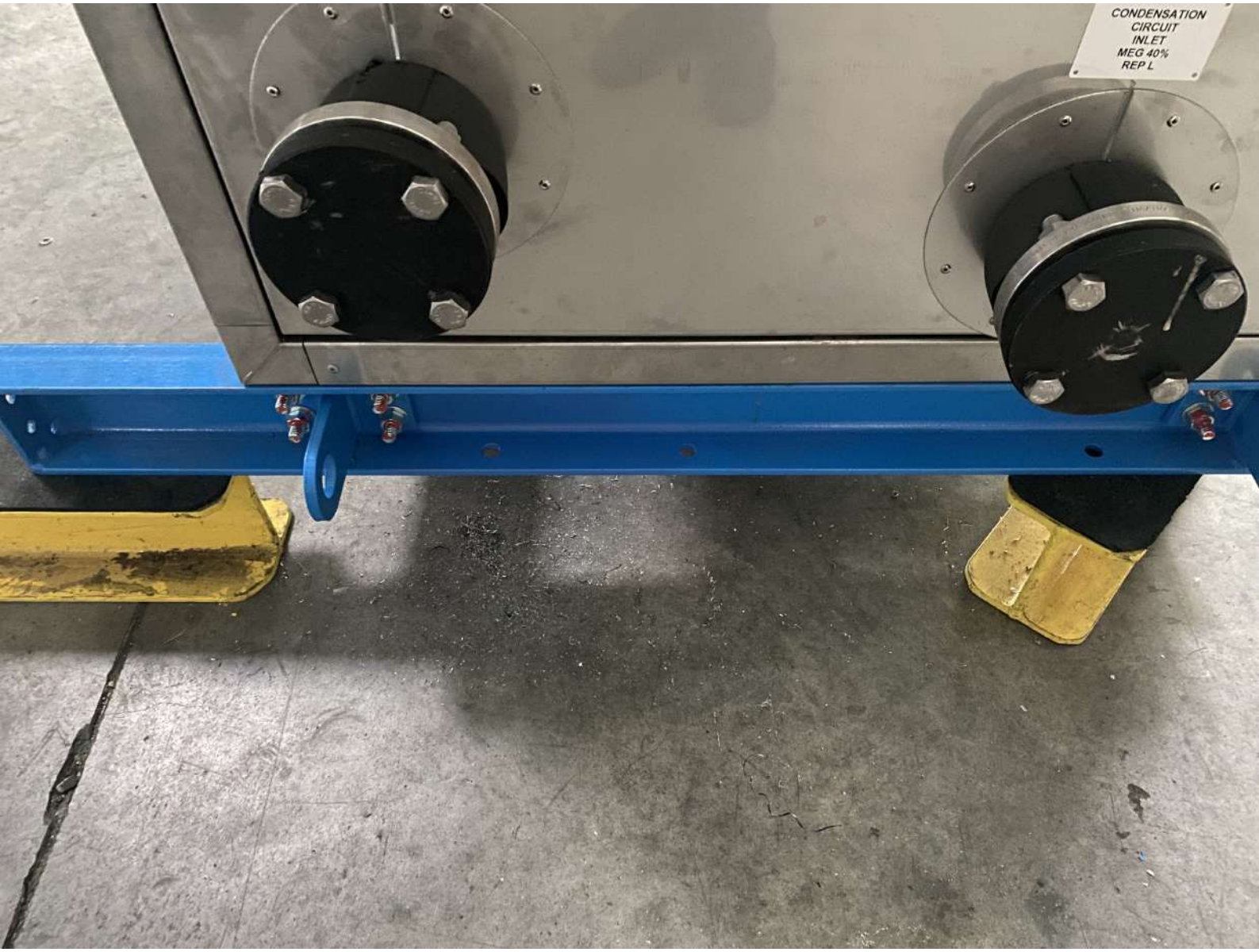
Echelle /Scale	Format / Size	Plan N° / Drawing N°	Page / Sheet	Rev.
1/10	A1	P.0608371.L.02.205	3/6	H

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Paumier

elogen

PICTURE


CONDENSATION
CIRCUIT
INLET
MEG 40%
REP L




WARNING
The control panel will be installed
during commissioning




Manutan Manutan Manutan Manutan
chassis
FRAME


Roof
Panneau
arrière
REAR
PANEL












UNIT 1
OFF - ON
RUNNING
EMERGENCY

P.0608871.L.02.504
C63

Report FAT n°5
Drycooler

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	15/11/2024	Document creation	1
B	13/12/2024	Comments taken into account	1

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marine@ets-paumier.fr
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Agences : Concarneau – Fécamp – Marseille

Siège social : PAUMIER
PARC D'ACTIVITES DES HAUTES FALAISES
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S.A.S au capital de 930 000€ - R.C.S. Le Havre B 346 350 101
Siret 346 350 101 00041 – A.P.E. 2825Z – N° TVA FR 89 346350101

Paumier	**Report FAT n°5** **Drycooler**	elogen
Révision : B	Statut document : BPA	Date : 13/12/2024

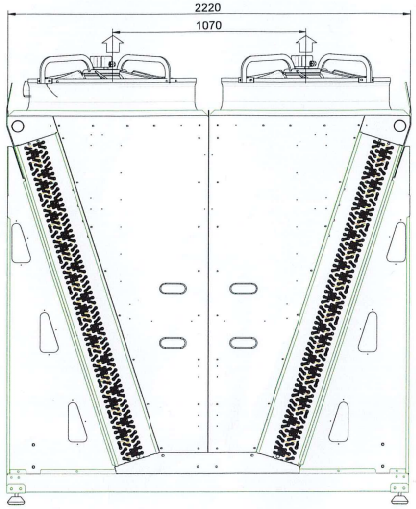
Comments receive List of people present :

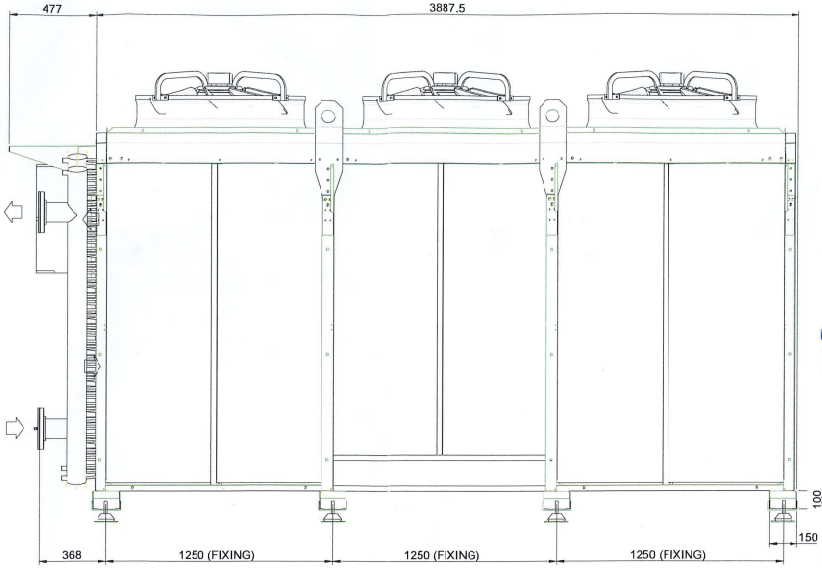
Paumier	**Elogen**
Provide a fin comb	Already send with the Drycoolers
small brown stain on the coating	Accepted as it is
CE Marking and PED category to be added in the nameplate	on site
Small differences between the manual measurement and the GAD: at the center distance of the Flanges 6 to 10 mm (see scanned annotated drawing)	Mesure have been taken (on site)
Anti-vibration pad to be mounted during installation on SITE, ensure quantities in the box and secure transport (box attached to the drycooller)	Paumier has checked before expedition

List of people present :

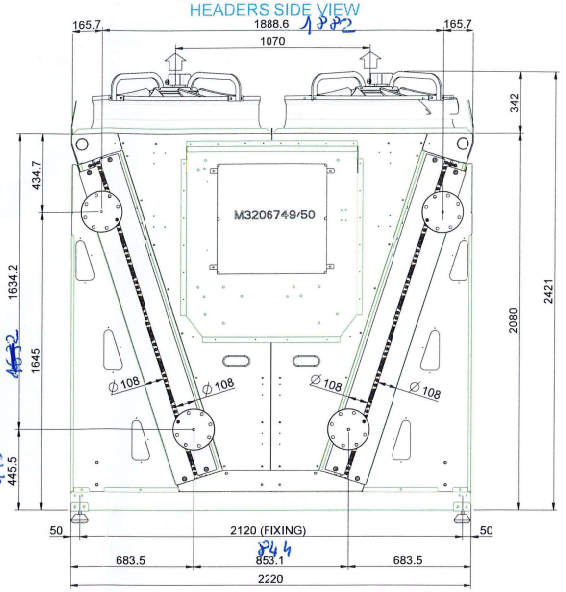
Paumier	**Elogen**
Laurent DEGRENNE	Ahmed RAZGUI
Olivier NEVEU	Hassan HAMMAMI
Robin LAMBERT	
Baptiste CHIROIS	

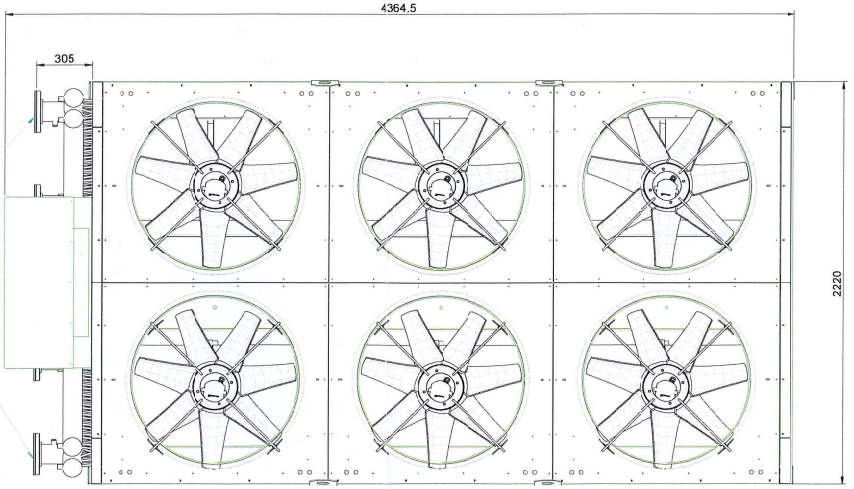
VISTA LATO OPPOSTO COLLETTORI
HEADERS OPPOSITE SIDE VIEW



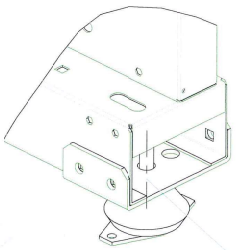


VISTA LATO COLLETTORI
HEADERS SIDE VIEW





Flangia 4" INOX UNI100 ANSI
slip on Dn 100
Kit precarica 3 Bar



Asse di fissaggio con antivibrante
Fixing center with shock absorber

Codice Gruppo Opzioni / Options Group Code	S1271
Codice Opzione Single Option Code	Descrizione Opzione Option Description
JW102	BATTERIA A GLICOLE 102 CIRCUITI 102 WATER COIL CIRCUITS
SSP	CARROZZERIA ESTERNA IN INOX 316L 316L STAINLESS STEEL EXTERNAL CASING ONLY
C	BATTERIA CON ALETTE DI RAME COPPER FINS
FX	COLLETTORI CON FLANGE INOX INOX SLIP ON FLANGES (WELDED IF INOX COIL TUBES)
EC	MOTOVENTILATORI A COMMUTAZIONE ELETTRONICA ELECTRONIC COMMUTATED FANMOTORS
TAXZ	MOTOVENTILATORI ESCLUSIVI ZIEHL ZIEHL OBLIGATORY FANMOTORS
SSB	BATTERIA CON LAMIERATI IN INOX 316L 316L STAILESS STEEL COIL SHEETS
Q1E	CABLATO EC CON QUADRO ELETTRICO EC WIRING WITH ELECTRICAL PANEL
ETFUV	BATTERIA VERNICIATA ELECTROFIN+TOP COATED ELECTROFIN COIL PAINTING+TOP COATED
A	ANTIVIBRANTE SHOCK ABSORBER
SPEC	FLANGE SPECIALI ANSI ANSI SPECIAL FLANGES

ELOGEN
Hassan HAMMANI
14/11/2024

Ets. PAUMIER & FILS
PA des Hautes Falaises
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Tél. : 02 35 10 42 90
Siret : 346 350 101 00041
Baptiste CHIROIS

Inspector Christian HAUCHARD
On behalf of TUV
Date: 14/11/2024 Signature

32 W5 62 05 3750 21 0051 CC
32 W6 62 05 3750 21 0051 CC

Rev.	Data Date	Descrizione Description			Diseg. Draft.	Visto Check.
A2	TOLLERANZE SECONDO NORME UNI ISO 2768 m	Per costruzione vedere SC010000	Rif.cliente Cust. ref.:	JVWH2390DNS1271 (5)	Sost. il: Replace:	-

TITOLOJUMBO TITLE: JVWH 2390	Scala Scale	1:20	Vol.Int. Int.Vol.	0dm3	Pese Weight	0	kg
	Diseg Draft.	PM	Visto Check	MR	Data Date	05/06/24	

ThermoKey
Heat Exchange Solutions

DISEGNO N.
DRAWING N. 00R240190400 Rev. 00

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P.0608871.L.02.600

SAT FCU

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	19/11/2024	Document creation	4
B	31/03/2024	SAT Completed	4

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Agences : Concarneau – Fécamp – Marseille

Siège social : PAUMIER
PARC D'ACTIVITES DES HAUTES FALAISES
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Tél. : + 33 (0)2 35 10 23 50 – Fax : + 33 (0)2 35 29 34 78
S.A.S au capital de 930 000€ - R.C.S. Le Havre B 346 350 101
Siret 346 350 101 00041 – A.P.E. 2825Z – N° TVA FR 89 346350101

F.C.U Test Sheet

Customer	**ELOGEN**
Document number	**P.0608871.L.02.600**

Site	**Project C63**
Equipment	**F.C.U**

Test conditions	**Ext T°.** 10°C

Grey cells to pre-fill

		Fan 1	**Fan 2**
Fans	**Rotational direction control**	**OK**	**OK**
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6 A	6 A
	Phase(s)	**Ph1**	**Ph1**
	fans measured current. (A)	**0,99 A**	**1,00 A**
	Fans starting current. (A)	**1,04 A**	**1,05 A**
	Fans insulation. (MΩ) *see nota	**550 MΩ**	**550 MΩ**
	Speed variation	No	
	Values (Hz)	**50 Hz**	
	Intended air flow (m3/h)	**1200**	
	Measured air flow (m3/h)	1235	
	T° settings	**20 °C**	
	T° measured	**20 °C**	

B	**T° Air entry (°C)**	
A	**T° Air exit (°C)**	
T	**T° Fluid entry (°C)**	
T	**T° Fluid exit (°C)**	

Local	**A20 - Rectifier Room**
Reference number	**FCU 201**
Fluid	**AIR / MPG 40%**
Brand	**PAUMIER**
Reference	**H8/EG-10**
Seriel number	**7424**
Voltage (V)	**230V / MONO**

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	**25/02/2025**

Comments :

PAU003 - Circuit breaker Q10 - Speed 1

Name et Visa

DAOUDAL Esteban

(PAUMIER)	**Customer :**
	Luc Paoletti

F.C.U Test Sheet

Customer	**ELOGEN**
Document number	**P.0608871.L.02.600**

Site	**Project C63**
Equipment	**F.C.U**

Test conditions	**Ext T°.** 10°C

Grey cells to pre-fill

		Fan 1	**Fan 2**
Fans	**Rotational direction control**	**OK**	**OK**
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6 A	6 A
	Phase(s)	**Ph1**	**Ph1**
	fans measured current. (A)	**0,95 A**	**0,92 A**
	Fans starting current. (A)	**0,99 A**	**0,96 A**
	Fans insulation. (MΩ) *see nota	**550 MΩ**	**550 MΩ**
	Speed variation	No	
	Values (Hz)	**50 Hz**	
	Intended air flow (m3/h)	**1200**	
	Measured air flow (m3/h)	**1283**	
	T° settings	**20 °C**	
	T° measured	**20 °C**	
BATT	**T° Air entry (°C)**		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Local	**A20 - Rectifier Room**
Reference number	**FCU 202**
Fluid	**AIR / MPG 40%**
Brand	**PAUMIER**
Reference	**H8/EG-10**
Seriel number	**7425**
Voltage (V)	**230V / MONO**

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	**25/02/2025**

Comments :

PAU003 - Circuit breaker Q11 - Speed 1

Name et Visa

DAOUDAL Esteban

(PAUMIER)	**Customer :**
	Luc Paoletti

F.C.U Test Sheet

Customer	**ELOGEN**
Document number	**P.0608871.L.02.600**

Site	**Project C63**
Equipment	**F.C.U**

Test conditions	**Ext T°.** 10 °C

Grey cells to pre-fill

		Fan 1	**Fan 2**
Fans	**Rotational direction control**	**OK**	**OK**
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6 A	6 A
	Phase(s)	**Ph1**	**Ph1**
	fans measured current. (A)	**0,98 A**	**0,97 A**
	Fans starting current. (A)	**1,03 A**	**1,01 A**
	Fans insulation. (MΩ) *see nota	**550 MΩ**	**550 MΩ**
	Speed variation	No	
	Values (Hz)	**50 Hz**	
	Intended air flow (m3/h)	**1200**	
	Measured air flow (m3/h)	1258	
	T° settings	**20 °C**	
	T° measured	**20 °C**	
BATT	**T° Air entry (°C)**		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Local	**A20 - Rectifier Room**
Reference number	**FCU 203**
Fluid	**AIR / MPG 40%**
Brand	**PAUMIER**
Reference	**H8/EG-10**
Seriel number	**7426**
Voltage (V)	**230V / MONO**

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	**25/02/2025**

Comments :

PAU003 - Circuit breaker Q12 - Speed 1

Name et Visa

DAOUDAL Esteban

(PAUMIER)	**Customer :**
	Luc Paoletti

F.C.U Test Sheet

Customer	**ELOGEN**
Document number	**P.0608871.L.02.600**

Site	**Project C63**
Equipment	**F.C.U**

Test conditions	**Ext T°.** 10 °C

Local	**A20 - Rectifier Room**
Reference number	**FCU 204**
Fluid	**AIR / MPG 40%**
Brand	**PAUMIER**
Reference	**H8/EG-10**
Seriel number	**7427**
Voltage (V)	**230V / MONO**

Grey cells to pre-fill

		Fan 1	Fan 2
Fans	**Rotational direction control**	**OK**	**OK**
	Fans plaqued nominal current. (A)	1,75	1,75
	Thermal circuit breaker fans settings. (A)	6 A	6 A
	Phase(s)	**Ph1**	**Ph1**
	fans measured current. (A)	**0,93 A**	**0,94 A**
	Fans starting current. (A)	**0,96 A**	**0,97 A**
	Fans insulation. (MΩ) *see nota	**550 MΩ**	**550 MΩ**
	Speed variation	No	
	Values (Hz)	**50 Hz**	
	Intended air flow (m3/h)	**1200**	
	Measured air flow (m3/h)	1326	
	T° settings		
	T° measured		
BATT	**T° Air entry (°C)**		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date	**25/02/2025**

Comments :

PAU003 - Circuit breaker Q13 - Speed 1

Name et Visa

DAOUDAL Esteban

(PAUMIER)	**Customer :**
	Luc Paoletti

P.0608871.L.02.601

SAT PUMP

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	19/11/2024	Document creation	2
B	01/04/2025	SAT completed	2

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Paumier

Chilled water test sheet

Customer	ELOGEN	Site	C63
Business number	P.0608871.L.02.601	Equipment	Chilled water pump

Test conditions	T° fluid : 5°C	T° ext. : 10°C

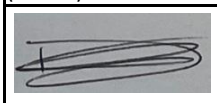
PAUMIER	Chilled water pump n°1 (Service)			Chilled water pump n°2 (Safety)		
Usage	Chilled water circulation			Chilled water circulation		
Type	Centrifugal			Centrifugal		
Brand	GRUNDFOSS			GRUNDFOSS		
Référence	NB 32-160/177 AASF2KESBQQELW1			NB 32-160/177 AASF2KESBQQELW1		
Serial number	9850567910000005			9850567910000006		
Rotational direction	OK			OK		
voltage (V) (Precise single or Triphase)	380-415D / 50Hz (Tri)			380-415D / 50Hz (Tri)		
Plated nominal current (A)	11,0 A			11,0 A		
Circuit Breaker settings (A)	Q1 16A			Q2 16A		
	Ph1	Ph2	Ph3	Ph1	Ph2	Ph3
Mesured intensity (A)	9,35	9,94	10	10,3	10,2	10,7
Starting intensity (A)	VAR	VAR	VAR	VAR	VAR	VAR
Insulation (MΩ) * see Nota	550 MΩ	550 MΩ	550 MΩ	550 MΩ	550 MΩ	550 MΩ
Variable speed YES / NO	YES			YES		
Valeurs (Hz)	50 Hz			50 Hz		
Expected flow (m3/h)	29,7			29,7		
Noted flow (m3/h)	28,1			28,4		
Upstream pressure (bar)	4,2			4,1		
Downstream pressure (bar)	1,5			1,32		

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date : 27/02/2025

Observations : Chilled Water Pump n°1 : CP-400 B // Chilled Water Pump n°2 : CP-400 A

Name : DAOUDAL Esteban

(PAUMIER)	CLIENT
	Luc Paoletti

Condesation pump test sheet

Customer	**ELOGEN**
Business number	**P.0608871.L.02.601**

Site	**C63**
Equipment	Condensation pump

Test conditions	**T° fluid : 12,1 °C**	**T° ext. : 10°C**

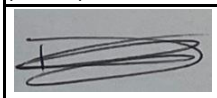
PAUMIER	**Condensation pump n°1 (Service)**			**Condensation pump n°2 (Safety)**		
Usage	**CONDENSATION circulation**			**CONDENSATION circulation**		
Type	**Centrifugal**			**Centrifugal**		
Brand	**GRUNDFOSS**			**GRUNDFOSS**		
Référence	**NB 80-160/151 AASF2KESBQQEOW1**			**NB 80-160/151 AASF2KESBQQEOW1**		
Serial number	**874002910002856**			**874002910002854**		
Rotational direction	**OK**			**OK**		
voltage (V) (Precise single or Triphase)	**380-415D / 50Hz (Tri)**			**380-415D / 50Hz (Tri)**		
Plated nominal current (A)	**28,0-26,0 A**			**28,0-26,0 A**		
Circuit Breaker settings (A)	**Q3 40A**			**Q4 40A**		
	Ph1	**Ph2**	**Ph3**	**Ph1**	**Ph2**	**Ph3**
Mesured intensity (A)	**23,18**	**23,17**	**22,88**	**23,36**	**23,52**	**22,7**
Starting intensity (A)	**VAR**	**VAR**	**VAR**	**VAR**	**VAR**	**VAR**
Insulation (MΩ) * see Nota	**550 MΩ**	**550 MΩ**	**550 MΩ**	**550 MΩ**	**550 MΩ**	**550 MΩ**
Variable speed YES / NO	**YES**			**YES**		
Valeurs (Hz)	**50 Hz**			**50 Hz**		
Expected flow (m3/h)	**122,3**			**122,3**		
Noted flow (m3/h)	**118**			**122**		
Upstream pressure (bar)	**2,35**			**2,55**		
Downstream pressure (bar)	**0**			**0**		

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date : 27/02/2025

Observations : Condensation pump n°1 : CP-200 B // Condensation pump n°2 : CP-200 A

Name : DAOUDAL Esteban

(PAUMIER)	**CLIENT**
	Luc Paoletti

P.0608871.L.02.602

SAT AHU

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	19/11/2024	Document creation	1
B	31/03/2025	SAT Completed	1

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AHU TEST SHEET

Customer	ELOGEN
Business numer	P.0608871.L.02.602

Site	C63
Equipment	AHU

Test conditions	ext. T° : 10 °C

Local	Locaux techniques
Local T°	N.C
Plan number	P.0608871.L.02.100
Type	AHU
Fluid	AIR / MPG 40%
Brand	PAUMIER
Serial number	7449
Voltage (V) / single or Triphase	400 V (Tri)
Heating power	22,5 kW
Refrigerating power	36,9 kW

VENTILATEUR	Fan(s)	Fan 1		
	Rotational direction control	OK		
	Fans plaqued nominal current. (A)	10,2 A		
	Thermal circuit breaker fans settings. (A)	Q7 16A		
	Phase(s)	Ph1	Ph2	Ph3
	fans measured current. (A)	4,15 A	4,13 A	4,19 A
	Fans starting current. (A)	VAR	VAR	VAR
	Fans insulation. (MΩ) *see nota	550 MΩ	550 MΩ	550 MΩ
	Speed variation	NO		
	Values (Hz)	50 Hz		
	Intended air flow (m3/h)	3362		
	Measured air flow (m3/h)	3391		
	T° settings	20,0 °C		
	T° measured	21,3 °C		

BATTERIE	T° Air entry (°C)		
	T° Air exit (°C)		
	T° Fluid entry (°C)		
	T° Fluid exit (°C)		
	Control open / close V3V (10V => 100% / 0V => 0%)	OK	OK

Nota *(insulation) : if BTA (50 à 500V) : Z ≥ 500 kΩ, Otherwise 1kΩ /V. No insulation measure if a frequency variator is present. If BV : Z ≥ 1 000 kΩ.*

Date : 27/02/25	
Comments :	
Name et Visa DAOUDAL Esteban	
PAUMIER :	Customer :
	Luc Paoletti

P.0608871.L.02.609

SAT Electrical Heater

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	01/04/2025	Document creation	6

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elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 101 EH-1006
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824181300998
Power (kW)	1000 w
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	55 Ω
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	OK / NOK
Intensity (U)	4,24 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	6 A

NOTES

Depart PAV003 : Disjoncteur Q14.

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 201 EH-1004
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824181300997
Power (kW)	1000 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 MΩ
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	(OK) / NOK
Intensity (U)	4.25 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	6A

NOTES

Depart PAU003 : Disjoncteur Q17

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	27/02/25	27/02/25	
DATE	DAOUDAL	Paoletti	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	

Tag Number	WH 103 EH-1007
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	ATANTIC
Serial Number	10082418L300667
Power (kW)	500w

PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 mΩ
Bump Check: Motor Rotation Direction	(OK) NOK

TEST	
Activation	(OK) NOK
Intensity (U)	2A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	3A

NOTES

Depart PAU003 : Disjoncteur Q16.

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	CROSSWIND

Tag Number	WH 203 EH-1003
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824ASL 300650
Power (kW)	500 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	550 Ω
Bump Check: Motor Rotation Direction	(OK) / NOK
TEST	
Activation	(OK) / NOK
Intensity (U)	2,06A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	3A
NOTES	

Depart PAU003 : Disjoncteur Q18.

PAUmier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0008 – ELECTRICAL HEATER

CROSSWIND

Tag Number	WH 205 EH-1002
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	ATLANTIC
Serial Number	100824 18L 300 649
Power (kW)	300 W

PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	Ok
Check the Resistance	550 MΩ
Bump Check: Motor Rotation Direction	(OK) / NOK

TEST	
Activation	(OK) / NOK
Intensity (U)	2,12 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	6A

NOTES

Depart PAU003 : Disjoncteur @ 20

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0008 – ELECTRICAL HEATER	CROSSWIND

Tag Number	WH 206 EH-1001
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	A·F·I·B
Serial Number	202109/4510
Power (kW)	1000 W
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	OK
Verify the Correct Installation	OK
Check the Resistance	55 Ω
Bump Check: Motor Rotation Direction	~~OK~~ / ~~NOK~~
TEST	
Activation	(OK) / NOK
Intensity (U)	3,68 A
Intensity (V)	—
Intensity (W)	—
Voltage	230 V
Thermal Ajustement	8A
NOTES	

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	Daoudal	Paoletti	
DATE	27/02/2025	27/02/25	
SIGNATURE		Luc Paoletti	

P.0608871.L.02.610

SAT Instrumentation

		Name	Function	Visa
Created by	PAUMIER	Baptiste CHIROIS	Project manager	✓
Approved by	PAUMIER	Laurent DEGRENNE	Business manager	✓

Revision	Date	Modification description	Page nb
A	01/04/2025	Document creation	48

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elogen	PRECOMMISSIONING	CROSSWIND
	C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT	

Tag Number	FS 33
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS	
Manufacturer	IFM electronic
Type	SA 5000
Serial Number	X0141106247
Range	18-30 V DC TOR

ELECTRICAL CHECK	
Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK		
Input / Output function	(Process)	~~Safety~~
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	(NO)	NC	N/A
	Setting (unit) L-MIN		Switch Contact
Switch Trigger	20		Open - On / Closed - Off
Reset	6		Open - On / (Closed - Off)

OUTPUT CHECK		
Field Device Off Status	On / Open / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	19/3/25	19/03/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT

CROSSWIND

Tag Number	FS 43
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	IFM electronic
Type	SA5000
Serial Number	x0142106247
Range	18-30 vDC TOR

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Input / Output function	(Process)	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK

Switch Contacts	(NO)	NC	N/A
	Setting (unit) L-MIN		Switch Contact
Switch Trigger	20		(Open - On) / Closed - Off
Reset	6		Open - On / (Closed - Off)

OUTPUT CHECK

Field Device Off Status	(On) / Open / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	19 / 3 / 25	19/03/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT

CROSSWIND

Tag Number	FS 141
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	IFM electronic
Type	SA5000
Serial Number	X0142106247
Range	TOR

ELECTRICAL CHECK

Wiring Check	On
Voltage Measurement	24 V DC

LOOP CHECK

Input / Output function	(Process)	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK

Switch Contacts	(NO)	NC	N/A
	Setting (unit) L-MIN		Switch Contact
Switch Trigger	40		(Open - On) / Closed - Off
Reset	24		Open - On / (Closed - Off)

OUTPUT CHECK

Field Device Off Status	On / Open / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	19 / 3 / 25	19/03/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT

CROSSWIND

Tag Number	FS 149
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	IFM electronic
Type	SA5000
Serial Number	x0942106247
Range	18-30V DC TOR

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Input / Output function	(Process)	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK

Switch Contacts	(NO)	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger	40		(Open - On) / Closed - Off
Reset	24		Open - On / (Closed - Off)

OUTPUT CHECK

Field Device Off Status	On / Open / ...	(Off) / Closed / ...
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	(On) / Open / ...	Off / Closed / ...
HMI Feedback Display	(Yes) / No	

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	19/03/25	19/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	101 TT-HY-1006
System / Subsystem Number	HY101
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Roeltechnik
Type	AETF-I TYRE
Serial Number	120.1-7112-1000-000
Range	15 .. 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA

Indication Range Unit: 0 - 100%

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	73	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/2025	28/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0001 – ANALOG INPUT	

Tag Number	103
System / Subsystem Number	HY 103
P&ID Number	JT - HY - 1005

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

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	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/25	28/02/25	
SIGNATURE			

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	201
System / Subsystem Number	HY 201 TT-HY-1004
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 .... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA

Indication Range Unit: 0% 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	FORES	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	1003
System / Subsystem Number	HY 1003 TT-HY-1003
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	203
System / Subsystem Number	HY205 TT-HY-1002
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15-36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA

Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	75	OK
HI Alarm	63	65	OK
LO Alarm	35	35	OK
LO LO Trip	25	25	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAK	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	206
System / Subsystem Number	HY 206 TT-HY-1001
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SCHISCHER
Type	FFR-2G
Serial Number	057·1000·24390002
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4-20 mA

Indication Range Unit: 0-100 %

	Rising %					Falling %				
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	73	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	75	73	OK
HI Alarm	65	65	OK
LO Alarm	35	35	OK
LO LO Trip	23	25	OK

NOTES

	~~FORES~~ Paunier	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/2025	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	AHU 100 AHU-400
System / Subsystem Number	HY
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	StS Regel technik
Type	AFTF-1 TYR2
Serial Number	1201 - 7112 - 1000 - 000
Range	15 - 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 100 %

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

HY treated air blowing - air handling unit

Paunier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	17/03/25	17/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0005 – PROPORTIONAL VALVE

CROSSWIND

Tag Number	V1
System / Subsystem Number	
P&ID Number	PSV-01

CHARACTERISTICS

Manufacturer	Belimo
Serial Number	10173-00001
Valve Type	NR24A-SR
Trim (Linear, Square, =%,...)	
Fail Position (Closed / Open)	closed

PRELIMINARY CHECKS

Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	ok 24Vdc.

LOOP CHECK

Valve Failure Action On Loss of Air supply NA	FO	FC	Stay put	
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)	

Valve 'Open' Time (s)	90s			Valve 'Close' Time (s)			90s		
	Rising %					Falling %			
Command Value	0	25	50	75	100	75	50	25	0
Physical Status (Stroke on Positioner)	0	25	50	75	100	75	50	25	0
HMI feedback NA									

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	4
System / Subsystem Number	THS-400-VCW1-MA
P&ID Number	M2WV-04
CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	22A37338.058
Valve Type	AQ7L
Fail Position (Closed / Open)	closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	–

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 S	Valve 'Close' Time (s)	15 S

NOTES

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NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	13
System / Subsystem Number	THS-400-VCW2-M1
P&ID Number	M2WV-13

CHARACTERISTICS

Manufacturer	Bernard Controls
Serial Number	22A37338.053
Valve Type	AQ7L
Fail Position (Closed / Open)	Closed

PRELIMINARY CHECKS

Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	–

LOOP CHECK

Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 S	Valve 'Close' Time (s)	15 S

NOTES

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NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	14
System / Subsystem Number	THS-400-VCW&-M2
P&ID Number	M2 WV-14

CHARACTERISTICS

Manufacturer	Bernard Controls
Serial Number	22A37338.0.60
Valve Type	AQ7L
Fail Position (Closed / Open)	Closed

PRELIMINARY CHECKS

Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK

Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 S	Valve 'Close' Time (s)	15 S

NOTES

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NAME	DAOUDAL	Paoletti	
DATE	27/02/2025	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	23
System / Subsystem Number	THS-400-VCW4-M2
P&ID Number	M2WV-23

CHARACTERISTICS

Manufacturer	Bernard Controls
Serial Number	22A37338.038
Valve Type	AQ7L
Fail Position (Closed / Open)	Closed

PRELIMINARY CHECKS

Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK

Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	15 s	Valve 'Close' Time (s)	15 s

NOTES

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NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	104
System / Subsystem Number	THS-200-VCW1-M1
P&ID Number	M2WV-104

CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	23L30359.009
Valve Type	AQ15
Fail Position (Closed / Open)	CPosed

PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	30 Second	Valve 'Close' Time (s)	30 Second

NOTES

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	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

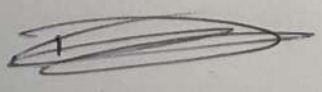
CROSSWIND

Tag Number	113
System / Subsystem Number	THS-200-VCW2-M1
P&ID Number	M2WR-113
CHARACTERISTICS	
Manufacturer	Bernard Controls
Serial Number	23L30359.017
Valve Type	AO15
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	–

LOOP CHECK				
Valve Failure Action On Loss of Air supply		FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal		FO	FC	(Stay put)
Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI		(OK) / NOK
Valve 'Open' Time (s)	30 S	Valve 'Close' Time (s)		30 S

NOTES

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	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0004 – ON/OFF VALVE

CROSSWIND

Tag Number	114
System / Subsystem Number	THS-200-VCW3-M2
P&ID Number	M2WV-114

CHARACTERISTICS

Manufacturer	Bernard Controls
Serial Number	23L30359.018
Valve Type	AQ15
Fail Position (Closed / Open)	Closed

PRELIMINARY CHECKS

Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK

Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	30s	Valve 'Close' Time (s)	30s

NOTES

Paunier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING	CROSSWIND
	C063-ELO-REP-CO-0004 – ON/OFF VALVE	

Tag Number	123
System / Subsystem Number	THS - 200 - VCW4 - M2
P&ID Number	M2W4 - 123
CHARACTERISTICS	
Manufacturer	Benard Controls
Serial Number	23L30359.006
Valve Type	AQ 15
Fail Position (Closed / Open)	Closed
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	(OK) / NOK
Check the conformity to the data sheet	(OK) / NOK
Check free movement of valve with handwheel (if any)	(OK) / NOK / NA
Check the installation of heating & insulation (if any)	(OK) / NOK / NA
Check Power / Air Supply Setting	—

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	(Stay put)

Verify Correct 'Open' Limit Switch on HMI	(OK) / NOK	Verify Correct 'Closed' Limit Switch HMI	(OK) / NOK
Valve 'Open' Time (s)	30 Sec	Valve 'Close' Time (s)	30 Sec

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/2025	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	5
System / Subsystem Number	PT 5
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGELtechnik
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	12
System / Subsystem Number	PT 12
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	SHD
Serial Number	520.99634
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 ~ 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9	2,9	Ok
LO Alarm	0,3	0,3	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

elogen	PRECOMMISSIONING C063-ELO-REP-CO-0001 – ANALOG INPUT	CROSSWIND

Tag Number	15
System / Subsystem Number	PT 15
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	Sfs regeltechnik
Type	SHD
Serial Number	520.09034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA	Indication Range Unit	0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	
LO Alarm	0,5 bar	0,5 bar	
LO LO Trip			

NOTES

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	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	PT 22
System / Subsystem Number	22
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	SHB
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	101
System / Subsystem Number	PT 101
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	Premasgard 1121-1
Serial Number	1301 - 1172 - 0010 - 000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: -300 ÷ 300 Pa

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

Paoletti

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/2025	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	103
System / Subsystem Number	PT103
P&ID Number	PT - 1005

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	Premasgard 1121-1
Serial Number	1301 - 1172 - 0010 - 000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: -300 +300 PA

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAUMIER

	~~TORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/23	28/02/23	
SIGNATURE			

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	105
System / Subsystem Number	PT-105
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS REGELTECHNIK
Type	SHD
Serial Number	520.99034
Range	24 VDC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4-20 mA — Indication Range Unit: 0-6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	~~4~~	8	12	16	~~20~~	16	12	8	0
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Pavonier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	119
System / Subsystem Number	PT112
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGELTECHNIK
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 6 bar

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,3 bar	2,9 bar	OK
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	115
System / Subsystem Number	PT115
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGELTECHNIK
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA				Indication Range Unit	0 - 6 bar				
	Rising %					Falling %				
	0	25	50	75	100	75	50	25	0	
Input Signal	4	8	12	16	20	16	12	8	4	
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0	
	Trip or Alarm Setting			Actual Trip or Alarm Point			OK / NOK / NA			
HI HI Trip										
HI Alarm	2,9 bar			2,9 bar			OK			
LO Alarm	0,5 bar			0,5 bar			OK			
LO LO Trip										

NOTES

Faurnier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	27/02/25	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	122
System / Subsystem Number	PT 122
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	SHD
Serial Number	520.99034
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA			Indication Range Unit	0 - 6 bar				
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	1,5	3	4,5	6	4,5	3	1,5	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm	2,9 bar	2,9 bar	OK
LO Alarm	0,5 bar	0,5 bar	OK
LO LO Trip			

NOTES

Pauumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	27/02/2025	27/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	201
System / Subsystem Number	PT 201 PT-1004
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	PremasGard 1121-1
Serial Number	1301-1172-0010-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA | Indication Range Unit: -300 +300 PA

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	130	130	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	203
System / Subsystem Number	PT 203 PT-1003
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS Regeltechnik
Type	Premagard 1121-1
Serial Number	1301-1172-0010-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 – 20 mA | Indication Range Unit: -300 ÷ 300 Pa

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	130	130	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	28/02/2025	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	203
System / Subsystem Number	PT 205 PT-1002
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regeltechnik
Type	Pressmassgord 1121-1
Serial Number	1301-1172-0010-000
Range	15 ··· 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA

Indication Range Unit: -300 ÷ 300 PA

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-300	-150	0	150	300	150	0	-150	-300

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

	FORES	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	206
System / Subsystem Number	PT 206 PT-1001
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SCHICHER
Type	EXCOS-D-250
Serial Number	056.3005-24390049
Range	19,2 .... 28,8 V AC/DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: - 250 + 250

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-250	-125	0	125	250	125	0	-125	-250

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	150	150	OK
HI Alarm	120	120	OK
LO Alarm	80	80	OK
LO LO Trip	50	50	OK

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	TT 25
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S regel technik
Type	TM65-1 100mm
Serial Number	1101-7122-0029-900
Range	15 - 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20 mA			Indication Range Unit		-50°C + 50°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	25	50	25	0	-25	-50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	19/03/2025	19/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	TT 32 TI-32
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S REGEL Technik
Type	TM65-1 100mm
Serial Number	1101-7122-0029-900
Range	15-36V DC

ELECTRICAL CHECK

Wiring Check	Ok
Voltage Measurement	24V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4-20mA — Indication Range Unit: -50°C + 50°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	25	50	25	0	-25	50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAK	Paoletti	
DATE	19/3/2025	19/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	TT 42 TI-42
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS TEGEL technik
Type	1101-7122-0029-900
Serial Number	TM63-1 100mm
Range	15-36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: -50°C +50°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-30	-25	0	25	50	25	0	-25	50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

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	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	19/3/25	19/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	60
System / Subsystem Number	TT-60
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS REGELTECHNIK
Type	TM65-.1 100MM
Serial Number	1101-7122-0029-900
Range	15-36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4-20 mA			Indication Range Unit		-50°C +50°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	+25	+50	+25	0	-25	-50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

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	FORES	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	17/03/25	17/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	
System / Subsystem Number	101
P&ID Number	TT 101 TT-HY-1006

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20mA — Indication Range Unit: -35°C +35°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

PAUMier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	TT 103
System / Subsystem Number	103
P&ID Number	TT-HY-1005

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7212-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA

Indication Range Unit: -35 ÷ 75°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	PAOLETTI	
DATE	28/02/2025	28/02/25	
SIGNATURE			

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	154
System / Subsystem Number	TT 154
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SIS Regel Technik
Type	TM65-1 100MM
Serial Number	1101-7122-029-900
Range	15-36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4-20 mA — Indication Range Unit: +0°C - +100°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	17/03/25	17/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	TT 126
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SIS REGEL technik
Type	TM 65-1 100mm
Serial Number	1101-7122-0029-900
Range	15-36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20mA — Indication Range Unit: 0°C 100°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	0	25	50	75	100	75	50	25	0

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	19/3/2025	19/03/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	201
System / Subsystem Number	TT 201 TT-HY-1004
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	STS readtechnik
Type	AFTF-I TYR 2
Serial Number	1201-7112-1000-000
Range	15...36V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 - 20mA	Indication Range Unit	-35°C + 75°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/2025	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	203
System / Subsystem Number	TT 203 TT-HY-1003
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	13 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: - 35 + 75 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

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PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	205
System / Subsystem Number	TT 205 TT-HY-1002
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	S+S Regeltechnik
Type	AFTF-I TYR2
Serial Number	1201-7112-1000-000
Range	15 ... 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: -35 +75 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	47,5	47,5	OK
HI Alarm	45	45	OK
LO Alarm	5	5	OK
LO LO Trip	2,5	2,5	OK

NOTES

Paumier

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAC	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	206
System / Subsystem Number	TT206 TT-HY-1001
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SCHISCHER
Type	TFR-2G
Serial Number	057.1200 24160072
Range	24 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20 mA — Indication Range Unit: 0 - 1000 °C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip	32,5	32,5	OK
HI Alarm	30	30,5	OK
LO Alarm	10	10	OK
LO LO Trip	8,5	8,5	OK

NOTES

PAUMIER

	~~FORES~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	28/02/25	28/02/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	AHU.100 AHU-400
System / Subsystem Number	TT
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SIS Regel technik
Type	AFTF-1 TYR2
Serial Number	1201-7112-1000-000
Range	15000 36 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit	4 – 20 mA			Indication Range Unit		-35°C +75°C			
	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-35	-12,5	20	52,5	75	52,5	20	-12,5	-35

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

TT treated air blowing air handling unit

PAOMier

	~~FORCE~~	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	17/03/25	17/03/25	
SIGNATURE		Luc Paoletti	

elogen

PRECOMMISSIONING

C063-ELO-REP-CO-0001 – ANALOG INPUT

CROSSWIND

Tag Number	AHU 100 AHU-400
System / Subsystem Number	TT
P&ID Number	

ITEM CHARACTERISTICS

Manufacturer	SIS REGEL TECHNIK
Type	AZTM2-1 DISPLAY
Serial Number	1101-1122-2219-920
Range	15-35 V DC

ELECTRICAL CHECK

Wiring Check	OK
Voltage Measurement	24 V DC

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit: 4 - 20mA — Indication Range Unit: -50°C + 50°C

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal	4	8	12	16	20	16	12	8	4
HMI Indication	-50	-25	0	+25	+50	+25	0	-25	-50

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

Frech air inlet air handling unit

	[redacted]	ELOGEN	CROSSWIND
NAME	DAOUDAL	Paoletti	
DATE	17/03/25	17/03/25	
SIGNATURE		Luc Paoletti	

Section 8 LIST OF MODIFICATIONS

NOT APPLICABLE

Section 8.1 List of changes

Formal queries should be raised as per the table below. Where an activity has been assigned a '**YES**', a commissioning query (CQ) must be raised

Task Description	Required to Consult with Crosswind
Alarm Point change	**NO**
Trip Point Change	**YES**
Set-Point Change	**YES**
Change to Cause & Effects	**YES**
Protection Setting Change	**YES**
Measurement / Range Changes	**YES**
Graphics and or alarm banner information	**NO**
Sequence control changes	**YES**
Wiring mods – corrections	**NO**
Wiring mods - design change	**YES**
Controllers tuning and valve control action (direct/reverse acting)	**NO**
Phase Rotation Change	**NO**
Valve line-up change.	**YES**
Valve position change	**NO**
Leak Test boundaries and or pressure change.	**YES**
Changes to Flushing scopes.	**NO**

If there are any tasks that are not shown above, assume that they require consulting with Crosswind.

BLHP Commissioning Query(CQ) Tracker

CQ I.D	Discipline	Description	Originator	Company	Date Raised	PL I.D	Assigned To (Refer to Index)	CW Postion	Response Date	Response Required From	Return Date To Originator	Proposal Accepted by Originator Date	Proposal Implemented & Close-Out Date	Status	Comments
1	Piping	Change of medium for Electroylser GALT tests 1-3 from N2 to air	John Mackillop	CW	14.01.25	N/A	Elogen	N/A	15.01.25		20.01.25	20.01.25	20.01.25	Closed	
2	Electrical	Install of EX Glands on AquaGas Skid	John Mackillop	CW	12.02.25	N/A	Elogen	N/A	03/07/2024		16.03.25	17.03.25	17.03.25	Closed	
3	Piping	Dis-similiar flange types Electrolyser HVAC Piping-VOID	John Mackillop	CW	15.02.25	N/A	Alan Gibson	Piping TA						Void	
4	Electrical	Ballard E-Stop inter-trip Upstream	John Mackillop	CW	15.02.25	N/A	Paul Kyle	CPI Eng		Stephen Bremner				Awaiting Approval	Facility is available in switchgear, comm & operations suggest should be included. SB to decide
5	Piping	MV-319 wrong size and wrong spec flange face	Gerry MCann	CW	19/02/25	N/A	Elogen	N/A	27.02.25		16.03.25	17.03.25	17.03.25	Closed	
6	Process	Isolation of PT-632 IN WP3 for hydrogen introduction	David Musgrove	CW	03/09/2025	N/A	Elogen			Stephen Bremner				Awaiting Approval	With S.B to sign 04/04
7	Instrument	Cycling of IA Package	John Mackillop	CW	17.03.25	N/A	Paul Williamson	Inst TA		Stephen Bremner					Email sent to S.B for update 04/04
8	Instrument	Isolation of WLD-005 in WP3 for Hydrogen introduction-VOID	David Musgrove	CW	17.03.25	N/A	Elogen	N/A						Void	WLD now fixed
9	Instrument	Stopping of platform WTP when no demand from Ovivo	John Mackillop	CW	18.03.25	N/A	Elogen	N/A							With S.B to raise TQ with RM
10	Control	Reset signal from/to Electrolyser	Jamie McAllister	CW	22.03.25	N/A	Paul Williamson	Inst TA						Awaiting Engineering	
11	Process	Confirmation of conductivity values for flushing lines-VOID	Jamie McAllister	CW	23.03.25	N/A	Elogen	N/A						Void	
12	Process	Confirm that the pH value from the PSC WTP can be in a range of 6.5 (Low) to 7.9 (High)	Jamie McAllister	CW	27.03.24	N/A	Stephen Bremner	Engineering Manager							
13	Process	NRV in water treatment drain lines to prevent back filling	Jamie McAllister	CW	27.03.25	N/A	Paul Kyle	Mechnical TA						Draft	
14	Electrical	Shorten test duration of emergency light fittings	Anthony Iveson	CW	31.03.25	N/A	Ken Rose	Elec TA						Awaiting Engineering	
15	Process	Instrument Air Setpoints	Dave Musgrove	CW	23.03.25	N/A	Elogen	N/A						Void	Superceded by CQ016
16	Process	Instrument Air Pressure Interface Electrolyser	Thijs Philippo	CW	03/04/2025	N/A	Rosetti								
17	Electrical	BESS-Secondary Voltage Requirement	John Mackillop	CW	03/04/2025	N/A	Alessandro Sutto	CPI						Awaiting Engineering	
18	Process	Water Inlet Specification at Electrolyser Interface	Thijs Philippo	CW	03/04/2025	N/A	Rosetti								
19	Process	Change of medium for Electroylser Leak test on 600 O2 line	John Mackillop	CW	10/04/2025	N/A	Elogen	N/A	04/09/2025	Elogen	10/04/2025	10/04/2026	10/04/2025	Closed	
20	Electrical	Operation of Electrolyser Tx T4 with surge arrester protection	John Mackillop	CW	10/04/2025	N/A	Ken Rose	Electrical TA							
21	instrument	Voting of Fire system foe Electolyser SSI Panel	John Mackillop	CW	11/04/2025	N/A	Paul Williamson	Instrument TA							
22															
23															
24															
25															
26															

CQ I.D	Discipline	Description	Originator	Company	Date Raised	PL I.D	Assigned To (Refer to Index)	CW Postion	Response Date	Response Required From	Return Date To Originator	Proposal Accepted by Originator Date	Proposal Implemented & Close-Out Date	Status	Comments
27															
28															
29															
30															
31															
32															
33															
34															
35															
36															
37															
38															
39															
40															
41															
42															
43															
44															
45															
46															
47															
48															
49															
50															

Personnel

Name	Title
Martin Taylor	CW Commissioning Manager
Gerry McCann	CW Commissioning Engineer
Jamie McAllister	CW Operations Engineer
John MacKillop	CW Operations Engineer
Stephen Bremner	CW Engineering Manager
Thijs Philippo	CW CPI Electrolyser Engineer
Alessandro Sutto	CW CPI BESS Engineer
Paul Kyle	CW CPI Fuel Cell Engineer/ CW Mechanical Engineer
Paul Williamson	CW Instrument & Control Engineer
Ken Rose	CW Electrical Engineer
Hamand Patel	CW Process Engineer
Alan Gibson	QA/QC Manager

Smoke Detector Zone List

C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
-A	*Internal Issue*	*09-APR-2025*	*T.ZACCARELLI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	
Elogen Project Document Title	
Crosswind Project Document Number	
Fores Project Document Number and Revision	**224J10-DDL-AUT-LIS-00002_0**

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Review*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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LEGEND

D-OSD	OPTICAL SMOKE DETECTOR
X-OSD	OPTICAL SMOKE DETECTOR ATEX
D-MCP	MANUAL CALL POINT

C&E MATRIX

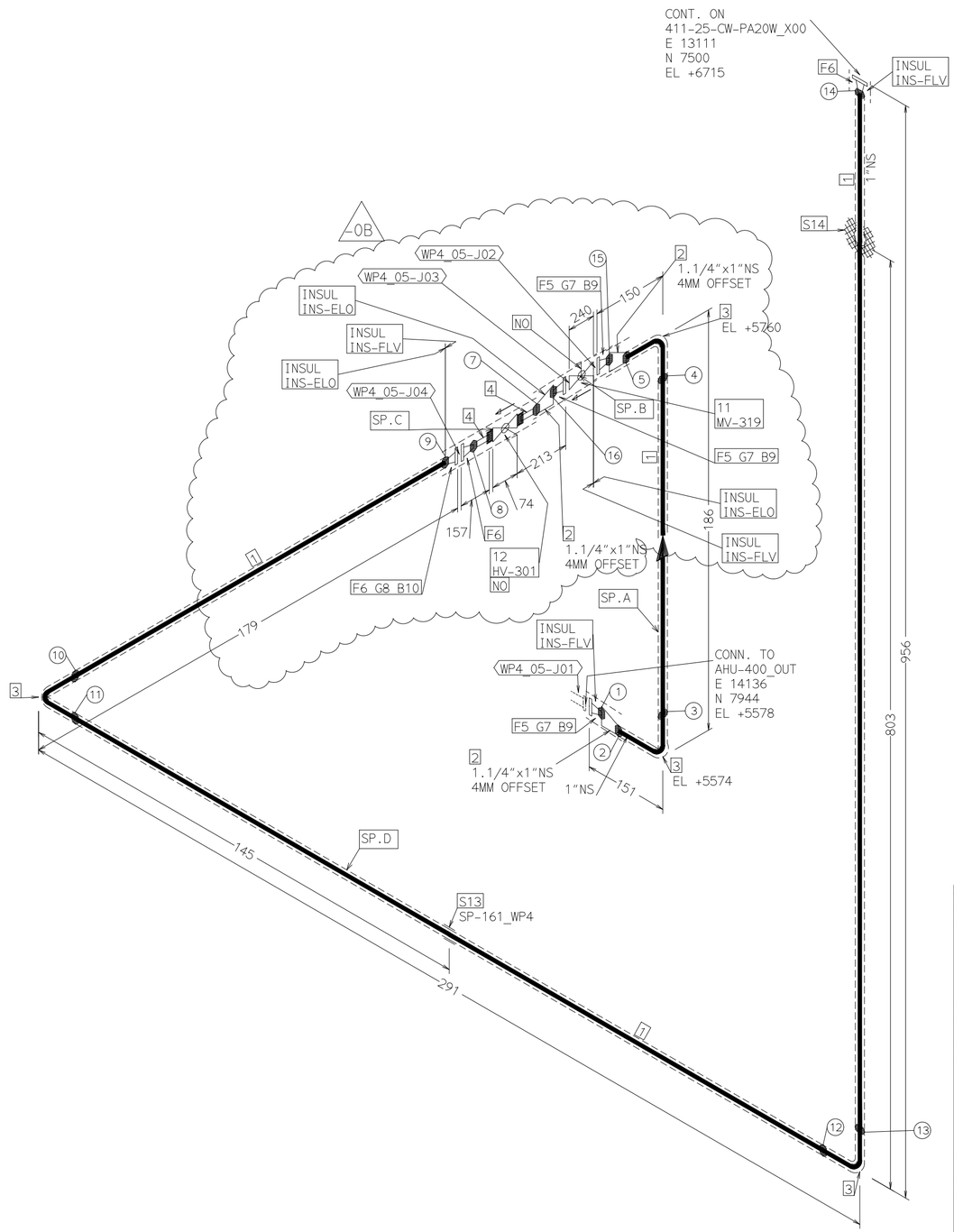
TYPE	DESCRIPTION
FAULT	if a MCP is in fault status, the SSI panel activate the fault output
	if 1 sensor is in fault status, the SSI panel activate the fault output
	if the SSI panel has an internal fault status (battery fault, card fault ecc..), the SSI panel activate the fault output
FIRE	if a MCP is pressed, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in alarm status, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in fault status, the SSI panel activate the fire alarm output
	if there is 1 sensor in alarm and 1 sensor in fault in the same zone, the SSI panel activate the fire alarm output

SD-00xA	SD-00xB	SD-00xC	OUT
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

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elogen	Electrolyzer Package						Document Code	
	Smoke Detector Zone List						Revision	Rev.0
	C63- CrossWind Project						Page Number	4 of 4

NAME	CARD	RACK	POS	CHANNEL	TYPE	LEVEL	ZONE	LOGIC
SD-001A_SMOKE DET.	F7009	1	1	1	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001B_SMOKE DET.	F7009	1	1	2	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001C_SMOKE DET.	F7009	1	1	3	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-002A_SMOKE DET.	F7009	1	1	4	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002B_SMOKE DET.	F7009	1	1	5	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002C_SMOKE DET.	F7009	1	1	6	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-003A_SMOKE DET.	F7009	1	1	7	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003B_SMOKE DET.	F7009	1	1	8	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003C_SMOKE DET.	F7009	1	1	9	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-004A_SMOKE DET.	F7009	1	1	10	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004B_SMOKE DET.	F7009	1	1	11	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004C_SMOKE DET.	F7009	1	1	12	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-005A_SMOKE DET.	F7009	1	1	13	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005B_SMOKE DET.	F7009	1	1	14	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005C_SMOKE DET.	F7009	1	1	15	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-006A_SMOKE DET.	F7009	1	1	16	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006B_SMOKE DET.	F7009	1	1	17	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006C_SMOKE DET.	F7009	1	1	18	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-007A_SMOKE DET.	F7009	1	1	19	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007B_SMOKE DET.	F7009	1	1	20	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007C_SMOKE DET.	F7009	1	1	21	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-008A_SMOKE DET.	F7009	1	1	22	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008B_SMOKE DET.	F7009	1	1	23	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008C_SMOKE DET.	F7009	1	1	24	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
FB-001_FIRE BUTT.	F7009	1	1	25	D-MCP	00	8 - 20-UCP-001	1 = ALARM
FB-002_FIRE BUTT.	F7009	1	1	26	D-MCP	00	9 - LEVEL 00	1 = ALARM
FB-003_FIRE BUTT.	F7009	1	1	27	D-MCP	01	10 - LEVEL 01	1 = ALARM
FB-004_FIRE BUTT.	F7009	1	1	28	D-MCP	01	10 - LEVEL 01	1 = ALARM



FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	PIPE				
1	PIPE SMLS, ASME B36.19M, Sch.40S ASTM A312 Gr.TP 304/304L	1	PIPESS02500100	1.3M	3.14
	FITTINGS				
2	ECCENTRIC REDUCER ASME B16.9, BE, Sch.40S ASTM A403 Gr.WP304/304L-S	1.1/4 x 1	REE0SS0986UQ01	3	0.51 -0B
3	ELBOW L.R. ASME B16.9, BE, 90 DEG, Sch.40S ASTM A403 Gr.WP304/304L-S	1	E90RSS01790100	4	0.60
4	NIPPLE POE/TOE BSPP 100mmMM LONG, SCH.40S ASTM A312 Gr.TP 304/304L	1	N100SS02750100	2	0.64
	FLANGES				
5	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1.1/4	FLW0SS0757UQ00	3	4.20
6	FLANGE WELDING NECK ASME B16.5, CL150 RF, Sch.40S ASTM A182 Gr.F304/304L	1	FLW0SS07520100	3	3.30
			TOTAL FABRICATION WEIGHT		12.39

ERECTION MATERIALS

PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY	WEIGHT (kg)
	GASKETS				
7	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1.1/4	GENEGK0064UQ00	3	0.21 -0B
8	KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150 SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	GENEGK00300100	1	0.06
	BOLTS				
9	70 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062960200	12	1.94 -0B
10	65 mm LONG STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	1/2	SB20B062950200	4	0.62
	VALVES / IN-LINE ITEMS				
11	METERING VALVE, IMI TA-BVS 240/243, CL150 RF	1.1/4	- -0B	1	3.00
12	BALL VALVE, CGR TYPE 311, PN63 BSPPF, FULL BORE, L.O. ASTM A182 Gr.F316	1	BY CLIENT	1	0.57
	SUPPORTS				
13	PIPE SHOE, S-64-DN25-100-200, Carbon Steel	1	SUPPORT	1	4.40
14	MCT FLANGED FOR PIPING, ROXTEC, SLEEVE SLR-125 AISI316 + R 125 AISI316 WITH NET + RM 80 25-54	1	2MCTZFR-1	1	3.40
			TOTAL ERECTION WEIGHT		14.20
			TOTAL WEIGHT		26.59

SPOOL NUMBERS:

SP.A SP.B SP.C SP.D

WELD NO	SHOP /FLD	NOTES (IF ANY)
1	S	
2	S	
3	S	
4	S	
5	S	
7	S	
8	S	
9	S	
10	S	
11	S	
12	S	
13	S	
14	S	
15	S	
16	S	

411-25-CW-PA20W_E01

REF. DOCUMENTS		CONDITIONS (DES. / OPER.)		FLUID PROP. / PED CAT.		INSULATION	TEST CONDITIONS		NOTE
P&ID :	C63-PID-001-010/013	DES. TEMP. (°C) :	40	FLUID DENSITY(kg/m3) :	1039	THICKNESS (mm):	TEST PRESS. (barg) :	8,58	
LINE LIST :	C63-MLO-001	DES. PRESS. (barg) :	6	FLUID PHASE :	Liquid	Thk=25	FLUID :	WATER	
PIPING LAYOUT :	224J10-DDL-PP-DA-00002	OP. TEMP. (°C) :	11	PED CATEGORY :	2	TRACING :	NDT :	100% RX (BW) / DYE PEN.T	
STRESS ANALYSIS :		OP. PRESS. (barg) :	1,5					VISUAL 100% ALL WELDS	

GRAPHIC LEGEND

SHOP WELD · FIELD WELD · SOCKET WELD · SCREWED JOINT · COMPR.N JOINT · SITE CONNECTION · PIPE SUPPORT / ATTACHMENT · PIPE INSULATION · PIPE TRACING

INSUL INS-ELO = STANDARD INSULATION

INSUL INS-FLV = THERMAL JACKET INSULATION

PIPE INSULATION + TRACING

REV.	DATE	DESCRIPTION
-0B	19/02/2025	INTERNAL ISSUE
-0A	04/11/24	INTERNAL ISSUE
00	25/09/24	ISSUE FOR REVIEW

elogen

PROJECT:

C63 - CROSSWIND PROJECT
ELECTROLYZER PACKAGE

TITLE

PIPING ISOMETRIC DRAWING

ELOGEN DOC. Nr.: C0063-FOR-DTB-MP-006

FORES DOC. Nr.: 224J10-DDL-PP-DI-00004

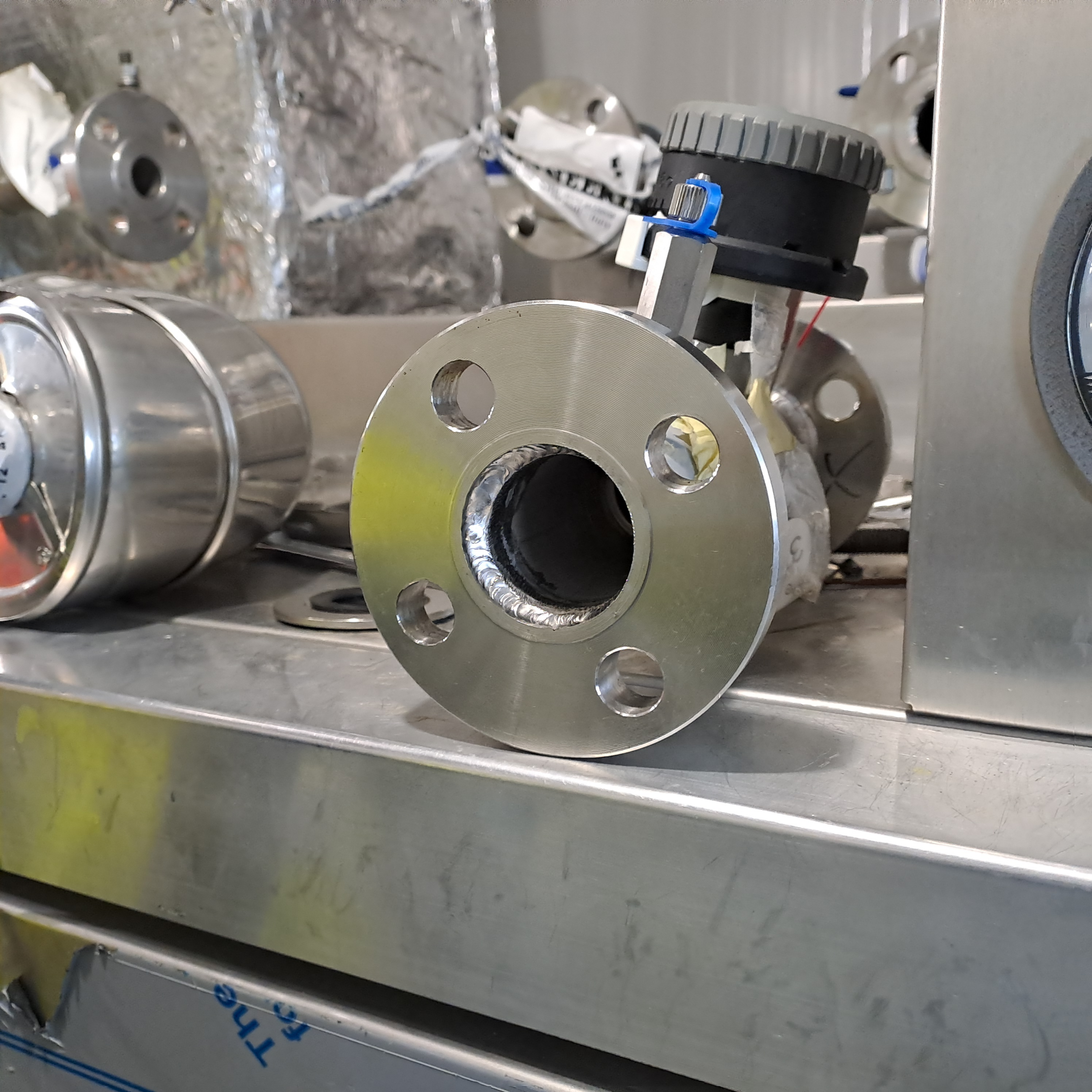
CROSSWIND DOC. Nr.: FORES-INN-BPH-DWG-00024

ISO Nr.: 05

SHEET - OF: 1 / 1

COMP.: C.B.

File Name:



Hydrogen Deoxo/Dryer

Type:	DEOR-500/36
Serial No:	A-23/24 140
Max pressure:	36 bar (g)
Voltage supply heaters:	400 V - 230V - 50 Hz
Voltage supply instruments:	24 VDC
Power consumption:	9kW
Year of manufacture:	2024

AQUAGAS

www.aquagas.se

Phone: +46 (0) 8

CE

JB-1

8146/1051
Terminal box Ex e
PTB 01 ATEX 1015
IECEx PTB 06.0046
Ex eb IIC T6 Gb
Ex tb IIIC T80°C Db
500 V
2,5 mm²
16 Ta: 20°C ... +40°C
IP66
10 A

⚠ WARNUNG! WARNING! AVERTISSEMENT!

Nicht unter Spannung öffnen.

Do not open when energized.

Ne pas ouvrir sous tension.

HPP-700-JB1

W-64-V1

W-64-V3

W-64-V12

HPP-700-JB3

UKCA 2503 ROSE Systemtechnik GmbH D-32457 Porta Westfalica ROSE

II 2G Ex eb IIC T6 Gb
II 2D Ex tb IIIC T85°C Db
-55°C ≤ Ta ≤ +40°C/+55°C
IP66

Type 06.161609
550 V
Imax =*)
10 mm²
F10120065
05.10.2023
Nicht unter Spannung öffnen / Do not open while energized
*) s. data sheet
CML 21UKEX1582

CE 2004 ROSE Systemtechnik GmbH D-32457 Porta Westfalica ROSE

II 2G Ex eb IIC T6 Gb
II 2D Ex tb IIIC T85°C Db
-55°C ≤ Ta ≤ +40°C/+55°C
IP66

Type 06.161609
550 V
Imax =*)
10 mm²
F10119833
05.10.2023
Nicht unter Spannung öffnen / Do not open while energized
*) s. data sheet
PTB 00 ATEX 1002
IECEx PTB 08.0004

ROSE Systemtechnik GmbH D-32457 Porta Westfalica ROSE

Ex eb IIC T6 Gb
Ex tb IIIC T85°C Db
-55°C ≤ Ta ≤ +40°C/+55°C
IP66

Type/ 06.161609
550 V
Imax =*)
10 mm²
F10119849
05.10.2023
Nicht unter Spannung öffnen / Do not open while energized
*) s. data sheet
CN 2023312303000725

nVent
RAYCHEM
JB-EX-40-EP
EAC Ex

Do not open while energised !
Ne pas ouvrir sous tension !
Nicht unter Spannung öffnen !
Niet openen onder spanning !
Non aprire sotto tensione !
Ala avaa virran ollessa kytkettyna !
Не открывать под напряжением !

nVent Thermal Belgium N.V.
PN 1244-000505 SAL-40 03/19

HPP-700-JB1

W-64-V12

BASE LOAD POWER HUB (BLPH)

"SG-100D1" HV SWBD 6,6kV

ELECTRICAL
SINGLE LINE DIAGRAM

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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+					
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

DWG n° : 231151/SD/10
Item n° : PF1113279/4

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-100D1"
ELECTRICAL SINGLE LINE DIAGRAM
Cover

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 001

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

INDEX

Sheet	Description	Revision 0	1	2	3	4	5	6	7	8
001	Cover / ELECTRICAL SINGLE LINE DIAGRAM									
002	Index / ELECTRICAL SINGLE LINE DIAGRAM									
003	Acronyms Legend / ELECTRICAL SINGLE LINE DIAGRAM									
004	Column A1: Electrolyser Package A-20000 / ELECTRICAL SINGLE LINE DIAGRAM									
005	Column A2 : Solar Package TR-200ED1 / ELECTRICAL SINGLE LINE DIAGRAM									
006	Column A3 : Bess Package A-85000 / ELECTRICAL SINGLE LINE DIAGRAM									
007	Column A4 : Auxiliary Transformer TR-200DE1 / ELECTRICAL SINGLE LINE DIAGRAM									
008	Column A5 : Measure / ELECTRICAL SINGLE LINE DIAGRAM									
009	Column A6 : Incoming TR-100AD1 / ELECTRICAL SINGLE LINE DIAGRAM									
010	Column A7 : Fuel Cell Package A-80000 / ELECTRICAL SINGLE LINE DIAGRAM									

Sheet	Description	Revision 0	1	2	3	4	5	6	7	8

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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+					
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
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0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

DWG n° : 231151/SD/10

Item n° : PF1113279/4

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Index

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 002

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

ACRONIMUS LEGEND

ITEM	DESCRIPTION
BB	ARC SENSOR PROTECTION ON MAIN BUS BARS
BGE	EARTHING SWITCH
C1	VOLTAGE PRESENCE
CB	ARC SENSOR PROTECTION ON C.B. / CONTACTOR COMPARTMENT
CC	ARC SENSOR PROTECTION ON CABLE COMPARTMENT
DCO	DOUBLE COMMAND OPERATED CONTACTOR
DI3	UNDERVOLTAGE CONTACTOR
DP1	ALARM RELAY MODULE TEMPERATURE
E1	INTERNAL LIGHT
E8	RESISTOR FERRO-RESONANCE
EH1	INTERNAL SPACE HEATER
Fn	MV FUSE
FP1	PROTECTION RELAY
GS1	DC/DC CONVERTER
HGR	THERMOSTAT
Kn	AUXILIARY RELAY
K1	MV CONTACTOR
K86	BLOCK RELAY
KT1	DE-ENERGIZATION TIMER
LS	MICRO SWITCH ON AUXILIARY DOOR
MAS	MOTOR SPRING CHARGER
MBC	CLOSING COIL
MBO1	OPENING COIL
MBU	UNDERVOLTAGE
ODn	VOLTAGE DISCHARGER
PU1	MEASURING VOLTAGE INSTRUMENT
PTT	V.T. TRUCK
QM	MV CIRCUIT-BREAKER
QDn	M.C.B. CIRCUITS PROTECTION

ITEM	DESCRIPTION
QVn	M.C.B FOR V.T. PROTECTION
RLE1	COIL FOR CONSET CLOSING CIRCUIT-BREAKER
RLE2	COIL FOR UNLOCKING RACK-IN/OUT OPERATION
RLE3	COIL FOR UNLOCKING OPERATION EARTHING
RLE4	COIL FOR UNLOCKING ENCLOSURE DOOR OPERATION
SU1	VOLTAGE SELECTOR
SWH...	ETHERNET SWITCH
TI-Ln	CURRENT TRANSFORMER
TO	OMOPOLAR RING CURRENT TRANSFORMER
TR1	TEMPERATURE CONTROL DEVICE

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
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0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

DWG n° : 231151/SD/10

Item n° : PF1113279/4

CROSSWIND

ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Acronyms Legend

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 003

REV. 04

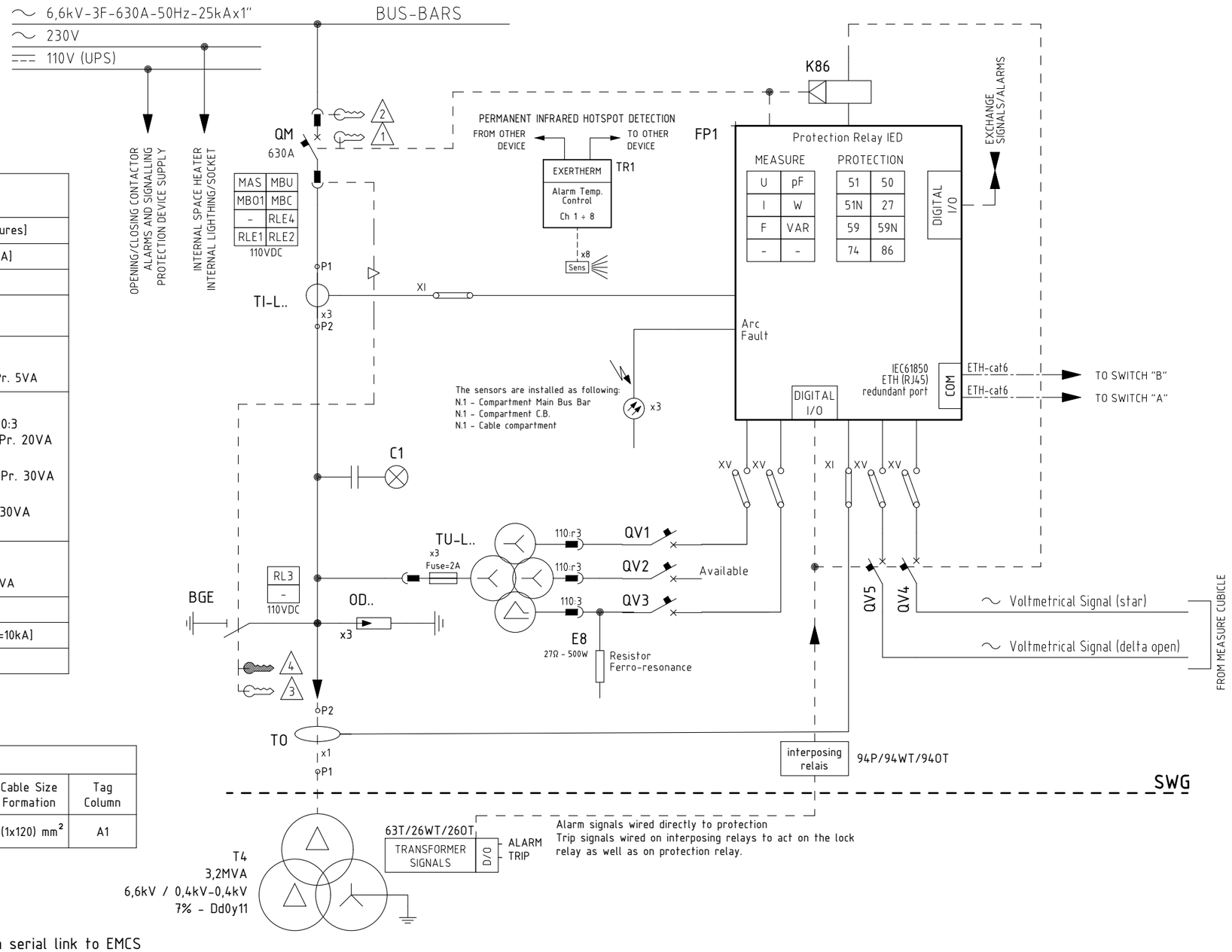
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

SINGLE LINE DIAGRAM
"CB FEEDER"

LEGEND:

- Free key with opened Circuit Breaker (Circuit Breaker locked in open position)
- Free key with insolated Circuit Breaker or Contactor (Circuit Breaker or Contactor locked in isolated position)
- Free key with opened Earthing Switch (Earthing Switch locked in open position)
- Free key with closed Earthing Switch (Earthing Switch locked in close position)
- Mechanical interlock



MAIN EQUIPMENT
[Additional Features and Auxiliary Components will be inserted on Functional Diagram]

Tag	Desciption Tag	Supplier	Type [Technical Features]
QM	Circuit Breaker	ABB	VD4/P [12KV - 630A - 25kA]
BGE	Earthing Switch	ABB	ST-E [12KV - 25kA]
FP1	Protection Relay	ABB	REX640
TI-L..	Current Transformers	ESITAS	ATB 10-BS 7,2kV - 400/1 - 25kA 1°winding : Cl. 0,5+5P20 - Pr. 5VA
TU-L..	Voltage Transformers + Fuses	ABB	TJP4.3 [7,2kV - 6,6kV:√3/110:√3-110:√3-110:3 1° winding : Cl. 0,5-3P - Pr. 20VA (110:√3) 2° winding : Cl. 0,5-3P - Pr. 30VA (110:√3) 3° winding : Cl. 3P - Pr. 30VA (110:3)
TO	Omopolar Ring Current Transformer (Internal Diameter 150mm)	ESITAS	KAP-150/250-55 1.2kV - 100/1A - 25kA 1° winding : Cl. 5P5 - Pr. 5VA
TR1	Permanent Infrared Hotspot Detection	EXERTHERM	
OD..	Voltage Discharger	DEHN	SBKW 9/DH I-0 [Ur=9kV-In=10kA]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS

Tag User	Desciption User	User Power	Current Transformer Ratio	Cable Size Formation	Tag Column
A-20000	ELECTROLYSER PACKAGE	3200 kVA	400 / 1A	3(1x120) mm²	A1

NOTE :

For ELECTROLYSER PAKAGE feeder interlocks and intertrips will be managed via serial link to EMCS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

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DWG n° : 231151/SD/10
Item n° : PF1113279/4

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Column A1: Electrolyser Package A-20000

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 004

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

LEGEND:

1 Free key with opened Circuit Breaker
(Circuit Breaker locked in open position)

2 Free key with insolated Circuit Breaker or Contactor
(Circuit Breaker or Contactor locked in isolated position)

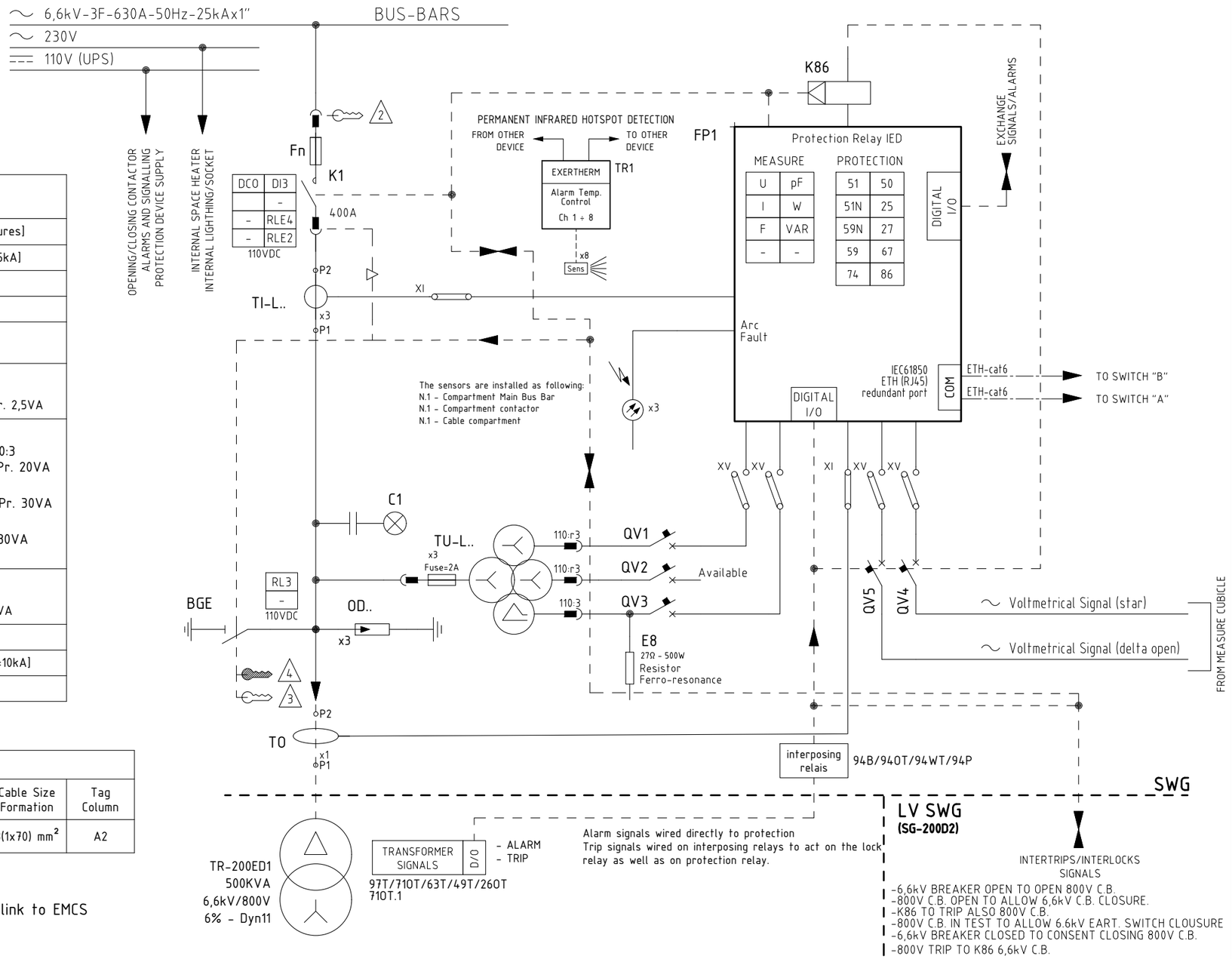
3 Free key with opened Earthing Switch
(Earthing Switch locked in open position)

4 Free key with closed Earthing Switch
(Earthing Switch locked in close position)

▷ Mechanical interlock

DCO DOUBLE COMMAND OPERATED

SINGLE LINE DIAGRAM
"FEEDER with CONTACTOR"



MAIN EQUIPMENT

[Additional Features and Auxiliary Components will be inserted on Functional Diagram]

Tag	Desciption Tag	Supplier	Type [Technical Features]
K1	Contactor	ABB	VSC7/P [7,2KV - 400A - 25kA]
Fn	Fuse for Contactor	ABB	CEF 63A
BGE	Earthing Switch	ABB	ST-E [12KV - 25kA]
FP1	Protection Relay	ABB	REX640
TI-L..	Current Transformers	ESITAS	ATB 10-BS 7,2kV - 50/1 - 25kA 1°winding : Cl. 0,5+5P15 - Pr. 2,5VA
TU-L..	Voltage Transformers + Fuses	ABB	TJP4.3 [7,2kV - 6,6kV:√3/110:√3-110:√3-110:3 1° winding : Cl. 0,5-3P - Pr. 20VA (110:√3) 2° winding : Cl. 0,5-3P - Pr. 30VA (110:√3) 3° winding : Cl. 3P - Pr. 30VA (110:3)
TO	Omopolar Ring Current Transformer (Internal Diameter 150mm)	ESITAS	KAP-150/250-55 1.2kV - 100/1A - 25kA 1° winding : Cl. 5P5 - Pr. 5VA
TR1	Permanent Infrared Hotspot Detection	EXERTHERM	
OD..	Voltage Discharger	DEHN	SBKW 9/DH I-0 [Ur=9kV-In=10kA]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS

Tag User	Desciption User	User Power	Current Transformer Ratio	Cable Size Formation	Tag Column
TR-200ED1	SOLAR PACKAGE	480KW	50 / 1A	3(1x70) mm²	A2

NOTE :

For SOLAR PACKAGE feeder interlocks and intertrips will be managed via serial link to EMCS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

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DWG n° : 231151/SD/10
Item n° : PF1113279/4

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Column A2 : Solar Package TR-200ED1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 005

REV. 04

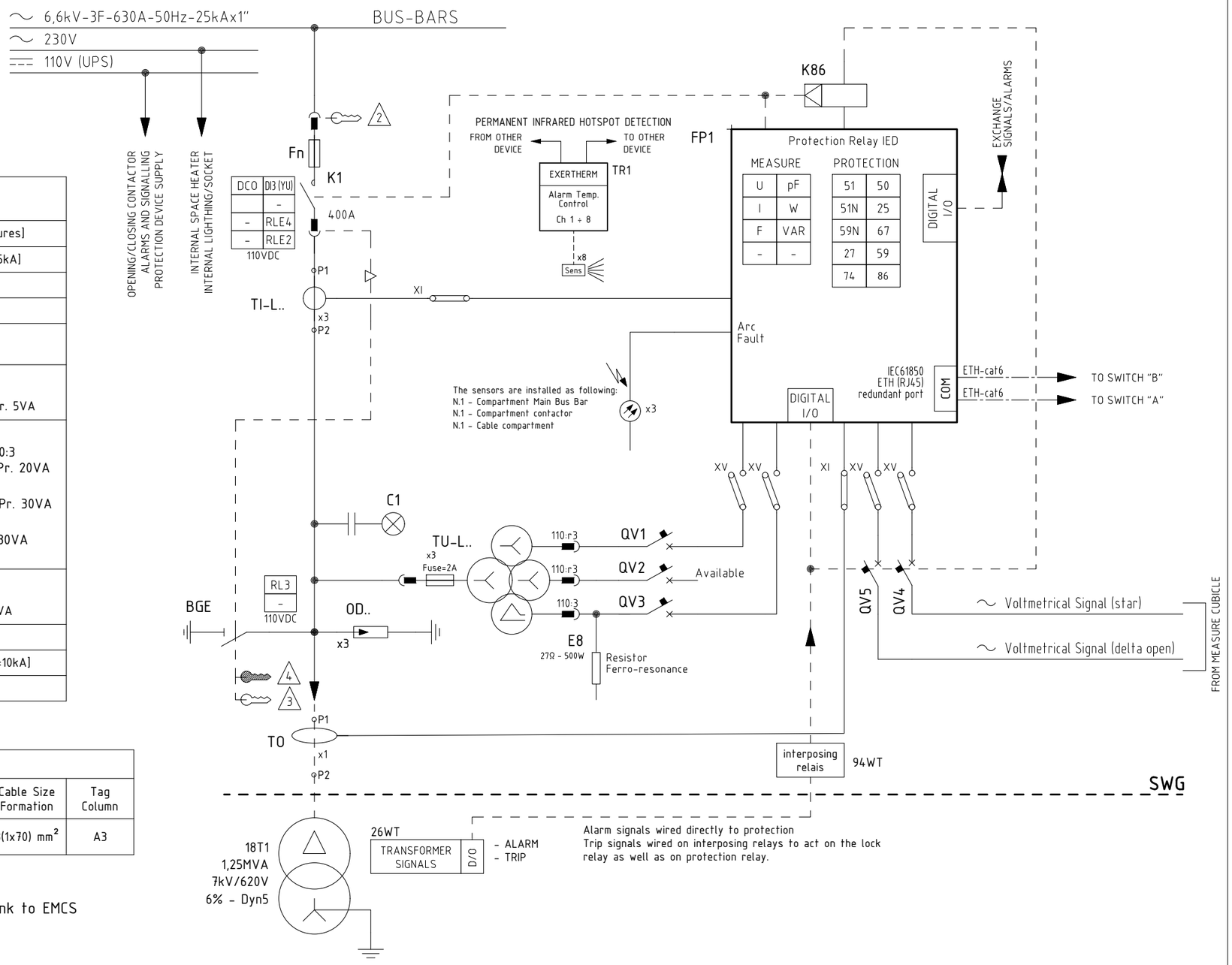
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

LEGEND:

- Free key with opened Circuit Breaker (Circuit Breaker locked in open position)
- Free key with insolated Circuit Breaker or Contactor (Circuit Breaker or Contactor locked in isolated position)
- Free key with opened Earthing Switch (Earthing Switch locked in open position)
- Free key with closed Earthing Switch (Earthing Switch locked in close position)
- Mechanical interlock
- DCO DOUBLE COMMAND OPERATED

SINGLE LINE DIAGRAM
"FEEDER with CONTACTOR"



MAIN EQUIPMENT

[Additional Features and Auxiliary Components will be inserted on Functional Diagram]

Tag	Desciption Tag	Supplier	Type [Technical Features]
K1	Contactor	ABB	VSC7/P [7,2KV - 400A - 25kA]
Fn	Fuse for Contactor	ABB	CEF 160A
BGE	Earthing Switch	ABB	ST-E [12KV - 25kA]
FP1	Protection Relay	ABB	REX640
TI-L..	Current Transformers	ESITAS	ATB 10-BS 7,2kV - 150/1 - 25kA 1°winding : Cl. 0,5+5P20 - Pr. 5VA
TU-L..	Voltage Transformers + Fuses	ABB	TJP4.3 [7,2kV - 6,6kV:√3/110:√3-110:√3-110:3 1° winding : Cl. 0,5-3P - Pr. 20VA (110:√3) 2° winding : Cl. 0,5-3P - Pr. 30VA (110:√3) 3° winding : Cl. 3P - Pr. 30VA (110:3)
TO	Omopolar Ring Current Transformer (Internal Diameter 150mm)	ESITAS	KAP-150/250-55 1.2kV - 100/1A - 25kA 1° winding : Cl. 5P5 - Pr. 5VA
TR1	Permanent Infrared Hotspot Detection	EXERTHERM	
OD..	Voltage Discharger	DEHN	SBKW 9/DH I-0 [Ur=9kV-In=10kA]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS

Tag User	Desciption User	User Power	Current Transformer Ratio	Cable Size Formation	Tag Column
A-85000	BESS PACKAGE	1000 kW	150 / 1A	3(1x70) mm²	A3

NOTE :

For BESS PACKAGE feeder interlocks and intertrips will be managed via serial link to EMCS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

DWG n° : 231151/SD/10
Item n° : PF1113279/4

IMESA ELECTRICAL ENGINEERING
CROSSWIND
ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Column A3 : Bess Package A-85000

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 006

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

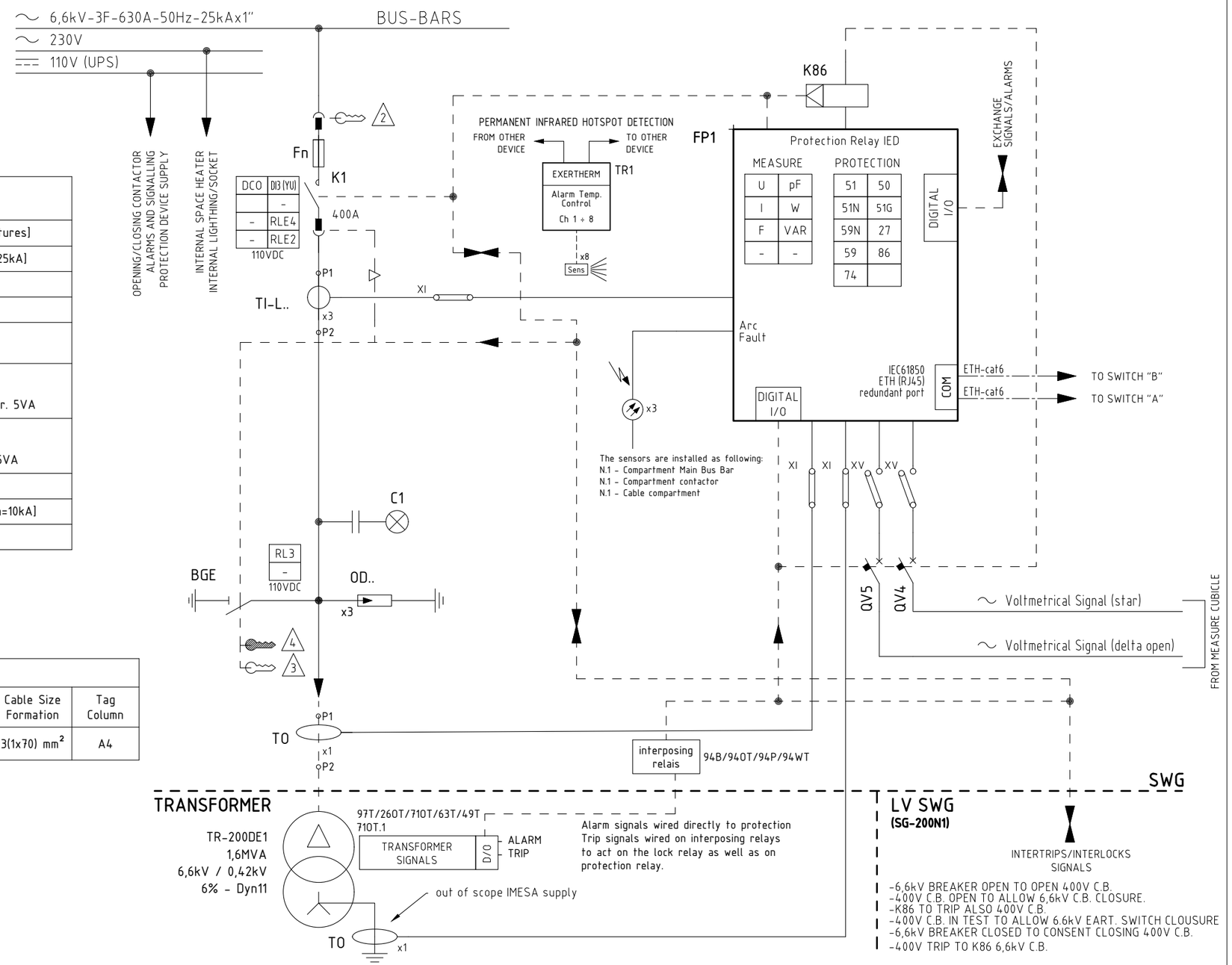
SINGLE LINE DIAGRAM
"TRANSFORMER"

LEGEND:

- Free key with opened Circuit Breaker (Circuit Breaker locked in open position)
- Free key with insolated Circuit Breaker or Contactor (Circuit Breaker or Contactor locked in isolated position)
- Free key with opened Earthing Switch (Earthing Switch locked in open position)
- Free key with closed Earthing Switch (Earthing Switch locked in close position)
- ▷ Mechanical interlock
- DCO DOUBLE COMMAND OPERATED

MAIN EQUIPMENT [Additional Features and Auxiliary Components will be inserted on Functional Diagram]			
Tag	Desciption Tag	Supplier	Type [Technical Features]
K1	Contactor	ABB	VSC7/P [7,2KV - 400A - 25kA]
Fk	Fuse for Contactor	ABB	CMF 250A
BGE	Earthing Switch	ABB	ST-E [12KV - 25kA]
FP1	Protection Relay	ABB	REX640
TI-L..	Current Transformers	ESITAS	ATB 10-BS 7,2kV - 200/1 - 25kA 1°winding : Cl.0,5+5P20 - Pr. 5VA
TO	Omopolar Ring Current Transformer (Internal Diameter 150mm)	ESITAS	KAP-150/250-95 1.2kV - 100/1A - 25kA 1° winding : Cl. 5P5 - Pr. 5VA
TR1	Permanent Infrared Hotspot Detection	EXERTHERM	
OD..	Voltage Discharger	DEHN	SBKW 9/DH I-0 [Ur=9kV-In=10kA]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS					
Tag User	Desciption User	User Power	Current Transformer Ratio	Cable Size Formation	Tag Column
TR-200DE1	TRANSFORMER 1.6MVA	1.6 MVA	200 / 1A	3(1x70) mm²	A4



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

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DWG n° : 231151/SD/10

Item n° : PF1113279/4

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Column A4 : Auxiliary Transformer TR-200DE1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 007

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

SINGLE LINE DIAGRAM
"MEASURING BUS BAR"

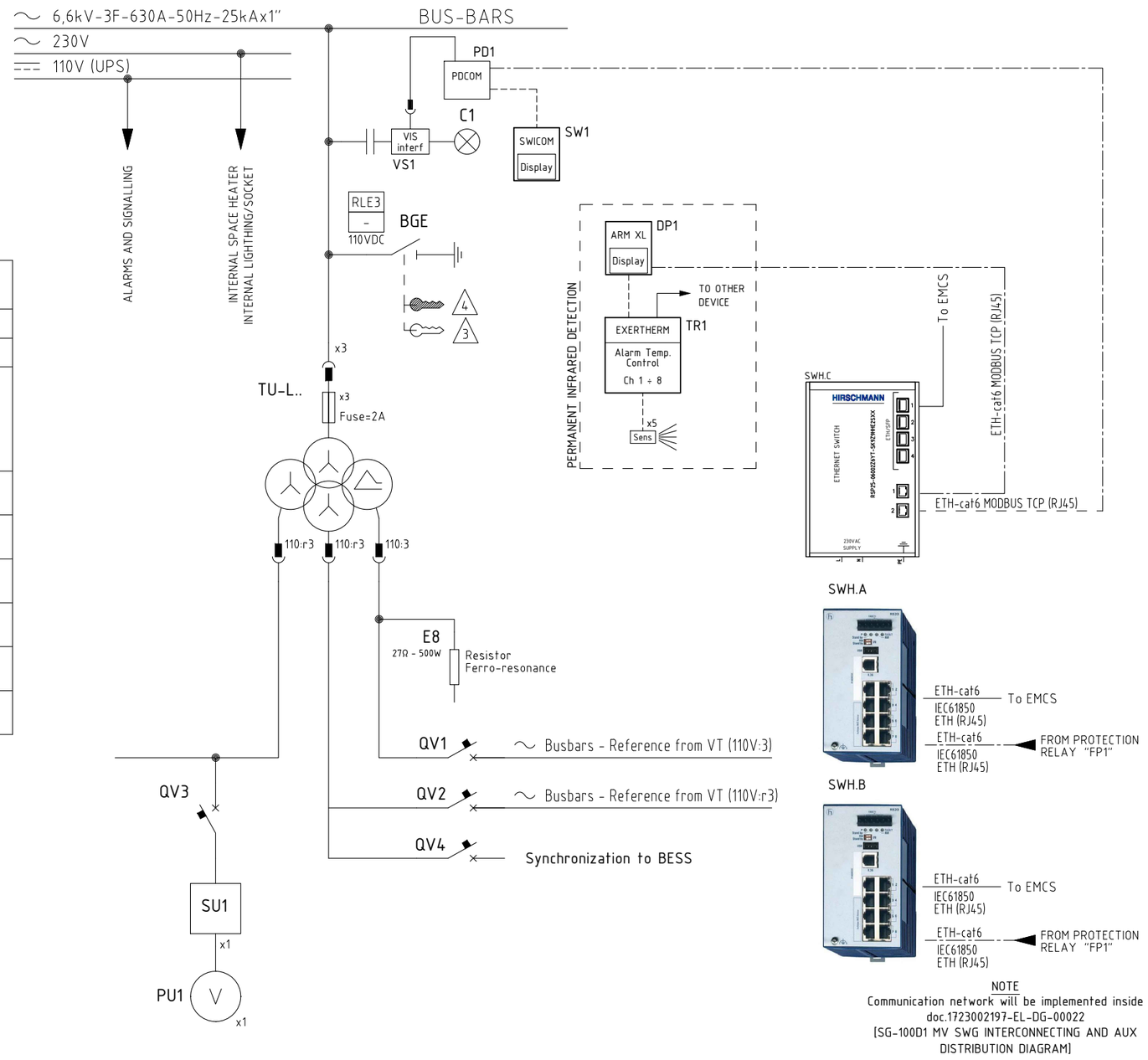
LEGEND:

Free key with opened Earthing Switch
(Earthing Switch locked in open position)

Free key with closed Earthing Switch
(Earthing Switch locked in close position)

MAIN EQUIPMENT [Additional Features and Auxiliary Components will be inserted on Functional Diagram]			
Tag	Desciption Tag	Supplier	Type [Technical Features]
BGE	Earthing Switch	ABB	ST-E [17,5KV - 31,5kA]
TU-L..	Voltage Transformers + Fuses	ABB	TJP4.3 [7,2kV - 6,6kV:√3/110:√3-110:√3-110:3 1° winding : Cl. 0,5-3P - Pr. 20VA (110:√3) 2° winding : Cl. 0,5-3P - Pr. 30VA (110:√3) 3° winding : Cl. 3P - Pr. 30VA (110:3)
PU1	Voltmeter	FRER	F96EVXYYYXC1 96x96 90° SCALE 0÷10kV on VT 6,6kV/110V
VS1+PD1	Partial Discharge Condition Monitoring	ABB	PDCOM Interface + PDCOM
TR1+DP1	Permanent Infrared Hotspot Detection	EXERTHERM	
SW1	Monitoring Unit for Partial Discharge	ABB	SWICOM
SWH.n	Managed Ethernet Switch Device	ABB	AFS660 [n°3 SFP ports + n°8 RJ45 ports]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS					
Tag User	Desciption User	User Power	Voltage Transformer Ratio	Cable Size Formation	Tag Column
-	MEASURING	N.A.	6,6kV:√3 110:√3-110:√3-110:3	-	A5



NOTE
Communication network will be implemented inside doc.1723002197-EL-DG-00022 [SG-100D1 MV SWG INTERCONNECTING AND AUX DISTRIBUTION DIAGRAM]

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
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1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING
DWG n° : 231151/SD/10
Item n° : PF1113279/4

CROSSWIND
ROSETTI MARINO

TITLE : "SG-100D1"
ELECTRICAL SINGLE LINE DIAGRAM
Column A5 : Measure

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : NTS

A3
DRAWING NO. 1723002197-EL-DG-00010
SHEET 008
REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

SINGLE LINE DIAGRAM
"INCOMER"

LEGEND:

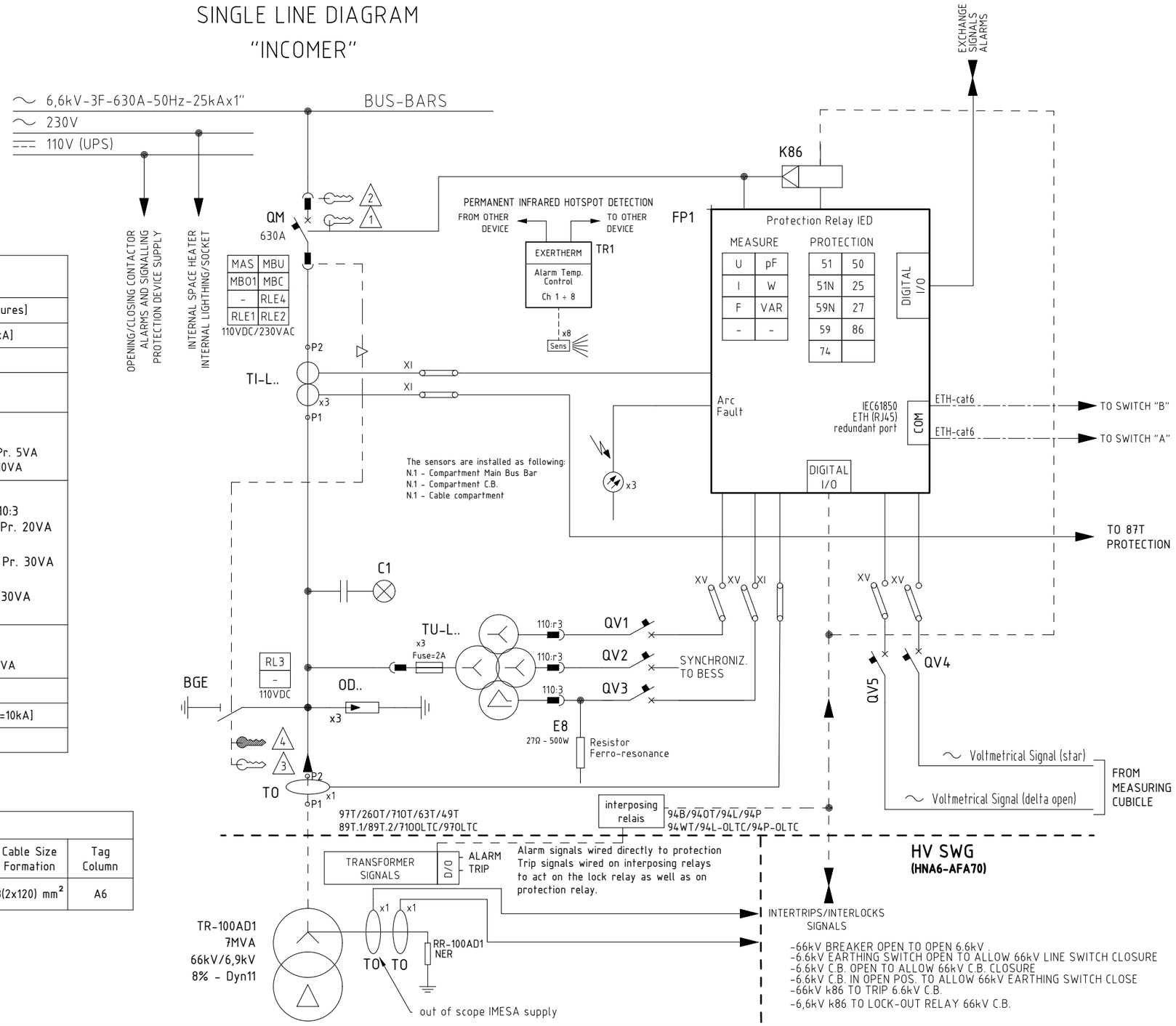
- Free key with opened Circuit Breaker (Circuit Breaker locked in open position)
- Free key with insolated Circuit Breaker or Contactor (Circuit Breaker or Contactor locked in isolated position)
- Free key with opened Earthing Switch (Earthing Switch locked in open position)
- Free key with closed Earthing Switch (Earthing Switch locked in close position)
- Mechanical interlock

MAIN EQUIPMENT
[Additional Features and Auxiliary Components will be inserted on Functional Diagram]

Tag	Desciption Tag	Supplier	Type [Technical Features]
QM	Circuit Breaker	ABB	VD4/P [12KV - 630A - 25kA]
BGE	Earthing Switch	ABB	ST-E [12KV - 25kA]
FP1	Protection Relay	ABB	REX640
TI-L..	Current Transformers	ESITAS	ATB 10-BS 7,2kV - 600/1-1 - 25kA 1°winding : Cl. 0,5+5P20 - Pr. 5VA 2°winding : Cl. 5P25 - Pr. 10VA
TU-L..	Voltage Transformers + Fuses	ABB	TJP4.3 [7,2kV - 6,6kV:√3/110:√3-110:√3-110:3 1° winding : Cl. 0,5-3P - Pr. 20VA (110:√3) 2° winding : Cl. 0,5-3P - Pr. 30VA (110:√3) 3° winding : Cl. 3P - Pr. 30VA (110:3)
TO	Omopolar Ring Current Transformer (Internal Diameter 150mm)	ESITAS	KAP-150/250-55 1.2kV - 100/1A - 25kA 1° winding : Cl. 5P5 - Pr. 5VA
TR1	Permanent Infrared Hotspot Detection	EXERTHERM	
OD..	Voltage Discharger	DEHN	SBKW 9/DH I-0 [Ur=9kV-In=10kA]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS

Tag User	Desciption User	User Power	Current Transformer Ratio	Cable Size Formation	Tag Column
TR-100AD1	INCOMING	7 MVA	600 / 1A	3(2x120) mm²	A6



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

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DWG n° : 231151/SD/10
Item n° : PF1113279/4

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Column A6 : Incoming TR-100AD1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 009

REV. 04

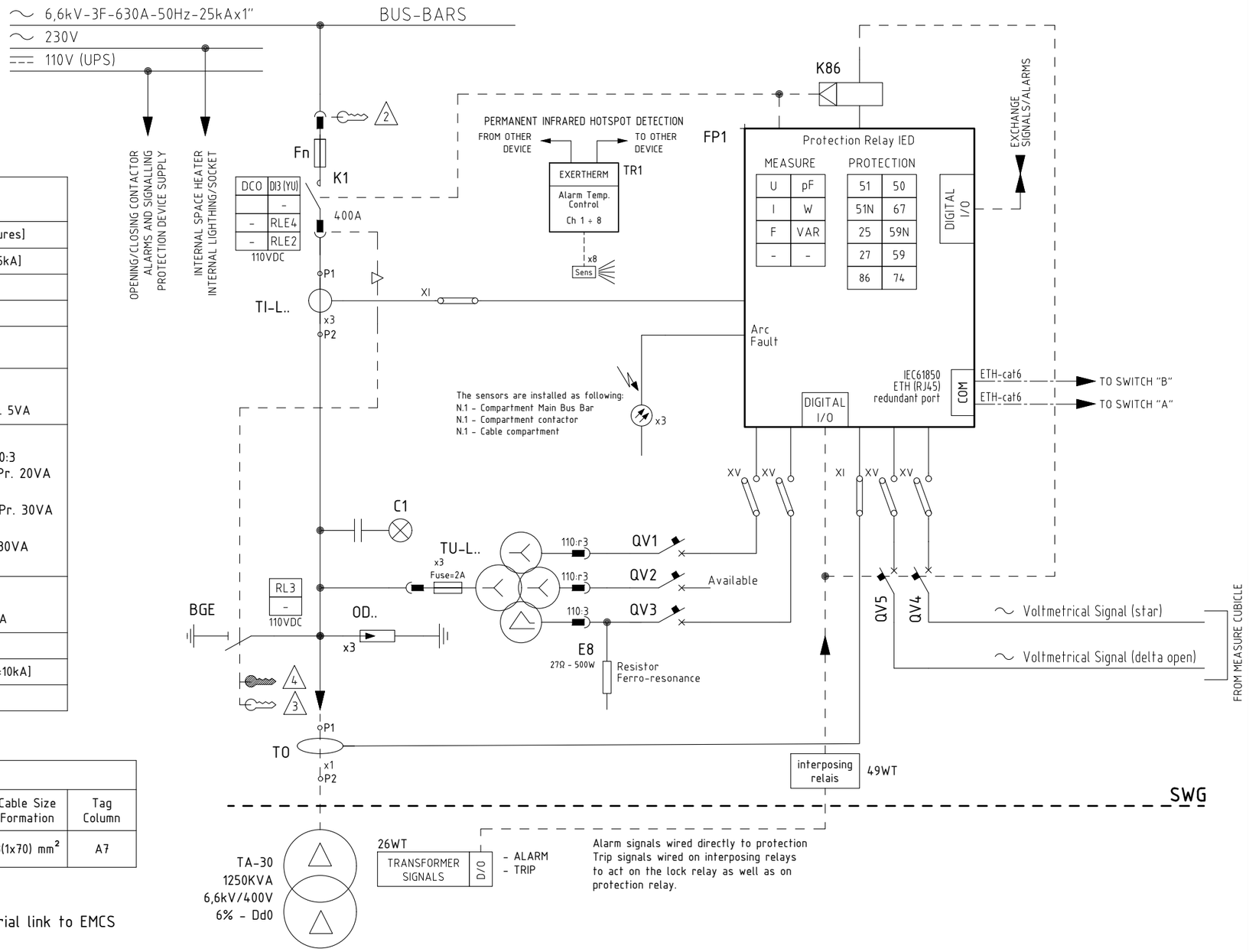
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

LEGEND:

- 1 Free key with opened Circuit Breaker (Circuit Breaker locked in open position)
- 2 Free key with insolated Circuit Breaker or Contactor (Circuit Breaker or Contactor locked in isolated position)
- 3 Free key with opened Earthing Switch (Earthing Switch locked in open position)
- 4 Free key with closed Earthing Switch (Earthing Switch locked in close position)
- ▷ Mechanical interlock
- DCO DOUBLE COMMAND OPERATED

SINGLE LINE DIAGRAM
"FEEDER with CONTACTOR"



MAIN EQUIPMENT
[Additional Features and Auxiliary Components will be inserted on Functional Diagram]

Tag	Desciption Tag	Supplier	Type [Technical Features]
K1	Contactor	ABB	VSC7/P [7,2KV - 400A - 25kA]
Fn	Fuse for Contactor	ABB	CEF 160A
BGE	Earthing Switch	ABB	ST-E [12KV - 25kA]
FP1	Protection Relay	ABB	REX640
TI-L..	Current Transformers	ESITAS	ATB 10-BS 7,2kV - 150/1 - 25kA 1°winding : Cl.0,5+5P20 - Pr. 5VA
TU-L..	Voltage Transformers + Fuses	ABB	TJP4.3 [7,2kV - 6,6kV:√3/110:√3-110:√3-110:3 1° winding : Cl. 0,5-3P - Pr. 20VA (110:√3) 2° winding : Cl. 0,5-3P - Pr. 30VA (110:√3) 3° winding : Cl. 3P - Pr. 30VA (110:3)
TO	Omopolar Ring Current Transformer (Internal Diameter 150mm)	ESITAS	KAP-150/250-55 1.2kV - 100/1A - 25kA 1° winding : Cl.5P5 - Pr. 5VA
TR1	Permanent Infrared Hotspot Detection	EXERTHERM	
OD..	Voltage Discharger	DEHN	SBKW 9/DH I-0 [Ur=9kV-In=10kA]
C1	Voltage Presence Indicator	ABB	VPIS [3÷24kV]

USER DETAILS

Tag User	Desciption User	User Power	Current Transformer Ratio	Cable Size Formation	Tag Column
A-80000	FUEL CELL PACKAGE	1000 kW	150 / 1A	3(1x70) mm²	A7

NOTE :

For FUEL CELL PACKAGE feeder interlocks and intertrips will be managed via serial link to EMCS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	08/08/2024	Santinelli	Giulietti	Sigismondi	As-Built (ASB)
3	26/06/2024	Santinelli	Giulietti	Sigismondi	Accepted for Construction (AFC)
2	14/05/2024	Santinelli	Giulietti	Sigismondi	Issued for review (IFR)
1	14/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	07/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

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DWG n° : 231151/SD/10
Item n° : PF1113279/4

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-100D1"

ELECTRICAL SINGLE LINE DIAGRAM
Column A7 : Fuel Cell Package A-80000

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00010

SHEET 010

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00010 Rev. 04

Commissioning Query Form

		QUERY NUMBER	CQ-001			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**	**Crosswind**			
		DISCIPLINE:	**Piping/Process**	LOCATION:	**Electrolyser**	
		WORKPACK REF:	**Fores Leak Test Pack 3**			
		SYSTEM:**20-00**		SUB SYSTEM:	N/A	
			Print: John Mackillop	*Sign:*	*Date:* 14.01.24	
		DESCRIPTION OF QUERY				
		Proposed change of test medium for Fores GALT from Nitrogen to air, this is seen as a safer option at this stage of the project, it will also reduce the areas to be barriered off.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		Please see attached documents in email				
		PROPOSED SOLUTION				
		Use air instead of Nitrogen				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-001*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Piping**	LOCATION:	**ElectrolyPlease see attached in meser**	
		WORKPACK REF:	**Fores Leak Test Pack 3**			
		SYSTEM:20-00		SUB SYSTEM:	N/A	
			Print: John Mackillop	*Sign:*	*Date:*	
		DESCRIPTION OF QUERY				
		Proposed change of test medium for fores GALT from Nitrogen to air, this is seen as a safer option at this stage of the project, it will also reduce the areas to be barriered off.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		Please see attached documents in email				
		PROPOSED SOLUTION				
		Use air instead of Nitrogen				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				

		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

CROSSWIND
ROSETTI MARINO

		QUERY NUMBER	CQ-002			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**	**Crosswind**			
		DISCIPLINE:	**Electrical**	LOCATION:	**Electrolyser**	
		WORKPACK REF:	**N/A**			
		SYSTEM:**20-00**		SUB SYSTEM:	N/A	
			Print: John Mackillop	*Sign:*	*Date:* 13.02.25	
		DESCRIPTION OF QUERY				
		Proposed change of power cable plastic glands on the Aquagas skid to EX rated due to WP3 being Atex zone 2.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		Please see attached photo's in email				
		PROPOSED SOLUTION				
		Change to EX certified glands				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:* S. Mackillop	*Sign:*	*Date:* 13-2-25
		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		***ENGINEERING TECHNICAL RESPONSE***				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-005*		
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**			
		DISCIPLINE:	**Process / HVAC / Supply Chain**	LOCATION:	**Electrolyser**
		WORKPAC K REF:	**HVAC (Paumier) System.**		
		SYSTEM:20-00	*Electrolyser*	SUB SYSTEM:	HVAC
			Print: Gerry MCann	*Sign:*	*Date: 18.02.25*
		DESCRIPTION OF QUERY			
		Prior to commencing Gross Air Leak Test (GALT) lines the system was checked (as per normal practice) and GALT commenced. During GALT there were a few joints found to be leaking, including those at the valve flange to piping interface for MV-319. On further inspection / check of MV-319 the following has been found: - 1 – The valve should have Raised face but doesn't. 2 – The valve size is DN32 when it should be DN25. 3 – The valve flange is ASME where the piping connection is ISO. Initial engagement has been had with Paumier who admit to supplying the wrong valve. Their current response is that replacement "could" be available in around 8 weeks, which is not a satisfactory solution for the project as by then we should have the electrolyser fully operational. *A Non-Conformance=Report has been raised by Elogen – reference number xxx (to be provided by Luc)*			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		See attached marked up sketch for solution B. *P&ID reference number C63-PID-001-010 (Page 10 of 16) title HVAC UNIT* *Valve Data Sheet number and tile (to be completed by Elogen)*			
		PROPOSED SOLUTION			
		Options that we require engineering and supply chain to explore: - A – soonest availability of suitable valve, either form Paumier or from elsewhere. B – To change the piping interface to add a coupling piece to allow fitting to the valve flanges – we suggest / request this be given due consideration for prompt response and agreement if possible for us at site to be able to proceed with acting on this proposal with view to getting GALT complete to confirm initial integrity of the completed fitting – see sketch attached to this CQ (Gerry / Luc to get from Luca) If we are to proceed with the use of the current (larger) valve Paumier to review and confirm any possible issues with the system and if they could be deemed acceptable.			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		

Commissioning Query Form

		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken her				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-005*		
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**			
		DISCIPLINE:	**Process / HVAC / Supply Chain**	LOCATION:	**Electrolyser**
		WORKPACK REF:	**HVAC (Paumier) System.**		
		SYSTEM:20-00	*Electrolyser*	SUB SYSTEM:	HVAC
			Print: Gerry MCann	*Sign:*	*Date: 18.02.25*
		DESCRIPTION OF QUERY			
		Prior to commencing Gross Air Leak Test (GALT) lines the system was checked (as per normal practice) and GALT commenced. During GALT there were a few joints found to be leaking, including those at the valve flange to piping interface for MV-319. On further inspection / check of MV-319 the following has been found: - 1 – The valve should have Raised face but doesn't. 2 – The valve size is DN32 when it should be DN25. 3 – The valve flange is ASME where the piping connection is ISO. Initial engagement has been had with Paumier who admit to supplying the wrong valve. Their current response is that replacement "could" be available in around 8 weeks, which is not a satisfactory solution for the project as by then we should have the electrolyser fully operational. *A Non-Conformance=Report has been raised by Elogen – reference number xxx (to be provided by Luc)*			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		See attached marked up sketch for solution B. *P&ID reference number C63-PID-001-010 (Page 10 of 16) title HVAC UNIT* *Valve Data Sheet number and tile (to be completed by Gerry / Luc)*			
		PROPOSED SOLUTION			
		Options that we require engineering and supply chain to explore: - A – soonest availability of suitable valve, either form Paumier or from elsewhere. B – To change the piping interface to add a coupling piece to allow fitting to the valve flanges – we suggest / request this be given due consideration for prompt response and agreement if possible for us at site to be able to proceed with acting on this proposal with view to getting GALT complete to confirm initial integrity of the completed fitting – see sketch attached to this CQ (Gerry / Luc to get from Luca) If we are to proceed with the use of the current (larger) valve Paumier to review and confirm any possible issues with the system and if they could be deemed acceptable.			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)	Y	*Print: BCA*	*Sign: BCA*	*Date: 10/03/2025*
		ENGINEERING TECHNICAL RESPONSE			
		ELOGEN accept the modification. The PID will present this update in As Built version: Adding 2 reducers DN25xDN32 + Flange ISO. Electrolyser Bill of Material is not impacted. But the bill of material of Paumier is. Paumier shall update his Bill of material taking it into account the modification. Information to be sent to Paumier.			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			

Commissioning Query Form

		REQUIRES CLARIFICATIONS (Y or N?)	**N**	IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print: BCA*	*Sign: BCA*	*Date: 10/03/2025*
		APPROVED DISCIPLINE LEAD (Y or N?)	Y	*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.	Y	*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)	Y	SBremner *Print:*	SBremner *Sign:*	15/03/2025 *Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken her				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)	Y	J.Mackillop *Print:*	John Mackillop *Sign:*	17/03/25 *Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)	Y	*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-009*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Instrument**	LOCATION:	**WTP/Electrolyser**	
		WORKPACK REF:				
		SYSTEM:20		SUB SYSTEM:	20-00	
			Print: John Mackillop	*Sign:*	*Date: 18.03.25*	
		DESCRIPTION OF QUERY				
		When there is no demand from the Ovivo Package the inlet valve will shut, this should in turn send a signal to Yokogawa that should in turn send a signal to the BLPH water treatment package to stop, however this is not currently implemented.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		PROPOSED SOLUTION				
		The proposed solution is to add a signal to the modbus register which flags when the command is sent to close the inlet valve. This signal should be used to stop the BLPH water treatment package. Further to this, to protect against overpressure and/or dead heading the WTP pumps, the manual drain valve at the Ovivo inlet should be remotely actuated to open when the inlet valve is closed.				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		

		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-010*		
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**			
		DISCIPLINE:	**Control**	LOCATION:	**Electrolyser**
		WORKPACK REF:			
		SYSTEM: 20		SUB SYSTEM:	20-00
			Print: Jamie McAllister	*Sign: JMcAllister*	*Date: 22.03.25*
		DESCRIPTION OF QUERY			
		When an emergency shutdown command is initiated from the electrolyser, the signal is sent to SIS which in turn shutdowns down all non-essential packages, the SIS will then only allow full reset once manual reset has been activated from the package and within a small amount of time accepted on the Scada which allows the SIS to clear the fault and subsequently allows all packages to be re-started. If the trip is not reset on the Scada, SIS then sends a Shutdown signal to the package which then loops back and maintains shutdown signal to all non-essential packages. The current configuration would require an operator to be on BLPH (offshore) and maintain communication with the remote-control operator (onshore) to allow both resets to be activated in the necessary time frame.		
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		PROPOSED SOLUTION			
		Allow overriding reset from remote operator if no faults persist in the system.			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		Martin Taylor *Print:*	*Sign: Martin Taylor* *Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:* *Date:*
		ENGINEERING TECHNICAL RESPONSE			
		>> Detail the technical discipline response to the above query and proposal here			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		>> List any attached sketches/information required to fully describe the response here			
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.	
		RESPONSE PREPARED BY:		*Print:*	*Sign:* *Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:* *Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:* *Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)	ATRAC No.:

		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-010*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Control**	LOCATION:	**Electrolyser**	
		WORKPACK REF:				
		SYSTEM: 20		SUB SYSTEM:	20-00	
			Print: Jamie McAllister	*Sign: JMcAllister*	*Date: 22.03.25*	
		DESCRIPTION OF QUERY				
		When an emergency shutdown command is initiated from the electrolyser, the signal is sent to SIS which in turn shutdowns down all non-essential packages, the SIS will then only allow full reset once manual reset has been activated from the package and within a small amount of time accepted on the Scada which allows the SIS to clear the fault and subsequently allows all packages to be re-started. If the trip is not reset on the Scada, SIS then sends a Shutdown signal to the package which then loops back and maintains shutdown signal to all non-essential packages. The current configuration would require an operator to be on BLPH (offshore) and maintain communication with the remote-control operator (onshore) to allow both resets to be activated in the necessary time frame.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		PROPOSED SOLUTION				
		Allow overriding reset from remote operator if no faults persist in the system.				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Sign: M Taylor*	*Date: 23/03/25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print: Paul Williamson*	*Sign:*	*Date:09.04.25*
		ENGINEERING TECHNICAL RESPONSE				
		Agreed, Elogen to configure package system to accept remote reset from BLPH control system in order to provide the basic level of functionality required by the project.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		None				
		REQUIRES CLARIFICATIONS (Y or N?)	**N**	IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print: Paul Williamson*	*Sign:*	*Date:09.04.25*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print: Thijs Philippo*	*Sign: TP*	*Date: 09/04/2025*

Commissioning Query Form

		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:	
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-018*		
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**			
		DISCIPLINE:	**Process**	LOCATION:	**WTP/WTP-Electrolyser**
		WORKPACK REF:	**A-20000 / A-50000**		
		SYSTEM: 20, 50		SUB SYSTEM:	20-00, 50-00
			Print: *Thijs Philippo*	*Sign:*	*Date: 07.04.25*
		DESCRIPTION OF QUERY			
		To ensure seamless operation of the electrolyser, a consistent water supply is required at its water inlet interface. The specifications for the water at the inlet include a steady feed at a flow rate of 0.81 m^3/hr at 4-6 barg. It is essential that this supply remains available at the specified conditions when the electrolyser is in operation but perhaps not consuming. Currently flows and pressures fluctuate and the package stops, then on restart a time delay is experienced whilst specification is achieved. For example, currently, when the electrolyser closes the inlet valve (1EBV1) due to conditions such as a full ultra-pure water tank, the PSC Water Treatment Package ceases operation, resulting in the loss of the required water specifications at the inlet (e.g., no flow and loss of pressure).			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		CQ-009 123A90-PML-PM-TQ-00023 C63-DLO-001 INTERFACES AND UTILITY LIST ROSMA-INN-BPH-DWG-00233 - WATER TREATMENT PACKAGE-PID DIAGRAM (PSC)			
		PROPOSED SOLUTION			
		We propose that RM investigates potential solutions to rectify the issue of maintaining the reliability of the water feed specifications when required by electrolyser. This may involve creating a bypass route to reject surplus water, thereby maintaining pressure and flow rate. Alternatively, optimizing the control logic within the PSC Water Treatment Package or by improving communication between the Water Treatment Packages of the Electrolyser.			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print:*	*Sign:* *Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:* *Date:*
		ENGINEERING TECHNICAL RESPONSE			
		>> Detail the technical discipline response to the above query and proposal here			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		>> List any attached sketches/information required to fully describe the response here			
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.	
		RESPONSE PREPARED BY:		*Print:*	*Sign:* *Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:* *Date:*

Commissioning Query Form

		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:	
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-019*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Process**	LOCATION:	**Electrolyser**	
		WORKPACK REF:				
		SYSTEM:20		SUB SYSTEM:	20-00	
			Print: John Mackillop	*Sign:*	*Date: 08.04.25*	
		DESCRIPTION OF QUERY				
		According to the commissioning procedure the 600 Oxygen lines are to be leak tested with a N2H2 mix. It has been requested by the Elogen site team to only use N2 as they do not want to put H2 through the Oxygen system				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		C063-ELO-PRO-CO-0004 Page 57 Leak test Pack 1				
		PROPOSED SOLUTION				
		Only use Nitrogen				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Sign:*	*Date: 09.04.25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				

Commissioning Query Form

		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-019*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Process**	LOCATION:	**Electrolyser**	
		WORKPACK REF:				
		SYSTEM:20		SUB SYSTEM:	20-00	
			Print: John Mackillop	*Sign:*	*Date: 08.04.25*	
		DESCRIPTION OF QUERY				
		According to the commissioning procedure the 600 Oxygen lines are to be leak tested with a N2H2 mix. It has been requested by the Elogen site team to only use N2 as they do not want to put H2 through the Oxygen system				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		C063-ELO-PRO-CO-0004 Page 57 Leak test Pack 1				
		PROPOSED SOLUTION				
		Only use Nitrogen				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Sign:*	*Date: 09.04.25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)	Y	*Print: HRO*	*Sign:*	*Date: 10/04/2025*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here ELOGEN approves this modification. The primary purpose of using the H2N2 mixture on the O2 circuit is to facilitate leak detection with a sniffer. CWD is authorized to proceed with N2 leak testing. Reverting to the H2N2 method may be required if leak detection proves too challenging				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)	**N**	IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print: HRO*	*Sign:*	*Date: 10/04/2025*
		APPROVED DISCIPLINE LEAD (Y or N?)	Y	*Print: HRO*	*Sign:*	*Date: 10/04/2025*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)	Dominik Sznajder	*Print:*	*Sign:*	10/04/2025 *Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)	**Y**	IF "NO", RETURN TO CROSSWIND WITH COMMENT		

Commissioning Query Form

		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print: LPA*	*Sign:* Luc Paoletti	*Date: 10/04/25*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:* John Mackillop	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-019*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Process**	LOCATION:	**Electrolyser**	
		WORKPACK REF:				
		SYSTEM:20		SUB SYSTEM:	20-00	
			Print: John Mackillop	*Sign:*	*Date: 08.04.25*	
		DESCRIPTION OF QUERY				
		According to the commissioning procedure the 600 Oxygen lines are to be leak tested with a N2H2 mix. It has been requested by the Elogen site team to only use N2 as they do not want to put H2 through the Oxygen system				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		C063-ELO-PRO-CO-0004 Page 57 Leak test Pack 1				
		PROPOSED SOLUTION				
		Only use Nitrogen				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Sign:*	*Date: 09.04.25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)	Y	*Print: HRO*	*Sign:*	*Date: 10/04/2025*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here ELOGEN approves this modification. The primary purpose of using the H2N2 mixture on the O2 circuit is to facilitate leak detection with a sniffer. CWD is authorized to proceed with N2 leak testing. Reverting to the H2N2 method may be required if leak detection proves too challenging				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)	**N**	IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print: HRO*	*Sign:*	*Date: 10/04/2025*
		APPROVED DISCIPLINE LEAD (Y or N?)	Y	*Print: HRO*	*Sign:*	*Date: 10/04/2025*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)	Dominik Sznajder	*Print:*	*Sign:*	10/04/2025 *Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)	**Y**	IF "NO", RETURN TO CROSSWIND WITH COMMENT		

Commissioning Query Form

		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print: LPA*	*Sign:* Luc Paoletti	*Date: 10/04/25*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-020*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Electrical**	LOCATION:	**Electolyser**	
		WORKPACK REF:				
		SYSTEM:20		SUB SYSTEM:	20-00	
			Print: John Mackillop	*Sign:*	*Date: 10.04.25*	
		DESCRIPTION OF QUERY				
		During commissioning of the Electrolyser 6.6kv TX T4 with Nidec it was noticed that the surge arrestors that are required to be installed on the Tx HV side were the wrong specification, it was agreed that the initial energisation could take place as no load would be introduced and the new surge arrestors fitted when they arrived. However the lead time on these is longer than expected, so they will not arrive in time for Tx energisation with load.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		C63-NID-QIX-002_FAT_TRANSFORMER_NIDEC_REV01 page 34 C63–NID-ELO–SLD01 _ NIDEC - SINGLE LINES DIAGRAM _ 00 (5) NIDEC_TOD3176.V001_GAD of Transformer (including Cable box)_Rev01 1723002197-EL-DG-00010 REV.04 Page 4				
		PROPOSED SOLUTION				
		Use Tx on load without surge arrestor, then install surge arrestors when they arrive				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Sign:*	*Date:10.04.25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-020*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Electrical**	LOCATION:	**Electolyser**	
		WORKPACK REF:				
		SYSTEM:20		SUB SYSTEM:	20-00	
			Print: John Mackillop	*John Mackillop Sign:*	*Date: 10.04.25*	
		DESCRIPTION OF QUERY				
		During commissioning of the Electrolyser 6.6kv TX T4 with Nidec it was noticed that the surge arrestors that are required to be installed on the Tx HV side were the wrong specification, it was agreed that the initial energisation could take place as no load would be introduced and the new surge arrestors fitted when they arrived. However the lead time on these is longer than expected, so they will not arrive in time for Tx energisation with load.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		C63-NID-QIX-002_FAT_TRANSFORMER_NIDEC_REV01 page 34 C63–NID-ELO–SLD01 _ NIDEC - SINGLE LINES DIAGRAM _ 00 (5) NIDEC_TOD3176.V001_GAD of Transformer (including Cable box)_Rev01 1723002197-EL-DG-00010 REV.04 Page 4				
		PROPOSED SOLUTION				
		Use Tx on load without surge arrestor, then install surge arrestors when they arrive				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Martin Taylor Sign:*	*Date:10.04.25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*

SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-021*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Instrument**	LOCATION:	**Electolyser**	
		WORKPACK REF:				
		SYSTEM:63		SUB SYSTEM:	20-00	
			Print: John Mackillop	*Sign:*	*Date: 11.04.25*	
		DESCRIPTION OF QUERY				
		Could it please be confirmed that the attached C&E testing of the smoke and fire button testing of the Fores install within the Electolyser package to the SSI is correct as per project requirements. The logic was changed and re-tested after discussions with the instrument TA(see attached email). With no confirmed specification from Elogen, it has been matched to the other BLPH C&E specification.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		224J10-DDL-AUT-LIS-00003 Email from CW TA As-Builts				
		PROPOSED SOLUTION				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Sign:*	*Date: 12/04/25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				

		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		QUERY NUMBER	*CQ-021*		
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**			
		DISCIPLINE:	**Instrument**	LOCATION:	**Electolyser**
		WORKPACK REF:			
		SYSTEM:63		SUB SYSTEM:	20-00
			Print: John Mackillop	*Sign:*	*Date: 11.04.25*
		DESCRIPTION OF QUERY			
		Could it please be confirmed that the attached C&E testing of the smoke and fire button testing of the Fores install within the Electolyser package to the SSI is correct as per project requirements. The logic was changed and re-tested after discussions with the instrument TA(see attached email). With no confirmed specification from Elogen, it has been matched to the other BLPH C&E specification.			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		224J10-DDL-AUT-LIS-00003 Email from CW TA As-Builts			
		PROPOSED SOLUTION			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		*Print: Martin Taylor*	*Martin Taylor* *Sign:* *Date: 12/04/25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:* *Date:*
		ENGINEERING TECHNICAL RESPONSE			
		>> Detail the technical discipline response to the above query and proposal here			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		>> List any attached sketches/information required to fully describe the response here			
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.	
		RESPONSE PREPARED BY:		*Print:*	*Sign:* *Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:* *Date:*
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:* *Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)	ATRAC No.:
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:* *Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT	
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN			

		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

C063-ELO-PRO-CO-0004

BLPH Electrolyser Commissioning Manual

02	*2nd Issue*	*27-JAN-2025*	*MSA*	*HRO*	*DWA*
01	*1st Issue*	*02-DEC-2024*	*MSA*	*HRO*	*DWA*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Subcontractor Document Number	
Client Document Number	

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SUMMARY OF REVISION

REV.	DESCRIPTION
Rev 01	First issue
Rev 02	Issue after CWD Comments

REFERENCE DOCUMENTS

DOC NUMBER	REV.	DESCRIPTION
123A90-PML-COM-PRO-03007	01	BLPH Commissioning Strategy
123A90-PML-QHSE-PRO-00117	01	Punch List Management Procedure
123A90-PML-QHSE-PL-00001	01	Project HSE Management Plan
C063-ELO-PRO-CO-0001	01	BLPH Electrolyser Commissioning & Start-Up (CSU) Execution Plan
C063-ELO-PRO-CO-0002	01	BLPH Electrolyser CSU Method Statements
C063-ELO-PRO-CO-0003	01	BLPH Electrolyser Pre-Commissioning Manual
C063-ELO-PRO-CO-0005	01	BLPH Electrolyser Operational Test Procedure
C063-ELO-PRO-CO-0006	01	BLPH Electrolyser Performance Test Procedure
C063-ELO-PRO-CO-0007	01	BLPH Electrolyser O&M Training
C063-ELO-LST-CO-0001	01	BLPH Electrolyser - General Item list
C63-PWI-002	04	Cause & Effect
C63-PUY-001	04	Safety loop description
C63-PWI-003	02	Alarm list
C0063-FOR-DGM-EL-003	00	Power and Control Panel Wiring Diagram
C63-PRE-001	01	Presetting
C63-PWI-001	02	Set point list
STD-ERO-001	02	Electrolyzer Functional Analysis
C63-ERO-002	01	Project specific functional analysis
C63-PID-001	08	Electrolyzer Piping and Instrumentation Diagram
C63-DLO-001	05	Interfaces and Utility List
20230443 DEDR-500_36	03	DEDR-500_36 P&I Diagram Offshore
N/A	00	DEDR 500/36 Installation, Commissioning, O&M Manual
C63-NID-ELO-SAT04	00	SAT Low Voltage & High Voltage Tests Procedure
C63-NID-ELO-SAT07	00	SAT Functional and Performance Tests procedure
C63-PAU-SAT-001	01	HVAC SAT Procedure
SWL0841/Elogen/CP/001	03	Commissioning Plan for OVIVO WTP
SWL0841/MS01	02	Method Statement for OVIVO WTP

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1. Introduction

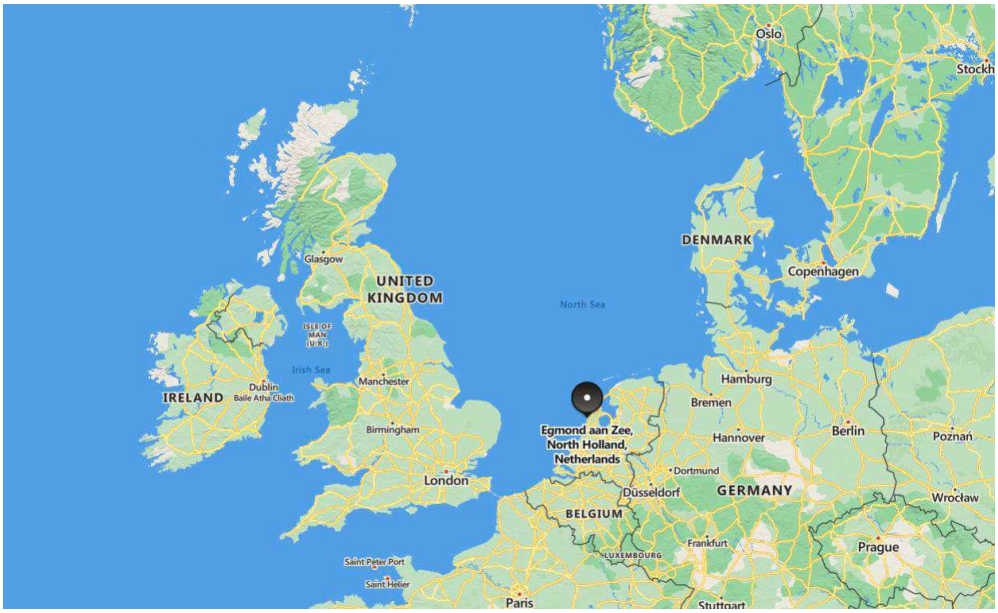
This document gives Commissioning & Pre-Start-Up requirements for the Commissioning & Start-Up of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the coordinating on site of all the means and resources required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

1.1 Overview of Project Scope

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.
Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.



HOLLANDSE KUST NOORD WIND PARK Location Map

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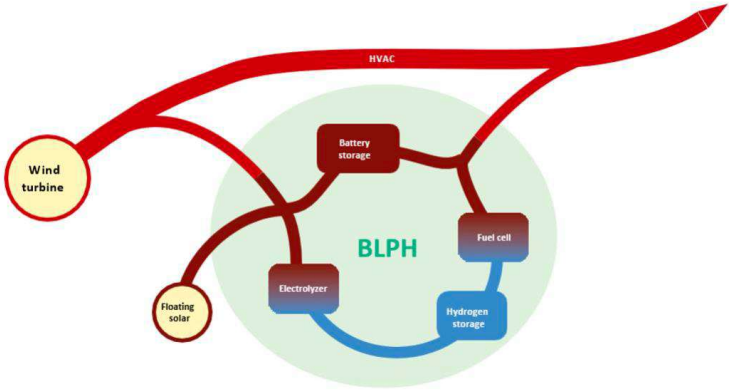


Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.



BLPH Concept

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Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.
The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2. Document Scope

This document describes the detailed activities scope to perform the Commissioning & Pre-Start-Up activities of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the follow up of all activities good practices on site required for the Unit Commissioning & Start-Up in accordance with COMPANY specifications. At this point, all Sub-Systems basic functions have been tested. The next steps are Utilities Operational Test and Unit preparation for Start-Up. The main activities are:

- Control Loop Simulation Test
- Cause & Effect Matrix
- Sequence Simulation Test
- Pure Water Purification & Distribution (56-03) Operational Test with WTP Vendor
- Flushing of Water Loops (25-11)
- Resin Filling into the Filters (25-11)
- Flushing with Resin
- Stacks Installation
- Flushing with Stacks
- Final Leak Test

The methodology and guidelines Simulation Tests and Leak Tests are detailed in C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statements. All ITR's specific to the project are given in this document.

For packages, vendors provide all the documentation including their own suite of ITR's regarding all remaining tests taking place onsite. FAT reports give all tested elements list. Vendors concerned are:

- OVIVO: for the Water Treatment Package (WTP) – Subsystem 56-03
- PAUMIER: HVAC Glycol Water Loop – Subsystem 66-06: All tests referring to the HVAC System here are tested through HVAC SAT Procedure (See C63-PAU-SAT-001).
- MSA: SSI-1000: Fire Safety System – Subsystem 25-11
- NIDEC: Transformer & Rectifiers – Subsystem 03-04 & 08-01

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- Regarding HPP (25-01), Aquagas mobilization onsite will be at the Start-Up. All items are connected directly to ELOGEN UCP. Commissioning on this package will be performed by CONTRACTOR under ELOGEN supervision. Therefore, this document also includes all 25-01 loops.

Regarding the Control System: the ELOGEN automation engineer will confirm onsite the good connection between the different UCPs by testing all the exchange tables. The simulation tests are done with all systems connected between each other's. At this point all should be communicating properly.

3. Definitions

COMPANY	means CROSSWIND C.V., owner & developer of the offshore WIND FARM Hollandse Kust Noord Wind Park Project.
ELOGEN	means ELOGEN as CONTRACTOR, the contracted party for engineering, and onshore commissioning of the Electrolyzer facilities associated with the PROJECT.
CONTRACTOR	means ROSETTI MARINO S.p.A., and his subcompany FORES for the contracted party for engineering, procurement, construction, offshore installation & commissioning of the facilities associated with the PROJECT.
Pre-Commissioning	Pre-Commissioning relates to the preliminary Commissioning activities to test and check the individual basic functions of individual items within any given system and/or sub-system to confirm they perform as designed.
Commissioning	The phase of the project after Pre-Commissioning. Commissioning consists of a comprehensive series of dynamic and energized Checks and Tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project Documents, Specifications, Standards and Engineering Best Practices.
Commissioning Team	Team established to perform the Commissioning and Handover process from CONTRACTOR Construction Team to COMPANY Operation & Maintenance Team.
Commissioning Spares	"Replacement" and "Consumable" spares required during the final hook-up, Pre-Commissioning, Commissioning and Start-up phases.
Equipment	An item that may be part of a System and be commissioned independently, however, it may or may not be operated independently.
Handover	Transfer of responsibility of the Plant from the Project Team to the Asset Holder.
Inspection Test Records (ITR)	A-ITR – used to record and verify construction scope associated with a tagged item (component). B-ITR – used to record and verify energization and function testing during pre-commissioning of a tagged item
Mechanical Completion	Mechanical Completion is the point in the project when construction is complete, and subsystems are ready to be handed over to the commissioning team. Mechanical Completion is achieved when: - • All ITR-A's for the given system / sub-system have been completed and signed off; • All Category A Punches have been closed. • All open Category B Punches shall be accepted with agreed plan for closure prior to commissioning. • Completion of all documents required to be As-Built Red Line Marked Up.

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	Mechanical Completion for any subsystem is recorded via the completing and signing of the Ready For Commissioning (RFC) certificate.
Operations	Operations include all personnel directly involved with Production Operations and Maintenance of the facility.
Performance Test	The Performance Test takes place following the Commissioning and Site Acceptance Test. A performance test is executed if there is a specific requirement to test performance criteria of an individual piece of equipment, a system, or the plant.
Performance Test Acceptance Certificate	This certificate shall be issued by the CONTRACTOR certifying that the PERFORMANCE TEST CRITERIAS have been achieved during the PERFORMANCE TESTS.
Plant	Refers to the permanent facilities (Base Load Power Hub) being constructed or to be constructed at WORKSITE resulting from the WORK.
Project	Refers to the BASE LOAD POWER HUB project.
Pre-Start Up Audit (PSUA)	The PSUA is a precursor to the PSSR meeting. The intention is to audit the readiness of the facility to commence start up with the findings being used as part of the PSSR and shall be conducted 6 weeks prior to Start-up.
Pre-Start Up Safety Review (PSSR)	Pre-Start-up Safety review (PSSR) meeting is the final determination that all prerequisites have been met to permit the hydrogen production and shall be conducted 4 weeks prior the RFSU.
Procedure	A document that details the execution of an activity.
Punch List	Work not executed as per approved documents and/or not meeting quality, health, safety, environment, operability/maintainability requirement and/or Standard; and recorded as a list for rectification.
Punch List ‘A’ Item	Punch List item that will prevent the safe operation of the Equipment, System and Plant and may jeopardize personnel or environment. Such item, as agreed, shall be cleared before the Equipment/System/Plant can progress to the next stage of the Commissioning and Handover phase.
Punch List ‘B’ Item	Punch List item that will not endanger the safe operation of the Equipment, System and Plant or personnel and/or environment. Such item, as agreed, can be carried over to the next stage and may be cleared later.
Ready For Commissioning Acceptance Certificate (RFC)	RFC is the Proverlis description for a sub-system Mechanical Completion. See definition for Mechanical Completion.
Ready For Operation Acceptance Certificate (RFO)	An RFO Acceptance Certificate shall be raised on the completion of the sub-system commissioning procedure scope.
Ready For Sail Away (RFSA)	All preservation and preparation works are complete.
Ready For Start-up (RFSU)	RFSU applies to the whole or part of the Plant and its associated Facilities and Systems. RFSU signifies that the applicable scopes have been fully commissioned and are ready for safe hydrogen production. RFSU will be authorized with the signing of the RFSU certificate. The RFSU requires that the Pre-Start-Up Audit (PSUA) and the Pre-Start- Up Safety Review have been completed, and all related action/blocking issues have been resolved
SITE	Refers to the offshore location where the PLANT is to be installed and the vicinity thereof (offshore North Sea - Netherlands).
Start-up	The stage at which process fluid is introduced/created into the Plant. It is defined as operation of all the facilities under the project. It can only be performed once

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	Commissioning of all associated utilities and auxiliaries and Pre-Commissioning activities of the Plant have been completed.
Start-up/Ramp-up	It is the initial start-up of processing equipment after first hydrogen, followed by a staged ramp up to full operating conditions. On completion of ramp-up, and after a period of steady state operations, the facility is ready to be performance tested.
Start Up on Paper (SUOP)	SUOP is an exercise to ensure that the start-up procedure and associated preparations are fit-for-purpose, including risk assessments, controls, mitigating actions and the Emergency Response protocols, procedures and capability are in place.
Site Acceptance Test	An un-interrupted safe operation of equipment, system, or plant, over a certain timeframe usually defined as 72hrs. A prerequisite to the Final Handover Certificate.
Statement of Fitness	As part of the COMPANY's HSE & SP Control Framework, the Statement of Fitness (SoF) before commissioning or introduction of hydrogen / hazardous substances in a New Asset, is a requirement of the Asset Integrity - Process Safety Management Application procedure. The Project and Asset Managers are accountable to develop a SoF to demonstrate asset integrity prior to energization or introduction of hazardous substances.
Sub-Contractor	means any company or person, to whom CONTRACTOR has subcontracted directly or indirectly at any level the performance of any part of the WORK.
System	A System is a major subdivision of a plant, being either process or utility, which performs an operational function of the plant. A System includes all the various equipment that allows it to operate. The division into functional Commissioning Systems corresponds to the prevailing fluids or services.
Sub-system	A Sub-system is a further subdivision of a System, which performs a partial operational function of the System, with little or no interference from the other Sub-systems. The Sub-system is the basic unit for Commissioning.
Systemization	The process of defining Systems for handover. Generally, colour coded on the 'marked up' engineering drawings such as P&IDs, SLD's & Cable Block Diagrams.
Vendor	means any CONTRACTOR's / CPI and/or SUBCONTRACTORS' supplier(s) of CONTRACTOR ITEM(s). VENDORS' presence on WORKSITE & SITE may be required to assist CONTRACTOR and/or COMPANY for the installation, commissioning and startup of such CONTRACTOR ITEMS and during the execution of PERFORMANCE TESTS.
Vendor Package	Skid and Equipment such as hydrogen purification, water purification, chillers, rectifiers, containers, etc.
Workshop(s)	means any location(s), other than WORKSITES, including offices, premises and workshops, where any equipment, materials or manufactured items including CONTRACTOR ITEMS shall be engineered, manufactured and assembled.
WORKSITE	means any construction location(s), where any major parts of the PLANT (such as templates, piles, nodes, jacket structure, modules, decks) shall be fabricated and assembled, excluding all other offices, premises and workshops of CONTRACTOR and SUBCONTRACTORS.
Shall	used to indicate requirements strictly to be followed to conform to the specification and accepted by all involved parties.

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Should	used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
May	used to indicate a course of action permissible within the limits of the specification.
Can	used for statements of possibility and capability, whether material, physical or casual.
“he”, “him”, “his”	are used in relation to CONTRACTOR.
“it”, “its”	are used in relation to COMPANY.

4. Abbreviations

Acronyms / Abbreviations	Description
E&I	Electrical & Instrumentation
ESD	Emergency Shut Down
FAT	Factory Acceptance Test
FH	Fixed-bed Filter
HSE	Health, Safety, & Environment
ITR	Inspection & Test Record
IP	Interlock Process
IS	Interlock Safety
LC	Locked Closed
LO	Locked Open
MC	Mechanical Completion
NO	Normally Open
NC	Normally Closed
N/A	Non-Applicable
OTP	Operation Test Procedure (Commissioning)
PCS	Process Control System
PL	Punchlist
PID (P&ID)	Piping and Instrumentation Diagram

5. N2 Distribution Panel Service Test

Prior to perform the flushing of the Electrolyser with pure water, the N2 Panel must be operational for purging purposes. The presence of oxygen can affect the efficiency of the flushing required prior to Unit Start-Up.

Steps	Description	Completed By	Witnessed By	Date
01	Ensure Mechanical Completion for N2 sub-system scope described in ELOGEN P&IDs has been completed.			
02	Check that Pre-Commissioning for N2 Distribution has been completed by the CONTRACTOR. The Loop Test ITRs are available for review in ELOGEN supervision on the following items:			

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	- PT-910 / PV-900 / PV-901 / MV-900 / MV-901 / FT-900 / FT-901 / PT-900 / FI-940 / MV-941 / PV-920 / PV-921 / MV-920 / MV-921 / FT-920 / FT-921 / PT-920			
03	Check that BLPH N2 Supply is available at the Battery Limit. (See P&ID 9/16)			
04	Line Up the circuit as per P&ID Mark-Up in Appendix. Close the following valves: - HV-620 / HV-620A / HV-620B / HV-624 - PV-620 / PV-640 / PV-641 / PV-642 / HV-642 / PV-631 / PV-500 / HV-940 / HV-941 - PV-632 / HV-930 / HV-931 / PV-933 / PV-635 - HV-600 / HV-600A / HV-600B / HV-605 - PV-600 / MPV-611 At this stage, all N2 injections are prepared to be routed straight to the vent.			
05	Close also the following valves to ST-600 & ST-620: - To ST-620: PV-920 / MV-920 / PV-921 / MV-921 - To ST-600: PV-900 / MV-900 / PV-901 / MV-601			
06	The goal is now to set the purging flowrate through the Unit to avoid overpressure during Commissioning & Start-Up phases: Open PV-900 & PV-920			
07	Supply N2 at the battery limit & pressurize the N2 header to normal operating pressure. Check that the pressure in the Electrolyser unit is atmospheric pressure (0 barg).			
08	By monitoring carefully FI-900 & FI-920, Open slowly MV-900 & MV-921 & set the following flowrate: - MV-900 set for 46 m3/h at FI-900 - MV-920 set for 4 m3/h at FI-920 Ensure also the pressure is not increasing in the whole unit and a flow is detected at both H2 and O2 vents.			
09	Leave MV-900 & MV-920 on this position, record the % of valve opening for any resetting purposes that happen in the future. Close PV-900 & PV-920			
10	Proceed to the same operation for the bypasses: Open PV-901 & PV-921 By monitoring carefully FI-901 & FI-921, Open slowly MV-901 & MV-921 & set the following flowrate: - MV-901 set for 78 m3/h at FI-900			

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	- MV-921 set for 11.7 m3/h at FI-920 Ensure also the pressure is not increasing in the whole unit.			
11	Leave MV-901 & MV-921 on this position, record the % of valve opening for any resetting purposes that happen in the future. Close PV-901 & PV-921.			

6. Hydrogen Purification Package

The HPU Start-Up is achieved during the Unit Start-Up. Prior to that, some tests and checks are required as per Vendor documentation. Vendor's documentation gives the following steps to be carried out. For more information about the HPU refers to Aquagas documentation DEDR 500/36: Installation, Commissioning, Operation and Maintenance Manual. All LOTO tasks must be performed through CONTRACTOR Procedure.

The Construction & Pre-Commissioning have been done and all ITRs signed off, proceed to the following additional crosschecking if necessary:

- DEDR is properly installed as per above recommendations.
- Check the DEDR sequence by manual operation of the solenoid valves.
- Check the valve limit switches.
- Check that all valves are in the correct position.
- Check that all Hy-Lok connections have the correct torque (green markings are aligned).
- Check the set points of temperature transmitters and temperature switches.
- Check the positioner of valve of flow regulating valve 64-V6.
- Check cooling water flow, temperature, and pressure.
- Check instrument air or nitrogen flow and pressure.
- Check that valves 61-V2, 64-V15 and 64-V16 are open. Put a lock (not included) on them.
- Gross Leak test have been completed during the Pre-Commissioning and a Leak Test at operating pressure will be performed prior to Start-Up: If leakage with a Hylok coupling, retighten until maximum finger tight + ¼ turn with spanner and green markings are aligned. Use Hylok gap inspection tool for checking the torque, if available. Do not over torque!

Once all Pre-Commissioning crosschecking is done, proceed with the Simulation Tests among all simulation tests to be performed in section 6. Fill the corresponding point to the HPU Simulations Tests in section 6.1.

- Without pressure on the system, shut-off fuses for regeneration heater (all fuses except control voltage). Once all signals connected, use the HMI/PLC to step through all sequences, with extra attention to the supplied Control Logic description, to secure that the wiring is correct, and the sequences are working OK without any alarms. Pay extra attention to valves that might open and create a high-pressure peak : 64-V4.1, 64-V4.2, 64-V4.3, 64-V4.4, 64-V5, 64-V6, 64-V7.
  If anything is abnormal, please contact AQUAGAS for advice.

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7. Cause & Effect Matrix

The method statement is described in the document C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statement at the chapter “6.6.9 Cause & Effect Matrix”.
The following two tables in the two next pages give all triggered effects to observe following the causes activation. IP is for Interlock Process and IS for Interlock Safety.
The table given after are all the triggered causes to activate for the test.

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elogen

Electrolyzer Package
CAUSE AND EFFECT MATRIX
C63- CrossWind Project

C63-PWI-002
Rev.004
04 of 05

CAUSE & EFFECT DIAGRAM

CAUSES Référence effect		EFFECTS	DISPLAY alarm	STOP AND SET Rectifiers (all) (Uset=0V)	DEENERGISE All solenoid valves. Back to rest position	CLOSE Control valves MPV-611 (FC)	CLOSE Control valves MPV-630 (FC)	CLOSE PV-631 (FC)	CLOSE H2 purification unit pneumatic valves	CLOSE M3WV-200 (FC)	CLOSE PV-633 (FC) - CUSTOMER LINE ISOLATED	CLOSE PV-640 (FC)	CLOSE PV-642 (FC)	START INTERMITTENTLY BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT VE-002 / 006 / 010 (Orange)	LIGHT ON FLASHING VE-001 / 005 / 009 (Rouge)	STOP IMMEDIATLY CP-200	STOP AT THE END OF STOP SEQUENCE CP-200	STOP IMMEDIATELY BY SETTING VAR600A/B to 0% (ISTO) THE RUNNING CP-600 (A or B following status)	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR600A/B TO 0% THE RUNNING CP-600 (A or B following status)	STOP IMMEDIATELY BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)	STOP AT THE END OF STOP SEQUENCE DC-200 - All motors	STOP IMMEDIATELY H2 purification unit dosso dryers heating	STOP IMMEDIATELY BY SETTING VAR300A/B TO 0% THE RUNNING LP-300 (A or B following status)	STOP IMMEDIATELY WC-400 (CP-400)	STOP AT THE END OF STOP SEQUENCE WC-400 (CP-400)	STOP IMMEDIATELY WC-401 (CP-401)	STOP AT THE END OF STOP SEQUENCE WC-401 (CP-401)	OPEN MPV-611 (FC) till depressurisation and/or inerting of ST-600 completed. OPEN PV-610 if MPV-611 is failing.	OPEN PV-631 (FC) till depressurisation and/or inerting of ST-620 completed. OPEN PV-630 if PV-631 is failing.	OPEN PV-901 (FC) till PT-610 reach 0,5 barg	OPEN PV-901 (FC) till inerting of ST-600 completed	OPEN PV-921 (FC) till inerting of ST-620 completed	OPEN PV-921 (FC) till PT-610 reach 0.6 barg	OPEN IMMEDIATELY PV-632 (FO)	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-630 HH	FORCE STANDBY PRESSURISED Till TT1001 < TAH1001 or TT1002<TAH1002 or TT1003<TAH1003 or TT1004<TAH1004 or TT1005<TAH1005 or TT1006<TAH1006	FORCE STANDBY After 1200s	SWITCH LP300 - From A to B or B to A	SWITCH CP600 - From A to B or B to A	SWITCH CP620 - From A to B or B to A	GO TO STANDBY PRESSURISED	REDUCE ELECTROLYSER SETPOINT AT 50%
INTERLOCK PROCESS	*DESCRIPTION*																																									
IP1	Major Fault		X	X	X		X		X	X	X	X	X			X		X			X			X		X		X	X	X			X	X								
IP4	H2 Purity not reached		X								X																								X							
IP5	Problem on CP-620A/B requiring instant stop of the pump		X												X							X																X				
IP6	Problem on CP-600A/B requiring instant stop of the pump		X												X				X																			X				
IP7	Problem on LP-300A/B requiring instant stop of the running pump		X												X												X											X				
IP8	Low Temperature in anodic/cathodic water loop and ambient		X							X				X	X																						X				
IP9	Process value out of regular operating value		X												X																											
IP11	High Ambient temperature - Loss of AHU		X												X																					X						
IP13	Hydrogen Ambient Detection High		X											X	X																											
IP15	Minor Fault requiring stop of production		X																																					X	
IP16	Problem on pure water feed to anodic loop		X																								X														
IP17	LP300 changeover unforeseen		X																																		X				
IP18	CP600 changeover unforeseen		X																																			X			
IP19	CP620 changeover unforeseen		X																																				X		
IP20	LOSS OF HALF OF THERMAL POWER (THS-400 or THS-200)		X																																						X

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elogen	Electrolyzer Package																													Document Code		C63-PWI-002	
	CAUSE AND EFFECT MATRIX																													Revision		Rev.004	
	C63- CrossWind Project																													Page Number		05 of 05	
CAUSE & EFFECT DIAGRAM		**EFFECTS**	DISPLAY alarm	ENABLE ESD signal (ASE-001 : Process) to customer SCADA	ENABLE ESD signal (ASE-002: Fire and Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger MN Breaker (Main Supply)	STOP AND SET Rectifiers (all) (Used=0V)	ACTIVATE Safety E.Board 061A2, MN Inter DC (ESD Rectifiers), MN Rectifier Breaker	START CONTINOUSLY (NOT IN SIS) BUZ_1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT (NOT IN SIS) VE-001 / 005 / 009 / 013 (Rouge)	STOP IMMEDIATELY CP-600A/B BY SETTING VAR-600A/B TO 0%	STOP IMMEDIATELY CP-620A/B BY SETTING VAR-620A/B TO 0%	STOP IMMEDIATELY LP-300A/B BY SETTING VAR-300A/B TO 0%	OPEN PV-610 (FO) till depressurisation and/or inerting of ST-600 completed.	OPEN PV-630 (FO) till depressurisation and/or inerting of ST-620 completed. OPEN PV-631 if PV-630 is failling.	OPEN PV-900 (FO) till inerting of ST-600 completed	OPEN PV-920 (FO) till inerting of ST-620 completed	CLOSE AND LOCK PV-641 (FC)	CLOSE PV-635 (FC)	CLOSE AND LOCK PV-601 (FC)	OPEN IMMEDIATELY PV-610 (FO) till pressure < PT-611_H-0.2	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-631_H-0.2	CLOSE PV-800	OPEN PV-900 (FO) till PT611 > 0.5 barg	OPEN PV-920 (FO) till PT-631 > 0.5 barg	CLOSE PV-501 (FC)	STOP IMMEDIATELY CP-600A BY SETTING VAR-600A TO 0%	STOP IMMEDIATELY CP-600B BY SETTING VAR-600B TO 0%	STOP IMMEDIATELY CP-620A BY SETTING VAR-620A TO 0%	STOP IMMEDIATELY CP-620B BY SETTING VAR-620B TO 0%	TRIGGER IS1
CAUSES																																	
Référence effect																																	
INTERLOCK SAFETY	***DESCRIPTION***																																
IS1	ESD Electrolyser following Process issue SAFETY STOP		X	X		X	X	X	X	X				X	X	X	X		X														
IS2	Isolation from customer H2 line		X																X														
IS3	Isolation balancing line (640)		X															X															
IS4	ESD Electrolyser following Fire & Gas issue		X		X	X	X	X	X	X				X	X	X	X		X														
IS5	Very Low water level in ST-620		X				X					X																					X
IS6	Very Low water level in ST-600		X				X				X																						X
IS9	Very High Flowrate on H2 Analysis Line		X																					X									
IS10	Very Low Pressure on anodic side		X																							X							
IS11	Very Low Pressure on cathodic side		X																								X						
IS12	Very High Level ST-600		X										X																				
IS13	Very Low Level CS-610		X																	X													
IS14	Very Low Level in H2 Vent		X																									X					
IS15	Blocked discharge CP600A		X																										X				
IS16	Blocked discharge CP600B		X																											X			
IS17	Blocked discharge CP620A		X																												X		
IS18	Blocked discharge CP620B		X																													X	
IS19	MPV-611 fault - High Oxygen Pressure																				X												
IS20	PV-631 fault - High Hydrogen Pressure																					X											

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
OIHA-800	AAH-800 (ISO22)	5	volppm	IP9	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800	5	TO PLC			
OIHA-800	AAHH-800 (ISO22)	6	volppm	IP1	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-800	1200	TO PLC			
REC-001	ACA-001 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001	-	COM			
REC-002	ACA-002 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002	-	COM			
LP-300A	ACA-300A (C63)	-	-	IP17	LP-300A STARTING FAULT - LP-300A	1	TO PLC			
LP-300B	ACA-300B (C63)	-	-	IP17	LP-300B STARTING FAULT - LP-300B	1	TO PLC			
CP-600A	ACA-600A (ISO22)	-	-	IP6	STARTING MALFUNCTION CP-600A - ERR - CP-600A	60	TO PLC			
CP-600B	ACA-600B (ISO22)	-	-	IP6	STARTING MALFUNCTION CP-600B - ERR - CP-600B	60	TO PLC			
CP-620A	ACA-620A (ISO22)	-	-	IP5	STARTING MALFUNCTION CP-620A - ERR - CP-620A	60	TO PLC			
CP-620B	ACA-620B (ISO22)	-	-	IP5	STARTING MALFUNCTION CP-620B - ERR - CP-620B	60	TO PLC			
DC-200	AQA-200 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-200	-	COM			
DC-201	AQA-201 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-201	-	COM			
WC-400	AQA-400 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-400	-	COM			
WC-401	AQA-401 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-401	-	COM			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
RSP-001	AQA-1005	-	-	IP1	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER	0	COM			
HVAC PACKAGE	AQA-1006	-	-	IP1	COMMUNICATION FAULT PLC ELOGEN / HVAC	0	COM			
REC-001	AQA-001 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-001	-	COM			
REC-002	AQA-002 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-002	-	COM			
COMMUNICATION WITH CLIENT	AQA-052	-	-	IP1	CUSTOMER/ELOGEN COMMUNICATION SWITCH FAULT, REMOTE MODE	-	COM			
MPV-611	AQA-611	1	-	IP1	MPV-611 Fault	15	TO PLC			
MPV-630	AQA-630	1	-	IP1	MPV-630 Fault	-	TO PLC			
SSI-1000	AQA-1001 (ISO22)	-	-	IP1	FIRE CONTROL PANEL FAULT - ERR - SSI-1000	-	HARDWIRED			
WTP-300	AQA-1003	-	-	IP1	COMMUICATION FAULT PLC ELOGEN / WTP	0	COM			
SSI-1000	AQA-1010 (ISO22)	-	-	IS4	FIRE AND GAS DETECTION - FIRE - SSI-1000	-	HARDWIRED			
PLC	BZ-001 (ISO22)	-	-	IS1	PLC FAULT - ERR - PLC-001	0	HARDWIRED			
HIOD-610	CAH-610 (C63)	25	% LFL	IP9	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3	1	TO PLC			
AHD-1000	CAH-1000 (ISO22)	25	%LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000	1	TO PLC			
AHD-1001	CAH-1001 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
AHD-1002	CAH-1002 (C63)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002	1	TO PLC			
AHD-1003	CAH-1003 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003	1	TO PLC			
AHD-1004	CAH-1004 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004	1	TO PLC			
QIA-1B4	CAHH-300 (C63)	1	µS/cm	IP16	VERY HIGH CONDUCTIVITY LP300 - HH	5	COM			
HIOD-610	CAHH-610 (C63)	50	% LFL	IS4	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3	-	TO PLC			
DPT-800	CAHH-800 (ISO22)	6	ppmv	IP4	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800	1200	TO PLC			
AHD-1000	CAHH-1000 (ISO22)	50	%LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000	1	TO PLC			
AHD-1001	CAHH-1001 (ISO22)	50	%LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001	1	TO PLC			
AHD-1002	CAHH-1002 (C63)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002	1	TO PLC			
AHD-1003	CAHH-1003 (ISO22)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003	1	TO PLC			
AHD-1004	CAHH-1004 (ISO22)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004	1	TO PLC			
EH-1001	EGA-1001 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1001	-	COM			
EH-1002	EGA-1002 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1002	-	COM			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
EH-1003	EGA-1003 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1003	-	COM			
EH-1004	EGA-1004 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1004	-	COM			
EH-1006	EGA-1006 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1006	-	COM			
EH-1007	EGA-1007 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1007	-	COM			
EXT-001	EGA-1101 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001	-	TO PLC			
EXT-002	EGA-1102 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002	-	TO PLC			
EXT-003	EGA-1103 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003	-	TO PLC			
EXT-004	EGA-1104 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004	-	TO PLC			
EXT-005	EGA-1105 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005	-	TO PLC			
EXT-006	EGA-1106 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006	-	TO PLC			
EXT-007	EGA-1107 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007	-	TO PLC			
EXT-008	EGA-1108 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008	-	TO PLC			
PQ-001	EJAHH-001 (C63)	250	V	IP1	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001	0	TO PLC			

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PQ-002	EJAHH-002 (C63)	440	V	IP1	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002	0	TO PLC			
PQ-003	EJAHH-003 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-003	0	TO PLC			
PQ-004	EJAHH-004 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-004	0	TO PLC			
PQ-001	EJALL-001 (C63)	209	V	IP1	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001	0	TO PLC			
PQ-002	EJALL-002 (C63)	380	V	IP1	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002	0	TO PLC			
PQ-003	EJALL-003 (C63)	342	V	IP1	VERY LOW RECTIFIER VOLTAGE - LL - PQ-003	0	TO PLC			
PQ-004	EJALL-004 (C63)	342	V	IP1	VERY LOW RECTIFIER VOLTAGE - LL - PQ-004	0	TO PLC			
FSH-640	FAHH-640 (ISO22-500)	1 (4,9)	- (m3/h)	IS3	DEBIT EQUILIBRAGE ELEVEE - FSH-640 - HH	15	TO PLC			
FICV-800	FAHH-800 (ISO22)	1 (4)	- (NL/min)	IS9	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800	15	TO PLC			
FT-600	FAL-600 (ISO22-500)	79,38	m3/h	IP9	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600	2	TO PLC			
FT-620	FAL-620 (ISO22-500)	30,24	m3/h	IP9	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620	2	TO PLC			
FT-900	FAL-900 (ISO22)	41,4	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-900	1	TO PLC			
FT-901	FAL-901 (ISO22)	70,3	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-901	1	TO PLC			

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FT-920	FAL-920 (ISO22)	3,6	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-920	1	TO PLC			
FT-921	FAL-921 (ISO22)	10,5	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-921	1	TO PLC			
FT-600	FALL-600 (ISO22-500)	44,1	m3/h	IS1	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600	2	TO PLC			
FICV-610	FALL-610 (ISO22)	0,7	- (NL/min)	IS1	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610	15	TO PLC			
FICV-611	FALL-611 (ISO22)	7,7	- (NL/min)	IP9	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611	15	TO PLC			
FT-620	FALL-620 (ISO22-500)	26,88	m3/h	IP1	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620	2	TO PLC			
FICV-800	FALL-800 (ISO22)	2,1	(NL/min)	IP4	VERY LOW H2 FLOW ANALYSIS - LL - FICV-800	15	TO PLC			
FT-630	FDAH-630 (ISO22)	5	%	IP9	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630	2	TO PLC			
FC 64.1	FSA 64.1	No 4-20	mA	IP1	NO SIGNAL - ERR - FC 64.1	0	TO PLC			
FC 64.1	FSA 64.1 LL	<5.16	mA	IP1	GAS INLET FLOW VERY LOW - LL - FC 64.1	0	TO PLC			
MPV-611	GDA-611 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-611 - ERR - MPV-611	133	TO PLC			

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MPV-630	GDA-630 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-630 - ERR - MPV-630	133	TO PLC			
ZIO-604	GGA-604 (ISO22)	1	-	IS6	HV-604 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-604	5	TO PLC			
ZIO-605	GGA-605 (ISO22)	1	-	IS6	HV-605 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-605	5	TO PLC			
ZIO-623	GGA-623 (ISO22)	1	-	IS1	HV-623 VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-623	5	TO PLC			
ZIO-624	GGA-624 (ISO22)	1	-	IS1	HV-624VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-624	5	TO PLC			
GS 64.1.1	GSA 64.1.1 HH	1	-	IP1	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1	5	TO PLC			
GS 64.1.1	GSA 64.1.1 LL	0	-	IP1	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1	5	TO PLC			
GS 64.1.2	GSA 64.1.2 HH	1	-	IP1	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2	5	TO PLC			
GS 64.1.2	GSA 64.1.2 LL	0	-	IP1	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2	5	TO PLC			
GS 64.1.3	GSA 64.1.3 HH	1	-	IP1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3	5	TO PLC			
GS 64.1.3	GSA 64.1.3 LL	0	-	IP1	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3	5	TO PLC			
GS 64.1.4	GSA 64.1.4 HH	1	-	IP1	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4	5	TO PLC			
GS 64.1.4	GSA 64.1.4 LL	0	-	IP1	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4	5	TO PLC			
GS 64.2	GSA 64.2 HH	1	-	IP1	VALVE 64-V5 NOT CLOSED - HH - GS 64.2	5	TO PLC			
GS 64.2	GSA 64.2 LL	0	-	IP1	VALVE 64-V5 NOT OPEN - LL - GS 64.2	5	TO PLC			
GS 64.3	GSA 64.3 HH	1	-	IP1	VALVE 64-V7 NOT CLOSED - HH - GS 64.3	5	TO PLC			

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GS 64.3	GSA 64.3 LL	0	-	IP1	VALVE 64-V7 NOT OPEN - LL - GS 64.3	5	TO PLC			
GS 64.T2	GSA 64.T2 HH	1	-	IP1	VALVE 64-T2 NOT OPEN - HH - GS 64.T2	5	TO PLC			
GS 64.T2	GSA 64.T2 LL	0	-	IP1	VALVE 64-T2 NOT CLOSED - LL - GS 64.T2	5	TO PLC			
IM-001	IAHH-001 (ISO22)	1689 ,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-001	1	TO PLC			
IM-002	IAHH-002 (ISO22)	1689 ,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-002	1	TO PLC			
IM-001	IDAHH-001 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001	2	TO PLC			
IM-002	IDAHH-002 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002	2	TO PLC			
POWER 400V	JGA-001 (ISO22)	-	-	IP1	LOSS OF 400 VAC POWER SUPPLY - ERR	0	TO PLC			
LP-300A	JGA-300A (C63)	-	-	IP17	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A	1	TO PLC			
LP-300B	JGA-300B (C63)	-	-	IP17	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B	1	TO PLC			
CP-600A	JGA-600A (ISO22)	-	-	IP6	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A	0	TO PLC			
CP-600B	JGA-600B (ISO22)	-	-	IP6	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
CP-620A	JGA-620A (ISO22)	-	-	IP5	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A	0	TO PLC			
CP-620B	JGA-620B (ISO22)	-	-	IP5	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B	0	TO PLC			
EH-1001	JGA-1001 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001	0	COM			
EH-1002	JGA-1002 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002	0	COM			
EH-1003	JGA-1003 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003	0	COM			
EH-1004	JGA-1004 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004	0	COM			
EH-1006	JGA-1006 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006	0	COM			
EH-1007	JGA-1007 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007	0	COM			
EXT 001/002/003/004	JGA-1121	-	-	IP9	MALFUNCTION MAIN CIRCUIT BREAKER FOR 4 FANS STACK - ERR - BREAKER STACK 001/002/003/004	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
EXT 005/ 006/ 007/ 008	JGA-1122	-	-	IP9	MALFUNCTION COMMON CIRCUIT BREAKER OF 4 FANS STACKS - ERR - BREAKER STACK 005/ 006/ 007/ 008	0	TO PLC			
K01	KSA K01 HH	1	-	IP1	Dryer heater HE 64.1, K01 Not deactivated	5	TO PLC			
K01	KSA K01 LL	0	-	IP1	Dryer heater HE 64.1, contactor K01 Not activated	5	TO PLC			
K02	KSA K02 HH	1	-	IP1	Dryer heater HE 64.1, K02 Not deactivated	5	TO PLC			
K02	KSA K02 LL	0	-	IP1	Dryer heater HE 64.1, K02 Not activated	5	TO PLC			
K03	KSA K03 HH	1	-	IP1	Deoxo Trace heater HE 61.1, K03 Not deactivated	5	TO PLC			
K03	KSA K03 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03	5	TO PLC			
K04	KSA K04 HH	1	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04	5	TO PLC			
K04	KSA K04 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04	5	TO PLC			
LT-600	LAH-600 (C63)	50	%	IP9	HIGH LEVEL ST-600 - H - LT-600	2	TO PLC			
LSH-610	LAH-610 (ISO22)	1	-	IP9	HIGH LEVEL CS-610 - H - LSH-610	60	TO PLC			
LT-620	LAH-620 (C63)	62	%	IP9	HIGH LEVEL ST-620 - H - LT-620	2	TO PLC			
LSH-630	LAH-630 (C63)	1	-	IP15	HIGH LEVEL CS-630 - HH - LSH-630	1080	TO PLC			
WLD-001	LAHH-001 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-001	60	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
WLD-002	LAHH-002 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-002	60	TO PLC			
WLD-003	LAHH-003 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-003	60	TO PLC			
WLD-004	LAHH-004 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-004	60	TO PLC			
WLD-005	LAHH-005 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-005	60	TO PLC			
WLD-006	LAHH-006 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-006	60	TO PLC			
LT-600	LAHH-600 (C63)	52	%	IP1	VERY HIGH LEVEL ST-600 - HH - LT-600	2	TO PLC			
LT-620	LAHH-620 (C63)	71	%	IP1	VERY HIGH LEVEL ST-620 - HH - LT-620	2	TO PLC			
LSH-631	LAHH-631 (ISO22)	1	-	IS1	VERY HIGH LEVEL CS-630 - HH - LSH-631	60	TO PLC			
LSH-640	LAHH-640 (ISO22)	1	-	IP9	HIGH LEVEL DG-640 - HH - LSH-640	60	TO PLC			
LT-600	LAL-600 (C63)	32	%	IP9	LOW LEVEL ST-600 - L	2	TO PLC			
LSL-610	LAL-610 (ISO22)	1	-	IP9	Low Level CS-610 - L- LSL-610	60	TO PLC			
LT-620	LAL-620 (C63)	31	%	IP9	LOW LEVEL ST-620 - L - LT-620	2	TO PLC			
LSL-630	LAL-630 (ISO22)	1	-	IP9	LOW LEVEL CS-630 - L - LSL-630	60	TO PLC			
LALL-301	LALL-300 (C63)	20	%	IP1	VERY LOW LEVEL WTP-300 - LL - LT-300	2	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
LT-600	LALL-600 (C63)	26	%	IP6	VERY LOW LEVEL ST-600 - LL - LT-600	2	TO PLC			
LSL-611	LALL-611 (ISO22)	1	-	IS13	VERY LOW LEVEL CS-610 - LL - LSL-611	60	TO PLC			
LT-620	LALL-620 (C63)	27	%	IP5	VERY LOW LEVEL ST-620 - LL - LT-620	2	TO PLC			
LSH-600	LASHH-600 (ISO22)	1	-	IS12	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600	5	TO PLC			
LSHH-500	LASHH-500 (C63)	1	-	IP1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500	5	TO PLC			
LSL-600	LASLL-600 (C63)	1		IS6	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600	5	TO PLC			
LSL-620	LASLL-620 (C63)	1	-	IS5	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620	5	TO PLC			
LSLL-500	LASLL-500 (C63)	1	-	IS14	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT -LSLL-500	1	TO PLC			
AUC-001	OAR-001 (ISO22)	-	-	IS1	CUSTOMER EMERGENCY STOP - AUC-001	-	HARDWIRED			
DS-001	OAS-001 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-001	5	TO PLC			
DS-002	OAS-002 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-002	5	TO PLC			
DS-003	OAS-003 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-003	5	TO PLC			
DS-004	OAS-004 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-004	5	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
DS-005	OAS-005 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-005	5	TO PLC			
DS-006	OAS-006 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-006	5	TO PLC			
DS-007	OAS-007 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-007	5	TO PLC			
DS-008	OAS-008 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-008	5	TO PLC			
DS-009	OAS-009 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-009	5	TO PLC			
DS-010	OAS-010 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-0010	5	TO PLC			
DS-011	OAS-011 (ISO22)	1		IP1	ELECTROLYSER DOOR OPENED - DS-0011		TO PLC			
DS-012	OAS-012 ISO22)	1		IP1	ELECTROLYSER DOOR OPENED - DS-0012		TO PLC			
ESD-001	OAZ-001 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-001	-	HARDWIRED			
ESD-002	OAZ-002 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-002	-	HARDWIRED			
ESD-003	OAZ-003 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-003	-	HARDWIRED			
ESD-004	OAZ-004 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-004	-	HARDWIRED			
ESD-005	OAZ-005 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-005	-	HARDWIRED			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
ESD-006	OAZ-006 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-006	-	HARDWIRED			
ESD-007	OAZ-007 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-007	-	HARDWIRED			
PT-64.1	PA 64.1 L	15	barg	IP9	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1	15	TO PLC			
PT-150	PAH-150 (ISO22)	8,5	barg	IP9	HIGH INSTRUMENT AIR PRESSURE - H - PT-150	1	TO PLC			
PT-300	PAH-300 (ISO22)	14	barg	IP9	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300	1	TO PLC			
PT-600	PAH-600 (ISO22)	15	barg	IP9	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600	2	TO PLC			
PT-610	PAH-610 (ISO22)	11,8	barg	IP9	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- H - PT-610	1	TO PLC			
PT-612	PAH-612 (ISO22)	0,5	barg	IP9	HIGH OXYGEN VENT PRESSURE - H - PT-612	2	TO PLC			
PT-620	PAH-620 (ISO22)	37	barg	IP9	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620	2	TO PLC			
PT-630	PAH-630 (ISO22)	33	barg	IP9	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630	1	TO PLC			
PT-910	PAH-910 (ISO22)	8,5	barg	IP9	HIGH NITROGEN PRESSURE - H - PT-910	1	TO PLC			
PT-105	PAHH-05 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-05	1	COM			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PT-12	PAHH-12 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-12	1	COM			
PT-15	PAHH-15 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-15	1	COM			
PT-22	PAHH-22 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 2 - HH - PT-22	1	COM			
PT-105	PAHH-105 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 1 - HH - PT-105	1	COM			
PT-112	PAHH-112 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 1 - HH - PT-112	1	COM			
PT-115	PAHH-115 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 2 - HH - PT-115	1	COM			
PT-122	PAHH-122 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 2 - HH - PT-122	1	COM			
PT-150	PAHH-150 (ISO22)	8,5	barg	IP1	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150	10	TO PLC			
PT-300	PAHH-300 (C63)	16	barg	IP16	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PT-600A	PAHH-600A (C63)	16	barg	IS15	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A	1	TO PLC			
PT-600B	PAHH-600B (C63)	16	barg	IS16	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B	1	TO PLC			
PT-610	PAHH-610 (ISO22)	12	barg	IP1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610	1	TO PLC			
PT-611	PAHH-611 (ISO22)	12,5	barg	IS1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS)- HH - PT-611	1	TO PLC			
PT-620A	PAHH-620A (C63)	38	barg	IS17	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A	1	TO PLC			
PT-620B	PAHH-620B (C63)	38	barg	IS18	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B	1	TO PLC			
PT-630	PAHH-630 (ISO22)	33,5	barg	IP1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630	1	TO PLC			
PT-631	PAHH-631 (ISO22)	34	barg	IS1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631	1	TO PLC			
PT-632	PAHH-632 (C63)	3,6	barg	IP9	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632	1	TO PLC			
PT-633	PAHH-633 (C63)	33	barg	IP4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633	1	TO PLC			
PT-900	PAHH-900 (ISO22)	9	barg	IP1	LEAK ON OXYGEN INERTING LINE - HH - PT-900	1	TO PLC			
PT-910	PAHH-910 (ISO22)	9	barg	IP1	VERY HIGH NITROGEN PRESSURE - HH - PT-910	10	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PT-920	PAHH-920 (ISO22)	9	barg	IP1	LEAK ON HYDROGEN INERTING LINE - HH - PT-920	10	TO PLC			
PT-150	PAL-150 (ISO22)	6	barg	IP9	LOW INSTRUMENT AIR PRESSURE - L - PT-150	10	TO PLC			
PT-300	PAL-300 (C63)	10,8	barg	IP9	LP300 PUMP PRESSURE LOSS - L - PT300	1	TO PLC			
PT-600	PAL-600 (C63)	2,79	barg	IP9	CP-600 PUMP PRESSURE LOSS - L - PT600	10	TO PLC			
PT-620	PAL-620 (C63)	3,11	barg	IP9	CP-620 PRESSURE LOSS - L - PT-620	10	TO PLC			
PT-910	PAL-910 (ISO22)	6	barg	IP9	LOW NITROGEN PRESSURE - L - PT-910	10	TO PLC			
PT-150	PALL-150 (ISO22)	5,5	barg	IP1	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150	10	TO PLC			
PT-300	PALL-300 (C63)	9,6	barg	IP17	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300	1	TO PLC			
PT-600	PALL-600 (C63)	2,48	barg	IP18	CP- 600 CHANGEOVER UNFORESEEN - LL - PT-600	60	TO PLC			
PT-611	PALL-611 (ISO22)	0	barg	IS10	LOW PRESSURE ON ANODIC SIDE - LL - PT-611	1	TO PLC			
PT-620	PALL-620 (C63)	2,76	barg	IP19	CP-620 CHANGEOVER UNFORESEEN - LL - PT-620	60	TO PLC			
PT-631	PALL-631 (ISO22)	0	barg	IS11	LOW PRESSURE ON CATHODIC SIDE - LL - PT-631	1	TO PLC			
PT-910	PALL-910 (ISO22)	5,5	barg	IP1	VERY LOW NITROGEN PRESSURE - LL - PT910	10	TO PLC			
PT-1001	PALL-1001 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT-1001	1	TO PLC			

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PT-1002	PALL-1002 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002	1	TO PLC			
PT-1003	PALL-1003 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003	1	TO PLC			
PT-1004	PALL-1004 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004	1	TO PLC			
PT-1005	PALL-1005 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005	1	TO PLC			
PT-1006	PALL-1006 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006	1	TO PLC			
DPY-001 = PT630 - PT610	PDAH-001 (ISO22)	21,5	barg	IP9	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610	15	TO PLC			
PT-610	PDAH-610 (ISO22)	1200	s	IP9	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610	0	TO PLC			
PT-630	PDAH-630 (ISO22)	1200	s	IP9	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630	0	TO PLC			
DPY-001 = PT630 - PT610	PDAHH-001 (ISO22)	22	barg	IP1	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610	15	TO PLC			
DPY-002 = PT631 - PT611	PDAHH-002 (ISO22)	23	barg	IS1	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611	15	TO PLC			
DPY-001 = PT630 - PT610	PDAL-001 (ISO22)	-0,1	barg	IP9	REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
DPY-001 = PT630 - PT610	PDALL-001 (ISO22)	-0,5	barg	IP1	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC			
DPY-002 = PT631 - PT611	PDALL-002 (ISO22)	-1	barg	IS1	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611	15	TO PLC			
TT 60.1	TA 60.1 H	>200	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1	0	TO PLC			
TT 60.1	TA 60.1 L	<50	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1	3600	TO PLC			
TT 60.2	TA 60.2 H	>220	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2	0	TO PLC			
TT 60.2	TA 60.2 L	<70	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2	3600	TO PLC			
TT 61.1	TA 61.1 H	>200	°C	IP9	DEOXO TOWER 61, GAS UTLET TEMPERATURE HIGH - H - TT 61.1	0	TO PLC			
TT 64.5	TA 64.5 H	>40	°C	IP9	DRYER TOWER 64A, COOLING FLOW LOW - H - TT 64.5	0	TO PLC			
TT 64.5	TA 64.5 H A	>45	°C	IP9	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5	0	TO PLC			
TT 64.5	TA 64.5 H R	>120	°C	IP9	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5	0	TO PLC			
TT 64.5	TA 64.5 L	<100	°C	IP9	DRYER TOWER 64A, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.5	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT 64.6	TA 64.6 H A	>45	°C	IP9	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6	0	TO PLC			
TT 64.6	TA 64.6 H R	>200	°C	IP9	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6	0	TO PLC			
TT-64.6	TA 64.6 L	<150	°C	IP9	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6	0	TO PLC			
TT-64.7	TA 64.7 H	>40	°C	IP9	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7	0	TO PLC			
TT 64.7	TA 64.7 H A	>45	°C	IP9	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7	0	TO PLC			
TT 64.7	TA 64.7 H R	>120	°C	IP9	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7	0	TO PLC			
TT-64.7	TA 64.7 L	<100	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7	0	TO PLC			
TT 64.8	TA 64.8 H A	>45	°C	IP9	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8	0	TO PLC			
TT 64.8	TA 64.8 H R	>200	°C	IP9	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8	0	TO PLC			
TT-64.8	TA 64.8 L	<150	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-600	TAHH-600 (ISO22)	80	°C	IP1	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-620	TAHH-620 (ISO22)	80	°C	IP1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620	0	TO PLC			
TT-1001	TAHH-1001 (C63)	30	°C	IP11	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001	5	TO PLC			
TT-1002	TAHH-1002 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002	5	TO PLC			
TT-1003	TAHH-1003 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003	5	TO PLC			
TT-1004	TAHH-1004 (C63)	35	°C	IP11	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004	5	TO PLC			
TT-1005	TAHH-1005 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005	5	TO PLC			
TT-1006	TAHH-1006 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006	5	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-1003	TAL-1003 (ISO22)	10	°C	IP9	AMBIENT TEMPERATURE LOW - L - TT-1003	0				
TT-600	TALL-600 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-600	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-620	TALL-620 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-620	0	TO PLC			
TT-HY-1001	TALL-1001 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001	5	TO PLC			
TT-HY-1002	TALL-1002 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002	5	TO PLC			
TT-HY-1003	TALL-1003 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003	5	TO PLC			
TT-HY-1005	TALL-1005 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005	5	TO PLC			
TT-HY-1006	TALL-1006 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006	5	TO PLC			
TT-HY-1004	TALL-1003 (ISO22)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW - LL - TT-1004	5	TO PLC			
TDI-600	TDAH-600 (ISO22)	10	°C	IP9	ANODE DT HIGH - H - TDY-600	0	TO PLC			
TDI-600	TDAHH-600 (ISO22)	12	°C	IP1	ANODE DT VERY HIGH - HH - TDY-600	0	TO PLC			
TDI-600	TDAL-600 (ISO22)	-1	°C	IP9	ANODE DT LOW - L - TDY-600	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TDI-600	TDALL-600 (ISO22)	-2	°C	IP1	ANODE DT VERY LOW - LL - TDY-600	0	TO PLC			
TT 60.1	TSA 60.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.1	0	TO PLC			
TT 60.1	TSA 60.1 HH	>250	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1	0	TO PLC			
TT 60.1	TSA 60.1 LL	<40	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1	3600	TO PLC			
TT 60.2	TSA 60.2	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.2	0	TO PLC			
TT 60.2	TSA 60.2 HH	>250	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2	0	TO PLC			
TT 60.2	TSA 60.2 LL	<50	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2	3600	TO PLC			
TT 61.1	TSA 61.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 61.1	0	TO PLC			
TT 61.1	TSA 61.1 HH	>250	°C	IP1	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1	0	TO PLC			
TS 64.2	TSA 64.2 HH	>400	°C	IP1	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2	0	TO PLC			
TS 64.3	TSA 64.3 HH	>200	°C	IP1	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3	0	TO PLC			
TS 64.4	TSA 64.4 HH	>60	°C	IP1	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4	0	TO PLC			
TT 64.5	TSA 64.5	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.5	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT 64.5	TSA 64.5 HH A	>50	°C	IP1	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC			
TT 64.5	TSA 64.5 HH R	>150	°C	IP1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC			
TT 64.6	TSA 64.6	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.6	0	TO PLC			
TT 64.6	TSA 64.6 HH A	>50	°C	IP1	DRYER TOWER 64A, TOP ADS. TEMPERATURE VERY HIGH -HH - 64.6	0	TO PLC			
TT-64.6	TSA 64.6 HH C	>40	°C	IP1	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6	0	TO PLC			
TT 64.6	TSA 64.6 HH R	>250	°C	IP1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6	0	TO PLC			
TT 64.7	TSA 64.7	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.7	0	TO PLC			
TT 64.7	TSA 64.7 HH A	>50	°C	IP1	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC			
TT 64.7	TSA 64.7 HH R	>150	°C	IP1	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC			
TT 64.8	TSA 64.8	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.8	0	TO PLC			
TT 64.8	TSA 64.8 HH A	>50	°C	IP1	DRYER TOWER 64B, TOP ADS. TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC			
TT-64.8	TSA 64.8 HH C	>40	°C	IP1	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8	0	TO PLC			
TT 64.8	TSA 64.8 HH R	>250	°C	IP1	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-621A	TSAHH-621A (ISO22)	80	°C	IP5	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A	0	TO PLC			
TT-621B	TSAHH-621B (ISO22)	80	°C	IP5	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B	0	TO PLC			
PCA-001	VAH-001 (ISO22)	2.2	V/cell	IP9	STACK-001 VERY HIGH CELL VOLTAGE - H - PCA-001	1	TO PLC			
PCA-002	VAH-002 (ISO22)	2.2	V/cell	IP9	STACK-002 VERY HIGH CELL VOLTAGE - H - PCA-002	1	TO PLC			
PCA-003	VAH-003 (ISO22)	2.2	V/cell	IP9	STACK-003 VERY HIGH CELL VOLTAGE - H - PCA-003	1	TO PLC			
PCA-004	VAH-004 (ISO22)	2.2	V/cell	IP9	STACK-004 VERY HIGH CELL VOLTAGE - H - PCA-004	1	TO PLC			
PCA-005	VAH-005 (ISO22)	2.2	V/cell	IP9	STACK-005 VERY HIGH CELL VOLTAGE - H - PCA-005	1	TO PLC			
PCA-006	VAH-006 (ISO22)	2.2	V/cell	IP9	STACK-006 VERY HIGH CELL VOLTAGE - H - PCA-006	1	TO PLC			
PCA-007	VAH-007 (ISO22)	2.2	V/cell	IP9	STACK-007 VERY HIGH CELL VOLTAGE - H - PCA-007	1	TO PLC			
PCA-008	VAH-008 (ISO22)	2.2	V/cell	IP9	STACK-008 VERY HIGH CELL VOLTAGE - H - PCA-008	1	TO PLC			
REC-001	VAH-101 (C63)	975	V	IP9	REC-001 HIGH VOLTAGE - H - VM-101	1	COM			
REC-002	VAH-102 (C63)	975	V	IP9	REC-002 HIGH VOLTAGE - H - VM-102	1	COM			
PCA-001	VAHH-001 (ISO22)	2.3	V/cell	IP1	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001	1	TO PLC			
PCA-002	VAHH-002 (ISO22)	2.3	V/cell	IP1	STACK-002 VERY HIGH CELL VOLTAGE - HH - PCA-002	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PCA-003	VAHH-003 (ISO22)	2.3	V/cell	IP1	STACK-003 VERY HIGH CELL VOLTAGE - HH - PCA-003	1	TO PLC			
PCA-004	VAHH-004 (ISO22)	2.3	V/cell	IP1	STACK-004 VERY HIGH CELL VOLTAGE - HH - PCA-004	1	TO PLC			
PCA-005	VAHH-005 (ISO22)	2.3	V/cell	IP1	STACK-005 VERY HIGH CELL VOLTAGE - HH - PCA-005	1	TO PLC			
PCA-006	VAHH-006 (ISO22)	2.3	V/cell	IP1	STACK-006 VERY HIGH CELL VOLTAGE - HH - PCA-006	1	TO PLC			
PCA-007	VAHH-007 (ISO22)	2.3	V/cell	IP1	STACK-007 VERY HIGH CELL VOLTAGE - HH - PCA-007	1	TO PLC			
PCA-008	VAHH-008 (ISO22)	2.3	V/cell	IP1	STACK-008 VERY HIGH CELL VOLTAGE - HH - PCA-008	1	TO PLC			
REC-001	VAHH-101 (C63)	1023	V	IP1	REC-001 VERY HIGH VOLTAGE - HH - VM-101	1	COM			
REC-002	VAHH-102 (C63)	1023	V	IP1	REC-002 VERY HIGH VOLTAGE - HH - VM-102	1	COM			
PCA-001	VAL-001 (ISO22)	1.55	V/cell	IP9	STACK-001 LOW CELL VOLTAGE - L - PCA-001	1	TO PLC			
PCA-002	VAL-002 (ISO22)	1.55	V/cell	IP9	STACK-002 LOW CELL VOLTAGE - L - PCA-002	1	TO PLC			
PCA-003	VAL-003 (ISO22)	1.55	V/cell	IP9	STACK-003 LOW CELL VOLTAGE - L - PCA-003	1	TO PLC			
PCA-004	VAL-004 (ISO22)	1.55	V/cell	IP9	STACK-004 LOW CELL VOLTAGE - L - PCA-004	1	TO PLC			
PCA-005	VAL-005 (ISO22)	1.55	V/cell	IP9	STACK-005 LOW CELL VOLTAGE - L - PCA-005	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PCA-006	VAL-006 (ISO22)	1.55	V/cell	IP9	STACK-006 LOW CELL VOLTAGE - L - PCA-006	1	TO PLC			
PCA-007	VAL-007 (ISO22)	1.55	V/cell	IP9	STACK-007 LOW CELL VOLTAGE - L - PCA-007	1	TO PLC			
PCA-008	VAL-008 (ISO22)	1.55	V/cell	IP9	STACK-008 LOW CELL VOLTAGE - L - PCA-008	1	TO PLC			
PCA-001	VALL-001 (ISO22)	1.5	V/cell	IP1	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001	1	TO PLC			
PCA-002	VALL-002 (ISO22)	1.5	V/cell	IP1	STACK-002 VERY LOW CELL VOLTAGE - LL - PCA-002	1	TO PLC			
PCA-003	VALL-003 (ISO22)	1.5	V/cell	IP1	STACK-003 VERY LOW CELL VOLTAGE - LL - PCA-003	1	TO PLC			
PCA-004	VALL-004 (ISO22)	1.5	V/cell	IP1	STACK-004 VERY LOW CELL VOLTAGE - LL - PCA-004	1	TO PLC			
PCA-005	VALL-005 (ISO22)	1.5	V/cell	IP1	STACK-005 VERY LOW CELL VOLTAGE - LL - PCA-005	1	TO PLC			
PCA-006	VALL-006 (ISO22)	1.5	V/cell	IP1	STACK-006 VERY LOW CELL VOLTAGE - LL - PCA-006	1	TO PLC			
PCA-008	VALL-008 (ISO22)	1.5	V/cell	IP1	STACK-008 VERY LOW CELL VOLTAGE - LL - PCA-008	1	TO PLC			
PCA-001	VCA-001 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-001 - PCA-001	1	TO PLC			
PCA-002	VCA-002 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-002 - PCA-002	1	TO PLC			
PCA-003	VCA-003 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-003 - PCA-003	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PCA-004	VCA-004 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-004 - PCA-004	1	TO PLC			
PCA-005	VCA-005 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-005 - PCA-005	1	TO PLC			
PCA-006	VCA-006 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-006 - PCA-006	1	TO PLC			
PCA-007	VCA-007 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-007 - PCA-007	1	TO PLC			
PCA-008	VCA-008 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-008 - PCA-008	1	TO PLC			
PCA-001	VKA-001 (ISO22)	10	%	IP1	STACK-001 VOLTAGE DROP - PCA-001 - DROP	0	TO PLC			
PCA-002	VKA-002 (ISO22)	10	%	IP1	STACK-002 VOLTAGE DROP - PCA-002 - DROP	0	TO PLC			
PCA-003	VKA-003 (ISO22)	10	%	IP1	STACK-003 VOLTAGE DROP - PCA-003 - DROP	0	TO PLC			
PCA-004	VKA-004 (ISO22)	10	%	IP1	STACK-004 VOLTAGE DROP - PCA-004 - DROP	0	TO PLC			
PCA-005	VKA-005 (ISO22)	10	%	IP1	STACK-005 VOLTAGE DROP - PCA-005 - DROP	0	TO PLC			
PCA-006	VKA-006 (ISO22)	10	%	IP1	STACK-006 VOLTAGE DROP - PCA-006 - DROP	0	TO PLC			
PCA-007	VKA-007 (ISO22)	10	%	IP1	STACK-007 VOLTAGE DROP - PCA-007 - DROP	0	TO PLC			
PCA-008	VKA-008 (ISO22)	10	%	IP1	STACK-008 VOLTAGE DROP - PCA-008 - DROP	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
VM-001	VQAHH-001 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-001 AND VM-001 - HH	5	TO PLC			
VM-002	VQAHH-002 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-002 AND VM-002 - HH	5	TO PLC			
VM-003	VQAHH-003 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-003 AND VM-003 - HH	5	TO PLC			
VM-004	VQAHH-004 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-004 AND VM-004 - HH	5	TO PLC			
VM-005	VQAHH-005 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-005 AND VM-005 - HH	5	TO PLC			
VM-006	VQAHH-006 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-006 AND VM-006 - HH	5	TO PLC			
VM-007	VQAHH-007 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-007 AND VM-007 - HH	5	TO PLC			
VM-008	VQAHH-008 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-008 AND VM-008 - HH	5	TO PLC			
CT-600	YAH-600 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT600 - H	5	TO PLC			
CT-620	YAH-620 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT620 - H	5	TO PLC			
CT-600	YAHH-600 (ISO22)	1	µS/cm	IP1	VERY HIGH CONDUCTIVITY CT600 - HH	5	TO PLC			
CT-600	YALL-600 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT600	5	TO PLC			
CT-620	YALL-620 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT620	5	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
VAR-300A	SCA-300A (C63)	-	-	IP17	ERROR VSD LP-300A - ERR - VAR-300A	1	TO PLC			
VAR-300B	SCA-300B (C63)	-	-	IP17	ERROR VSD LP-300B - ERR - VAR-300B	1	TO PLC			
VAR-600A	SCA-600A	-	-	IP6	ERROR VSD CP-600A - ERR - VAR-600A	1	TO PLC			
VAR-600B	SCA-600B	-	-	IP6	ERROR VSD CP-600B - ERR - VAR-600B	1	TO PLC			
VAR-620A	SCA-620A	-	-	IP5	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC			
VAR-620B	SCA-620B	-	-	IP5	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC			
PT-633	PKA-633 (C63)	-7	barg/s	IS2	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633	0	TO PLC			

8. Simulation Tests

This section is performed straight after the Basic Function Testing described in the document C063-ELO-PRO-CO-0003 - BLPH Electrolyser Pre-Commissioning Manual. In this section, all complex loops and functional sequences are tested with simulated inputs to validate their correct implementation and physical actions.

8.1 Control Loop & Basic Sequences

The method statement is described in the document C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statement at the chapter “6.6.7 Multi Loop or Complex Loop Item”. All functions referring to the HVAC System referred here are tested through HVAC SAT Procedure (See C63-PAU-SAT-001).

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Function - Description		Completed by	Witnessed by	Date	Comment
Regulation Functions	R-CC-200 – 45°C Cooling Loop Control				
	R-CC-200 – 45°C Cooling Loop Control				
	R-CC-201 – 45°C Cooling Loop Control				
	R-CC-400 – H2 gas cooling loop control				
	R-CC-401 – O2 gas cooling loop control				
	R-DPC-001 – Delta Pressure H2/O2 control				
	R-DPC-101 – Delta Pressure H2/O2 control (STANDBY)				
	R-FC-300 – Water purification recirculation				
	R-FC-600 – Oxygen pump setpoint control				
	R-FC-601 – Pure water recirculation (anodic loop)				
	R-FC-620 – Hydrogen pump setpoint control				
	R-FC-621 – Pure water recirculation (cathodic loop)				
	R-LC-300 – PWT-300 water level control.				
	R-LC-600 – ST-600 Water Level Control (Direct Injection)				
	R-LC-610 – CS-610 water level control				
	R-LC-620 – ST-620 Water Level Control (Direct balancing)				
	R-LC-630 – CS-630 water level control				
	R-LC-642 – DG-640 Hydrogen Purge				
	R-LC-500 – Water Level Control of H_2 vent condensates				
	LSLL-500 Very Low Level in H2 Vent Drain				
	LSHH-500 Very High Level in H2 Vent Drain				
	R-PC-150 – Instrument air Pressure Control Loop				

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Function - Description		Completed by	Witnessed by	Date	Comment
	R-PC-610 – Pressure Control Oxygen Loop				
	R-PC-611 – O2 separator under pressure				
	R-PC-630 – Pressure Control Hydrogen Loop				
	R-PC-631 – H2 separator under pressure				
	R-PC-950 – Regular inerting against air ingress.				
	R-QC-800 – H2 Quality Control				
	R-REC-001 – Rectifier setting current.				
	R-REC-002 – Adjustment of flowrate setpoint in case of WC-400/401 failure				
	R-TC-600 – O2 Water Temperature Control Loop				
	R-TC-601 – O2 & H2 water loop antifreeze				
	R-TC-700 – Hydrogen heating before Deoxo				
	R-TC-1000 – Air extraction & ambient temperature control loop				
Depressurisation	S-PC-610 – O2 Depressurisation				
	S-SPC-610 – O2 Safety Depressurisation				
	S-PC-630 – H2 Depressurisation				
	S-SPC-630 – H2 Safety Depressurisation				
Inerting Sequences	S-FC-900 – O2 Line Inerting				
	S-SFC-900 – Safety O2 line inerting				
	S-FC-920 – H2 Line Inerting				
	S-SFC-920 – Safety H2 line inerting				
	S-PUR-00x – Hydrogen purification unit				
	S-PUR-002 – SEQ 1: Adsorption tower A & regeneration (heating) tower B				

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Function - Description		Completed by	Witnessed by	Date	Comment
Hydrogen Purification Sequences	S-PUR-003 – SEQ 2: Adsorption tower A & regeneration (cooling) tower B				
	S-PUR-004 – SEQ 3: Adsorption tower B & regeneration (heating) tower A				
	S-PUR-005 – SEQ 4: Adsorption tower B & regeneration (cooling) tower A				
	S-PUR-006 – Condensate sub program				
Rectifier Control	S-REC-001 – Stack polarization				
	S-REC-002 – Rectifier: setting current				
	S-REC-003 – Stop rectifier (decreasing current)				
	S-REC-004 – Rectifier going to Standby from Start (decreasing current)				
Others	S-FC-001 – Start Circulation Pump				
	S-LC-300 – Automatic Filling of PWT-300				
	S-LC-600 – Automatic Filling of ST-600				
	S-LC-620 – Automatic Filling of ST-620				

8.2 Operating Sequences

By simulating values, the sequences simulation tests allow the ensure the correct implementation of all steps to ensure a smooth Start-Up.

Function - Description		Completed By	Witnessed By	Date	Comment
Sequences Functions	S-A0-001 – NO MODE leaving				
	S-F5-001 – MAINTENANCE in progress (from STOP and NO MODE)				
	S-D2-001 – SAFETY in progress (from ALL STATES)				
	S-B0-001 – STOP in progress (from NO MODE or MAINTENANCE)				

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Function - Description		Completed By	Witnessed By	Date	Comment
	S-A5-001 – STOP in progress (from START/STANDBY/IDLE states)				
	S-A11-001 – IDLE in progress (from STOP)				
	S-A4-001 – IDLE in progress (from STANDBY)				
	S-A7-001 – IDLE in progress (from START)				
	S-A9-001 – STANDBY in progress (from STOP)				
	S-A8-001 – STANDBY in progress (from IDLE)				
	S-A6-001 – STANDBY in progress (from START)				
	S-A10-001 – STANDBY depress. in progress (from STANDBY press.)				
	S-A12-001 – IDLE in progress (from STANDBY press.)				
	S-F2-001 – START in progress (from STOP)				
	S-F3-001 – START in progress (from STANDBY)				
	S-F4-001 – START in progress (from IDLE)				
	S-F6-001 – START in progress (from STANDBY press.)				

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9. Flushing, N2 Purging & Leak Test

Once all simulation tests of process and safety loops and sequences have been tested, the pre-start-up activities can take place. The first operation to take place is the flushing. This following chapter provides material list, conditions and detailed method statement for a safe and efficient flushing of both Water/H2 Loop and Water/O2 prior to the unit start-up. The goal is to reach the necessary conductivity specification to ensure a successful unit start-up and to protect the stacks integrity. During this flushing operation, Nitrogen purging is done because the presence of ambient air can affect the conductivity. Also, the first final Leak test is performed without the stacks and then with the stacks connected only in dynamic.

This specific flushing activity is not a classic flushing activity taking place during the end of construction activities. Indeed, mechanical equipment cleaning and piping cleaning by blowing or flushing have been performed prior to the Mechanical Completion. This operation is a commissioning activity due to the livening up of 56-03 WTP System and both 600 and 620 loops included in 25-11 sub-system.

9.1 Conditions

The flushing can be performed when the mechanical completion certificate for the subsystem has been signed by all parties and after the Pre-Commissioning activities:

- The piping has been tested, cleaned, dried and is free of rust before the instruments and valves are fitted.
- The equipments have been cleaned and permanently closed.
- The reinstatement as per P&ID is completed with all piping, equipment, valves and instruments installed and oriented in the correct direction.
- The equipment, valves and instruments have been visually checked and are free of any damage.
- All Punchlist that does not require the system to be reopened are cleared.
- 25-11 Subsystem Mechanical Completion Certificate has been signed.
- The Gross Leak Test has been performed and forms signed by all parties.
- Vent lines are operational.
- Electrical cabinet / Control System is operational (tested and energized).
- Stacks bypasses are installed.
- Valves & Instruments Loop Testing on the systems has been completed; All valves & instruments are operational.
- Alarms & Trips (Process & Safety Interlocks) relevant to the systems have been tested.
- Pump CP-600A / CP-600B / CP-620A / CP-620B are ready for Start-Up.
- 56-03 Subsystem WTP is operational with feed water availability and pumps LP300A/B ready for start-up.
- If there is no feed water, provide IBC tank of water.
- Nitrogen Purging is operational.
- The system 25-11 is pressurized with around 200 mbarg of positive pressure with Nitrogen.
- A Nitrogen Purging shall be achieved in case the system is not preserved with Nitrogen.
- Select maintenance mode on the HMI.
- All necessary tools for the operation are available.
- All relevant documentation is available in the latest revision.

9.2 Safety

These defining rules shall be applied from the initial (total or partial) energizing of the instrumented systems, until the end of the commissioning activities.

- Appropriate PPE must be always worn during the operation.

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- A permit to work has been delivered.
- No equipment will be definitively energized without the subsystem Mechanical Completion.
- The piping under pressure is clearly identified

Safety rules in accordance with the risk must be applied (e.g. Fluids, Pressure, Electrical Power, etc.).
Risk assessment must be done prior to any test activity.

9.3 Prerequisites

9.3.1 Required Equipments

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches…
- Portable Conductivity meter
- Portable O2 meter
- Flexible for Stack Bypass
- Field telephone or Walkie-Talkie
- Empty IBC Tank (to route the used water from flushing)
- If water is not available: IBC tank of soft water.
- Spare gasket for F-600 and F-620.
- N2/H2 bottle rack mix for Leak Test.

All equipment used must have a serial number and a valid calibration certificate (if applicable).
Soft water quantity and specifications must be as followed:

- For the first fill-in: 2m3
- For the flushing: between 6 and 14 m3 (depending on pipe condition)

For the type of water, the specifications must be as followed:

- Conductivity: Conductivity <703 µS/cm
- TOC (total organic carbon) <3 mg/l
- SDI (Fouling index) <3
- Free chlorine, Total chlorine <0.5 mg/l
- Average Flow Rate: 0.81m3/h
- Pressure: 4-6 barg
- Temperature: 10-35 °C

9.3.2 Required Documents

- This procedure is approved for use.
- Set of PIDs at the last revision.
- Subsystem Mechanical Completion Certificate including the loop signed by all parties.
- Permit To Work delivered and signed.
- Simulation Tests, Cause & Effects Tests completed. (Chapter 7 & 8 inside this procedure)
- N2 Distribution Test completed. (Chapter 5 inside this procedure)

9.3.3 Manpower (Indicative)

- 1 Elogen Automation Engineer
- 1 Elogen Commissioning Engineer (Responsible for the Operation)
- 1 E&I Supervisor
- 2 Helpers (pipefitter)
- 1 LOTO supervisor

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9.4 Flushing Operation of Anode Water Loop / O2 Production

Steps	Description	Completed By	Witnessed By	Date
01	Line Up the valves as per the P&ID Mark Up (See Appendix for Anode Water Loop / O2 Production Flushing P&ID Mark Up): For Water Injection: Check that HV-300, HV-301A, HV-302A, PV-300 are open. Check that the 3ways valve (3WV-320) is open towards the separator tank for the oxygen loop (ST600). Remove the nozzle plate from FH-600. The system is ready to receive pure water from WTP system. Note: as per the design of WTP, it cannot receive tap water to produce pure water as per its specification. There is no softener in WTP package, so a temporary softener should be used upstream of WTP. For Venting: Check that HV-615, MPV-611 are open. Check that PV-610 is closed. The system is connected to the O2 Vent during the filling. The system has been inerted with Nitrogen during Nitrogen Service Test. At this stage 8% O2 is acceptable for a good preservation. Check the O2 % at PT-612 vent with a portable O2 meter. If O2 is more than 8%, perform a Nitrogen purging by opening PV-900. Also put the following valves in the indicated position: Check that HV-600D, HV-600DA, HV-600DB, HV-601D, HV-602DA, HV-603D, PV-640 are closed. Check that HV-600, HV-600A, HV-600B, HV-601A, HV-601B, HV-602A, HV-603A, HV-604 and HV-605 are open.			
02	Check the feed water conductivity from WTP measurement. Conductivity measured shall be below 0.1 µS/cm. Record the conductivity value on the Flushing Report.			

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03	Start the LP-300A in MANUAL mode. Check that there is no overflow by listening to the pump noise and by checking the pump curve versus the actual pressures (WTP outlet Pressure and PI-300). Fill ST-600 and all piping with water until approximately the middle of tank. During the filling, verify that the air is vented from all dead volumes as much as possible. If needed open some vent to make sure no air below the water level in the ST-600. Monitor ST-600 level on LT-600 during the filling.			
04	Stop LP-300A as soon as the alarm LAH-600 is triggered.			
05	**Start CP-600A at minimum speed** and flush the loop pipes. Check that there is no overflow by listening to the pump noise. If necessary, check the pump curve versus the actual pressures. Slightly close partially the outlet valve HV-603A to create a slight pressure loss if necessary. Check the level on LT-600 at the CP-600A start-up. Fill ST-600 with water when the level will decrease (due to the discharge lines filling near HE-600 heat exchanger).			
06	Monitor the conductivity on the CT/P-600 during the pipes flushing. Record the initial value on the Flushing Report. Check in F-600 if any dirt has been be collected. The goal is to reach a conductivity below **0.5 µS/cm** at the end of the operation.			
07	If necessary, perform conductivity measurements at different purge points. Drain slightly a part of the used water through HV-602DA & HV-602DB, route the used water flow to an empty IBC tank and fill slowly with fresh water. Repeat this operation until the required conductivity in the loop is reached ($\sigma < 0.5\mu S/cm$). Once the conductivity is reached, check that the conductivity measurements are stable.			
08	Proceed to the flushing by switching to **CP-600B.** Once the conductivity is reached ($\sigma < 0.5\mu S/cm$), check that the conductivity measurements are stable. Fill the Flushing Report.			

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09	Stop the operation for at least 12h.			
10	Recheck all conductivity measurements after 12h the ensure σ < 0.5µS/cm. Proceed to a flushing (Steps 05-08) or troubleshooting if the conductivity is not OK.			
11	Fill the FH-600 with Resin (check the Resin Filling in section 9.)			
12	Fill the system with water until conditions described in Step 03 Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.			
13	Start the pump CP-600A or CP-600B and flush the water loop again with the resin filled in the FH-600. Check in F-600 if any dirt or resin has been collected. If resin is collected, do some troubleshooting at the FH. The goal is to reach a conductivity below **0.1 µS/cm** at the end of the operation. Fill the Flushing Report.			
14	Perform the Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up (Leak Test Pack 01) in Appendix: Pure water is left in place and a mix of N2/H2 is injected till 11.7 barg through HV-902. Follow the methodology explained in the Leak Test chapter in the Method Statement. Do a precise leak check with the H2 sniffer. Fill the Leak Test ITR.			

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9.5 Flushing Operation of Cathode Water Loop / H2 Production

Steps	Description	Completed By	Witnessed By	Date
01	Line Up the valves as per the P&ID Mark Up (See Appendix for Cathode Water Loop / H2 Production Flushing P&ID Mark Up): For Water Injection: Check that HV-300, HV-301B, HV-302B are open. Check that the 3ways valve (3WV-320) is open towards the separator tank for the hydrogen loop (ST620). Remove the nozzle plate from FH-620. The system is ready to receive pure water from WTP system. Note: as per the design of WTP, it cannot receive tap water to produce the pure water as per its specification. There is no softener in WTP package, so a temporary softener should be used upstream of WTP. For Venting: Check that PV-631, PV-642 are open. The system is connected to the H2 Vent during the filling. The system has been inerted with Nitrogen during Nitrogen Service Test. At this stage 8% O2 is acceptable for a good preservation. Check the O2 % at PT-632 vent with a portable O2 meter. If O2 is more than 8%, perform a Nitrogen purging by opening PV-920. Also put the following valves in the indicated position: Check that HV-620D, HV-620DA, HV-620DB, HV-621D, HV-622D, PV-600, PV-620, PV640, PV-641 are closed. Check that HV-620, HV-620A, HV-620B, HV-621A, HV-621B, HV-622, HV-623, HV-624, MV-640 are open.			
02	Check the feed water conductivity from WTP measurement. Conductivity measured shall be below 0.1 µS/cm. Record the conductivity value on the Flushing Report.			

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03	Start the LP-300B in MANUEL mode. Check that there is no overflow by listening to the pump noise and by checking the pump curve versus the actual pressures (WTP outlet Pressure and PI-300). Fill ST-620 and all piping with water until approximately the middle of tank. During the filling, verify that the air is vented from all dead volumes as much as possible. If needed open some vent to make sure no air below the water level in the ST-620. Monitor ST-620 level on LT-620 during the filling.			
04	Stop LP-300B as soon as the alarm LAH-620 is triggered & Close to the vent by closing PV-631.			
05	Start **CP-620A at minimum speed** and flush the loop pipes. Check that there is no overflow by listening to the pump noise. If necessary, check the pump curve versus the actual pressures. Slightly close partially the outlet valves HV-622 to create a slight pressure loss if necessary. Check the level on LT-620 at the CP-620A start-up. Fill ST-620 with water when the level will decrease.			
06	Monitor the conductivity on the CT/P-620 during the pipes flushing. Record the initial value on the Flushing Report. Check in F-620 if any dirt or resin have been collected. The goal is to reach a conductivity below **0.5 µS/cm** at the end of the operation.			
07	If necessary, perform conductivity measurements at different purge points. Drain slightly a part of the used water through HV-621D, route the used water flow to an empty IBC tank and fill slowly with fresh water. Repeat this operation until the required conductivity in the loop is reached ($\sigma < 0.5\mu S/cm$). Once the conductivity is reached, check that the conductivity measurements are stable.			
08	Proceed to the flushing by switching to **CP-620B.** Once the conductivity is reached ($\sigma < 0.5\mu S/cm$), check that the conductivity measurements are stable. Fill the Flushing Report.			

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09	The next step is to flush the DG-640: Check that PV-642 is open for DG-640 venting purposes. Check that PRV-640 is fully open. HV-640D is ready to be used for draining purposes. Open PV-640 & then open slowly MV-640 to avoid a sudden pressure drop at the CP-620A Pump outlet. Fill with water when ST-620 level is decreasing excessively during the DG-640 flushing. The alarm LAL-620 can be used as an indication to top up with water in ST-620. Overflow at FT-620 can lead to a trip. Pressurize slightly ST-620 with N2.			
10	Purge also DG-640 with N2 by opening HV-640, HV-641 then by opening slowly MV-941. While opening MV-941, check that flow doesn't exceed 700 NL/h on FI-940. Once conditions of flushing are stable, close PV-642, HV-640 and HV-641. Keep MV-941 at the same position for further inerting purposes.			
11	Monitor the conductivity with a portable conductivity meter on the sampling point HV-640D.			
12	Recheck all conductivity measurements after 12h the ensure $\sigma < 0.5\mu S/cm$. Proceed to a flushing (Steps 05-08) or troubleshooting if the conductivity is not OK. Check again in F-620 if any dirt or resin has been collected. Fill the Flushing Report.			
13	Fill the FH-620 with Resin (check the Resin Filling in section 9.)			
14	Fill the system with water until conditions described in Step 03 Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.			
15	Start the pump CP-620A or CP-620B and flush the water loop again with the resin filled in the FH-620. The goal is to reach a conductivity below **0.1 µS/cm** at the end of the operation. Check in F-620 if any dirt or resin has been collected. If resin is collected, do some troubleshooting at the FH. Fill the Flushing Report.			

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16	Perform the Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up (Leak Test Pack 02) in Appendix: Purge HPP with H2/N2 by opening MV-632 in the beginning. Pure water is left in place and a mix of N2/H2 is injected till 32.4 barg through HV-922. Follow the methodology explained in the Leak Test chapter in the Method Statement. Do a precise leak check with the H2 sniffer. Fill the Leak Test ITR.			

9.6 Flushing with Stacks

Steps	Description	Completed By	Witnessed By	Date
01	Install the Stacks (check the Stack Installation in section 10.)			
Important Note: At this stage, H2/Water Loop Pressure should remain always higher than O2/Water Loop Pressure at all times.				
02	Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.			
03	Pressurize with N2 the H2/Water Loop with 2 barg and the O2/Water Loop with 200 mbarg. Note: Each Stack sides are permeable to water.			
04	Start the pumps CP-600A & CP-620A or CP-600B & CP-620B at their normal speed and flush the water loop again with the resin filled in the FH-600 & FH-620 and all the stacks installed. Monitor carefully the pressure. If necessary, inject N2 to H2/Water Loop to keep the pressure higher than O2/Water Loop Pressure. The goal is to reach a conductivity below **0.1 µS/cm in both sides** at the end of the operation. Fill the Flushing Report. Keep the same pressures in both sides systems. Next step is described in chapter 11.			

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10. Resin Installation

This following section gives the requirements and steps for the insertion of the resin in the filters housing FH-600 and FH-620. The acceptance criteria for this activity are the conductivity measurement to be kept under 0.5µS/cm on both loops after the flushing with resin. It ensures a good particles and ions adsorption.

10.1 Pre-requisites

This operation is performed straight after the flushing, therefore the Flushing Report this procedure steps for 7. Flushing has been completed and filled out.

10.1.1 Required Equipments

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches…
- Field telephone or Walkie-Talkie
- 1 clean shovel for Resin loading
- 3 flange gaskets for RS-603A 6” (DN150)
- 3 EPDM gaskets (815ID/875OD) for FH-600
- 3 EPDM gaskets (750ID/810OD) for FH-600
- 3 flange gaskets for FH-600 cover 36”150# (DN900)
- 3 flange gaskets for RS-622 4” (DN100)
- 3 EPDM gaskets (505ID/565OD) for FH-620
- 3 EPDM gaskets (440ID/500OD) for FH-620
- 3 flange gaskets for FH-620 cover 24” 300# (DN600)
- 508 L of IRN160 Amberlite resin
- 158 L of IRN160 Amberlite resin.
- 1 torque wrench (range up to 2700 Nm)
- 1 sling to install the nozzle plate
- Keys for the hand valves padlocks
- Fitting hoses for FH drain valves (HV-602DA and HV-621D)
- Empty IBC Tank (to route the water from FH section)
- 1 Allen key

All equipment used must have a serial number and a valid calibration certificate (if applicable).

10.1.2 Required Documents

- Flushing Procedures
- Filter housing datasheet
- This procedure is approved for use
- Set of PIDs at the last revision
- Subsystem RFC Certificate signed by all parties
- Permit To Work delivered and signed

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10.1.3 Manpower (Indicative)

- 1 Elogen Commissioning Engineer
- 2 Mechanical Supervisor
- 2 Helpers (pipefitter)
- 1 LOTO supervisor

The resin filling activities are under the responsibility of the Commissioning Engineer.

10.1.4 Duration

The duration of the activities is 1 day per FH.

10.2 Safety

Main risks during the operation are:

- Slippery floor risk
- Chemical Risks (cf. SDS IRN160 amberlite)
- Heavy load

10.3 Resin Filling Operation

The following procedure is for the FH-600. Same steps are applicable to perform the FH-620 filling. The corresponding tags for FH-620 filling are indicated in brackets.

Steps	Description	Completed By	Witnessed By	Date
01	Isolate the FH-600 (FH-620): remove the padlocks (if present) from the HV-602A (HV-621A and HV-621B) and HV-603A (HV-622). Close these FH upstream and downstream valves.			
02	Connect a hose to FH-600 (FH-620) section to drain valve HV-602DA (HV-621D).			
03	Remove the padlock from the HV-602DA (HV-621D) (if present).			
03	Then, open the HV-602DA (HV-621D) to drain the FH-600 (FH-620).			
06	Once the water draining is completed, close HV-602DA (HV-621D) and put the padlock at its original place.			
07	To remove the FH cover, unscrew the flanges at both ends of the removable pipe section RS-603A (RS-622) and remove it. Unscrew the bolts of the FH cover on the top. Turn the cover by using the mounting arm.			
08	Prepare the upper nozzle plate by placing it on a clean and flat surface ready to be installed.			

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09	Fill the housing with resin: for this, use the shovel.			
10	Put the upper nozzle plate at its position and tighten to indicated torque with the torque wrench. Be careful with the EPDM Gasket: it must be installed properly without any damage & proper bolt tightening. Otherwise, that affects the integrity of the resin bed.			
11	Replace the original flange gasket of the cover with a new one (if necessary).			
12	Put the FH cover on the FH. Screw the cover bolts and tighten to a proper torque using the torque wrench.			
13	Put the removable pipe section RS-603A (RS-622) at its original position.			
14	If necessary, replace the original flange gaskets with a new one.			
15	Check that all the drain valves are in their original position like it was before the operation.			
16	Open the isolating valves HV-602A (HV-621A and HV-621B) and HV-603A (HV-622).			
17	Reinstall all the padlocks on all valves.			
18	Perform several cycles of flushing, until obtaining a compliant conductivity (0.1µS/cm on both loops) by following the procedure steps in the section 8. Check in F-600 & F-620 if any resin has been collected			
19	Clean and tidy up the equipment.			

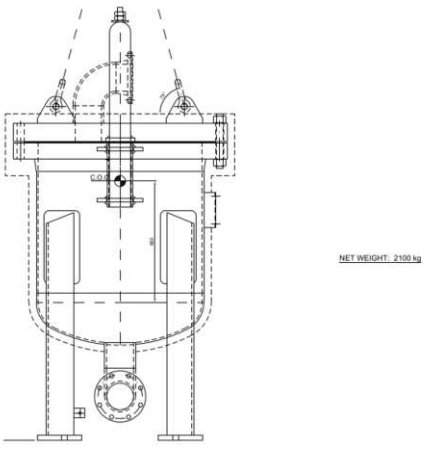


Figure 3. FH-600

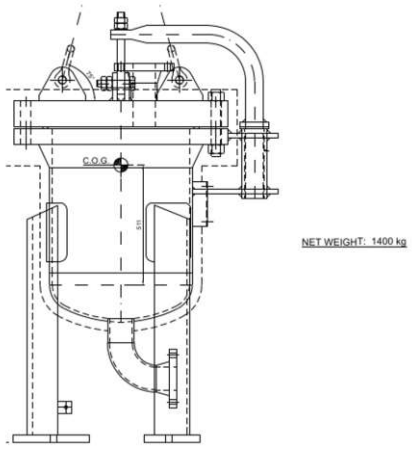


Figure 4. FH-620

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11. Stack Connection

This following section gives the requirements and steps for the stack's installation.

11.1Pre-requisites

This operation is performed after both loops flushing with resin. At this stage, the stacks are already in place and connected electrically with all its instrumentation. The goal is to connect it mechanically to the unit.

11.1.1 Required Equipments

- Torque wrench
- Valve padlocks
- Flexible for draining
- 32 Gaskets Kempchen DN50 PN40
- 192 screw, nuts M16 lg 90 A4

11.1.2 Required Documents

- This procedure is approved for use
- Set of PIDs at the last revision
- Subsystem RFC Certificate signed by all parties
- Permit To Work delivered and signed

11.1.3 Manpower (Indicative)

- 1 Elogen Commissioning Engineer
- 2 Mechanical Supervisor
- 1 Electrician
- 2 Helpers (pipefitter)
- 1 LOTO supervisor

The stacks connection activities are under the responsibility of the Commissioning Engineer.

11.1.4 Duration

The duration of the activities is 0.5 to 1 day per Stack.

11.2 Safety

Main risks during the operation are:

- Slippery floor risk
- Electrical Risks
- Mechanical Risks / Heavy load
- Necessary LOTO for electrical and mechanical must be done

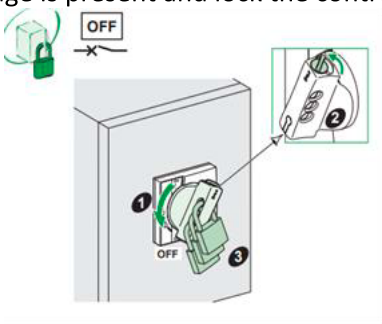
11.3 Stack Connection

The 8 stacks required for electrolysis to produce hydrogen are installed in the electrolyser.

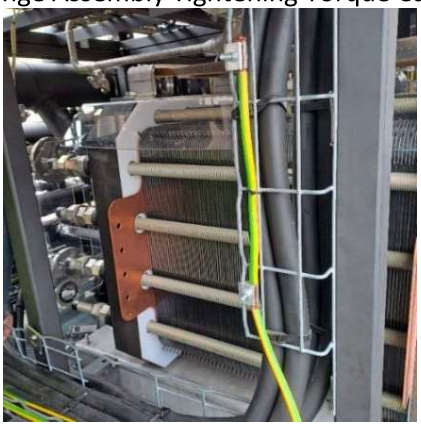
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All Electrical wiring & Instrumentation are connected
Follow the following Steps to connect the stacks mechanically:

- Check that the unit is stopped via the HMI and switch to maintenance mode.
- Check especially that the pumps CP-600A/B and CP-620A/B are switched off and close 3WV-320 valve.
- Check that the power cables to the stacks are not energized:
    - To isolate the 400Vac, open the circuit-breaker and align the handle with the OFF position.
    - Fit padlocks like in the illustration below.
    - Attach a lockout work card.
    - Check with a VAT that no voltage is present and lock the electrical cabinet.
    - Use a VAT to check that no voltage is present and lock the control cabinet.



- Isolate and drain the stacks section to prepare the installation:
    - Close HV-623, HV-624, HV-604, HV-605
    - Open HV-602D and HV-623D to drain the water
    - Remove the flexible
- If Stacks are preserved with pure water, remove the plugs and drain the water to an IBC tank.
- Place the flexible flanges on the stacks and put protection to preserve them from the outside.
- At this stage E&I Mechanical Completion must be completed (PCA, VM, Ground, EXT, DC Power cables, must all be connected). If not connect them at this step.
- Also, E&I Pre-Commissioning must be completed (PCA, VM, Ground, EXT, DC Power cables, must all be tested). If not, proceed to all tests and fill the relevant ITRs (if any).
- Connect the stacks to the manifold, then tighten to 120 N.m (staggered).
  Caution: Confirm torque value with Flange Assembly Tightening Torque Calculation Note



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- Repeat the previous steps to install stacks 2, 3….
- Protect the bipolar plates of each stack with their dedicated Plexiglas protection panels if not already done.
- Open the stacks' isolation valves once the assembly of the stacks is complete.
- Perform several cycles of flushing, until obtaining a compliant conductivity (0.1µS/cm on both loops) by following the procedure steps in the section 8.6

12. Pre-Start-Up Operations

In this section, a check is made on all Cold Operations that have been performed to make the Unit ready for the Start-Up as described in the following document: C063-ELO-PRO-CO-0005 - BLPH Electrolyser Operational Test Procedure.

- All Simulations Tests have been performed (as per chapter 7.)
- All Causes & Effects Tests have been performed (as per chapter 6.)
- Resin & Stacks are properly installed.
- Nitrogen Purging to 3% O2 have been done.
- Final Flushing below 0.1 µS/cm have been performed.
- All containers and ambient items have been tested.
- Fire & Gas detection is operational.
- HVAC Glycol Loop System is operational. PC&C & Start-Up performed by Vendor.
- Transformers & Rectifiers are not energized.
- H2/Water Loop is pressurized at around 2barg > O2/Water Loop at around 200mbarg.

Steps	Description	Completed By	Witnessed By	Date
01	Perform the Final Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up in Appendix: - First Pressurize gradually the Leak Test Pack 02 at 32.4 barg using an N2/H2 mix as per step 16 in chapter 9.5. HPP must be purged with N2/H2 by opening MV-632 at the beginning. - After & Only After: Pressurize the Leak Test Pack 01 at 11.7 barg by keeping the pressure in the Leak Test Pack 02 using an N2/H2 mix as per step 14 in chapter 9.4 Stacks are not waterproof, therefore, there is a natural pressure transfer from the H2/Water loop system to the O2/Water loop system. Do only a precise leak check in dynamic with the H2 sniffer: pressure holding for 1h is not applicable. Inject N2/H2 into H2/Water side if needed to hold the pressure. Vent N2/H2 from O2/Water side if the pressure increases. Fill the Leak Test ITR & Hold the pressure for the next step.			
02	Set the N2 pressure at 30 barg at H2/Water Loop side and 11 barg at O2/Water Loop side then from its closed position, open the following manual valves: - MV-631: 6.8 turns - MV-632: 6.8 turns - MV-642: 0.8 turns - FICV-610A/B/C: To be set at 60 NL/h and Low Flow Alarm to be set at 40 NL/h same time as FICV-611			

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	- FICV-611: To be set at 660 NL/h - FICV-800: To be set at 60 NL/h with and High Flow Alarm to be set at 469 NL/h and Low Flow Alarm to be set at 40NL/h - FSH-640: Alarm to be set at 6m3/h with water - MV-640: To be set at 3m3/h using FSH-640			
03	Line-Up the valves as per normal operation. Start-Up the Unit with Transformers & Rectifiers Off. Check that all Utilities have been started up as per the expected sequence. Check that both Water loops (H2 & O2) are working together.			
04	Check that the unit is less than 3% O2 ready for Start-Up and H2 Production. HPP will be purged by H2/N2 coming from the ST-620 once H2 will start to be produced. If necessary, purge very slowly in a control manner to remove the O2 from the unit by opening slightly PV-630 and injecting N2 by opening slightly PV-900. Always monitor carefully that the pressure in H2/Water Loop side remains always higher than O2/Water Loop side.			
05	Once the Unit is considered ready for Start-Up, a PSSR meeting is organized to review all conditions to sign the RFO certificate.			

13. Appendix

13.1 N2 Service Test P&ID Mark Up

13.2 Flushing P&ID Mark Up

13.3 Flushing ITR’s

13.4 Leak Test Pack P&ID Mark Up

13.5 Leak Test ITR’s

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TAG NO.	BTK-980
DESCRIPTION	COMPRESSED AIR BUFFER TANK
DESIGN PRESSURE (barg)	124
DESIGN TEMPERATURE (°C)	45
VOLUME (L)	1

IA SUPPLY
NITROGEN SUPPLY
CLIENT
ELOGEN
A10 X00
ZONE BREAK
TP I
TP D

PSV-900
10 barg
1/2 GF

906A - 50 - N2 - PA22S → N2 TO O2 VENT PID-005

N2 PANEL

PT 910
PI 910
PAHH PAH
PAL PALL
BBV-910
HV-910
HV-911
NOTE 2

906 - 25 - N2 - PA22S
910 - 25 - N2 - PA22S
900 - 15 - N2 - PA22S → N2 TO ST-600 PID-003
920 - 15 - N2 - PA22S → N2 TO ST-620 PID-006
940 - 25 - N2 - PA22S → N2 TO DG-640 PID-007
930 - 1/4" - N2 - TK22 → N2 TO H2 PANEL PID-008
TK22 PA22S

PSV-150
10 Barg
PI 150
PT 150
PAHH PAH
PAL PALL
BBV-150
HV-150
HV-151
NOTE 1

980 - 1/2" - CA - TK22
CV-980
BTK-980
980B - 1/2" - CA - TK22

APC-980
PVI-980

1	MANIFOLD	CA TO PV-631 PID-007
2	MANIFOLD	CA TO PV-632 PID-008
3	MANIFOLD	CA TO PV-600 PID-005
4	MANIFOLD	CA TO PV-300 PID-001
5	MANIFOLD	CA TO PV-901 PID-003
6	MANIFOLD	CA TO PV-921 PID-006
7	MANIFOLD	CA TO PV-620 PID-007
8	MANIFOLD	CA TO PV-642 PID-007
	MANIFOLD	CA TO PV-633 PID-008
	MANIFOLD	CA TO PV-640 PID-007
		CA TO PV-500 PID-007

APC-900
PVI-900

980C - 1/2" - CA - TK22

1	MANIFOLD	CA TO PV-900 PID-003
2	MANIFOLD	CA TO PV-920 PID-006
3	MANIFOLD	CA TO PV-601 PID-005
4	MANIFOLD	CA TO PV-610 PID-005
5	MANIFOLD	CA TO PV-630 PID-007
6	MANIFOLD	CA TO PV-635 PID-008
7	MANIFOLD	CA TO PV-641 PFD-007
8	MANIFOLD	CA TO PV-800 PFD-008
		CA TO PV-501 PFD-007

PVI-901

980D - 1/2" - CA - TK22

1	MANIFOLD	SV-500
2		

981 - 1/2" - CA - TK22 → TO WTP-300 PID-001
970 - 1/2" - CA - TK22 → TO HPP-700 PID-011

N2

NOTES :
NOTE 1 : IA CONNECTION FOR MAINTENANCE PURPOSE IN CASE OF NEED OF COMPRESSED AIR IN A SPECIFIC POINT ON ELECTROLYSER
NOTE 2 : NITROGEN CONNECTION FOR MAINTENANCE/COMISSIONING PURPOSE IN CASE OF NEED OF NITROGEN IN A SPECIFIC POINT ON THE ELECTROLYSER

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N2 Distribution Service Test (1/6)

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005
421 - 1/2" - CW - TK22
FROM PT-630 PID-006
FROM HE-630/631 PID-007
420 - 1/2" - CW - TK22
TO RDPC-002 PID-006
TO PV-631 PID-007
TO MPV-611 PID-005
616A - 80 - O2 - PA22S
TO O2 VENT PID-005
TO FX-642 PID-007
616 - 1" - PWO2 - TK22
TO O2 VENT PID-005
902A - 25 - N2 - PA22S
FROM N2 PANEL
900 - 15 - N2 - PA22S
N2 PID-009
900A - 40 - N2 - PA22S
CV-900
CV-901
NOTE 3
NOTE 2
NOTE 3
901 - 15 - N2 - PA22S
TO PV-300 PID-001
MIN.
ACO-610
614A - 1/4" - O2 - TK22
615C - 1/4" - O2 - TK22
615B - 1/4" - O2 - TK22
615A - 1/4" - O2 - TK22
614B - 1/4" - O2 - TK22
TO O2 VENT PID-005
610 - 20 - PWO2 - PA22S
TO HE-610 PID-005
FROM STACKS PID-002
606 - 200 - PWO2 - PA22S
X00 A10 ZONE BREAK
PIPE HEATED
PIPE NOT HEATED
FOR START-UP ONLY
600B - 150 - PWO2 - PA22S
600A - 150 - PWO2 - PA22S
601B - 150 - PWO2 - PA22S
601A - 150 - PWO2 - PA22S
Auto-start
Shutdown
TO HE-600 PID-004
FROM DG-640 PID-007
641A - 25 - PWH2 - PB22S
FROM LP-300 A/B PID-001
306 - 25 - PW - PA22S
HR-306
C01 X00 ZONE BREAK
X00 A02 ZONE BREAK
TO VAR-300A/B PID-001
A10 A02 ZONE BREAK
2 OUT OF 3
Analysis System Package

Instrument to monitor
Closed Valve
Valve to Operate
N2

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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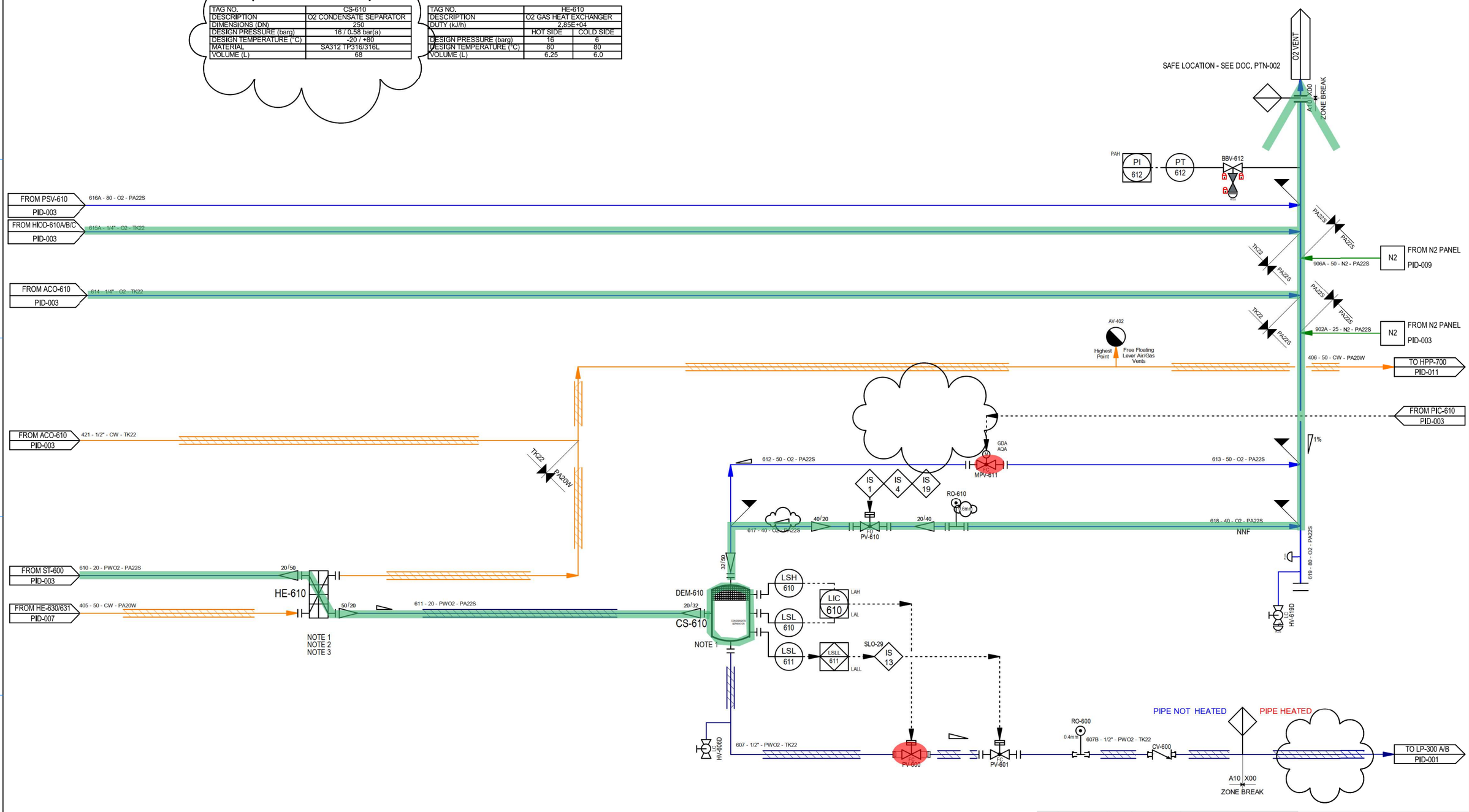
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Client reference: -

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8	25/10/2024	EN	3/16

N2 Distribution Service Test (2/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0



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NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Closed Valve

N2

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N2 Distribution Service Test (3/6)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

TO RDPC-001 PID-003
TO MPV-630 PID-008
TO FX-642 PID-007
TO FIC-640 PID-007
TO H2 VENT PID-007
FROM N2 PANEL
N2 PID-009
FROM STACKS PID-002
FROM LP-300 A/B PID-001
TO H2 VENT PID-007
FROM PT-611 PID-003
TO HE630/631 PID-007
TO FH-620 PID-004

PSV-630 36 barg
PIC 630
PT 630
FX 630
IP 15
HV-630
BBV-630
BBV-631
PT 631
PSHH 631
RDPC 002
PDSHH 002
PDSLL 002
RD-920 10 BARG
PT 920
PI 920
FI 920
FT 920
SP-920
BBV-920
CV-920
CV-921
HV-920
HV-921
HV-922
MV-920
MV-921
PV-920
PV-921
FT 921
FI 921
HV-625V
ZI 624
ZIO 624
HV-624
ST-620
LT 620
LI 620
LSL 620
LSLL 620
HV-620
HV-620A
HV-620B
HV-620DA
HV-620DB
CP-620A
CP-620B
TT 621A
TT 621B
TSHH 621A
TSHH 621B
PT 620A
PI 620A
PT 620B
PI 620B
CV-621A
CV-621B
HV-621A
HV-621B
PT 620
PI 620
VAR-620A
VAR-620B
IS 17
IS 18
SLO-32

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

Instrument to monitor
Closed Valve
Valve to Operate
N2

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P&ID	DETAILED DESIGN

Title, Supplementary title	Client reference
HYDROGEN SEPARATION	-

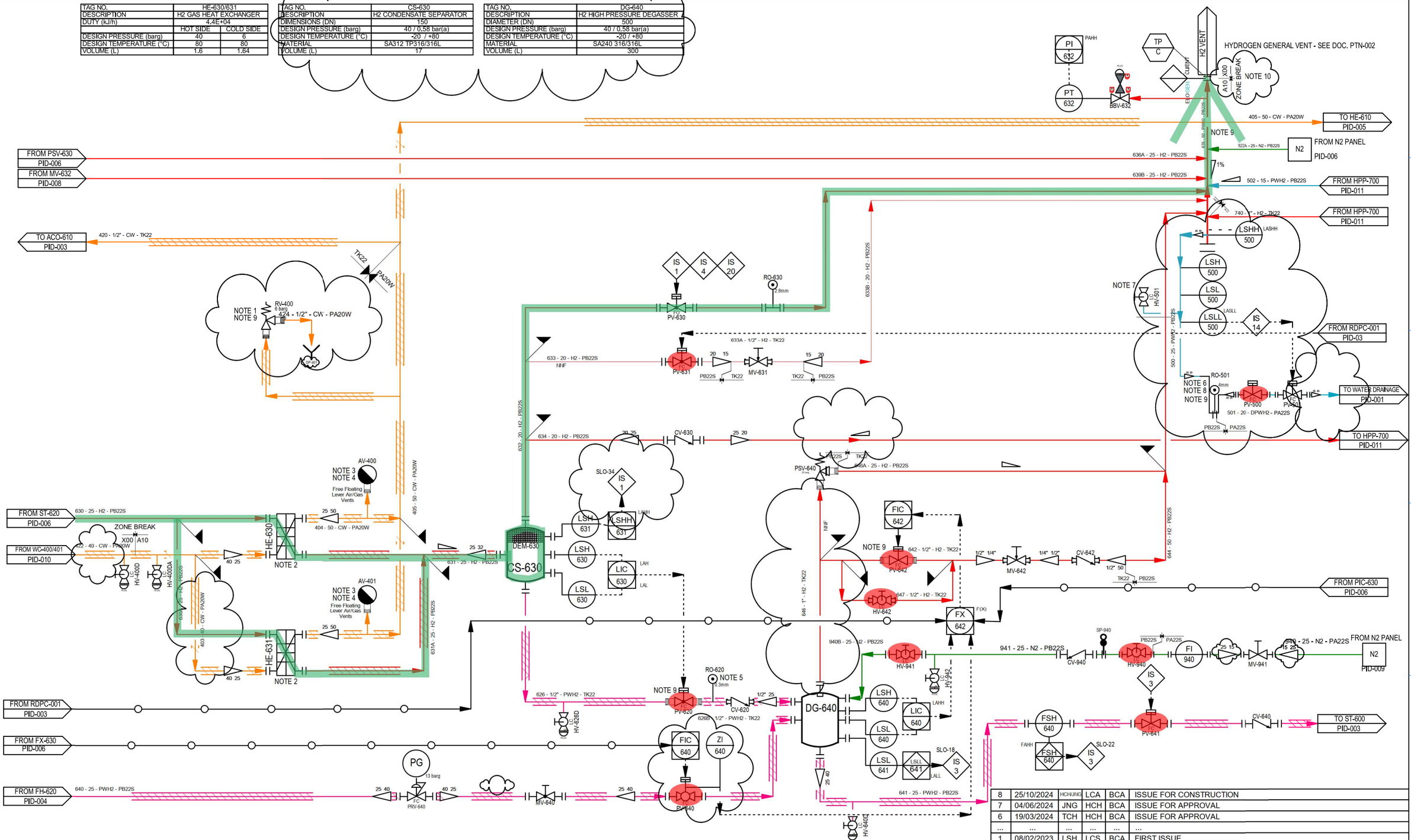
Rev.	Date of issue	Lang.	Page
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N2 Distribution Service Test (4/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Closed Valve

N2

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PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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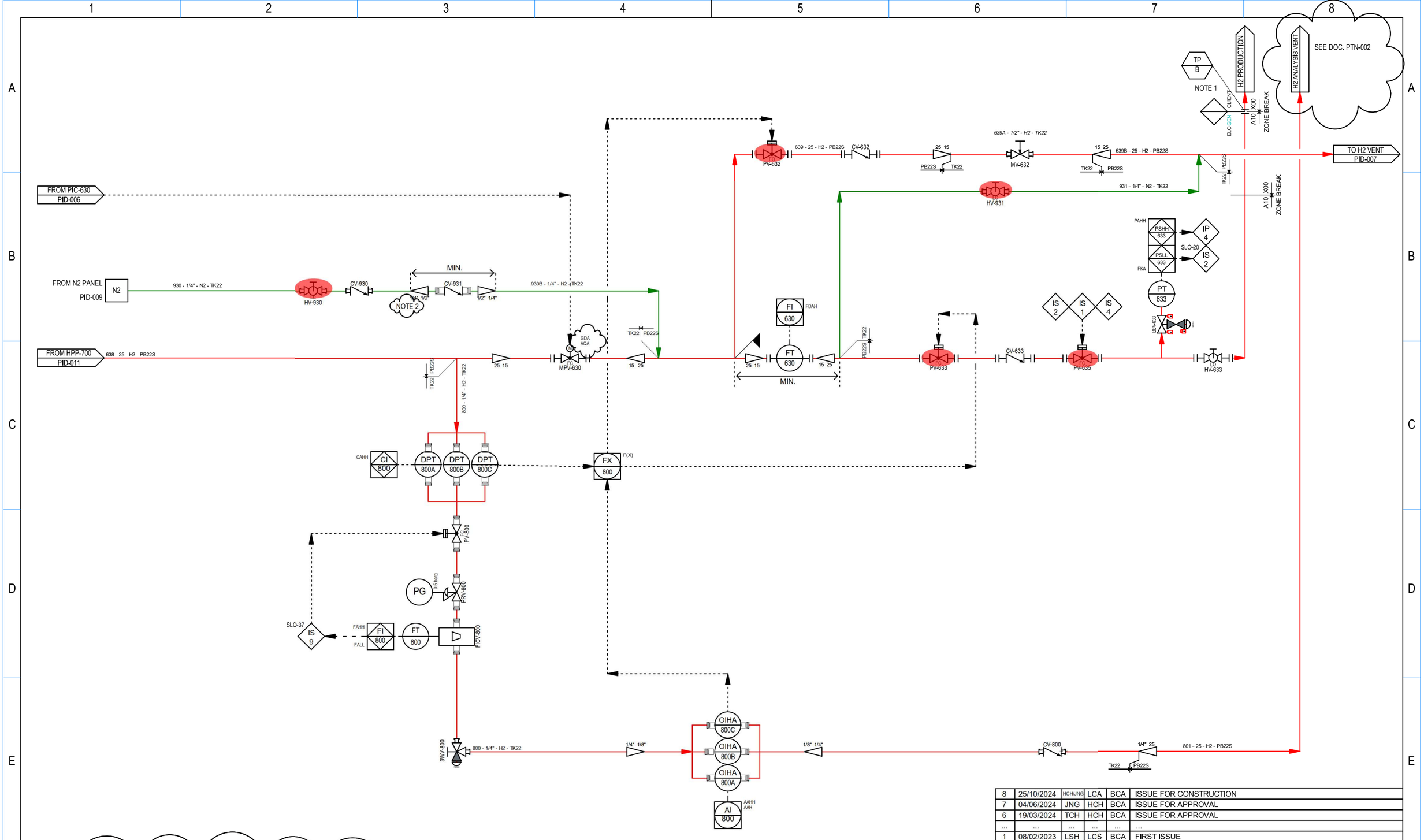
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
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N2 Distribution Service Test (5/6)



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

Closed Valve

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8	25/10/2024	HCHUNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-008	HCH/JNG	LCA	BCA	1:1

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P&ID	DETAILED DESIGN

Title, Supplementary title	Client reference
H2 PANEL	-

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N2 Distribution Service Test (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

WATER TREATMENT PACKAGE

NOTE 7
NOTE 8

FROM CS-610
PID-005

607B - 1/2" - PWO2 - TK22

ZONE BREAK
X00 | C01

HR-607B

982 - 1/2" - CA - TK22

CA VENT

981 - 1/2" - CA - TK22

FROM BTK-980
PID-009

3/8" BSPP F

1/2" NPT

3A

3E

1ROP1.1 | 2ROP1.1 | YP-70 | 1PSP1.1 | 1RFP1

AQA-1003

HV-300

CV-300

HV-300D

50 - 15

300 - 15 - RW - PA22S

WP-300

PI 1RO5	PI 1RO7	PI 2RO5	PI 2RO7	PI 2RO8	PI 1F1	PI 1ME2	PI 1ED1	PI 1ED2	PI 1ED4	PI 1ED6	PI 2F1	PI 2F2	PI 1PS3	PISA+ 1PS1
TI 1C1	TI 1RO7	TI 1ED7	TI 2RO7	TI 1B4	FSA- 1ED3	FSA 1ED3	QE 1Z1	QIA 1Z1	QISA+ 2RO4	PSA- 1RO2	QISA+ 1RO4	PSA- 1F2	UI 1ED11	LISA 1RF1
FI 1ME3	FI 1RO6	FI 2RO6	FI 1ED3	FI 1ED4	FI 1ED5	FIR 1RO8	FIR 2RO5	FIR 1ED1	FIR 2RO3	FIR 2RO6	FIR 1RO3	FIR 1PS4		QIA 1B4

DEMIN TANK

LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 LALL

FROM LIC-600
PID-003

TO ST-600
PID-003

PV-300

PAHH
PAH
PAL
PALL
PI 300

PT 300

4A

5A

CAHH 300 CAHH

≤ 20

PA22S | TK22

FROM FCU-401
PID-012

ZONE BREAK
X00 | C01

505 - 15 - RW - TK22

NOTE 5

NOTE 1
NOTE 4
NOTE 3
NOTE 3
NOTE 9

302A - 25 - PW - PA22S

303A - 25 - PW - PA22S

HV-301A

LP-300A

CV-301A

CV-302A

HV-302A LO

HV-303DA

306 - 25 - PW - PA22S

#300

3WV-320

Open to ST-600

PA22S | PB22S

305 - 15 - PW - PA22S

302B - 25 - PW - PA22S

HV-301D

HV-300DA

SLO-15

IS 12

VAR-300A

NOTE 5

NOTE 1
NOTE 4
NOTE 3
NOTE 3
NOTE 9

303B - 25 - PW - PA22S

HV-301B

LP-300B

CV-301B

CV-302B

HV-302B LO

HV-303DB

HV-300DB

NNF

HV-307V

307 - 25 - PW - PB22S

CV-320

NOTE 2

FROM AHU-400
PID-013

503 - 15 - RW - TK22

ZONE BREAK
E01 | X00

NOTE 9

ZONE BREAK
X00 | C01

HR-503

SPH-404

504 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU-400
PID-012

FROM H2 VENT
PID-007

501 - 20 - DPWH2 - PA22S

509 - 50 - RW - PA22S

506 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU 402
PID-012

507 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU 403
PID-012

VAR-300B

SLO-15

IS 12

FOR START-UP ONLY

TO ST-620
PID-006

FROM LIC-600
PID-003

ELO GEN
CLIENT
25 | 15
X00 | C01
ZONE BREAK
TP A

WATER SUPPLY

ELO GEN
CLIENT
X00 | A10
ZONE BREAK
TP F

WATER DRAINAGE

TP E
ELO GEN
CLIENT
X00 | C01
ZONE BREAK

PURE WATER DRAINAGE

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VAL'
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATIO
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Flushing System 600
Valve Open
Valve Closed
Auto Mode

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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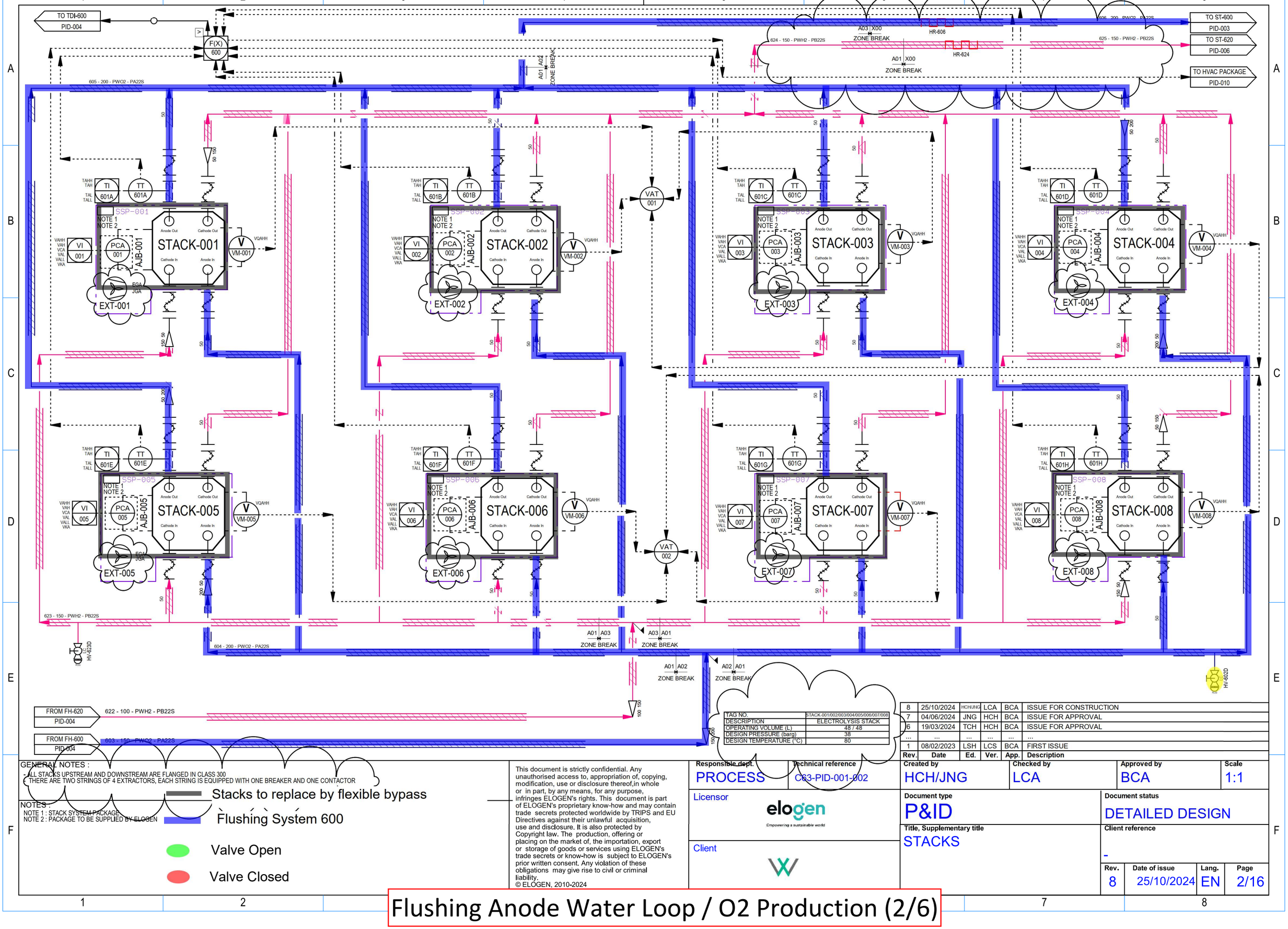
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

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8	25/10/2024	EN	1/16

Flushing Anode Water Loop / O2 Production (1/6)



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Stacks to replace by flexible bypass

Flushing System 600

Valve Open

Valve Closed

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PROCESS	C63-PID-001-002	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

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8	25/10/2024	EN	2/16

Flushing Anode Water Loop / O2 Production (2/6)

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005

421 - 1/2" - CW - TK22

FROM PT-630 PID-006

FROM HE-630/631 PID-007

420 - 1/2" - CW - TK22

TO RDPC-002 PID-006

TO PV-631 PID-007

TO MPV-611 PID-005

TO O2 VENT PID-005

616A - 80 - O2 - PA22S

TO FX-642 PID-007

N2 Purging

FROM N2 PANEL

900 - 15 - N2 - PA22S

PID-009

902A - 25 - N2 - PA22S

900A - 40 - N2 - PA22S

Open to Vent during the Filling with Water

Monitor the level

TO PV-300 PID-001

MIN.

ACO-610

2 OUT OF 3

615C - 1/4" - O2 - TK22

615B - 1/4" - O2 - TK22

615A - 1/4" - O2 - TK22

614B - 1/4" - O2 - TK22

TO O2 VENT PID-005

FROM STACKS PID-002

606 - 200 - PWO2 - PA22S

PIPE HEATED

PIPE NOT HEATED

610 - 20 - PWO2 - PA22S

TO HE-610 PID-005

To start after flushing with A

FROM DG-640 PID-007

641A - 25 - PWH2 - PB22S

FROM LP-300 A/B PID-001

306 - 25 - PW - PA22S

HR-306

600B - 150 - PWO2 - PA22S

601B - 150 - PWO2 - PA22S

600A - 150 - PWO2 - PA22S

601A - 150 - PWO2 - PA22S

TO HE-600 PID-004

TO VAR-300A/B PID-001

Water Supply

Air Vented from System 600

Flushing System 600

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPMENT

NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

NOTE 3 : ACCESSIBLE FOR MAINT...

NOTE 4 : NITROGEN AUTO PURGI...

NOTE 5 : PG CONNECTION

NOTE 6 : FLANGE SUPPLIED WITH...

Valve Open

Valve Closed

Valve to operate

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-003	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
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Title, Supplementary title: OXYGEN SEPARATION

Client reference: -

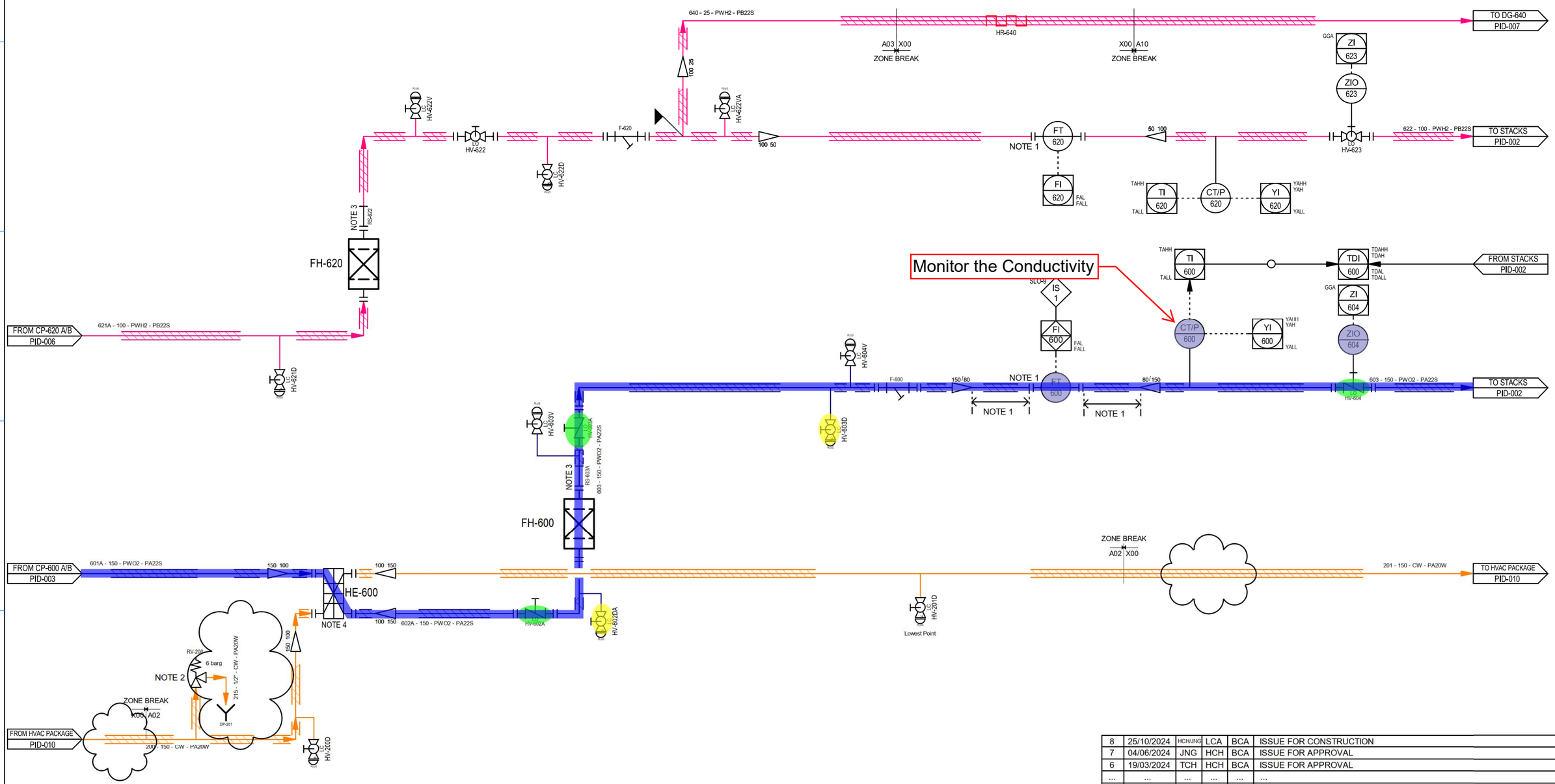
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Flushing Anode Water Loop / O2 Production (3/6)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Flushing System 600
Valve Open
Valve Closed

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Flushing Anode Water Loop / O2 Production (4/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0

SAFE LOCATION - SEE DOC. PTN-002

O2 VENT

A10 X00 ZONE BREAK

PAH PI 612 PT 612 BBV-612

O2 content to be checked at PT-612 vent

FROM PSV-610 PID-003 — 616A - 80 - O2 - PA22S

FROM HIOD-610A/B/C PID-003 — 615A - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 614 - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 421 - 1/2" - CW - TK22

FROM ST-600 PID-003 — 610 - 20 - PWO2 - PA22S

FROM HE-630/631 PID-007 — 405 - 50 - CW - PA20W

HE-610 — NOTE 1 NOTE 2 NOTE 3

611 - 20 - PWO2 - PA22S

DEM-610 CS-610 NOTE 1

LSH 610 LIC 610 LAH LAL LSL 610 LSL 611 LSLL 611 LALL SLO-29 IS 13

LC HV-606D

607 - 1/2" - PWO2 - TK22

PV-600 PV-601

RO-600 0.4mm 607B - 1/2" - PWO2 - TK22 CV-600

PIPE NOT HEATED PIPE HEATED

A10 X00 ZONE BREAK

TO LP-300 A/B PID-001

N2 FROM N2 PANEL PID-009 — 906A - 50 - N2 - PA22S

N2 FROM N2 PANEL PID-003 — 902A - 25 - N2 - PA22S

AV-402 Highest Point Free Floating Lever Air/Gas Vents

406 - 50 - CW - PA20W

TO HPP-700 PID-011

FROM PIC-610 PID-003

GDA AQA MPV-611

642 - 50 - O2 - PA22S 643 - 50 - O2 - PA22S

IS 1 IS 4 IS 19

RO-610 0.6mm

617 - 40 - O2 - PA22S 40/20 PV-610 20/40

618 - 40 - O2 - PA22S NNF

619 - 80 - O2 - PA22S HV-619D

1%

TK22 PA20W

PA22S TK22

Air Vented from System 600

Flushing System 600

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO E

Valve Open

Valve Closed

Valve to operate

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
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...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

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8	25/10/2024	EN	5/16

Flushing Anode Water Loop / O2 Production (5/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006
FROM MV-632 PID-008
TO ACO-610 PID-003
FROM ST-620 PID-006
FROM WC-400/401 PID-010
FROM RDPC-001 PID-003
FROM FX-630 PID-006
FROM FH-620 PID-004
TO HE-610 PID-005
FROM N2 PANEL PID-006
FROM HPP-700 PID-011
FROM HPP-700 PID-011
FROM RDPC-001 PID-03
TO WATER DRAINAGE PID-001
TO HPP-700 PID-011
FROM PIC-630 PID-006
FROM N2 PANEL PID-009
TO ST-600 PID-003

NOTES :

Flushing System 600

Valve Open

Valve Closed

Valve to operate

NOTE 1 : TO CONTAINER DRIP P...
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING SUB...
NOTE 8 : HYDRAULIC GUARD HE... L AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL TI...
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

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8	25/10/2024	EN	7/16

Flushing Anode Water Loop / O2 Production (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

1ROP1.1 2ROP1.1 YP-70 1PSP1.1 1RFP1 — AQA-1003

HV-300 — CV-300 — 50 15 — TE — HV-300D

PI 1RO5 | PI 1RO7 | PI 2RO5 | PI 2RO7 | PI 2RO8 | PI 1F1 | PI 1ME2 | PI 1ED1 | PI 1ED2 | PI 1ED4 | PI 1ED6 | PI 2F1 | PI 2F2 | PI 1PS3 | PISA+ 1PS1

TI 1C1 | TI 1RO7 | TI 1ED7 | TI 2RO7 | TI 1B4 | FSA- 1ED3 | FSA 1ED3 | QE 1Z1 | QIA 1Z1 | QISA+ 2RO4 | PSA- 1RO2 | QISA+ 1RO4 | PSA- 1F2 | UI 1ED11 | LISA 1RF1

FI 1ME3 | FI 1RO6 | FI 2RO6 | FI 1ED3 | FI 1ED4 | FI 1ED5 | FIR 1RO8 | FIR 2RO5 | FIR 1ED1 | FIR 2RO3 | FIR 2RO6 | FIR 1RO3 | FIR 1PS4 | QIA 1B4

WTP-300

DEMIN TANK — LISA 1B1 — TANK XL-300-SR — REJECT TANK — LALL 301 LALL

FROM LIC-600 PID-003 — TO ST-600 PID-003 — LIC 300 PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

300 - 15 - RW - PA22S — 306 - 25 - PW - PA22S — Open to ST-620

4A — 5A — CAHH 300 CAHH — 15 20 — PA22S TK22

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — HR-503 — ZONE BREAK X00 C01 — SPH-404 — 504 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S — 302A - 25 - PW - PA22S — 303A - 25 - PW - PA22S — 302B - 25 - PW - PA22S — 303B - 25 - PW - PA22S

LO HV-301A — LP-300A — CV-301A — CV-302A — HV-302A LO — HV-303DA LO — HV-300DA

LO HV-301B — LP-300B — CV-301B — CV-302B — HV-302B LO — HV-303DB LO — HV-300DB

NOTE 1 NOTE 3 NOTE 4 NOTE 5 NOTE 9

SLO-15 IS 12 — VAR-300A BCA — VAR-300B BCA

#300 — 3WV-320 — PA22S PB22S — HV-307V — NNF — CV-320 — 307 - 25 - PW - PB22S — NOTE 2

TO ST-620 PID-006 — FROM LIC-600 PID-003 — FOR START-UP ONLY

ELO GEN CLIENT — 25 15 — X00 C01 — ZONE BREAK — TP A — WATER IS IPRX Y

ELO GEN CLIENT — X00 A10 — ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN CLIENT — X00 C01 — ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VAL'
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 2...,

Flushing System 620
Valve Open
Auto Mode
MENT
67001_02)

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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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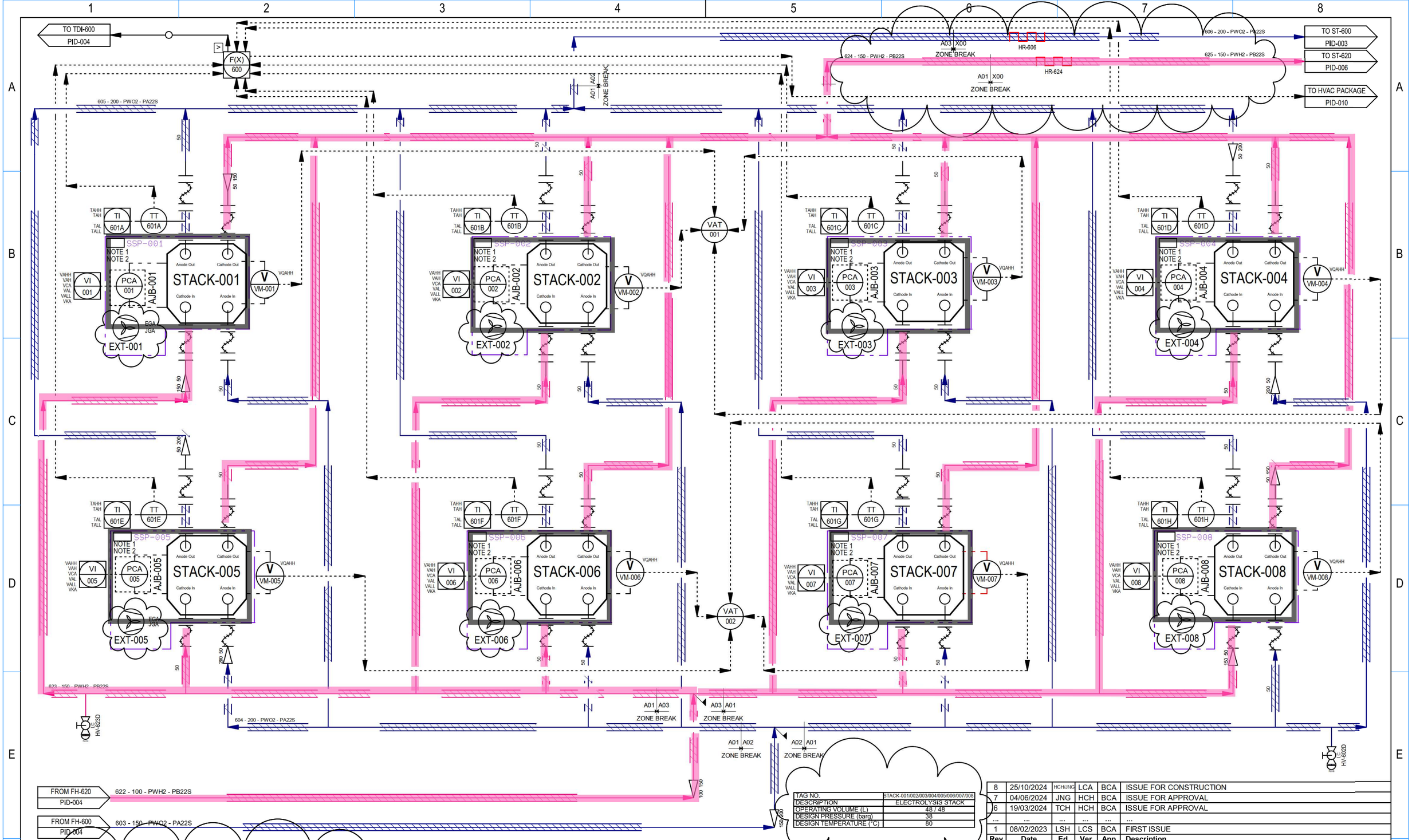
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

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Flushing Cathode Water Loop / H2 Production (1/5)



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Stacks to replace by flexible bypass

Flushing System 620 & 640

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Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

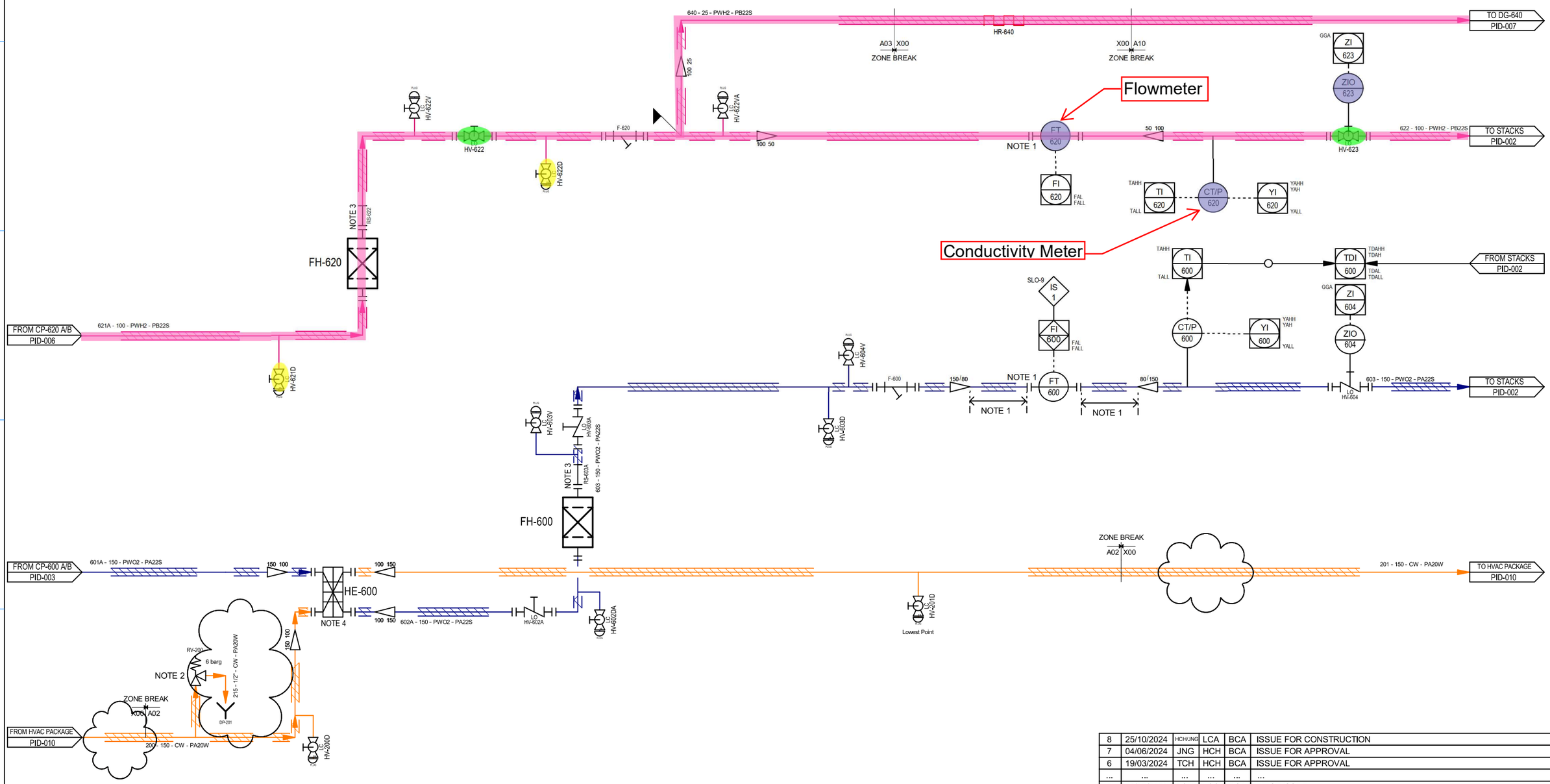
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	2/16

Flushing Cathode Water Loop / H2 Production (2/5)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Flushing System 620 & 640

Valve Open

Valve to operate

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

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8	25/10/2024	EN	4/16

Flushing Cathode Water Loop / H2 Production (3/5)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

TO RDPC-001 PID-003
TO MPV-630 PID-008
TO FX-642 PID-007
TO FIC-640 PID-007
TO H2 VENT PID-007
FROM PT-611 PID-003
TO HE630/631 PID-007
FROM N2 PANEL
N2 PID-009
FROM STACKS PID-002
FROM LP-300 A/B PID-001
TO FH-620 PID-004

N2 Purging

Vent Open for Filling

To start after flushing with A

PSV-630 36 barg
TK22 1/2" GF
PB22S 15 25
1/2" GM
21/1000
636A - 25 - H2 - PB22S
RDPC 002
PDAHH
PDALL
SLO-19
SLO-7
SLO-33
PT 631
PSHH 631
PAHH
PAH
PALL
BBV-631
HV-630
PIC 630
PDAH
PT 630
FX 630
BBV-630
IP 15
TO H2 VENT PID-007
N2
922A - 25 - N2 - PB22S
RD-920 10 BARG
PT 920
PI 920
PAHH
HR-920
SP-920
BBV-920
FI 920
FAL
FT 920
#300
CV-920
CV-921
NOTE 2
NOTE 3
920A - 40 - N2 - PB22S
HV-922
HV-921
IS 1
IS 4
IS 11
NOTE 4
HV-920
PV-920
MV-920
PV-921
MV-921
922 - 15 - N2 - PA22S
FT 921
FI 921
636 - 1" - PWH2 - TK22
MIN.
SLO-17
HV-625V
ZI 624
ZIO 624
HV-624
625 - 150 - PWH2 - PB22S
PIPE HEATED
PIPE NOT HEATED
X00
A10
ZONE BREAK
ST-620
DEM-620
LT 620
LI 620
LAHH
LAH
LAL
LALL
LSL 620
LSLL 620
LASLL
SLO-32
HV-620D
HV-620
HR-620A
A20
ZONE BREAK1
NOTE 5
PLUG 1/2" NPT F
620A - 100 - PWH2 - PB22S
HV-620A
HV-620AA
TSAHH
TSHH 621A
TT 621A
NOTE 1
CP-620A
RS-620A
RS-621A
CV-621A
HV-621A
621A - 100 - PWH2 - PB22S
PT 620A
PI 620A
IS 17
BBV-620A
Auto-start
VAR-620A
IS 17
SLO-32
IS 5
620B - 100 - PWH2 - PB22S
TSHH 621B
TT 621B
CP-620B
RS-620B
RS-621B
CV-621B
HV-621B
621B - 100 - PWH2 - PB22S
PT 620B
PI 620B
IS 18
BBV-620B
Shutdown
VAR-620B
IS 18
IS 5
SLO-32
PI 620
PAH
PAL
PALL
PT 620
BBV-620
307 - 25 - PW - PB22S
NNF
C01 X00
HR-307
X00 A10
ZONE BREAK
ZONE BREAK

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NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

Air Vented from System 620 & 640
Flushing System 620 & 640
Valve Open
Valve Closed
Valve to operate

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Title, Supplementary title: HYDROGEN SEPARATION
Client reference: -

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Flushing Cathode Water Loop / H2 Production (4/5)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

O2 content to be checked at PT-632 vent

Open to Vent during the Filling with Water

Vent Open for Filling

N2 Purging

Operate Slowly in Manual Mode to start DG-640 flushing

Drain for DG-640

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006

FROM MV-632 PID-008

TO ACO-610 PID-003

TO HE-610 PID-005

FROM N2 PANEL PID-006

FROM HPP-700 PID-011

FROM HPP-700 PID-011

FROM RDPC-001 PID-03

TO WATER DRAINAGE PID-001

TO HPP-700 PID-011

FROM ST-620 PID-006

FROM WC-400/401 PID-010

FROM RDPC-001 PID-003

FROM FX-630 PID-006

FROM FH-620 PID-004

FROM PIC-630 PID-006

TO ST-600 PID-003

NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYD
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Air Vented from System 620 & 640

Flushing System 620 & 640

Valve Open

Valve Closed

Valve to operate

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Document type	Document status
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Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

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Flushing Cathode Water Loop / H2 Production (5/5)

elogen	**COMMISSIONING**	CROSSWIND
	C63-ELO-REP-CO-0102 - FLUSHING	

TEST CONDITIONS	
Procedure Reference	C063-ELO-PRO-CO-0004 - BLPH Electrolyser Commissioning Manual
System Flushing	
Reference Sampling Point	
Online Conductivity Meter Tag	
Water from WTP conductivity value (µS.cm-1)	

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Portable Conductivity Meter		
O2 Meter		

FLUSHING OPERATION				
	Date	Time	Conductivity (µS.cm-1)	Temperature (°C)
Beginning				
End				
After 12h				
After Resin Filling				
After Stacks Installation				

RESULT		
Pure Water Flushing		
Conductivity	σ < 0.1 µS.cm-1 on all sampling points	OK / NOK
Nitrogen Purging		
Inerting	O2 Content < 3 % on all sampling points	OK / NOK

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

AQA-1003

1ROP1.1 — 2ROP1.1 — YP-70 — 1PSP1.1 — 1RFP1

PI 1RO5 — PI 1RO7 — PI 2RO5 — PI 2RO7 — PI 2RO8 — PI 1F1 — PI 1ME2 — PI 1ED1 — PI 1ED2 — PI 1ED4 — PI 1ED6 — PI 2F1 — PI 2F2 — PI 1PS3 — PISA+ 1PS1

TI 1C1 — TI 1RO7 — TI 1ED7 — TI 2RO7 — TI 1B4 — FSA- 1ED3 — FSA 1ED3 — QE 1Z1 — QIA 1Z1 — QISA+ 2RO4 — PSA- 1RO2 — QISA+ 1RO4 — PSA- 1F2 — UI 1ED11 — LISA 1RF1

FI 1ME3 — FI 1RO6 — FI 2RO6 — FI 1ED3 — FI 1ED4 — FI 1ED5 — FIR 1RO8 — FIR 2RO5 — FIR 1ED1 — FIR 2RO3 — FIR 2RO6 — FIR 1RO3 — FIR 1PS4 — QIA 1B4

WTP-300

DEMIN TANK — LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 — LALL

FROM LIC-600 PID-003

TO ST-600 PID-003

PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

306 - 25 - PW - PA22S

300 - 15 - RW - PA22S

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

CAHH 300 — CAHH

4A — 5A — PA22S — TK22

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404 — 504 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S

302A - 25 - PW - PA22S — 303A - 25 - PW - PA22S — LP-300A — HV-301A — HV-300DA — CV-301A — CV-302A — HV-302A — HV-303DA — NOTE 5 — NOTE 1 NOTE 4 NOTE 3 NOTE 9

302B - 25 - PW - PA22S — 303B - 25 - PW - PA22S — LP-300B — HV-301B — HV-300DB — CV-301B — CV-302B — HV-302B — HV-303DB

SLO-15 — IS 12 — VAR-300A — VAR-300B

#300 — SLW-320 — PB22S — PA22S

HV-307V — NNF — CV-320 — 307 - 25 - PW - PB22S — NOTE 2

TO ST-620 PID-006 — FROM LIC-600 PID-003 — FOR START-UP ONLY

ELO GEN — CLIENT — ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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Client

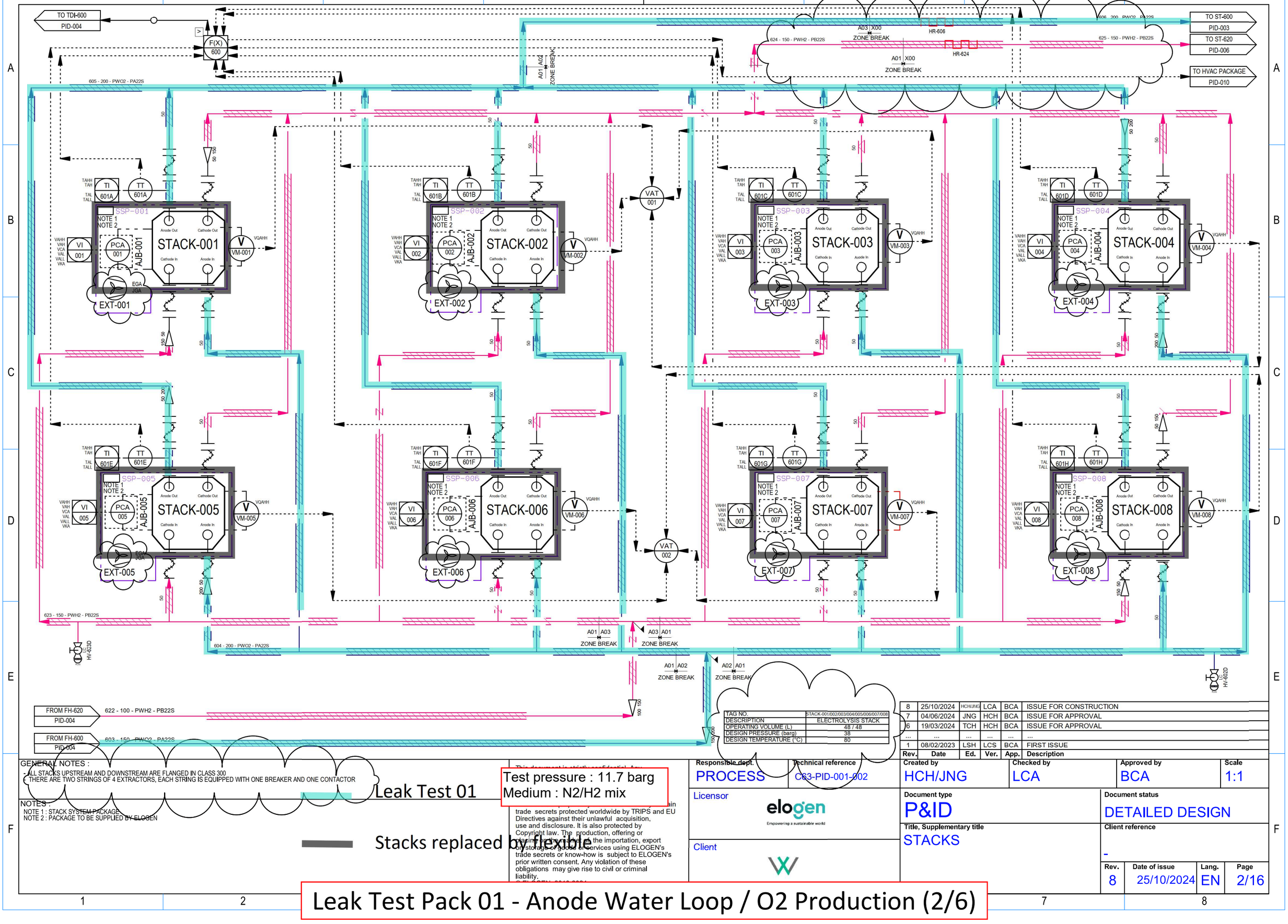
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

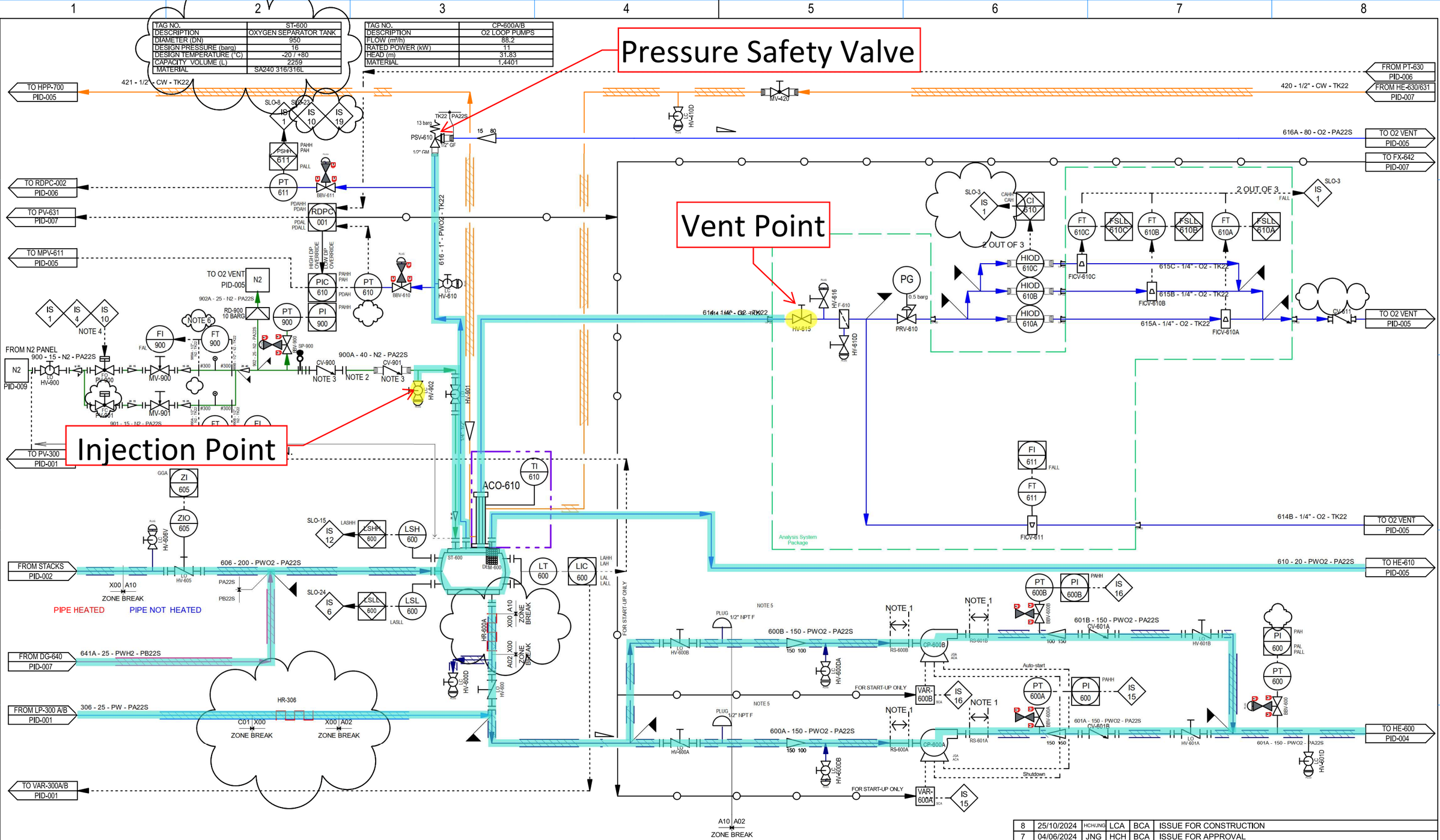
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Leak Test Pack 01 - Anode Water Loop / O2 Production (1/6)



Leak Test Pack 01 - Anode Water Loop / O2 Production (2/6)



NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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Responsible dept. PROCESS	Technical reference C63-PID-001-003	Created by HCH/JNG	Checked by LCA
Approved by BCA	Scale 1:1		
Licensor elogen Empowering a sustainable world		Document type P&ID	Document status DETAILED DESIGN
Client		Title, Supplementary title OXYGEN SEPARATION	Client reference -

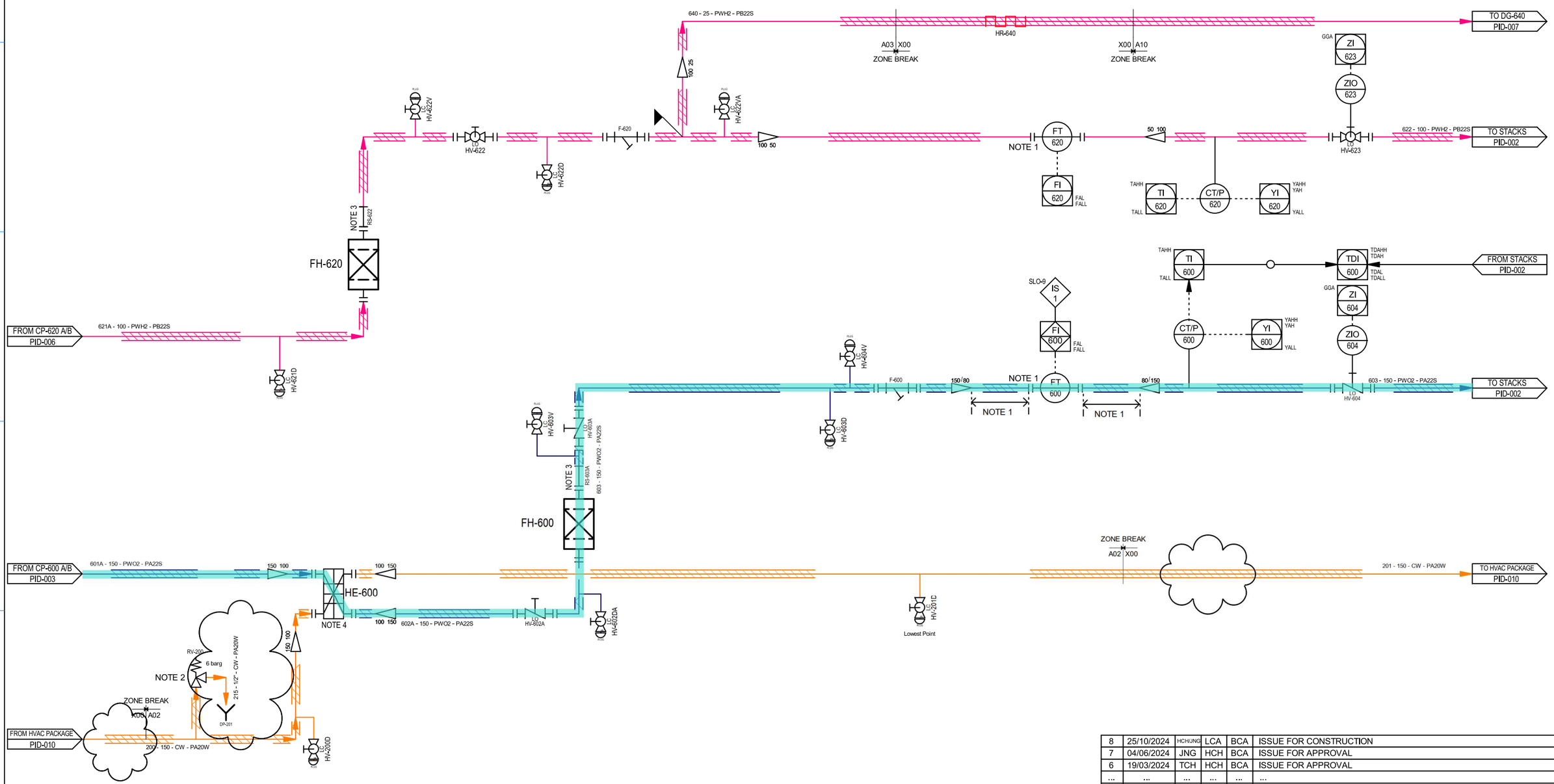
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	3/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (3/6)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



Rev.	Date	Ed.	Ver.	App.	Description
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 01

Test pressure : 11.7 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (4/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0

SAFE LOCATION - SEE DOC. PTN-002

O2 VENT

A10 X00

ZONE BREAK

PAH

PI 612

PT 612

BBV-612

FROM PSV-610 PID-003 — 616A - 80 - O2 - PA22S

FROM HIOD-610A/B/C PID-003 — 615A - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 614 - 1/4" - O2 - TK22

FROM N2 PANEL PID-009 — 906A - 50 - N2 - PA22S

FROM N2 PANEL PID-003 — 902A - 25 - N2 - PA22S

AV-402 — Highest Point — Free Floating Lever Air/Gas Vents

TO HPP-700 PID-011 — 406 - 50 - CW - PA20W

FROM PIC-610 PID-003

FROM ACO-610 PID-003 — 421 - 1/2" - CW - TK22

GDA AQA

FO MFV-611

612 - 50 - O2 - PA22S

613 - 50 - O2 - PA22S

IS 1 / IS 4 / IS 19

RO-610 0,6mm

40/20

617 - 40 - O2 - PA22S

FO PV-610

20/40

618 - 40 - O2 - PA22S NNF

619 - 80 - O2 - PA22S

HV-619D

FROM ST-600 PID-003 — 610 - 20 - PWO2 - PA22S

FROM HE-630/631 PID-007 — 405 - 50 - CW - PA20W

HE-610

NOTE 1
NOTE 2
NOTE 3

611 - 20 - PWO2 - PA22S

DEM-610

CS-610

NOTE 1

LSH 610

LIC 610 LAH LAL

LSL 610

LSL 611

LSLL 611 LALL

SLO-29 IS 13

HV-606D

607 - 1/2" - PWO2 - TK22

FO PV-600

PV-601

RO-600 0,4mm

607B - 1/2" - PWO2 - TK22

CV-600

PIPE NOT HEATED

PIPE HEATED

A10 X00 ZONE BREAK

TO LP-300 A/B PID-001

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (5/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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Licensor: elogen — Empowering a sustainable world

Client:

Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

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8	25/10/2024	EN	7/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E)

981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

FROM LIC-600 PID-003

TO ST-600 PID-003

1ROP1.1 2ROP1.1 YP-70 1PSP1.1 1RFP1 — AQA-1003

PI 1RO5	PI 1RO7	PI 2RO5	PI 2RO7	PI 2RO8	PI 1F1	PI 1ME2	PI 1ED1	PI 1ED2	PI 1ED4	PI 1ED6	PI 2F1	PI 2F2	PI 1PS3	PISA+ 1PS1	
TI 1C1	TI 1RO7	TI 1ED7	TI 2RO7	TI 1B4	FSA- 1ED3	FSA 1ED3	QE 1Z1	QIA 1Z1	QISA+ 2RO4	PSA- 1RO2	QISA+ 1RO4	PSA- 1F2	UI 1ED11	LISA 1RF1	
FI 1ME3	FI 1RO6	FI 2RO6	FI 1ED3	FI 1ED4	FI 1ED5	FIR 1RO8	FIR 2RO5	FIR 1ED1	FIR 2RO3	FIR 2RO6	FIR 1RO3	FIR 1PS4		QIA 1B4	

DEMIN TANK — LISA 1B1 — LALL 301 LALL

TANK XL-300-SR

REJECT TANK

FROM BTK-980 PID-009 — 981 - 1/2" - CA - TK22

FROM LIC-600 PID-003

TO ST-600 PID-003

LO HV-300 — CV-300 — 50 15 — 1E — LO HV-300D

WTP-300

300 - 15 - RW - PA22S

PAHH PAH PAL PALL — PI 300 — PT 300

306 - 25 - PW - PA22S

4A

CAHH 300 — CAHH — 5A — 15 20 — PA22S TK22

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

NOTE 5 — NOTE 1 NOTE 4 NOTE 3 — NOTE 3 — NOTE 5

302A - 25 - PW - PA22S — LO HV-301A — LP-300A — CV-301A — CV-302A — HV-302A LO — 303A - 25 - PW - PA22S

NOTE 9

305 - 15 - PW - PA22S

LO HV-300DA

302B - 25 - PW - PA22S — LO HV-301B — LP-300B — CV-301B — CV-302B — HV-302B LO — 303B - 25 - PW - PA22S

LO HV-300DB

LO HV-301D

SLO-15 — IS 12 — VAR-300A — VAR-300B — SLO-15 — IS 12

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404

504 - 15 - RW - TK22 — C01 X00 ZONE BREAK — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

ELO GEN — CLIENT — 25 15 — C01 X00 ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — X00 A10 ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — C01 X00 ZONE BREAK — PURE WATER DRAINAGE

#300 — PA22S — PB22S — 300/320 — HV-307V — NNF — 307 - 25 - PW - PB22S — CV-320 — NOTE 2 — TO ST-620 PID-006

FOR START-UP ONLY — FROM LIC-600 PID-003

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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 02

Closed Valve

Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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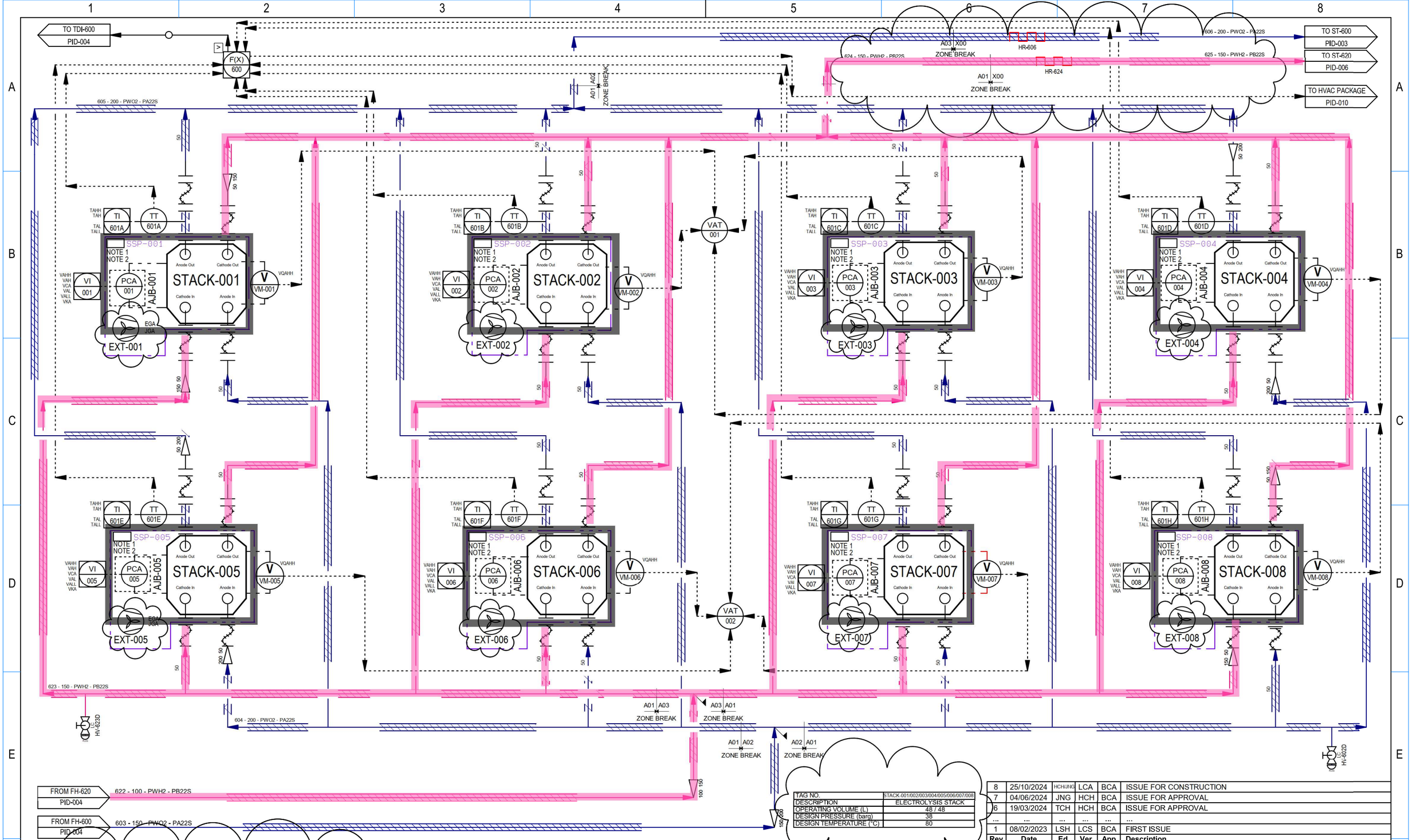
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	1/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (1/8)



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Leak Test 02

Stacks replaced by flexible

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Test pressure : 32.4 barg
Medium : N2/H2 mix

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	CG3-PID-001-002	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

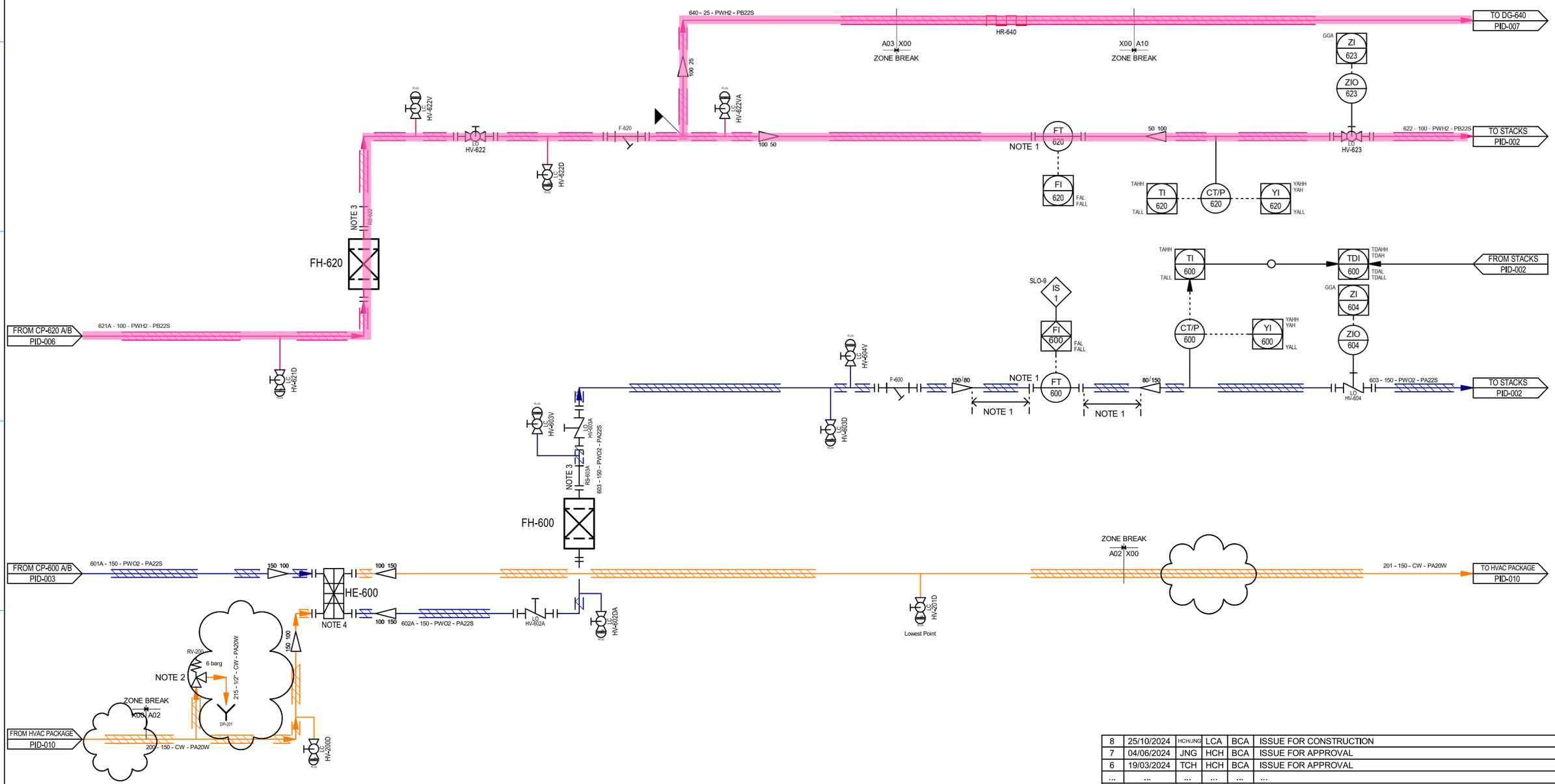
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	2/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (2/8)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 02

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (3/8)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

Pressure Safety Valve

Injection Point

TO RDPC-001 PID-003

TO MPV-630 PID-008

TO FX-642 PID-007

TO FIC-640 PID-007

TO H2 VENT PID-007

FROM N2 PANEL

N2 PID-009

FROM STACKS PID-002

FROM LP-300 A/B PID-001

TO H2 VENT PID-007

FROM PT-611 PID-003

TO HE630/631 PID-007

TO FH-620 PID-004

PSV-630 36 barg

TK22 1/2" GF

PB22S 15 25

636A - 25 - H2 - PB22S

RDPC 002

PDAHH PDALL

PDSHH 002

PDSLL 002

PT 631

PSHH 631

PAHH PAH PALL

BBV-631

HV-630

PIC 630

PT 630

FX 630

BBV-630

IP 15

SLO-19

SLO-7

SLO-33

IS 1

IS 11

IS 20

IS 4

IS 17

IS 18

IS 5

IS 15

NOTE 4

FI 920

FT 920

PT 920

PI 920

RD-920 10 BARG

SP-920

BBV-920

CV-920

CV-921

NOTE 2

NOTE 3

HV-920

HV-921

HV-922

MV-920

MV-921

PV-920

PV-921

920A - 40 - N2 - PB22S

922 - 25 - N2 - PB22S

922 - 15 - N2 - PA22S

636 - 1" - PWH2 - TK22

MIN.

SLO-17

HV-625V

ZI 624

ZIO 624

HV-624

625 - 150 - PWH2 - PB22S

PIPE HEATED

PIPE NOT HEATED

X00 A10

ZONE BREAK

ST-620

DEM-620

LT 620

LI 620

LAHH LAH LAL LALL

LSL 620

LSLL 620

LASLL

SLO-32

HR-620A

HV-620D

HV-620C

ZONE BREAK1

625 - 25 - H2 - PB22S

NOTE 5

PLUG 1/2" NPT F

620A - 100 - PWH2 - PB22S

HV-620A

HV-620DA

620B - 100 - PWH2 - PB22S

HV-620B

HV-620DB

TSAHH

TSHH 621A

TT 621A

NOTE 1

CP-620A

RS-620A

RS-621A

100 80

50 100

Auto-start

VAR-620A

CV-621A

HV-621A

621A - 100 - PWH2 - PB22S

PT 620A

PI 620A

IS 17

BBV-620A

TSHH 621B

TT 621B

CP-620B

RS-620B

RS-621B

Shutdown

VAR-620B

CV-621B

HV-621B

621B - 100 - PWH2 - PB22S

PT 620B

PI 620B

IS 18

BBV-620B

PI 620

PT 620

BBV-620

307 - 25 - PW - PB22S

NNF

C01 X00

HR-307

ZONE BREAK

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT

NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES FULLMEET CLASS 1 REQUIREMENT

NOTE 3 : ACCESSIBLE FOR MAINTENANCE

NOTE 4 : NITROGEN AUTO PURGING CONTROL

NOTE 5 : PG CONNECTION

Leak Test 02

Closed Valve

Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	HCH/JNG	LCA	BCA	1:1

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Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	6/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (4/8)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006
FROM MV-632 PID-008
TO ACO-610 PID-003
420 - 1/2" - CW - TK22
424 - 1/2" - CW - PA20W
RV-400 6 barg
NOTE 1 NOTE 9
TO HE-610 PID-005
405 - 50 - CW - PA20W
NOTE 9
FROM N2 PANEL PID-006
922A - 25 - N2 - PB22S
636A - 25 - H2 - PB22S
639B - 25 - H2 - PB22S
502 - 15 - PWH2 - PB22S
FROM HPP-700 PID-011
740 - 1" - H2 - TK22
FROM HPP-700 PID-011
PI 632 PAHH
PT 632
BBV-632
TP C
H2 VENT
CLIENT
ELOGEN
A10 X00
ZONE BREAK
NOTE 10
LSHH 500
LSH 500
LSL 500
LSLL 500
LASLL
IS 14
NOTE 7
LC HV-511
FROM RDPC-001 PID-03
500 - 25 - PWH2 - PB22S
RO-501 4mm
NOTE 6 NOTE 8 NOTE 9
PV-500 PV-501
501 - 20 - DPWH2 - PA22S
TO WATER DRAINAGE PID-001
TO HPP-700 PID-011
IS 1 IS 4 IS 20
RO-630 2.8mm
PV-630
633A - 1/2" - H2 - TK22
633 - 20 - H2 - PB22S
PV-631
MV-631
638B - 20 - H2 - PB22S
634 - 20 - H2 - PB22S
CV-630
SLO-34
LSH 631
LSHH 631
LSH 630
LIC 630
LSL 630
DEM-630
CS-630
AV-400 NOTE 3 NOTE 4 Free Floating Lever Air/Gas Vents
AV-401 NOTE 3 NOTE 4 Free Floating Lever Air/Gas Vents
FROM ST-620 PID-006
630 - 25 - H2 - PB22S
ZONE BREAK
X00 A10
FROM WC-400/401 PID-010
422 - 40 - CW - PA20W
HE-630
HE-631
NOTE 2
404 - 50 - CW - PA20W
405 - 50 - CW - PA20W
631 - 25 - H2 - PB22S
631A - 25 - H2 - PB22S
PSV-640
PA22S TK22
638A - 25 - H2 - PB22S
HNF
646 - 1" - H2 - TK22
NOTE 9
FIC 642
642 - 1/2" - H2 - TK22
PV-642
1/2" 1/4"
MV-642
1/4" 1/2"
CV-642
1/2" 50
644 - 50 - H2 - PB22S
TK22 PB22S
FROM PIC-630 PID-006
647 - 1/2" - H2 - TK22
HV-642
FX 642
F(X)
940B - 25 - H2 - PB22S
HV-941
941 - 25 - N2 - PB22S
SP-940
CV-940
HV-940
FI 940
MV-941
941A - 25 - N2 - PA22S
FROM N2 PANEL PID-009
IS 3
PV-641
CV-640
TO ST-600 PID-003
FSH 640
FAHH
FSH 640
SLO-22
IS 3
FROM RDPC-001 PID-003
FROM FX-630 PID-006
FROM FH-620 PID-004
640 - 25 - PWH2 - PB22S
PG 13 barg
PRV-640
MV-640
PA640
626 - 1/2" - PWH2 - TK22
NOTE 9
RO-620 NOTE 5 0.3mm
PV-620
CV-620
626B - 1/2" - PWH2 - TK22
HV-626D
DG-640
LSH 640
LIC 640
LAHH
LSL 640
LSL 641
LSLL 641
LALL
SLO-18
IS 3
641 - 25 - PWH2 - PB22S
HV-640D
HV-400
HV-400DA
HV-626D
HV-640D

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 02

Closed Valve

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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Client

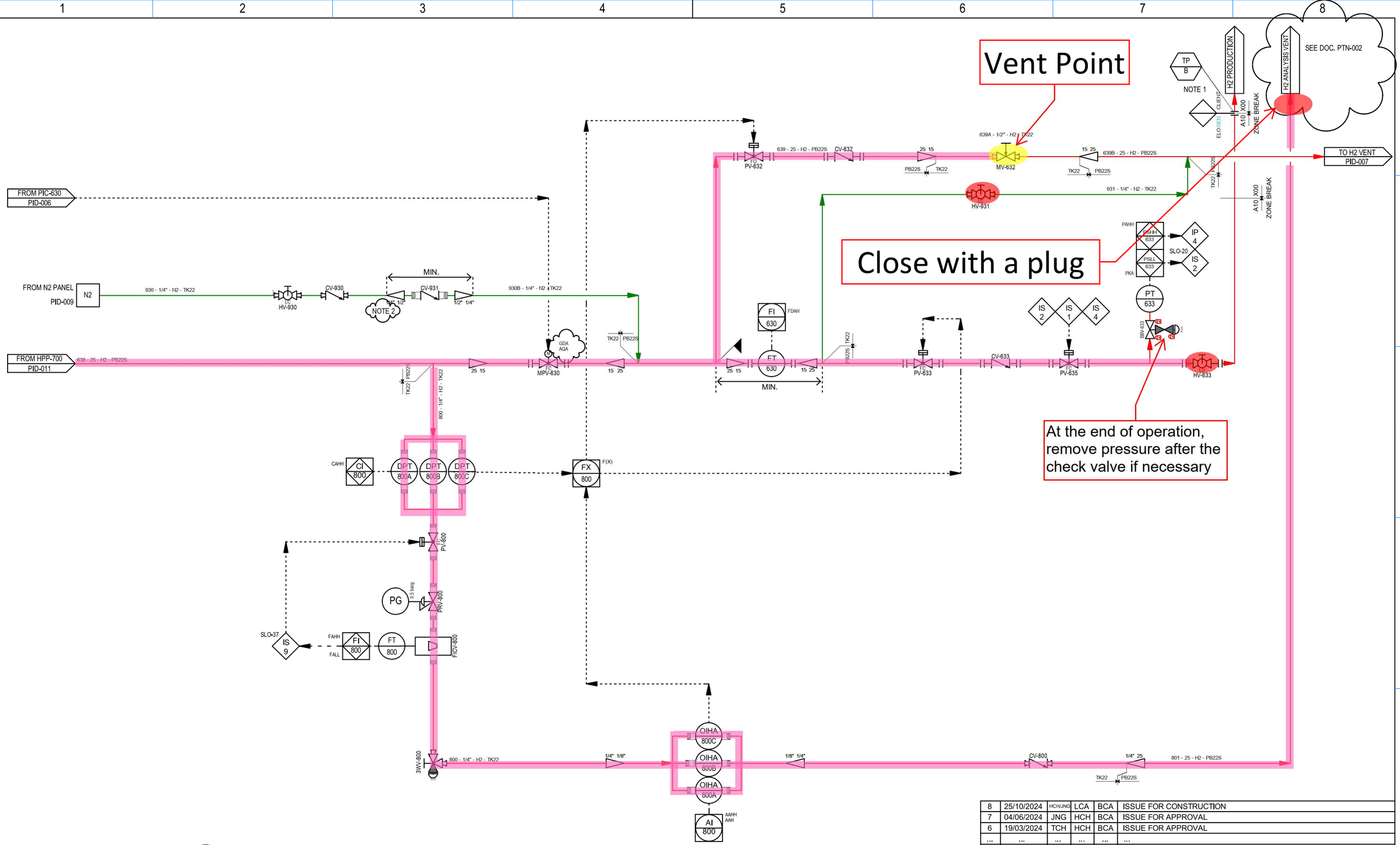
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (5/8)



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

Leak Test 02

Closed Valve

Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-008	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 PANEL

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	8/16

Leak Test Pack 02 - H2 Purification & Send Out (6/8)

Pressure Safety Valve

FROM CS-630
PID-007

634 - 20 - H2 - PB22S

TO H2 VENT
PID-007

740 - 1" - H2 - TK22

PSV-631
36 barg

1" GF

1/2" GM

PB22S | TK22

740B - 1" - H2 - TK22

741 - 1" - H2 - TK22

PSV outlet

25 20

25 40

407 - 40 - CW - PA20W

A10 | X00
ZONE BREAK

TO THS-400
PID-010

HE 64.1

HE 61.1

FC
FC-64.1
FSA
FSA LL

TT
TT-60.1
TSA HH
TA H
TSA
TA L
TSA LL

TT
TT-60.2
TSA HH
TA H
TSA
TA L
TSA LL

TT
TT-61.1
TSA HH
TA H
TSA

PT
PT-64.1
PSA HH
PSA
PA L
PSA LL

TT
TT-64.5
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TA H
TA L

TT
TT-64.6
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TSA HH C
TA L

TT
TT-64.7
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TA H
TA L

TT
TT-64.8
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TSA HH C
TA L

HYDROGEN
PURIFICATION
PACKAGE

NOTE 1
NOTE 2

TSH
TS-64.1

TSH
TS-64.2
TSA HH

TSH
TS-64.3
TSA HH
PSV outlet

TSH
TS-64.4
TSA HH

700 - 3/4" - CW - PA20W

DP-700

KSA K01 HH
KSA K01 LL
KSA K02 HH
KSA K02 LL
KSA K03 HH
KSA K03 LL
KSA K04 HH
KSA K04 LL

64 V1
64 V2
64 V3
64 V8
64 V12
64 V17

GSA HH
GSA LL
GS
GS-64.1.1
GS-64.1.2
GS-64.1.3
GS-64.1.4
GS-64.2
GS-64.3
GS-64-T2

RACCORD PNEUFIT 6MM

HY-LOK 8MM FITTING

502 - 15 - PWH2 - PB22S

TO H2 VENT
PID-007

638 - 25 - H2 - PB22S

TO H2 PANEL
PID-008

970 - 1/2" - CA - TK22

FROM BTK-980
PID-009

NOTE 3

15 25

HV-401D

MV-406

50 15

NOTE 3

FROM HE-610
PID-005

406 - 50 - CW - PA20W

MV-408

425 - 40 - CW - PA20W

Leak Test 02

Test pressure : 32.4 barg
Medium : N2/H2 mix

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-011	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN PURIFICATION PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	11/16

Leak Test Pack 02 - H2 Purification & Send Out (7/8)

No.	Qty.	Modified from	Date	Intr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

N7 Φ6mm Instrument air or Nitrogen

TO CP 64-V17 | TO CP 64-V8 | TO CP 64-V3 | TO CP 64-V2 | TO CP 64-V1 | TO CP 64-V12

TSA HH 64.4 / TS 64.4 ≤60°C

PI 64.1 — 64-V9

AQUAGAS

Customer
Flange
1", 300Lbs
ASME B16.5, 316L
N2 Hydrogen
N10 Vent
Flange
1", 300Lbs
ASME B16.5, A105

66 Particle filter 5µm

PSV 64.1 36bar — N8 — 64-V4.1
PSV 64.2 36bar — N9 — 64-V4.2

GSA LL/HH 64.1.1 / GS 64.1.1 Open=I
GSA LL/HH 64.1.3 / GS 64.1.3 Open=I
GS 64.1.2 / GSA LL/HH 64.1.2 Open=I
GS 64.1.4 / GSA LL/HH 64.1.4 Open=I

64-V4.3 | 64-V4.4

TSA HH 64.6 / TA L/H 64.6 / TC 64.6 / TI 64.6 / TT 64.6

TT 64.8 / TI 64.8 / TC 64.8 / TA L/H 64.8 / TSA HH 64.8

TS 64.3 / TSA HH 64.3 ≤200°C

TSA HH 64.2 / TS 64.2 / TS(TC) 64.1 — Heater HE64.1 — 64-V14 — 64-V14.1

64-V7 — GSA LL/HH 64.3 / GS 64.3 Open=I

64B Dryer

TSA HH 64.5 / TA L/H 64.5 / TC 64.5 / TI 64.5 / TT 64.5

GSA LL/HH 64.2 / GS 64.2 Open=I

64A Dryer

FC 64.1 4-20mA — 64-V5 — 64-V6 — 64-T4

TT 64.7 / TI 64.7 / TC 64.7 / TA L/H 64.7 / TSA HH 64.7

64-V15 — 64-V10 — 64-T1 — 64-V16 — 64-V11

G 3/4" PSV-64.3 6bar

Discharge N4

Hydrogen N1
Flange
1", 300Lbs
ASME B16.5
A105

61-V2 — 61-V1

TSA HH 61.1 / TA 61.1 / TC 61.1 / TI 61.1 / TT 61.1

TSA LL/HH 60.1 / TA L/H 60.1 / TC 60.1 / TI 60.1 / TT 60.1

TSA LL/HH 60.2 / TA L/H 60.2 / TC 60.2 / TI 60.2 / TT 60.2

*Note 1

61 Deoxidizer

Trace heater cable HE61.1

CW N6
CW N5
Flange
1", 150Lbs
ASME B16.5
A105

Customer | AQUAGAS

64-F1.1 1mm — 64-F1.2 0,5mm — 64-V13 — 64-F2.2 0,5mm — 64-V33 — 64-F2.1 1mm

61-F1.1 — 61-F1.2 — 61-V3

64-V31 — 64-T2 — GS 64-T2 Closed=I / GSA LL/HH 64-T2

Test pressure : 32.4 barg
Medium : N2/H2 mix

Leak Test 02

Closed Valve

*Note 1: Flange to fill/drain desiccant/catalyst.

– – – – = Customer scope of supply

Leak Test Pack 02 - H2 Purification & Send Out (8/8)

Pos. No.	Qty.	Designation	Material	Dimension	Remark
Design. RE	Drawn RE	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
							Filename 20230443.dwg	Date 23-07-03

R-500/36 OffShore
P&I Diagram
Drawing no. 20230440

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elogen	**PRECOMMISSIONING**	CROSSWIND
	C63-ELO-REP-CO-0101 - LEAK TEST	

TEST CONDITIONS	
Leak Test Pack	
Tested System	
Test Pressure (Barg)	
Test Fluid	

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
END	Date	Time	Pressure (Barg)	Temperature (°C)

RESULT			
Test Duration		Delta P (Bar)	
Snoop Detection without Bubbles	YES / NO / NA		
Gas Detection Without Leaks	YES / NO / NA		
Result	OK / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

AQA-1003

1ROP1.1 — 2ROP1.1 — YP-70 — 1PSP1.1 — 1RFP1

PI 1RO5 — PI 1RO7 — PI 2RO5 — PI 2RO7 — PI 2RO8 — PI 1F1 — PI 1ME2 — PI 1ED1 — PI 1ED2 — PI 1ED4 — PI 1ED6 — PI 2F1 — PI 2F2 — PI 1PS3 — PISA+ 1PS1

TI 1C1 — TI 1RO7 — TI 1ED7 — TI 2RO7 — TI 1B4 — FSA- 1ED3 — FSA 1ED3 — QE 1Z1 — QIA 1Z1 — QISA+ 2RO4 — PSA- 1RO2 — QISA+ 1RO4 — PSA- 1F2 — UI 1ED11 — LISA 1RF1

FI 1ME3 — FI 1RO6 — FI 2RO6 — FI 1ED3 — FI 1ED4 — FI 1ED5 — FIR 1RO8 — FIR 2RO5 — FIR 1ED1 — FIR 2RO3 — FIR 2RO6 — FIR 1RO3 — FIR 1PS4 — QIA 1B4

WTP-300

DEMIN TANK — LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 — LALL

FROM LIC-600 PID-003

TO ST-600 PID-003

PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

306 - 25 - PW - PA22S

300 - 15 - RW - PA22S

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

CAHH 300 — CAHH

4A — 5A — PA22S — TK22

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404 — 504 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S

302A - 25 - PW - PA22S — 303A - 25 - PW - PA22S — LP-300A — HV-301A — HV-300DA — CV-301A — CV-302A — HV-302A — HV-303DA — NOTE 5 — NOTE 1 NOTE 4 NOTE 3 NOTE 9

302B - 25 - PW - PA22S — 303B - 25 - PW - PA22S — LP-300B — HV-301B — HV-300DB — CV-301B — CV-302B — HV-302B — HV-303DB

SLO-15 — IS 12 — VAR-300A — VAR-300B

#300 — SLW-320 — PB22S — PA22S

HV-307V — NNF — CV-320 — 307 - 25 - PW - PB22S — NOTE 2

TO ST-620 PID-006 — FROM LIC-600 PID-003 — FOR START-UP ONLY

ELO GEN — CLIENT — ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	1/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (1/6)

C63-AUT-002

Communication table

(Phase 2)

C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
001	*1st Issuance (Ph1)*	*10/06/2024*	*DA*	*VTI*	*VTI*
002	*2st Issuance (Ph2)*	*15/11/2024*	*SDE*	*YHI*	*VTI*
003	*2st Issuance (Ph3)*	*03/09/2024*	*SDE*	*YHI*	*VTI*
004	*Adding Alarm Liste*	*17/12/2024*	*SDE*	*CCA*	
005	*Taking comments into account*	*29/01/2025*	*SDE*	*CCA*	

Elogen Project Document Number	C63-AUT-002
Elogen Project Document Name	Communication Table
Elogen Document File Name	C63-AUT-002_Rev.005

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REVISION LIST

REV.	DESCRIPTION
001	*First issue*
002	Adding comamnds/status/,,, signals
003	Adding Alarms/,,, and modifying Hardwire signals
004	Adding Alarm Liste
005	Taking comments into account

HOLD RECORD

REV. ITEM	REV. DESCRIPTION
Item A	**It changed the comamnds/status/,,, signals a to b from Rev.001 to Rev.002**
Table X	**It changed the Hardwire signals a to b from Rev.002 to Rev.003**

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HARDWIRED SAFETY SIGNAL

IP ADDRESS

		TAG	RANGE	TYPE	DESCRIPTION	WIRING	COMMENTS
FROM MASTER TO ELECTROLYSER	**FREE VOLTAGE CONTACT (0-24 VDC)**	CES-001	0-24VDC	NO	24VDC (TRUE) : NO SAFETY FAULT 0VDC (FALSE) : SAFETY FAULT	DRY CONTACTS NO FOR SAFETY RELAY	SHUTDOWN TO ELECTROLYSER 20-XS-001

		TAG	RANGE	TYPE	DESCRIPTION	WIRING	COMMENTS
FROM ELECTROLYSER TO MASTER	**FREE VOLTAGE CONTACT (0-24 VDC)**	ESS-001	0-24VDC	NO	CLOSE : NO SAFETY FAULT OPEN : SAFETY FAULT	DRY CONTACTS NO (FROM PLC)	Safety fault 20-XA-003
		ESS-002	0-24VDC	NO	CLOSE : NO SAFETY FAULT OPEN : SAFETY FAULT	DRY CONTACTS SAFETY RELAY (FROM PLC)	Gas Detection 20-XA-001
		FSS	0-24VDC	NO	CLOSE : NO SAFETY FAULT OPEN : SAFETY FAULT	DRY CONTACTS SAFETY RELAY (FROM PLC)	Fire Detection 20-XA-003

IP ADDRESS

PORT	PORT ELOGEN	PORT Cross Wind
PROJECT	Cross wind	
CODE	C63	
PROTOCOL	PROFINET PN/PN	
HARDWARE	COUPLEUR PN/PN SIEMENS	
ELOGEN CPU PLC	SIEMENS S7 1516F-2 PN	TBD
IP ADDRESS	192.168.63.x	TBD
SUBMASK NET.	255.255.255.0	TBD

C63-AUT-002_V5.0 Communication table

COMMUNICATION TABLE

FROM MASTER TO ELECTROLYSER

PROFINET COMMUNICATION

VARIABLE NAME	RANGE	UNIT	TYPE	LENGTH	BYTE	Bit	COMMENTS
Power setpoint (KW)	250-2500	Kw	REAL	32	0-3		Power Setpoint
FLOW SETPONIT	50-500	NM3/H	REAL	32	4-7		FLOW H2 Setpoint
WATCHDOG	0-300	N/A	INT	16	8-9		Communication control
ANNEE	N/A	N/A	BYTE	8	10		Date Synchronisation btw Elogen PLC & SHELL control system
MOIS	N/A	N/A	BYTE	8	11		Date Synchronisation btw Elogen PLC & SHELL control system
JOUR	N/A	N/A	BYTE	8	12		Date Synchronisation btw Elogen PLC & SHELL control system
HEURE	N/A	N/A	BYTE	8	13		Date Synchronisation btw Elogen PLC & SHELL control system
MIN	N/A	N/A	BYTE	8	14		Date Synchronisation btw Elogen PLC & SHELL control system
SECONDES	N/A	N/A	BYTE	8	15		Date Synchronisation btw Elogen PLC & SHELL control system
Electrolyser Command	1 - 4	N/A	INT	16	16-17		1 : MODE STOP (STOP) 2 : MODE IDLE (IDLE) 3 : MODE STANDBY (STANDY BY) 4 : MODE PRODUCTION
Setpoint_Choise	0-1	N/A	BOOL	1	18	0	Bit = 0 : Power Setpoint Bit= 1 : Flow H2 Setpoint
Transformer DGPT2 REED Fault	0-1	N/A	BOOL	1	18	1	Transformer DGPT2 REED Fault
Transformer DGPT2 PRESSURE Fault	0-1	N/A	BOOL	1	18	2	Transformer DGPT2 PRESSURE Fault
Transformer DGPT2 Temperature (T1) ALARM	0-1	N/A	BOOL	1	18	3	Transformer DGPT2 Temperature (T1) ALARM
Transformer DGPT2 Temperature (T2) FAULT	0-1	N/A	BOOL	1	18	4	Transformer DGPT2 Temperature (T2) FAULT
RECTIFIER 1 MAIN CB ' TRIP'	0-1	N/A	BOOL	1	18	5	RECTIFIER 1 MAIN CB ' TRIP'
RECTIFIER 2 MAIN CB ' TRIP'	0-1	N/A	BOOL	1	18	6	RECTIFIER 2 MAIN CB ' TRIP'
RECTIFIER 1 MAIN CB OPEN	0-1	N/A	BOOL	1	18	7	RECTIFIER 1 MAIN CB OPEN
RECTIFIER 1 MAIN CB CLOSED	0-1	N/A	BOOL	1	19	0	RECTIFIER 1 MAIN CB CLOSED
RECTIFIER 2 MAIN CB OPEN	0-1	N/A	BOOL	1	19	1	RECTIFIER 2 MAIN CB OPEN
RECTIFIER 2 MAIN CB CLOSED	0-1	N/A	BOOL	1	19	2	RECTIFIER 2 MAIN CB CLOSED
H.V CB STATUS OPEN	0-1	N/A	BOOL	1	19	3	H.V CB STATUS OPEN
H.V CB STATUS CLOSED	0-1	N/A	BOOL	1	19	4	H.V CB STATUS CLOSED
SPARE	0-1	N/A	BOOL	1	19	5	SPARE
SPARE	0-1	N/A	BOOL	1	19	6	SPARE
SPARE	0-1	N/A	BOOL	1	19	7	SPARE

FROM ELECTROLYSER TO MASTER

PROFINET COMMUNICATION

VARIABLE NAME	RANGE	UNIT	TYPE	LENGTH	BYTE	Bit	COMMENTS
STATUS_ELECTROLYSER							
MINOR_FAULT	0-1	N/A	BOOL	1	0	1	AT LEAST ONE "MINOR_FAULT" PRESENT (Warning) ; 1= Fault exist
MAJOR_FAULT	0-1	N/A	BOOL	1		1	AT LEAST ONE "DEFAUT MAJEUR" PRESENT ; 1= Fault exist
SAFETY_FAULT	0-1	N/A	BOOL	1		2	AT LEAST ONE "DEFAUT DE SECURITE" PRESENT ; 1= Fault exist
SSI	0-1	N/A	BOOL	1		3	FIRE CENTRAL alarm ; 1= Aalrm exist
SPARE	-	-	-	-		4	SPARE
SPARE	-	-	-	-		5	SPARE
SPARE	-	-	-	-		6	SPARE
SPARE	-	-	-	-		7	SPARE
STATUS_ELECTROLYSER	0-19	N/A	INT	16	1-2		LOCAL MODE 0 : MISE POWER ON (POWER ON) 1 : MODE STOP (STOP) 2 : MODE IDLE (IDLE) 3 : MODE STAND BY 4 : MODE PRODUCTION 5 : MODE SAFETY 6 : MODE Maintenance 7 : MODE Stop in progress 8. MODE Start in progress 9. MODE IDLE in progress 10.MODE STAND BY in progress 11.MODE SAFETY in progress DISTANT MODE +100
WATCHDOG	TBD	N/A	INT	16	3-4		COMMUNICATION CONTROL
Process Signals							
Process_CODE_01			**INT**	**16**	**TBD**		**Each Bit of INT Code represent one process signal**
FSH-640		N/A	BOOL	1	5	0	FLOW SWITCH HIGH DN50 CL300 ATEX SIL DEGREASED
GS-64-T2		N/A	BOOL	1	5	1	TBD-Limit switch
GS-64.1.1		N/A	BOOL	1	5	2	TBD-Limit switch
GS-64.1.2		N/A	BOOL	1	5	3	TBD-Limit switch
GS-64.1.3		N/A	BOOL	1	5	4	TBD-Limit switch
GS-64.1.4		N/A	BOOL	1	5	5	TBD-Limit switch
GS-64.2		N/A	BOOL	1	5	6	TBD-Limit switch
GS-64.3		N/A	BOOL	1	5	7	TBD-Limit switch
LSH-600		N/A	BOOL	1	6	0	High level in ST600
LSH-610		N/A	BOOL	1	6	1	Water level CS610 HH
LSH-630		N/A	BOOL	1	6	2	Water level CS630 H
LSH-631		N/A	BOOL	1	6	3	Water level CS 630 HH
LSH-640		N/A	BOOL	1	6	4	DG640 Level Switch - HH
LSL-600		N/A	BOOL	1	6	5	Low level ST-600
LSL-610		N/A	BOOL	1	6	6	Water level CS610 L
LSL-611		N/A	BOOL	1	6	7	Water level CS610 LL
Process_CODE_02			**INT**	**16**	**TBD**		**Each Bit of INT Code represent one process signal**
LSL-620		N/A	BOOL	1	7	0	Vey low level ST-620
LSL-630		N/A	BOOL	1	7	1	Vey low level ST-630
LSL-640		N/A	BOOL	1	7	2	level ST-640 Low
LSL-641		N/A	BOOL	1	7	3	level ST-640 LL
SPARE		N/A	BOOL	1	7	4	SPARE
SPARE		N/A	BOOL	1	7	5	SPARE
SPARE		N/A	BOOL	1	7	6	SPARE
SPARE		N/A	BOOL	1	7	7	SPARE
SPARE		N/A	BOOL	1	8	0	SPARE
SPARE		N/A	BOOL	1	8	1	SPARE
SPARE		N/A	BOOL	1	8	2	SPARE
SPARE		N/A	BOOL	1	8	3	SPARE
SPARE		N/A	BOOL	1	8	4	SPARE
SPARE		N/A	BOOL	1	8	5	SPARE
SPARE		N/A	BOOL	1	8	6	SPARE
SPARE		N/A	BOOL	1	8	7	SPARE
RETURN FLOW SETPOINT	50-500	NM3/H	INT	16	10-11	-	VALUE FLOW SETPOINT CLIENT (FLOW SETPOINT)
FT630	0-500	%	INT	16	12-13	-	ELECTROLYSE OUTLET HYDROGENE FLOW
PT630		BARG	INT	16	14-15	-	PRESSURE IN THE ELECTROLYZER (H2)
PT610		BARG	INT	16	16-17	-	PRESSURE IN THE ELECTROLYSER (O2)
CT/P-600		µS/cm	INT	16	18-19	-	CONDUCTIVITIMER WATER O2 SIDE
CT/P-620		µS/cm	INT	16	20-21	-	CONDUCTIVITIMER WATER H2 SIDE
IM-001		A	INT	16	22-23	-	CURRENT output of Rectifier 1
VM-100		V	INT	16	24-25	-	VOLTAGE OUTPUT of Rectifier 1
IM-002		A	INT	16	26-27	-	CURRENT output of Rectifier 2
VM-102		V	INT	16	28-29	-	VOLTAGE OUTPUT of Rectifier 2
TT200		°C	INT	16	30-31	-	TEMPERATURE TRANSMITTER THERMAL SKID
TT201		°C	INT	16	32-33	-	TEMPERATURE TRANSMITTER THERMAL SKID
TT-202A		°C	INT	16	34-35	-	TEMPERATURE TRANSMITTER -20/80 DEG, ATEX DEGREASED
TT-202B		°C	INT	16	36-37	-	TEMPERATURE TRANSMITTER -20/80 DEG, ATEX DEGREASED
TT400		°C	INT	16	38-39	-	TEMPERATURE TRANSMITTER WATER CHILLER
TT401		°C	INT	16	40-41	-	TEMPERATURE TRANSMITTER WATER CHILLER
TT1000		°C	INT	16	42-43	-	TEMPERATURE TRANSMITTER -20/80 DEG
TT1001		°C	INT	16	44-45	-	TEMPERATURE TRANSMITTER -20/80 DEG
TT1002		°C	INT	16	46-47	-	TEMPERATURE TRANSMITTER -20/80 DEG
TT-1003		°C	INT	16	48-49	-	TEMPERATURE TRANSMITTER -20/80 DEG
LT300		%	INT	16	50-51	-	Level Transmitter,Package PWT-300
LT600		%	INT	16	52-53	-	SEPARATOR TANK WATER LEVEL O2 SIDE
LT620		%	INT	16	54-55	-	SEPARATOR TANK WATER LEVEL SIDE H2
PT900		BARG	INT	16	56-57	-	NITROGEN NETWORK PRESSURE
AHD1000		%	INT	16	58-59	-	QUANTITY OF HYDROGEN IN THE AMBIENT
AHD1001		%	INT	16	60-61	-	QUANTITY OF HYDROGEN IN THE AMBIENT
AHD-1002		% LIE	INT	16	62-63	-	AMBIENT HYDROGEN DETECTOR 0.01KG/S 28M H2
AHD-1003		% LIE	INT	16	64-65	-	AMBIENT HYDROGEN DETECTOR

HIOD610A		%	INT	16	66-67	-	HYDROGEN MEASUREMENT IN OXYGEN
DPT800		ppmV	INT	16	68-69	-	DEW POINT MEASUREMENT H2
OIHA800		ppmV	INT	16	70-71	-	OXYGEN MEASUREMENT IN HYDROGEN
Stack operating hours (h)		h	INT	16	72-73	-	Stack operating hours (h)
Full load hours stack (h)		h	INT	16	74-75	-	Full load hours stack (h)
Total power consumption (W)		W	INT	16	76-77	-	Total power consumption (W)
Total system energy consumption (Wh)		Wh	INT	16	78-79	-	Total system energy consumption (Wh)
Energy consumption stack (Wh)		Wh	INT	16	80-81	-	Energy consumption stack (Wh)
TT600		°C	INT	16	82-83	-	O2 SIDE STACKS INLET TEMPERATURE
TT601_A		°C	INT	16	84-85	-	O2 SIDE STACK 1 OUTLET TEMPERATURE
TT601_B		°C	INT	16	86-87	-	O2 SIDE STACK 2 OUTLET TEMPERATURE
TT601_C		°C	INT	16	88-89	-	O2 SIDE STACK 3 OUTLET TEMPERATURE
TT601_D		°C	INT	16	90-91	-	O2 SIDE STACK 4 OUTLET TEMPERATURE
TT601_E		°C	INT	16	92-93	-	O2 SIDE STACK 5 OUTLET TEMPERATURE
TT601_F		°C	INT	16	94-95	-	O2 SIDE STACK 6 OUTLET TEMPERATURE
TT601_G		°C	INT	16	96-97	-	O2 SIDE STACK 7 OUTLET TEMPERATURE
TT601_H		°C	INT	16	98-99	-	O2 SIDE STACK 8 OUTLET TEMPERATURE
TT620		°C	INT	16	100-101	-	H2 SIDE STACKS INLET TEMPERATURE
TT621		°C	INT	16	102-103	-	TEMPERATURE TRANSMITTER 0/120 DEG
FT600		NM3/H	INT	16	104-105	-	FLOW TRANSMITTER 200 M3/H H2O+O2 ATEX SIL DEGREASED
FT620		NM3/H	INT	16	106-107	-	FLOW TRANSMITTER 80 M3/H H2O+H2 ATEX DEGREASED
PT611		BARG	INT	16	108-109	-	PRESSURE TRANSMITTER 16 BARG O2 ATEX SIL DEGREASED
PT612		BARG	INT	16	110-111	-	PRESSURE TRANSMITTER 16 BARG O2 ATEX SIL DEGREASED
PT631		BARG	INT	16	112-113	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED
PT632		BARG	INT	16	114-115	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED
PT633		BARG	INT	16	116-117	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED
PT910		BARG	INT	16	118-119	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED
PT920		BARG	INT	16	120-121	-	PRESSURE TRANSMITTER 40 BARG H2/N2 ATEX SIL DEGREASED
DPRT-1000		BARG	INT	16	122-123	-	DIFFERENTIAL PRESSURE TRANSMITTER
PT-64.1		BARG	INT	16	124-125	-	HPU AQUAGAS Pressure transmitter , Package HPP-700
TT-60.1		°C	INT	16	126-127	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
TT-60.2		°C	INT	16	128-129	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
Spare		°C	INT	16	130-131	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
TT-61.1		°C	INT	16	132-133	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
TT-64.5		°C	INT	16	134-135	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
TT-64.6		°C	INT	16	136-137	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
TT-64.7		°C	INT	16	138-139	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
TT-64.8		°C	INT	16	140-141	-	HPU AQUAGAS Temperature transmitter,Package HPP-700
VM001		V	INT	16	142-143	-	Voltage sensor of stack 1
VM002		V	INT	16	144-145	-	Voltage sensor of stack 2
VM003		V	INT	16	146-147	-	Voltage sensor of stack 3
VM004		V	INT	16	148-149	-	Voltage sensor of stack 4
VM005		V	INT	16	150-151	-	Voltage sensor of stack 5
VM006		V	INT	16	152-153	-	Voltage sensor of stack 6
VM007		V	INT	16	154-155	-	Voltage sensor of stack 7
VM008		V	INT	16	156-157	-	Voltage sensor of stack 8
Selector Swtch mode	0-2	N/A	INT	16	158-159	-	Selector Swith mode 0: Maintenance 1 : Remote 2 : Maintenance
HIOD610B		%	INT	16	160-161	-	HYDROGEN MEASUREMENT IN OXYGEN
HIOD610C		%	INT	16	162-163	-	HYDROGEN MEASUREMENT IN OXYGEN
SPARE		V	INT	16	164-165	-	SPARE
SPARE		N/A	INT	16	174-175	-	SPARE
SPARE		N/A	INT	16	168-169	-	SPARE
SPARE		N/A	INT	16	170-171	-	SPARE
SPARE		N/A	INT	16	172-173	-	SPARE
SPARE		N/A	INT	16	174-175	-	SPARE
SPARE		N/A	INT	16	176-177	-	SPARE
SPARE		N/A	INT	16	178-179	-	SPARE
SPARE		N/A	INT	16	180-181	-	SPARE
SPARE		N/A	INT	16	182-183	-	SPARE
SPARE		N/A	INT	16	184-185	-	SPARE
Intelock Safety Faults							
AQA-1010 (ISO22)		N/A	BOOL	1	186	0	FIRE AND GAS DETECTION - FIRE - SSI-1000
BZ-001 (ISO22)		N/A	BOOL	1	186	1	PLC FAULT - ERR - PLC-001
CAHH-610 (C63)		N/A	BOOL	1	186	2	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3
CAHH-1000 (ISO22)		N/A	BOOL	1	186	3	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000
CAHH-1001 (ISO22)		N/A	BOOL	1	186	4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001
CAHH-1002 (C63)		N/A	BOOL	1	186	5	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002
CAHH-1003 (ISO22)		N/A	BOOL	1	186	6	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003
CAHH-1004 (ISO22)		N/A	BOOL	1	186	7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004
FAHH-640 (ISO22-500)		N/A	BOOL	1	187	0	DEBIT EQUILIBRAGE ELEVEE - FSH-640 - HH
FAHH-800 (ISO22)		N/A	BOOL	1	187	1	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800
FALL-600 (ISO22-500)		N/A	BOOL	1	187	2	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600
FALL-610 (ISO22)		N/A	BOOL	1	187	3	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610A/B/C 2oo3
GGA-604 (ISO22)		N/A	BOOL	1	187	4	HV-604 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-604
GGA-605 (ISO22)		N/A	BOOL	1	187	5	HV-605 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-605
GGA-623 (ISO22)		N/A	BOOL	1	187	6	HV-623 VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-623
GGA-624 (ISO22)		N/A	BOOL	1	187	7	HV-624VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-624
LAHH-631 (ISO22)		N/A	BOOL	1	188	0	VERY HIGH LEVEL CS-630 - HH - LSH-631
LALL-611 (ISO22)		N/A	BOOL	1	188	1	VERY LOW LEVEL CS-610 - LL - LSL-611
LASHH-600 (ISO22)		N/A	BOOL	1	188	2	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600
LASLL-600 (C63)		N/A	BOOL	1	188	3	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600
LASLL-620 (C63)		N/A	BOOL	1	188	4	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620
LASLL-500 (C63)		N/A	BOOL	1	188	5	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT -LSLL-500
OAR-001 (ISO22)		N/A	BOOL	1	188	6	CUSTOMER EMERGENCY STOP - AUC-001
OAZ-001 (ISO22)		N/A	BOOL	1	188	7	EMERGENCY SHUTDOWN BUTTON - ESD-001
OAZ-002 (ISO22)		N/A	BOOL	1	189	0	EMERGENCY SHUTDOWN BUTTON - ESD-002
OAZ-003 (ISO22)		N/A	BOOL	1	189	1	EMERGENCY SHUTDOWN BUTTON - ESD-003
OAZ-004 (ISO22)		N/A	BOOL	1	189	2	EMERGENCY SHUTDOWN BUTTON - ESD-004
OAZ-005 (ISO22)		N/A	BOOL	1	189	3	EMERGENCY SHUTDOWN BUTTON - ESD-005
OAZ-006 (ISO22)		N/A	BOOL	1	189	4	EMERGENCY SHUTDOWN BUTTON - ESD-006
OAZ-007 (ISO22)		N/A	BOOL	1	189	5	EMERGENCY SHUTDOWN BUTTON - ESD-007
PAHH-600A (C63)		N/A	BOOL	1	189	6	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A
PAHH-600B (C63)		N/A	BOOL	1	189	7	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B
PAHH-611 (ISO22)		N/A	BOOL	1	190	0	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS) - HH - PT-611
PAHH-620A (C63)		N/A	BOOL	1	190	1	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A
PAHH-620B (C63)		N/A	BOOL	1	190	2	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B
PAHH-631 (ISO22)		N/A	BOOL	1	190	3	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631
PALL-611 (ISO22)		N/A	BOOL	1	190	4	LOW PRESSURE ON ANODIC SIDE - LL - PT-611
PALL-631 (ISO22)		N/A	BOOL	1	190	5	LOW PRESSURE ON CATHODIC SIDE - LL - PT-631
PDAHH-002 (ISO22)		N/A	BOOL	1	190	6	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611
PDALL-002 (ISO22)		N/A	BOOL	1	190	7	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611
PKA-633 (C63)		N/A	BOOL	1	191	0	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633
SPARE		N/A	BOOL	1	191	1	360KA1 SAF MODULE
SPARE		N/A	BOOL	1	191	2	SPARE
SPARE		N/A	BOOL	1	191	3	SPARE
SPARE		N/A	BOOL	1	191	4	SPARE
SPARE		N/A	BOOL	1	191	5	SPARE
SPARE		N/A	BOOL	1	191	6	SPARE
SPARE		N/A	BOOL	1	191	7	SPARE
SAFETY_FAULT_ALARM_CODE_4			INT	16	**192-193**		SPARE
SAFETY_FAULT_ALARM_CODE_5			INT	16	**194-195**		SPARE
Intelock process faults (IP1-IP9)							
AAHH-800 (ISO22)		N/A	BOOL	1	196	0	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-800
ACA-001 (ISO22)		N/A	BOOL	1	196	1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001
ACA-002 (ISO22)		N/A	BOOL	1	196	2	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002
AQA-1005		N/A	BOOL	1	196	3	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER
AQA-1006		N/A	BOOL	1	196	4	COMMUNICATION FAULT PLC ELOGEN / HVAC
AQA-001 (ISO22)		N/A	BOOL	1	196	5	RECTIFIER FAULT - ERR - REC-001
AQA-002 (ISO22)		N/A	BOOL	1	196	6	RECTIFIER FAULT - ERR - REC-002
AQA-052		N/A	BOOL	1	196	7	CUSTOMER/ELOGEN COMMUNICATION SWITCH FAULT,REMOTE MODE
AQA-1001 (ISO22)		N/A	BOOL	1	197	0	FIRE CONTROL PANEL FAULT - ERR - SSI-1000
AQA-1003		N/A	BOOL	1	197	1	COMMUICATION FAULT PLC ELOGEN / WTP
EJAHH-001 (C63)		N/A	BOOL	1	197	2	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001
EJAHH-002 (C63)		N/A	BOOL	1	197	3	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002
EJAHH-003 (C63)		N/A	BOOL	1	197	4	HIGH RECTIFIER VOLTAGE - HH - PQ-003
EJAHH-004 (C63)		N/A	BOOL	1	197	5	HIGH RECTIFIER VOLTAGE - HH - PQ-004
EJALL-001 (C63)		N/A	BOOL	1	197	6	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001
EJALL-002 (C63)		N/A	BOOL	1	197	7	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002
EJALL-003 (C63)		N/A	BOOL	1	198	0	VERY LOW RECTIFIER VOLTAGE - LL - PQ-003
EJALL-004 (C63)		N/A	BOOL	1	198	1	VERY LOW RECTIFIER VOLTAGE - LL - PQ-004
FALL-620 (ISO22-500)		N/A	BOOL	1	198	2	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620
FSA 64.1		N/A	BOOL	1	198	3	FC 64.1 non alimenté par courant 4-20 mA

FSA 64.1 LL		N/A	BOOL	1	198	4	Débit entrée HPU FC 64.1 - LL
GSA 64.1.1 HH		N/A	BOOL	1	198	5	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1
GSA 64.1.1 LL		N/A	BOOL	1	198	6	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1
GSA 64.1.2 HH		N/A	BOOL	1	198	7	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2
GSA 64.1.2 LL		N/A	BOOL	1	199	0	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2
GSA 64.1.3 HH		N/A	BOOL	1	199	1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3
GSA 64.1.3 LL		N/A	BOOL	1	199	2	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3
GSA 64.1.4 HH		N/A	BOOL	1	199	3	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4
GSA 64.1.4 LL		N/A	BOOL	1	199	4	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4
GSA 64.2 HH		N/A	BOOL	1	199	5	VALVE 64-V5 NOT CLOSED - HH - GS 64.2
GSA 64.2 LL		N/A	BOOL	1	199	6	VALVE 64-V5 NOT OPEN - LL - GS 64.2
GSA 64.3 HH		N/A	BOOL	1	199	7	VALVE 64-V7 NOT CLOSED - HH - GS 64.3
GSA 64.3 LL		N/A	BOOL	1	200	0	VALVE 64-V7 NOT OPEN - LL - GS 64.3
GSA 64.T2 HH		N/A	BOOL	1	200	1	VALVE 64-T2 NOT OPEN - HH - GS 64.T2
GSA 64.T2 LL		N/A	BOOL	1	200	2	VALVE 64-T2 NOT CLOSED - LL - GS 64.T2
IAHH-001 (ISO22)		N/A	BOOL	1	200	3	HIGH CURRENT RECTIFIER - HH - IM-001
IAHH-002 (ISO22)		N/A	BOOL	1	200	4	HIGH CURRENT RECTIFIER - HH - IM-002
IDAHH-001 (ISO22)		N/A	BOOL	1	200	5	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001
IDAHH-002 (ISO22)		N/A	BOOL	1	200	6	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002
JGA-001 (ISO22)		N/A	BOOL	1	200	7	LOSS OF 400 VAC POWER SUPPLY - ERR
KSA K01 HH		N/A	BOOL	1	201	0	Dryer heater HE 64.1, K01 Not deactivated
KSA K01 LL		N/A	BOOL	1	201	1	Dryer heater HE 64.1, contactor K01 Not activated
KSA K02 HH		N/A	BOOL	1	201	2	Dryer heater HE 64.1, K02 Not deactivated
KSA K02 LL		N/A	BOOL	1	201	3	Dryer heater HE 64.1, K02 Not activated
KSA K03 HH		N/A	BOOL	1	201	4	Deoxo Trace heater HE 61.1, K03 Not deactivated
KSA K03 LL		N/A	BOOL	1	201	5	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03
KSA K04 HH		N/A	BOOL	1	201	6	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04
KSA K04 LL		N/A	BOOL	1	201	7	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04
LAHH-001 (ISO22)		N/A	BOOL	1	202	0	WATER LEAK DETECTION - HH - WLD-001
LAHH-002 (ISO22)		N/A	BOOL	1	202	1	WATER LEAK DETECTION - HH - WLD-002
LAHH-003 (ISO22)		N/A	BOOL	1	202	2	WATER LEAK DETECTION - HH - WLD-003
LAHH-004 (ISO22)		N/A	BOOL	1	202	3	WATER LEAK DETECTION - HH - WLD-004
LAHH-005 (ISO22)		N/A	BOOL	1	202	4	WATER LEAK DETECTION - HH - WLD-005
LAHH-006 (ISO22)		N/A	BOOL	1	202	5	WATER LEAK DETECTION - HH - WLD-006
LAHH-600 (C63)		N/A	BOOL	1	202	6	VERY HIGH LEVEL ST-600 - HH - LT-600
LAHH-620 (C63)		N/A	BOOL	1	202	7	VERY HIGH LEVEL ST-620 - HH - LT-620
LALL-300 (C63)		N/A	BOOL	1	203	0	VERY LOW LEVEL WTP-300 - LL - LT-300
LASHH-500 (C63)		N/A	BOOL	1	203	1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500
OAS-001 (ISO22)		N/A	BOOL	1	203	2	ELECTROLYSER DOOR OPENED - DS-001
OAS-002 (ISO22)		N/A	BOOL	1	203	3	ELECTROLYSER DOOR OPENED - DS-002
OAS-003 (ISO22)		N/A	BOOL	1	203	4	ELECTROLYSER DOOR OPENED - DS-003
OAS-004 (ISO22)		N/A	BOOL	1	203	5	ELECTROLYSER DOOR OPENED - DS-004
OAS-005 (ISO22)		N/A	BOOL	1	203	6	ELECTROLYSER DOOR OPENED - DS-005
OAS-006 (ISO22)		N/A	BOOL	1	203	7	ELECTROLYSER DOOR OPENED - DS-006
OAS-007 (ISO22)		N/A	BOOL	1	204	0	ELECTROLYSER DOOR OPENED - DS-007
OAS-008 (ISO22)		N/A	BOOL	1	204	1	ELECTROLYSER DOOR OPENED - DS-008
OAS-009 (ISO22)		N/A	BOOL	1	204	2	ELECTROLYSER DOOR OPENED - DS-009
OAS-010 (ISO22)		N/A	BOOL	1	204	3	ELECTROLYSER DOOR OPENED - DS-0010
OAS-011 (ISO22)		N/A	BOOL	1	204	4	ELECTROLYSER DOOR OPENED - DS-0011
OAS-012 ISO22)		N/A	BOOL	1	204	5	ELECTROLYSER DOOR OPENED - DS-0012
PAHH-05 (C63)		N/A	BOOL	1	204	6	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-05
PAHH-12 (C63)		N/A	BOOL	1	204	7	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-12
PAHH-15 (C63)		N/A	BOOL	1	205	0	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-15
PAHH-22 (C63)		N/A	BOOL	1	205	1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 2 - HH - PT-22
PAHH-105 (C63)		N/A	BOOL	1	205	2	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 1 - HH - PT-105
PAHH-112 (C63)		N/A	BOOL	1	205	3	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 1 - HH - PT-112
PAHH-115 (C63)		N/A	BOOL	1	205	4	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 2 - HH - PT-115
PAHH-122 (C63)		N/A	BOOL	1	205	5	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 2 - HH - PT-122
PAHH-150 (ISO22)		N/A	BOOL	1	205	6	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150
PAHH-610 (ISO22)		N/A	BOOL	1	205	7	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610
PAHH-630 (ISO22)		N/A	BOOL	1	206	0	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630
PAHH-900 (ISO22)		N/A	BOOL	1	206	1	LEAK ON OXYGEN INERTING LINE - HH - PT-900
PAHH-910 (ISO22)		N/A	BOOL	1	206	2	VERY HIGH NITROGEN PRESSURE - HH - PT-910
PAHH-920 (ISO22)		N/A	BOOL	1	206	3	LEAK ON HYDROGEN INERTING LINE - HH - PT-920
PALL-150 (ISO22)		N/A	BOOL	1	206	4	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150
PALL-910 (ISO22)		N/A	BOOL	1	206	5	VERY LOW NITROGEN PRESSURE - LL - PT910
PDAHH-001 (ISO22)		N/A	BOOL	1	206	6	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610
PDALL-001 (ISO22)		N/A	BOOL	1	206	7	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610
TAHH-600 (ISO22)		N/A	BOOL	1	207	0	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600
TAHH-601A (ISO22)		N/A	BOOL	1	207	1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601A
TAHH-601B (ISO22)		N/A	BOOL	1	207	2	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601B
TAHH-601C (ISO22)		N/A	BOOL	1	207	3	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601C
TAHH-601D (ISO22)		N/A	BOOL	1	207	4	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601D
TAHH-601E (ISO22)		N/A	BOOL	1	207	5	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601E
TAHH-601F (ISO22)		N/A	BOOL	1	207	6	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601F
TAHH-601G (ISO22)		N/A	BOOL	1	207	7	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601G
TAHH-601H (ISO22)		N/A	BOOL	1	208	0	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601H
TAHH-620 (ISO22)		N/A	BOOL	1	208	1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620
TDAHH-600 (ISO22)		N/A	BOOL	1	208	2	ANODE DT VERY HIGH - HH - TDY-600
TDALL-600 (ISO22)		N/A	BOOL	1	208	3	ANODE DT VERY LOW - LL - TDY-600
TSA 60.1		N/A	BOOL	1	208	4	NO SIGNAL - ERR - TT 60.1
TSA 60.1 HH		N/A	BOOL	1	208	5	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1
TSA 60.1 LL		N/A	BOOL	1	208	6	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1
TSA 60.2		N/A	BOOL	1	208	7	NO SIGNAL - ERR - TT 60.2
TSA 60.2 HH		N/A	BOOL	1	209	0	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2
TSA 60.2 LL		N/A	BOOL	1	209	1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2
TSA 61.1		N/A	BOOL	1	209	2	NO SIGNAL - ERR - TT 61.1
TSA 61.1 HH		N/A	BOOL	1	209	3	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1
TSA 64.2 HH		N/A	BOOL	1	209	4	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2
TSA 64.3 HH		N/A	BOOL	1	209	5	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3
TSA 64.4 HH		N/A	BOOL	1	209	6	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4
TSA 64.5		N/A	BOOL	1	209	7	NO SIGNAL - ERR - TT 64.5
TSA 64.5 HH A		N/A	BOOL	1	210	0	DRYER TOWER 64A, BOTTOM ADS, TEMPERATURE VERY HIGH - HH - TT 64.5
TSA 64.5 HH R		N/A	BOOL	1	210	1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5
TSA 64.6		N/A	BOOL	1	210	2	NO SIGNAL - ERR - TT 64.6
TSA 64.6 HH A		N/A	BOOL	1	210	3	DRYER TOWER 64A, TOP ADS, TEMPERATURE VERY HIGH -HH - 64.6
TSA 64.6 HH C		N/A	BOOL	1	210	4	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6
TSA 64.6 HH R		N/A	BOOL	1	210	5	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6
TSA 64.7		N/A	BOOL	1	210	6	NO SIGNAL - ERR - TT 64.7
TSA 64.7 HH A		N/A	BOOL	1	210	7	DRYER TOWER 64B, BOTTOM ADS, TEMPERATURE VERY HIGH - HH - TT 64.7
TSA 64.7 HH R		N/A	BOOL	1	211	0	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7
TSA 64.8		N/A	BOOL	1	211	1	NO SIGNAL - ERR - TT 64.8
TSA 64.8 HH A		N/A	BOOL	1	211	2	DRYER TOWER 64B, TOP ADS, TEMPERATURE VERY HIGH - HH - 64.8
TSA 64.8 HH C		N/A	BOOL	1	211	3	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8
TSA 64.8 HH R		N/A	BOOL	1	211	4	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8
VAHH-001 (ISO22)		N/A	BOOL	1	211	5	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001
VAHH-101 (C63)		N/A	BOOL	1	211	6	REC-001 VERY HIGH VOLTAGE - HH - VM-101
VAHH-102 (C63)		N/A	BOOL	1	211	7	REC-002 VERY HIGH VOLTAGE - HH - VM-102
VALL-001 (ISO22)		N/A	BOOL	1	212	0	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001
VKA-001 (ISO22)		N/A	BOOL	1	212	1	STACK-001 VOLTAGE DROP - PCA-001 - DROP
VKA-002 (ISO22)		N/A	BOOL	1	212	2	STACK-002 VOLTAGE DROP - PCA-002 - DROP
VKA-003 (ISO22)		N/A	BOOL	1	212	3	STACK-003 VOLTAGE DROP - PCA-003 - DROP
VKA-004 (ISO22)		N/A	BOOL	1	212	4	STACK-004 VOLTAGE DROP - PCA-004 - DROP
VKA-005 (ISO22)		N/A	BOOL	1	212	5	STACK-005 VOLTAGE DROP - PCA-005 - DROP
VKA-006 (ISO22)		N/A	BOOL	1	212	6	STACK-006 VOLTAGE DROP - PCA-006 - DROP
VKA-007 (ISO22)		N/A	BOOL	1	212	7	STACK-007 VOLTAGE DROP - PCA-007 - DROP
VKA-008 (ISO22)		N/A	BOOL	1	213	0	STACK-008 VOLTAGE DROP - PCA-008 - DROP
VQAHH-001 (ISO22)		N/A	BOOL	1	213	1	VOLTAGE DEVIATION BETWEEN PCA-001 AND VM-001 - HH
VQAHH-002 (ISO22)		N/A	BOOL	1	213	2	VOLTAGE DEVIATION BETWEEN PCA-002 AND VM-002 - HH
VQAHH-003 (ISO22)		N/A	BOOL	1	213	3	VOLTAGE DEVIATION BETWEEN PCA-003 AND VM-003 - HH
VQAHH-004 (ISO22)		N/A	BOOL	1	213	4	VOLTAGE DEVIATION BETWEEN PCA-004 AND VM-004 - HH
VQAHH-005 (ISO22)		N/A	BOOL	1	213	5	VOLTAGE DEVIATION BETWEEN PCA-005 AND VM-005 - HH
VQAHH-006 (ISO22)		N/A	BOOL	1	213	6	VOLTAGE DEVIATION BETWEEN PCA-006 AND VM-006 - HH
VQAHH-007 (ISO22)		N/A	BOOL	1	213	7	VOLTAGE DEVIATION BETWEEN PCA-007 AND VM-007 - HH
VQAHH-008 (ISO22)		N/A	BOOL	1	214	0	VOLTAGE DEVIATION BETWEEN PCA-008 AND VM-008 - HH
YAHH-600 (ISO22)		N/A	BOOL	1	214	1	VERY HIGH CONDUCTIVITY CT600 - HH
YAHH-620 (ISO22)		N/A	BOOL	1	214	2	VERY HIGH CONDUCTIVITY CT620 - HH
YALL-600 (ISO22)		N/A	BOOL	1	214	3	CALIBRATION FAULT - CT600
YALL-620 (ISO22)		N/A	BOOL	1	214	4	CALIBRATION FAULT - CT620
JGA-001 (ISO22)		N/A	BOOL	1	214	5	LOSS OF 400 VAC POWER SUPPLY - ERR
JGA-002 (C63)		N/A	BOOL	1	214	6	OVERVOLTAGE - SURGE PROTECTION - RF8

JGA-003 (C63)		N/A	BOOL	1	214	7	FAULT - UPS CIRCUIT BREAKER AUXILIARY CONTACT - QF5
JGA-005 (C63)		N/A	BOOL	1	215	0	BREAKER - AUXILIARY TYPE 2 - 120QM1
JGA-008 (C63)		N/A	BOOL	1	215	1	FAULT - HCU RECTIFIER 400Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF3
JGA-302 (C63)		N/A	BOOL	1	215	2	BREAKER WTP300 - 102QF3
SJGA-010 (C63)		N/A	BOOL	1	215	3	HVAC PANEL CIRCUIT BREAKER AUXILIARY CONTACT - 102QM1
JGA-014 (C63)		N/A	BOOL	1	215	4	FAULT - RECTIFIER UPS POWER SUPPLY 1 CIRCUIT BREAKER AUXILIARY CONTACT - 130QF5
JGA-1000 (C63)		N/A	BOOL	1	215	5	SSI-1000 POWER FAILURE - 130QF7
JGA-015 (C63)		N/A	BOOL	1	215	6	RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF1
JGA-016 (C63)		N/A	BOOL	1	215	7	RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF3
JGA-005 (C63)		N/A	BOOL	1	216	0	FAULT - RECTIFIER 230Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF1
JGA-006 (ISO22)		N/A	BOOL	1	216	1	REC_MAIN_BREK_DEF
PSA-001 (C63)		N/A	BOOL	1	216	2	RECTIFIER COOLING NETWORK PRESSURE SWITCH - PS001
AQA-005 (ISO22)		N/A	BOOL	1	216	3	LOSS OF COMMUNICATION RIO MAIN - ERR
AQA-006 (ISO22)		N/A	BOOL	1	216	4	LOSS OF COMMUNICATION RIO 1 - ERR
AQA-007 (ISO22)		N/A	BOOL	1	216	5	LOSS OF COMMUNICATION RIO 2 - ERR
AQA-018 (C63)		N/A	BOOL	1	216	6	LOSS OF COMMUNICATION RIO BURKERT - ERR
LAH-630 (C63)		N/A	BOOL	1	216	7	HIGH LEVEL CS-630 - HH - LSH-630
LALL-600 (C63)		N/A	BOOL	1	216	0	VERY LOW LEVEL ST-600 - LL - LT-600
LALL-620 (C63)		N/A	BOOL	1	216	1	VERY LOW LEVEL ST-620 - LL - LT-620
LASLL-600 (C63)		N/A	BOOL	1	217	2	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600
LASLL-620 (C63)		N/A	BOOL	1	217	3	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620
SPARE		N/A	BOOL	1	217	4	SPARE
SPARE		N/A	BOOL	1	217	5	SPARE
SPARE		N/A	BOOL	1	217	6	SPARE
SPARE		N/A	BOOL	1	217	7	SPARE
MAJOR_FAULT_ALARM_CODE_12			**INT**	**16**	**218-219**		**SPARE**
MAJOR_FAULT_ALARM_CODE_13			**INT**	**16**	**220-221**		**SPARE**
MAJOR_FAULT_ALARM_CODE_14			**INT**	**16**	**222-223**		**SPARE**
MAJOR_FAULT_ALARM_CODE_15			**INT**	**16**	**224-225**		**SPARE**
MAJOR_FAULT_ALARM_CODE_16			**INT**	**16**	**226-227**		**SPARE**
MAJOR_FAULT_ALARM_CODE_17			**INT**	**16**	**228-229**		**SPARE**
MAJOR_FAULT_ALARM_CODE_18			**INT**	**16**	**230-231**		**SPARE**
MAJOR_FAULT_ALARM_CODE_19			**INT**	**16**	**232-233**		**SPARE**
MAJOR_FAULT_ALARM_CODE_20			**INT**	**16**	**234-235**		**SPARE**
Intelock process faults (Warning)							
AAH-800 (ISO22)		N/A	BOOL	1	236	0	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800
ACA-300A (C63)		N/A	BOOL	1	236	1	LP-300A STARTING FAULT - LP-300A
ACA-300B (C63)		N/A	BOOL	1	236	2	LP-300B STARTING FAULT - LP-300B
ACA-600A (ISO22)		N/A	BOOL	1	236	3	STARTING MALFUNCTION CP-600A - ERR - CP-600A
ACA-600B (ISO22)		N/A	BOOL	1	236	4	STARTING MALFUNCTION CP-600B - ERR - CP-600B
ACA-620A (ISO22)		N/A	BOOL	1	236	5	STARTING MALFUNCTION CP-620A - ERR - CP-620A
ACA-620B (ISO22)		N/A	BOOL	1	236	6	STARTING MALFUNCTION CP-620B - ERR - CP-620B
CAH-610 (C63)		N/A	BOOL	1	236	7	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3
CAH-1000 (ISO22)		N/A	BOOL	1	237	0	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000
CAH-1001 (ISO22)		N/A	BOOL	1	237	1	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001
CAH-1002 (C63)		N/A	BOOL	1	237	2	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002
CAH-1003 (ISO22)		N/A	BOOL	1	237	3	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003
CAH-1004 (ISO22)		N/A	BOOL	1	237	4	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004
CAHH-300 (C63)		N/A	BOOL	1	237	5	VERY HIGH CONDUCTIVITY LP300 - HH
CAHH-800 (ISO22)		N/A	BOOL	1	237	6	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800
EGA-1001 (ISO22)		N/A	BOOL	1	237	7	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1001
EGA-1002 (ISO22)		N/A	BOOL	1	238	0	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1002
EGA-1003 (ISO22)		N/A	BOOL	1	238	1	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1003
EGA-1004 (ISO22)		N/A	BOOL	1	238	2	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1004
EGA-1006 (ISO22)		N/A	BOOL	1	238	3	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1006
EGA-1007 (ISO22)		N/A	BOOL	1	238	4	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1007
EGA-1101 (ISO22)		N/A	BOOL	1	238	5	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001
EGA-1102 (ISO22)		N/A	BOOL	1	238	6	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002
EGA-1103 (ISO22)		N/A	BOOL	1	238	7	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003
EGA-1104 (ISO22)		N/A	BOOL	1	239	0	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004
EGA-1105 (ISO22)		N/A	BOOL	1	239	1	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005
EGA-1106 (ISO22)		N/A	BOOL	1	239	2	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006
EGA-1107 (ISO22)		N/A	BOOL	1	239	3	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007
EGA-1108 (ISO22)		N/A	BOOL	1	239	4	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008
FAL-600 (ISO22-500)		N/A	BOOL	1	239	5	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600
FAL-620 (ISO22-500)		N/A	BOOL	1	239	6	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620
FAL-900 (ISO22)		N/A	BOOL	1	239	7	LOW N2 FLOWRATE FOR PURGE - L - FT-900
FAL-901 (ISO22)		N/A	BOOL	1	240	0	LOW N2 FLOWRATE FOR PURGE - L - FT-901
FAL-920 (ISO22)		N/A	BOOL	1	240	1	LOW N2 FLOWRATE FOR PURGE - L - FT-920
FAL-921 (ISO22)		N/A	BOOL	1	240	2	LOW N2 FLOWRATE FOR PURGE - L - FT-921
FALL-611 (ISO22)		N/A	BOOL	1	240	3	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611
FALL-800 (ISO22)		N/A	BOOL	1	240	4	VERY LOW H2 FLOW ANALYSIS - LL - FICV-800
FDAH-630 (ISO22)		N/A	BOOL	1	240	5	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630
GDA-611 (ISO22)		N/A	BOOL	1	240	6	POSITION DEVIATION OF MPV-611 - ERR - MPV-611
GDA-630 (ISO22)		N/A	BOOL	1	240	7	POSITION DEVIATION OF MPV-630 - ERR - MPV-630
JGA-300A (C63)		N/A	BOOL	1	241	0	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A
JGA-300B (C63)		N/A	BOOL	1	241	1	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B
JGA-600A (ISO22)		N/A	BOOL	1	241	2	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A
JGA-600B (ISO22)		N/A	BOOL	1	241	3	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B
JGA-620A (ISO22)		N/A	BOOL	1	241	4	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A
JGA-620B (ISO22)		N/A	BOOL	1	241	5	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B
JGA-1001 (ISO22)		N/A	BOOL	1	241	6	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001
JGA-1002 (ISO22)		N/A	BOOL	1	241	7	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002
JGA-1003 (ISO22)		N/A	BOOL	1	242	0	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003
JGA-1004 (ISO22)		N/A	BOOL	1	242	1	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004
JGA-1006 (ISO22)		N/A	BOOL	1	242	2	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006
JGA-1007 (ISO22)		N/A	BOOL	1	242	3	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007
JGA-1121		N/A	BOOL	1	242	4	MALFUNCTION MAIN CIRCUIT BREAKER FOR 4 FANS STACK - ERR - BREAKER STACK 001/002/003/004
JGA-1122		N/A	BOOL	1	242	5	MALFUNCTION COMMON CIRCUIT BREAKER OF 4 FANS STACKS - ERR - BREAKER STACK 005/ 006/ 007/ 008
LAH-600 (C63)		N/A	BOOL	1	242	6	HIGH LEVEL ST-600 - H - LT-600
LAH-610 (ISO22)		N/A	BOOL	1	242	7	HIGH LEVEL CS-610 - H - LSH-610
LAH-620 (C63)		N/A	BOOL	1	243	0	HIGH LEVEL ST-620 - H - LT-620
SPARE		N/A	BOOL	1	243	1	SPARE
LAHH-640 (ISO22)		N/A	BOOL	1	243	2	HIGH LEVEL DG-640 - HH - LSH-640
LAL-600 (C63)		N/A	BOOL	1	243	3	LOW LEVEL ST-600 - L
LAL-610 (ISO22)		N/A	BOOL	1	243	4	Low Level CS-610 - L- LSL-610
LAL-620 (C63)		N/A	BOOL	1	243	5	LOW LEVEL ST-620 - L - LT-620
LAL-630 (ISO22)		N/A	BOOL	1	243	6	LOW LEVEL CS-630 - L - LSL-630
SPARE		N/A	BOOL	1	243	7	SPARE
SPARE		N/A	BOOL	1	244	0	SPARE
PA 64.1 L		N/A	BOOL	1	244	1	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1
PAH-150 (ISO22)		N/A	BOOL	1	244	2	HIGH INSTRUMENT AIR PRESSURE - H - PT-150
PAH-300 (ISO22)		N/A	BOOL	1	244	3	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300
PAH-600 (ISO22)		N/A	BOOL	1	244	4	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600
PAH-610 (ISO22)		N/A	BOOL	1	244	5	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- H - PT-610
PAH-612 (ISO22)		N/A	BOOL	1	244	6	HIGH OXYGEN VENT PRESSURE - H - PT-612
PAH-620 (ISO22)		N/A	BOOL	1	244	7	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620
PAH-630 (ISO22)		N/A	BOOL	1	245	0	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630
PAH-910 (ISO22)		N/A	BOOL	1	245	1	HIGH NITROGEN PRESSURE - H - PT-910
PAHH-300 (C63)		N/A	BOOL	1	245	2	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300
PAHH-632 (C63)		N/A	BOOL	1	245	3	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632
PAHH-633 (C63)		N/A	BOOL	1	245	4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633
PAL-150 (ISO22)		N/A	BOOL	1	245	5	LOW INSTRUMENT AIR PRESSURE - L - PT-150
PAL-300 (C63)		N/A	BOOL	1	245	6	LP300 PUMP PRESSURE LOSS - L - PT300
PAL-600 (C63)		N/A	BOOL	1	245	7	CP-600 PUMP PRESSURE LOSS - L - PT600
PAL-620 (C63)		N/A	BOOL	1	246	0	CP-620 PRESSURE LOSS - L - PT-620
PAL-910 (ISO22)		N/A	BOOL	1	246	1	LOW NITROGEN PRESSURE - L - PT-910
PALL-300 (C63)		N/A	BOOL	1	246	2	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300
PALL-600 (C63)		N/A	BOOL	1	246	3	CP- 600 CHANGEOVER UNFORESEEN - LL - PT-600
PALL-620 (C63)		N/A	BOOL	1	246	4	CP-620 CHANGEOVER UNFORESEEN - LL - PT-620
PALL-1001 (C63)		N/A	BOOL	1	246	5	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT-1001
PALL-1002 (C63)		N/A	BOOL	1	246	6	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002
PALL-1003 (C63)		N/A	BOOL	1	246	7	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003

PALL-1004 (C63)		N/A	BOOL	1	247	0	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004
PALL-1005 (C63)		N/A	BOOL	1	247	1	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005
PALL-1006 (C63)		N/A	BOOL	1	247	2	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006
PDAH-001 (ISO22)		N/A	BOOL	1	247	3	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610
PDAH-610 (ISO22)		N/A	BOOL	1	247	4	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610
PDAH-630 (ISO22)		N/A	BOOL	1	247	5	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630
PDAL-001 (ISO22)		N/A	BOOL	1	247	6	REVERSE DIFFERENTIAL PRESSURE - L - PT630-PT610
TA 60.1 H		N/A	BOOL	1	247	7	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1
TA 60.1 L		N/A	BOOL	1	248	0	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1
TA 60.2 H		N/A	BOOL	1	248	1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2
TA 60.2 L		N/A	BOOL	1	248	2	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2
TA 61.1 H		N/A	BOOL	1	248	3	DEOXO TOWER 61, GAS UTLET TEMPERATURE HIGH - H - TT 61.1
TA 64.5 H		N/A	BOOL	1	248	4	Température liquide de refroidissement sécheur 64A TT 64.5 - H
TA 64.5 H A		N/A	BOOL	1	248	5	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5
TA 64.5 H R		N/A	BOOL	1	248	6	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5
TA 64.5 L		N/A	BOOL	1	248	7	Température bas sécheur 64A régénération TT 64.5 - L
TA 64.6 H A		N/A	BOOL	1	249	0	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6
TA 64.6 H R		N/A	BOOL	1	249	1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6
TA 64.6 L		N/A	BOOL	1	249	2	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6
TA 64.7 H		N/A	BOOL	1	249	3	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7
TA 64.7 H A		N/A	BOOL	1	249	4	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7
TA 64.7 H R		N/A	BOOL	1	249	5	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7
TA 64.7 L		N/A	BOOL	1	249	6	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7
TA 64.8 H A		N/A	BOOL	1	249	7	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8
TA 64.8 H R		N/A	BOOL	1	250	0	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8
TA 64.8 L		N/A	BOOL	1	250	1	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8
TAH-601A (ISO22)		N/A	BOOL	1	250	2	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601A
TAH-601B (ISO22)		N/A	BOOL	1	250	3	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601B
TAH-601C (ISO22)		N/A	BOOL	1	250	4	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601C
TAH-601D (ISO22)		N/A	BOOL	1	250	5	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601D
TAH-601E (ISO22)		N/A	BOOL	1	250	6	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601E
TAH-601F (ISO22)		N/A	BOOL	1	250	7	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601F
TAH-601G (ISO22)		N/A	BOOL	1	251	0	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601G
TAH-601H (ISO22)		N/A	BOOL	1	251	1	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601H
TAHH-1001 (C63)		N/A	BOOL	1	251	2	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001
TAHH-1002 (C63)		N/A	BOOL	1	251	3	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002
TAHH-1003 (C63)		N/A	BOOL	1	251	4	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003
TAHH-1004 (C63)		N/A	BOOL	1	251	5	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004
TAHH-1005 (C63)		N/A	BOOL	1	251	6	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005
TAHH-1006 (C63)		N/A	BOOL	1	251	7	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006
TAL-601A (ISO22)		N/A	BOOL	1	252	0	ANODE TEMPERATURE LOW - L - TT-601A
TAL-601B (ISO22)		N/A	BOOL	1	252	1	ANODE TEMPERATURE LOW - L - TT-601B
TAL-601C (ISO22)		N/A	BOOL	1	252	2	ANODE TEMPERATURE LOW - L - TT-601C
TAL-601D (ISO22)		N/A	BOOL	1	252	3	ANODE TEMPERATURE LOW - L - TT-601D
TAL-601E (ISO22)		N/A	BOOL	1	252	4	ANODE TEMPERATURE LOW - L - TT-601E
TAL-601F (ISO22)		N/A	BOOL	1	252	5	ANODE TEMPERATURE LOW - L - TT-601F
TAL-601G (ISO22)		N/A	BOOL	1	252	6	ANODE TEMPERATURE LOW - L - TT-601G
TAL-601H (ISO22)		N/A	BOOL	1	252	7	ANODE TEMPERATURE LOW - L - TT-601H
TAL-1003 (ISO22)		N/A	BOOL	1	253	0	AMBIENT TEMPERATURE LOW - L - TT-1003
TALL-600 (ISO22)		N/A	BOOL	1	253	1	ANODE TEMPERATURE VERY LOW - LL - TT-600
TALL-601A (ISO22)		N/A	BOOL	1	253	2	ANODE TEMPERATURE VERY LOW - LL - TT-601A
TALL-601B (ISO22)		N/A	BOOL	1	253	3	ANODE TEMPERATURE VERY LOW - LL - TT-601B
TALL-601C (ISO22)		N/A	BOOL	1	253	4	ANODE TEMPERATURE VERY LOW - LL - TT-601C
TALL-601D (ISO22)		N/A	BOOL	1	253	5	ANODE TEMPERATURE VERY LOW - LL - TT-601D
TALL-601E (ISO22)		N/A	BOOL	1	253	6	ANODE TEMPERATURE VERY LOW - LL - TT-601E.
TALL-601F (ISO22)		N/A	BOOL	1	253	7	ANODE TEMPERATURE VERY LOW - LL - TT-601F.
TALL-601G (ISO22)		N/A	BOOL	1	254	0	ANODE TEMPERATURE VERY LOW - LL - TT-601G.
TALL-601H (ISO22)		N/A	BOOL	1	254	1	ANODE TEMPERATURE VERY LOW - LL - TT-601H
TALL-620 (ISO22)		N/A	BOOL	1	254	2	ANODE TEMPERATURE VERY LOW - LL - TT-620
TALL-1001 (C63)		N/A	BOOL	1	254	3	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001
TALL-1002 (C63)		N/A	BOOL	1	254	4	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002
TALL-1003 (C63)		N/A	BOOL	1	254	5	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003
TALL-1005 (C63)		N/A	BOOL	1	254	6	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005
TALL-1006 (C63)		N/A	BOOL	1	254	7	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006
TALL-1003 (ISO22)		N/A	BOOL	1	255	0	AMBIENT TEMPERATURE VERY LOW - LL - TT-1004
TDAH-600 (ISO22)		N/A	BOOL	1	255	1	ANODE DT HIGH - H - TDY-600
TDAL-600 (ISO22)		N/A	BOOL	1	255	2	ANODE DT LOW - L - TDY-600
TSAHH-621A (ISO22)		N/A	BOOL	1	255	3	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A
TSAHH-621B (ISO22)		N/A	BOOL	1	255	4	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B
VAH-001 (ISO22)		N/A	BOOL	1	255	5	STACK-001-008 VERY HIGH CELL VOLTAGE - H - PCA-001
VAH-101 (C63)		N/A	BOOL	1	255	6	REC-001 HIGH VOLTAGE - H - VM-101
VAH-102 (C63)		N/A	BOOL	1	255	7	REC-002 HIGH VOLTAGE - H - VM-102
VAL-001 (ISO22)		N/A	BOOL	1	256	0	STACK-001 LOW CELL VOLTAGE - L - PCA-001
YAH-600 (ISO22)		N/A	BOOL	1	256	1	CONDUCTIVITE ELEVEE CT600 - H
YAH-620 (ISO22)		N/A	BOOL	1	256	2	CONDUCTIVITE ELEVEE CT620 - H
SCA-300A (C63)		N/A	BOOL	1	256	3	ERROR VSD LP-300A - ERR - VAR-300A
SCA-300B (C63)		N/A	BOOL	1	256	4	ERROR VSD LP-300B - ERR - VAR-300B
SCA-600A		N/A	BOOL	1	256	5	ERROR VSD CP-600A - ERR - VAR-600A
SCA-600B		N/A	BOOL	1	256	6	ERROR VSD CP-600B - ERR - VAR-600B
SCA-620A		N/A	BOOL	1	256	7	ERROR VSD CP-620A - ERR - VAR-620A
SCA-620B		N/A	BOOL	1	257	0	ERROR VSD CP-620B - ERR - VAR-620B
CAHH-300 (C63)		N/A	BOOL	1	257	1	VERY HIGH CONDUCTIVITY LP300 - HH
AQA-200 (C63)		N/A	BOOL	1	257	2	DRY COOLER FAULT - ERR - DC-200
AQA-201 (C63)		N/A	BOOL	1	257	3	DRY COOLER FAULT - ERR - DC-201
AQA-400 (C63)		N/A	BOOL	1	257	4	WATER CHILLER DEFAULT - ERR - WC-400
AQA-401 (C63)		N/A	BOOL	1	257	5	WATER CHILLER DEFAULT - ERR - WC-401
JGA-400 (C63)		N/A	BOOL	1	257	6	BREAKER WC-400 - CHILLER 1 - 102QM5
JGA-401 (C63)		N/A	BOOL	1	257	7	BREAKER WC-401 - CHILLER 2 - 102QM7
JGA-012 (C63)		N/A	BOOL	1	258	0	BREAKER DC ALIM1 24VDC - 130QF1
JGA-013 (C63)		N/A	BOOL	1	258	1	BREAKER DC ALIM2 24VDC - 130QF3
AQA-008 (ISO22)		N/A	BOOL	1	258	2	LOSS OF COMMUNICATION CAN/PN001 - ERR
AQA-009 (ISO22)		N/A	BOOL	1	258	3	LOSS OF COMMUNICATION CAN/PN002 - ERR
AQA-010 (ISO22)		N/A	BOOL	1	258	4	LOSS OF COMMUNICATION CAN/PN003 - ERR
AQA-011 (ISO22)		N/A	BOOL	1	258	5	LOSS OF COMMUNICATION CAN/PN004 - ERR
AQA-012 (ISO22)		N/A	BOOL	1	258	6	LOSS OF COMMUNICATION CAN/PN005 - ERR
AQA-013 (ISO22)		N/A	BOOL	1	258	7	LOSS OF COMMUNICATION CAN/PN006 - ERR
AQA-014 (ISO22)		N/A	BOOL	1	259	0	LOSS OF COMMUNICATION CAN/PN007 - ERR
AQA-015 (ISO22)		N/A	BOOL	1	259	1	LOSS OF COMMUNICATION CAN/PN008 - ERR
AQA-016 (ISO22)		N/A	BOOL	1	259	2	LOSS OF COMMUNICATION PQ001 - ERR
AQA-017 (ISO22)		N/A	BOOL	1	259	3	LOSS OF COMMUNICATION PQ002 - ERR

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VENDOR DOCUMENT REVIEW

Reviewed by	Position
Mohamed HAJI	Eelctrical Engineer

Accepted/Reviewed without Comments. No further revision. Work may proceed.	CODE 1	☑
Accepted/Reviewed with Comments. Revise and resubmit. Work may proceed.	CODE 2	☐
Rejected. Revise and resubmit. Work may not proceed.	CODE 3	☐
Received but not reviewed.	CODE 4	☐

ELOGEN acceptance in no way relieves the duty of the supplier to meet the Purchase Order requirements.

Revision	Description	Prepared by	Date	Approved by	Date
02	AS BUILT	F.MORTIER	26/09/2024	A ADAMOU	26/09/2024
01	UPDATED	F.MORTIER	28/11/2023	JP CHOVET	28/11/2023
00	FIRST ISSUE	C. DANIEL	09/11/2023	JP CHOVET	09/11/2023

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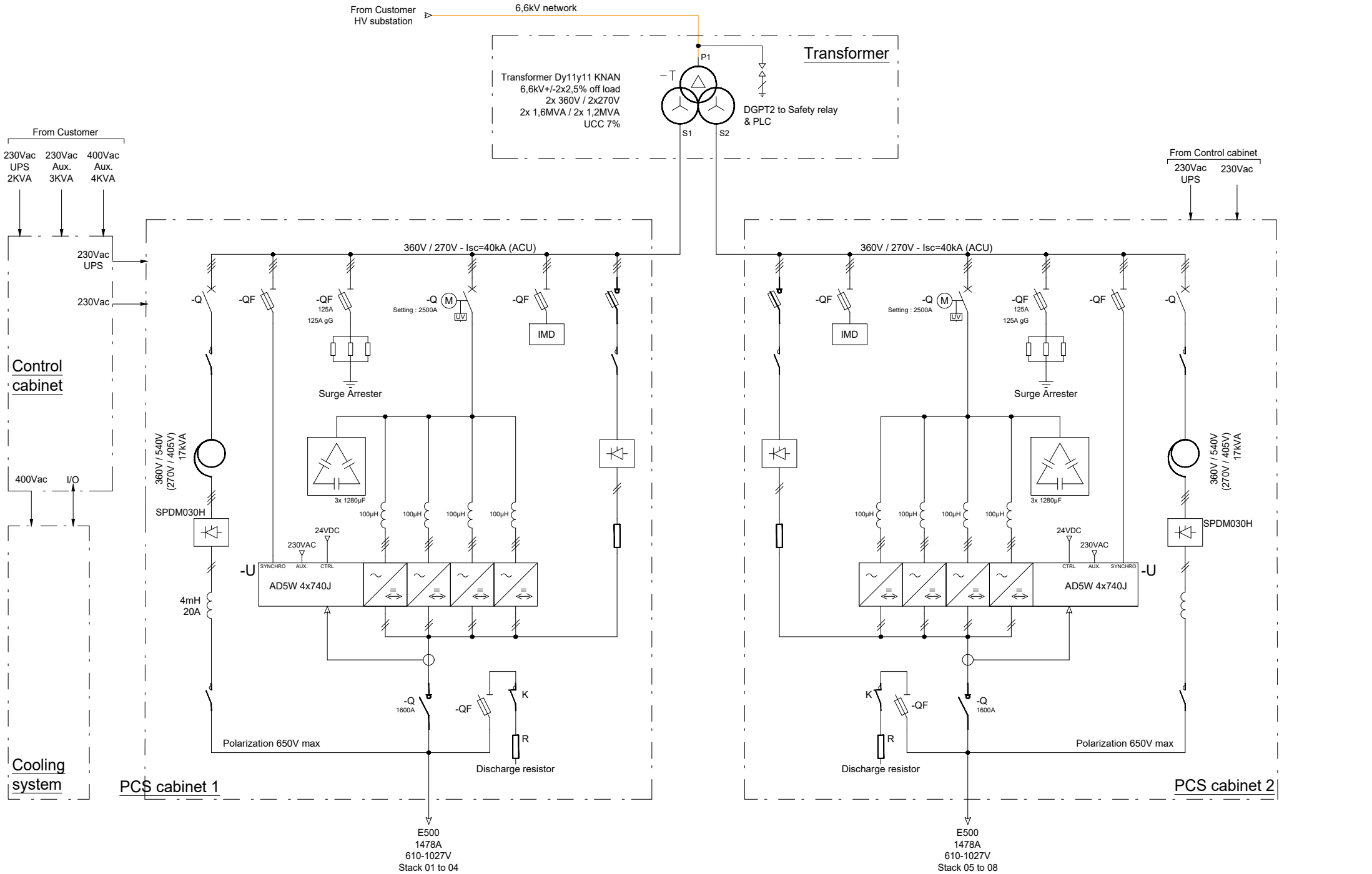
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8 AV. DU PARANA
91940 LES ULIS
FRANCE

C63 – 2,5MW Transformer rectifier for E500 electrolyser 8934 – ELOGEN

NIDEC document reference:	**Single Line Diagram**
8934SLD01	
CUSTOMER document reference:	
C63-NID-ELO-SLD01	

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REV.	DATE	MODIFICATION	DES.
02	26/09/2024	AS BUILT	NIDEC
01	28/11/2023	UPDATED	NIDEC
00	09/11/2023	FIRST ISSUE	NIDEC

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N° Document :8934SLD01

N° Document :
C63–NID-ELO–SLD01

LOC.

C63 - 2,5 MW Transformer Rectifier for E500 Electrolyser
SINGLE LINE DIAGRAM

Sheet
001

Software Autocad

C63-QIX-NID-002

FAT TRANSFORMER NIDEC

01	*1st Issue*	*22-OCT-2024*	*NID*	*IDI*	*LDG*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Client Document Number	**ELO-INN-BPH-RPT-00019**

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Italy, Montebello Vicentino, October 4th , 2024

FACTORY ACCEPTANCE TEST – FINAL REPORT

Celme' order confirmation: **23/00084**
Customer order no: **600045206 Change 5**
Customer: **Nidec ASI S.A.S.**
Project name: **8934**
Transformer under tests:

Model: **TOD3176.001** Serial number: **60258**

T no.	*Sno*	*DESCRIPTION*	*Result*
1	60258	Separate source AC withstand voltage (AV)	passed
2	60258	Short duration induced AC withstand voltage (IVW)	passed
3	60258	Measurement of no-load loss and current	passed
4	60258	Measurement of no-load loss and current at 90 % and 110 % of rated voltage	measured
5	60258	Measurement of winding resistance	measured
6	60258	Measurement of short-circuit impedance and load loss	passed
7	60258	Measurement of voltage ratio and check of phase displacement	passed
8	60258	Auxiliaries: functionality	passed
9	60258	Dimensional Check / Overall Visual Check	passed

Test reviewed

10	60258	Check of core and frame insulation	done during production
11	60258	Fluid leak test under pressure	done during production

FAT outcome: ***SUCCESSFUL***

Attendees:

Company	*Name*	*Position*	*Date*	*Stamp / Signature*
Nidec ASI S.A.S	Aissata Adamou Hassane	Project Manager	04/10/2024	
ELOGEN	Mohamed HAJI	Electrical Engineer	04/10/2024	
ELOGEN	Hassan Hammami	Quality Engineer	04/10/2024	
CROSS WIND	Alberto Mambelli	Electrical Engineer	04/10/2024	
CROSS WIND	Matteo Zanellato	Construction Manager	04/10/2024	
celme	Chiara Vezzaro	Project Manager	04/10/2024	
celme	Luciano Gallina	EE	04/10/2024	

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Attached documents (index):

Doc	Sno	Description	Page no.
1	-	FACTORY ACCEPTANCE TEST – FINAL REPORT	1
2	-	Agenda	4
3	60258	Routine test report	5
4	60258	PEI & kPEI CALCULATION note	6
5	60258	Dimensional Check / Overall Visual on GA	7
6		Instruments list	11

To be noted: only the attached reports must be considered part of the official FAT report.
Any additional documents and/or pictures not agreed, are non-official.

25/09/2024 lg

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FAT AGENDA

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

Customer	**NIDEC ASI SA**
Customer PO	**600045206 Rev4 dated 05/09/2024**
Project name	**8934**
Celme Ref.	**23/00084**

LINE	XFMR	TEST*	DESCRIPTION	DATE	TIME BEGIN	TIME END
1	1	R	Separate source AC withstand voltage (AV) (11.1.2.1 e)	04/10/2024	08:30	09:00
2	1	R	Short duration induced AC withstand voltage (IVW) (11.1.2.1 e)	04/10/2024	09:00	09:30
3	1	R	Measurement of no-load loss and current (11.5)	04/10/2024	09:30	10:00
4	1	R	Measurement of winding resistance (11.2)	04/10/2024	10:00	10:30
5	1	R	Measurement of short-circuit impedance and load loss (11.4)	04/10/2024	10:30	11:30
6	1	R	Measurement of voltage ratio and check of phase displacement (11.3)	04/10/2024	11:30	12:00
7	1	R	Dimensional checking	04/10/2024	14:00	14:30
8	1	R	Auxiliaries: functionality	04/10/2024	14:30	15:00
9	1	-	Report issue, control, approvement, signature	04/10/2024	15:00	17:00
10	1	R	Fluid leak test under pressure (11.8): carried out during production (reviewed)	04/10/2024	15:00	17:00
11	1	R	Check of core and frame insulation (11.12): carried out during production; report available (reviewed)	04/10/2024	15:00	17:00

9:00 → 12:00
14:00 → 16:00

R= Routine; T= Type; S= Special

Xfmr	Type	Sno
1	TOD3176.001	60258

Rev. No	Date		Descritpion	Issued	Checked	Approved
1	24/09/2024		First issue	MZA	NMA	LGA

NOTE Program may change during FAT execution due to testing or production needs.

RR.24

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Test Report

Test performed according Standard:	CEI EN 60076	**Test Date:**	04/10/24	**Order N°:**	23/00084
Transformer type:	TOD3176.001	**Serial number :**	60258	**Customer:**	NIDEC ASI SA

Frequency [Hz]:	50	**Insulating oil:**	Natural ester Cargill FR3
Phases:	3	**Cooling:**	KNAN
Windings material:	Al	**Tap regulation:**	+2 / -2 x 2.5 %
Vector group:	Dy11y11		

Primary Windings	Power [kVA]	Voltage [V]	Current [A]
HV	3200	6600	279.9

Secondary Windings	Power [kVA]	Voltage [V]	Current [A]
LV2	1600	360	2566
LV3	1600	360	2566

INSULATION WITHSTAND TEST

Power frequency applied voltage

Winding	Test Voltage [kV]	Duration [s]
HV	20	60
LV2	3	60
LV3	3	60

Test result: PASSED

Induced voltage withstand test

Volt. Source [V]: 720 f [Hz]: 150 t [s]: 40

Test result: PASSED

MEASUREMENT OF TURNS RATIO

6600 / 360 - 270 V

Tap regulation: +2 / -2 x 2.5 %

Polarity and phase relation tests :

D y 11 : **PASSED** D y 11 : **PASSED**

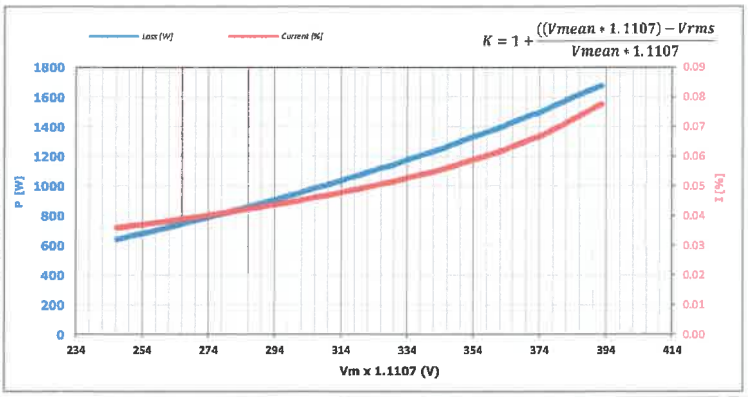
TAP Pos.	Theorical Ratio	Measured Ratio Phase U	Phase V	Phase W	Max Dev. %
1	33.34	33.41	33.42	33.41	0.225
2	32.55	32.58	32.58	32.57	0.110
3	31.75	31.74	31.75	31.74	-0.010
4	30.96	30.91	30.92	30.91	-0.140
5	30.17	30.08	30.08	30.08	-0.274
1	33.34	33.41	33.42	33.41	0.225
2	32.55	32.58	32.58	32.57	0.110
3	31.75	31.74	31.75	31.74	-0.010
4	30.96	30.91	30.92	30.91	-0.140
5	30.17	30.08	30.08	30.08	-0.274
1	44.45	44.54	44.56	44.53	0.220
2	43.40	43.43	43.44	43.42	0.110
3	42.34	42.32	42.33	42.31	-0.060
4	41.28	41.21	41.22	41.20	-0.190
5	40.22	40.10	40.11	40.09	-0.330
1	44.45	44.54	44.56	44.53	0.220
2	43.40	43.43	43.44	43.42	0.110
3	42.34	42.32	42.33	42.31	-0.070
4	41.28	41.21	41.22	41.20	-0.190
5	40.22	40.10	40.11	40.09	-0.330

MEASUREMENT OF NO-LOAD LOSS AND CURRENT

Energized winding: LV2 (360 V) f [Hz]: 50

	Phase U	Phase V	Phase W	Aver. Val.	Voltage [V]
V mean x 1.1107 [V]	359.2	361.6	359.2	360.0	357.2
Current [A]	3.3	2.5	3.4	3.1	K factor
Losses [W]	561.8	366.1	425.8		1.008

	90%	100%	110%
Losses [W]	1092.9	1364.1	1691.1
Current [%]	0.05	0.06	0.08



MEASUREMENT OF WINDINGS RESISTANCE

Test Temperature [°C]: 23.7

Tap Pos	1U-1V [Ω]	1V-1W [Ω]	1W-1U [Ω]
3	0.13084	0.13092	0.13085
	2U-2V [Ω]	2V-2W [Ω]	2W-2U [Ω]
LV2	0.00074	0.00074	0.00075
LV3	0.00079	0.00079	0.00082

MEASUREMENT OF SHORT-CIRCUIT IMPEDANCE AND LOAD LOSS

F [Hz]	Measured Current [A]				Uk [V]				Load Losses [W]				Kf		
	Iu	Iv	Iw	Im	Vuv	Vvw	Vwu	Vm	Wu	Wv	Ww	Wsum			
49.98	146.0	148.2	146.7	147.0	237.1	236.6	237.7	236.9	3625.1	3426.6	3112.0	10163.7	1.00	V at Ir [V]:	451.1
														V at Ir and fr = V at Ir x Kf [V]:	451.4
														Losses at In [W]:	36830.3

Ambient Temperature [°C]:	23.7	**Reference Temperature [°C]:**	75	**Component X [%]:**	6.74
Winding Resistance HV [Ω]:	0.13087	**Winding Resistance HV [Ω]:**	0.15786	**Component R [%]:**	1.32
Winding Resistance LV2 [Ω]:	0.000745	**Winding Resistance LV2 [Ω]:**	0.000898	**Impedance Z [%]**	6.87
Winding Resistance LV3 [Ω]:	0.000797	**Winding Resistance LV3 [Ω]:**	0.000962	**Power factor:**	0.19
Total Ohmic losses [W]:	30614.3	**Total Ohmic losses [W]:**	36929.2		
Additional losses [W]:	6216.0	**Additional losses [W]:**	5154.1		
Load losses [W]:	36830.3	**Load losses [W]:**	42083.2		

- Leak test with pressure: 15 kPa for 8 h: PASSED (Performed during production)
- Auxiliaries dielectric: 2 kV for 60": PASSED
- Functional check of auxiliaries and tap-changer: PASSED
- Core and frame insulation (§ 11.12): checked at 500V d.c. for 60s without breakdown: PASSED (Performed during production)

TEST SUMMARY

	No-load loss [W]	No-load current [%]	Load loss [W]	Short-circuit imp. 1-2/3 [%]	Short-circuit imp. 1-2 [%]	Short-circuit imp. 1-3 [%]
Guaranteed	1400	0.5	42000	7.00	7.00	7.00
Tollerance [%]	15	30	15	+0 -10	+0 -10	+0 -10
Measured	1364.1	0.06	42083.2	6.87	6.58	6.54
Difference [%]	-2.6	-88.0	0.2	-1.9	-6.1	-6.5

Test result: PASSED

THE CUSTOMER **TESTED BY**

COMPLIED WITH THE NORM

Celme S.r.l.

celme	TEST REPORT	23/00084 revision A/2

PEI & kPEI CALCULATION

Standard: EU 548/2014, EU 1783-2019

Transformer ref.

Des	*Value*	*Des*	*Value*
Rated power (Sn) [kVA]	**3200**	P.O.	**23/00084**
Primary Voltage (1U) [V]	6600 ±2x2,5	TRF sno	60258
Secondary (2u) [V]	360/270	Type	TOD3176.001
Tertiary (3u) [V]	360/270	Vector group	Dyn11y11

Formulae

$$PEI = 1 - \frac{2(P_0 + P_{c0} + P_{ck}(k_{PEI}))}{S_r\sqrt{\frac{P_0 + P_{c0} + P_{ck}(k_{PEI})}{P_k}}} = 1 - \frac{2}{S_r}\sqrt{(P_0 + P_{c0} + P_{ck}(k_{PEI}))P_k}\ (\%)$$

Where:

P_0	is the no load losses measured at rated voltage and rated frequency on the rated tap
P_{c0}	is the electrical power required by the cooling system for no load operation, derived from the type test measurements of the power taken by the fan and liquid pump motors (for ONAN and ONAN/ONAF cooling systems P_{c0} is always zero)
P_{ck} (k_{PEI})	is the electrical power required by the cooling system in addition to P_{c0} to operate at k_{PEI} times the rated load. P_{ck} is a function of the load. P_{ck} (k_{PEI}) is derived from the type test measurements of the power taken by the fan and liquid pump motors (for ONAN cooling systems P_{ck} is always zero).
P_k	is the measured load loss at rated current and rated frequency on the rated tap corrected to the reference temperature
S_r	is the rated power of the transformer or autotransformer on which P_k is based
k_{PEI}	is the load factor at which Peak Efficiency Index occurs';

Measuring & Calculation

Po [W]	Pco [W]	Pck(kPEI) [W]	Pk +75°C [W]	Ptot [W]	PEI meas [%]	Tier	PEI min [%]	kPEI
1364,1	0	0	42093	43457,1	99,526	2	99,519	0,18

Acceptance criteria: PEI meas > PEI min

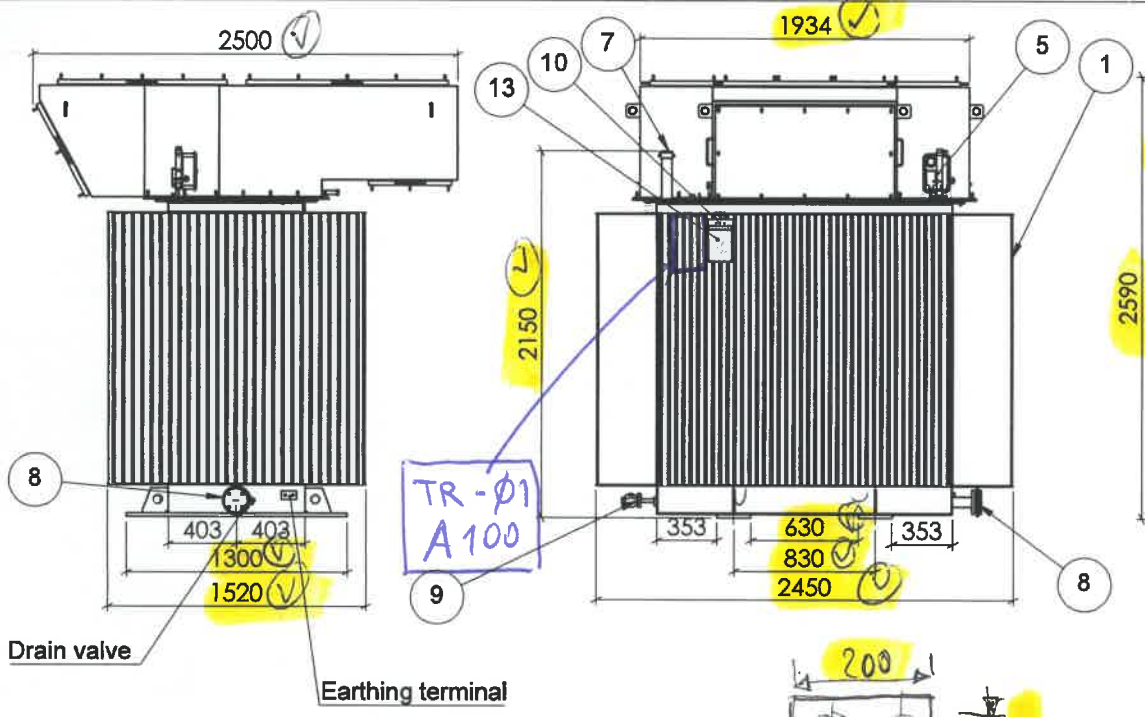
Result: **COMPLIANCE**

Note -

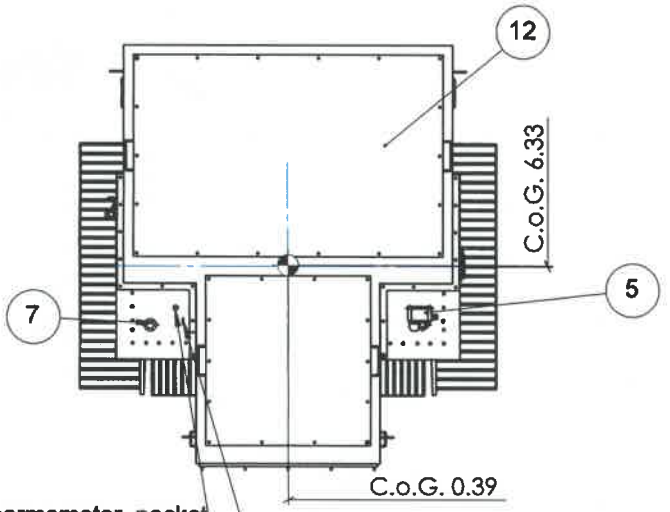
Instruments Celme Testing room

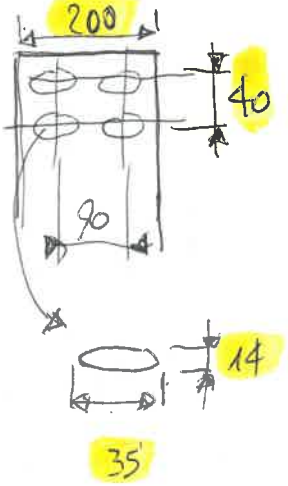
Test date	Technician	Checked	Approved
04/10/2024	MZA	LGA	LGA

FAT 09/10/24



Bushing	Voltage [V]
1U-1V-1W	6600
2u-2v-2w	360
2u'-2v'-2w'	270
3u-3v-3w	360
3u'-3v'-3w'	270





OIL MASS	2220 [kg]
DRY MASS	5880 [kg]
TOTAL MASS	8100 [kg]

Other data on technical data sheet

Pos.	Description	Q.ty
13	Rating Plate	1
12	Protection box AISI 304	1
11	Surge arrester	1
10	Standard rating plate support	1
9	Gate sample valve 1/2" DN15 PN6 lockable	1
8	Intercepting valve DN50 - PN6	1
7	Oil filling plug G2	1
6	Tap-changer type 24kV 120A 5 pos.	1
5	Integrated safety detector DGPT2 with PT100	1
4	Bushing type 1 kV - 3150A with flag - tinned	12
3	Bushing type EN 50180 36kV - 630A M400AR-3	3
2	Cover	1
1	Tank	1

C.o.G. = Center of Gravity

Tolerance in according with EN-22768 ISO-2768

From 0,5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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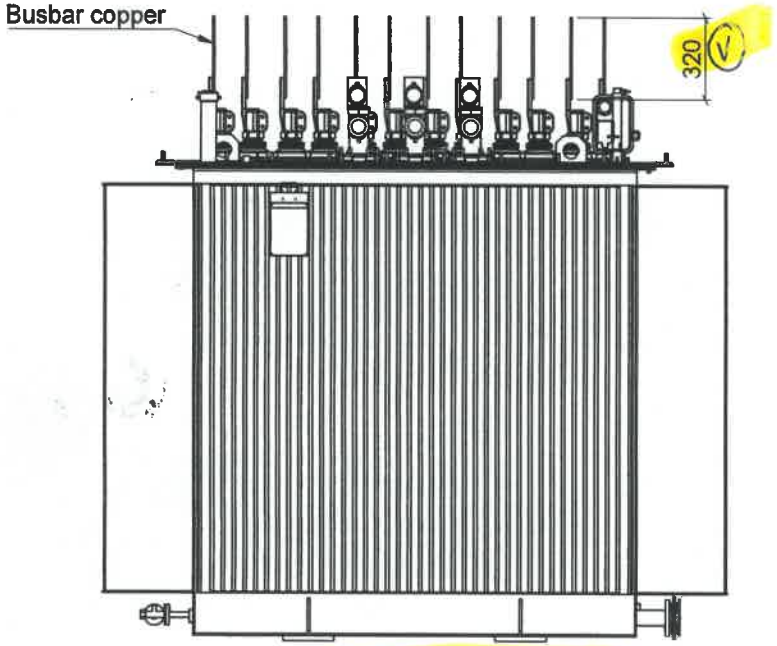
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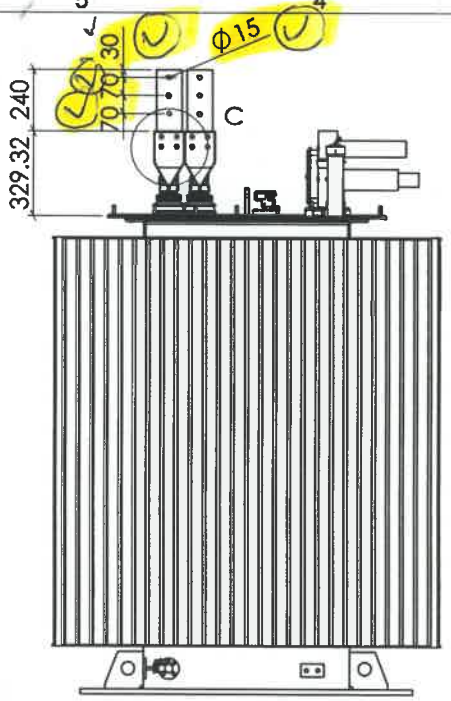
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A3	TOD3176.V001	D

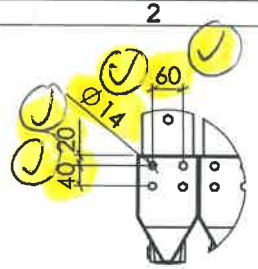
SCALE	TOT MASS	SHEET
1:30	8100 [kg]	1 / 4

PS.07

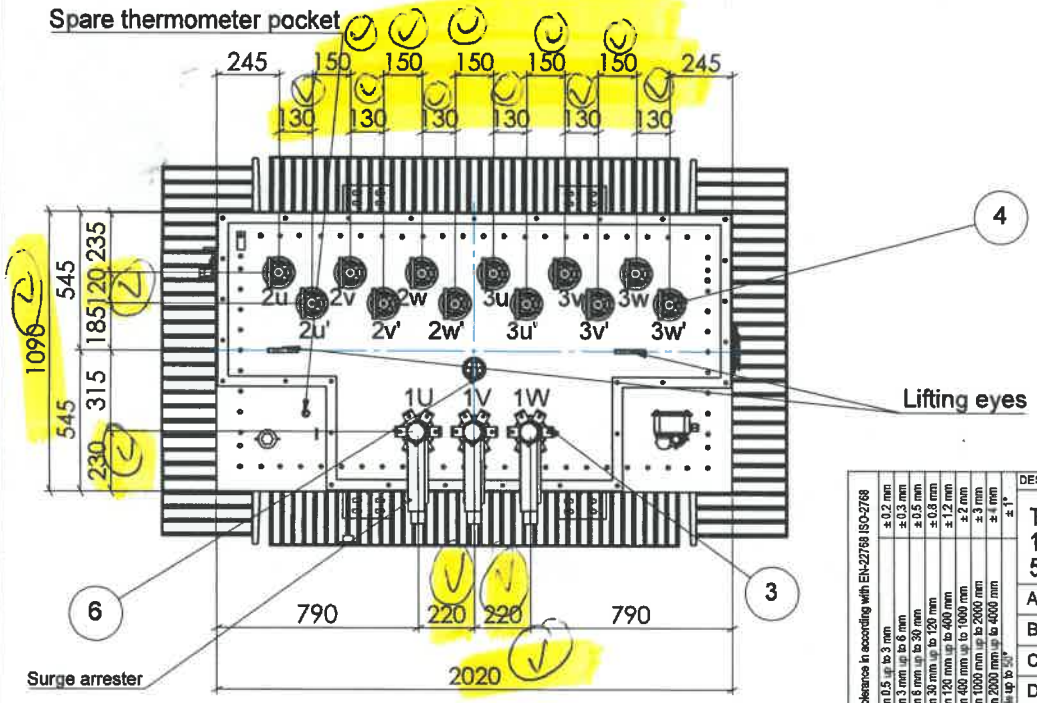
FAT 04/10/24







Detail C Scale 1:10



DGPT2 check

T1 : ✓

T2 : ✓

pressure : ✓

Gas : ✓

Pt100 : 109,7 Ω

pasted

Tolerance in according with EN-22768 ISO-2768	
From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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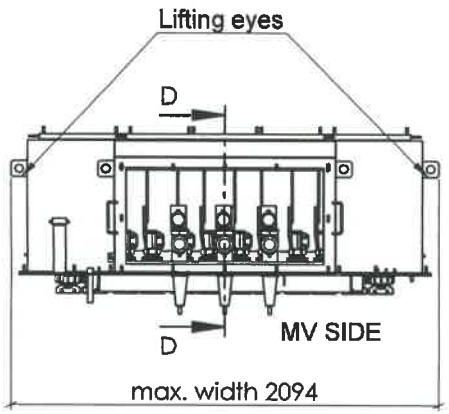
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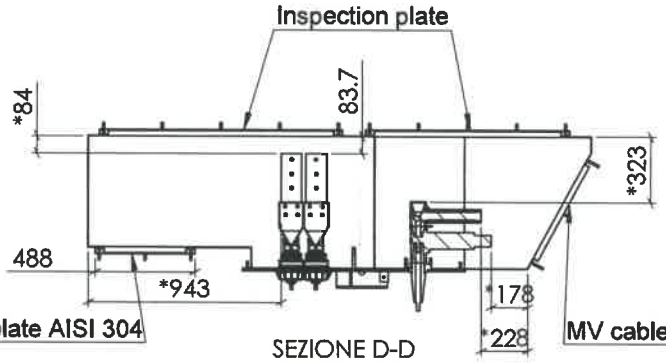
FORMAT	CODE	REV.
A3	TOD3176.V001	D

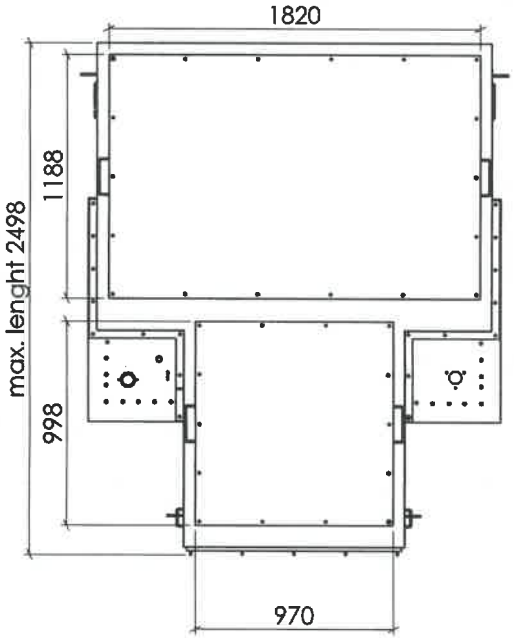
SCALE	TOT MASS	SHEET
1:20	8100 [kg]	2 / 4

PR08

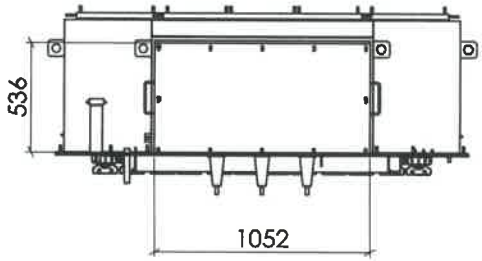
04/10/24

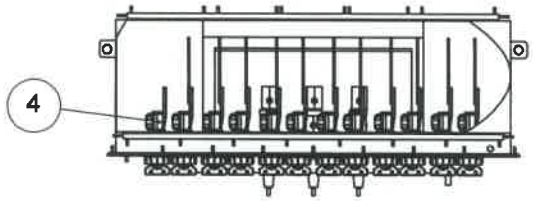






***= minimum air clearances**





Tolerance in according with EN-22768 ISO-2768	
From 0,5 up to 3 mm	± 0,2 mm
From 3 mm up to 6 mm	± 0,3 mm
From 6 mm up to 30 mm	± 0,5 mm
From 30 mm up to 120 mm	± 0,8 mm
From 120 mm up to 400 mm	± 1,2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
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C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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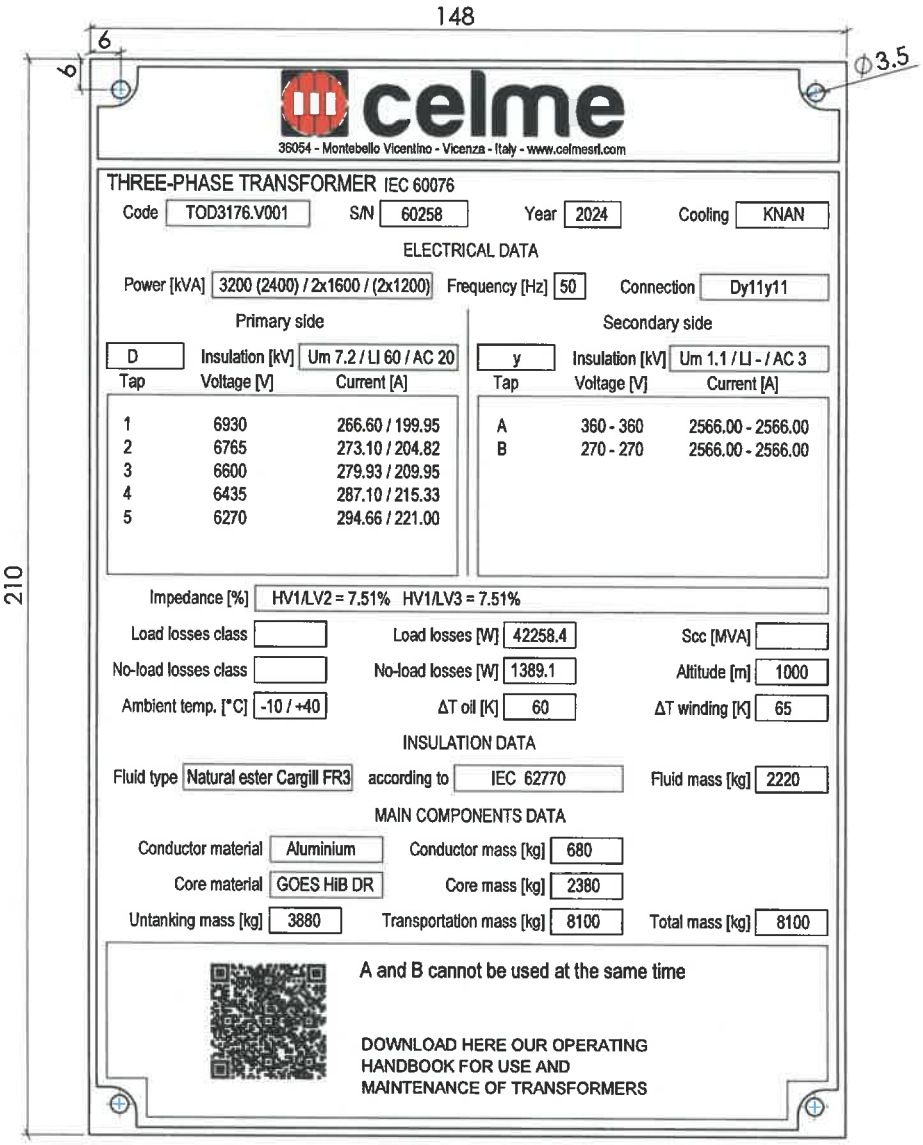
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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:25	8100 [kg]	3/4

PR 09

FAT 04/10/24



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THREE-PHASE TRANSFORMER IEC 60076

Code	S/N	Year	Cooling
TOD3176.V001	60258	2024	KNAN

ELECTRICAL DATA

Power [kVA]	Frequency [Hz]	Connection
3200 (2400) / 2x1600 / (2x1200)	50	Dy11y11

Primary side

D — Insulation [kV]: Um 7.2 / LI 60 / AC 20

Tap	Voltage [V]	Current [A]
1	6930	266.60 / 199.95
2	6765	273.10 / 204.82
3	6600	279.93 / 209.95
4	6435	287.10 / 215.33
5	6270	294.66 / 221.00

Secondary side

y — Insulation [kV]: Um 1.1 / LI - / AC 3

Tap	Voltage [V]	Current [A]
A	360 - 360	2566.00 - 2566.00
B	270 - 270	2566.00 - 2566.00

Impedance [%]			
HV1/LV2 = 7.51% HV1/LV3 = 7.51%			
Load losses class		Load losses [W]: 42258.4	Scc [MVA]
No-load losses class		No-load losses [W]: 1389.1	Altitude [m]: 1000
Ambient temp. [°C]: -10 / +40		ΔT oil [K]: 60	ΔT winding [K]: 65

INSULATION DATA

Fluid type	according to	Fluid mass [kg]
Natural ester Cargill FR3	IEC 62770	2220

MAIN COMPONENTS DATA

Conductor material	Aluminium	Conductor mass [kg]	680		
Core material	GOES HiB DR	Core mass [kg]	2380		
Untanking mass [kg]	3880	Transportation mass [kg]	8100	Total mass [kg]	8100

A and B cannot be used at the same time

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Material: stainless steel , thickness 1 mm

Black words/drawings on metallic background

Tolerance in according with EN-22768 ISO-2768	
From 0,5 up to 3 mm	± 0,2 mm
From 3 mm up to 6 mm	± 0,3 mm
From 6 mm up to 30 mm	± 0,5 mm
From 30 mm up to 120 mm	± 0,8 mm
From 120 mm up to 400 mm	± 1,2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
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C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:1	8100 [kg]	4 / 4

PR 10

Measurement equipment for testing room

Code	Description	Manufacturer	Model	Manufacturer SN	Calibration frequency (months)	Expiry Date	Last control date	Measuring range	Calibration certificate number
Instrument type : Tool certified by external Lab.									
SC064	Capacitive divider	A.M.E.	CC - 1 - 800 Kv	199 - DIV - AT	48	12/07/25	13/07/21	1 ÷ 800 kV	10215 D-K-19153-01-00 2021-07
SC068	Shunt	OFEL	-----	1503	60	22/07/25	23/07/20	15 A - 300 mv	4292
SC069	Shunt	OFEL	-----	1504	60	22/07/25	23/07/20	75 A - 300 mv	4293
SC080	Wattmeter threephase	FLUKE	NORMA 5000	C414145BA	12	05/03/25	05/03/24	0 ÷ 10 A / 0 ÷ 1000 V	101 Q339_2024_ACCR_EO
SC081	Digital multimeter	AGILENT	34411A	MY48005411	12	28/03/25	28/03/24	0 ÷ 750 V	LAT 019 74332
SC082	Digital multimeter	AGILENT	34401A	MY47053427	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74333
SC083	Digital multimeter	AGILENT	34401A	MY47052991	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74338
SC084	Digital multimeter	AGILENT	34401A	MY47053725	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74335
SC085	Digital multimeter	AGILENT	34401A	MY47053365	12	29/03/25	29/03/24	0 ÷ 10 V	LAT 019 74339
SC092	Wattmeter threephase	FLUKE	NORMA 5000	D208177BA	12	02/04/25	02/04/24	0 ÷ 10 A / 0 ÷ 1000 V	LAT 019 74343
SC112	Thermometer	DELTA OHM	HD2307.0	17020652	12	01/03/25	01/03/24	-200°C +650°C	101 M306_2024_ACCR_MC
SC115	Ratio meter	TETTEX	WA2293	188111	36	19/12/24	20/12/21	Rapporto 1 / X	ESTIC-BIL-CI-21011831
Instrument type : Tool certified by internal Lab.									
SV071	Voltage transformer	Wandler - WirGes	TV 7	548875	12	26/03/25	26/03/24	0 - 60000 V	Interno
SV100	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 24 - 50 KV	8951-02-01	12	11/01/25	12/01/24	30 - 60 / 5 A	Interno
SV101	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 24 - 50 KV	8951-02-02	12	11/01/25	12/01/24	30 - 60 / 5 A	Interno
SV102	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 24 - 50 KV	8951-02-03	12	11/01/25	12/01/24	30 - 60 / 5 A	Interno
SV103	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 7,2 - 20 KV	8951-03-01	12	11/01/25	12/01/24	50 - 100 - 200 / 5 A	Interno
SV104	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 7,2 - 20 KV	8951-03-02	12	11/01/25	12/01/24	50 - 100 - 200 / 5 A	Interno
SV105	Current transformer	TESAR	ABM22 CLASSE ISOLAMENTO 7,2 - 20KV	8951 - 03 - 03	12	11/01/25	12/01/24	50 - 100 - 200/ 5 A	Interno

CELME s.r.l.
Controllo Qualità

pg 11

25/09/2024 lg

celme
we make transformers

FAT AGENDA

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

Customer	NIDEC ASI SA
Customer PO	600045206 Rev4 dated 05/09/2024
Project name	8934
Celme Ref.	23/00084

LINE	XFMR	TEST*	DESCRIPTION	DATE	TIME BEGIN	TIME END
1	1	R	Separate source AC withstand voltage (AV) (11.1.2.1 e) ✓	04/10/2024	08:30	09:00
2	1	R	Short duration induced AC withstand voltage (IVW) (11.1.2.1 e) ✓	04/10/2024	09:00	09:30
3	1	R	Measurement of no-load loss and current (11.5) ✓	04/10/2024	09:30	10:00
4	1	R	Measurement of winding resistance (11.2) ✓	04/10/2024	10:00	10:30
5	1	R	Measurement of short-circuit impedance and load loss (11.4) ✓	04/10/2024	10:30	11:30
6	1	R	Measurement of voltage ratio and check of phase displacement (11.3) ✓	04/10/2024	11:30	12:00
7	1	R	Dimensional checking ✓	04/10/2024	14:00	14:30
8	1	R	Auxiliaries: functionality ✓	04/10/2024	14:30	15:00
9	1	-	Report issue, control, approvement, signature	04/10/2024	15:00	17:00
10	1	R	Fluid leak test under pressure (11.8): carried out during production (reviewed)	04/10/2024	15:00	17:00
11	1	R	Check of core and frame insulation (11.12): carried out during production; report available (reviewed)	04/10/2024	15:00	17:00

*R= Routine; T= Type; S= Special

Xfmr	Type	Sno
1	TOD3176.001	60258

Rev. No	Date		Descritpion	MZA Issued	NMA Checked	LGA Approved
1	24/09/2024		First issue			

NOTE Program may change during FAT execution due to testing or production needs.

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CROSSED ND
A. MALBEZIN
04/10/2024

Elogen.
N. Hajji
04/10/2024

ELOGEN
H. HATTABI
04/10/2024

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Fax +39 0444.440191
Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

NIDEC
A.H. Aissata
04/10/2024

celme

via Ca' Sordis 30/32
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Web: celmesrl.com

Test Procedure

Mod 06 13 -F

TP_23_00084

revision A-1

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Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

09/10/24

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

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CROSSUNO
A. MAMBELLI
04/10/2024

Elogen
N. Haji
04/10/2024

ELOGEN
H. HAMMAMI
04/10/2024 8934

NIDEC
A. ADAMOU
04/10/2024

Rev.	Date	Prepared	Checked	Notes
1	2024/09/25	N.Marcazzan	L.Gallina	First issue

Revision index

INDEX

Routine

1	Auxiliaries		p. 3
2	Separate source AC withstand voltage (AV) (11.1.2.1 e)		p. 4
3	Short duration induced AC withstand voltage (IVW) (11.1.2.1 e)		p. 5
4	Measurement of voltage ratio and check of phase displacement (11.3)		p. 6
5	Measurement of winding resistance (11.2)		p. 7
6	Measurement of short-circuit impedance and load loss (11.4)		p. 8
7	Measurement of no-load loss and current (11.5)		p. 9
8	Check of core and frame insulation (11.12)	*	p. 10
9	Fluid leak test under pressure (11.8)	*	p. 11
10	Dimensional Check / Overall Visual Check		p. 12

* ***Carried out during production: available as review***

Note: Routine tests are performed on every transformer. Type, special and other tests are performed upon previous agreement between manufacturer and customer. Not all tests apply to every transformer type. Different arrangements and tolerances are possible upon previous agreement between manufacturer and customer.

Auxiliaries

Standard: IEC 60076-3 ed. 3.0 (2013-07)
Power transformers
Part 3: Insulation levels, dielectric tests and external clearances in air
§ 9

DGPT2+PT100

Surge arresters

A visual control of the placement of the auxiliaries is done, together with a functional check of the alarm and trip contacts and their respective cabling to the marshalling box.
In detail:
1. auxiliary dielectric and insulation resistance test (through relavant terminals on marshalling box); a test voltage of 2 kV is applied for 60 s between the auxiliaries' contacts and earth to verify the adequate insulation and protection.
2. auxiliary functionality (through relevant terminals on marshalling box);
3. accessories check;
4. Thermometer and WTI: calibration and setting on alarm and trip thresholds according to the references indicated on the general arrangement.

celme	Test Procedure	TP_23_00084 revision A-1

Separate source AC withstand voltage (AV) (11.1.2.1 e)

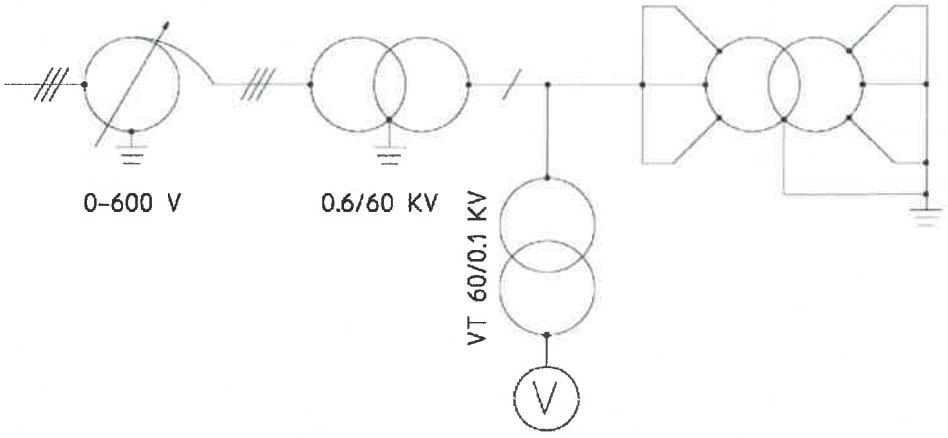
Standard: IEC 60076-3 ed. 3.0 (2013-07)
Power transformers
Part 3: Insulation levels, dielectric tests and external clearances in air
§ 11

Procedure: The separate source AC withstand test shall be made with single-phase alternating voltage as nearly as possible on **sine-wave form and not less than 80% of the rated frequency. The peak value of voltage divided by √2 shall be equal** to the test value. The full test voltage shall be applied for 60s between all terminals of the winding under test connected together and all terminals of the remaining windings, core, frame and tank connected together at earth. The test is performed on every winding according to its insulation level.

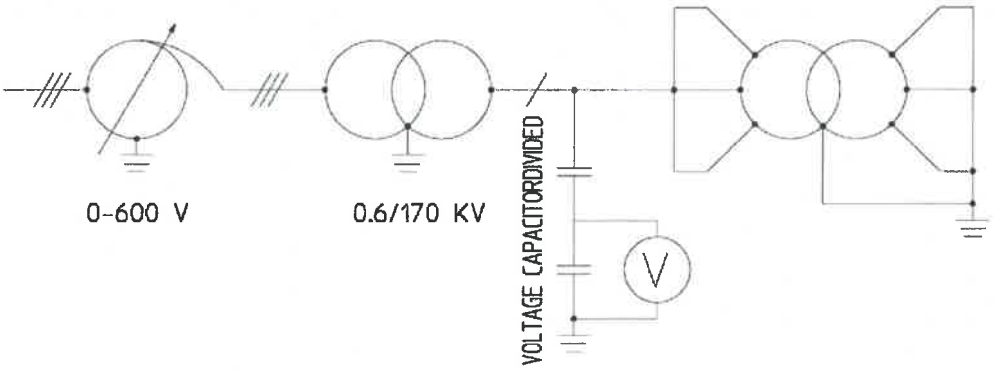
20KV at primary no intervention of protection OK
3KV at 1° secondary OK no intervention of protection
3KV at 2° secondary OK no intervention of protection

Wiring diagram

Variant 1:



Variant 2:



Results: /

celme	Test Procedure	TP_23_00084 revision A-1

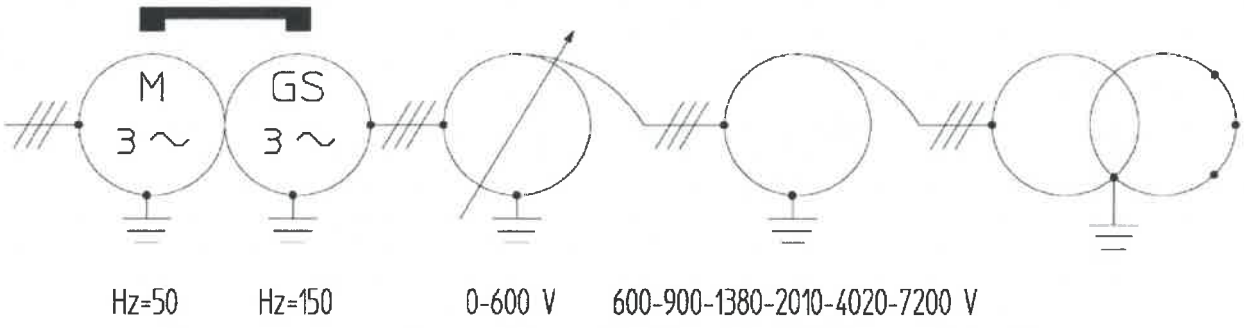
Short duration induced AC withstand voltage (IVW) (11.1.2.1 e)

Standard: IEC 60076-3 ed. 3.0 (2013-07)
Power transformers
Part 3: Insulation levels, dielectric tests and external clearances in air
§ 12.2

Procedure: An alternating voltage as close as possible to two times the nominal voltage shall be applied to the terminals of one winding of the transformer. The test time shall be 120x([rated frequency]/[test frequency]) but not less than 15s. The equipment in the test room provides a 150Hz voltage so the duration is: 120x50/150 = 40s.

720V @ 150Hz For 40sec
acceptance criteria: no discharge no intervention of protection
OK passed

Wiring diagram



Results: /

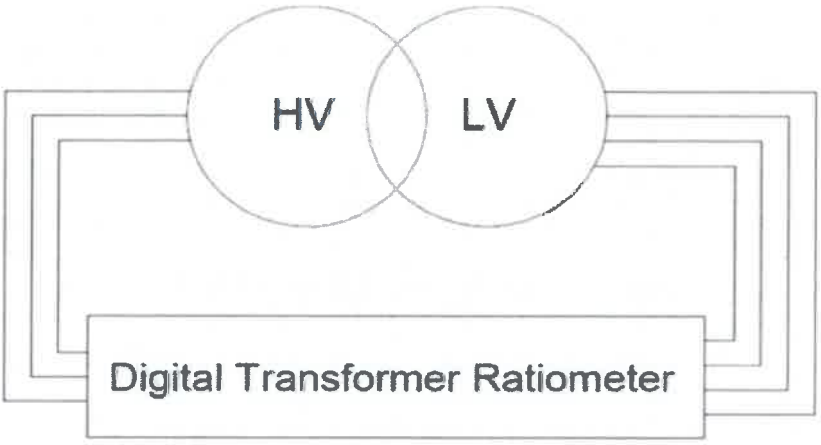
celme	Test Procedure	TP_23_00084 revision A-1

Measurement of voltage ratio and check of phase displacement (11.3)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.3

Procedure: The transformer is connected to a portable fully automated three phase turns ratio meter. The group and phase displacement is verified on every tap position.

Wiring diagram



N° 5 position Tap changer (2,5% each)
See Pos on general nameplate
acceptance criteria ±0,5° phase displacement.
±0,5% ratio deviation

Results: /

celme	Test Procedure	TP_23_00084 revision A-1

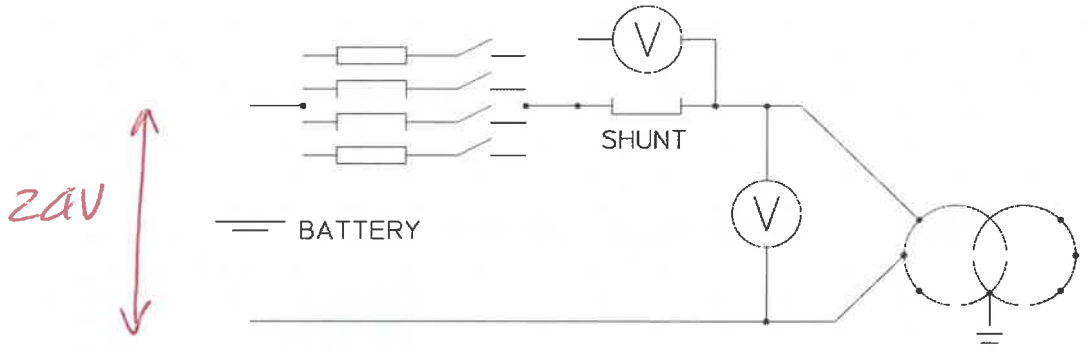
Measurement of winding resistance (11.2)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.2

Procedure: The transformer shall be at rest in a constant ambient temperature for at least 3 hours. The temperature of the winding is then deemed to be the same as the average oil temperature. A small current is feeded through the each pair of phases in the winding and the voltage is read. The mean value is the resistance of the winding. The value is then corrected to the reference temperature of 75°C.

Temperature 23,7 °C

Wiring diagram



Aluminium winding 225
↙ ref temperature
225 + 75 = 300

225 + 23,7 = 248,7
↖ measured temperature

300 / 248,7 = 1,2 coefficient for temperature compensation to 75°C

Results: /

celme	Test Procedure	TP_23_00084 revision A-1

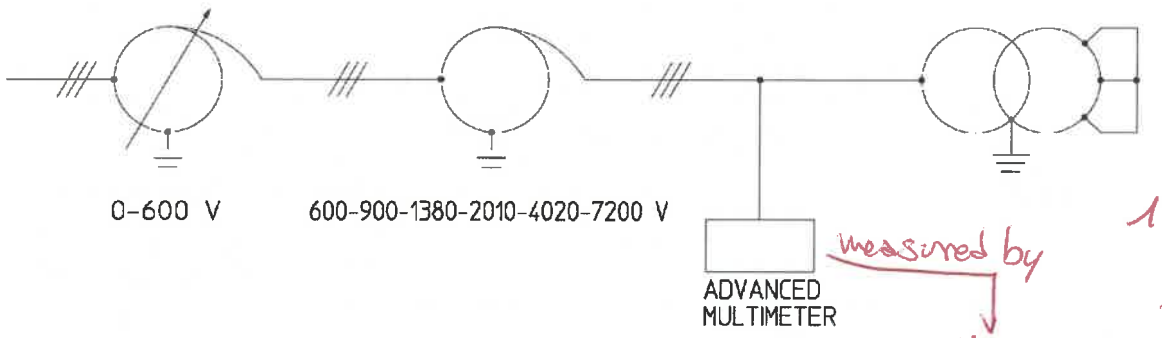
Measurement of short-circuit impedance and load loss (11.4)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.4

Procedure: The short-circuit impedance and load loss for a pair of windings shall be measured at rated frequency with a voltage applied to the terminals of one winding and the terminals of the other winding short-circuited. All other windings, if present, must be open-circuited. The applied current shall be between 50% and 100% of the rated current. The measurement must be made quickly to avoid any significant error coming from the heating of the windings.

$In' = 279,93A \rightarrow 50\% = 139,96A$

Wiring diagram



measured by

1° winding

100%

$\frac{Vcc}{Vn} \cdot 100 = Vcc\%$

6,866 V @100%

acceptance criteria impedance 7% ± 10%

load loss < 42000 ± 15% = 42083 V

be measured and then calculated by sw.

$P_k = P_J + P_{add} + P_{adde} \propto B \propto \frac{1}{T}$

winding $\propto RI^2 \propto T$

@ 50% 6,575%

2° Winding

Results: /

~~@ 100%~~

@ 50% 6,543 %

celme	Test Procedure	TP_23_00084 revision A-1

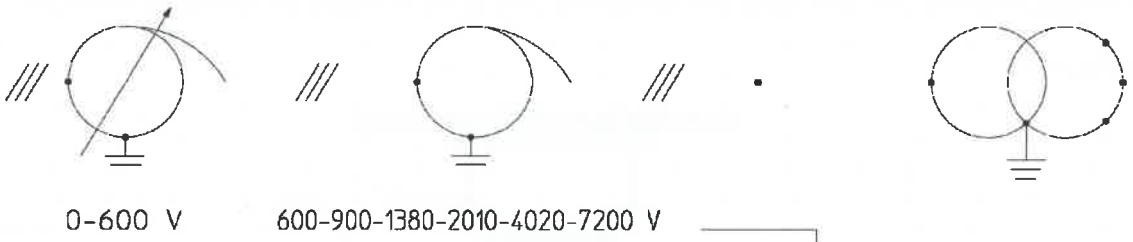
Measurement of no-load loss and current (11.5)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.5

Procedure: The no-load loss and the no-load current shall be measured on one of the windings at rated frequency and rated voltage. The remaining windings shall be left open-circuited. The winding that can be connected in open delta must be in closed. The transformer shall be approximately at factory ambient temperature. This test shall be performed at 90, 100 and 110% of rated voltage, measuring relevant corrent and losses.

3Ø

Wiring diagram



acceptance criteria

no load lossess < 1400W (+15%)

no load current < 0,5% + 30%
< 16,679 A

90% 1092
100% 1364 ← OK
110% 1694
< 2566 0,5% + 30%

0,65%
0,06 OK

Results: /

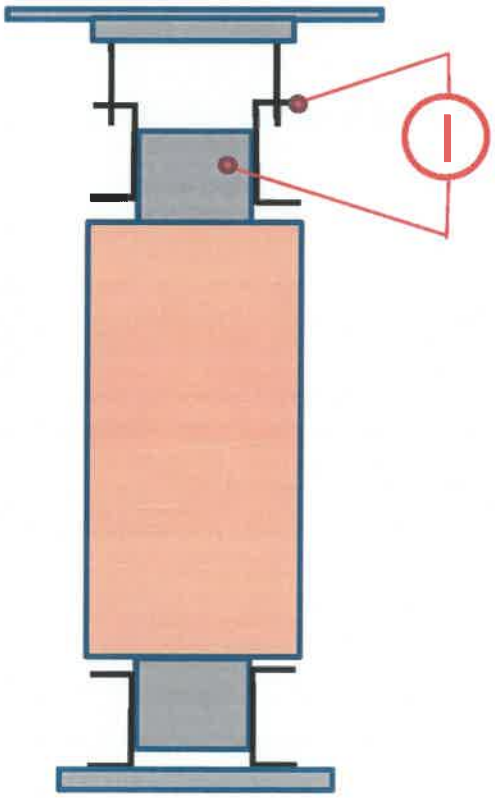
celme	Test Procedure	TP_23_00084 revision A-1

Check of core and frame insulation (11.12)

Standard: IEC 60076-1 ed3.0 (2011-04)
Power transformers
Part 1: General
§ 11.12

Procedure: This test shall be carried out on all liquid immersed transformers which incorporate insulation separating core and frame and/or frame and tank.
For transformers where the core and frame earth connections are not accessible when the transformer is liquid filled, the insulation shall be tested at 500 V d.c. for 1 min without breakdown before the active part is installed in the tank.
For transformers where the core and frame earth connections are accessible when the transformer is liquid filled, the insulation shall be tested at 2 500 V d.c. for 1 min without breakdown after the transformer is filled with liquid.

Wiring diagram



Results: /

celme	Test Procedure	TP_23_00084 revision A-1

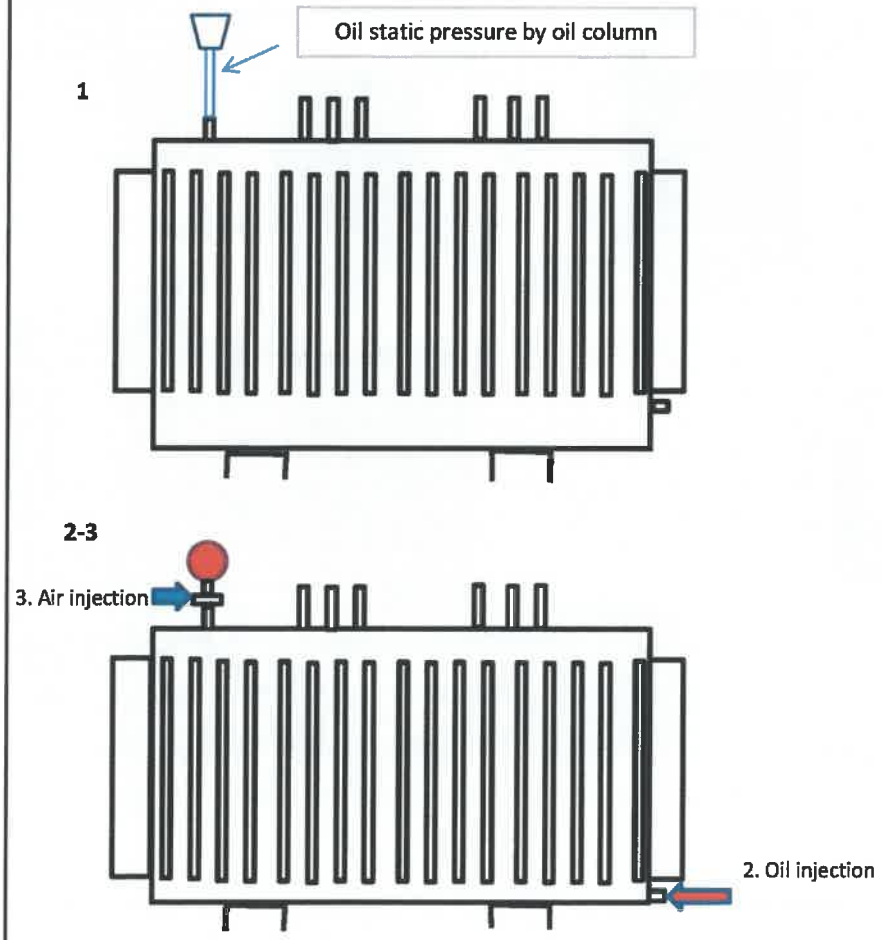
Fluid leak test under pressure (11.8)

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General
§ 11.8

Procedure: If not differently agreed between manufacturer and purchaser, a pressure (by either using a liquid column or gas pressure in the conservator) of at least 30 kPa is applied over the normal liquid pressure. This pressure shall be maintained for 24 hours for transformers greater than 20 MVA or 72,5 kV and 8 hours for transformers with lower rating and voltage. The test is not applicable to hermetic transformers.

Even if this type of transformer is hermetic type (thus not under this test), the agreement between parts is to apply a pressure of 30kPa for 8hs. Celme follows three methods alternately:
1. pipe estension full of oil over the filling pipe up to height at least of mm over the cover surface.
2. injection of oil by a pump controlled by a calibrated pressure gauge installed on the filling pipe.
3. Injection of air controlled by calibrated pressure gauge installed on the filling pipe.

Sketch of test



Results: /

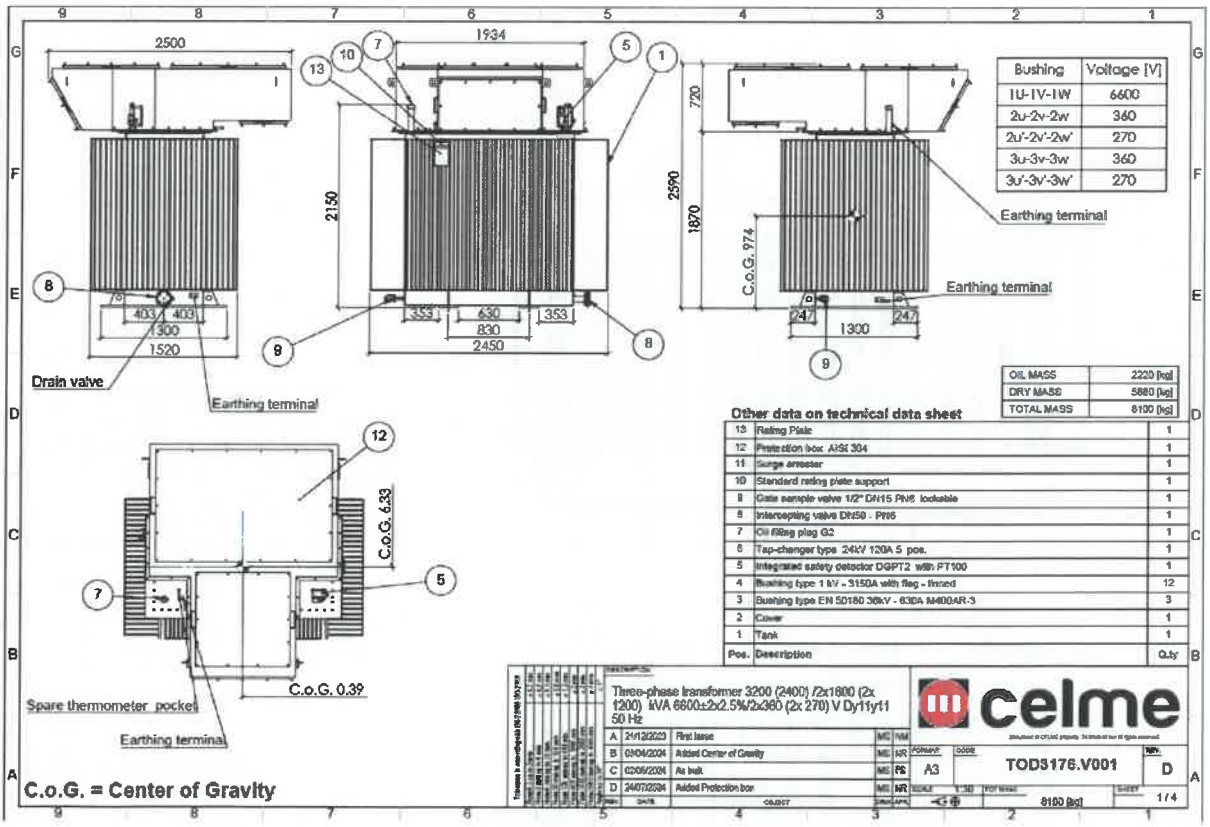
celme	Test Procedure	TP_23_00084 revision A-1

Dimensional Check / Overall Visual Check

Standard: IEC 60076-1 ed. 3.0 (2011-04)
Power transformers
Part 1: General

Procedure: General control is performed using the general arrangement drawing as reference. The tollerances are reported into the relevant drawnings.

Sketch



Results: /

CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 3 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

PUNCH-LIST REPORT

OUTSTANDING WORKING LIST (OWL) N°: N°: IR-02-C63-NIDEC	PROJECT C63	PURCHASE ORDER N°: BC0005845	REQUISITION N°: 1		SUPPLIER: ELOGEN	SUB-SUPPLIER: NIDEC ASI SAS CELME
INSPECTION DATE: 04/10/2024	MATERIAL / EQUIPMENT: 3.2MVA TRANSFORMER	PO ITEM / TAG N° : -	INSPECTION LOCATION : CELME Montebello Vicentino		REVISION: 0	PAGE : 1 / 2
OWL ITEM N°	DESCRIPTION OF ACTIVITY	TO BE DONE BEFORE SHIPMENT	TO BE DONE ON CONSTRUCTION SITE	ACTION		VERIFICATION OF THE CORRECTIVE ACTION DATE & SIGNATURE
				SUPPLIER	SUBSUPPLIER	
1	Celme to apply identification labels on HV and LV power terminals, according to general arrangement for their identification.	X			X	
2	Celme to install LV tinned terminations and extention busbars only in 360V power terminals, by using proper bolt, nuts to be torqued and marked, the remaining parts with their bolts and nuts shall be delivered as loose.	X			X	
3	Celme to install general nameplate with updated data from the FAT, on transformer before shipment, and update the general arragement accordinghly	X			X	
4	Celme to provide mounting procedure of Transformer and cable box with torque values, since they will be delivered separately.	X			X	
5	Celme to provide as loose touch up paint can.	X			X	

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Haji	NIDEC ASI SAS Mrs. Aissata Adamou CELME Mrs Chiara Vezzaro

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
This document does not relieve the Supplier of the responsibility of any possible defects and/or misfunctioning arising during the utilisation.

CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 4 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	**FORNITORE: ELOGEN** *Supplier:*	**COMMESSA: C63** *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	**No. Ordine: BC0005845** *P.O. No.:*	**OGGETTO: 2.5MW Rectifier** *Object:*	

PUNCH-LIST REPORT

OUTSTANDING WORKING LIST (OWL) N°: N°: IR-02-C63-NIDEC	**PROJECT** C63	**PURCHASE ORDER N°:** BC0005845	**REQUISITION N°: 1**	**SUPPLIER: ELOGEN**	**SUB-SUPPLIER: NIDEC ASI SAS CELME**
INSPECTION DATE: 04/10/2024	MATERIAL / EQUIPMENT: 3.2MVA TRANSFORMER	PO ITEM / TAG N° : -	INSPECTION LOCATION : CELME Montebello Vicentino	REVISION: 0	PAGE : 2 / 2

OWL ITEM N°	DESCRIPTION OF ACTIVITY	TO BE DONE BEFORE SHIPMENT	TO BE DONE ON CONSTRUCTION SITE	ACTION		VERIFICATION OF THE CORRECTIVE ACTION DATE & SIGNATURE
				SUPPLIER	SUBSUPPLIER	
6	Celme to provide stainless steel Tansformer's TAG plate, with project tag: TR-01 A100 close to general nameplate (HV left side).	X			X	

NEW INSPECTION VISIT TO BE SCHEDULED ☐ NO ADDITIONAL INSPECTION VISIT SCHEDULED ☐	INSPECTOR NAME: ALBERTO MAMBELLI DATE & VISA : 04/10/2024	SUBVENDOR NAME : AISSATA ADAMOU DATE – VISA & STAMP: 04/10/2024

Diffusion : Original → Final Dossier attached to the Inspection Release Note, Copy → TEPC DPTN & Vendor
(1) Project Reference – (2) Trigram from Vendor (*) – (3) Sequential Number per Vendor

L' INCARICATO / *The person in charge*	**IL FORNITORE** / *Supplier*	**IL SUBFORNITORE** / *Subsupplier*
CROSSWIND ***Mr. Alberto Mambelli***	**ELOGEN** **Mr Mohamed Haji**	**NIDEC ASI SAS Mrs. Aissata Adamou** **CELME Mrs Chiara Vezzaro**

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
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CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 2 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	FORNITORE: ELOGEN *Supplier:*	COMMESSA: C63 *Job:*	
SUBFORNITORE: NIDEC ASI SAS *Subsupplier:*	No. Ordine: BC0005845 *P.O. No.:*	OGGETTO: 2.5MW Rectifier *Object:*	

ATTIVITA' ESEGUITE / *Activities Carried Out*

Witnessed test of 3.2MVA Transfomer tag TR-01/A100 according to FAT agenda, and visual and dimensional inspection, according to test notification issued by ELOGEN, ref mail Andreia Vilarinho dated 26/09/2024.
At supplier workshop:
CELME Via Cà Sordis, 30, 36054 Montebello Vicentino VI, Italy.

Before the FAT CELME declare that all internal tests was carried out successfully without punches.

The FAT tests are carried out following the given agenda here attached IR-01-C63-CELME FAT AGENDA, and FAT test procedure IR-01-C63-CELME FAT PROCEDURE, in which are described the procedures to follow, and the acceptance criteria to be respected.

Here attached CELME FAT report ref no 23/00084_241004_FAT, as evidence of carried out tests and results.

Some punch-list items was raised, reference is made to the OWL no IR-02-C63-NIDEC here attached.

Celme informs that before the SAT he will provide the check list for installation.

The Goods are accepted by Elogen, the relevant release note it will be issued by Elogen to Nidec only after closing of punch-list verification, to be done before shipment (expected to be the next Wednesday 9th Thursady 10th October), by sending pictures which as to be reviewed by Nidec/Elogen.

Attachments:

1. **IR-01-C63-CELME FAT AGENDA;**
2. **IR-01-C63-CELME FAT PROCEDURE;**
3. **CELME FAT report: 23/00084_241004_FAT**
4. **OWL no IR-01-C63-CELME**
5. **CELME FAT RED LINE MARK UP 04/10/2024;**

L' INCARICATO / *The person in charge*	IL FORNITORE / *Supplier*	IL SUBFORNITORE / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	ELOGEN Mr Mohamed Hajji	NIDEC ASI SAS Mrs. Aissata Adamou CELME Mrs Chiara Vezzaro

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
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CROSSWIND	INSPECTION REPORT	Report No. IR-02-C63-NIDEC	SHEET 1 di 4
		Data 04/10/2024 *Date*	Rev. 0 *Rev.*
PROGETTO: ELECTROLIZER PACKAGE *Project:*	**FORNITORE: ELOGEN** *Supplier:*	**COMMESSA: C63** *Job:*	
SUBFORNITORE: *Subsupplier:* **NIDEC ASI SAS**	**No. Ordine: BC0005845** *P.O. No.:*	**OGGETTO:** *Object:* **2.5MW Rectifier**	

DESCRIZIONE DEL MATERIALE / *Material Description*

POSIZIONE *Item*	**QUANTITA'** *Quantity*	**DESCRIZIONE & TAG** *Description and Tag*	**TIPO DI ISPEZIONE** / *Kind of Inspection*	**ESITO** / *Result*
-	1	**3.2MVA Transformer tag TR-01/A100**	**Witnessed test of 3.2 MW Transformer tag TR-01. according to FAT agenda, and visual and dimentional inspection. At supplier workshop: CELME Via Cà Sordis, 30, 36054 Montebello Vicentino VI, Italy**	**Positive With punch-list items.**

DOCUMENTI APPLICABILI / *Applicable Documents*

TITOLO DOCUMENTO / *Document Title*	**NUMERO DOCUMENTO** / *Document Number*	**REVISIONE** / *Revision*	**STATO DOCUMENTO** / *Document Status*
Purchase Order	**BC0005845**	**00**	-
FAT agenda	-	**1**	**approved**
Quality Control Plan	**PFC02.2300084**	**A/1**	**For information**
Test procedure	**TP_23_00084**	**A-1**	**approved**
General arrangment drawing	**TOD3176.V001**	**D**	**approved**
Transformer datasheet	**TDS.TOD3176.V001**	**A-0**	**approved**

DISTRIBUZIONE A: / *Distribution to:*

☒**GESTIONE FORNITURE** / *Supply Management Department*	☒**CAPO COMMESSA** / *Project Manager*
☒**PRODUZIONE** / *Production*	☒**FORNITORE** / *Supplier*
☒**CONTROLLO QUALITA'** / *Quality Control*	☐**AMMINISTRAZIONE** / *Administration*
☒**MAGAZZINO** / *Warehouse*	☒**P.E.M.**

L' INCARICATO / *The person in charge*	**IL FORNITORE** / *Supplier*	**IL SUBFORNITORE** / *Subsupplier*
CROSSWIND *Mr. Alberto Mambelli*	**ELOGEN** Mr Mohamed Hajl	**NIDEC ASI SAS Mrs. Aissata Adamou** **CELME Mrs Chiara Vezzaro**

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Italy, Montebello Vicentino, October 10th , 2024

PUNCH LIST ACTIONS

Celme' order confirmation: **23/00084**
Customer order no: **600045206 Change 5**
Customer: **Nidec ASI S.A.S.**
Project name: **8934**

Model: **TOD3176.001** Serial number: **60258**

T no.	*DESCRIPTION*	*Pictures*	
1	Celme to apply identification labels on HV and LV power terminals, according to general arrangement for their identification.	23_00084_1	✓
2	Celme to install LV tinned terminations and extension busbars only in 360V power terminals, by using proper bolt, nuts to be torqued and marked, the remaining parts with their bolts and nuts shall be delivered as loose.	23_00084_2	✓
3	Celme to install general nameplate with updated data from the FAT, on transformer before shipment, and update the general arrangement accordingly	23_00084_3	✓
4	Celme to provide stainless steel Transformers TAG plate, with project tag: TR-01 A100 dose to general nameplate (HV Left side).	23_00084_3	✓
5	Celme to provide as lose **touch up paint can.**	23_00084_4	✓
6	Celme to provide mounting procedure of Transformer and cable box with torque values, since they will be delivered separately.		By 18/10

celme

via Ca' Sordis 30/32
IT-36054
Montebello Vic. (VI)

Tel: +39-0444-440254
Fax: +39-0444-440191
Web: celmesrl.com

Transformer Technical Datasheet

Mod 03 13 rev. F

TDS.TOD3176.V001
revision A/0

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Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

04/10/24

NIDEC
A. ADAMOU
04/10/2024

FAT COPPI
CROSSWIND
A. MAMBELLI
04/10/2024

Elogen.
N. Haji
04/10/2024

ELOGEN
H. HATTMATTI
04/10/2024

Nidec
All for dreams

Approved 13/12/23
J-P Chovet

Rev.	Date	Prepared	Checked	Notes
0	22/11/23	M.Sharma	N.Rossin	First issue

Revision index

celme	Transformer Technical Datasheet	TDS.TOD3176.V001 revision A/0

Three phase transformer according to IEC 60076 for installation in safe zone with the following features:

natural ester Cargill FR3 (according to IEC 62770)

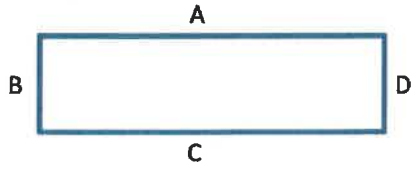
hermetic type (integral filling)

Type of load

The transformer is designed for continuous duty (THDi considered <3%)

Nominal ratings

Power 3,2 MVA KNAN



	Primary	Secondary
Power [MVA]	3.2/2.4	2 x 1.6/ 2 x 1.2
Rated voltage [V]	6600	2 x 360/ 2 x 270
Rated current [A]	279.93	2 x 2566
Material	AL	AL
Tap-changer	off-circuit	/
Taps	±2x2.5	/
Highest system voltage [kV]	7,2	1,1
Power frequency voltage [kV]	20	3
Impulse voltage [kV]	60	/
Bushing type	plug-in type - int. C 36kV/630A	porcelain 1kV/3150A
Bushing number	3	2 x 3 + 2 x 3
Bushing placement	cover side A	cover side C
Bushing protection	/	/

Electrical data

Frequency [Hz]	50	
Vector group	Dy11y11	
Impedance [%] @75 °C	7	(at Sn/2, 6600/360 V)
No load loss [W]	1400	
Load loss [W] @75 °C	42000	(at Sn/2, 6600/360 V)
Total loss [W] @75 °C	43400	(at Sn/2, 6600/360 V)
No load current [%]	0,5	
PEI [%]	99,52	

		Voltage drop				Efficiency			
Power factor		0,85	0,90	0,95	1,00	0,85	0,90	0,95	1,00
Load	1/4	1,19	1,05	0,86	0,34	99,41	99,44	99,47	99,50
	2/4	2,40	2,13	1,74	0,72	99,13	99,18	99,22	99,26
	3/4	3,63	3,22	2,65	1,12	98,79	98,85	98,91	98,97
	4/4	4,87	4,34	3,58	1,55	98,43	98,52	98,59	98,66

Environmental and working conditions

Minimum ambient temperature	-10 °C	
Maximum ambient temperature	40 °C	
Maximum installation altitude	1000 m	
Fluid temperature rise	60 K	
Winding temperature rise	65 K	
Corrosivity category	C5	durability: VH
Lp(A) @ 1m	75 dB(A)	

Mechanical data

Weights		Base
Fluid	2220 kg	Skid
Total	7830 kg	

Overall dimensions

Service conditions

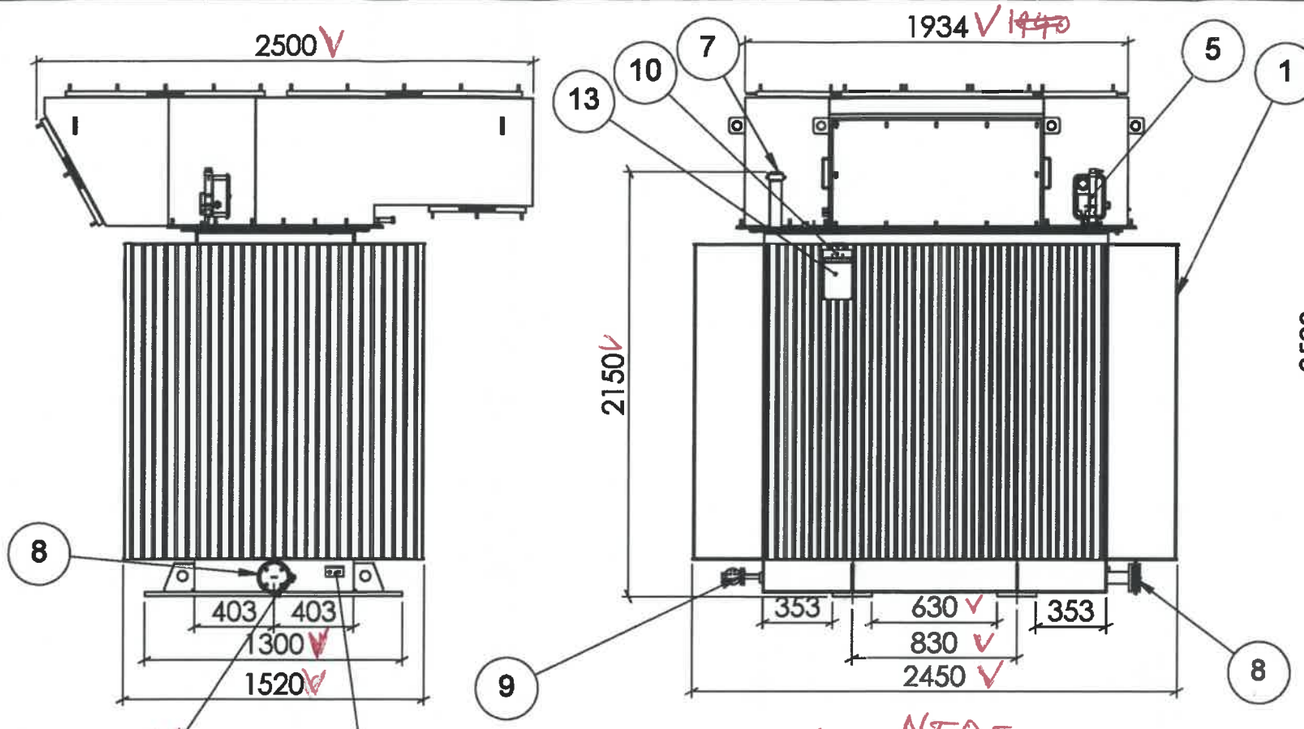
Lenght	2450 mm
Width	1520 mm
Height	2199 mm

Painting

The external protection is suitable for ambient C5. All the metallic surfaces are sandblasted Sa 2½. Tank is hot-dip galvanized (except for stainless steel parts). The paint thickness is 310µm. The color is RAL 7033.

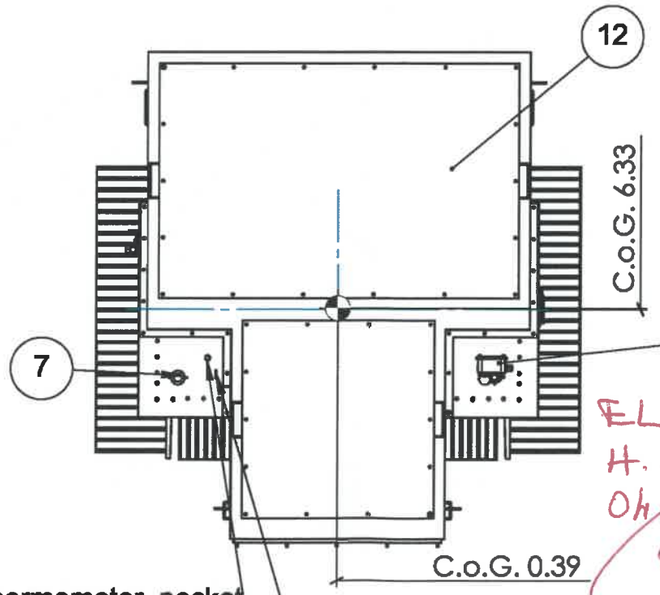
Fittings

1 x Rating plate
2 x Earthing plate
1 x Filling plug
1 x Drain valve
1 x Sampling valve
1 x Spare thermometer pocket
1 x Electrostatic shield
1 x DGPT2 (safety device for hermetic transformers) fitted with PT100
3 x Surge arrester (primary side) - supply as loose material



Bushing	Voltage [V]
1U-1V-1W	6600
2u-2v-2w	360
2u'-2v'-2w'	270
3u-3v-3w	360
3u'-3v'-3w'	270

OIL MASS	2220 [kg]
DRY MASS	5880 [kg]
TOTAL MASS	8100 [kg]



C.o.G. = Center of Gravity

NIDEC
A. Adamou
04/10/2024

Nidec
All for dreams

Approved 03/10/24
J-P Chovet

FAT COPY
CROSSWIND
A. MAMBELLI
04/10/2024

Elogen
D. Haji
04/10/2024

ELOGEN
H. HAJJAJI
04/10/2024

Other data on technical data sheet

Pos.	Description	Q.ty
13	Rating Plate	1
12	Protection box AISI 304	1
11	Surge arrester	1
10	Standard rating plate support	1
9	Gate sample valve 1/2" DN15 PN6 lockable	1
8	Intercepting valve DN50 - PN6	1
7	Oil filling plug G2	1
6	Tap-changer type 24kV 120A 5 pos.	1
5	Integrated safety detector DGPT2 with PT100	1
4	Bushing type 1 kV - 3150A with flag - tinned	12
3	Bushing type EN 50180 36kV - 630A M400AR-3	3
2	Cover	1
1	Tank	1

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Fax +39 0444 440191
Cod. Fisc. e P.IVA: 03331830244
Cod. SDI SUBM70N

04/10/24

Tolerance in according with EN-22768 ISO-2768

From 0,5 up to 3 mm	±0,2 mm
From 3 mm up to 6 mm	±0,3 mm
From 6 mm up to 30 mm	±0,5 mm
From 30 mm up to 120 mm	±0,8 mm
From 120 mm up to 400 mm	±1,2 mm
From 400 mm up to 1000 mm	±2 mm
From 1000 mm up to 2000 mm	±3 mm
From 2000 mm up to 4000 mm	±4 mm
Angle up to 50°	±1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

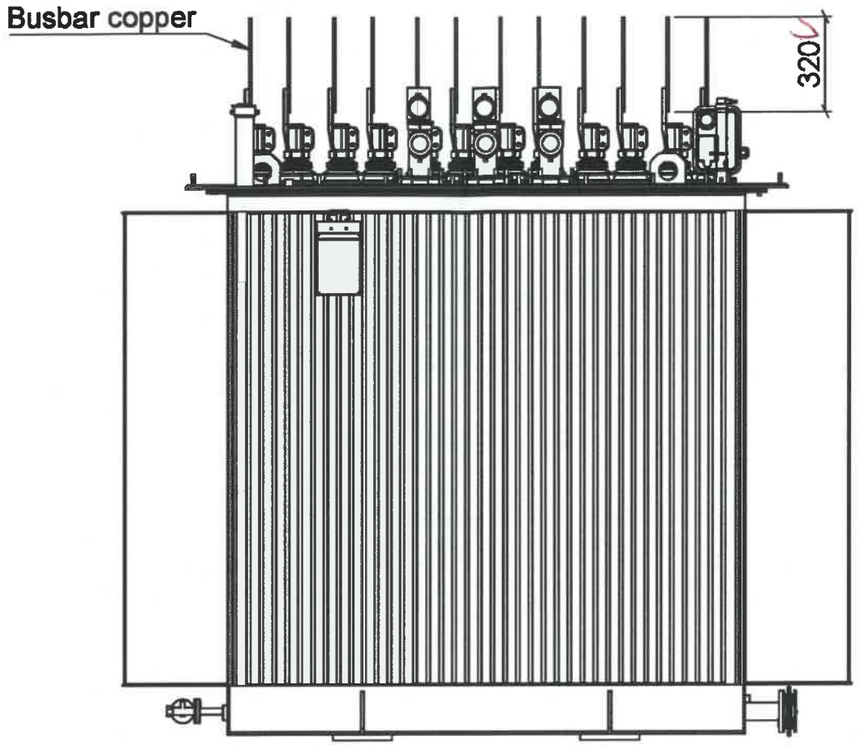
REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

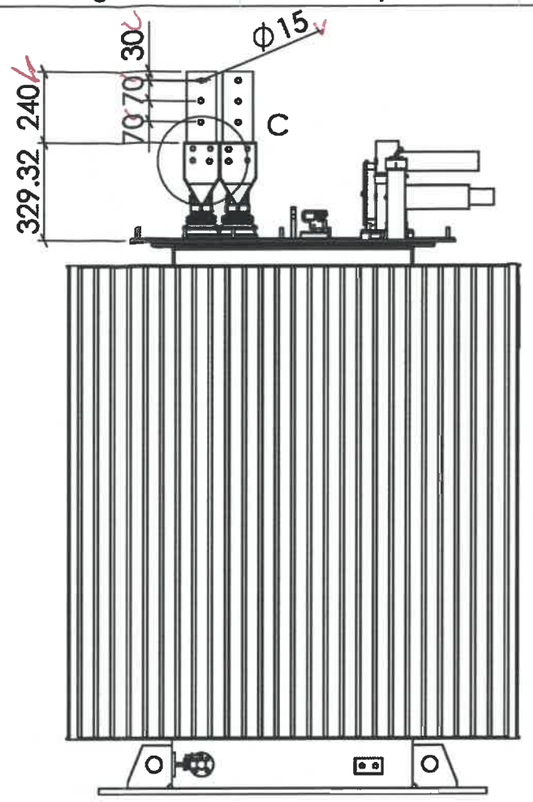
celme

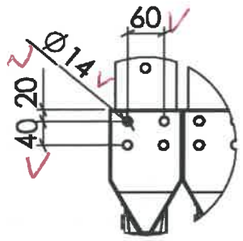
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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:30	8100 [kg]	1 / 4



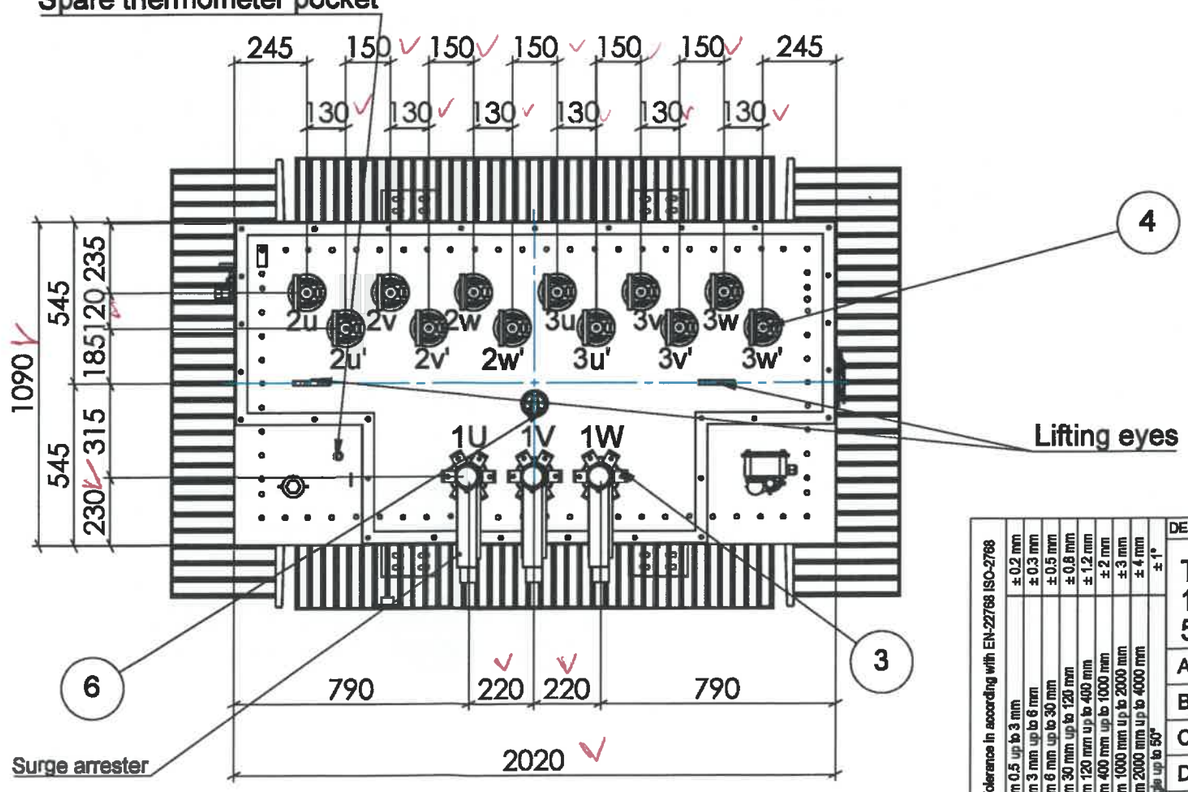




Detail C Scale 1:10

DGPT2

- CABLE GLAND M25
- P_T 100 = 109,9
- ALL THE AUXILIARY CONTACTS WORK PROPERLY



Tolerance in according with EN-22768 ISO-2768	
From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

celme

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:20	8100 [kg]	2 / 4

148

6

6

Ø3.5

210

celme

36054 - Montebello Vicentino - Vicenza - Italy - www.celmesrl.com

THREE-PHASE TRANSFORMER IEC 60076

Code	S/N	Year	Cooling
TOD3176.V001	60258	2024	KNAN

ELECTRICAL DATA

Power [kVA]	Frequency [Hz]	Connection
3200 (2400) / 2x1600 / (2x1200)	50	Dy11y11

Primary side

D — Insulation [kV]: Um 7.2 / LI 60 / AC 20

Tap	Voltage [V]	Current [A]
1	6930	266.60 / 199.95
2	6765	273.10 / 204.82
3	6600	279.93 / 209.95
4	6435	287.10 / 215.33
5	6270	294.66 / 221.00

Secondary side

y — Insulation [kV]: Um 1.1 / LI - / AC 3

Tap	Voltage [V]	Current [A]
A	360 - 360	2566.00 - 2566.00
B	270 - 270	2566.00 - 2566.00

Impedance [%]	HV1/LV2 = 7.51% HV1/LV3 = 7.51%				
Load losses class		Load losses [W]	42258.4	Scc [MVA]	
No-load losses class		No-load losses [W]	1389.1	Altitude [m]	1000
Ambient temp. [°C]	-10 / +40	ΔT oil [K]	60	ΔT winding [K]	65

INSULATION DATA

Fluid type	according to	Fluid mass [kg]
Natural ester Cargill FR3	IEC 62770	2220

MAIN COMPONENTS DATA

Conductor material	Aluminium	Conductor mass [kg]	680		
Core material	GOES HiB DR	Core mass [kg]	2380		
Untanking mass [kg]	3880	Transportation mass [kg]	8100	Total mass [kg]	8100

A and B cannot be used at the same time

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Material: stainless steel , thickness 1 mm

Black words/drawings on metallic background

Tolerance in according with EN-22768 ISO-2768	
From 0,5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 90°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW.	APR.
A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:1	8100 [kg]	4 / 4

celme

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QUALITY CONTROL PLAN

Oil immersed transformers
Mod 04 13

PFC02.2300084
revision A/1

Legend:

INSTRUCTIONS AND PLANS
IT: operative instructions;
SF: supply specifications;
PCA: check-in control plan;
PCQ: quality control plan;
D: drawing.

RECORDS OF P.C.C.
VCNu: magnetic circuit record;
VCCa: tank control record;
VCOl: oil control record;
Vco: test record;
RPF: supplier test record.

OPERATIVE AND CONTROL DATASHEET
SRM: assembly datasheet;
SA: winding datasheet;
SS: pre-spedition check.

OTHER
D.d.C.: supplier's declaration of conformity;
M: marking;
DD: PC record;
F: supplier's check;
AE: external assembler check.

INTERNAL FUNCTIONS
DG: general management;
FQ: quality function;
CQ: quality control;
FT: technical function;
FP: production function;
FC: sale function;
FA: purchase function;
MAG: warehouseman.

PARTICIPANTS
C: customer;
CF: final customer;
TP: third party.

ACTIVITIES
H: must be performed with a witness;
W: should be perfomerd with a witness; the internal record can be requested;
R: the internal record can be requested.

NOTE:
CELME, for some of its actions, doesn't prepare any quality document because the material is approved by the supplier's documents. In case of defective or broken material, a non-conformity record (N.C.) is open.
The column "Record n°" can be compiled upon customer's request with the relevant documents of the single transformer or of the production batch.

Rev.	Date	Prepared	Checked	Notes
1	2024/10/04	N.Marcazzan	L.Gallina	First issue

Revision index

FAT COPY CROSSWIND A. MAMBELLI 04/10/2024

celme	QUALITY CONTROL PLAN					PFC02.2300084 - revision A/1				
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
MATERIAL CHECK-IN										
1	**Insulated copper wire**									
1.01	Physico-chemical characteristics	F					R	R	R	
1.02	Dimensional characteristics	F					R	R	R	
1.03	Insulation characteristics	F	SF 01 Purchase order		D.d.C. RPF DD		R	R	R	
1.04	Identification	F/AE								
1.05	Packing visual control	F/AE								
1.06	Conformity to the order	F/AE								
2	**Foil - ribbon - bar**									
2.01	Physico-chemical characteristics	F					R	R	R	
2.02	Dimensional characteristics	F					R	R	R	
2.03	Identification	F/AE	SF 02 Purchase order		D.d.C. RPF DD					
2.04	Packing visual control	F/AE								
2.05	Conformity to the order	F/AE								
3	**Magnetic circuit**									
3.01	Iron core type (circular/oval)	F/AE					R	R	R	
3.02	Leg total thickness	F/AE					R	R	R	
3.03	Step number	F/AE					R	R	R	
3.04	Central distance	F/AE	PCA 03 SF 04 Purchase order		VCNu M RPF D.d.C.		R	R	R	
3.05	Frame	F/AE					R	R	R	
3.06	Identification label	F/AE					R	R	R	
3.07	Other components (if present)	F/AE					R	R	R	
3.08	No-load loss	F		IEC 60076-1	Vco / RPF		R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
4	**Steelworks**									
	Tank									
4.01	Frame dimensions	F/AE	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.02	Internal dimensions	F/AE					R	R	R	
4.03	Wheel type, axis and support	F/AE					R	R	R	
4.04	Cooling fins dimensions (if present)	F/AE					R	R	R	
4.05	Other components applied	F/AE					R	R	R	
4.06	Identification label	F/AE					R	R	R	
4.07	Paint type and status	F/AE					R	R	R	
4.08	General visual control	F/AE					R	R	R	
4.09	Paint thickness (8 points' averange)	F/AE		ISO 2808			R	R	R	
	Cover									
4.10	Dimensions	F/AE	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.11	Holes number	F/AE					R	R	R	
4.12	Holes size	F/AE					R	R	R	
4.13	Bushings' hole distance	F/AE					R	R	R	
4.14	Tap-changer fixing points	F/AE					R	R	R	
4.15	Stainless steel plate position and dimensions	F/AE					R	R	R	
4.16	Other components applied	F/AE					R	R	R	
4.17	Conservator connection's type and distance	F/AE					R	R	R	
4.18	Identification and serial number	F/AE					R	R	R	
4.19	Paint type and status	F/AE					R	R	R	
4.20	General visual control	F/AE					R	R	R	
4.21	Paint thickness (8 points' averange)	F/AE		ISO 2808			R	R	R	

n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
	Conservator									
4.22	Dimensions	F/CQ	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.23	Connection type and distance	F/CQ					R	R	R	
4.24	Buchholz's tube angle	F/CQ					R	R	R	
4.25	Oil level indicator holes	F/CQ					R	R	R	
4.26	Other components applied	F/CQ					R	R	R	
4.27	Identification label	F/CQ					R	R	R	
4.28	Paint type and status	F/CQ					R	R	R	
4.29	General visual control	F/CQ					R	R	R	
4.30	Paint thickness (8 points' averange)	F/CQ		ISO 2808			R	R	R	
	Cable boxes									
4.31	Dimensions	F/CQ	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.32	Type of removable plates	F/CQ					R	R	R	
4.33	Gland plate exit holes (if present)	F/CQ					R	R	R	
4.34	Paint type and status	F/CQ					R	R	R	
4.35	Identification label	F/CQ					R	R	R	
4.36	General visual control	F/CQ					R	R	R	
4.37	Paint thickness (8 points' averange)	F/CQ		ISO 2808			R	R	R	
	Radiators									
4.38	Dimensions	F/CQ	PCA 01 SF 08 D Purchase order		VCCa RPF		R	R	R	
4.39	Number of elements	F/CQ					R	R	R	
4.40	Paint type and status	F/CQ					R	R	R	
4.41	Identification label	F/CQ					R	R	R	
4.42	General visual control	F/CQ					R	R	R	
4.43	Paint thickness (8 points' averange)	F/CQ		ISO 2808			R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
5	**Windings**									
5.01	Conductor dimensions	F	PCA 01 SF 09 D Purchase order		SA M D.d.C. RPF DD		R	R	R	*if requested by FT or FA
5.02	Winding direction	F					R	R	R	
5.03	Radial dimension	F					R	R	R	
5.04	External perimeter (oval)	F					R	R	R	
5.05	External diameter (circular)	F					R	R	R	
5.06	Height	F					R	R	R	
5.07	Number of turns	F					R	R	R	
5.08	Number of terminations	F					R	R	R	
5.09	GTAW (foil)	F					R	R	R	
5.10	Identification	F/AE					R	R	R	
5.11	General visual control	F/AE					R	R	R	
5.12	Batch conformity	F/AE					R	R	R	
5.13	Winding weight	F/ *					R	R	R	
6	**Insulating fluid**									
6.01	Weight	F/CQ/MAG	PCA 04 SF 05 Purchase order		VCOI RPF D.d.C.		R	R	R	
6.02	Dielectric strength	F/CQ		IEC 60156			R	R	R	
6.03	PCB content	F/Ext. Lab.		IEC 60296 IEC 61619			R	R	R	
6.04	Batch conformity	F/CQ					R	R	R	
7	**Tap-changer**									
7.01	Type	F/AE	PCA 03 D Catalog Purchase order		D.d.C. RPF DD		R	R	R	
7.02	Mechanical functioning	F					R	R	R	
7.03	General visual control	F/AE					R	R	R	
7.04	Batch conformity	F/AE					R	R	R	

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
8	**Bushing**									
8.01	Type	F/MAG	PCA 03 D / Catalog Purchase order		RPF DD		R	R	R	
8.02	General visual control	F/MAG					R	R	R	
8.03	Batch conformity	F/MAG					R	R	R	
9	**Valves**									
9.01	Type	F/MAG	PCA 03 D / Catalog Purchase order		RPF DD		R	R	R	
9.02	General visual control	F/MAG					R	R	R	
9.03	Batch conformity	F/MAG					R	R	R	
10	**Accessories**									
10.01	Type	F/MAG	PCA 03 D / Catalog Purchase order		RPF DD		R	R	R	
10.02	General visual control	F/MAG					R	R	R	
10.03	Batch conformity	F/MAG					R	R	R	
11	**Thermopox paper**									
11.01	Type	F/MAG	PCA 03 Purchase order		RPF DD		R	R	R	
11.02	General visual control	F/MAG					R	R	R	
11.03	Batch conformity	F/MAG					R	R	R	
12	**Cylinders - wooden support components**									
12.01	Type	F/MAG	PCA 03 Purchase order		RPF DD		R	R	R	
12.02	General visual control	F/MAG					R	R	R	
12.03	Batch conformity	F/MAG					R	R	R	

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
13	**Duct spacers - wheels - insulating tubes**									
13.01	Type	F/MAG	PCA 03 Catalog Purchase order		RPF DD		R	R	R	
13.02	General visual control	F/MAG					R	R	R	
13.03	Batch conformity	F/MAG					R	R	R	
14	**Tank-cover gasket**									
14.01	Type	F/MAG	D Purchase order		RPF DD		R	R	R	
14.02	General visual control	F/MAG					R	R	R	
14.03	Batch conformity	F/MAG					R	R	R	
15	**Composite paper**									
15.01	Type	F/MAG	PCA 03 Catalog Purchase order		RPF DD		R	R	R	
15.02	General visual control	F/MAG					R	R	R	
15.03	Batch conformity	F/MAG					R	R	R	
16	**Consumables**									
16.01	Batch conformity	MAG	PCA 02 Purchase order		DD					

celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
	PRODUCTION									
1	**Winding manufacture**									
1.01	Frame type check (after setting)	AE	PCQ 02 IT D		SA		R	R	R	
1.02	Program (NC windger)	AE					R	R	R	
1.03	Conductor dimensions	AE					R	R	R	
1.04	Internal cylinder diameter (circular)	AE					R	R	R	
1.05	External diameter (circular)	AE					R	R	R	
1.06	External perimeter (oval)	AE					R	R	R	
1.07	Height	AE					R	R	R	
1.08	Number of turns (executing)	AE					R	R	R	
1.09	GTAW (foil)	AE					R	R	R	
1.10	Terminations's number, identification and lenght	AE					R	R	R	
1.11	General comparison against drawing	AE					R	R	R	
1.12	Identification	AE					R	R	R	
2	**Winding processing**									
2.01	Press type	AE	PCQ 02 IT D		SRM		R	R	R	
2.02	Winding height during pressing	AE					R	R	R	
2.03	Processing time and temperature	AE					R	R	R	
2.04	Width check after processing (oval)	AE					R	R	R	
2.05	Height check after processing (circular)	AE					R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
3	**Cover assembly**									
3.01	Type, integrity and serial number of cover	AE	PCQ 03 IT D		SRM		R	R	R	
3.02	Type and integrity of components	AE					R	R	R	
3.03	Type, integrity and surface of bushings	AE					R	R	R	
3.04	Bushing and gaskets positioning	AE					R	R	R	
3.05	Tap-changer positioning	AE					R	R	R	
3.06	Tap-changer gasket positioning	AE					R	R	R	
3.07	Tap-changer integrity and functionality	AE					R	R	R	
4	**Active part assembly**									
	Magnetic circuit preparation									
4.01	Type and integrity of magnetic circuit	AE	PCQ 03 IT / D		SRM		R	R	R	
4.02	Identification label check	AE					R	R	R	
	Winding and yoke mounting									
4.03	Type and integrity of windings	AE	PCQ 03 IT D		SRM		R	R	R	
4.04	Identification label check	AE					R	R	R	
4.05	Sticks and windings positioning (circular)	AE					R	R	R	
4.06	Winding insulation / LV (1°)	AE					R	R	R	
4.07	Yoke placing	AE					R	R	R	
4.08	Frame orientation	AE					R	R	R	
4.09	Winding insulation / LV (2°)	AE					R	R	R	
4.09.1	Core and frame insulation test: 500Vdc @60s	AE					R	R	R	

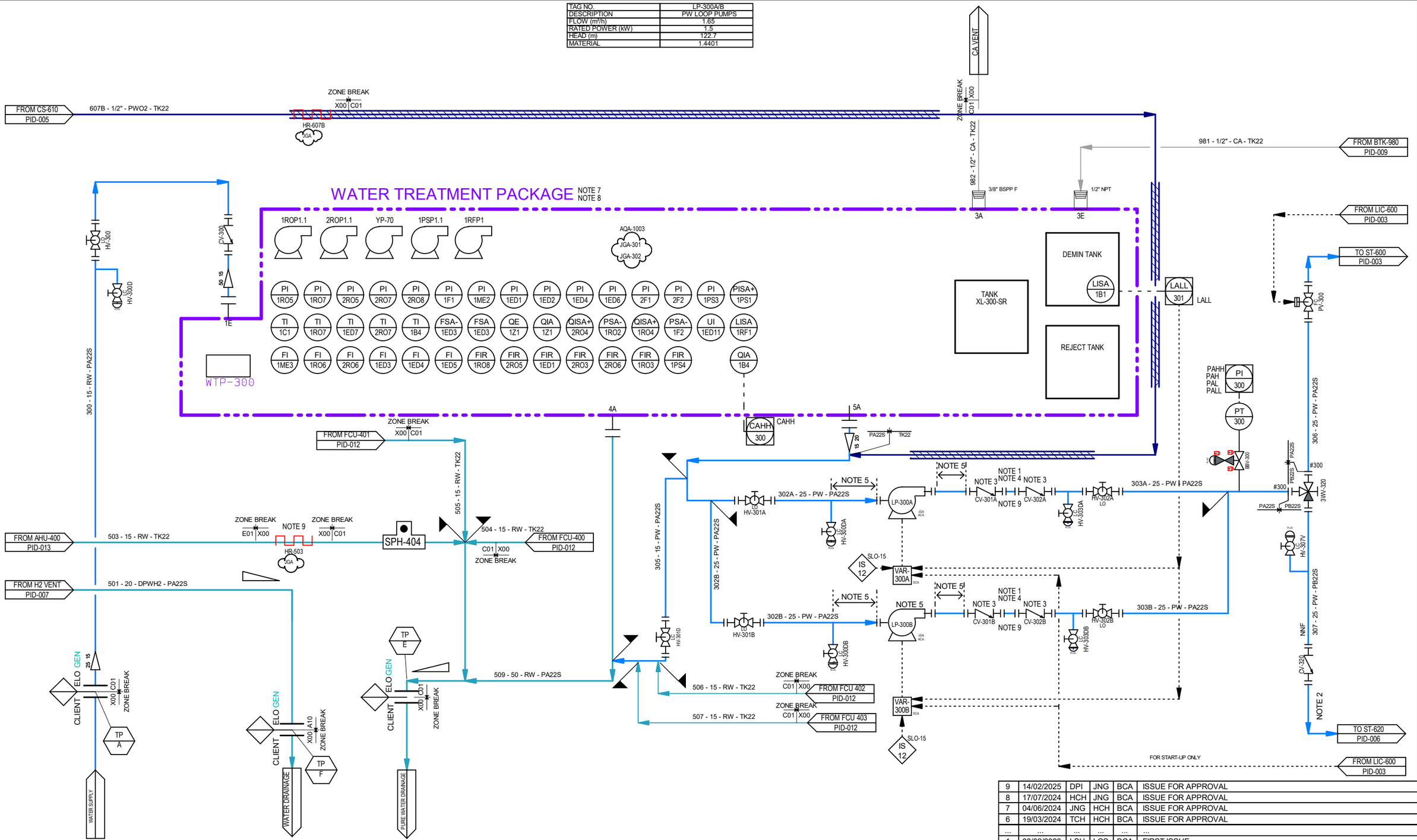
celme	QUALITY CONTROL PLAN						PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
	Cover mounting over active part, HV and LV connections									
4.10	Cover orientation according HV/LV	AE	PCQ 03 IT D		SRM		R	R	R	
4.11	Cover height over active part	AE					R	R	R	
4.12	HV connection group	AE					R	R	R	
4.13	HV insulation supports	AE					R	R	R	
4.14	LV connection group	AE					R	R	R	
4.15	LV bars fixing (if present)	AE					R	R	R	
4.16	LV insulation supports	AE					R	R	R	
	Voltage ratio check									
4.17	Voltage ratio / number of turns	AE	PCQ 03 IT	IEC 60076-1	SRM		R	R	R	
4.18	Connection group	AE		IEC 60076-1			R	R	R	
	Oil and active part processing, encasing and finishing									
4.19	Processing's time and temperature	AE	PCQ 04 IT D		SRM		R	R	R	
4.20	Active part's bolts fastening	AE					R	R	R	
4.21	Connection and insulators placement	AE					R	R	R	
4.22	Tank type and cleaning	AE					R	R	R	
4.23	Gaskets' type and integrity	AE					R	R	R	
4.24	Tank and active part contacts	AE					R	R	R	
4.25	Active part height and tank bolts fastening	AE					R	R	R	
4.26	Dielectric strength before filling	AE		IEC 60156			R	R	R	
4.27	Autoclave's vacuum level during filling	FP					R	R	R	
4.28	Oil level during filling	FP					R	R	R	
4.29	Components and accessories check	FP					R	R	R	
4.30	Components and accessories mounting	FP					R	R	R	
4.31	Pressure leak test	FP		60076-1			R	R	R	

celme	QUALITY CONTROL PLAN								PFC02.2300084 - revision A/1
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
5	**Final test**									
5.01	Turns ratio and vector group	CQ	PCQ 05	IEC 60076-1	Vco ** DD		W	W	W	*if requested on purchase order **can be made of one or more test records of points 5.01-5.15
5.02	Applied voltage (HV/LV)	CQ		IEC 60076-3			W	W	W	
5.03	Induced voltage	CQ					W	W	W	
5.04	No-load loss and current	CQ		IEC 60076-1			W	W	W	
5.05	Winding resistance	CQ					W	W	W	
5.06	Load loss and short-circuit impedance	CQ					W	W	W	
5.07	Auxiliary circuits' dielectric test	CQ		IEC 60076-3			W	W	W	
5.08	Lightning impulse */Lightning impulse chopped *	CQ		IEC 60076-3 IEC 60076-4			W	W	W	
5.09	Temperature rise *	CQ		IEC 60076-2			W	W	W	
5.10	Noise level *	CQ		IEC 60076-10			W	W	W	
5.11	Insulation resistance *	CQ		IEC 60076-1			W	W	W	
5.12	Coupling *	CQ					W	W	W	
5.13	Oil dielectric strength *	CQ		IEC 60156			W	W	W	
5.14	Protective coating *	CQ		ISO 2808			W	W	W	
5.15	Short-time leak test under pressure *	CQ					W	W	W	
5.16	Auxiliary circuits' functioning	CQ	PCQ 05		SS		W	W	W	
5.17	Tap-changer functioning	CQ					W	W	W	
5.18	Accessories check	CQ					W	W	W	

celme	QUALITY CONTROL PLAN					PFC02.2300084 - revision A/1			
n°	Action	Control responsability	Applicable document		Q.lity record docum.		Activity			Notes
			internal	norm	type	record n°	C	CF	TP	
6	**Pre-shipping checks**									
6.01	Accessories tuning	CQ	PCQ 06		SS		R	R	R	*if requested on purchase order
6.02	Bushings	CQ					R	R	R	
6.03	Wheels	CQ					R	R	R	
6.04	Oil leakage	CQ					R	R	R	
6.05	Paint (visual)	CQ					R	R	R	
6.06	Paint type	CQ					R	R	R	
6.07	Oil level	CQ					R	R	R	
6.08	Dimensions and weight	CQ					R	R	R	
6.09	Warranty seals	CQ					R	R	R	
6.10	Separable connectors *	CQ					R	R	R	
6.11	Phases marking	CQ					R	R	R	
6.12	Tank/cover bolts' fastening	CQ					R	R	R	
6.13	Bushings' fastening	CQ					R	R	R	
6.14	Bushings' deviation mark	CQ					R	R	R	
6.15	Photo of package on truck	CQ					R	R	R	
	Attachments									
6.16	User's manual	CQ	PCQ 06		SS		R	R	R	*if requested on purchase order
6.17	Test report	CQ					R	R	R	
6.18	Dielectric fluid certificate *	CQ					R	R	R	

the end

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1.5
HEAD (m)	122.7
MATERIAL	1.4401



Rev.	Date	Ed.	Ver.	App.	Description
9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES. REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE. USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

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PROCESS	C63-PID-001-001	DPI	JNG	BCA	1:1

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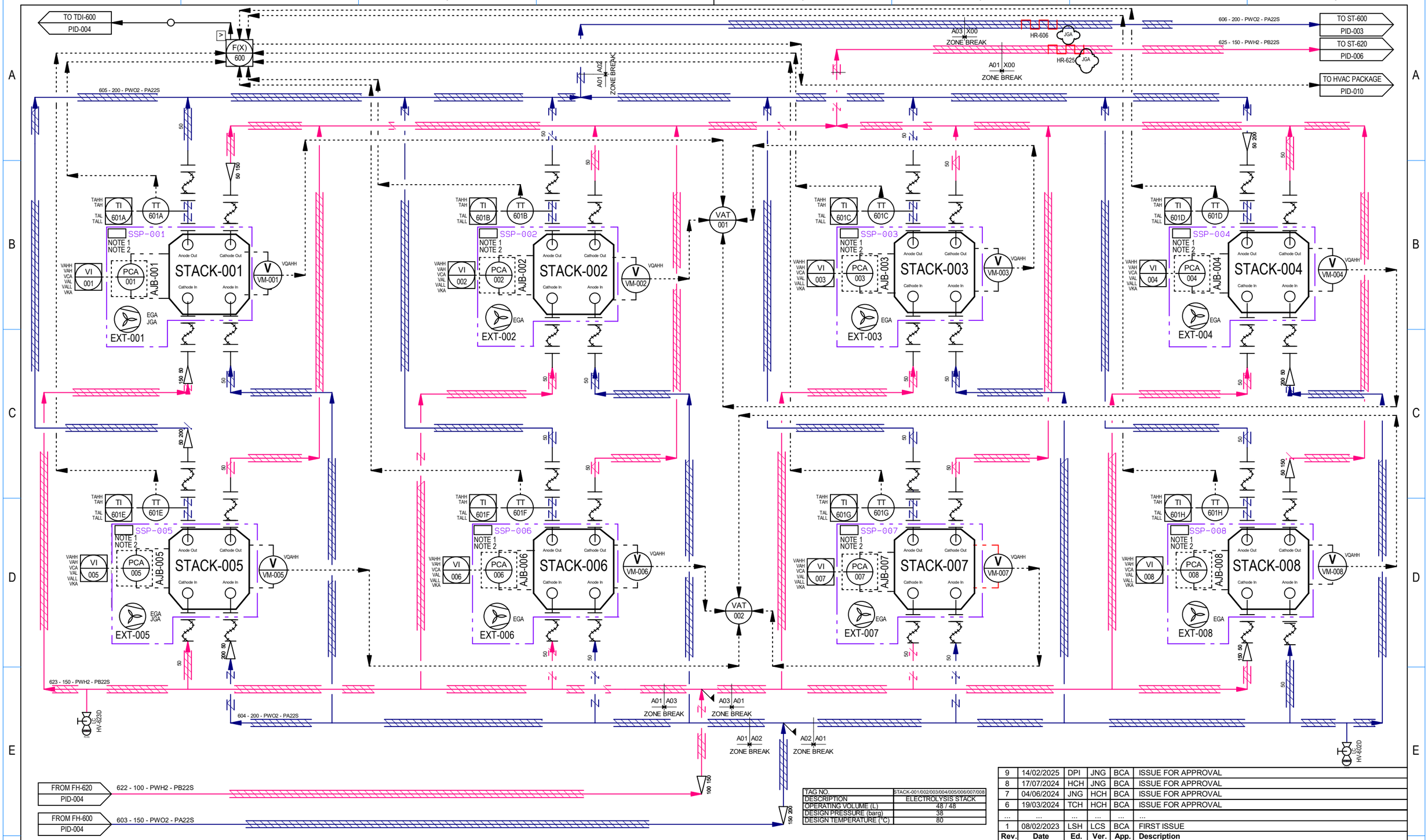
Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	1/16



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

Rev.	Date	Ed.	Ver.	App.	Description
9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

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PROCESS	C63-PID-001-002	DPI	JNG	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	2/16

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005
421 - 1/2" - CW - TK22
FROM PT-630 PID-006
FROM HE-630/631 PID-007
420 - 1/2" - CW - TK22
TO RDPC-002 PID-006
TO PV-631 PID-007
TO MPV-611 PID-005
TO O2 VENT PID-005
TO FX-642 PID-007
616A - 80 - O2 - PA22S
TO O2 VENT PID-005
SLO-8 IS 1
SLO-23 IS 10
IS 19
PSHH 611
PAHH PAH PALL
PT 611
BBV-611
TK22 PA22S
13 barg
PSV-610
1/2" GF
1/2" GM
HV-410D
MV-420
616 - 1" - PWO2 - TK22
RDPC 001
PDAHH PDAH PDAL PDALL
HIGH DP OVERRIDE
LOW DP OVERRIDE
PIC 610
PI 900
PT 610
BBV-610
LC HV-610
TO O2 VENT PID-005
N2
902A - 25 - N2 - PA22S
RD-900 10 BARG
PT 900
RV-900
SP-900
IS 1
IS 4
IS 10
NOTE 4
NOTE 6
FI 900
FAL
FT 900
FROM N2 PANEL
900 - 15 - N2 - PA22S
N2 PID-009
LO HV-900
FO PV-900
MV-900
902 - 25 - N2 - PA22S
CV-900
NOTE 3
NOTE 2
900A - 40 - N2 - PA22S
CV-901
NOTE 3
LO HV-902
LO HV-901
614 - 1/4" - O2 - TK22
HV-615
HV-616
HV-F-610
HV-610D
PG 0.5 barg
PRV-610
SLO-3 IS 1
CAHH CAH
CI 610
2 OUT OF 3
FALL
HIOD 610C
HIOD 610B
HIOD 610A
FS 610C
FSLL 610C
FS 610B
FSLL 610B
FS 610A
FSLL 610A
FICV-610C
615C - 1/4" - O2 - TK22
FICV-610B
615B - 1/4" - O2 - TK22
615A - 1/4" - O2 - TK22
FICV-610A
CV-611
TO O2 VENT PID-005
FROM PT-300 PID-001
MIN.
GGA ZI 605
ZIO 605
HV-606V
FROM STACKS PID-002
606 - 200 - PWO2 - PA22S
LO HV-605
X00 A10 ZONE BREAK
PA22S
PB22S
PIPE HEATED
PIPE NOT HEATED
ACO-610
TI 610
SLO-15 IS 12
LASHH LASHH 600
LSH 600
ST-600
DEM-600
LT 600
LIC 600
LAHH LAH LAL LALL
SLO-24 IS 6
LSLL 600
LSL 600
LASLL
FOR START-UP ONLY
FI 611
FALL
FT 611
FICV-611
Analysis System Package
614B - 1/4" - O2 - TK22
TO O2 VENT PID-005
610 - 20 - PWO2 - PA22S
TO HE-610 PID-005
FROM DG-640 PID-007
641A - 25 - PWH2 - PB22S
HR-600A
HR-600B
X00 A10 ZONE BREAK
X00 A02 ZONE BREAK
HR-306
FROM LP-300 A/B PID-001
306 - 25 - PW - PA22S
C01 X00 ZONE BREAK
X00 A02 ZONE BREAK
TO VAR-300A/B PID-001
A10 A02 ZONE BREAK
NOTE 5
PLUG 1/2" NPT F
600B - 150 - PWO2 - PA22S
LO HV-600B
RS-600B
CP-600B
NOTE 1
PT 600B
PI 600B
PAHH
IS 16
BBV-600B
601B - 150 - PWO2 - PA22S
CV-601A
LO HV-601B
PI 600
PAH PAL PALL
PT 600
BBV-600
TO HE-600 PID-004
600A - 150 - PWO2 - PA22S
LO HV-600A
RS-600A
CP-600A
PT 600A
PI 600A
BBV-600A
601A - 150 - PWO2 - PA22S
CV-601B
LO HV-601A
LO HV-601D
VAR-600B
VAR-600A
IS 15
Auto-start
Shutdown
LO HV-600C
LO HV-600D

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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5"D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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PROCESS	C63-PID-001-003	DPI	JNG	BCA	1:1

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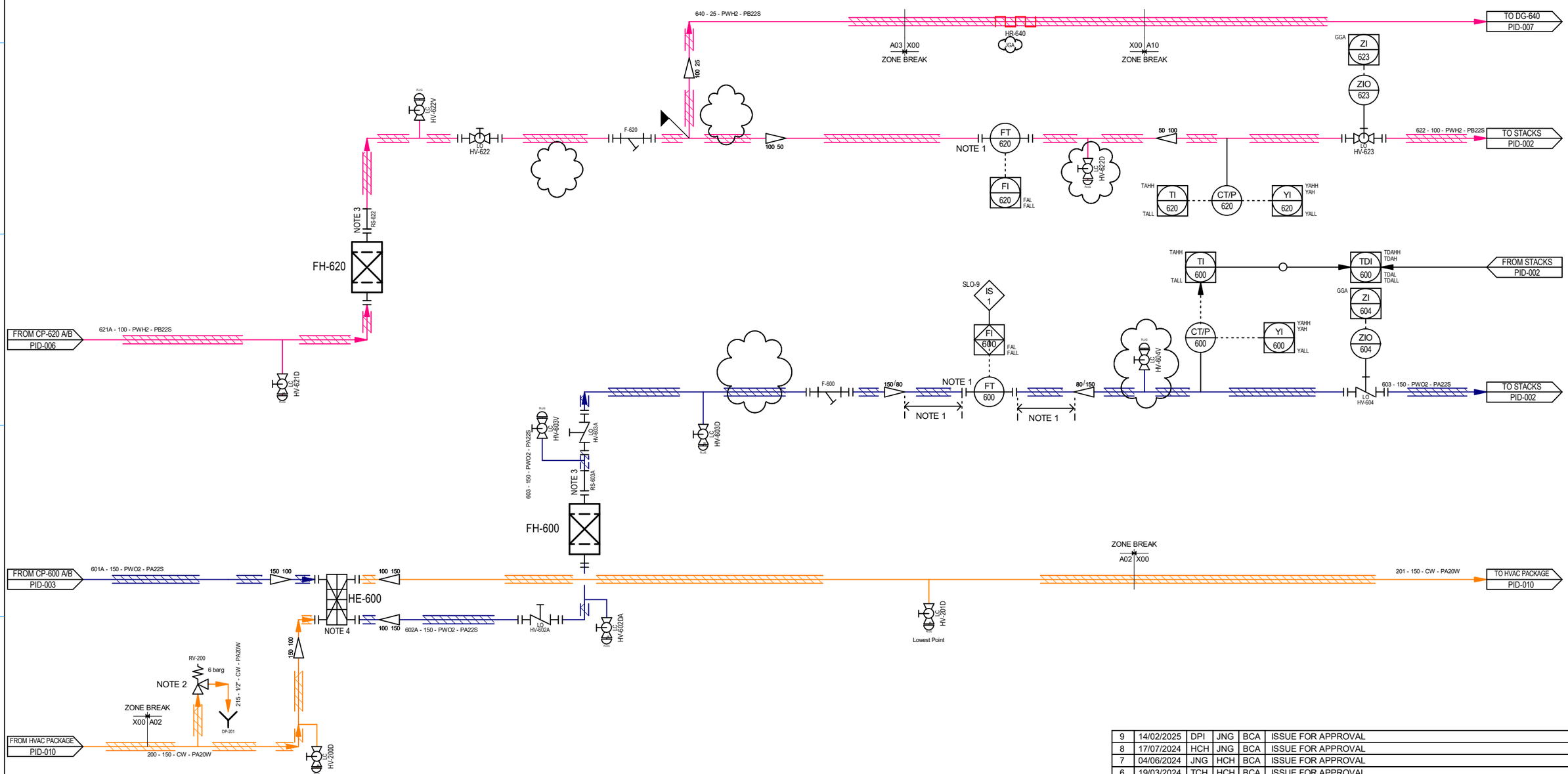
Title, Supplementary title: OXYGEN SEPARATION
Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	3/16

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0.58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

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PROCESS	C63-PID-001-004	DPI	JNG	BCA	1:1

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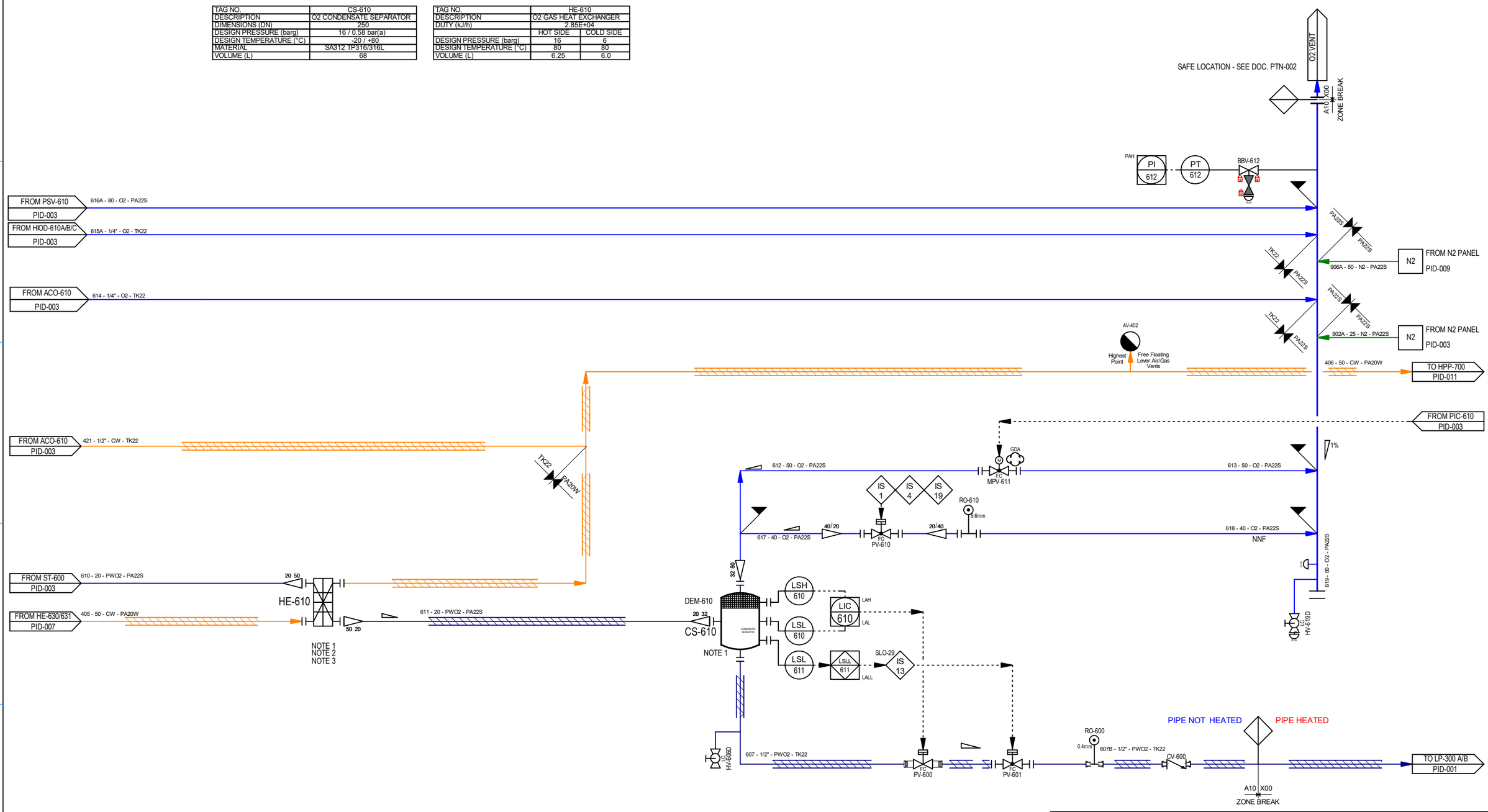
Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	4/16

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2.85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0



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8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

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PROCESS	C63-PID-001-005	DPI	JNG	BCA	1:1

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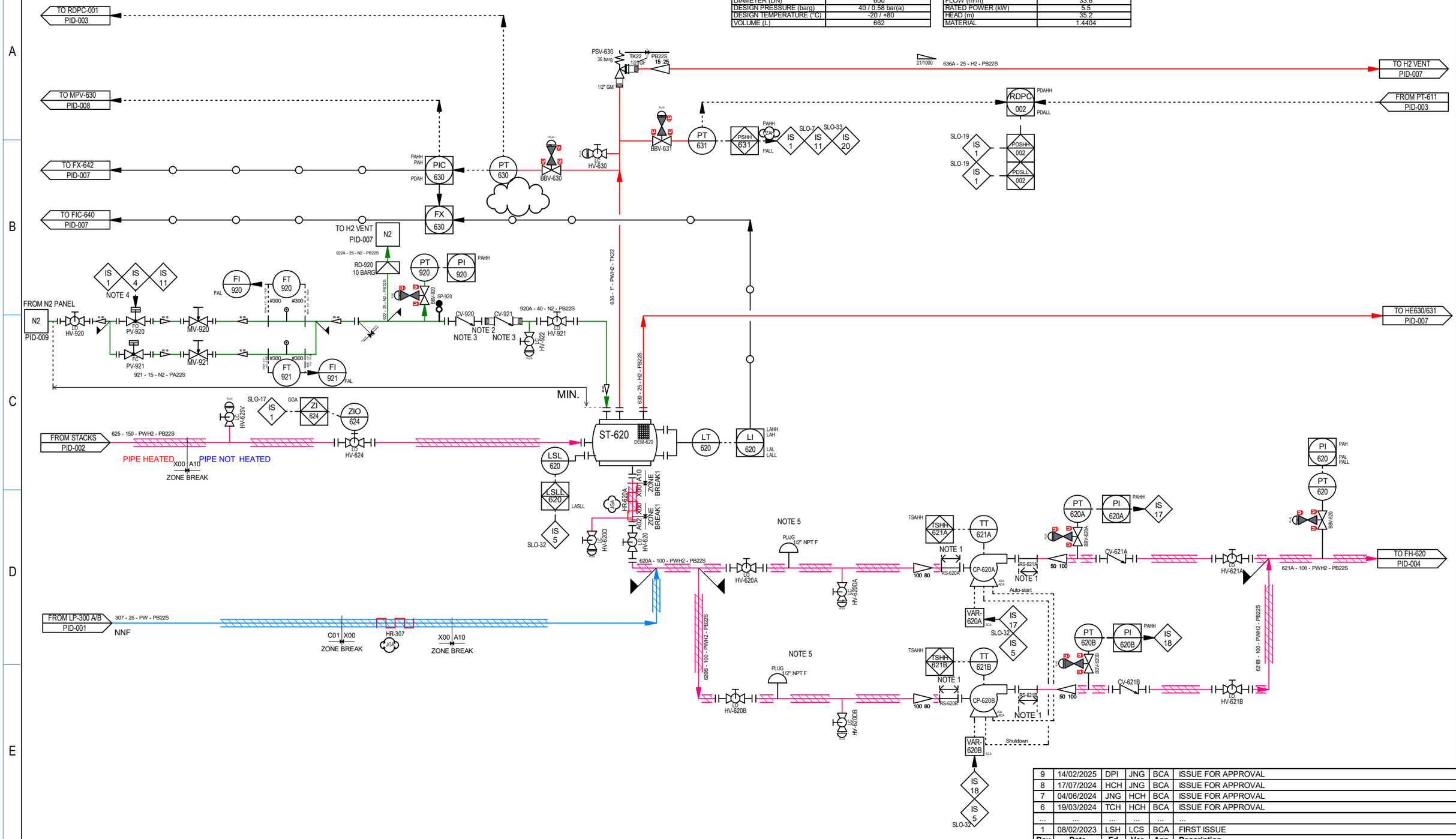
Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	5/16

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33.6
RATED POWER (kW)	5.5
HEAD (m)	35.2
MATERIAL	1.4404



NOTES :

NOTE 1 : DISTANCE OF 5"D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

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8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	DPI	JNG	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN SEPARATION

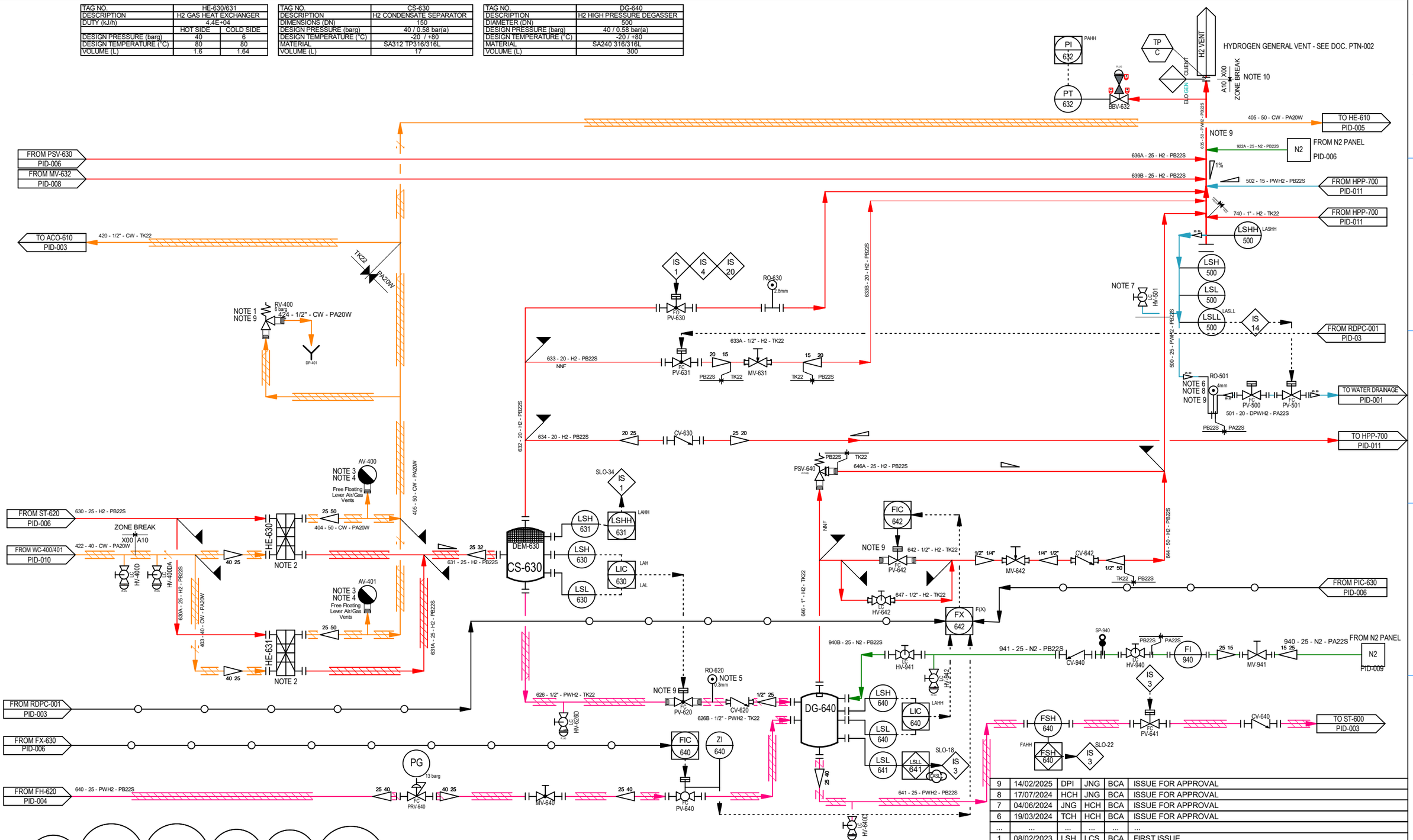
Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	6/16

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4.4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PV-642 & MV-642 SETTING
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

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PROCESS	C63-PID-001-007	DPI	JNG	BCA	1:1

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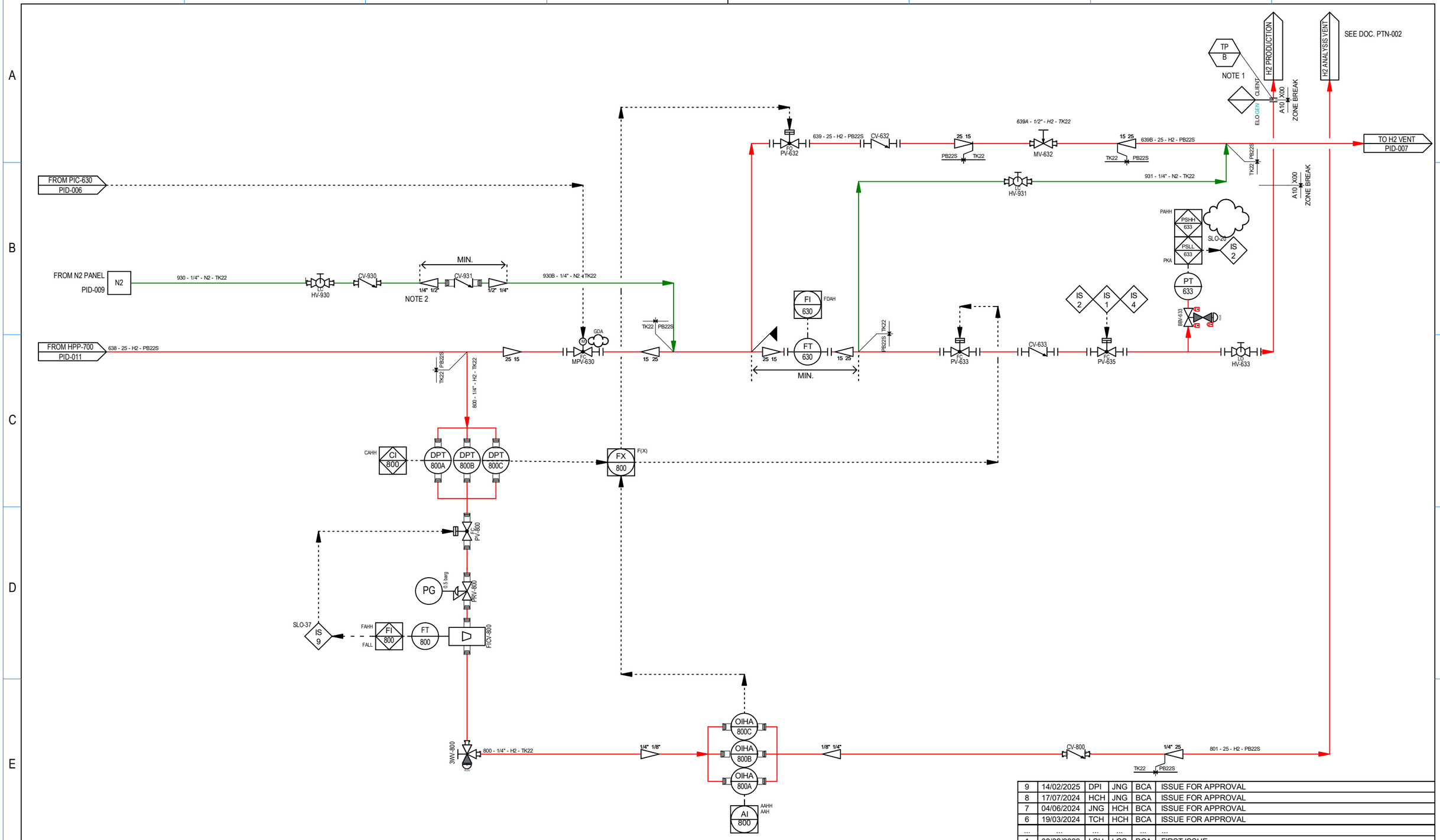
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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDENSATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	7/16



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

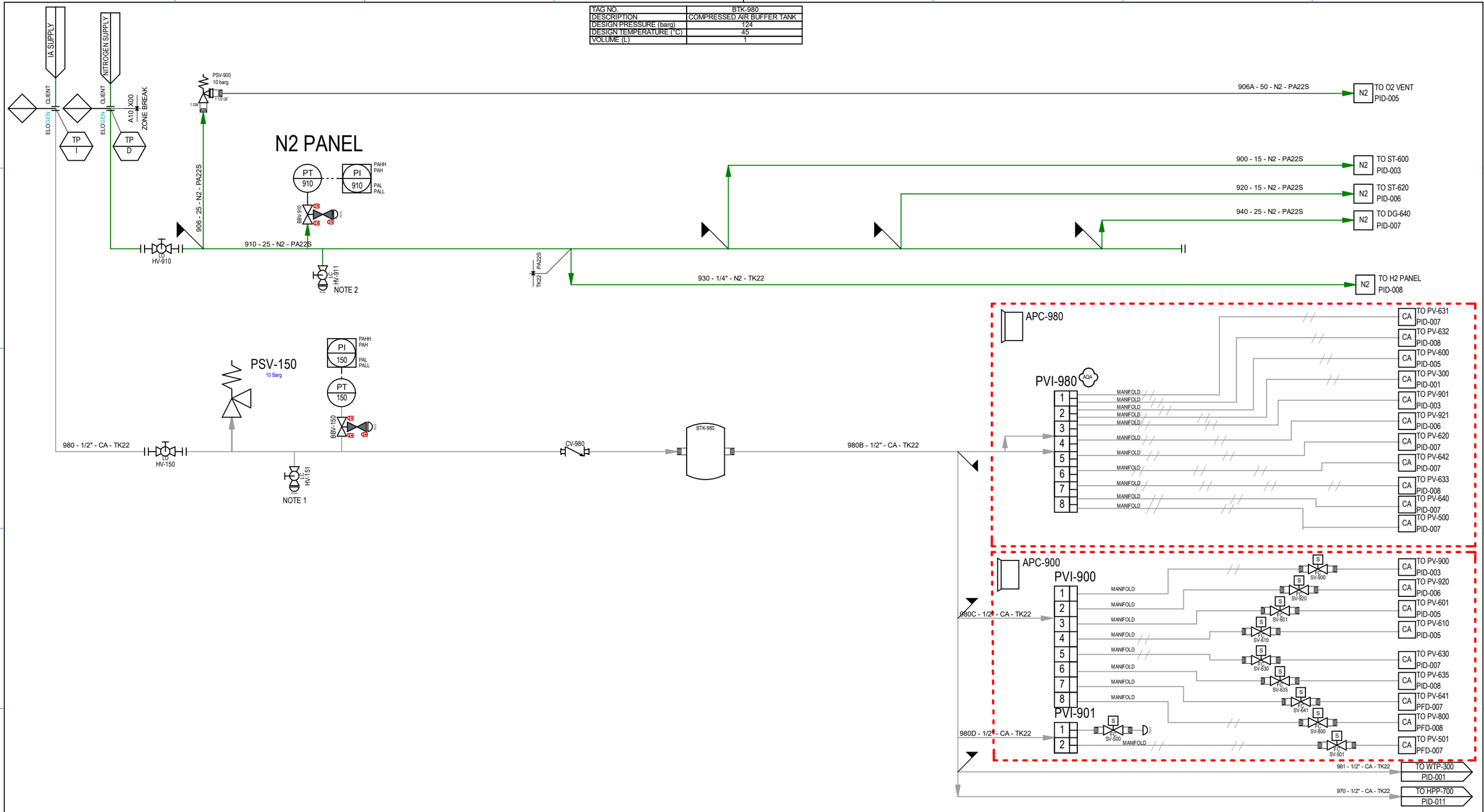
Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-008	DPI	JNG	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN
Title, Supplementary title	**Client reference**
H2 PANEL	-

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	8/16

TAG NO.	BTK-980
DESCRIPTION	COMPRESSED AIR BUFFER TANK
DESIGN PRESSURE (barg)	124
DESIGN TEMPERATURE (°C)	45
VOLUME (L)	1



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9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : IA CONNECTION FOR MAINTENANCE PURPOSE IN CASE OF NEED OF COMPRESSED AIR IN A SPECIFIC POINT ON ELECTROLYSER
NOTE 2 : NITROGEN CONNECTION FOR MAINTENANCE/COMISSIONING PURPOSE IN CASE OF NEED OF NITROGEN IN A SPECIFIC POINT ON THE ELECTROLYSER

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PROCESS	C63-PID-001-009	DPI	JNG	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: NITROGEN & INSTRUMENT AIR PANEL

Client reference: -

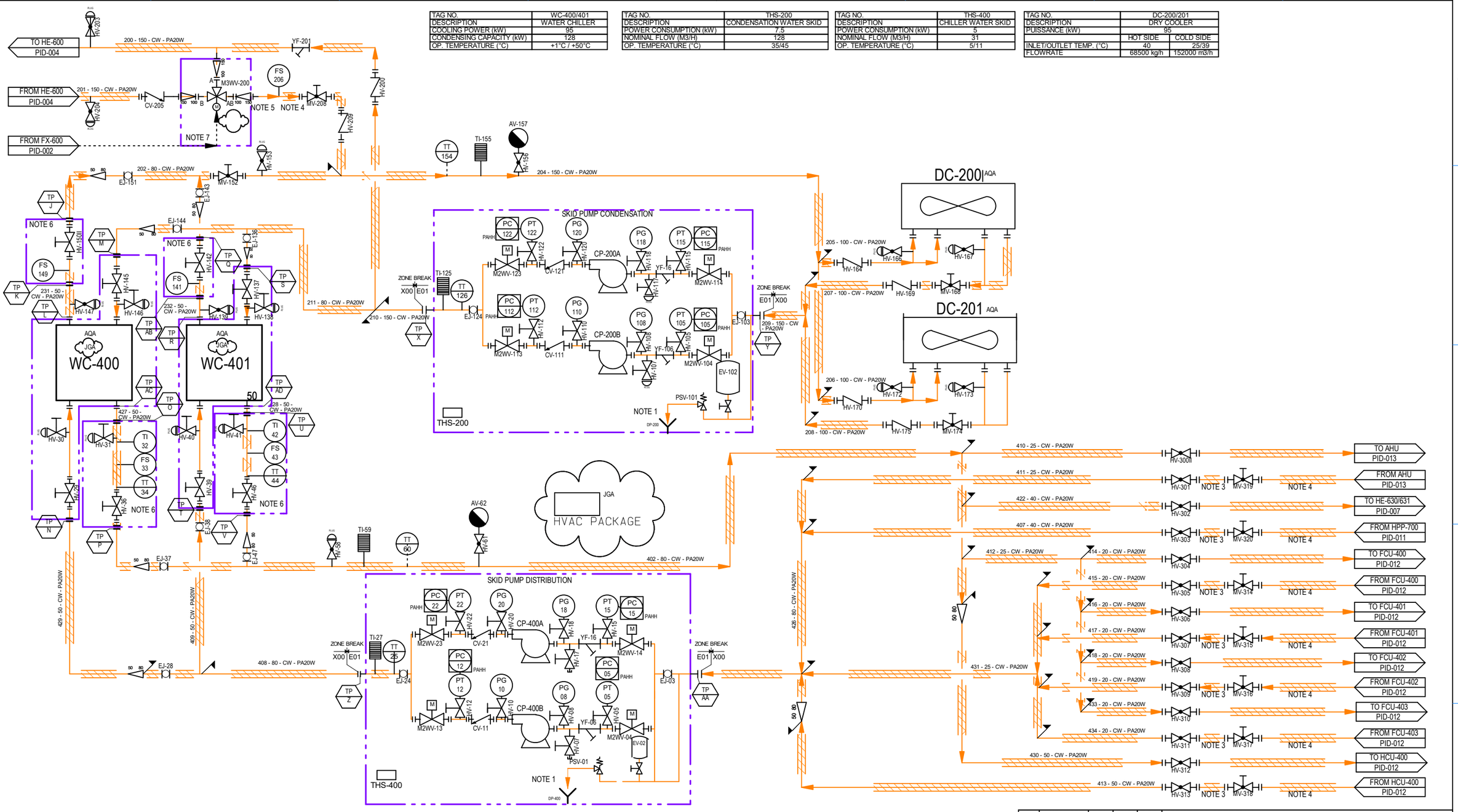
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TAG NO.	WC-400/401
DESCRIPTION	WATER CHILLER
COOLING POWER (kW)	95
CONDENSING CAPACITY (kW)	128
OP. TEMPERATURE (°C)	+1°C / +50°C

TAG NO.	THS-200
DESCRIPTION	CONDENSATION WATER SKID
POWER CONSUMPTION (kW)	7.5
NOMINAL FLOW (M3/H)	128
OP. TEMPERATURE (°C)	35/45

TAG NO.	THS-400
DESCRIPTION	CHILLER WATER SKID
POWER CONSUMPTION (kW)	5
NOMINAL FLOW (M3/H)	31
OP. TEMPERATURE (°C)	5/11

TAG NO.	DC-200/201	
DESCRIPTION	DRY COOLER	
PUISSANCE (kW)	95	
	HOT SIDE	COLD SIDE
INLET/OUTLET TEMP. (°C)	40	25/39
FLOWRATE	68500 kg/h	152000 m3/h



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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GENERAL NOTES :
- REFER TO HVAC PACKAGE DOCUMENTATION FROM PAUMIER FOR COMPLETE P&ID - P&ID N° (HOLD)
-IS ON THE THERMAL SKID WILL BE ADDED FOR THE NEXT REVISION

NOTES :
NOTE 1: Drip pan will be provided by Paumier and installed on skid pump

NOTE 3 : 2xD MINIMUM DISTANCE
NOTE 4 : 5xD MINIMUM DISTANCE
NOTE 5 : 10xD MINIMUM DISTANCE
NOTE 6 : THESE EQUIPMENTS WILL BE SUPPLIED ASSEMBLED.
NOTE 7 : FROM B TO AB: PROCESS LINE 100% OPEN. FROM A TO AB: BYPASS LINE 100% OPEN.

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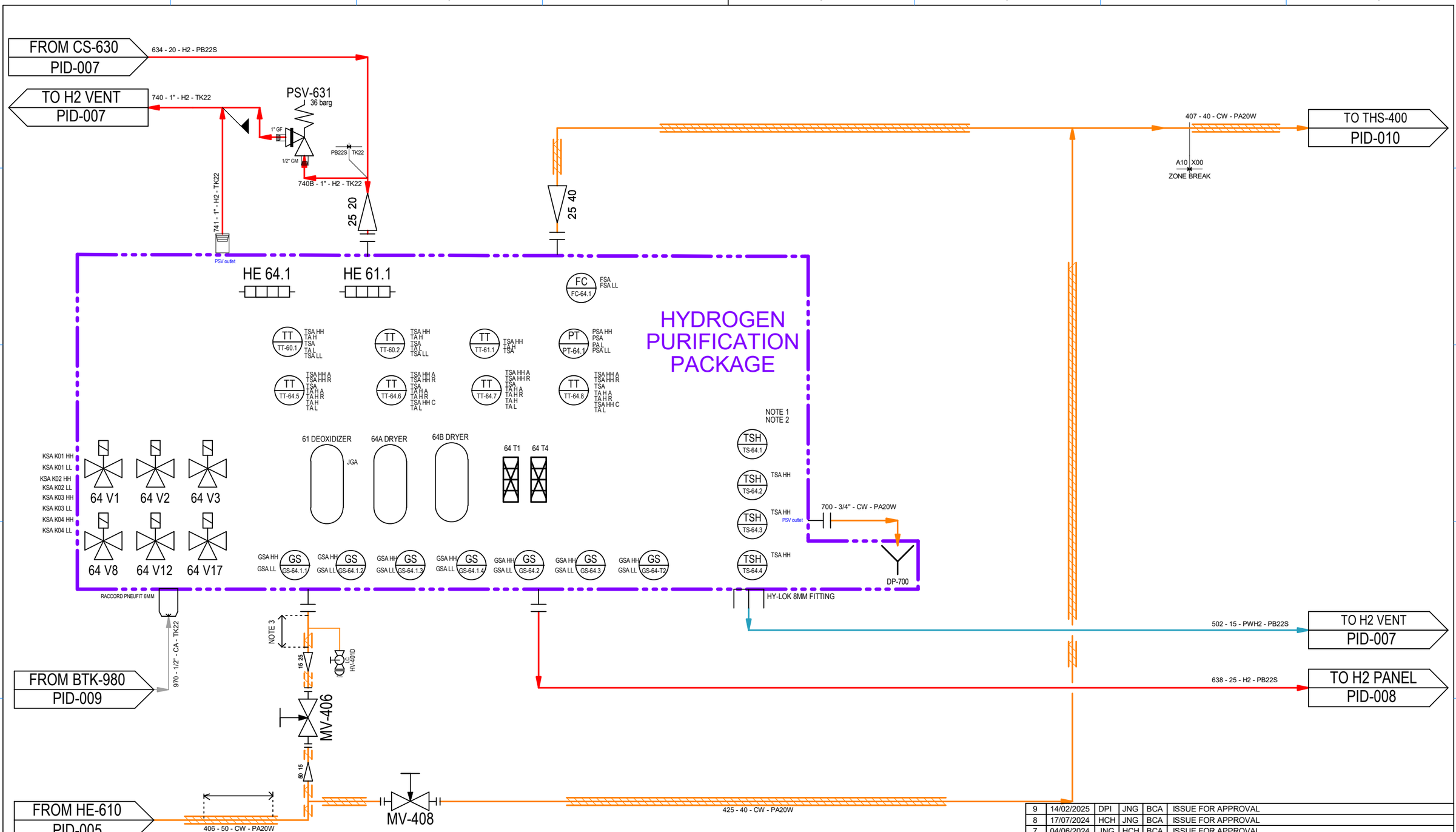
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PROCESS	C63-PID-001-010	DPI	JNG	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN
Title, Supplementary title	**Client reference**
HVAC UNIT	-

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

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PROCESS	C63-PID-001-011	DPI	JNG	BCA	1:1

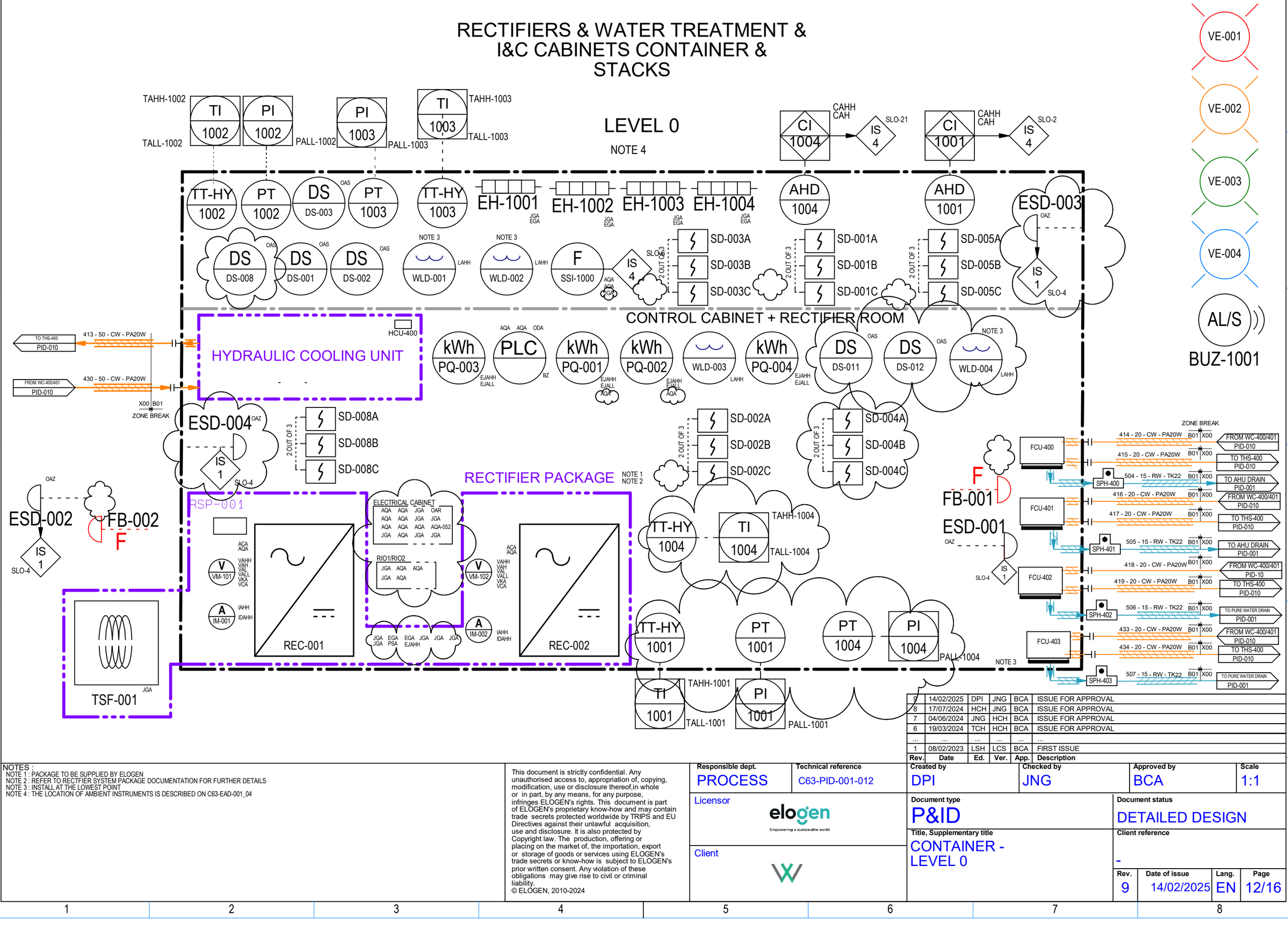
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Client:

Document type	Document status
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Title, Supplementary title	Client reference
HYDROGEN PURIFICATION PACKAGE	-

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RECTIFIERS & WATER TREATMENT & I&C CABINETS CONTAINER & STACKS



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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO RECTFIER SYSTEM PACKAGE DOCUMENTATION FOR FURTHER DETAILS
NOTE 3 : INSTALL AT THE LOWEST POINT
NOTE 4 : THE LOCATION OF AMBIENT INSTRUMENTS IS DESCRIBED ON C63-EAD-001_04

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Document type	Document status
P&ID	DETAILED DESIGN

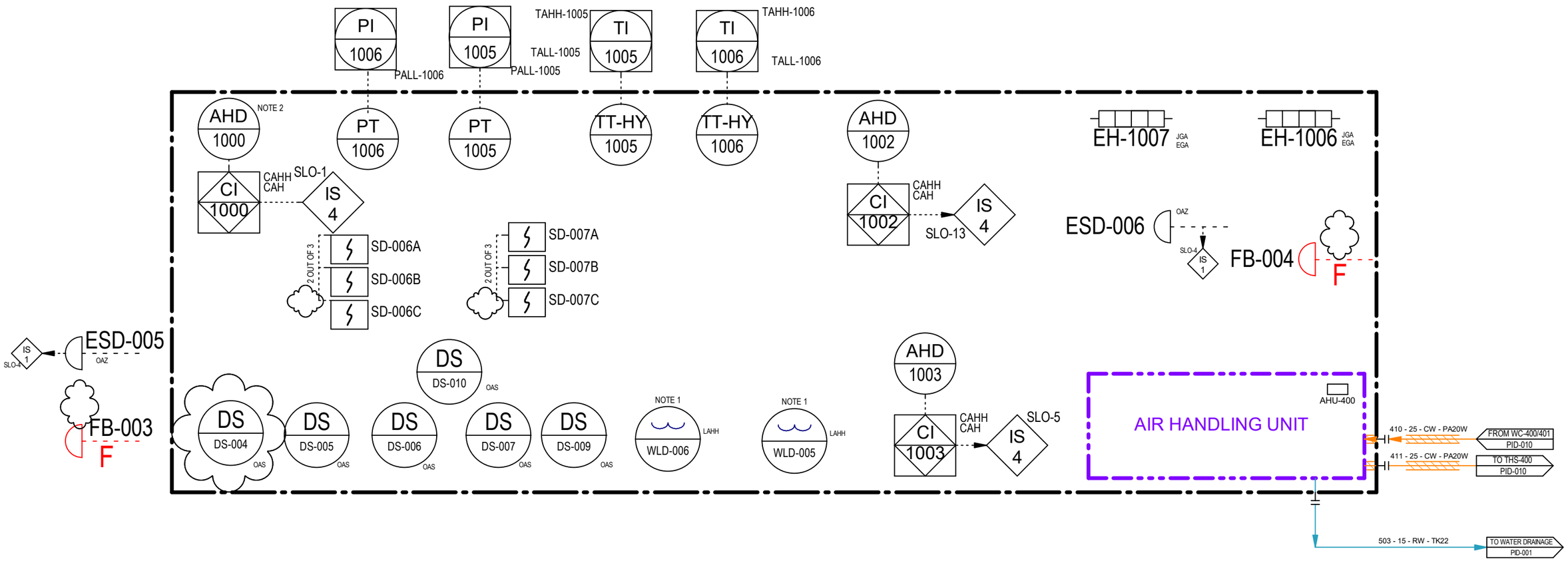
Title, Supplementary title: CONTAINER - LEVEL 0

Client reference: -

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AHU-400
AIR HANDLING UNIT

LEVEL 1



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : INSTALL AT THE LOWEST POINT
NOTE 2 : CLOSE TO HPP-700
NOTE 3 : The location of ambient instruments is described on C63-EAD-001_04

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: CONTAINER - LEVEL 1

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VE-005

VE-006

VE-007

VE-008

AL/S

BUZ-1002

LEVEL 2

VE-009

VE-010

VE-011

VE-012

AL/S

BUZ-1003

IS 1

SLO-4

ESD-007

OAZ

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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Title, Supplementary title

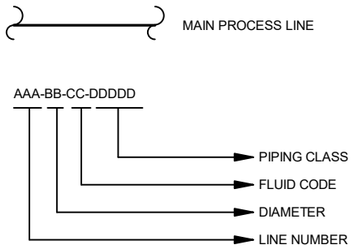
PROCESS CONTAINER LEVEL 2

Client reference

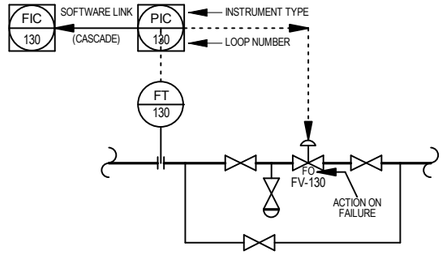
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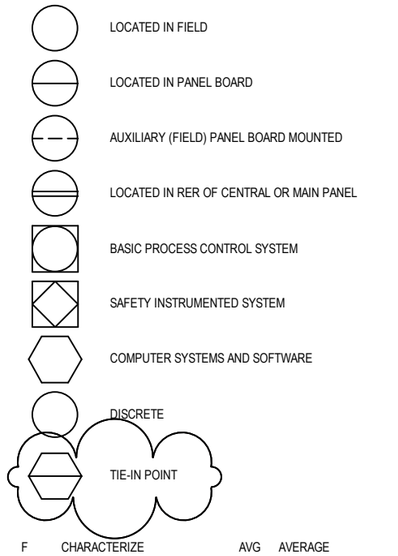
LINE IDENTIFICATION



INSTRUMENT IDENTIFICATION



INSTRUMENT SYMBOLS



F	CHARACTERIZE	AVG	AVERAGE
REV	REVERSE	%	GAIN OR ATTENUATE
X	MULTIPLICATION	x^n	EXPONENTIAL
÷	DIVISION	∫	INTEGRATE
√	ROOT EXTRACTION	>	HIGH SIGNAL SELECT
+	POSITIVE BIAS	<	LOW SIGNAL SELECT
±	BIAS	△	DIFFERENCE
∑	SUMMATION		

FO	FAIL TO OPEN POSITION
FC	FAIL TO CLOSED POSITION
FL	FAIL LOCK AT LAST POSITION



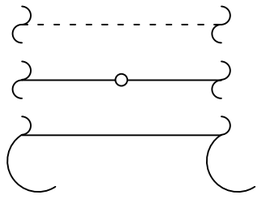
SPRING-DIAPHRAGM ACTUATOR

LINEAR PISTON OR SINGLE/DOUBLE ACTING ACTUATOR

SOLENOID ACTUATOR FOR PROCESS ON-OFF VALVE

ROTARY MOTOR OPERATED ACTUATOR

MANUAL ACTUATOR



ELECTRICAL LEAD

PNEUMATIC LEAD

SOFTWARE LINK

INSTRUMENT TYPES

AE	ANALYZER ELEMENT
AI	ANALYZER INDICATOR
AIC	ANALYZER INDICATING CONTROLLER
AT	ANALYZER TRANSMITTER
CI	CONDUCTIVITY INDICATOR
CIT	CONDUCTIVITY INDICATING TRANSMITTER
CT	CONDUCTIVITY TRANSMITTER
CV	CONTROL VALVE
EI	VOLTAGE INDICATOR (VOLTMETER)
EIS	VOLTAGE INDICATOR SWITCH
ES	VOLTAGE SWITCH
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIC	FLOW INDICATING CONTROLLER
FIT	FLOW INDICATING TRANSMITTER
FT	FLOW TRANSMITTER
FV	FLOW CONTROL VALVE
HS	HAND SWITCH
HV	HAND OPERATED CONTROL VALVE
II	CURRENT INDICATOR
LC	LEVEL CONTROLLER
LI	LEVEL INDICATOR
LIC	LEVEL INDICATING CONTROLLER
LIT	LEVEL INDICATING TRANSMITTER
LS	LEVEL SWITCH
LT	LEVEL TRASNMITTER
LV	LEVEL CONTROL VALVE
PRV	PRESSURE REGULATED VALVE (INTERNAL SELF CONTROLLED)
PDI	DIFFERENTIAL PRESSURE INDICATOR
PDIT	DIFFERENTIAL PRESSURE INDICATING TRANSMITTER
PDT	DIFFERENTIAL PRESSURE TRANSMITTER
PI	PRESSURE INDICATOR
PIC	PRESSURE INDICATING CONTROLLER
PIT	PRESSURE INDICATING TRANSMITTER
PSV	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
PV	PRESSURE CONTROL VALVE
PVRV	PRESSURE VACUUM RELIEF VALVE
RO	RESTRICTION ORIFICE
SCR	SILICON CONTROLLER RECTIFIER
SI	SPEED INDICATOR
SIC	SPEED INDICATING CONTROLLER
SS	SPEED SWITCH
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATING CONTROLLER
TIT	TEMPERATURE INDICATING TRANSMITTER
TT	TEMPERATURE TRANSMITTER
TV	TEMPERATURE CONTROL VALVE
TY	TEMPERATURE RELAY
VM	VIBRATION MONITOR
ZI	POSITION INDICATOR
ZS	POSITION SWITCH
ZSC	POSITION SWITCH CLOSED
ZSO	POSITION SWITCH OPEN
ZT	POSITION TRANSMITTER
TT-HY	TEMPERATURE & HUMIDITY TRANSMITTER

FLUID CODE

O2	OXYGEN
H2	HYDROGEN
PWH2	PURE WATER + DISSOLVED HYDROGEN
OWH2	PURE WATER + DISSOLVED OXYGEN
DPWH2	DRAIN PURE WATER + DISSOLVED HYDROGEN
PW	PURE WATER
RW	RAW WATER
N2	NITROGEN
CA	COMPRESSED AIR
AA	AMBIENT AIR
CW	COOLING WATER

ZONE DEFINITION

STACK ROOM	A01
PROCESS ROOM O2	A02
PROCESS ROOM H2	A03
WATER TREATMENT PACKAGE ROOM	C01
RECTIFIER + CONTROL CABINET ROOM	B01
HYDROGEN PROCESS CONTAINER	A10
HVAC ROOM	E01
INTERCONNECTION AREA	X00

PIPING CLASS

A B CC D
(1) (2) (3) (4)

(1) TYPE

P : PIPING (MM)
T : TUBING (INCH)
X : PFA

(2) PRESSURE RATING

A : CLASS 150
B : CLASS 300
D : CLASS 600
K : 3000 PSIG
R : MANUFACTURE'S STANDARD

(3) MAIN MATERIAL

10 : CARBON STEEL 0.0MM CORROSION ALLOWANCE
11 : CARBON STEEL 1.5MM CORROSION ALLOWANCE
13 : CARBON STEEL 3.0MM CORROSION ALLOWANCE
20 : STAINLESS STEEL 304
21 : STAINLESS STEEL 304L
22 : STAINLESS STEEL 316
23 : STAINLESS STEEL 316L
30 : CPVC SCH40
31 : CPVC SCH80
40 : PFA

(4) SPECIAL REQUIREMENT

S : SEAMLESS PIPING COMPONENTS
W : WELDED PIPING COMPONENTS

NOTES :

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Title, Supplementary title: LEGEND SHEET 1

Client reference: -

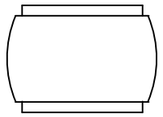
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PIPING SYMBOLS

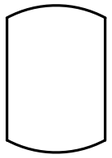
- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- NEEDLE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- HAND-OPERATED GLOBE VALVE
- THREE WAY VALVE
- PRESSURE SAFETY VALVE
- PRESSURE REGULATOR VALVE
- BLOCK AND BLEED VALVE
- MOTORIZED TWO WAY VALVE
- ECCENTRIC REDUCER
- CONCENTRIC REDUCER
- REMOVABLE SPOOL
- EXPANSION JOINT
- Y FILTER
- CLASS BREAK
- SPEC BREAK
- BATTERY LIMIT
- LINE BREAK
- COMPRESSION FITTING
- FLANGED CONNECTION
- THREADED CONNECTION
- PLUG
- SLOPE
- STEAM TRAP
- FLEXIBLE HOSE

- INTEGRAL VALVE ROTAMETER
- RUPTURE DISC
- SPECTACLE BLIND
- HEAT RIBBON
- INSULATION
- ORIFICE PLATE
- DRIP PAN
- THERMOMETER
- EXPANSION JOINT

EQUIPMENT SYMBOLS



HORIZONTAL SEPARATOR



CONDENSATE SEPARATOR

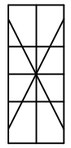
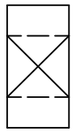
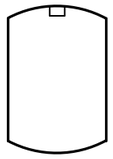


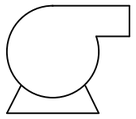
PLATE HEAT EXCHANGER



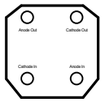
FIXED BED FILTER



HIGH PRESSURE DEGASSER



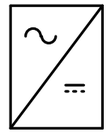
PUMP



STACK



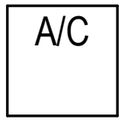
METALLIC MESH



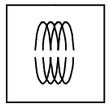
RECTIFIER



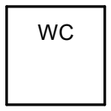
AIR EXTRACTOR



AIR CONDITIONER



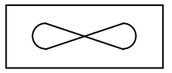
TRANSFORMER



WATER CHILLER



SMOKE DETECTOR



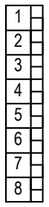
DRY COOLER



VISUAL ELEMENT



BUZZER



PNEUMATIC VALVE ISLAND



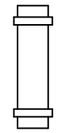
SPEED VARIATOR



ELECTRICAL HEATER



GAZ CYLINDER



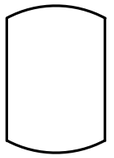
DUCTED PIPE



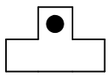
HAND SWITCH



FLOATING - HEAD TUBE -
BUNDLE HEAT EXCHANGER



BUFFER TANK



BALL SIPHON

Rev.	Date	Ed.	Ver.	App.	Description
9	14/02/2025	DPI	JNG	BCA	ISSUE FOR APPROVAL
8	17/07/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-016	DPI	JNG	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: LEGEND SHEET 2

Client reference: -

Rev.	Date of issue	Lang.	Page
9	14/02/2025	EN	16/16

C63-PWI-002

CAUSE AND EFFECT MATRIX

(Phase 2)

C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
005	5th Issuance (Ph2) - IFC	28/01/2025	DPI	BCA	IDI
004	4thrd Issuance (Ph2) - IFC	04/09/2024	BCA	HCH	BBA
003	3thrd Issuance (Ph2) - IFA	26/04/2024	JNG	HCH	BCA
002	2end Issuance (Ph1)	*18/08/2023*	*JLB*	*LSH*	*EGR*
001	*1st Issuance (Ph1)*	*14/04/2023*	*LSH*	*BCA/LSH*	*EGR*

Elogen Project Document Number	C63-PWI-002
Elogen Project Document Name	CAUSE & EFFECT MATRIX
Elogen Document File Name	C63-PWI-002_Rev.004

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REVISION LIST

REV.	DESCRIPTION
003	*General update as per PID and HAZOP recommendations*
004	*General update*
005	General update according to CRS rev. 04

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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Bonjour vous venez d'ouvrir la Cause and Effect
Ce document liste les interlocks process et safety
Vous retrouverez les différentes séquences ou actions singulières qui existent dans l'anlayse fonctionnelle
Les codes des séquences sont associés ensuite avec ceux présents dans la table d'alarme, on peut ainsi déterminer quels sont les initiateurs
Le document associé est le CXX - PWI-003- Alarm list

Hello, you just opened the Cause and Effect
This document makes the list of interlocks process and safety
You will find the different sequences or singular actions existing in the functional analysis
The codes of sequences are associated with the one present in the alarm table, then it is possible to determine the initiating cause
The document associated is CXX - PWI-003- Alarm list

CAUSE & EFFECT DIAGRAM	EFFECTS	DISPLAY alarm	TRIGGER Safety Relay	ENABLE ESD signal (ASE-001 : Process) to customer SCADA	ENABLE ESD signal (ASE-002: Fire and Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger Main Circuit Breaker	STOP AND SET Rectifiers (all) (Usually)	RESET Rectifiers	ALL control valves Back to rest position	CLOSE Control valves MPV-011 (FO)	CLOSE Control valves MPV-030 (FO)	CLOSE PV-001 (FC)	CLOSE H2 purification unit pneumatic valves	CLOSE MSWV-200 (FO)	CLOSE PV-003 (FO) - CUSTOMER LINE ISOLATED	CLOSE SV-641 (FC)	CLOSE SV-642 (FC)	START CONTINUOUSLY BUZ-1000 / 1001 / 1002 / 1003
CAUSES																		
Référence effect																		
INTERLOCK PROCESS																		
IP1		X					X	X		X		X	X	X	X	X	X	
IP2		X																
IP3		X					X	X		X		X	X	X	X	X	X	
IP4		X													X			
IP5		X					X	X		X		X	X	X	X	X	X	
IP6		X					X	X		X		X	X	X	X	X	X	
IP7		X					X	X		X		X	X	X	X	X	X	

	A	B	C	D	E	G	H	I	J
1	Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Alarm message (FR)	Timer (sec)	Alarm Group
2	OIHA-800	AAH-800	7	volppm	IP9	%O2 in H2 detector OIHA800 - H	Détection d'O2 dans l'H2 OIHA800 - H	5	DEFAULT
3	OIHA-800	AAHH-800	10	volppm	IP1	%O2 in H2 detector OIHA800 - HH	Détection d'O2 dans l'H2 OIHA800 - HH	1200	DEFAULT
4	REC-001	ACA-001	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
5	REC-002	ACA-002	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
6	REC-003	ACA-003	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
7	REC-004	ACA-004	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
8	CP-600	ACA-600	-	-	IP6	Starting of CP-600 failed.	Le démarrage de la CP-600 a échoué.	-	DEFAULT

CAUSE & EFFECT DIAGRAM

CAUSES		EFFECTS	DISPLAY alarm	STOP AND SET PURGE (Load-off)	DISENRGISE All solenoid valves. Back to rest position	CLOSE Control valves MPV-611 if FQ	CLOSE Control valves MPV-630 FQ	CLOSE PV-631 FQ	CLOSE H2 purification unit pneumatic valves	CLOSE KSWV-200 (FC)	CLOSE FV-601 FQ - CUSTOMER LINE ISOLATED	CLOSE PV-640 FQ	CLOSE PV-642 FQ	START INTERMITTENTLY (BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT VE-002 / 006 / 010 (Orange)	LIGHT ON FLASHING VE-001 / 005 / 009 (Rouge)	STOP IMMEDIATLY CP-200	STOP AT THE END OF STOP SEQUENCE CP-200	STOP IMMEDIATELY BY SETTING VAR60Alb to 0% (STO) THE RUNNING CP-600 (A or B following status)	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR60Alb TO 0% THE RUNNING CP-600 (A or B following status)	STOP IMMEDIATELY BY SETTING VAR60Alb TO 0% THE RUNNING CP-620 (A or B following status)	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR60Alb TO 0% THE RUNNING CP-620 (A or B following status)	STOP AT THE END OF STOP SEQUENCE CP-200 + 240 seconds	STOP IMMEDIATELY H2 purification unit Valves dryers heating	STOP IMMEDIATELY BY SETTING VAR60Alb TO 0% THE RUNNING LP-300 (A or B following status)	STOP IMMEDIATELY WC-400 (CP-400)	STOP AT THE END OF STOP SEQUENCE WC-400 (CP-400)	STOP IMMEDIATELY WC-401 (CP-401)	STOP AT THE END OF STOP SEQUENCE WC-401 (CP-401)	OPEN PV-611 (FC) till depressurisation and/or inerting of ST-600 completed. OPEN PV-610 if MPV-611 is falling	D-PEN PV-651 (FC) till depressurisation and/or inerting of ST-620 completed. OPEN FV-600 if PV-651 is falling	OPEN PV-901 if FQ till PT-610 reach 0,5 barg	OPEN PV-901 if FQ till inerting of ST-600 completed	OPEN PV-921 if FQ till inerting of ST-620 completed	OPEN PV-921 if FQ till PT-610 reach 0,6 barg	OPEN IMMEDIATLY PV-652 if FQ	OPEN IMMEDIATLY Air pressure < PT-630_HH	FORCE STANDBY PRESSURISED TT1003<TAH1002 or TT1003<TAH1003 or TT1004<TAH1002 or TT1004<TAH1004 or TT1005<TAH1005 or TT1006<TAH1006	FORCE STANDBY After 1 200s	SWITCH LP300 - From A to B or B to A	SWITCH CP600 - From A to B or B to A	SWITCH CP620 - From A to B or B to A	GO TO STANDBY PRESSURISED	REDUCE ELECTROLYSER SETPOINT AT 50%
Effect reference																																											
INTERLOCK PROCESS	***DESCRIPTION***																																										
IP1	Major Fault		X	X	X		X			X	X	X	X	X			X		X			X			X		X		X		X	X	X	X									
IP2	*Not Used*																																										
IP3	*Not Used*																																										
IP4	Hydrogen Purity not reached or Hydrogen pressure too high		X									X																												X				
IP5	Problem on CP-620A/B requiring instant stop of the pump		X												X						X																						
IP6	Problem on CP-600A/B requiring instant stop of the pump		X												X				X																								
IP7	Problem on LP-300A/B requiring instant stop of the running pump		X												X												X																
IP8	Low Temperature in anodic/cathodic water loop and ambient		X							X				X	X																												
IP9	Process value out of regular operating value		X												X																												
IP10	*Not Used*																																										
IP11	High Ambient temperature - Loss of AHU		X												X																										X		
IP12	*Not Used*																																										
IP13	Hydrogen Ambient Detection High		X											X	X																												
IP14	*Not Used*		X																																								
IP15	Minor Fault requiring stop of production		X																																						X		
IP16	Problem on pure water feed to anodic loop		X																								X																
IP17	LP300 changeover unforeseen		X																																						X		
IP18	CP600 changeover unforeseen		X																																							X		
IP19	CP620 changeover unforeseen		X																																								X	
IP20	LOSS OF HALF OF THERMAL POWER (THS-400 or THS-200)		X																																									X

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		Electrolyzer Package																													
		CAUSE AND EFFECT MATRIX																													
		C63- CrossWind Project																													
CAUSE & EFFECT DIAGRAM		**EFFECTS**	DISPLAY alarm	ENABLE ESD signal (ASE-001 : Process) to customer SCADA	ENABLE ESD signal (ASE-002: Fire and Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger MN Breaker (Main Supply)	STOP AND SET Rectifiers (all) (Uset=0V)	ACTIVATE Safety E.Board 061A2, MN Inter DC (ESD Rectifiers), MN Rectifer Breaker	START CONTINOUSLY (NOT IN SIS) BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT (NOT IN SIS) VE-001 / 005 / 009 / 013 (Rouge)	STOP IMMEDIATELY CP-600A/B BY SETTING VAR-600A/B TO 0%	STOP IMMEDIATELY CP-620A/B BY SETTING VAR-620A/B TO 0%	STOP IMMEDIATELY LP-300A/B BY SETTING VAR-300A/B TO 0%	OPEN PV-610 (FO) till depressurisation and/or inerting of ST-600 completed.	OPEN PV-630 (FO) till depressurisation and/or inerting of ST-620 completed. OPEN PV-631 if PV-630 is failling.	OPEN PV-900 (FO) till inerting of ST-600 completed	OPEN PV-920 (FO) till inerting of ST-620 completed	CLOSE AND LOCK PV-641 (FC)	CLOSE PV-635 (FC)	CLOSE AND LOCK PV-601 (FC)	OPEN IMMEDIATELY PV-610 (FO) till pressure < PT-611_H-0,2	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-631_H-0,2	CLOSE PV-800	OPEN PV-900 (FO) till PT611 > 0,5 barg	OPEN PV-920 (FO) till PT-631 > 0,5 barg	CLOSE PV-501 (FC)	STOP IMMEDIATELY CP-600A BY SETTING VAR-600A TO 0%	STOP IMMEDIATELY CP-600B BY SETTING VAR-600B TO 0%	STOP IMMEDIATELY CP-620A BY SETTING VAR-620A TO 0%	STOP IMMEDIATELY CP-620B BY SETTING VAR-620B TO 0%	TRIGGER IS1
CAUSES																															
Effect reference																															
INTERLOCK SAFETY	***DESCRIPTION***																														
IS1	ESD Electrolyser following Process issue SAFETY STOP		X	X		X	X	X	X	X				X	X	X	X		X												
IS2	Isolation from customer H2 line		X																X												
IS3	Isolation balancing line (640)		X															X													
IS4	ESD Electrolyser following Fire & Gas issue		X		X	X	X	X	X	X				X	X	X	X		X												
IS5	Very Low water level in ST-620		X				X					X																			X
IS6	Very Low water level in ST-600		X				X				X																				X
IS7	*Not Used*																														
IS8	*Not Used*																														
IS9	Very High Flowrate on H2 Analysis Line		X																					X							
IS10	Very Low Pressure on anodic side		X																						X						
IS11	Very Low Pressure on cathodic side		X																							X					
IS12	Very High Level ST-600		X										X																		
IS13	Very Low Level CS-610		X																	X											
IS14	Very Low Level in H2 Vent		X																								X				
IS15	Blocked discharge CP600A		X																									X			
IS16	Blocked discharge CP600B		X																										X		
IS17	Blocked discharge CP620A		X																											X	
IS18	Blocked discharge CP620B		X																												X
IS19	MPV-611 fault - High Oxygen Pressure																				X										
IS20	PV-631 fault - High Hydrogen Pressure																					X									

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Commissioning Query Form

CROSSWIND
ROSETTI MARINO

SITE ORIGINATOR TO COMPLETE		QUERY NUMBER	CQ-001		
		ORIGINATING LOCATION REF. NO	Crosswind		
		DISCIPLINE:	Piping/Process	LOCATION:	Electrolyser
		WORKPACK REF:	Fores Leak Test Pack 3		
		SYSTEM 20-00		SUB SYSTEM:	N/A
			Print: John Mackillop	Sign:	Date: 14.01.25
		DESCRIPTION OF QUERY			
		Proposed change of test medium for Fores GALT from Nitrogen to air, this is seen as a safer option at this stage of the project, it will also reduce the areas to be barriered off.			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		Please see attached documents in email			
		PROPOSED SOLUTION			
		Use air instead of Nitrogen			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)		C. McCann Print:	Sign: 15/1/25 Date:
		RECEIVED (Y or N?) BY:		PAOLETTI C Print:	Sign: 20/01/25 Date:
ENGINEERING TO COMPLETE		***ENGINEERING TECHNICAL RESPONSE***			
		>> *Detail the technical discipline response to the above query and proposal here* **OK for Air only if it is clean & dry air (use an oil free compressor and a dryer if IA not available)**			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		>> *List any attached sketches/information required to fully describe the response here*			
		REQUIRES CLARIFICATIONS (Y or N?)	N	IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.	
		RESPONSE PREPARED BY:		Print: Milade Sarmadi	Sign: Date: 15/01/25
		APPROVED DISCIPLINE LEAD (Y or N?)		Print: Hamant Patel	Sign: HP Date: 20-01-2025
		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		J. Mackillop Print:	Sign: Date: 20.01.25
		PAC TO BE ISSUED (Y or N?)	N	NCR TO BE ISSUED (Y or N?)	N ATRAC No.: N
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)	Y	S.Bremner Print:	Stephen Bremner Sign: Date: 20/01/25
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)	Y	IF "NO", RETURN TO CROSSWIND WITH COMMENT	
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN			
		>>*Detail the actions taken here*			
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		J. Mackillop Print:	Sign: Date: 20.1.25
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		Print:	Sign: Date:

Commissioning Query Form

		QUERY NUMBER	*CQ-00*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Instruments**	LOCATION:	**Electrolyser**	
		WORKPACK REF:				
		SYSTEM:20-00		SUB SYSTEM:	N/A	
			Print: Dave Musgrove	*Sign:*	*Date: 14/03/2025*	
		DESCRIPTION OF QUERY				
		While carrying out Inspections of the Atex certified equipment, it has been identified that there is a damaged flame path on the Endress + Hauser pressure transmitter PT-632, this is situated on the Hydrogen vent line 635-50-PWH2-PB22S within the WP3 Zone 2 area. The pressure transmitter PT-632 is for the Hydrogen general vent and is for indication only, this has no executive actions and is designed to read the pressure of the Hydrogen prior to it being vented to atmosphere. Due to the lead time/ETA of the replacement transmitter which is not due until after the target date for Hydrogen introduction, is it acceptable to run the system and introduce Hydrogen on to the BLPH and within the WP3 Zone 2 area without PT-632 being in service?				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		Please see attached documents in email				
		PROPOSED SOLUTION				
		Isolate PT-632 both electrically and mechanically to allow the introduction of Hydrogen to the BLPH and the WP3 Zone 2 area. Once the replacement like for like Endress + Hauser pressure transmitter arrives this will be installed and brought into service.				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)	Y	*Print:*	*Sign:*	*Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:*	*Date:*
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:*	*Sign:*	*Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:	
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

Commissioning Query Form

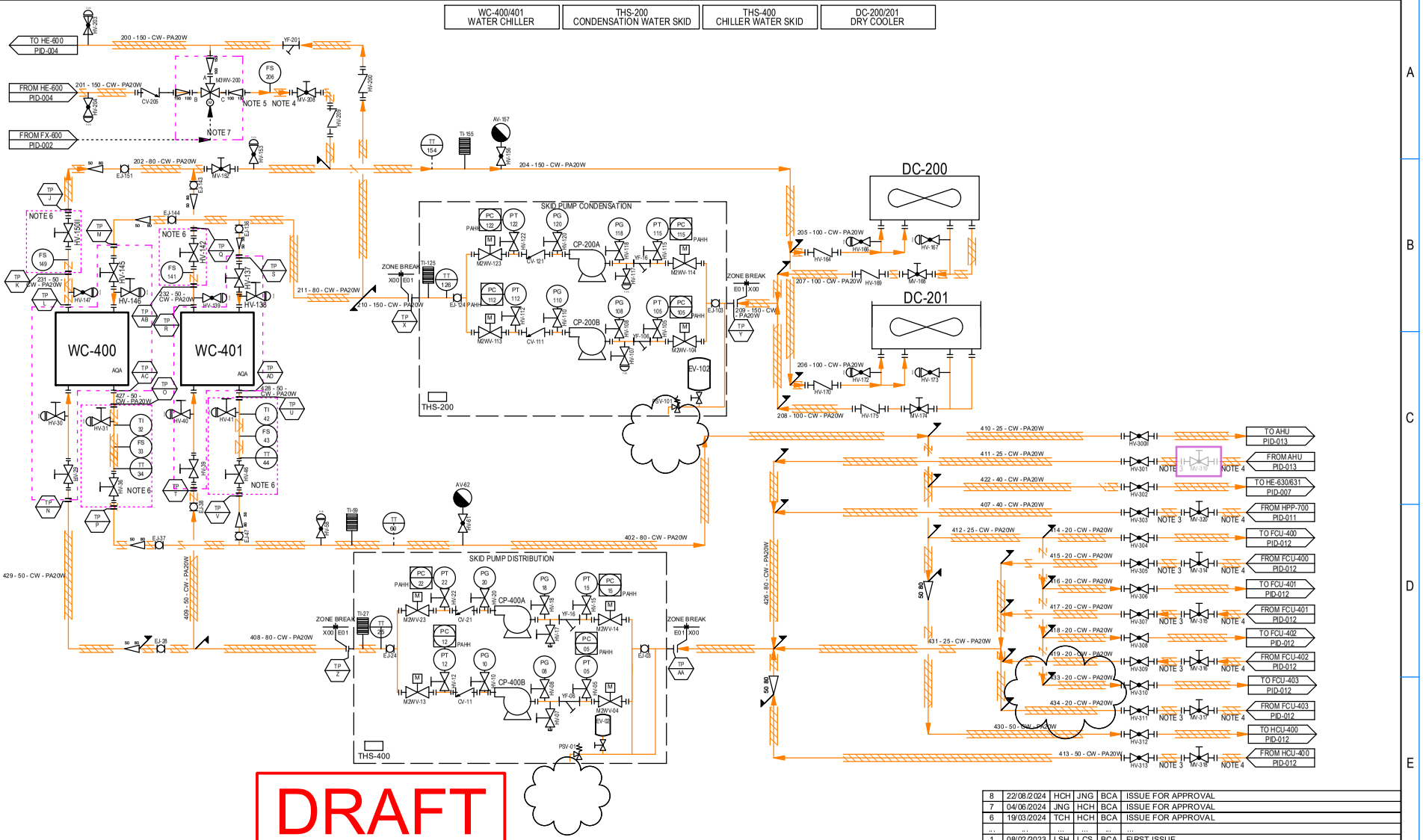
		QUERY NUMBER	*CQ-006*		
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**			
		DISCIPLINE:	**Instruments**	LOCATION:	**Electrolyser**
		WORKPACK REF:			
		SYSTEM:20-00		SUB SYSTEM:	N/A
			Print: Dave Musgrove	*Sign:*	*Date: 14/03/2025*
		DESCRIPTION OF QUERY			
		While carrying out Inspections of the Atex certified equipment, it has been identified that there is a damaged flame path on the Endress + Hauser pressure transmitter PT-632, this is situated on the Hydrogen vent line 635-50-PWH2-PB22S within the WP3 Zone 2 area. The pressure transmitter PT-632 is for the Hydrogen general vent and is for indication only, this has no executive actions and is designed to read the pressure of the Hydrogen prior to it being vented to atmosphere. Due to the lead time/ETA of the replacement transmitter which is not due until after the target date for Hydrogen introduction, is it acceptable to run the system and introduce Hydrogen on to the BLPH and within the WP3 Zone 2 area without PT-632 being in service?		
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		Please see attached documents in email			
		PROPOSED SOLUTION			
		Isolate PT-632 both electrically and mechanically to allow the introduction of Hydrogen to the BLPH and the WP3 Zone 2 area. Once the replacement like for like Endress + Hauser pressure transmitter arrives this will be installed and brought into service.			
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)	Y	*Print:*	*Sign:* / *Date:*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)		*Print:*	*Sign:* / *Date:*
		ENGINEERING TECHNICAL RESPONSE			
		>> Detail the technical discipline response to the above query and proposal here			
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)			
		>> List any attached sketches/information required to fully describe the response here			
		REQUIRES CLARIFICATIONS (Y or N?)		IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.	
		RESPONSE PREPARED BY:		*Print:*	*Sign:* / *Date:*
		APPROVED DISCIPLINE LEAD (Y or N?)		*Print:*	*Sign:* / *Date:*

Commissioning Query Form

		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:	
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

09	Stop the operation for at least 12h.			
10	Recheck all conductivity measurements after 12h the ensure σ < 0.5µS/cm. Proceed to a flushing (Steps 05-08) or troubleshooting if the conductivity is not OK.			
11	Fill the FH-600 with Resin (check the Resin Filling in section 9.)			
12	Fill the system with water until conditions described in Step 03 Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.			
13	Start the pump CP-600A or CP-600B and flush the water loop again with the resin filled in the FH-600. Check in F-600 if any dirt or resin has been collected. If resin is collected, do some troubleshooting at the FH. The goal is to reach a conductivity below **0.1 µS/cm** at the end of the operation. Fill the Flushing Report.			
14	Perform the Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up (Leak Test Pack 01) in Appendix: Pure water is left in place and a mix of N2/H2 is injected till 11.7 barg through HV-902. Follow the methodology explained in the Leak Test chapter in the Method Statement. Do a precise leak check with the H2 sniffer. Fill the Leak Test ITR.			

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Rev.	Date	Ed.	Ver.	App.	Description
8	22/08/2024	HCH	JNG	BCA	ISSUE FOR APPROVAL
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- REFER TO HVAC PACKAGE DOCUMENTATION FROM PAUMIER FOR COMPLETE P&ID - P&ID N° (HOLD)
-IS ON THE THERMAL SKID WILL BE ADDED FOR THE NEXT REVISION

NOTES :
NOTE 1 : OUTSIDE THE CONTAINER AND CLOSE TO AHD-1002

NOTE 3 : 2xD MINIMUM DISTANCE
NOTE 4 : 5xD MINIMUM DISTANCE
NOTE 5 : 10xD MINIMUM DISTANCE
NOTE 6 : THESE EQUIPMENTS WILL BE SUPPLIED ASSEMBLED.
NOTE 7 : FROM B TO C: PROCESS LINE 100% OPEN. FROM A TO C: BYPASS LINE 100% OPEN.

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-010	HCH	JNG	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HVAC UNIT

Client reference: -

Rev.	Date of issue	Lang.	Page
8	22/08/2024	EN	10/16

elogen	Electrolyzer Package	Document Code	
	Smoke Detector Zone List	Revision	Rev.0
	C63- CrossWind Project	Page Number	3 of 4

LEGEND

D-OSD	OPTICAL SMOKE DETECTOR
X-OSD	OPTICAL SMOKE DETECTOR ATEX
D-MCP	MANUAL CALL POINT

C&E MATRIX

TYPE	DESCRIPTION
FAULT	if a MCP is in fault status, the SSI panel activate the fault output
	if 1 sensor is in fault status, the SSI panel activate the fault output
	if the SSI panel has an internal fault status (battery fault, card fault ecc..), the SSI panel activate the fault output
FIRE	if a MCP is pressed, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in alarm status, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in fault status, the SSI panel activate the fire alarm output
	if there is 1 sensor in alarm and 1 sensor in fault in the same zone, the SSI panel activate the fire alarm output

SD-00xA	SD-00xB	SD-00xC	OUT
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

TESTED 11.4.25
JOHN MACKILLOP

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elogen	Electrolyzer Package						Document Code	
	Smoke Detector Zone List						Revision	Rev.0
	C63- CrossWind Project						Page Number	4 of 4
NAME	CARD	RACK	POS	CHANNEL	TYPE	LEVEL	ZONE	LOGIC
SD-001A_SMOKE DET.	F7009	1	1	1	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001B_SMOKE DET.	F7009	1	1	2	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001C_SMOKE DET.	F7009	1	1	3	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-002A_SMOKE DET.	F7009	1	1	4	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002B_SMOKE DET.	F7009	1	1	5	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002C_SMOKE DET.	F7009	1	1	6	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-003A_SMOKE DET.	F7009	1	1	7	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003B_SMOKE DET.	F7009	1	1	8	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003C_SMOKE DET.	F7009	1	1	9	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-004A_SMOKE DET.	F7009	1	1	10	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004B_SMOKE DET.	F7009	1	1	11	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004C_SMOKE DET.	F7009	1	1	12	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-005A_SMOKE DET.	F7009	1	1	13	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005B_SMOKE DET.	F7009	1	1	14	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005C_SMOKE DET.	F7009	1	1	15	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-006A_SMOKE DET.	F7009	1	1	16	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006B_SMOKE DET.	F7009	1	1	17	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006C_SMOKE DET.	F7009	1	1	18	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-007A_SMOKE DET.	F7009	1	1	19	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007B_SMOKE DET.	F7009	1	1	20	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007C_SMOKE DET.	F7009	1	1	21	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-008A_SMOKE DET.	F7009	1	1	22	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008B_SMOKE DET.	F7009	1	1	23	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008C_SMOKE DET.	F7009	1	1	24	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
FB-001_FIRE BUTT.	F7009	1	1	25	D-MCP	00	8 - 20-UCP-001	1 = ALARM
FB-002_FIRE BUTT.	F7009	1	1	26	D-MCP	00	9 - LEVEL 00	1 = ALARM
FB-003_FIRE BUTT.	F7009	1	1	27	D-MCP	01	10 - LEVEL 01	1 = ALARM
FB-004_FIRE BUTT.	F7009	1	1	28	D-MCP	01	10 - LEVEL 01	1 = ALARM

TESTED 11.04.25
JOHN MACKILLOP
E. [illegible]

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

AQA-1003

1ROP1.1 — 2ROP1.1 — YP-70 — 1PSP1.1 — 1RFP1

PI 1RO5 — PI 1RO7 — PI 2RO5 — PI 2RO7 — PI 2RO8 — PI 1F1 — PI 1ME2 — PI 1ED1 — PI 1ED2 — PI 1ED4 — PI 1ED6 — PI 2F1 — PI 2F2 — PI 1PS3 — PISA+ 1PS1

TI 1C1 — TI 1RO7 — TI 1ED7 — TI 2RO7 — TI 1B4 — FSA- 1ED3 — FSA 1ED3 — QE 1Z1 — QIA 1Z1 — QISA+ 2RO4 — PSA- 1RO2 — QISA+ 1RO4 — PSA- 1F2 — UI 1ED11 — LISA 1RF1

FI 1ME3 — FI 1RO6 — FI 2RO6 — FI 1ED3 — FI 1ED4 — FI 1ED5 — FIR 1RO8 — FIR 2RO5 — FIR 1ED1 — FIR 2RO3 — FIR 2RO6 — FIR 1RO3 — FIR 1PS4 — QIA 1B4

WTP-300

DEMIN TANK — LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 — LALL

FROM LIC-600 PID-003

TO ST-600 PID-003

PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

306 - 25 - PW - PA22S

300 - 15 - RW - PA22S

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

CAHH 300 — CAHH

4A — 5A — PA22S — TK22

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404 — 504 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S

302A - 25 - PW - PA22S — 303A - 25 - PW - PA22S — LP-300A — HV-301A — HV-300DA — CV-301A — CV-302A — HV-302A — HV-303DA — NOTE 5 — NOTE 1 NOTE 4 NOTE 3 NOTE 9

302B - 25 - PW - PA22S — 303B - 25 - PW - PA22S — LP-300B — HV-301B — HV-300DB — CV-301B — CV-302B — HV-302B — HV-303DB

SLO-15 — IS 12 — VAR-300A — VAR-300B

#300 — SLW-320 — PB22S — PA22S

HV-307V — NNF — CV-320 — 307 - 25 - PW - PB22S — NOTE 2

TO ST-620 PID-006 — FROM LIC-600 PID-003 — FOR START-UP ONLY

ELO GEN — CLIENT — ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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Client

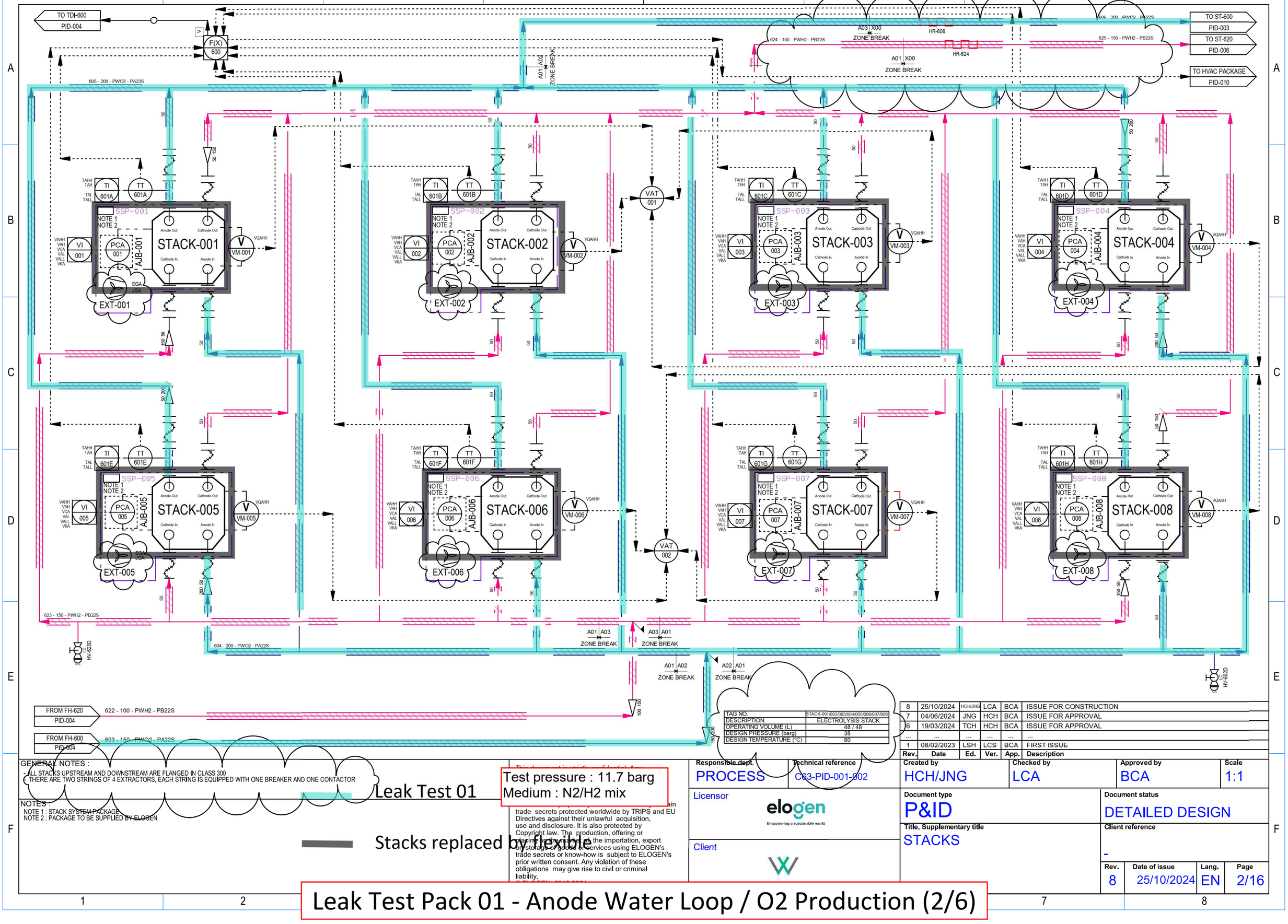
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

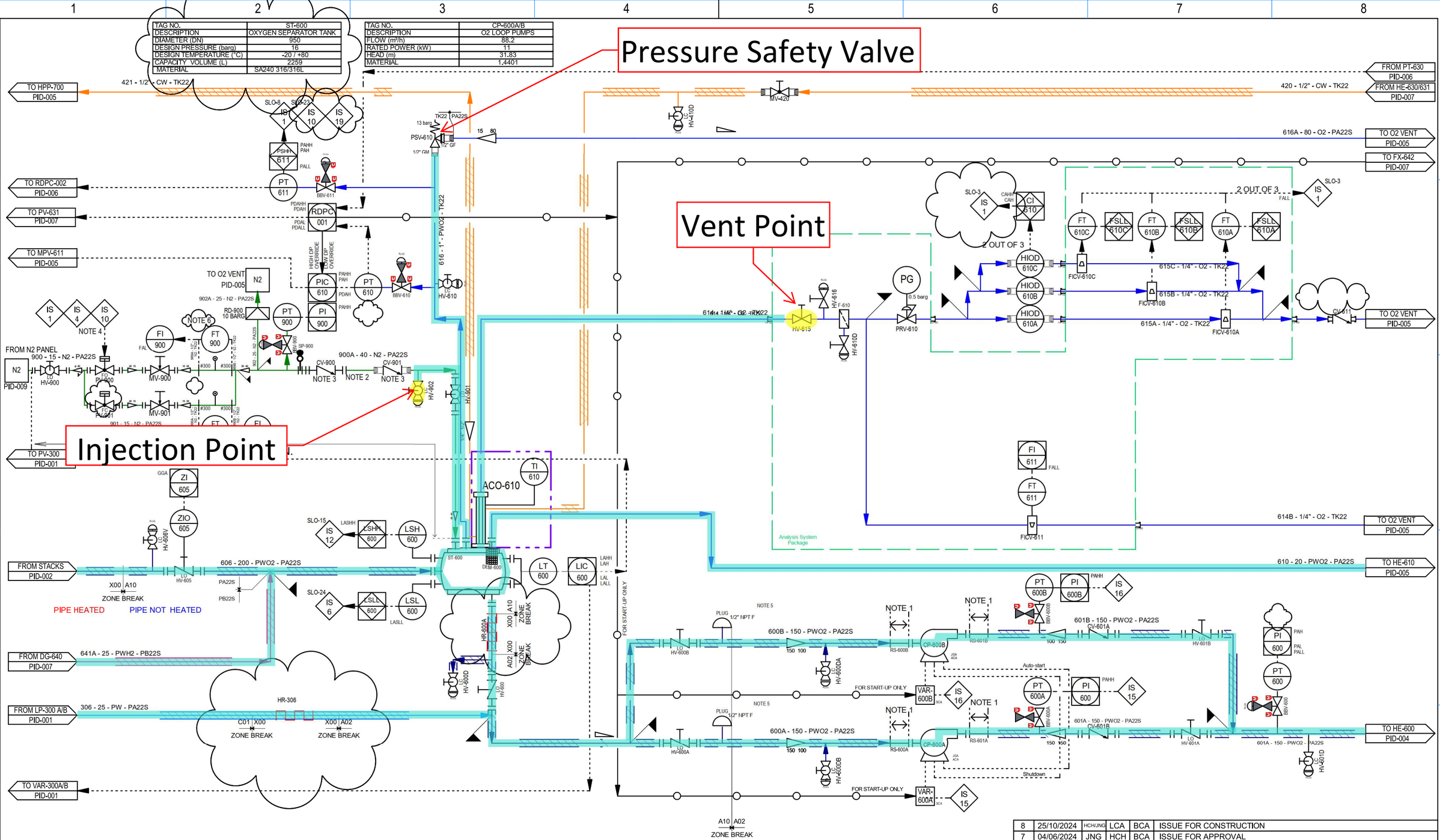
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8	25/10/2024	EN	1/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (1/6)



Leak Test Pack 01 - Anode Water Loop / O2 Production (2/6)



NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept. PROCESS	Technical reference C63-PID-001-003	Created by HCH/JNG	Checked by LCA
Approved by BCA	Scale 1:1		
Licensor elogen Empowering a sustainable world		Document type P&ID	Document status DETAILED DESIGN
Client		Title, Supplementary title OXYGEN SEPARATION	Client reference -

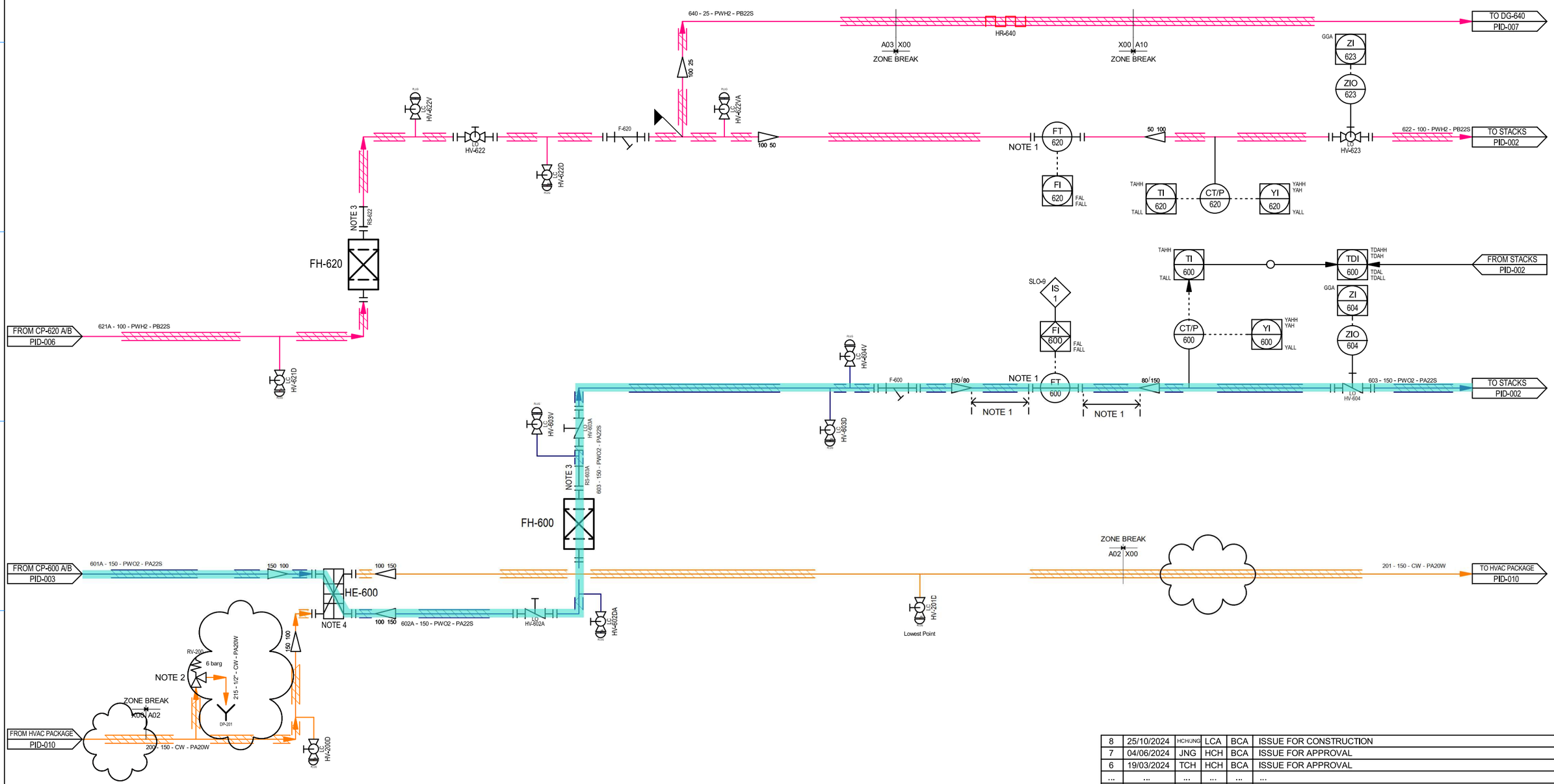
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	3/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (3/6)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 01

Test pressure : 11.7 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (4/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0

SAFE LOCATION - SEE DOC. PTN-002

O2 VENT

A10 X00

ZONE BREAK

PAH

PI 612

PT 612

BBV-612

FROM PSV-610 PID-003 — 616A - 80 - O2 - PA22S

FROM HIOD-610A/B/C PID-003 — 615A - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 614 - 1/4" - O2 - TK22

FROM N2 PANEL PID-009 — 906A - 50 - N2 - PA22S

FROM N2 PANEL PID-003 — 902A - 25 - N2 - PA22S

AV-402 — Highest Point — Free Floating Lever Air/Gas Vents

TO HPP-700 PID-011 — 406 - 50 - CW - PA20W

FROM PIC-610 PID-003

FROM ACO-610 PID-003 — 421 - 1/2" - CW - TK22

GDA AQA

FO MFV-611

612 - 50 - O2 - PA22S

613 - 50 - O2 - PA22S

IS 1 / IS 4 / IS 19

RO-610 0,6mm

40/20

617 - 40 - O2 - PA22S

FO PV-610

20/40

618 - 40 - O2 - PA22S NNF

619 - 80 - O2 - PA22S

HV-619D

FROM ST-600 PID-003 — 610 - 20 - PWO2 - PA22S

FROM HE-630/631 PID-007 — 405 - 50 - CW - PA20W

HE-610

NOTE 1
NOTE 2
NOTE 3

611 - 20 - PWO2 - PA22S

DEM-610

CS-610

NOTE 1

LSH 610

LIC 610 LAH LAL

LSL 610

LSL 611

LSLL 611 LALL

SLO-29 IS 13

HV-606D

607 - 1/2" - PWO2 - TK22

FO PV-600

PV-601

RO-600 0,4mm

607B - 1/2" - PWO2 - TK22

CV-600

PIPE NOT HEATED

PIPE HEATED

A10 X00 ZONE BREAK

TO LP-300 A/B PID-001

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (5/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (6/6)

800SA - Surge arrester for 480/484/489TB/G, EPDM



CONTACT

Sales contact
Phone: +49 9281 8306 0
kundenzentrum.hof@nexans.com

800SA - Surge arrester for 480/484/489TB/G, EPDM, up to 42 kV - 630 A/1250 A

STANDARDS

International IEC 60099-4

DESCRIBTION

Application

Surge arrester designed to protect 12, 24, 36 and 42 kV class components, including transformers, equipment, cable and accessories from high voltage surges resulting from lightning or switching.

Technical characteristics

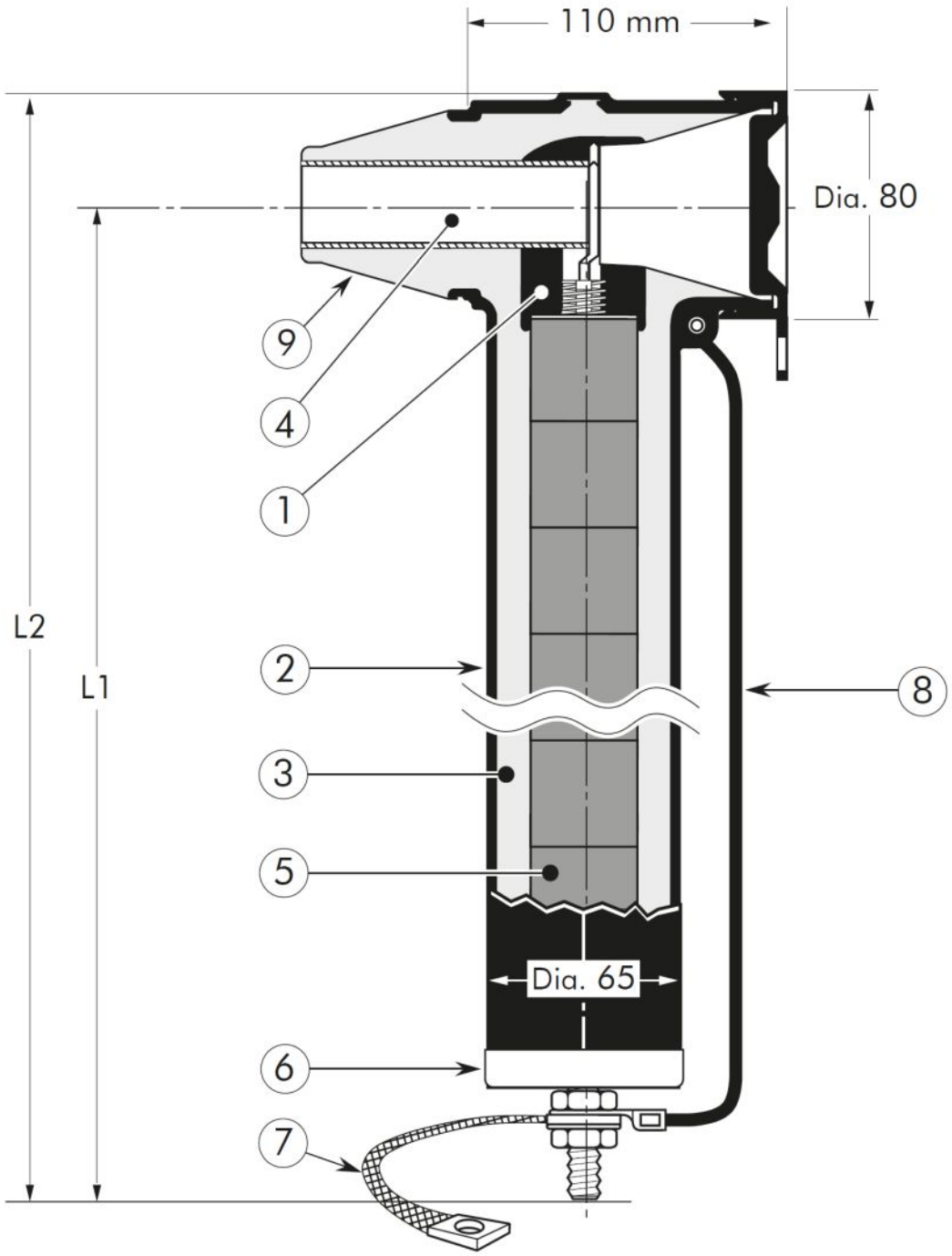
- It has been designed to be used with the 480TB/G, 484TB/G and 489TB/G separable tee connector or 800PB/G, 804PB/G and 809PB/G coupling connector.
- Each arrester is tested for AC withstand, partial discharge and critical voltage prior to leaving the factory.

Specifications and standards

The 800SA surge arresters meet the test requirements of IEC 60099-4. ATEX version can be delivered on request.

All drawings, designs, specifications, plans and particulars of weights, size and dimensions contained in the technical or commercial documentation of Nexans is indicative only and shall not be binding on Nexans or be treated as constituting a representation on the part of Nexans.

DRAWING 800SA



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800SA - Surge arrester for 480/484/489TB/G, EPDM

DESIGN 800SA

1. Conductive EPDM insert
2. Conductive EPDM jacket
3. Insulating EPDM layer moulded between the insert and the jacket
4. Receptacle for contact rod
5. Metal oxide valve elements
6. Steel cap
7. Earth connection
8. Earth lead
9. Interface designed to fit 480TB/G, 484TB/G and 489TB/G tee connector, 800PB/G, 804PB/G and 809PB/G coupling connector or 480BE/G bushing extender

SELECTION TABLE 800SA

Surge arrester type	Nominal discharge current I_n (kA)	Rated voltage[1] U_r (kV)	Max. continuous operating voltage U_c (kV)	High current impulse withstand (kA)	Dimensions (mm)		Ordering part number
					L1	L2	
800SA-10-6N	10	6	4.8	100	250	290	85801
800SA-10-9N	10	9	7.2	100	250	290	85803
800SA-10-12N	10	12	9.6	100	250	290	85805
800SA-10-15N	10	15	12.0	100	250	290	85807
800SA-10-18N	10	18	14.4	100	250	290	85809
800SA-10-22N	10	22	17.6	100	250	290	87149
800SA-10-24N	10	24	19.2	100	350	390	85811
800SA-10-30N	10	30	24.0	100	350	390	85813
800SA-10-33N	10	33	26.4	100	350	390	86998
800SA-10-36N	10	36	28.8	100	350	390	85815
800SA-10-42N	10	42	33.6	100	450	490	85817
800SA-10-45N	10	45	36.0	100	450	490	85819
800SA-10-51N	10	51	40.8	100	450	490	87147

[1] Surge arresters for other rated voltages available on request.

ORDERING INSTRUCTIONS 800SA

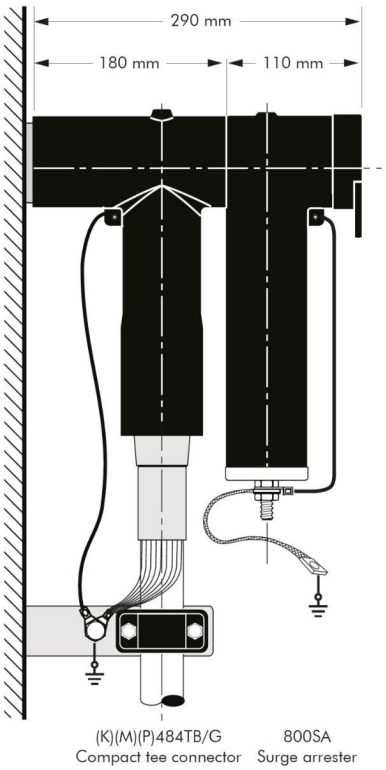
Indicate the type of surge arrester when ordering (see table). The part numbers each apply to one kit consisting of three surge arresters.

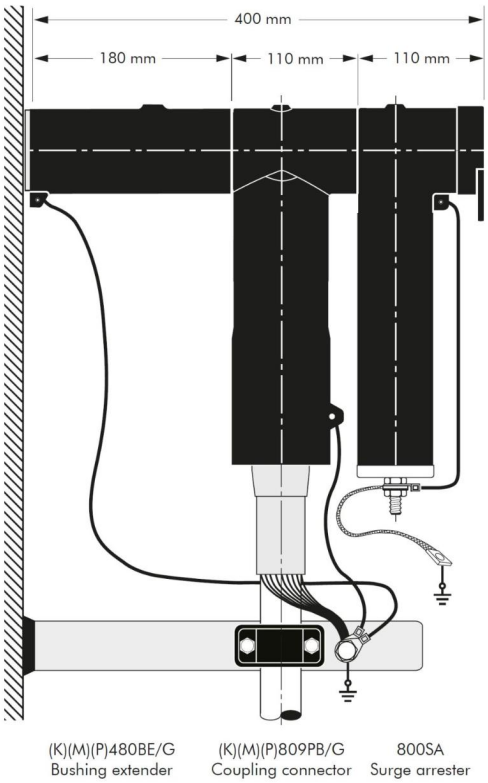
Order example:
For a max. operating voltage of 24 kV and a nominal discharge current of 10 kA, order according to the table: Surge arrester type 800SA-10-30N with part number 85813.

Note:
The order information only applies to the use in compensated, high-impedance and insulated networks.

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TYPICAL APPLICATION AND DIMENSIONS 800SA





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TECHNICAL INSTRUCTIONS AND APPLICATION INFORMATION (ACCESSORIES)

The data given were determined diligently, but do not release our customers of the duty to carry out tests themselves in order to check the suitability of the products delivered by us for the intended use. We reserve the right to modify characteristic and performance data according to the present state of technology. Processing and use of the products cannot be controlled by us and are therefore exclusively in your field of responsibility.

Our products meet the VDE standards respectively correspond to DIN pages and IEC recommendations.

Attention: Before first design in please contact manufacturer.

The products, described in this catalogue, are designed for connection of bare energy cable conductors (Class 1 & 2) with description of round solid (RE), round stranded (RM), as well as sector solid (SE), sector stranded (SM) and round stranded compacted (RMV) for conductor temperatures up to 90 °C. All conductor filling materials like tapes, yarn, powder or similar need to be completely removed before the installation. A check on basis of the actual existing conductor dimensions by the user is indispensable. This applies also for the application of Class 6 conductors or other special conductor types.

Impact wrenches have to be approved by Nexans! Depending on different conductor material or conductor type, indicated values may differ from test values acc. to IEC 61238-1. The use of fine stranded conductors has to be approved by Nexans Power Accessories Germany GmbH.

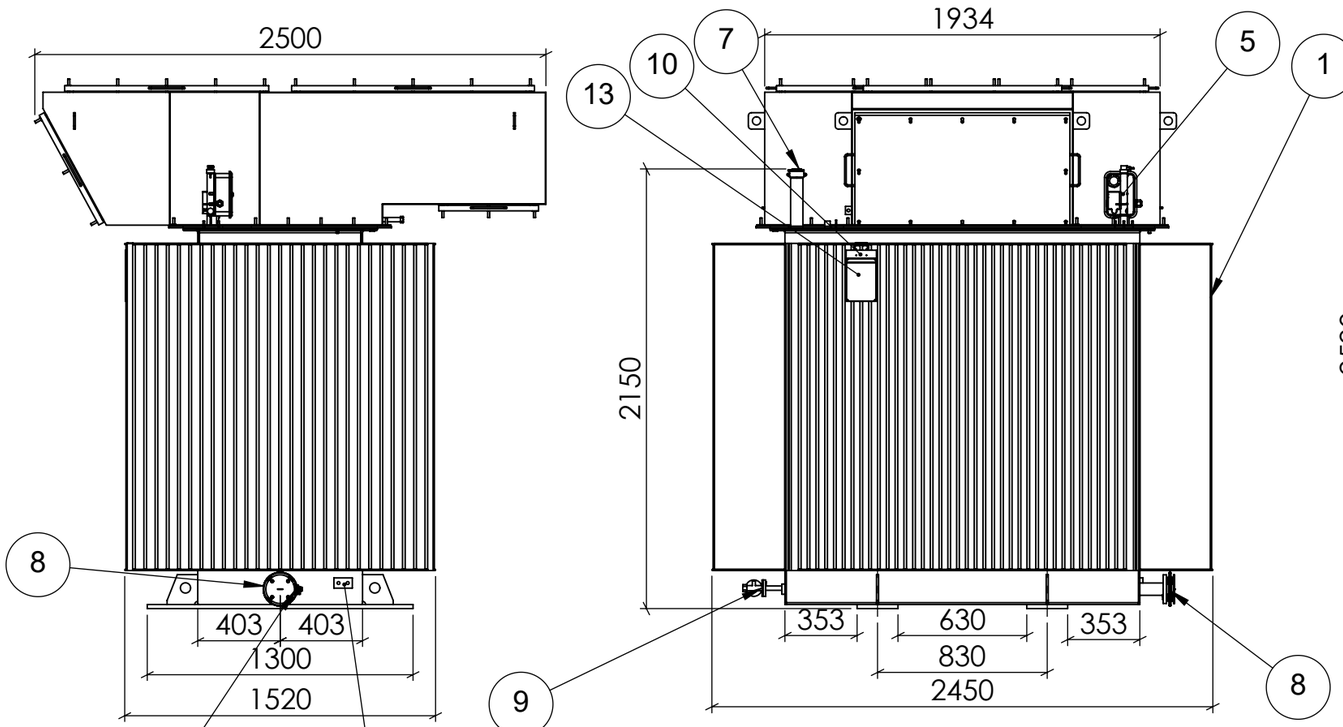
Our responsibilities are only those listed in the latest edition of “General terms and conditions for the supply of products and services of the electrical and electronics industry”. We can provide a copy on request.

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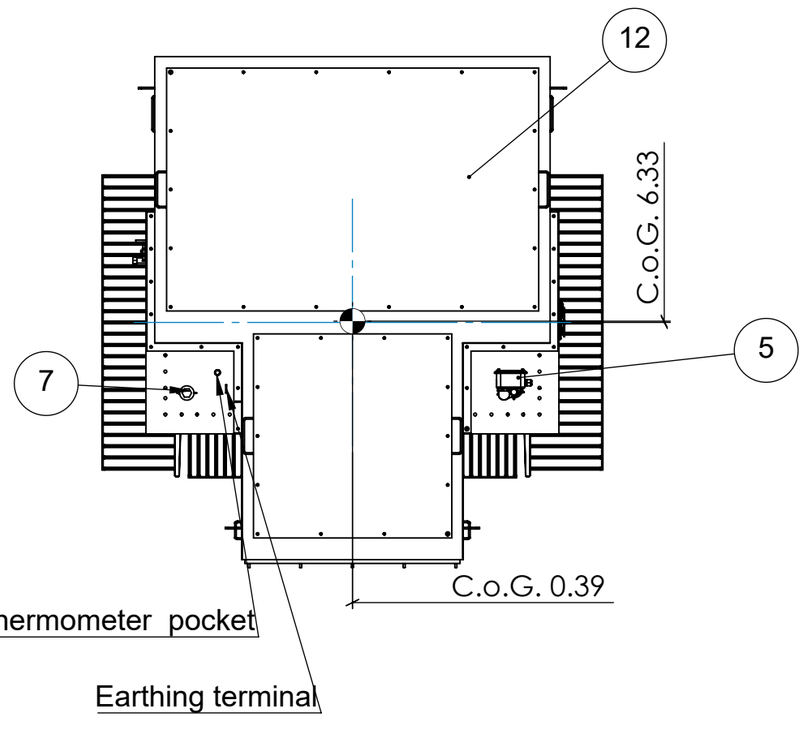
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Hof, May 2021

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Bushing	Voltage [V]
1U-1V-1W	6600
2u-2v-2w	360
2u'-2v'-2w'	270
3u-3v-3w	360
3u'-3v'-3w'	270



C.o.G. = Center of Gravity

elogen

VENDOR DOCUMENT REVIEW

Reviewed by	Position
Mohamed HAJI	Eelctrical Engineer

Accepted/Reviewed without Comments. No further revision. Work may proceed.	CODE 1	☑
Accepted/Reviewed with Comments. Revise and resubmit. Work may proceed.	CODE 2	☐
Rejected. Revise and resubmit. Work may not proceed.	CODE 3	☐
Received but not reviewed.	CODE 4	☐

ELOGEN acceptance in no way relieves the duty of the supplier to meet the Purchase Order requirements.

OIL MASS	2220 [kg]
DRY MASS	5880 [kg]
TOTAL MASS	8100 [kg]

Other data on technical data sheet

Pos.	Description	Q.ty
13	Rating Plate	1
12	Protection box AISI 304	1
11	Surge arrester	1
10	Standard rating plate support	1
9	Gate sample valve 1/2" DN15 PN6 lockable	1
8	Intercepting valve DN50 - PN6	1
7	Oil filling plug G2	1
6	Tap-changer type 24kV 120A 5 pos.	1
5	Integrated safety detector DGPT2 with PT100	1
4	Bushing type 1 kV - 3150A with flag - tinned	12
3	Bushing type EN 50180 36kV - 630A M400AR-3	3
2	Cover	1
1	Tank	1

Tolerance in according with EN-22768 ISO-2768

From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

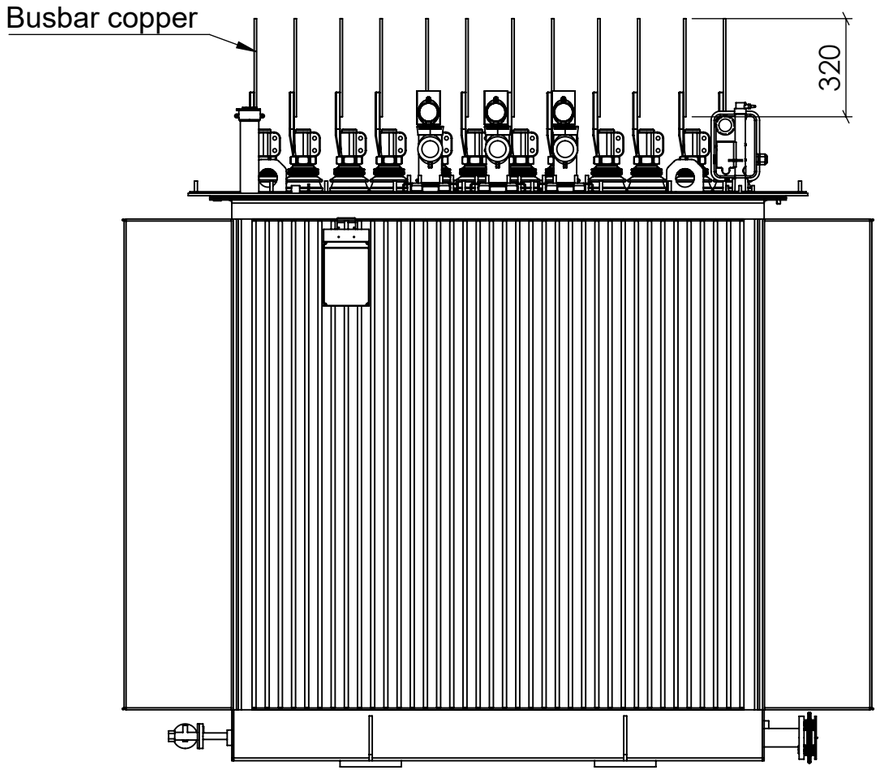
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A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

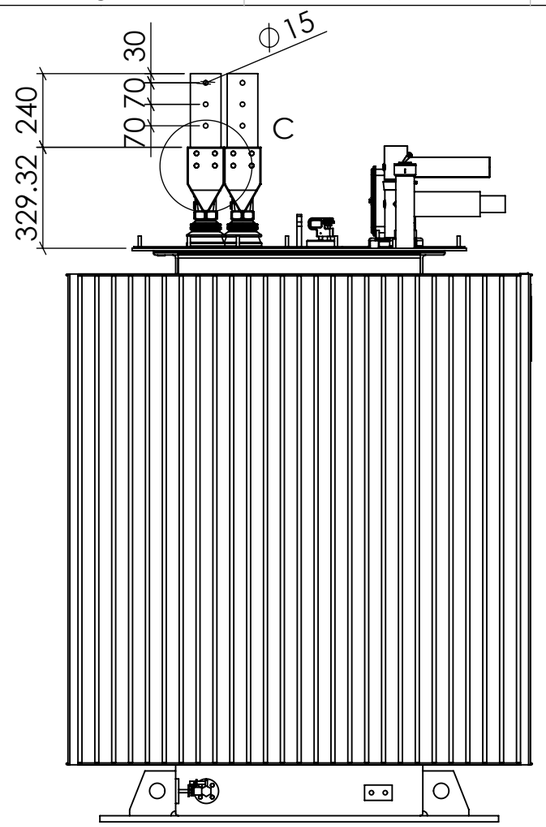
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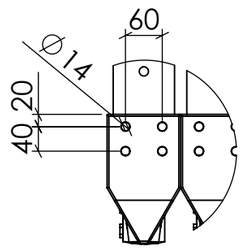
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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:30	8100 [kg]	1 / 4

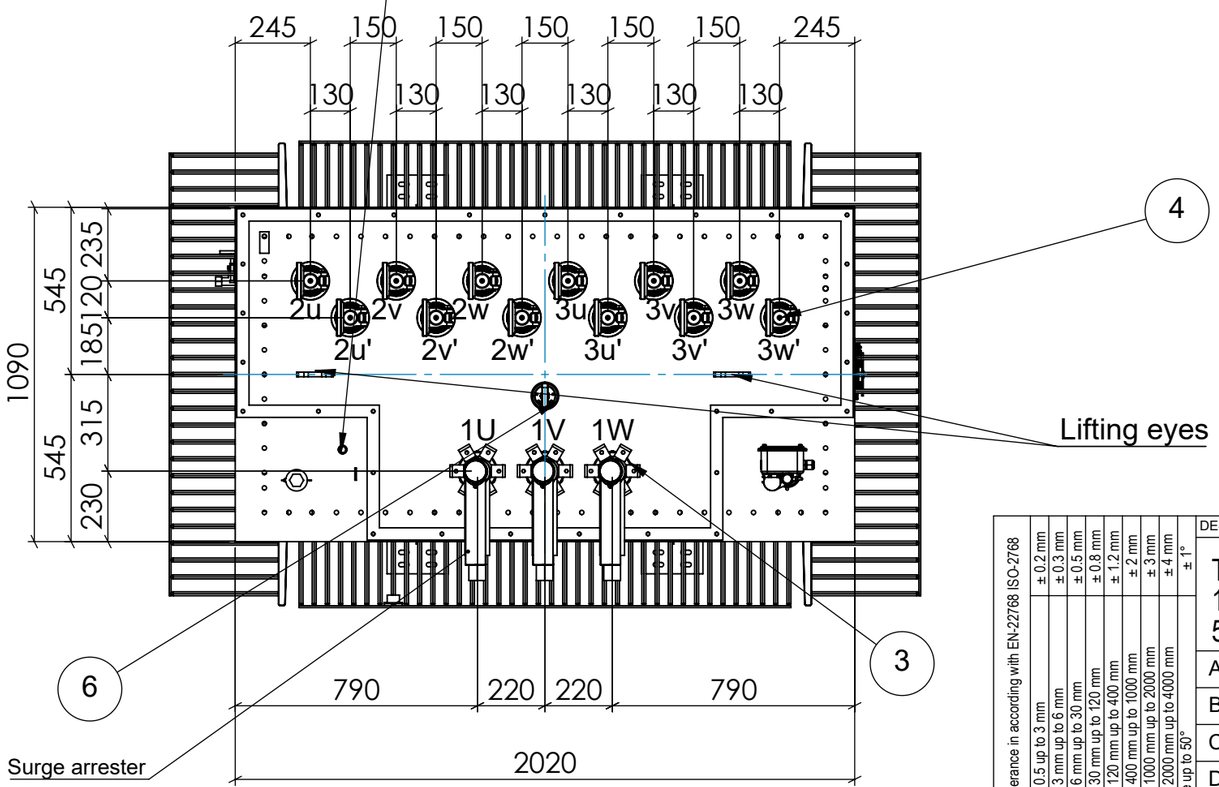






Detail C Scale 1:10

Spare thermometer pocket



Tolerance in according with EN-22768 ISO-2768	
From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

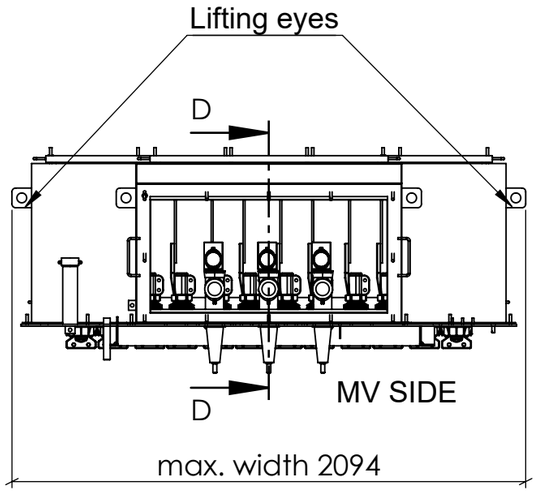
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C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

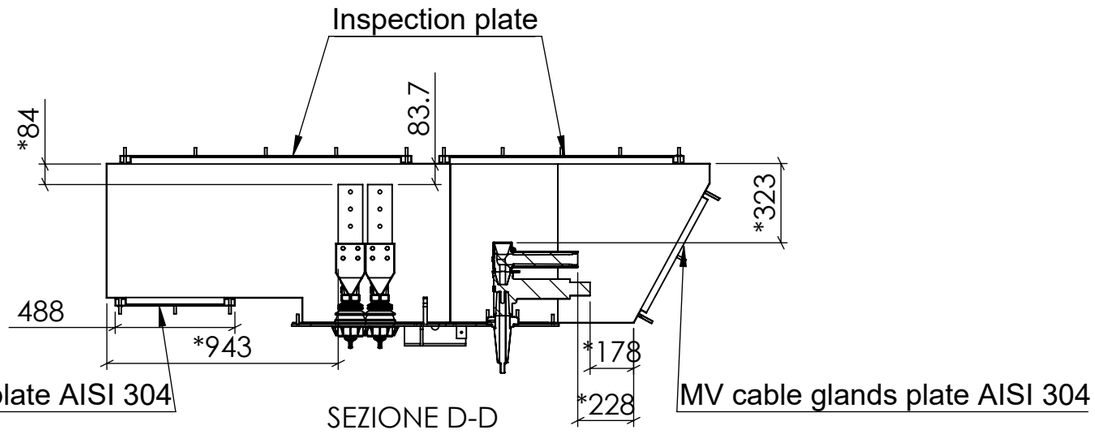
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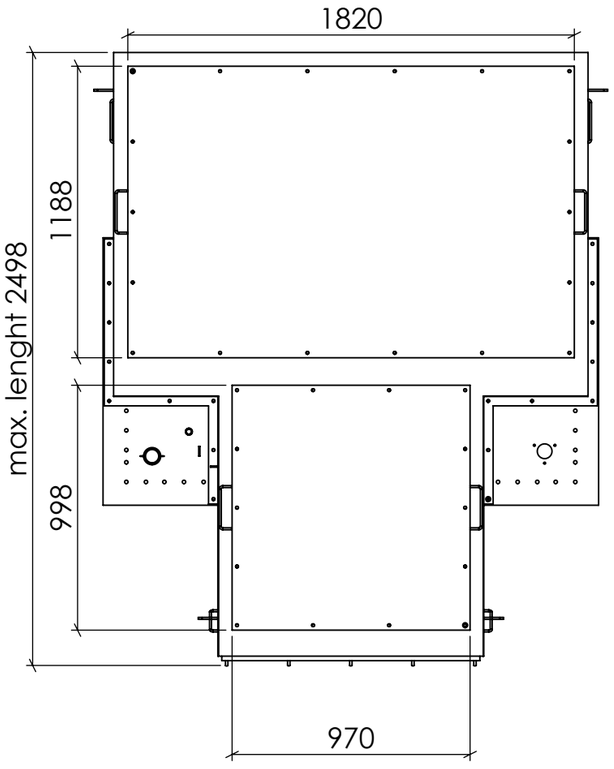
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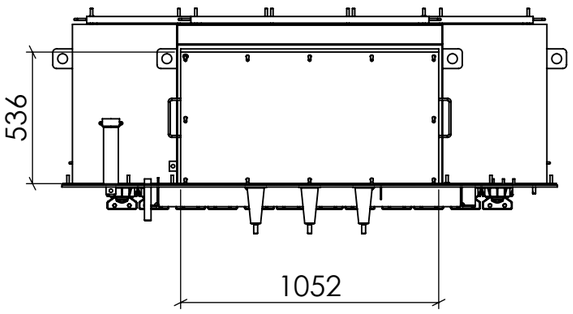
SCALE	TOT MASS	SHEET
1:20	8100 [kg]	2 / 4

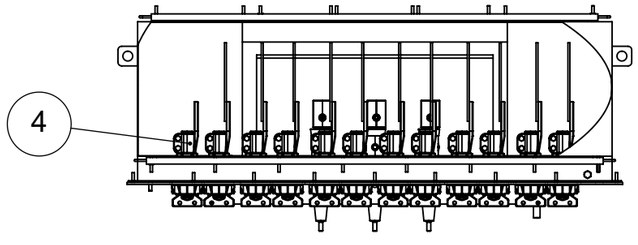






***= minimum air clearances**





Tolerance in according with EN-22768 ISO-2768	
From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
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From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
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Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

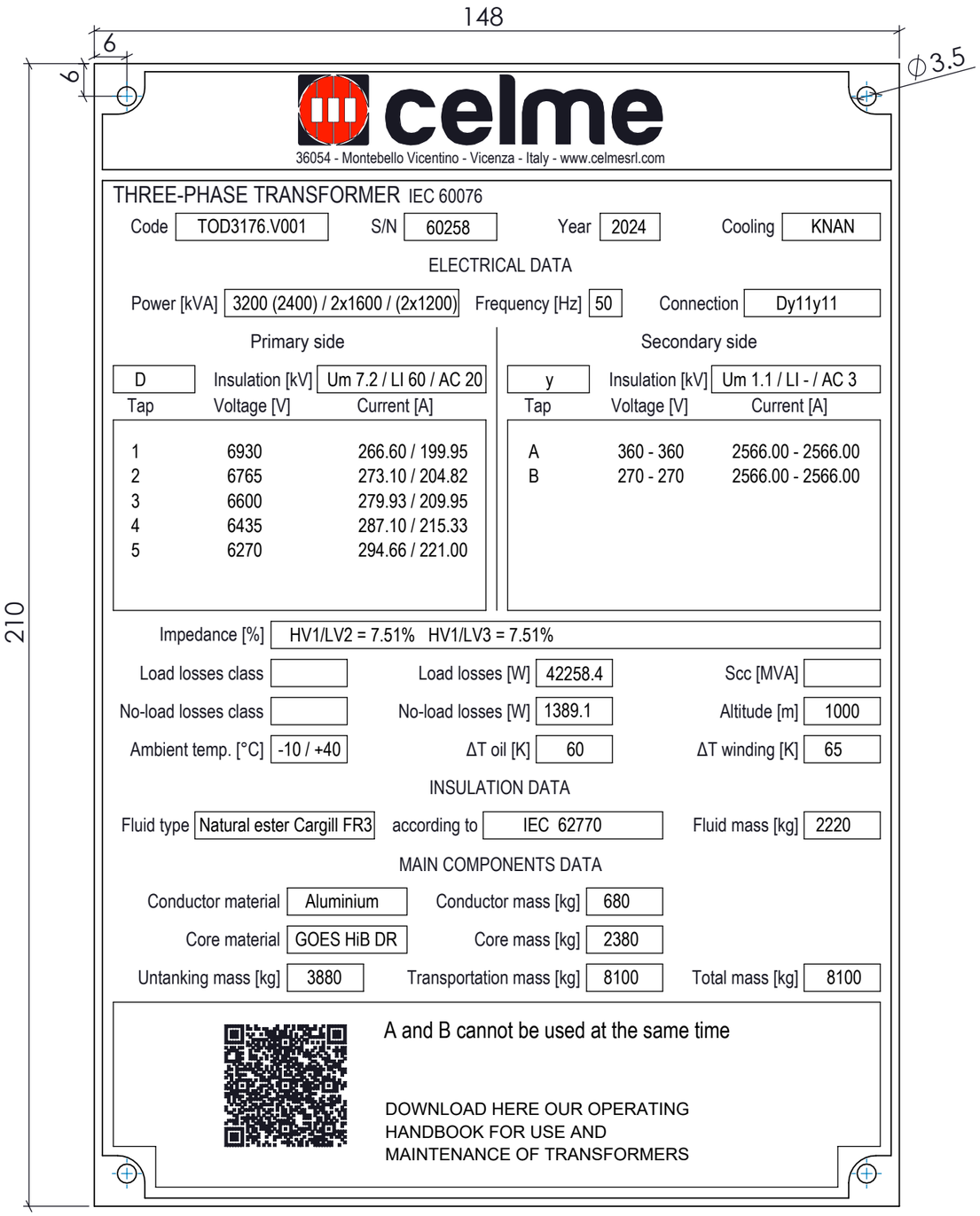
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A	21/12/2023	First Issue	MS	NM
B	03/04/2024	Added Center of Gravity	MS	NR
C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:25	8100 [kg]	3 / 4



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36054 - Montebello Vicentino - Vicenza - Italy - www.celmesrl.com

THREE-PHASE TRANSFORMER IEC 60076

Code	S/N	Year	Cooling
TOD3176.V001	60258	2024	KNAN

ELECTRICAL DATA

Power [kVA]	Frequency [Hz]	Connection
3200 (2400) / 2x1600 / (2x1200)	50	Dy11y11

Primary side

D — Insulation [kV]: Um 7.2 / LI 60 / AC 20

Tap	Voltage [V]	Current [A]
1	6930	266.60 / 199.95
2	6765	273.10 / 204.82
3	6600	279.93 / 209.95
4	6435	287.10 / 215.33
5	6270	294.66 / 221.00

Secondary side

y — Insulation [kV]: Um 1.1 / LI - / AC 3

Tap	Voltage [V]	Current [A]
A	360 - 360	2566.00 - 2566.00
B	270 - 270	2566.00 - 2566.00

Impedance [%]	Load losses class	Load losses [W]	Scc [MVA]	No-load losses class	No-load losses [W]	Altitude [m]	Ambient temp. [°C]	ΔT oil [K]	ΔT winding [K]
HV1/LV2 = 7.51% HV1/LV3 = 7.51%		42258.4			1389.1	1000	-10 / +40	60	65

INSULATION DATA

Fluid type	according to	Fluid mass [kg]
Natural ester Cargill FR3	IEC 62770	2220

MAIN COMPONENTS DATA

Conductor material	Conductor mass [kg]	Core material	Core mass [kg]	Untanking mass [kg]	Transportation mass [kg]	Total mass [kg]
Aluminium	680	GOES HiB DR	2380	3880	8100	8100

A and B cannot be used at the same time

DOWNLOAD HERE OUR OPERATING HANDBOOK FOR USE AND MAINTENANCE OF TRANSFORMERS

Material: stainless steel , thickness 1 mm

Black words/drawings on metallic background

Tolerance in according with EN-22768 ISO-2768

From 0.5 up to 3 mm	± 0.2 mm
From 3 mm up to 6 mm	± 0.3 mm
From 6 mm up to 30 mm	± 0.5 mm
From 30 mm up to 120 mm	± 0.8 mm
From 120 mm up to 400 mm	± 1.2 mm
From 400 mm up to 1000 mm	± 2 mm
From 1000 mm up to 2000 mm	± 3 mm
From 2000 mm up to 4000 mm	± 4 mm
Angle up to 50°	± 1°

DESCRIPTION

Three-phase transformer 3200 (2400) /2x1600 (2x 1200) kVA 6600±2x2.5%/2x360 (2x 270) V Dy11y11 50 Hz

REV.	DATE	OBJECT	DRW.	APR.
A	21/12/2023	First Issue	MS	NM
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C	02/05/2024	As built	MS	FS
D	24/07/2024	Added Protection box	MS	NR

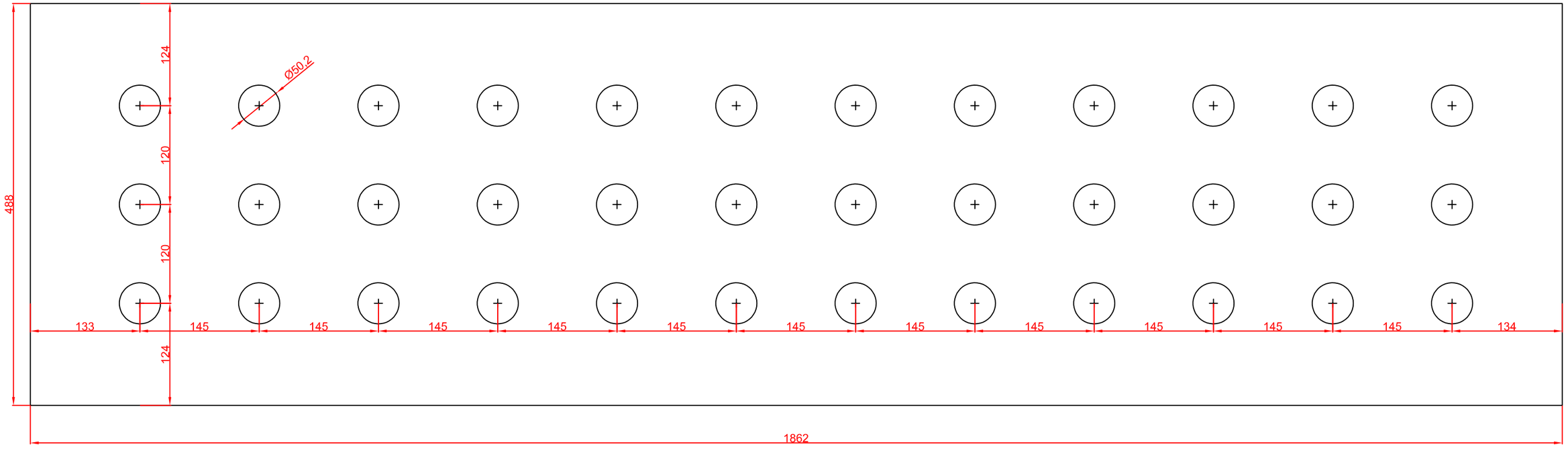
celme

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FORMAT	CODE	REV.
A3	TOD3176.V001	D

SCALE	TOT MASS	SHEET
1:1	8100 [kg]	4 / 4

ALL THE CABLE GLANDS WILL BE M50, SO THE HOLE NEED TO BE ø50.2mm.
(ALL DIMENSION IN mm)



Section 9 SUPPORTING DOCUMENTS

Base Load Power Hub (BLPH)

OTP – Electrolyser Package

Document Number: 123A90-PML-COM-PRO-03061

Document Class: 2

			Daniela Picon		
02	28/02/2024	Second Issue	DPI	MSA	HRO
01	04/02/2024	Issue with CWD Inputs	DPI	MSA	DWA
Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

Rev.	Description
01	Issue with CWD Inputs
02	Second issue: Cross-references updated. Sections 3.1, 5.3.1, 4.1.6, and 4.1.1, 5.4.1.10 updated.

HOLD LIST

No.	Description
1	
2	
3	

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1 INTRODUCTION

1.1 Project Overview

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

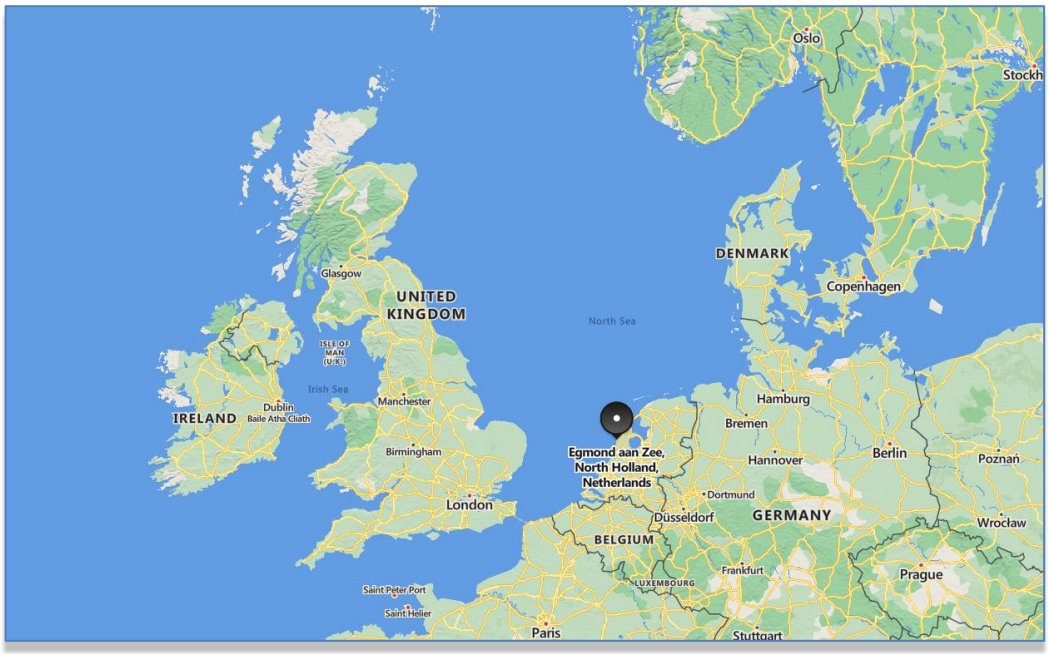


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map

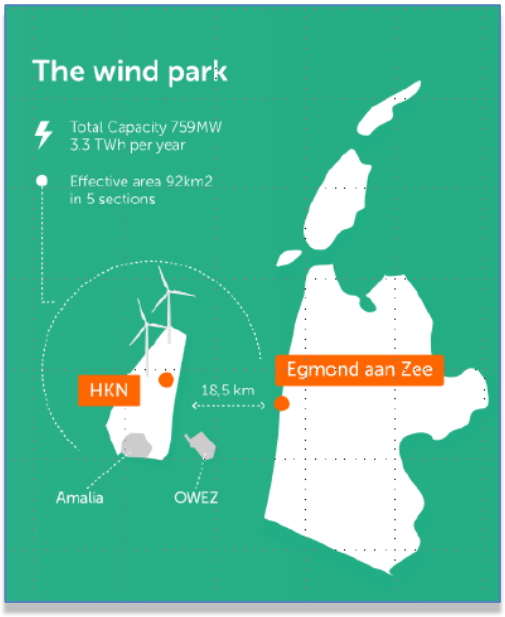


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

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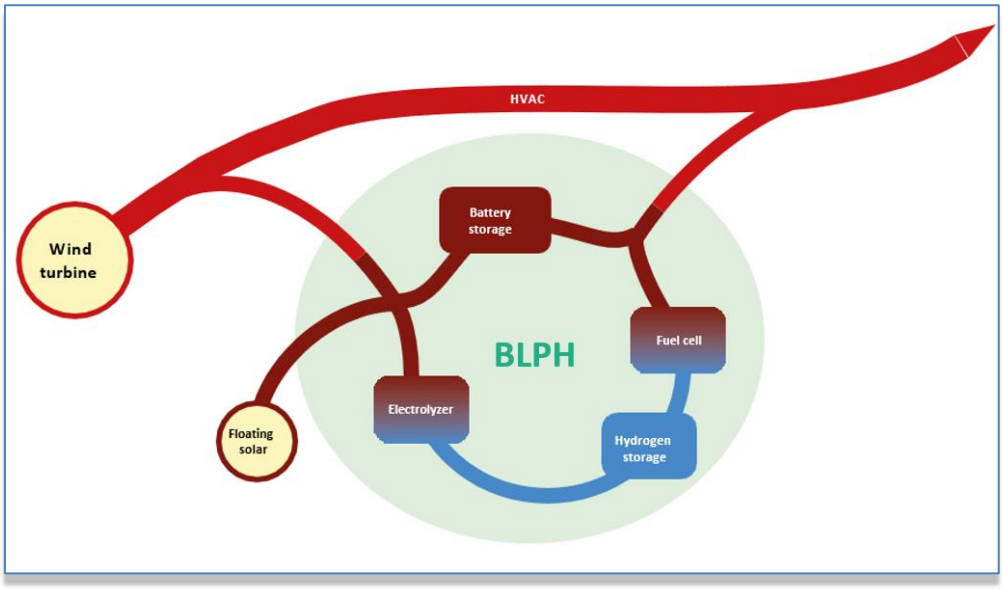


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

This procedure encompasses the Pre-start-up, Start-up, and Ramp-up activities of the BLPH Electrolyser. These activities include the electrolyser's Start-Up and Operation in automatic mode (referred to as 'Start mode' in the User Manual, cf. C63-PMO-001) and the progressive increase in current supplied by the rectifiers to the stacks, thereby enhancing the hydrogen flow rate produced.

For more details about the principle of electrolysis and the operation of the process through the HMI (Human Machine Interfaces) refer to the electrolyser's User Manual (cf. C63-PMO-001).

Despite the distinct categories of activities (i.e. Pre-start up, Start-up and Ramp-up), it has been decided to consolidate all these activities into a single document for practical purposes. This approach is taken because these activities must be performed sequentially, and their scopes overlap.

The prerequisites outlined in Section 3.4 must be ensured prior to initiating the machine in start mode, as specified in Section 6.4.1.2. A comprehensive description of the required activities is provided in Section 6.4.

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3 OTP SUMMARY

3.1 Test Objective

The operating test of the Electrolyser system is executed to ensure that the system is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

Aim of this document is to provide the sequence and appropriate actions to verify the safety systems of the Electrolyser system along with proving the design intent of the system to produce hydrogen gas (H2).

Prerequisites for proceeding with the OTP:

- The UPS is charged at 100%.
- All Utilities are operational.
- The electrolyser is stopped, depressurized and cold (T < 40 °C).
- Written authorization has been obtained to send hydrogen through the client's installation (**Figure 4** piping highlighted in turquoise, PV-633 open and PV-632 close). In the absence of such authorization, the hydrogen will be directed through the designated hydrogen vent (**Figure 4** piping highlighted in yellow, PV-633 close and PV-632 open).

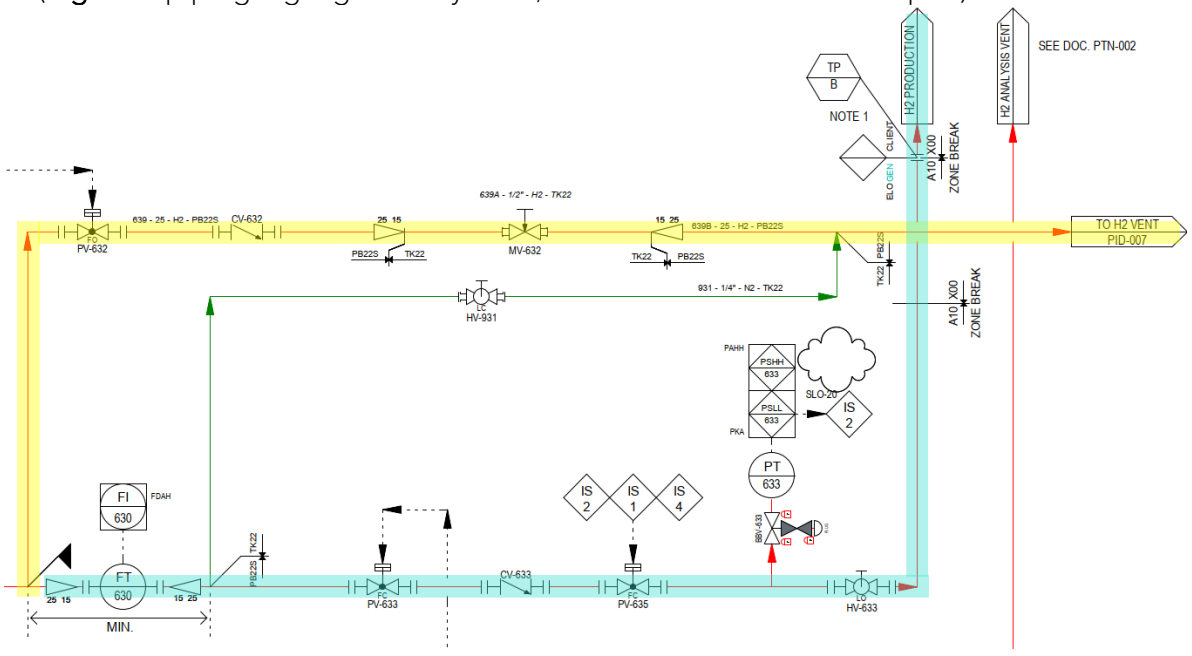


Figure 4. Hydrogen production routing

- All design documentation is approved or relevant TQ / CQ approved to proceed with introduction of combustible gas.
- It is mandatory to have the written authorization to send the hydrogen to the vent during

these activities.

- Onshore pre-commissioning and commissioning activities at Contractor site (WORKSITE)
  a. PHASE 1: Pre-commissioning (powered) activities listed in C063-ELO-PRO-CO- 0003 (NOT PART OF THIS OTP)
  b. PHASE 2: Commissioning (powered) activities listed in C063-ELO-PRO-CO- 0004 (NOT PART OF THIS OTP).
  c. PHASE 3: Vendor SAT & Integrated function test of Electrolyser package including:
     - Confirming Unit Settings on the START mode
     - Stack polarization
     - Hydrogen Setpoint Achievement
     - Functionality of electrolyser's Sequences during Operation
     - Hydrogen Leak Detection
     - Safety Stops at 10%
     - Increasing current by 10% up to 100%
     - Production Settings at 100%

       HPP Start-Up
- Offshore commissioning (SITE)

  PHASE 4: Integrated function test of Electrolyser package (OFFSHORE).

PHASES 1 – 2 are covered by and contained within the vendor documents. PHASES 3 - 4 are included within this OTP document, and the Vendor SAT procedure.

3.2 System Boundary Limits

Please refer to the relevant systems and subsystems outlined below on the Overall Single Line Diagram.

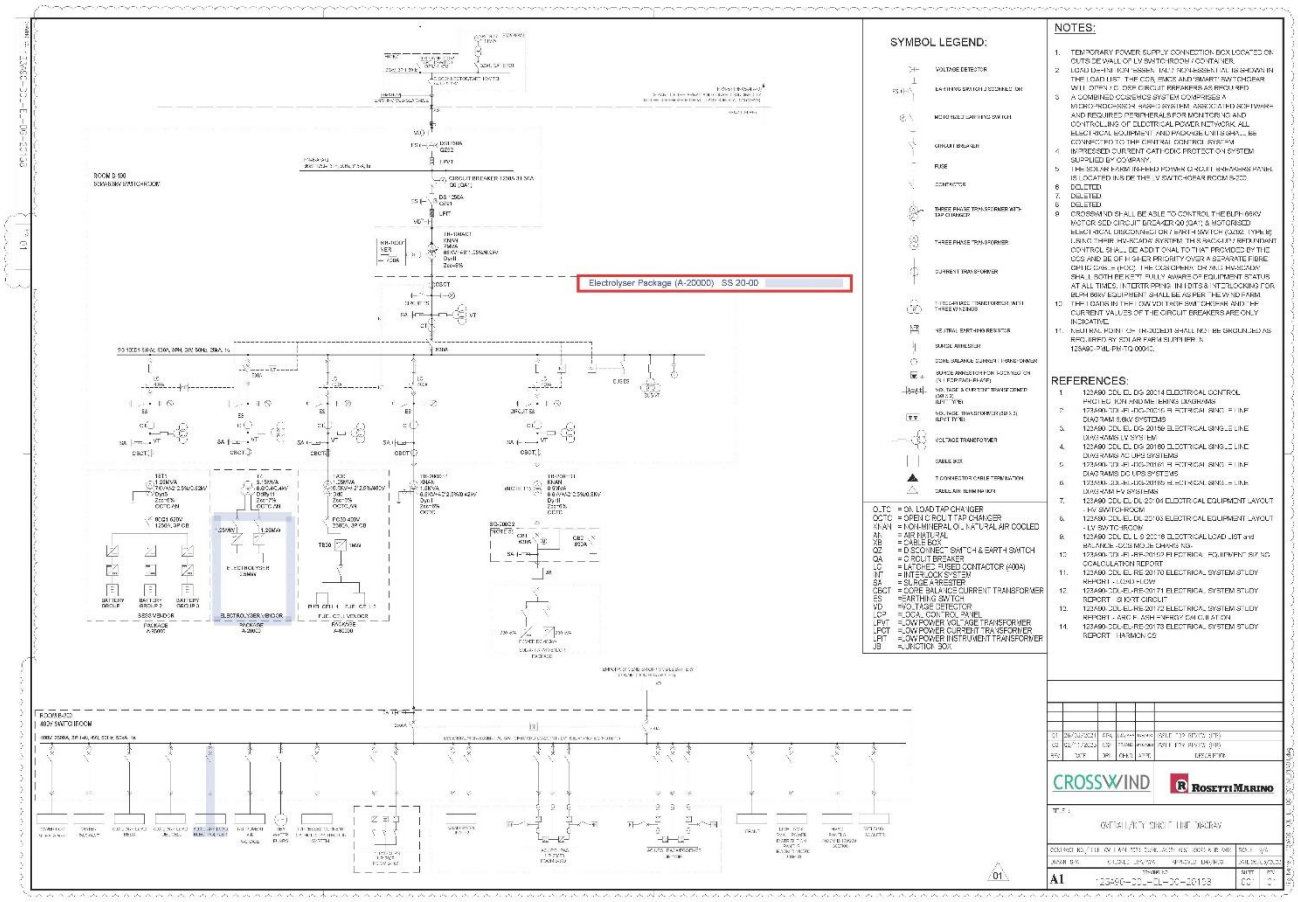


Figure 5. System Boundary Limits in Overall Single Line Diagram

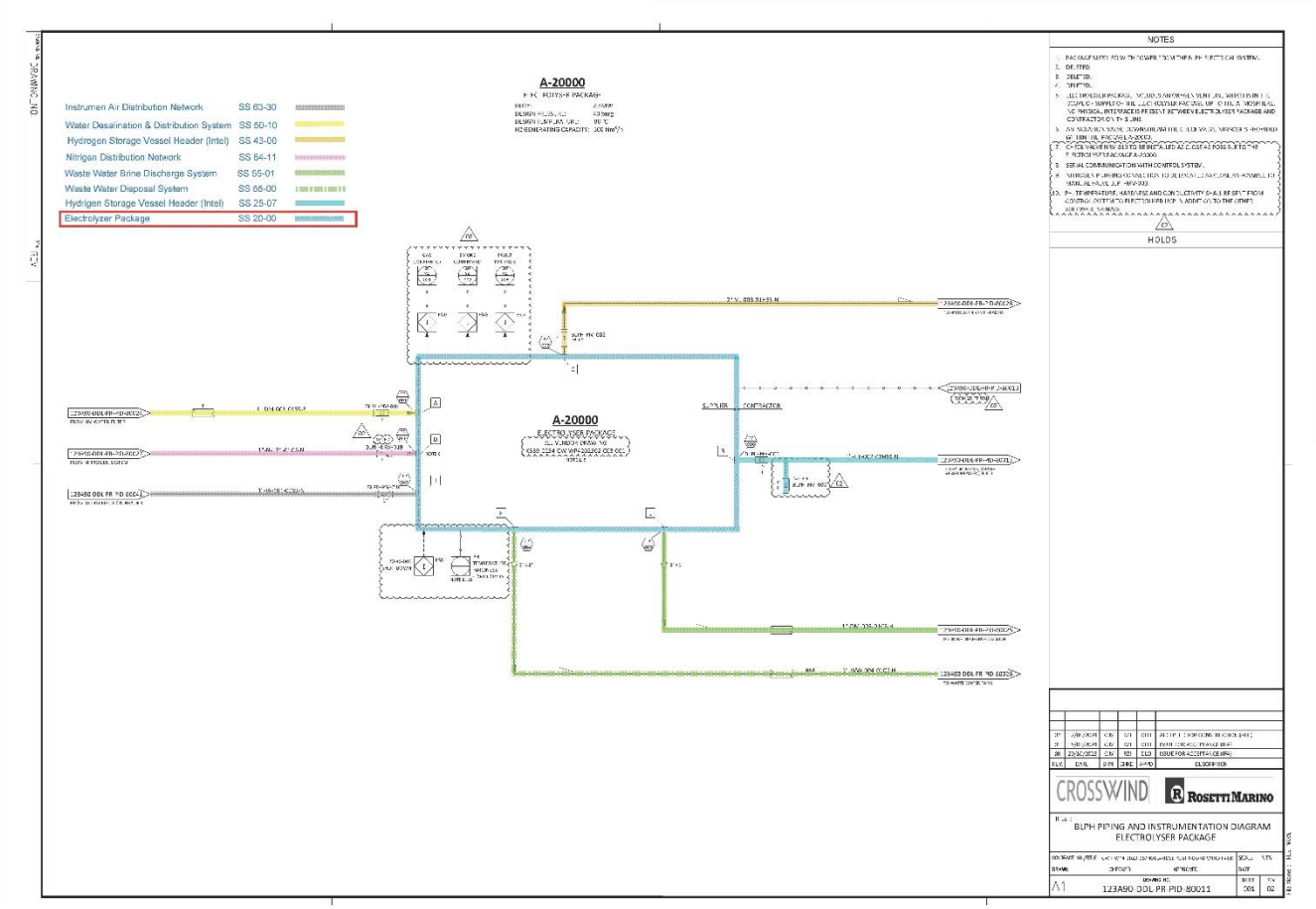


Figure 6. OTP System Boundary Limits

3.3 Test and System Description

Proceeding with this OTP is confirmation that for the following system:

- 20-00 Electrolyser Package (A-20000)

All equipment is installed in accordance with the following vendor documents:

- ELO-INN-BPH-DWG-00008 Process Flow Diagrams
- ELO-INN-BPH-DWG-00009 AQUAGAS Wiring diagram
- ELO-INN-BPH-DWG-00010 NIDEC Detailed Electrical Drawing of PCS units
- ELO-INN-BPH-DWG-00011 OVIVO Electrical Instrument Detailed Drawing Wiring Diagram
- ELO-INN-BPH-DWG-00012 PAUMIER PAU001 & PAU002 Chiller electrical wiring
- ELO-INN-BPH-DWG-00013 PAUMIER PAU003 HVAC electrical cabinet
- ELO-INN-BPH-DWG-00014 NIDEC Mechanical drawing of skid HCU

- ELO-INN-BPH-DWG-00015 NIDEC Rectifier Mechanical Drawing
- ELO-INN-BPH-DWG-00016 NIDEC - SINGLE LINE DIAGRAM
- ELO-INN-BPH-MAN-00007 Handling and Installation Guidance for finalized stacks
- ELO-INN-BPH-OTH-00005 Lines List
- ELO-INN-BPH-OTH-00017 Interfaces and Utility list
- ELO-INN-BPH-PLN-00010 AQUAGAS Electrical Panel & Connections / Wiring Diagram
- ELO-INN-BPH-PLN-00011 NIDEC Detailed Electrical Drawing
- ELO-INN-BPH-REG-00006 CABLE LIST AND INTERCONNECTING DIAGRAM
- ELO-INN-BPH-RPT-00005 Electrical function & protection philosophy
- ELO-INN-BPH-RPT-00008 Safety Loop Design
- ELO-INN-BPH-RPT-00010 Explosion Protection Document
- ELO-INN-BPH-SPC-00006 Technical specification Control cabinet & Electrical wiring
- ELO-INN-BPH-SPC-00008 O2 and H2 Vent Technical specification (Phase 2)
- ELO-INN-BPH-SPC-00010 Electrolyser Network Architecture

3.4 Safety Devices

These defining rules shall be applied from the initial (total or partial) energizing of the instrumented systems, until the end of the commissioning activities.

- Appropriate PPE must be always worn during loop testing.
- A permit to work has been delivered.
- No equipment will be definitively energized without the subsystem Mechanical Completion.
- As soon as a panel is energized (Relay Panel, cabinets, PLC cabinets or local PLC) a sticker "Panel energized - Commissioning in progress" will be suitably displayed on the door in different languages, indicating that it is available for loop checking.
- Testing of electrical/instrumentation interfaces (i.e. I/O serving electrical switchboards for motors control) will be done in conjunction with the power distribution systems lead engineer.
- The on-site equipment area must be visibly marked with a “Test in Progress” sign.
- In any case this procedure shall not conflict with, or supersede, the electrical lock-out procedure. Only electrical system leaders will be authorized to remove padlocks in electrical cabinets.
- Safety rules in accordance with the risk must be applied (e.g. Calibration Gas, Fluids, Pressure, Electrical Power, etc.)
- Risk assessment must be done prior to any test activity.

3.4.1 HSE Management

- All necessary safety precautions must be taken to avoid any risk of personnel injury.
- All personnel involved in this operational test shall be competent for the tasks they will be required to undertake

- Place safety / warning signs and segregate the entire area with barrier tapes (safety barriers) of a colour distinguished (blue and white) from those used for construction activities
- Restrict access into area only to authorized personnel
- Conduct "Toolbox Talk" with all personnel prior to starting test work
- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g. safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements
- All activities carried out on the project shall be performed in accordance with the "Permit to Work" system Doc. PRO-HSE-23
- Electrical and mechanical isolations are to be assured as per Doc. PRO-HSE-08 and "Commissioning and start-up operation" procedure.
- Observe and enforce all international codes and regulations to safeguard personnel, plant and environment.
- Ensure that the working area is clean, tidy, well illuminated and that access and escape routes are free from obstructions.

Before starting work on any of the activities in this OTP it is the responsibility of the persons performing the work to:

- Familiarize themselves with the plant/equipment to be worked on
- Ensure they are aware of all other work activities that are taking place, or due to take place
- If necessary, re-plan any situation/activity
- Ensure proper communications between parties involved in the execution of the OTP
- Read the relevant Vendor documentation for the equipment covered by this OTP and observe any special requirements and limitations recommended or imposed by Vendor
- Verify that all personnel involved in the implementation of this procedure are familiar with its content as well as the associated safety requirements (Toolbox Talk)

3.5 Acceptance Criteria

- Before Power ON:

Visual inspection and verification are a crucial step to identify any obvious issues with the installation, such as loose connections, missing components, or damage to the equipment.

Crosschecking the installation with engineering documentation ensures that the installation is done correctly and according to the manufacturer's guidelines. These steps can help identify any missing or incorrect components, and wrong connections.

All package ITRs to be completed & RFC issued for sub-system 20-00.

Apply padlocks on all necessary Breakers per LoTo Procedure (if required)

Phase 1 (Not in the OTP) will prove basic function of individual instruments and equipment which may or may not be on final power supplies.

Phase 2 (Not in the OTP) will prove correct function of auxiliary systems or packages and close out of any punch list A activities prior to unit startup phase.

Phase 3 will prove correct:

- Completion of the Vendor SAT procedures.
- Functionality of the Electrolyser package in coordination with Required Associated Subsystems packages on BLPH. (ONSHORE)

Phase 4 will prove correct:

- Functionality of the Electrolyser package in coordination with the other packages on BLPH (OFFSHORE).

Performing the steps in this OTP as per engineering documents is crucial to ensure that the equipment is operating correctly and that it meets the desired design specifications. Observing the results will help identify any issues that may arise during the operation.

Overall, following these steps shall provide a comprehensive and effective way to verify the equipment installation and functionality.

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4 DOCUMENTS REFERENCES AND ABBREVIATIONS

4.1 Reference Documents

4.1.1 Elogen Commissioning Specific Deliverables

Table 1. Elogen Reference Documents

Document ID	Document Title
1. 123A90-PML-COM-PRO-03007	BLPH Commissioning Strategy
2. 123A90-PML-QHSE-PRO-00117 Rev.01	Punch List Management Procedure
3. 123A90-PML-QHSE-PL-00001	Project HSE Management Plan
4.	Base Load Power Hub – Electrolyser Workflows
5. C063-ELO-PRO-CO-0002	BLPH Electrolyser CSU Method Statements
6. C063-ELO-PRO-CO-0003	BLPH Electrolyser Pre-Commissioning Manual
7. C063-ELO-PRO-CO-0004	BLPH Electrolyser Commissioning Manual
8. C063-ELO-PRO-CO-0005	BLPH Electrolyser Operational Test Procedure
9. C063-ELO-PRO-CO-0006	BLPH Electrolyser Performance Test Procedure
10. C063-ELO-PRO-CO-0007	BLPH Electrolyser O&M Training
11. C063-ELO-LST-CO-0001	BLPH Electrolyser - General Item list
12. 123A90-PML-COM-PRO-03007	BLPH Commissioning Strategy
13. 123A90-PML-QHSE-PRO-00117 Rev.01	Punch List Management Procedure
14. 123A90-PML-QHSE-PL-00001	Project HSE Management Plan

4.1.2 Project Documents

Table 2. Reference Project Deliverables

Document ID	Document Title
1. 123A90-PML-PM-LIS-01001	Master Document Register
2. 123A90-PML-PM-PL-00001	Project Execution Plan
3. 123A90-PML-QHSE-PL-00001	Project HSE Plan

Document ID	Document Title
4. 123A90-PRO-HSE-23	RM Yard Permit to Work Procedure
5. 123A90-PML-COM-PL-03002	Mechanical Completion & Commissioning Execution Plan
6. 123A90-PML-COM-PRO-03007	Commissioning Strategy
7. 123A90-PML-COM-LIS-03011	System/Sub-Systems List
8. 123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
9. 123A90-PML-COM-PRO-03038	Leak Test Procedure
10. 123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
11. 123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
12. 123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
13. 123A90-PML-COM-LIS-03034	Inhibit-Override Register
14. 123A90-PML-COM-LIS-03035	PSV Calibration Register
15. 123A90-PML-COM-PRO-03036	OTP - Black Start Procedure
16. 123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
17. 123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
18. 123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
19. 123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
20. 123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
21. 123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
22. 123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
23. 123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
24. 123A90-PML-QHSE-PRO-00117	Punch list Management Procedure

Document ID	Document Title
25. 123A90- 123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
26. 123A90- 123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Systems
27. 123A90- 123A90-PML-COM-PRO-03043	OTP - Instrument Air System
28. 123A90- 123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
29. 123A90- 123A90-PML-COM-PRO-03044	OTP - HVAC Systems
30. 123A90- 123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
31. 123A90- 123A90-PML-COM-PRO-03046	OTP - MV Switchgear & 6.6 kV Transformer Systems
32. 123A90- 123A90-PML-COM-PRO-03047	OTP - LV Switch Boards & LV Distribution Board Systems
33. 123A90- 123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
34. 123A90- 123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
35. 123A90- 123A90-PML-COM-PRO-03050	OTP - UPS Systems
36. 123A90- 123A90-PML-COM-PRO-03051	OTP - Data Network Systems
37. 123A90- 123A90-PML-COM-PRO-03052	OTP - Telecom & Surveillance Systems
38. 123A90- 123A90-PML-COM-PRO-03053	OTP - Navaid System
39. 123A90- 123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics
40. 123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
41. 123A90-PML-COM-PRO-03056	OTP – Document Template
42. 123A90-DDL-IN-RE-40095	Process Control Logics Description

4.1.3 Vendor Documents

Table 3. Vendor documents

Document ID	Document Title
1. C63-NID-ELO-SAT04	SAT Low Voltage & High Voltage Tests Procedure
2. C63-NID-ELO-SAT07	SAT Functional and Performance Tests procedure
3. C63-PAU-SAT-001	HVAC SAT Procedure
4. SWL0841/Elogen/CP/001	Commissioning Plan for OVIVO WTP
5. SWL0841/MS01	Method Statement for OVIVO WTP
6. 20230443 DEDR-500_36	DEDR-500_36 P&I Diagram Offshore
7. N/A	DEDR 500/36 Installation, Commissioning, O&M Manual
8. C63-OVI-QIX-002_01	Site Acceptance Test (SAT) Ovivo
9.	

4.2 Acronyms and Abbreviations

Table 4. Abbreviations

Document ID	Document Title
BLPH	Base Load Power Hub
BOP	Balance of plant
CM	Commissioning
CO	Carbon monoxide
CSU	Commissioning & Start-Up
DEDR	Deoxo & Dryer
E&I	Electrical & Instrumentation
EMCS	Electrical Monitoring & Control System
ESD	Emergency Shut Down

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Document ID	Document Title
F&G	Fire and Gas
FAT	Factory Acceptance Test
FT	Functional Test
FTE	Full Time Employees
GALT	Gross Air Leak Test
HMI	Human Machine Interface
HPP	Hydrogen Purification Package[1]
HSE	Health, Safety, & Environment
HVAC	Heating Ventilation and Air Conditioning
ICSS	Integrated Control and Safety System
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
LOTO	Lock-Out / Tag-Out
LR	Low regulation point
MC	Mechanical Completion
OTP	Operation Test Procedure (Commissioning)
PC&C	Pre-Commissioning & Commissioning
PCA	Performance Cell Analyser
PCS	Process Control System

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File: 123A90-PML-COM-PRO-03047

Document ID	Document Title
PID	Proportional, Integral, Derivative
P&ID	Piping and Instrumentation Diagram
PL	Punchlist
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PSU	Pre-Start-Up
PSV	Pressure Safety Valve
PTW	Permit to Work
PVP	Piping and Vessels Preparation
RFC	Ready for Commissioning
RFO	Ready for Operation
RFSA	Ready For Sail Away
RFSU	Ready For Start-Up
RU	Ramp-Up
SAT	Site Acceptance test
SIS	Safety Instrumented System
SLD	Single Line Diagram
SOC	State Of Charge
SU	Start-Up
UPS	Uninterruptible Power Supply

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5 OTP AT ONSHORE WORKSITE

This chapter refer to the activities on the Contractor worksite (construction yard).

5.1 Planning and Manpower

5.1.1 Planned tasks with estimated manpower

Estimated manpower for the different phases of the OTP are:

Table 5. Estimated manpower ONSHORE Worksite

Activity	Staff qualifications	Advised presence
Unit Settings on the START mode	1 site supervisor, 2 electrical technicians	1 automation engineer
Stack's polarization	1 engineer and 1 automation engineer	1 rectifier specialist from NIDEC
Hydrogen Setpoint Achievement	1 automation engineer	
Functionality of electrolyser's		
Sequences during Operation	1 automation engineer	
Hydrogen Leak Detection	2 piping & mechanical technicians	2 helpers
Safety Stops at 10%	1 engineer and 1 automation engineer	
Increasing current by 10% up to 100%	1 automation engineer	
Production Settings at 100%	1 automation engineer	
HPP Start-Up	1 automation engineer	1 technician from Aquagas

5.1.2 Pre-Commissioning & Commissioning duration estimate prior to Start-Up:

Table 6. Estimated duration for Pre-Commissioning & Commissioning activities

Document ID	Duration [h]
Electrical Transformer SAT	4
Energization Transformer	2
Pre-Commissioning 6.6kV Electrical Supply	4
Pre-Commissioning 400V Electrical Supply	8
Electrolyser Rectifier SAT	8
Electrolyser UCP Electrical Pre-Commissioning	8
Electrolyser HVAC UCP Electrical Pre-Commissioning	8
Electrolyser Water Treatment UCP Electrical Pre-Commissioning	8
Electrolyser VSD Electrical Pre-Commissioning	8
F&G Detector SAT	4
Instrument Air – check HV	1
Non Hazardous Drains – check HV	1
Water Supply – check HV	1
Nitrogen Package Pre-Commissioning / Commissioning	2
Electrolyser HVAC Package SAT	156
Electrolyser Water Treatment Package SAT	214
Electrolyser Hydrogen Purification Package Pre-Commissioning	60
Electrolyser Stacks and BOP Pre-Commissioning & Commissioning	819

5.1.3 Start-Up phases duration estimation

Table 7. Estimated duration for Start-Up activities ONSHORE Worksite

Document ID	Duration [h]
Unit Settings on the START mode	24
Stack's polarization	8
Hydrogen Setpoint Achievement	4
Functionality of electrolyser's Sequences during Operation	46
Hydrogen Leak Detection	40

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Document ID	Duration [h]
Safety Stops at 10%	8
Increasing current by 10% up to 100%	54
Production Settings at 100%	4
HPP Start-Up	48

5.1.4 Vendor Assistance

Vendor Elogen will lead and/or supervise the onshore commissioning activities. For offshore commissioning Elogen will provide remote support.

5.1.5 Summary of interface signals to be tested:

Please refer to the following documents:

- ELO-INN-BPH-OTH-00009 – Communication table
- ELO-INN-BPH-SPC-00010 - Electrolyser Network Architecture

5.2 OTP Test Requirements – Onshore WORKSITE

5.2.1 Pre-Commissioning Achievement

Prior to commencement of commissioning activities, the relevant pre-commissioning documentation be fully signed.

5.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the Electrolyser package installed on BLPH.

5.2.3 Status of Required Associated Subsystems

- PHASE 3

Subsystems required RFC for Commissioning of the Electrolyser Package

- 25-01 to 25-08 (Partial): Hydrogen Storage Vessels & Header
- 43-00: Hydrogen Vent Header and Drum System
- 50-10: Water Desalination Package & Distribution
- 50-11: Non-Oxidant Biocide
- 55-00: Waste Water Disposal
- 55-01: Waste Water Brine Discharge System
- 63-00: Instrument Air Package (A-63000)
- 63-30: Instrument Air Distribution Network

- 64-00: Nitrogen Generator Package (U64000)
- 64-10: Nitrogen Distribution Network
- 70-00: F&G Control System
- 70-11: F&G Devices FZ-02 (Hydrogen Storage Area)
- 70-12: F&G Devices FZ-03 (Electrolyser Area)
- 79-00: Emergency Shutdown Systems (SIS)
- 79-12: Emergency Shutdown Systems (SIS) – Devices FZ-03 (Electrolyser Area)
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-20: Power Transformer 3.15 MVA
- 82-99: MV 6.6 kV Temporary Yard Supply Integrated Test
- 83-00 400V Switchboard SG200N1
- 83-20 Distribution board
- 83-99: Temporary Yard 400/230V Main and auxiliary power supplies
- 87-00: EMCS
- 87-10: PCS
- 88-00: Earthing System

5.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches.
- ATEX Field telephone or Walkie-Talkie.
- Leak detector sprays.
- VARIOTEC°460 Tracer gas.
- Chronometer.
- Personal hydrogen detectors for each people on site, calibrated up to date.

All equipment used must have a serial number and a valid calibration certificate up to date (if applicable).

Table 8. Test equipment register ONSHORE activities

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2.5 Commissioning Spare Parts

- See reference document ELO-CMM-BPH-PRD-00006 - BLPH Electrolyser Commissioning Start-Up (CSU) Execution Plan.

5.2.6 Temporary Facilities

Phase 3: Temporary emergency stop and/or fire and gas detection may be required if deemed necessary after suitable risk assessment. This will depend on the availability of interacting sub-systems.

5.3 OTP Description – Onshore WORKSITE

5.3.1 OTP Test Preparation

Table 9. OTP requirements Onshore Worksite

Step	Description	Result	Verified by	Date
1	System Ready for Commissioning Certificate (RFC) is issued and approved.			
2	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
3	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the system to be commissioned.			
4	All personnel involved in the implementation of this procedure are familiar with its content as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
5	A final walkdown of the system has been completed, to ensure that the system and the area are ready for commissioning.			
6	Check that areas are free for work and escape routes are clear of any obstructions.			
7	All safety barriers and warning signs have been installed.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			

Step	Description	Result	Verified by	Date
9	Verify availability of test equipment and spares as per Section 5.2.4.			
10	With reference to Commissioning Temporary equipment & Facilities (refer on Doc. 123A90-PML-COM-SP-03014), check that power is available to any temporary equipment or test equipment (if any).			
11	System(s) isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved			
12	All yard personnel have been duly notified by dedicated LUN (Livening Up Notification) that the system(s) is ready for commissioning.			

5.3.2 Electrical Preparation

Table 10. Electrical requirements OTP Onshore Worksite

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are completed.			
3	Check that grounding and bonding are in accordance with applicable documents.			
4	Verify and confirm the correct circuit breaker protection settings according to latest documentation.			
5	Verify and confirm the completion of the final connections between the LV 400V Switchboard and the Electrolyser, the MV 6.6kV and Electrolyser, and the EMCS.			
6	Assess the need for additional temporary F&G or E-Stop protection during ONSHORE phases and implement necessary changes.			

5.3.3 Mechanical Preparation

Table 11. Mechanical requirements OTP Onshore Worksite

Step	Description	Result	Verified by	Date
1	Check the correct flow direction of the valves.			
2	Confirm leak testing is complete and documented.			
3	Confirm mechanical alignment of all package pumps & equipment.			
4	Ensure package PSV setpoints are correct for the designed operating pressure.			
5	Ensure all unnecessary isolations are removed and vent system is ready to receive hydrogen.			

5.3.4 Instrument Preparation

Table 12. Instrument OTP requirements Onshore Worksite

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are ready.			
3	Check Inhibit and Override register has been prepared and validated.			
4	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			
5	Verify availability of test equipment as per Section 5.2.4.			

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5.3.5 Piping Preparation

Table 13. Piping OTP requirements Onshore Worksite

Step	Description	Result	Verified by	Date
1	Ensure Treated Water supply connection is correctly connected to the Rosetti system at TP-001			
2	Ensure Nitrogen supply connection is correctly connected to the Rosetti system at TP-046			
3	Ensure Instrument Air supply connection is correctly connected to the Rosetti system at TP-047			
4	Ensure Hydrogen Vent connection is correctly connected to the Rosetti system at TP-003			
5	Ensure Hydrogen Storage connection is correctly connected to the Rosetti system at TP-006			
6	Ensure Waste Water output connection is correctly connected to the Rosetti system at TP-004			
7	Ensure Brine Discharge output connection is correctly connected to the Rosetti system at TP-005			
8	Review Rosetti flange management and confirm all interface connections have been torqued and leak tested with details recorded and signed for.			
9	Ensure Blind flange/ positive isolation is in place at test boundary.			

5.3.6 Additional Discipline Preparation

Not applicable.

5.4 Test Steps – Onshore WORKSITE - PHASES 1-2 (NOT PART OF THIS OTP)

The previous chapters must be successfully performed prior to commissioning of the Electrolyser Package.

Pre-commissioning (powered) activities listed in ELO-CMM-BPH-PRD-00008 (NOT PART OF THIS OTP).

Commissioning (powered) activities listed in ELO-CMM-BPH-PRD-00010 (NOT PART OF THIS OTP).

5.4.1 OTP Steps WORKSITE - PHASE 3

It is foreseen that previous sections are successfully performed.

In the following steps the functionality of the Electrolyser package shall be tested for operation in all BLPH operating modes.

5.4.1.1 Electrolyser Integrated Testing ONSHORE

This section outlines all the steps required to perform the Unit Start-Up. The Unit Start-Up Test Report Table in Section 7.1 provides the steps that must be followed sequentially. During the procedure, please complete the columns labelled 'Completed by,' 'Witnessed by,' and 'Date.

During the follow-up of the Start-Up Procedure, the current supplied to the electrolysis stacks is gradually increased from 10% to 100%, reaching the maximum hydrogen production capacity of 500 Nm^3/h. The successful execution of this procedure also depends on the correct application of the O&M vendors' package.

Despite the pre-settings established on the valves previously, some tunings can be performed during the ramp-up.

5.4.1.2 Setting the machine at START mode

Put the unit in Local mode via the button displayed on the Main view of the HMI.

Log into the HMI as "Expert": See below an example of pop-up displayed for log into the HMI:

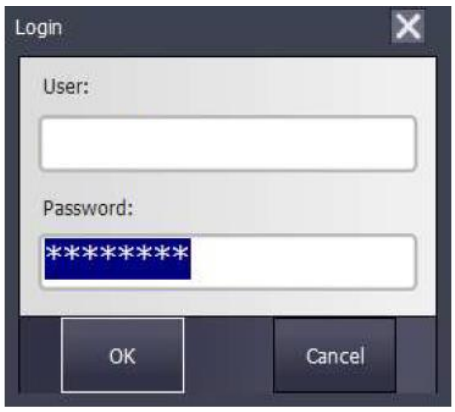


Figure 7. Login popup Electrolyser HMI

⚠	Only Elogen staff is responsible for commissioning and maintenance is allowed to use the "Expert" mode. Elogen cannot be held responsible for any malfunctions resulting from unauthorized access to this operating mode.

Acknowledge all the alarms. Check that the area is clear, and all personnel are ready and in position.

Upon powering on the installation, the user must log in. The electrolyser will automatically be set to 'STOP' mode.

⚠	If a "Major" or Safety" fault is present, do not operate the system until troubleshooting the source of the fault and resetting the systems into its normal status.

The presence of "Minor" faults does not restrain the electrolysis process to start.

To start the hydrogen production the electrolyser must be switched into the "START" mode. To do so, enter a desire hydrogen flowrate on the indicated area (See point 1 in below picture). For the first start enter 10% of the nominal flowrate, hence 50 Nm³/h.

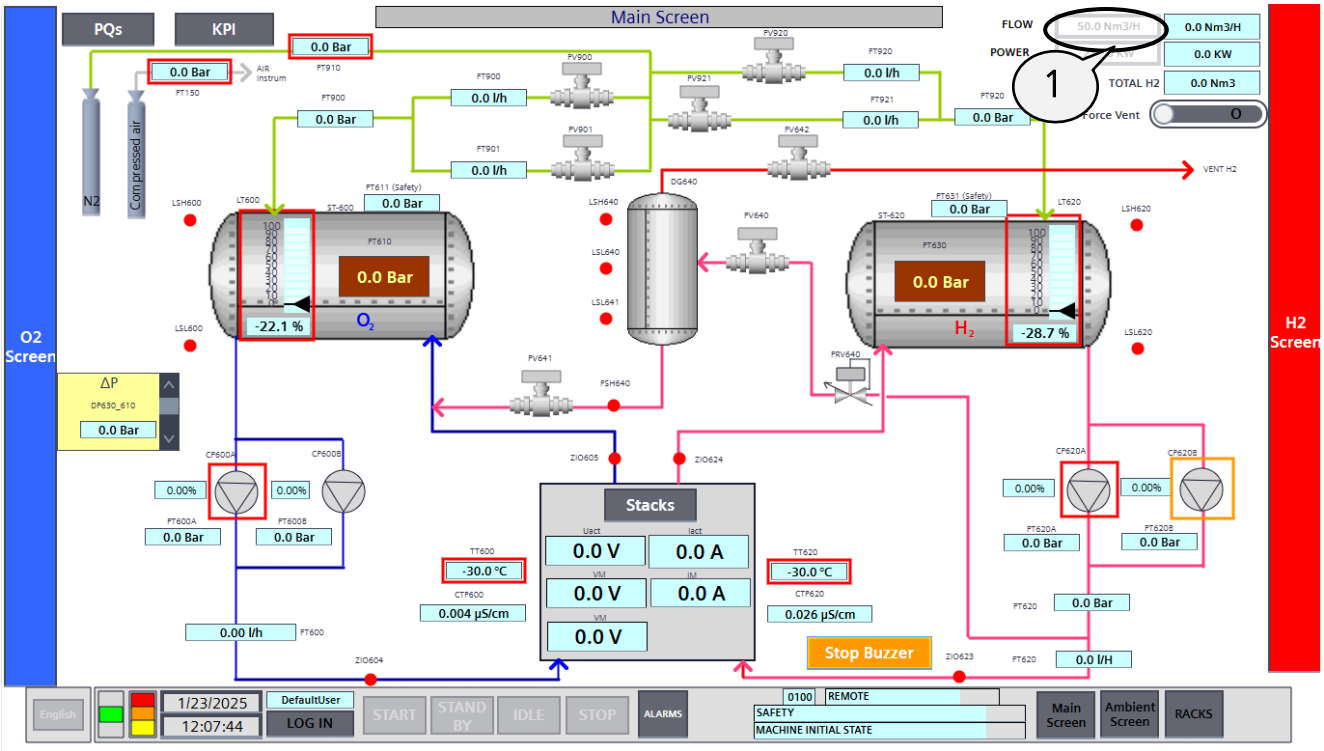


Figure 8. Electrolyser HMI main view

Set admissible pressure range for the hydrogen buffer tank downstream of the hydrogen purification unit (if applicable).

Push the "START" button on the HMI display.

At this point the available oxygen and hydrogen loop pumps (CP-600A or CP-600B and CP-620A or CP-620B) start running automatically according to the regulating function set in the Electrolyser's PLC.

5.4.1.3 Stack's Polarization

Within the start-up sequence, the HVAC system will automatically start-up. The stacks will be polarized as soon as the temperature of 3°C is achieved in the HVAC Loop (HVAC subsystem is used to cool the water passing through the heat exchangers HE-630/631 and HE-600 below its setpoint TT-60X LR). When HVAC Loop is ready, the stacks are polarized at 132.5V (1.25V per cell x 106 cells).

Note: From previous observations, in regard of the possible fluctuations of stacks voltage, it is considered that the polarization point can be achieved once the voltage per stacks is above 119.25 V (so 530 V per rectifier).

5.4.1.4 Hydrogen Production

With the stacks polarised and the 3 °C in the cooling loop reached, the stacks start to produce hydrogen up to the selected setpoint (previously set at 50 Nm^3/h in 10.1). Since the stacks are cold (temperature at inlet TT-600 < 50 °C), the current supplied by the rectifiers to the stacks follows a ramp up limited up to 763 V (and 423 A) at this stage to protect the stacks. This value corresponds to a maximum of 1.8 V per cell (checked through the PCA-00X with X as A, B, C… H). Fluctuations of this value are admissible up to 2.1 V per cell at this stage (890.4 V per rectifier). In case of exceeding the set point stacks inlet temperature (TT-600/TT-620 > 50 °C), the voltage ramp-up is stopped until the temperature goes below 50°C.

Once the temperature of 50 °C is reached (TT-600/TT-620), the electrolyser goes automatically to the "hot start" step. At this stage the operator can set a new hydrogen flowrate set point. During "hot start", the current is incremented by 20A/s.

5.4.1.5 Functional Tests at 10%

From the first molecules produced of hydrogen and oxygen (i.e. current above polarization point), the pressure of both tank separators (ST-600 and ST-620) starts to rise. The delta of pressure between both tanks is managed automatically via a regulation function R-DPC-001. Fill the Check sheet in 11.2. Check the conformity of the control function while the pressure fluctuates (cf. Table in section 7.2). Observe if the corresponding valves open (PV- 631 and MPV-611), and the speed variator VAR-600 is set at the corresponding value, according to the delta pressure.

The regulation of delta pressure keeps on until the pressure at both tank separators reaches the nominal values, 31 barg at hydrogen side (cathodic side), and 11 barg at oxygen side (anodic side). Check the execution of the regulating function R-DPC-001 and take note of the pressurisation time (elapsed from selecting START mode on the HMI until reaching 11 and 31 barg).

While the tank separators are being pressurised, the hydrogen produced on the water / hydrogen loop is sent to the HPP, where the remaining oxygen and water are removed, and this flow is then routed to the vent. In normal operation, the treated hydrogen is then sent to the limit of battery.

Once the operation is stabilised at 10% of nominal flowrate (50 Nm^3/h), some sequences functional test and regulating functions can be achieved. In the Check Sheet, the functions in **bold** required special attention and need to be checked in START mode at 10% of the hydrogen production capacity.

As usual at this stage of Unit Start-Up, some PID (proportional, integral, derivative) tunings can be performed by the automation engineer.

Note: The duration to reach the nominal pressure depends on the flowrate setpoint. The higher the setpoint is, faster is the pressurisation.

5.4.1.6 Leak Checks

While the sequence and regulating functions are being tested, check that there are no leaks on the pipes, vessels, flanges or equipment. Use the hydrogen tracer gas device (Variotec 460 Tracergas). Any leak detected must be repaired immediately. If needed, the unit can be stopped, depressurized and purged with nitrogen.

As a standard procedure, the leak test at this stage should be performed in the same manner as it was prior to Start-up. Particular attention must be given to the HPP, the hydrogen analysis section, and all lines and equipment with tags containing **63X** and **80X** numbers.

5.4.1.7 Safety Stops at 10%

During START mode when hydrogen is being produced at 10% of the nominal flowrate, the safety stops shall be tested. However, since all safety loops were already triggered/simulated during Commissioning phase (cf. ELO-CMM-BPH-PRD-00010), at this stage, the compliance of safety loops in START mode could be checked by triggering one of the emergencies stop buttons (ESD-00X). Check that all the effects represented in the Cause & Effect diagram are performed for the selected ESD (cf. Cause & Effect diagram-C63-PWI-002).

During commissioning and Start-up, the machine is subject to different tests, therefore the circuit breakers are in high demand. For this reason, the number of Safety stops limit that could be trigger within 24 hours is given by the number of cycles till 10% of the components fails (B10D). For these circuit breakers, it is $2x10^7$ cycles (ref. PLC-RSC- 24DC/21). Hence, to limit the wear of the circuit breakers during commissioning and start-up phase, it is recommended to trigger a maximum of 3 safety stops per day during the whole commissioning period (2 months). So, the number of cycles used will be restricted to 0.001% of the total.

5.4.1.8 Increasing current from 10% up to 100%

This section aims to increase slowly the hydrogen production from 10% of nominal capacity up to 100%. Since it is the first ramp up of the unit, the current will be increased by 10% manually. Set the flowrate as explained on Section 6.4.1.2.

Table 14. Hydrogen production stepwise increment

Percentage of nominal capacity	H2 flowrate setpoint [Nm3/h]
10%	50
20%	100
30%	150
40%	200
50%	250
60%	300
70%	350
80%	400
90%	450
100%	500

Once the hydrogen setpoint is changed, the current fed into the stacks start to increase. Follow the voltage ramp-up and take note of this transition duration. Wait until the flowrate of hydrogen produced is stable.

Let the system run at steady state (variations on the flowrate below 2% of the setpoint) at each setpoint for 15 minutes minimum and check for normal operation and the execution of regulating and functional sequences.

5.4.1.9 Setting production at 100%

Once reached the 500 Nm3/h, let the system run at steady state and check for hydrogen leaks as previously explained (see Section 5.4.1.6).

Check the compliance of the regulating sequences at 100% of capacity. Especially the Glycol loop flowrate, the direct balancing regulation and in general good overall control and absence of defaults. Use a copy of table in Appendix Section 7.2 to record these functions compliances.

5.4.1.10 HPP Start-Up

As presented in the Commissioning Manual (cf. C063-ELO-PRO-CO-0004), the HPP must be subject to a series of test before bringing process gas into the system. The activities described in this section must be carried out with hydrogen, since the HPP performance, and particularly the heaters, work differently with hydrogen compared to nitrogen or other inert gas.

Hence, after assuring a hydrogen production up to maximum capacity by the electrolyser (100% of nominal flowrate), the adjustment of the performance of the HPP can be carried out to test the compliance of the global process through the reading of the OIHA-800A/B/C and DPT-800A/B/C.

All instructions and information related to the installation and commissioning of the HPP are detailed in the document DEDR 500/36 Installation, Commissioning, Operation and Maintenance Manual. The activities are summarised and presented in tabular format, including the columns 'Completed by,' 'Witnessed by,' and 'Date,' to assist the staff in verifying compliance with each step during the procedure (Sections 7.3.1, 7.3.2, and 0).

The commissioning and performance procedure for the HPP that requires process gas, and is deployed into three main stages:

a. Start of the Deoxo-Dryer
b. Flow control positioner
c. Setup of pressurized condensation system

Once the performance of the HPP has been tested in all the flowrate range (10-100% of nominal), check the conformity of the hydrogen purity (through the reading of the OIHA-800A/B/C and DPT-800A/B/C). Both measures must be below 5 ppmv (i.e. impurities 10 ppmv which corresponds to 0.001%vol).

At this point, when a hydrogen production at maximum capacity is stabilised, along with the HPP operation, the performance test of the whole unit can be carried out. Follow the respective procedure given in the document C063-ELO-PRO-CO-0006 and complete the control list given on the same document.

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5.4.1.11 Electrolyser Integrated Testing ONSHORE Notes and Remarks

5.4.1.12 Testing of EMCS Operating modes ONSHORE

Table 15. *Test report for EMCS Operating modes Onshore activities*

Step	Description	Result	Verified by	Date
Electrolyser operating modes to be controlled from PCS via ECMS. Gas Production set point of Electrolyser to be agreed prior to test based on current site conditions/limitations.				
1	Confirm on PCS that CCS operating mode is in "IDLE". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
2	On PCS, change CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package continues to produce H2 at specified set point.			
3	On PCS, change CCS operating mode to "IMPORT (MODE 1B)". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			
4	On PCS, change CCS operating mode to "HOT STANDBY". Confirm Electrolyser remains in STOP.			
5	On PCS, change CCS operating mode to "EXPORT". Confirm Electrolyser remains in STOP.			
6	On PCS, change CCS operating mode to "COLD STANDBY". Confirm Electrolyser remains in STOP.			

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Step	Description	Result	Verified by	Date
7	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm Electrolyser remains in STOP.			
8	On PCS, change CCS operating mode to "MAINTENANCE". Confirm Electrolyser can only be operated locally.			
9	On PCS, return CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
10	On PCS, return CCS operating mode to "COLD STANDBY". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			

Full details of the EMCS HMI control graphics can be found in Document Number: 123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)

5.4.1.13 Electrolyser Integrated Testing ONSHORE - Certifying Authority Table of Attendances

Table 16. Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

5.4.1.14 Electrolyser Integrated Testing ONSHORE - Final Signatures and Company Acceptance

Table 17. Final Signatures and Company Acceptance

Name and Surname	Certifying Authority	Position	Signature

6 OTP AT SITE

6.1 Planning and Manpower

6.1.1 Offshore Site overview

It is expected that all pre-commissioning tests, systems energization and commissioning steps will have been successfully performed during the Onshore Phases.

Consequently, during the offshore SITE phase, the respective systems will be inspected prior to re-energization.

No additional test steps will be required on these items of equipment, correct operation and functioning will be verified.

6.1.2 Planned tasks with estimated manpower

Table 18. Estimated manpower OFFSHORE Worksite

Activity	Staff qualifications	Advised presence
Safety Stops at 10%	1 engineer and 1 automation engineer	
Increasing current by 10% up to 100%	1 automation engineer	
Production Settings at 100%	1 automation engineer	
HPP Start-Up	1 automation engineer	1 technician from Aquagas

6.1.3 Test duration estimate

Table 19. Estimated duration for Start-Up activities OFFSHORE Worksite

Document ID	Duration [h]
Safety Stops at 10%	8
Increasing current by 10% up to 100%	54
Production Settings at 100%	4
HPP Start-Up	48

If necessary, the estimated time can be extended to complete all required pre-commissioning and commissioning activities.

6.1.4 Vendor Assistance

- For offshore commissioning Elogen will provide onsite support.

6.1.5 Items Postponed to C&E OTP

- Not Applicable

6.1.6 HOLDS

- Not Applicable

6.2 OTP Test Requirements – Offshore SITE

6.2.1 Pre-Commissioning Achievement

- Not applicable

6.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the Electrolyser package installed on BLPH.

The successful commissioning result, achieved during the WORKSITE commissioning phase for the functionality and safeguard of the Electrolyser Package, will allow for a smoother commissioning phase of the offshore SITE.

- PHASE 4

Subsystems required RFC for OFFSHORE Commissioning of the Electrolyser Package

- 25-01 to 25-08: Hydrogen Storage Vessels & Header
- 43-00: Hydrogen Vent Header and Drum System
- 50-10: Water Desalination Package & Distribution
- 50-11: Non-Oxidant Biocide
- 55-00: Waste Water Disposal
- 55-01: Waste Water Brine Discharge System
- 63-00: Instrument Air Package (A-63000)
- 63-30: Instrument Air Distribution Network
- 64-00: Nitrogen Generator Package (U64000)
- 64-10: Nitrogen Distribution Network
- 70-00: F&G Control System
- 70-11: F&G Devices FZ-02 (Hydrogen Storage Area)
- 70-12: F&G Devices FZ-03 (Electrolyser Area)
- 79-00: Emergency Shutdown Systems (SIS)
- 79-12: Emergency Shutdown Systems (SIS) – Devices FZ-03 (Electrolyser Area)
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-00: 66 kV Subsea Cable

- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-20: Power Transformer 3.15 MVA
- 83-00 400V Switchboard SG200N1
- 83-20 Distribution board
- 87-00: EMCS
- 87-10: PCS
- 88-00: Earthing System

6.2.3 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches.
- ATEX Field telephone or Walkie-Talkie.
- Leak detector sprays.
- VARIOTEC°460 Tracer gas.
- Chronometer.
- Personal hydrogen detectors for each people on site, calibrated up to date.

All equipment used must have a serial number and a valid calibration certificate up to date (if applicable).

Table 20. Test equipment register OFFSHORE activities

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

6.2.4 Consumable List

- Not applicable

6.2.5 Commissioning Spare Parts

- See reference document ELO-CMM-BPH-PRD-00006 - BLPH Electrolyser Commissioning Start-Up (CSU) Execution Plan

6.2.6 Temporary Facilities

- Not applicable

6.3 OTP Description – SITE

The SITE test will consist of a repeat of the onshore integration testing with the BLPH now installed in situ to its permanent connections. In the following steps the functionality of the Electrolyser package shall be tested for operation in all BLPH operating modes.

6.3.1 OTP Test Preparation

Table 21. OTP requirements Offshore Worksite

Step	Description	Result	Verified by	Date
1	System Ready for Operation (RFO) Certificate is issued and approved.			
2	No blocking punch list items are outstanding against the system to be commissioned.			
3	System(s), (de)isolations as per LOTO procedure enclosed within commissioning Work Permits procedures prepared and approved			
4	Verify and confirm that all steps performed at WORKSITE of this procedure are completed without any pending issues that would prevent from proceeding with the offshore SITE PROCEDURE			
5	All personnel involved in the implementation of this procedure are familiar with this procedure as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			

Step	Description	Result	Verified by	Date
6	A final walkdown after hook-up of the system has been completed, any preservation items have been removed and to ensure that the system and the area are ready for energization.			
7	Check that areas are free for work and escape routes are clear of any obstructions.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9	Verify availability of test equipment and consumables as per chapters 6.2.4.			
10	All personnel have been duly notified during dedicated daily SIMOPS meetings that the system(s) is ready for operation.			

6.3.2 Electrical Preparation

Table 22. Electrical requirements OTP Offshore Worksite

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are completed.			

6.3.3 Mechanical Preparation

Table 23. Mechanical requirements OTP Offshore Worksite

Step	Description	Result	Verified by	Date
1	No blocking punch list items are outstanding against the system to be commissioned.			
2	Ensure all unnecessary isolations are removed.			

3	Ensure downstream systems are ready to receive H2.			

6.3.4 Instrument Preparation

Table 24. Instrument requirements OTP Offshore Worksite

Step	Description	Result	Verified by	Date
6	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
7	Verify that all relevant associated systems / subsystems are ready.			
8	Check Inhibit and Override register has been prepared and validated.			
9	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			
10	Verify availability of test equipment as per Section 5.2.4.			

6.3.5 Piping Preparation

Not applicable

6.3.6 Additional Discipline Preparation

Not applicable.

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6.4 OTP Test Steps – Offshore PHASE 4

The previous chapters must be successfully performed prior to commissioning of the Electrolyser Package.

In the following steps the functionality of the Electrolyser package shall be tested for operation in all BLPH operating modes.

6.4.1.1 Electrolyser Integrated Testing OFFSHORE

This section outlines all the steps required to perform the Unit Start-Up. The Unit Start-Up Test Report Table in Section 7.1 provides the steps that must be followed sequentially. During the procedure, please complete the columns labelled 'Completed by,' 'Witnessed by,' and 'Date.

During the follow-up of the Start-Up Procedure, the current supplied to the electrolysis stacks is gradually increased from 10% to 100%, reaching the maximum hydrogen production capacity of 500 Nm^3/h. The successful execution of this procedure also depends on the correct application of the O&M vendors' package.

6.4.1.2 Setting the machine at START mode OFFSHORE

Follow the description given in Section 5.4.1.2.

6.4.1.3 Stack's Polarization

Follow the description given in Section 5.4.1.35.4.1.2.

6.4.1.4 Hydrogen Production

Follow the description given in Section 5.4.1.4.

6.4.1.5 Safety Stops at 10%

Follow the description given in Section 5.4.1.7.

6.4.1.6 Increasing current from 10% up to 100%

Follow the description given in Section 5.4.1.8.

6.4.1.7 Setting production at 100%

Follow the description given in Section 5.4.1.9.

6.4.1.8 Testing of EMCS Operating modes OFFSHORE

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Table 25. Test report for EMCS Operating modes Offshore activities

Step	Description	Result	Verified by	Date
Electrolyser operating modes to be controlled from PCS via ECMS. Gas Production set point of Electrolyser to be agreed prior to test based on current site conditions/limitations.				
1	Confirm on PCS that CCS operating mode is in "IDLE". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
2	On PCS, change CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package continues to produce H2 at specified set point.			
3	On PCS, change CCS operating mode to "IMPORT (MODE 1B)". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			
4	On PCS, change CCS operating mode to "HOT STANDBY". Confirm Electrolyser remains in STOP.			
5	On PCS, change CCS operating mode to "EXPORT". Confirm Electrolyser remains in STOP.			
6	On PCS, change CCS operating mode to "COLD STANDBY". Confirm Electrolyser remains in STOP.			

Step	Description	Result	Verified by	Date
7	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm Electrolyser remains in STOP.			
8	On PCS, change CCS operating mode to "MAINTENANCE". Confirm Electrolyser can only be operated locally.			
9	On PCS, return CCS operating mode to "IMPORT (MODE 1A)". Confirm Electrolyser Package runs through start up sequence and progresses to H2 production at specified set point.			
10	On PCS, return CCS operating mode to "COLD STANDBY". Confirm Electrolyser Package progresses to STOP mode, with Unit cooled, depressurised & depolarised, and Chiller OFF.			

Full details of the EMCS HMI control graphics can be found in Document Number: 123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)

6.4.1.9 Electrolyser Integrated Testing OFFSHORE Notes and Remarks

6.4.1.10 Electrolyser Integrated Testing OFFSHORE - Certifying Authority Table of Attendances

Table 26. *Certifying Authority Table of Attendances Offshore*

Name and Surname	Certifying Authority	Position	Signature

6.4.1.11 Electrolyser Integrated Testing OFFSHORE - Final Signatures and Company Acceptance

Table 27. *Final Signatures and Company Acceptance Offshore*

Name and Surname	Certifying Authority	Position	Signature

6.5 Post-test Conditions

After functional tests have been completed, system / sub-systems are left in healthy and safety condition and operational.

6.6 Reinstatement tasks

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- All inhibition done for the test shall be removed (as per Inhibit / Override List)
- All equipment/devices shall be returned in healthy functional conditions.

7 APPENDICES

7.1 Unit Start-up Test Report

Table 28. Test report Start-up of the Electrolyser

Step	Description	Completed by	Witnessed by	Date
01	Select the LOCAL Mode.			
02	Log-in as "Expert" on the HMI.			
03	Check that all alarms are acknowledged, and all areas are clear.			
04	Check that Electrolyser is in STOP mode.			
05	Set the Hydrogen production at 50 Nm^3/h. (10% of hydrogen production).			
06	Press START and monitor the progression (Check that oxygen and hydrogen pumps CP-600A or B and CP-620A or B, and HVAC system are starting-up).			
07	Check that 3 °C is reached in the HVAC Loop system.			
08	Check that the stacks are polarized at 132.5 V.			

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Step	Description	Completed by	Witnessed by	Date
09	Check that the cold start-up is in good process (TT-600 < 50 °C). Separator tanks (ST-600 and ST-620) are being pressurized by the hydrogen produced. Warning: The voltage per stack must not exceed 222,6 V (890,4 V per rectifier).			
10	Observe that hot start-up reached (TT-600> 50 °C). Ramp-up shifts to 20 A/s automatically.			
11	Check that the Pressure in separator tanks is being regulated via PV-631 and MPV-611, until reaching the nominal pressure on both loops (11 barg at ST-600 and 31 barg ST-620). At this point Hydrogen is routed to the HPP.			
12	Check if the production is stabilized at 50 Nm3/h of hydrogen (monitor FT-630) and the unit is working at its nominal pressure (11 barg at ST-600 and 31 barg at ST-620).			
13	Perform a Leak Check at 10% of nominal production.			
14	Check that all sequences and regulating functions are working as expected at 10 % of nominal flowrate (see table in Section 7.2).			

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Step	Description	Completed by	Witnessed by	Date
15	Proceed to the Safety Test at 10% of nominal production are compliant (One ESD trigger).			
16	Do the ramp up manually and until 100% of Hydrogen production (cell voltage between the range and setting of current according to R-REC-001).			
17	Check that Hydrogen production stabilized at 100% (500 Nm3/h)			
18	Check that the sequences and controls are working as expected within the range of 10-100% of nominal flowrate.			
19	Check that the HPP is working as expected with a hydrogen quality produced as expected. OIHA-800A/B/C < 5 ppmv and DPT-800A/B/C < 5 ppmv			
21	Sequences and regulating functions are working as expected at 100 % of nominal flowrate (11.2 to be completed again for 100%).			
22	Perform a Leak Check at 100% of nominal production.			

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7.2 Test Report for Functional Test

Table 29. Test report Functional test for the Electrolyser

Function – Description. Tested at 10% or 100% of nominal flow	Completed by	Witnessed by	Date	Comment
S-A5-001 – STOP in progress (from START/STANDBY/IDLE states)				
S-F2-001 – START in progress (from STOP)				
R-DPC-001 – Delta Pressure H2/O2 control (START) *If ΔP[4]> 21 barg, then PV-631 OPEN. If ΔP < 21 barg, then PV-631 CLOSED.* *If ΔP < 5 barg, then PV-631 CLOSED, MPV-611=100% OPEN, VAR-600 = VAR600_LR*				
R-LC-600 – ST-600 Water Level Control (Direct Injection) *If LT-600 < 38% & LT-300 > 20%[5], then LP-300 START. If LT-600 > 48%, then LP-300 STOP*				
R-LC-610 – CS-610 water level control *If LSH-610 COVERED[6] & VAR-300 = 0%, then SV-600 OPEN. If LSL-610 UNCOVERED or VAR-300 > 0%, then SV-600 CLOSED*				
R-LC-620 – ST-620 Water Level Control (Direct balancing) *If PT-630 > 11 barg & LT-620 > 54%, then SV-640 OPEN.* *If LT-620 < 35% or PT-630 < 11 barg, then SV-640 CLOSED.*				
R-LC-630 – CS-630 water level control				

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Function – Description. Tested at 10% or 100% of nominal flow	Completed by	Witnessed by	Date	Comment
If LSH-630 COVERED, then SV-620 OPEN. If LSL-630 UNCOVERED, then SV-620 CLOSED.				
R-LC-642 – DG-640 Hydrogen Purge If LSL-640 UNCOVERED & SV-640 CLOSED & LSH-640 UNCOVERED & PT-630 > 20 barg & ΔP > 2 barg, then SV-642 OPEN. If LSH-640 COVERED, then SV-642 CLOSED.				
R-LC-500 – Water Level Control of H2 vent condensates If LSH-500 COVERED, then PV-500 OPEN. If LSL-500 UNCOVERED, then PV-500 CLOSED.				
R-PC-610 – Pressure Control Oxygen Loop If PT-610 > 11,5 barg, then MPV-611 = 100 % OPEN. If PT-610 < 10,8 barg, then MPV- 611 = 0% (CLOSED).				
R-PC-630 – Pressure Control Hydrogen Loop If PT-630 > 31,5 barg, then PV-631 OPEN. If PT-630 < 29,7 barg, then PV-631 CLOSED.				
R-REC-001 – Rectifier setting current. This function can be validated by comparing the hydrogen setpoint entered by the user and the flowrate measured by the FT-630.				
R-TC-600 – O2 Water Temperature Control Loop				

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Function – Description. Tested at 10% or 100% of nominal flow	Completed by	Witnessed by	Date	Comment
The M3WV-200 is commanded by a PID regulation, where the setpoint is TT-601 = 65 °C. Check that the TT-601 is stable and that the 3WV-200 opens to approach the setpoint.				
S-PC-610 – O2 Depressurisation ΔP > 1 barg & ΔP < 21 barg & LT-600 < 50%, then MPV-611 = 100%. If PT-610 < 0,15 barg & PT-630 < 0,15 barg, then MPV-611 = 0%. If this sequence is still active after 20 minutes, MPV-611 = 0% and displayed "O2 depressurisation failed. Going to safety O2 depressurisation"				
S-PC-630 – H2 Depressurisation If PT-610 > 0,35 barg & ΔP < 21 barg & ΔP > 1 barg & LT-620 < 62%, the PV-631 OPEN. If ΔP < 1 barg, the PV-631 CLOSED. If LT-620 > 62%, then PV-631 CLOSED. If PT-630 < 0,15 barg, then PV-631 CLOSED.				
S-REC-001 – Stack polarization See Section 5.4.1.3				
S-REC-003 – Stop rectifier (decreasing current) This function can be validated by an observed decrease in the hydrogen flowrate (measured by the FT-630)				

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7.3 HPP Start-Up Test Report

7.3.1 HPP commissioning performance adjustment and test – Start of Deoxo-Dryer

Table 30. Test report HPP Start-up– Start of Deoxo-Dryer

Step	Description	Completed by	Witnessed by	Date	Comment
01	Check inert gas is available and all connections have been checked against leakages.				
02	Check that instruments and electrical power are available.				
03	(If the DEDR has been opened against the atmosphere) Purge it with inert gas before feeding the hydrogen.				
04	Open cooling water to the coolers.				
05	Open the compressed hydrogen gas intake slowly. In case there is no valve to isolate the electrolyser and the HPP, once the previous steps completed, start the hydrogen production through the HMI at 10% of production (50 Nm3/h). And wait until the systems starts to be pressurised as described in previous sections.				
06	Check for leakages.				

7.3.2 HPP Commissioning performance adjustment and test – Flow controller positioner

Table 31. Test report HPP Start-up – Flow controller positioner

Step	Description	Completed by	Witnessed by	Date	Comment
01	Check that the PLC control have a linear output signal (0-100% = 4-20 mA)				
02	Check the positioner's output when no pilot pressure is supplied to the 64-V6. Positioner must indicate 100% open				
03	Test with pilot pressure: 4 mA: Positioner indicates 0% open. 8 mA: Positioner indicates ~10% open. 12 mA: Positioner indicates ~25% open 16 mA: Positioner indicates ~50% open. 20 mA: Positioner indicates ~75% open.				
04	Start the dryer in heating sequence at 100% of hydrogen nominal flow capacity.				
05	Check that positioner FC-64.1 indicates ~75% open.				
06	Adjust the by-pass needle valve 64-V14.1: count the turns from fully open to fully close and set it at 50% open.				
07	Partly close valve 64-V14 to about 50%.				

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Step	Description	Completed by	Witnessed by	Date	Comment
08	Wait 15 minutes and read the regeneration temperature (DR-TT-64-6 or DR-TT-64-8 depending on which tower is in regeneration sequence).				
09	If the temperature is below 155°C, partly close valve 64-V14 step by step until 155-160°C is reached. Wait 10- 15 minutes between every step. You can also use by-pass needle valve 64-V14.1 for fine tuning,				
10	If the temperature is above 165°C, partly open valve 64-V14 step by step until 160-165°C is reached. Wait 10- 15 minutes between every adjustment. Use the by-pass needle valve 64-V14.1 for fine tuning. If 155-160°C cannot be reached, increase the heater set point by 25°C and restart from step 04.				
11	Check the heater ON vs OFF time. If the heater is ON between 75% and 95% of the heating time, proceed to the control of operation at 25-100% capacity If ON time > 95%, then partly close the valve 64-V14 until the heater ON time drops to 75-95% of the time. If ON time < 75%, then partly open the valve 64-V14 until the heater ON time increase up to 75-95% of the time. Use the by-pass needle valve (64-V1431) for fine tuning. (Wait 15 minutes between every adjustment)				

Step	Description	Completed by	Witnessed by	Date	Comment
12	Start the dryer in heating sequence at 75% of hydrogen nominal flow capacity (375 Nm^3/h). From the electrolyser's HMI, as indicated in Section 6.4.1.2.				
13	Check that positioner indicates ~50% open.				
14	Wait 15 minutes and read the regeneration temperature (TT-64.6 or TT-64.8 depending on which tower is in regeneration sequence). If TT-64.6 or TT-64.8 < 155 °C, then remove the cover of the positioner and slightly increase the span until reaching 155-160 °C. If TT-64.6 or TT-64.8 > 165 °C, then slightly decrease the span until reaching 160-165 °C. (Wait 15 minutes between every adjustment)				
15	Start the dryer in heating sequence at 25% of hydrogen nominal flow capacity (125 Nm3/h). From the electrolyser's HMI, as indicated in Section 6.4.1.2. Let it stabilize and run for 15 minutes.				
16	Ramp-up the hydrogen flow every 15 minutes by 25% (i.e. 25%, 50%, 75% and 100%).				
17	Check regeneration temperature (TT-64.6 or TT-64.8). It must be around 160 - 180 °C for the range of flowrates, if not, contact Aquagas for assistance.				

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7.3.3 HPP commissioning performance adjustment and test - Setup of condensation system

Table 32. Test report HPP Start-up - Setup of condensation system

Step	Description	Completed by	Witnessed by	Date	Comment
01	Start the dryer at 100% of hydrogen nominal flow capacity (500 Nm^3/h) and let the system to stabilise.				
02	If the Pbar factor is set too high. Reduce it by a factor of 0.1 (ex. If initially set at 15 barg, then reduce it at 13.5 barg). If the Pbar factor is set too low. Increase it by a factor of 0.1 (ex. If initially set at 15 barg, then increase it at 16.5 barg). For both cases, repeat with a smaller difference if needed.				
03	Check if there is remaining water to be drained, by activating the solenoid valve 64-V12 and check how much water is coming out.				

7.4 Vendor SAT Procedure

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7.5 Proverlis Summary System Reports

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7.6 Equipment Related Technical Queries

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7.7 As Built Documentation

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7.8 Management of Change – Summary Table of Tasks and Details of Affected Related Documentation

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C0063-FOR-LST-QA-001
Recommended list for Start-up and comnsumables, Spare part list and special tools
(Phase 2)
C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
00	*Issue for Review*	*21-OCT-2024*	*D. CRESCIMBENI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	**C0063-FOR-LST-QA-001**
Elogen Project Document Title	**Recommended list for Start-up and consumables, Spare part list and special tools**
Crosswind Project Document Number	**FORES-INN-BPH-REG-00014**
Vendor Document Number and Revision	**224J10-DDL-MD-LIS-00002_0**

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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Review*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

NOTES

1) For spare parts not listed in this document, please note that no spare parts for commissioning & start up have been suggested by Vendors

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Spare Part List for Piping

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
2	1/2" HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2	HUTCHINSON			STAINLESS STEEL T304 + 7DF2075	2	2	2		
3	1/2" HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2	HUTCHINSON			STAINLESS STEEL T316 + 7DF2075	5	5	5		
4	1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
5	1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
6	3/4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	4	4		
7	3/4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	2	2		
8	1 1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	1	1		
9	1 1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
10	1 1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
11	1" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	2	2		
12	1" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	4	4		
13	1" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	8	8	8		
14	2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	5	5	5		
15	2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
16	2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	6	6		
17	3" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	3	3		
18	3" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
19	4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	2	2		
20	4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
21	4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
22	6" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	2	2		
23	6" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
24	8" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
25	1/2" 60 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
26	1/2" 65 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				22	22	22		

Spare Part List for Piping

27	1/2" 70 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				7	7	7		
28	5/8" 80 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				2	2	2		
29	5/8" 85 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				18	18	18		
30	5/8" 90 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				2	2	2		
31	5/8" 95 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				24	24	24		
32	5/8" 130 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
33	5/8" 150 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				3	3	3		
34	3/4" 105 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				16	16	16		
35	3/4" 110 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
36	3/4" 130 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
37	3/4" 165 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				2	2	2		
38	1/2" 60 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				10	10	10		
39	1/2" 65 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				19	19	19		
40	1/2" 70 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
41	1/2" 105 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
42	5/8" 75 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				8	8	8		
43	5/8" 80 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				26	26	26		
44	5/8" 85 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				13	13	13		
45	5/8" 90 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				47	47	47		
46	5/8" 95 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				10	10	10		
47	5/8" 120 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
48	5/8" 140 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				1	1	1		
49	5/8" 160 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				1	1	1		
50	3/4" 95 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				4	4	4		
51	3/4" 105 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				6	6	6		
52	3/4" 110 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				8	8	8		
53	3/4" 115 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				20	20	20		
54	3/4" 125 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				5	5	5		
55	3/4" 165 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				6	6	6		
56	3/4" 180 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				1	1	1		

Spare Part List for Piping

57	3/4" 195 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
58	3/4" 210 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		

Spare Part List for Vessels

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
1	STUD BOLTS 1 1/2" X 285 + 2 NUTS 1 1/2"	HYDROBOLT	B8G8ALL2XN1.500X285	24J033-001 POS. 6	B8 CL.1 / GR. 8 CL. 1	3	3	3		
2	24" GASKETS 300# RF 6 THK	KLINGER	RUBBER STEEL GASKET Inner 620 Outer 772mm	24J033-001 POS. 5	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
3	STUD BOLTS 1 1/2" X 300 + 2 NUTS 1 1/2"	HYDROBOLT	B8G8ALL2XN1.500X300	24J033-011 POS. 6	B8 CL.1 / GR. 8 CL. 1	4	4	4		
4	36" GASKETS 150# RF 6 THK	KLINGER	RUBBER STEEL GASKET Inner 900 Outer 984mm	24J033-011 POS. 5	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
5	STUD BOLTS 3/4" X 115 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X115	24J033-021 POS. "P"	B8 CL.1 / GR. 8 CL. 1	1	1	1		
6	3" GASKETS 300# RF 6 THK	KLINGER	RUBBER STEEL GASKET DN:3 PN 300	24J033-021 POS. "P"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
7	STUD BOLTS 3/4" X 130 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X130	24J033-021 POS. "H1-H2"	B8 CL.1 / GR. 8 CL. 1	3	3	3		
8	6" GASKETS 300# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 300	24J033-021 POS. "H1-H2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
9	STUD BOLTS 3/4" X 105 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X105	24J033-031 POS. "P"	B8 CL.1 / GR. 8 CL. 1	1	1	1		
10	6" GASKETS 150# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 150	24J033-031 POS. "P"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
11	STUD BOLTS 1" X 145 + 2 NUTS 1"	HYDROBOLT	B8G8ALL2XN1.000X145	24J033-031 POS. "M"	B8 CL.1 / GR. 8 CL. 1	1	1	1		
12	16" GASKETS 150# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:16 PN 150	24J033-031 POS. "M"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
13	STUD BOLTS 3/4" X 130 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X130	24J033-041 POS. "O2"	B8 CL.1 / GR. 8 CL. 1	2	2	2		
14	6" GASKETS 300# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 300	24J033-041 POS. "O2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
15	STUD BOLTS 3/4" X 130 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X130	24J033-051 POS. "H1-H2"	B8 CL.1 / GR. 8 CL. 1	3	3	3		
16	6" GASKETS 300# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 300	24J033-051 POS. "H1-H2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
17	STUD BOLTS 7/8" X 125 + 2 NUTS 7/8"	HYDROBOLT	B8G8ALL2XN0.875X125	24J033-061 POS. "O2"	B8 CL.1 / GR. 8 CL. 1	2	2	2		
18	10" GASKETS 150# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:10 PN 150	24J033-061 POS. "O2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
19										
20										
21										
22										
23										
24										
25										
26										
27										

Spare Part List for Electrical parts

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
1	Coupling relay PSR-PS21-1NO-1NC-24DC-SC	PHOENIX CONTACT	2700357	C0063-FOR-DGM-EL-003	N/A	1	1	1		
2	Luminaire LifEx-ME-0630-CCT	CORTEM	-	C0063-FOR-LAY-EL-002	N/A	3	3	3		
3	Luminaire LifEx-ME-0630N-CCT	CORTEM	-	C0063-FOR-LAY-EL-002	N/A	3	3	3		
4	Luminaire LifEx-ME-1260-CCT	CORTEM	-	C0063-FOR-LAY-EL-002	N/A	1	1	1		

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-QA-001
FORES ENGINEERING	Recommended list for Start-up and consumables, Spare parts list and special tools	Revision	Rev.00
	C63- CrossWind Project	Page Number	9 of 9

Spare Part List for Tubing and Instruments

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
1	BULKHEAD 1/4" O.D. 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	2	2	2		
2	UNION STRAIGHT 1/4" OD 1/4" OD DF 316	SWAGELOK			316 Stainless Steel	6	6	6		
3	STRAIGHT 1/4" NPT-M 1/2" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
4	UNION TEE 1/2" OD 1/2" OD 1/2" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
5	STRAIGHT 1/2" BSPP-F 1/2" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
6	STRAIGHT 1/2" NPT-M 1/2" O.D. DF 316	SWAGELOK			316 Stainless Steel	5	5	5		
7	UNION STRAIGHT 1/2" OD 1/2" OD DF 316	SWAGELOK			316 Stainless Steel	2	2	2		
8	DROP SIZE TEE 1" 1" 1/2" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
9	ELBOW 3/4" NPT-M 3/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
10	STRAIGHT 3/4" BSPP-M 3/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
11	STRAIGHT 1/8" NPT-M 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	6	6	6		
12	STRAIGHT 1/8" BSPP-M 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	3	3	3		
13	UNION STRAIGHT 3/4" OD 3/4" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
14	COMPRESSION FITTING FERRULE	SWAGELOK			316 Stainless Steel	8	8	8		
15	RS FITTING GASKET 1/4"	SWAGELOK			fluorocarbon FKM	1	1	1		
16	RG FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	1	1	1		
17	RS FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	2	2	2		
18	RP FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	1	1	1		
19	RS FITTING GASKET 3/4"	SWAGELOK			fluorocarbon FKM	1	1	1		
20	RS FITTING GASKET 1/8"	SWAGELOK			fluorocarbon FKM	1	1	1		
21	STRAIGHT 3/4" NPT-F 3/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
22	MALE CONNECTOR 1/2" OD x 3/4" BW	SWAGELOK			316 Stainless Steel	1	1	1		
23	UNION TEE 1/4" OD 1/4" OD 1/4" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
24	STRAIGHT 1/2" NPT-M 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
25	UNION REDUCTION 1/4"OD x 1/2" OD	SWAGELOK			316 Stainless Steel	1	1	1		
26	FITTING GASKET 1/4"	SWAGELOK			fluorocarbon FKM	1	1	1		
27	FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	2	2	2		
28	FITTING GASKET 1/8"	SWAGELOK			fluorocarbon FKM	2	2	2		
29	FITTING GASKET 3/8"	SWAGELOK			fluorocarbon FKM	2	2	2		

C063-ELO-PRO-CO-0002

BLPH Electrolyser CSU Method Statement

02	*2nd Issue*	*13-DEC-2024*	*MSA*	*HRO*	*DWA*
01	*1st Issue*	*19-NOV-2024*	*MSA*	*HRO*	*DWA*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Subcontractor Document Number	
Client Document Number	

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SUMMARY OF REVISION

REV.	DESCRIPTION
Rev 01	First issue
Rev 02	Issued after CWD Comments

REFERENCE DOCUMENTS

DOC NUMBER	REV.	DESCRIPTION
123A90-PML-COM-PRO-03007	01	BLPH Commissioning Strategy
123A90-PML-QHSE-PRO-00117	01	Punch List Management Procedure
123A90-PML-QHSE-PL-00001	01	Project HSE Management Plan
C063-ELO-PRO-CO-0001	01	BLPH Electrolyser Commissioning & Start-Up (CSU) Execution Plan
C063-ELO-PRO-CO-0003	01	BLPH Electrolyser Pre-Commissioning Manual
C063-ELO-PRO-CO-0004	01	BLPH Electrolyser Commissioning Manual
C063-ELO-PRO-CO-0005	01	BLPH Electrolyser Operational Test Procedure
C063-ELO-PRO-CO-0006	01	BLPH Electrolyser Performance Test Procedure
C063-ELO-PRO-CO-0007	01	BLPH Electrolyser O&M Training
C063-ELO-LST-CO-0001	01	BLPH Electrolyser - General Item list

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1. Introduction

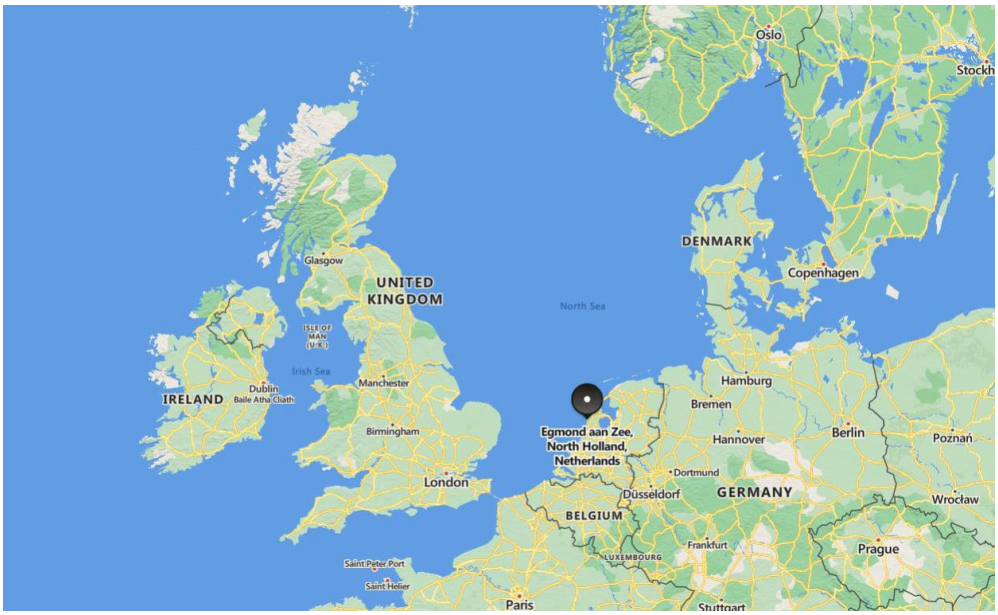
This document describes the philosophy, organization and milestones required for the Commissioning & Start-Up of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the coordinating on site of all the means and resources required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

1.1 Overview of Project Scope

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.
Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

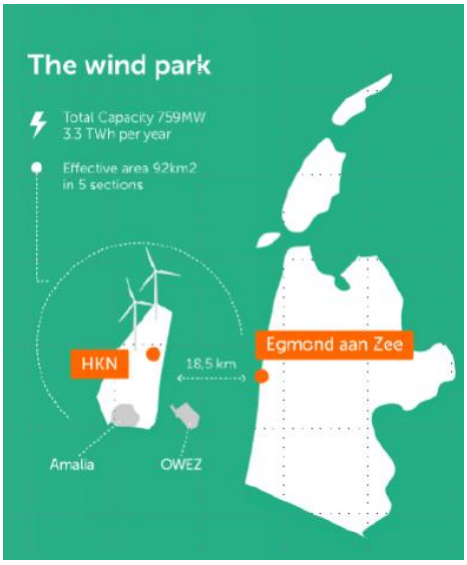
1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.



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HOLLANDSE KUST NOORD WIND PARK Location Map

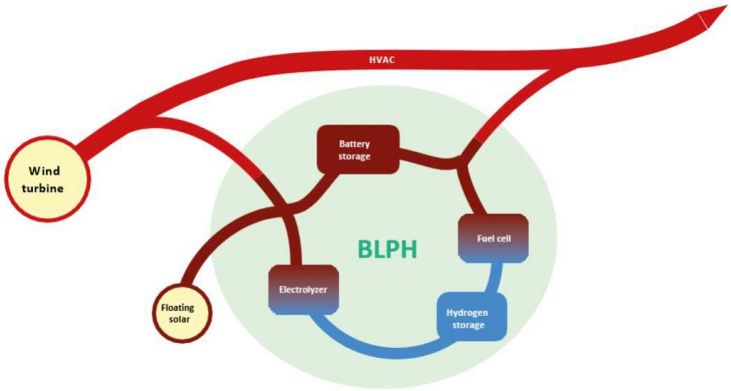


Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.



BLPH Concept

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Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.
The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2. Document Scope

This document describes the good practices guidelines through method statement procedures to perform the Pre-Commissioning & Commissioning of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the follow up of all activities good practices on site required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

The focus is made on:

- Energizing
- Loop Test
- Leak Test
- Nitrogen Purging

3. Definitions

COMPANY	means CROSSWIND C.V., owner & developer of the offshore WIND FARM Hollandse Kust Noord Wind Park Project.
ELOGEN	means ELOGEN as CONTRACTOR, the contracted party for engineering, and onshore commissioning of the Electrolyzer facilities associated with the PROJECT.
CONTRACTOR	means ROSETTI MARINO S.p.A., and his subcompany FORES for the contracted party for engineering, procurement, construction, offshore installation & commissioning of the facilities associated with the PROJECT.
Pre-Commissioning	Pre-Commissioning relates to the preliminary Commissioning activities to test and check the individual basic functions of individual items within any given system and/or sub-system to confirm they perform as designed.
Commissioning	The phase of the project after Pre-Commissioning. Commissioning consists of a comprehensive series of dynamic and energized Checks and Tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project Documents, Specifications, Standards and Engineering Best Practices.

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Commissioning Team	Team established to perform the Commissioning and Handover process from CONTRACTOR Construction Team to COMPANY Operation & Maintenance Team.
Commissioning Spares	"Replacement" and "Consumable" spares required during the final hook-up, Pre-Commissioning, Commissioning and Start-up phases.
Equipment	An item that may be part of a System and be commissioned independently, however, it may or may not be operated independently.
Handover	Transfer of responsibility of the Plant from the Project Team to the Asset Holder.
Inspection Test Records (ITR)	A-ITR – used to record and verify construction scope associated with a tagged item (component). B-ITR – used to record and verify energization and function testing during pre-commissioning of a tagged item
Mechanical Completion	Mechanical Completion is the point in the project when construction is complete, and subsystems are ready to be handed over to the commissioning team. Mechanical Completion is achieved when: - • All ITR-A's for the given system / sub-system have been completed and signed off; • All Category A Punches have been closed. • All open Category B Punches shall be accepted with agreed plan for closure prior to commissioning. • Completion of all documents required to be As-Built Red Line Marked Up. Mechanical Completion for any subsystem is recorded via the completing and signing of the Ready For Commissioning (RFC) certificate.
Operations	Operations include all personnel directly involved with Production Operations and Maintenance of the facility.
Performance Test	The Performance Test takes place following the Commissioning and Site Acceptance Test. A performance test is executed if there is a specific requirement to test performance criteria of an individual piece of equipment, a system, or the plant.
Performance Test Acceptance Certificate	This certificate shall be issued by the CONTRACTOR certifying that the PERFORMANCE TEST CRITERIAS have been achieved during the PERFORMANCE TESTS.
Plant	Refers to the permanent facilities (Base Load Power Hub) being constructed or to be constructed at WORKSITE resulting from the WORK.
Project	Refers to the BASE LOAD POWER HUB project.
Pre-Start Up Audit (PSUA)	The PSUA is a precursor to the PSSR meeting. The intention is to audit the readiness of the facility to commence start up with the findings being used as part of the PSSR and shall be conducted 6 weeks prior to Start-up.
Pre-Start Up Safety Review (PSSR)	Pre-Start-up Safety review (PSSR) meeting is the final determination that all prerequisites have been met to permit the hydrogen production and shall be conducted 4 weeks prior the RFSU.
Procedure	A document that details the execution of an activity.
Punch List	Work not executed as per approved documents and/or not meeting quality, health, safety, environment, operability/maintainability requirement and/or Standard; and recorded as a list for rectification.
Punch List 'A' Item	Punch List item that will prevent the safe operation of the Equipment, System and Plant and may jeopardize personnel or environment. Such item, as agreed, shall be

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	cleared before the Equipment/System/Plant can progress to the next stage of the Commissioning and Handover phase.
Punch List 'B' Item	Punch List item that will not endanger the safe operation of the Equipment, System and Plant or personnel and/or environment. Such item, as agreed, can be carried over to the next stage and may be cleared later.
Ready For Commissioning Acceptance Certificate (RFC)	RFC is the Proverlis description for a sub-system Mechanical Completion. See definition for Mechanical Completion.
Ready For Operation Acceptance Certificate (RFO)	An RFO Acceptance Certificate shall be raised on the completion of the sub-system commissioning procedure scope.
Ready For Sail Away (RFSA)	All preservation and preparation works are complete.
Ready For Start-up (RFSU)	RFSU applies to the whole or part of the Plant and its associated Facilities and Systems. RFSU signifies that the applicable scopes have been fully commissioned and are ready for safe hydrogen production. RFSU will be authorized with the signing of the RFSU certificate. The RFSU requires that the Pre-Start-Up Audit (PSUA) and the Pre-Start- Up Safety Review have been completed, and all related action/blocking issues have been resolved
SITE	Refers to the offshore location where the PLANT is to be installed and the vicinity thereof (offshore North Sea - Netherlands).
Start-up	The stage at which process fluid is introduced/created into the Plant. It is defined as operation of all the facilities under the project. It can only be performed once Commissioning of all associated utilities and auxiliaries and Pre-Commissioning activities of the Plant have been completed.
Start-up/Ramp-up	It is the initial start-up of processing equipment after first hydrogen, followed by a staged ramp up to full operating conditions. On completion of ramp-up, and after a period of steady state operations, the facility is ready to be performance tested.
Start Up on Paper (SUOP)	SUOP is an exercise to ensure that the start-up procedure and associated preparations are fit-for-purpose, including risk assessments, controls, mitigating actions and the Emergency Response protocols, procedures and capability are in place.
Site Acceptance Test	An un-interrupted safe operation of equipment, system, or plant, over a certain timeframe usually defined as 72hrs. A prerequisite to the Final Handover Certificate.
Statement of Fitness	As part of the COMPANY's HSE & SP Control Framework, the Statement of Fitness (SoF) before commissioning or introduction of hydrogen / hazardous substances in a New Asset, is a requirement of the Asset Integrity - Process Safety Management Application procedure. The Project and Asset Managers are accountable to develop a SoF to demonstrate asset integrity prior to energization or introduction of hazardous substances.
Sub-Contractor	means any company or person, to whom CONTRACTOR has subcontracted directly or indirectly at any level the performance of any part of the WORK.
System	A System is a major subdivision of a plant, being either process or utility, which performs an operational function of the plant. A System includes all the various equipment that allows it to operate. The division into functional Commissioning Systems corresponds to the prevailing fluids or services.

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Sub-system	A Sub-system is a further subdivision of a System, which performs a partial operational function of the System, with little or no interference from the other Sub-systems. The Sub-system is the basic unit for Commissioning.
Systemization	The process of defining Systems for handover. Generally, colour coded on the 'marked up' engineering drawings such as P&IDs, SLD's & Cable Block Diagrams.
Vendor	means any CONTRACTOR's / CPI and/or SUBCONTRACTORS' supplier(s) of CONTRACTOR ITEM(s). VENDORS' presence on WORKSITE & SITE may be required to assist CONTRACTOR and/or COMPANY for the installation, commissioning and startup of such CONTRACTOR ITEMS and during the execution of PERFORMANCE TESTS.
Vendor Package	Skid and Equipment such as hydrogen purification, water purification, chillers, rectifiers, containers, etc.
Workshop(s)	means any location(s), other than WORKSITES, including offices, premises and workshops, where any equipment, materials or manufactured items including CONTRACTOR ITEMS shall be engineered, manufactured and assembled.
WORKSITE	means any construction location(s), where any major parts of the PLANT (such as templates, piles, nodes, jacket structure, modules, decks) shall be fabricated and assembled, excluding all other offices, premises and workshops of CONTRACTOR and SUBCONTRACTORS.
Shall	used to indicate requirements strictly to be followed to conform to the specification and accepted by all involved parties.
Should	used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
May	used to indicate a course of action permissible within the limits of the specification.
Can	used for statements of possibility and capability, whether material, physical or casual.
"he", "him", "his"	are used in relation to CONTRACTOR.
"it", "its"	are used in relation to COMPANY.

4. Abbreviations

Acronyms / Abbreviations	Description
AI	Analog Input
AO	Analog Output
BPCS	Basic Process Control System
CSU	Commissioning & Start-Up
DBB	Double Block & Bleed
DI	Digital Input
DO	Digital Output
EIA	Electrical, Instrumentation & Automation
E&I	Electrical & Instrumentation
FAT	Factory Acceptance Test
F&G	Fire & Gas
FC	Fail Close
FO	Fail Open
FT	Functional Test

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Acronyms / Abbreviations	Description
HMI	Human-Machine Interface
HSE	Health, Safety, & Environment
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
LOTO	Lock-Out / Tag-Out
MC	Mechanical Completion
MCC	Motor Control Center
OTP	Operation Test Procedure (Commissioning)
PCS	Process Control System
PL	Punchlist
PLC	Programmable Logic Controller
PID (P&ID)	Piping and Instrumentation Diagram
PSV	Pressure Safety Valve
TSV	Temperature Safety Valve
RFC	Ready for Commissioning
RFO	Ready for Operation
RFSA	Ready For Sail Away
RFSU	Ready For Start-Up
SAT	Site Acceptance test
SIS	Safety Instrumented System
SLD	Single Line Diagram

5. Energizing

5.1 Introduction

This section serves as a reference to describe the powering-up procedure that must be performed during Pre-Commissioning, Commissioning & Start-Up activities.
This procedure provides the basic definitions and scope of work related to powering-up activities of electrical systems as well as the responsibilities of all parties.

The operations must be carried out with the highest quality of workmanship in accordance with this work instruction, the approved drawings and the applicable standards.
In addition to the above, the operations must also be in accordance with any regulations established by the continental, national or local authorities.

The electrical Ready For Commissioning Certificate has been signed by all parties with the following conditions:

- The electrical system has been received and installed.
- The connection with the electrical power supply subsystem has been made.
- The subsystems to which the equipment to be powered belongs are built.
- The earthing subsystem is installed and operational.
- All reference documents must be in the latest revision.

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- The work permit must be issued and signed.

5.2 Prerequisites

5.2.1 Required Equipments

- Toolboxes (e.g. screwdrivers, wrenches, pliers, spanners).
- Specific electrical tools (e.g. hot sticks, insulating mats, insulating stools, etc.).
- Test devices (e.g. multimeters, calibrators, Hart communicators).
- Bulk (fuses, electrical tapes).
- Field telephone or Walkie-Talkie.

5.2.2 Required Documents

- This procedure approved.
- Set of SLDs at the last revision.
- Isolation list at the last revision.
- A work permit has been issued and signed.
- Approved vendor test procedure and documentation.
- FAT report (If any)
- RFC Certificate of all electrical subsystems.

5.2.3 Required Manpower (Indicative)

- 1 Electrical Supervisor.
- 2 Electricians.
- 1 Discipline specialist if required.
- The Vendor if required.
- 1 LOTO & Work Permit Supervisor

Energization activities will be organized by the Site Manager and under the responsibility of the Field Service Engineer.

5.3 Safety

These defining rules shall be applied from the initial (total or partial) energizing of the instrumented systems, until the end of the commissioning activities:

- No equipment will be energized without construction completion and authorization
- Certified and qualified personnel are required for energization.
- Appropriate PPE must be worn.
- As soon as a panel is energized (Switchboards, Relay Panel, cabinets, PLC cabinets or local control panels) a sticker "Panel energized - Commissioning in progress" will be suitably displayed on the door, indicating that it is available for use.
- In any case, this procedure shall not conflict with, or supersede, the electrical lockout procedure. Only electrical system leaders will be authorized to remove padlocks on Breakers, MCCs, etc.

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Safety rules established for Electrical Power risks shall be applied.
Risk assessment must be done prior to any energization.
In case of firefighting system not available and in accordance with the risk assessment analysis result, a firewatcher must be mobilized with adequate portable firefighting equipment on each working area to be energized.

5.4 Method Statement

Prior to any energization, all breakers shall be opened to isolate the customer from supply.

- Check no interference with construction and other commissioning activities, this shall have been managed through the Work Permit.
- Open work permit.
- Install barriers with regulatory pictograms or icons around the working areas.
- Check all people inside the restricted perimeter are allowed to be there.
- Check earthing connection and bounding are in place according to earthing specifications, rules and standards.
- Check that there are no bare cores or disconnected cables.
- Check Logbook and Consignation List for review.
- Check that protection devices are available and implemented (Emergency device equipment, fire protection) according to Risk Assessment conducted.
- Check that radio communication devices (walky-talky) with such testing channels are at disposal.
- Check if the power supply is available.
- Remove padlocks.
- Proceed to energization.

<u>VENDOR Package energization</u>

FAT report is mandatory. FAT Punch List is included in the main related subsystem Punch List.
SAT must be done as per vendor procedure.
Packages vendors must carry out the energization of their package under the electrical lead witness and after electrical lead authorization.

<u>Temporary Power Supply</u>

This Energization procedure must be applied whatever the power is coming from a temporary device or the final power supply.

5.5 After Energization

- Check if the item setting is in accordance with stand-by rules, preservation procedure, standards and safety rules.
- Reinstall padlocks if required.

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- Update the Consignation List register.
- Close work permit.

6. Loop Test

6.1 Introduction

This section serves as a reference to describe the loop testing that must be performed during the Pre-Commissioning activities.

This procedure provides the basic definitions and scope of work related to Electrical-Instrumentation-Automation (EIA) loop testing activities as well as the responsibilities of all parties. This procedure also covers complex loop simulation testing. A specific ITR must be completed for each test. The project commissioning plan covers all start-up activities.

The cause & effect matrix test, including the process shutdown, emergency shutdown and F&G safety bar logics are also covered by this procedure. They will be tested during the operational tests after completion of all basic functions' tests.

6.2 Definition

A loop is defined as a combination of one or more instruments arranged to measure and/or control a process variable via a piece of equipment or a package (skid) as well as being able to generate alarms or safety triggers (trip).
The loop test must be carried out during the Pre-Commissioning phase before the Commissioning & Start-Up.
The purpose of the loop test is to ensure that all components of the loop are functioning correctly and are operational. It allows to check the correct connection of the instrument in the field with the Process Automation & the Safety Automation (in ELOGEN: BPCS and SIS) as well as the correct retransmission on the HMI (human-machine interface).
This includes:

- Validate the operation of the instrument.
- Check that the wiring is correct.
- Test all field inputs and outputs associated with the various process and utility subsystems via the integrated control panels: BPCS, SIS, F&G (Fire & Gas), MCC (Motor Starter Panel) and various local PLCs.
- Check the display on the HMI, the control from the HMI, the consistency of the physical value displayed on the HMI as well as the associated alarms.
- Validate the accuracy of the measurement ranges (scales), the limits, the physical units. This will allow operational tests to be carried out in a second step, which include the tests of the alarm thresholds and the safety triggers (trip).

A loop test is considered complete when the functional tests of the entire loop (including the regulator or logic) have been carried out with all the documentation duly signed.

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6.3 Conditions

Loop testing can be performed when the RFC certificate for the subsystem has been signed by all parties:

- The piping has been tested, cleaned, dried and is free of rust before the instruments and valves are fitted.
- The equipments have been cleaned and permanently closed.
- The reinstatement as per P&ID is completed with all piping, equipment, valves and instruments installed and oriented in the correct direction.
- The equipment, valves and instruments have been visually checked and are free of any damage.
- The equipment, valves and instruments are correctly fitted and are accessible for observation, adjustment, setting, etc.
- All equipment, valves and instrumentation have their tags installed correctly and visibly with all the required information.
- All electrical, pneumatic and piping connections to the instruments have been made in accordance with the supplier's instructions and the engineering design.
- All PSV's have their calibration certificate up to date.
- All Punchlist that does not require the system to be reopened are cleared.
- At least Gross Leak Test have been performed and forms signed by all parties.
- All relevant documentation is available in latest revision.

Before starting any loop testing activity, the field team must ensure that electrical continuity tests have been performed by the construction team and that no blocking A-type punchlist items are remaining.

The tests will require:

- Air supply (if applicable): air for equipment such as instrumented valves must be supplied from the instrument air distribution facilities. Temporary installations are acceptable (bottle/compressor & dryer) in case the instrument air system is unavailable.
- The pneumatic system tightness tested.
- Permanent or temporary power supply to the electrical distribution panels.
- The integrated control system received and operational.

6.4 Safety

These defining rules shall be applied from the initial (total or partial) energizing of the instrumented systems, until the end of the commissioning activities.

- Appropriate PPE must be always worn during loop testing.
- A permit to work has been delivered.
- No equipment will be definitively energized without the subsystem Mechanical Completion.
- As soon as a panel is energized (Relay Panel, cabinets, PLC cabinets or local PLC) a sticker "Panel energized - Commissioning in progress" will be suitably displayed on the door in different languages, indicating that it is available for loop checking.

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- Testing of electrical/instrumentation interfaces (i.e. I/O serving electrical switchboards for motors control) will be done in conjunction with the power distribution systems lead engineer.
- The on-site equipment area must be visibly marked with a “Test in Progress” sign.
- In any case this procedure shall not conflict with, or supersede, the electrical lock-out procedure. Only electrical system leaders will be authorized to remove padlocks in electrical cabinets.

Safety rules in accordance with the risk must be applied (e.g. Calibration Gas, Fluids, Pressure, Electrical Power, etc.) Risk assessment must be done prior to any test activity.

6.5 Prerequisites

The test of each input loop shall be done from the equipment on site to the operator console (HMI). The test of each output loop shall be done from the HMI display via the intermediate panels to the field instrument.

The loop test shall not include the calibration of the instruments. Indeed, the instruments are assumed to be intact, i.e. received as previously calibrated by the manufacturer. This is documented during the FAT for a prefabricated skid, and during pre-commissioning activities (by procurement or construction team) for all other equipment. However, the commissioning team shall check the instrument during the loop test and recalibrate if there is any doubt or if a check needs to be made again for any reason. The calibration certificate and the test sheet including the results shall be included in the loop folder.

Input values should be simulated from the field elements with available tools such as a pressure generator, gas calibration bottle, 4-20mA generator or a Hart communicator. At the end, the loop test is declared “completed” when the instrument concerned is ready to be used for operation. The loop test should also be formalized by a check sheet previously identified and available for use. The functional test can be performed during the loop test in case of a single loop instrument (depending on the transmitter). In case of multi-loop instruments such as on/off valves, control valves, MCCs, etc., the functional test should be performed when all the individual loops are tested.

6.5.1 Required Equipments

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches…
- Calibration devices: multimeters, pressure & temperature sources, calibrators, hart communicators, thermoelectric generator (PJN5208) …
- Fire & Gas testers: smoke generators, heat generators, IR and UV lamps, LEL cylinders, specific filters…
- Field telephone or Walkie-Talkie.
- Bulk (fuses, electrical tapes, leak detector sprays, sealants).

All equipment used must have a serial number and a valid calibration certificate (if applicable).

6.5.2 Required Documents

- This procedure approved for use.
- Set of PIDs at the last revision.

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- Set of SLDs at the last revision.
- Approved vendor test procedure and documentation.
- Integrated Control System tested and operational (SAT report signed by all parties).
- Subsystem RFC Certificate including the loop signed by all parties.
- Permit To Work delivered and signed.

6.5.3 Manpower (Indicative)

- 1 EIA Supervisor
- 2 Instrumentation technician
- 1 console operator
- 1 LOTO supervisor
- 1 specialist from another discipline if required
- Vendor if required.

Daily loop testing activities will be organized by the EIA Commissioning Supervisor under the responsibility of the Commissioning Engineer. Before testing, the test sheets are checked and clarified to be applicable to the equipment to be tested. Loop testing requires at least two people, one in the field and one at the HMI in the control room or at the HMI of the package controller, all are equipped with means of communication (walkie-talkie).

6.5.4 Duration

A visual check of approximately 5 min must be carried out (wiring, installation, presence of the tag, etc.) as described in the inspection sheet. Then the average time per loop is approximately 5 min including power-up. The functional test time depends on the complexity of the equipment (refer to the supplier's documentation).

6.6 Method Statement

Before loop testing, all disconnectors, circuit breakers and knives must be opened to isolate the field side of the distribution cabinet (or UCP).

- Verify that the wiring tests of the cabinets have been carried out.
- Verify that all necessary utilities are available for loop testing (instrument air, power supply…).
- Instrument air lines and tubing to the instrument must be blown with air before connection and energization.
- Verify that there is no interference with the construction or other commissioning activities (note: loops including a motor with the cabinet must be tested with the electrical team). The Work Permit has been issued.
- Verify that the control system is complete, powered and available (BPCS, SIS, etc.). For safety and reliability reasons, no subdivision could be accepted
- Verify that radio communication devices (walkie-talkie) with channels specifically assigned to loop testing are available.

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- Appropriate test sheets for equipment to be tested are ready for use. These sheets are previously filled with all information.
- Any temporary bypass, strap or bridging devices required must be distinctive, prominent and commented on the sheet and must be removed at the end of the test.
- During the loop test, any cables loosened and removed from the terminal block or instrument must be reconnected.
- The loop test must not start until the instrument has had an adequate warm-up period.
- Some instruments such as analyzers or some fire and gas detectors need to be energized before testing for a longer period. This warm-up time is given by the manufacturer. Analytical instruments must be checked according to the manufacturer's specific instructions.

Regarding the operation's general progress:

- The loop test team will be divided into a control room team and a field team.
- A customer representative may be present in the control room or on site to witness the activities
- An automation engineer or representative of the control system supplier must be present in the control room to simulate or force on-site actions or an output from the PLC. After the functional test, the PLC must be returned to its initial state, so all simulation or forcing states (overrides and bypass) must be removed.
- The control room team communicates to the field team the instrument tag to be tested.
- When the instrument is identified by the field team, the control room team closes the circuit breaker, disconnector or knife at the terminal block in the distribution cabinet according to the wiring diagram.
- The disconnector or circuit breaker can be placed in the closed position only when the loop concerned is ready to be tested. It will remain closed when the loop has been satisfactorily tested with the results reported on the test sheet.
- The control room team selects the loop on the control system screen, then checks the conformity of the display configuration in the static state and then checks the consistency of the value.
- The field team confirms that the instrument is powered on and can proceed with the simulation (input signal) and the functional check (output, valve limit switch, etc.).
- The control room team performs dynamic, and conformity checks related to the display configuration. It is done according with the loop type with all its parameters to be controlled (scale, physical unit, alarm animation, controller action, etc.).
- When a loop has been correctly tested, the representatives must sign the test sheet in the column concerning them: "performed by" and "accepted by" on the test sheets. The customer-side representative witnessing the operation must also sign as having witnessed the operation.
- The results of the loop tests must be recorded in the appropriate test sheet. The loop diagram should also be attached to the corresponding test sheet.
- A duly signed test sheet is proof that an instrument loop has been fully verified and is ready for the next commissioning activities.

In case of troubleshooting:

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- The loop test coordinator (usually the EIA Commissioning Supervisor) should coordinate troubleshooting by calling on the construction team if the wiring needs to be reviewed. The terminal disconnect (or circuit breaker or knives) should remain open until the troubleshooting activity is completed.
- When a loop needs to be removed from the test for troubleshooting, the loop testing team shall continue with another loop testing.
- Any changes made to a loop diagram during troubleshooting shall be marked in red on the master document with the associated test sheet attached.
- At the end of the troubleshooting, the troubleshooting team shall hand over all documentation related to the loop to the test coordinator in order to re-run the test.

6.6.1 Single Loop Item

- **Analog Input**

Item Type: Transmitter, etc.

- Check the status on the HMI.
- If external power supply, power on the loop. (Close the circuit breaker, knife or disconnector at the terminal block). Check loop voltage.
- Check if there is a short cut or if the loop current if less than 20 mA
- Check the loop configuration (sensor: active/passive) and adjust the mode on both sides.
- Check Stand-by status on HMI. Do troubleshooting investigation if wrong status.
- Check Activated Value on HMI:
    - In case of monitored line, apply physical action on the item.
    - In case of transmitter, apply, by simulation with a signal generator, a physical activation at 0%, 25%, 50%, 75%, 100%, 75%, 50%, 25% and 0% of scale.
    - Thermocouple and resistance temperature detector type transmitters must be simulated using a decade box (for resistive such as PT100, PT1000, RTD, etc.) otherwise use the thermocouple generator.
- Adjust if needed.
- Set item on stand-by mode or safety position as per requirement.
- Test sheet must be filled and signed

Notes:

- For temperature measuring instruments, it is recommended to check simply that the temperature indication is at ambient temperature before and after testing.
- For level transmitters with a displacer, the instrument must be checked with water or other suitable liquid before or during the loop test. This is to check that the instrument has been correctly installed and that the displacer has not been damaged during transport or installation. If the displacer is checked with a fluid of different density than its normal operating fluid (to be checked with the data sheet), then special care must be taken to convert the transmitter parameters and range values with the density of the fluid used for testing.

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- For pressure measuring instruments, it is recommended to check that the pressure indication is at ambient pressure before and after testing. On the other hand, it can be tested using a pressure test device (bulk aire or druck type) which is used to inject pressure at the primary element of the instrument. This test, if possible, should be performed as part of the pressure probe loop test. If this is not possible, it should be performed separately in the field using appropriate pressure test equipment and a 4-20mA injector or hart communicator to simulate the output signal.

- **Digital Input**

Item Type: Push buttons or switches (pressure, temperature, limit, etc.), Signal from a package, etc.

- Check the status on the HMI.
- Power up the loop (Close the circuit breaker or knife at the terminal block).
- Check the standby status on HMI. Carry out a troubleshooting investigation if wrong status.
- Put the equipment in an activated position:
    - By applying a physical action.
    - By simulation for inaccessible equipment and in all other cases.
- Check the status on the HMI.
- Set the device on standby mode or safety position as required.
- The test sheet must be completed and signed.

For packages, the entire exchange table must have been checked beforehand with a complete return of information to the main HMI (if applicable).

- **Analog Output**

Item Type: Valve Positioner, Set Point Signal, etc.

For control valves, the following methodology is to be completed with the valve-specific steps described in section 6.2:

- Check the status on the HMI.
- If the power supply is external, power up the loop. Check the loop voltage.
- Close the circuit breaker, disconnector or knives at the terminal block.
- Check no action in the field.
- Apply a command value of 0%, 25%, 50%, 75%, 100%, 75%, 50%, 25% and 0% of the scale in the HMI (by setting or forcing).
- Check physical action on the item.
- Adjust if necessary.
- Put the equipment in standby mode or in a safe position as required.
- The test sheet must be completed and signed.

- **Digital Output**

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Item Type: Lamp, Horn, ON/OFF Solenoid, Dry Contacts, Start/Stop Signals, etc.

For ON/OFF valves, the following methodology must be completed with the valve-specific steps described in section 6.2:

- Check the status on the HMI.
- If the power supply is external, power up the loop. Check the loop voltage.
- Close the circuit breaker, disconnector or knives at the terminal block.
- Check no action in the field.
- Check physical OFF position on the Item.
- Apply an ON-position command from the HMI (by setting or forcing).
- Check the physical action on the equipment.
- Adjust if necessary.
- Put the equipment in standby mode or in the safety position as required.
- The test sheet must be completed and signed.

6.6.2 Control Valve

Item Type: ON/OFF Valve

- Check the valve direction and its installation.
- Energize the solenoid.
- During the output control signal test, check and adjust the limit switches.
- Also check the discrepancy of the limit switches, i.e. the position feedback on the HMI.
- Check and record the opening and closing times.
- Check the manual control and the reset control if they exist.
- Check the safety position (FO: Fail Opened or FC: Fail Closed) in the event of a loss of power (air pressure, hydraulic power or electrical power).
- The FAT report is mandatory.
- The test sheet must be completed and signed.

Item Type: Proportional Valve

- Check the valve direction (correct orientation) and its installation.
- Operate the valve from the control room from zero to 100% and back to zero in 25% steps as described in the analog output test method.
- Check and record the actions in case of failure.
- Check and record the opening and closing times.
- Check the safety position (FO or FC) in case of power loss (air pressure, hydraulic power or electrical power).
- Check the linearity of the actuator (linear, square, =%, …).
- Check the actuator action (direct or reverse).
- Check the display function in the control room and the displayed indications are correct.
- The FAT report is mandatory.

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- The test sheet must be filled in and signed.

6.6.3 Motor Control

- Verify that the motor control unit in the switchgear room is in test mode; electrician assistance will be required.
- Verify that the emergency stop buttons on site are disengaged and that the manual/remote/stop switch is in the remote position.
- Verify protection settings are the newest revision and correctly inputted.
- Operate the motor from the control room, check all functions (at minimum: stop, start, run, unavailable, fail to start, trip).
- Verify that all indications and displays of all functions in the control room and on the motor electrical panel or at the motor control unit are correct.
- The test sheet must be completed and signed.
- Record the results on the test sheet applied to a digital input or output.

6.6.4 Embedded Software Items

Item Type: Flow meter, Level transmitters, Level Interface detector, etc.

- Test must be done as per vendor procedure and documentation.
- Vendor procedures must be approved.
- Special tool or software is required.
- Setting must be checked and recorded on the test sheet (and save on an appropriate support for future uses (final documentation)
- Interface even communication will be considered like DI/DO/AI/AO Test Loops
- Test sheet must be filled and signed.

6.6.5 Vendor Package (Including Vendor Skid)

- FAT report is mandatory.
- SAT must be done as per vendor procedure.
- Interface even communication will be considered like DI/DO/AI/AO Test Loops
- An exchange table must be created to allow full retransmission from the skid to the main control system.

- **Serial Link (Modbus, Profibus, Profinet…)**

Serial link has been checked during FATs by simulation.
Serial Link support must be checked during UCP SAT.
Interface even communication will be considered like DI/DO/AI/AO Test Loops
Test sheet must be filled and signed.

- **Instrument Loop**

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During FATs, all loops were tested by simulation on the BPCS & SIS or UCP.
During SATs, loops must be tested in accordance with vendor loop testing procedure and checked from/to the BPCS & SIS or UCP.
Test sheet must be filled and signed when this check is done.

- **Package**

Vendor must carry-out package commissioning activities (SAT, Loop test, functional test and OTP) under commissioning team witness.
Vendor test procedure must be approved.
Test sheet must be filled and signed.

6.6.6 Analyzer

This kind of item must be tested as per vendor test procedure under vendor assistance if required.
Vendor test procedure must be approved.
FAT report is mandatory.
Interface even communication will be considered like DI/DO/AI/AO Test Loops
Test sheet must be filled and signed.

6.6.7 Multi Loop or Complex Loop Item

A control loop is defined as complex when there are at least 2 or more instruments that work in conjunction with each other.

Loop Type: Control loop with transmitter (pressure, temperature, level, etc.) and control valve, Level control with level transmitter and pump start/stop control, Calculations (flow, viscosity, density, etc.), etc.

If a control valve is present:

- If in the failure position, check the limit switch.
- Adjust if necessary.
- Send the Open command.

Then proceed in the following order:

- Start testing the output loop according to the analog or digital output test procedure described in chapter 6.1.
- While testing the input loop according to the analog or digital input test procedure described in chapter 6.1, physically check the expected response of the equipment.
- If it is a combinational logic control, ensure that all aspects of the logic function operate according to the design.
- If it is a PID control type, ensure that the direction of control operates according to the design (direct or indirect direction), the PID parameters will be adjusted by the automation engineer during the Pre-Commissioning for Utilities and during Commissioning & Start-Up for the main Process.
- Record the final PID parameters during operation.

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- The test sheet must be completed and signed.

6.6.8 Various

Item Type : PSV, TSV, PI, TI, Gauge, etc.

No functional tests can be performed on this type of equipment. These are purely mechanical equipment.
A calibration certificate is, however, mandatory.

6.6.9 Cause & Effect Matrix

This section covers the test of interlocks, process shutdown, emergency shutdown and Fire & Gas detection.
It is mandatory to perform all these tests prior to unit start-up.
Also, all basic function loop tests concerned with each safety loop must be completed.

For each cause, proceed with the following steps:

- Verify that the latest revision is being used.
- Activate the safety loop trip cause physically on the item
- If not possible, on the HMI, simulate a value to activate the cause by overriding the actual value
- Verify on the field if all the expected effects are triggered
- If all the expected effects are observed, tick OK on the cause & effect test table
- If not, proceed to a troubleshooting

6.7 After Test

Check item setting is in accordance to stand-by rules or preservation procedure and safety rules.

7. Leak Test

7.1 Introduction

After the Electrolyser unit Mechanical Completion and before the Unit Start-Up, a leak detection shall be performed to ensure the good tightness of all systems. A preliminary gross leak test is performed on the different systems to ensure the tightness prior and during the Commissioning operations.
This operation makes it possible to detect leakage on bolted connections, flanges, instrument connections, valve bodies and compressed fittings. The leak detection test is carried out with air or inert gas.
This test is carried out after the construction: all hydrotesting (if any), cleanings and reinstatements (including flange tightening) are completed. The system has passed the Mechanical Completion inspection, and a certificate has been signed. All Punchlist A are cleared. A successful leak test is important for safety reasons as well as for the performance

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of the unit. Any leaks must be identified and repaired. The leak test during the Pre-Commissioning and Commissioning (prior to Start-Up) are prepared and performed by the CONTRACTOR under ELOGEN supervision.

7.2 Conditions & Preparations

- On-site personnel will be informed of the system's pressurization prior to the start of the operation. (Information will be shared in advance via e-mail and during site meetings).
- The system must be finished and conform to the P&ID: all piping is tested, cleaned and dried; all equipment are cleaned and closed.
- All PSV have their calibration certificates updated.
- All punch items A are cleared, and the system will remain closed after the leak test.
- All instruments are installed and online.
- All equipment, valves and instrumentation have their tag installed correctly and visibly.
- RFC Certificate is issued for the systems to be tested.
- All pipe flanges, valves and instrument connections will be accessible for testing. Scaffolding must be installed for inaccessible points.
- The unit is divided into different sections which will be tested independently of each other. Each section is called a Leak Test Pack and follow (when possible) the subsystem breakdown and respect operating pressures to facilitate the detection of possible leaks.
- P&ID Mark Up of each Leak Test Pack gives the position of all valves and the test battery limit.
- Isolation from other systems is done preferably, when possible, with a positive isolation such as spade or double block and bleed.
- It is recommended to set all valves inside the system to be tested at 50% open position to pressurize and test properly the valve cavity.
- The flanges can be reviewed directly at the bolt. It can also be sealed with tape with a simple hole on the top. A soapy solution will be used to detect the slightest leak. For detection with He or H2 sniffer, it is recommended to use this method.
- The temperature must be noted at each stage because it has an influence on the final pressure measured. Therefore, the final pressure is corrected with a simple calculation.
- Stacks are not integrated for the first leak test (gross leak test) before flushing: stacks connections are either closed or preferably connected with a flexible bypass.
- For the Final Leak Test, the control system is operational, and the interlock table has been tested.
- Packages like Water Purification or Hydrogen Purification Units have already been tested during their FAT, but it is recommended to include it in the test.
- Test Pressure must be respected, and it is important not to exceed it to avoid triggering pressure switches and pressures valves or to damage instruments.
- The final leak test is performed on all gas systems prior to start-up. For 25-11 water loops, leak test can be performed by filling with water till a normal operating level in the vessels and then pressurizing with a mixture of N2/H2 or N2/He to allow a precise leak detection by using a sniffer.
- A functional and calibrated sniffer is used for the final Leak Test at operating pressure.

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Note: the 25-11 water loops are also operating at 65°C in normal operation and in some cases, vibrations may occur. The thermal deformation due to a temperature difference temperature can cause stresses and geometrical deformation. This can affect gaskets and consequently create leakages if the system is not properly tightened.

7.3 Safety

Leak Test activities can be potentially hazardous; therefore, every precaution must be taken to ensure the safety of people and equipment. Before starting any activity, all site personnel must be aware of the risks involved and the systems that will be tested, i.e. all pressurized equipment, the extent of the system, the use of inert gas, etc. HSE personnel must be kept informed of the program. All personnel working in the vicinity must be alerted before any pressurization operation begins. Barriers should be put in place where possible with warning of the operations in progress and HSE personnel must be present to ensure the area is clear of unauthorized persons. Leak test activities sometimes involve the use of equipment not normally found in normal operation. The entire system downstream of the air or inert gas source must be capable of withstanding the maximum pressure delivered. The specifications of the lines to be tested must be reviewed. If the pressure is above what the line can support and it does not have an operational on-line PSV, a PSV must be temporarily connected and set below the line pressure design. All air hoses must be certified on site and correspond to the current operation (hose capable of supporting the pressure). All connections must be secured and provided with protection (quick coupling with anti-whip). The connections between the air tank or inert gas bottle rack and the hoses must have an isolation valve and a depressurization valve installed. If an inert gas is used, all safety measures must be taken for the use of the equipment that produces it, and personnel must be equipped with a portable gas detector to measure the ambient air Oxygen content.

7.4 Pre-requisites

7.4.1 Required Equipments

The following material list must be provided to perform the leak test:

- Pipe Fitter toolboxes: Adjustable Spanner, Pipe Wrenches (Stillson), Spanners, Striking Wrench, Torques Wrenches, ...
- A pressure gauge with a certificate added to the test report.
- Dried Air or Inert gas bottle rack (N2, mixture N2/H2 or N2/He).
- Gas regulator at the outlet of the gas bottle.
- Flexible between gas bottles and piping for injections.
- All fittings to the injection point.
- Bubble leak detection bottle.
- Air or N2 bottle for pneumatic valves activation if Instrument Air system is not started yet. Also provide electrical power to activate the motorized valves.
- H2 or He Sniffer
- Field telephone or Walkie-Talkie.
- At least one PSV is online, all PSV's have their calibration certificate up to date.

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- If there is no PSV online, a temporary PSV must be installed.

7.4.2 Required Documents

- This procedure approved for use.
- Set of Leak Test Pack with the P&IDs Mark Up at the last revision.
- Approved vendor leak test procedure and documentation.
- Integrated Control System tested and operational.
- Subsystem RFC Certificate signed by all parties.
- Permit To Work delivered and signed.

7.4.3 Manpower (Indicative)

- 1 Piping/Mechanical supervisor
- 1 Piping/Mechanical technician
- 2 Pipe Fitters
- 1 LOTO supervisor
- 1 specialist from another discipline if required
- Vendor if required.

Leak testing activities will be organized by the Piping Mechanical Commissioning Supervisor under the responsibility of the Commissioning Engineer or Superintendent. Before testing, the leak test packs and test sheets are checked and clarified to be applicable to the scope to be tested. Final leak testing requires at least three people, including one in the field and one at the HMI in the control room or at the HMI of the package controller, all are equipped with means of communication (walkie-talkie).

7.4.4 Duration

A walkdown is done prior to start the pressurization to validate the line-up conformity as per the Leak Test Pack. This can take 30 min maximum. Then the operation itself lasts around 1h30 if no leaks are detected. If some leaks are detected and depending on the troubleshooting to perform, the operation can last longer.

7.5 Method Statement

Pressurization should be done slowly and in a controlled manner. Pressurization should be carried out in stages for pressure zones above 300 mbarg: 25%, 50% and 100% of the final pressure. If a major leak is detected during pressure increases, pressurization should stop immediately, and the system should be completely depressurized via the selected vents. If there is no major leak but it is necessary to pressurize to remain at the operational pressure, this may be due to a leak through a valve or via the PSV. In this case, the PSV must be recalibrated or replaced. If it is the valve, another valve can be closed (DBB). During the operation, the following points must be respected:

- The pressure is gradually increased until reaching the next stage.
- Once the stage is reached, see if there is a significant pressure drop.

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- If there is no significant pressure drop, inspect for possible leaks by using a soapy solution.
- If a leak is detected, the system must be completely depressurized and then repaired and then retested.

Step	Pressure	Test duration (*)	Check
1	25% Test pressure	Stabilization: 5 min	
2	50% Test pressure	Stabilization: 5 min	
3	75% Test pressure	Stabilization: 5 min	
4	Test pressure	Stabilization: 1h	A check of all connections under gas with the gas detector and/or bubble leak product is required. A water leak check on all water connections is required.
		Test duration without pressure drop at least 1h	

(*): Test duration is for reference only. It will be adjusted on site during the test.

Acceptance Criteria:

The test will be considered successful once all connections have been tested:

- with bubble leak detection product and no bubbles detected
- with gas detector (Sniffer) and no leaks detected
- and no more than 0.1 bar/h (100 mbar) pressure drop has been observed

In case of Temperature variation during the operation, the final pressure can change, therefore we can do a correction on it as per the following calculation:

We consider $P_{adjusted}$, the final pressure considering the constant temperature during the test and the following equations:

$$P_{final}\ V = nRT_{final}$$
$$P_{adjusted}\ V = nRT_{initiale}$$

The volume and the mass are the same (it is a closed system)
Therefore, we get: $\boxed{P_{adjusted} = P_{final}\,(T_{initiale} / T_{final})}$

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8. Purging

8.1 Introduction

This section gives the technical specifications and method to be applied to perform a Nitrogen purging. The contexts could be for preservation, priori to first unit start-up or for maintenance.
The purpose of this document is to give the general method, the necessary equipment, and the safety requirements.
The P&ID Mark-Up of the sections to be purged are given in the relevant Purging Pack.
For the use of media frames, refer to the supplier's procedure for details.

8.2 Conditions

The purging can be performed when the RFC certificate for the subsystem has been signed by all parties:

- The piping has been tested, cleaned, dried and is rust free.
- All equipments have been cleaned and closed permanently.
- The equipments, valves and instruments have been visually checked and are free of any damage.
- The instruments are connected to the lines.
- All equipment, valves and instrumentation have their tag installed correctly and visibly.
- At least one PSV is online, all PSV's have their calibration certificate up to date.
- All Punchlist which do not require reopening the system are cleared.
- The reinstatement as per P&ID is completed with all piping, equipment, valves and instruments installed and oriented in the correct direction.
- The Gross Leak Test has been performed and ITR's signed by all parties.
- All necessary tools for the operation are available.
- All relevant documentation is available in the latest revision.

Due to the introduction of Hydrogen into the unit, the objective is to avoid any risk of creating an explosive mixture inside the system. Therefore, the goal is to carry out a purging using an inert media to achieve less than 3% vol of Oxygen. The inert media chosen is Nitrogen (N2).

8.3 Safety

These defining rules shall be applied from the initial (total or partial) nitrogen purging, until the end of the commissioning activities.

- Appropriate PPE must be always worn during loop testing.
- A permit to work has been delivered.
- No equipment will be purged with nitrogen without the subsystem Mechanical Completion.
- The system under pressure is clearly identified
- Safety rules in accordance with the risk must be applied (e.g. Fluids, Pressure, Electrical Power, etc.).
- Risk assessment must be done prior to any test activity.

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Before starting the activity, all site personnel must be aware of the risks involved and the systems that will be purged, i.e. all pressurized equipment, the scope of the system, etc. HSE personnel must be kept informed of the program. All personnel working in the nearby area must be alerted before any inerting operation begins. Barriers should be in place where possible with warning of ongoing operations and HSE personnel should be present to ensure the area is clear of people who have no reason to be here.

Nitrogen purging activities can also be dangerous, all precautions must be taken to ensure the safety of people and equipment. It involves the use of N2 frame and hoses usually found in the transitional phases like commissioning or maintenance until Nitrogen utility availability.
Exposure to high concentrations is quickly fatal. It is very important to control the ambient oxygen content. A nitrogen leak in a confined space can be enough to reduce the area of oxygen and create a danger of anoxia which can be fatal.
Inhaling an atmosphere with a too low oxygen content can lead to death by asphyxiation (Anoxia). Below 18% oxygen in the air, the first symptoms of danger to health can be felt: fatigue, yawning, headaches, rapid pulse, discomfort or dizziness and nausea. For oxygen concentrations below the threshold of 18%, there is a risk of rapid fainting without the possibility of reaction until death. To prevent any incident, measuring the oxygen content at all times is an essential preventive action for any intervention in confined spaces where inert gases are present.

8.4 Preparation

- Personnel present on site will be informed of the operation scope before the start. Information will be shared in advance via email and during site meetings.
- The battery limits of the area will be demarcated following the P&ID marking.
- Operators are trained on the procedure, the operation of the purging equipment and the safety instructions.
- N2 frames are available and working properly. They must be labeled, equipped with a regulator and protected against overpressure.
- The N2 frames will be placed in the same location as that provided for maintenance in normal operation.
- The hoses have been dried and cleaned and are ready for use.
- The sections to be inerted will be isolated from other systems by closed valves.
- The drains and vents used for the operation will be labeled and accessible. Otherwise, scaffolding must be put in place.
- The limits of the system placed under N2 must be clearly identified.
- The injection and depressurization points must be marked with tags and barricaded over a 3m diameter.
- Only operators or those responsible for the operation can enter the injection and vent point areas; they must wear a gas detector to check the atmosphere.
- If the pressure online cannot be checked, a Pressure Indicator must be installed and used to check the pressure.
- In the event of rain, protect the event and injection points with a temporary shelter.

8.5 Pre-requisites

8.5.1 Required Equipments

The following material list must be provided to perform the leak test:

- Pipe Fitter toolboxes: Adjustable Spanner, Pipe Wrenches (Stillson), Spanners, Striking Wrench, Torques Wrenches, ...

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- A pressure gauge with a certificate added to the test report.
- Inert gas bottle rack.
- Gas regulator at the outlet of the gas bottle.
- Flexible between gas bottles and piping for injections.
- All fittings to the injection point.
- Air or N2 bottle for pneumatic valves activation if Instrument Air system is not started yet. Also provide electrical power to activate the motorized valves.
- Field telephone or Walkie-Talkie.

8.5.2 Required Documents

- This procedure approved for use.
- Set of Purging Pack with the P&IDs Mark Up at the last revision.
- Approved vendor purging procedure and documentation.
- Integrated Control System tested and operational (for automatic inert gas injection).
- Subsystem RFC Certificate signed by all parties.
- Permit To Work delivered and signed.

8.5.3 Manpower (Indicative)

- 1 Piping/Mechanical supervisor
- 1 Piping/Mechanical technician
- 2 Pipe Fitters
- 1 LOTO supervisor
- 1 specialist from another discipline if required
- Vendor if required.

Purging activities will be organized by the Piping Mechanical Commissioning Supervisor under the responsibility of the Commissioning Engineer or Superintendent. Before testing, the purging packs and test sheets are checked and clarified to be applicable to the scope. Purging requires at least three people, including one in the field and one at the HMI in the control room or at the HMI of the package controller, all are equipped with means of communication (walkie-talkie).

8.5.4 Duration

The duration of the activity should not exceed 1-2h per Purging pack.

8.6 Method Statement

Two different methods will be used to purge a system with an inert gas:

- By Piston Effect.
- With Compressions/Decompressions.

If not injected manually, the inert gas can also be sent to the unit by an operator in the control room.
The method below specifies the necessary means to be implemented as well as the general methodology:

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Piston effect method:

- Check if the barricades and the panels at the injection and vent points are in place (if applicable).
- Check the initial pressure, remove any residual pressure (if applicable).
- Check that the N2 rack is available in sufficient quantity (plan for 5 times the volume of the unit).
- Check the vent points opening located at the unit outlet.
- Put the regulator at sufficient pressure to create a flow through the unit to be purged.
- Start the N2 injection by opening the injection point solenoid valve at the inlet of the unit
- Inject the N2, this will be done slowly and in a controlled manner by increasing the pressure of the regulator to allow a sufficient flow and so that there is no accumulation of pressure in the system.
- Regularly check the O2 level at the vent.
- When the O2 level is less than 3%, the operation is completed.
- Fill in the ITR with the measured O2 level.
- Stop the N2 injection then close immediately all vents.
- If the goal is to put the system on preservation, leave a positive pressure of 100mbarg (pressure must be below PSV relief pressure).

Compression/Decompression method:

- Check that barricades and panels at injection and vent points are in place.
- Check the initial pressure, remove any residual pressure (if applicable).
- Locate vents to be opened during depressurization.
- Inject N2 in a slow, controlled manner until a pressure of 1 barg is reached (or other chosen pressure as per the table showed in the next part).
- Vent all pressure contained in the volume through the vent line or any other vent.
- Repeat the operation another time and check the oxygen level on the last depressurization.
- If the measured O2 level is less than 3%, the operation is completed.
- Fill in the ITR with the measured O2 level.
- Immediately close vents.
- If the goal is to put the system on preservation, leave a positive pressure of 100mbarg (pressure must be below PSV relief pressure).

Calculate the amount of Inert Gas required in the following table :

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Added Pressure	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
O2 Initial	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%
1	14%	10,50%	8,40%	7%	6%	5,25%	4,67%	4,20%	3,82%	3,50%
2	9,33%	5,25%	3,36%	2,33%	1,71%	1,31%	1,04%	0,84%	0,69%	0,58%
3	6,22%	2,63%	1,34%	0,78%						
4	4,15%	1,31%								
5	2,77%									
6	1,84%									

This table above shows the optimum compression/decompression ratio. This is not applicable for very low-pressure systems. It is then possible to predict the exact quantity of Inert Gas in Nm3.

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BLPH Electrolyser
Pre-Commissioning Manual

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SUMMARY OF REVISION

REV.	DESCRIPTION
Rev 01	First issue
Rev 02	Issue after CWD comments

REFERENCE DOCUMENTS

DOC NUMBER	REV.	DESCRIPTION
123A90-PML-COM-PRO-03007	01	BLPH Commissioning Strategy
123A90-PML-QHSE-PRO-00117	01	Punch List Management Procedure
123A90-PML-QHSE-PL-00001	01	Project HSE Management Plan
C063-ELO-PRO-CO-0001	01	BLPH Electrolyser Commissioning & Start-Up (CSU) Execution Plan
C063-ELO-PRO-CO-0002	01	BLPH Electrolyser CSU Method Statements
C063-ELO-PRO-CO-0004	01	BLPH Electrolyser Commissioning Manual
C063-ELO-PRO-CO-0005	01	BLPH Electrolyser Operational Test Procedure
C063-ELO-PRO-CO-0006	01	BLPH Electrolyser Performance Test Procedure
C063-ELO-PRO-CO-0007	01	BLPH Electrolyser O&M Training
C063-ELO-LST-CO-0001	01	BLPH Electrolyser - General Item list

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1. Introduction

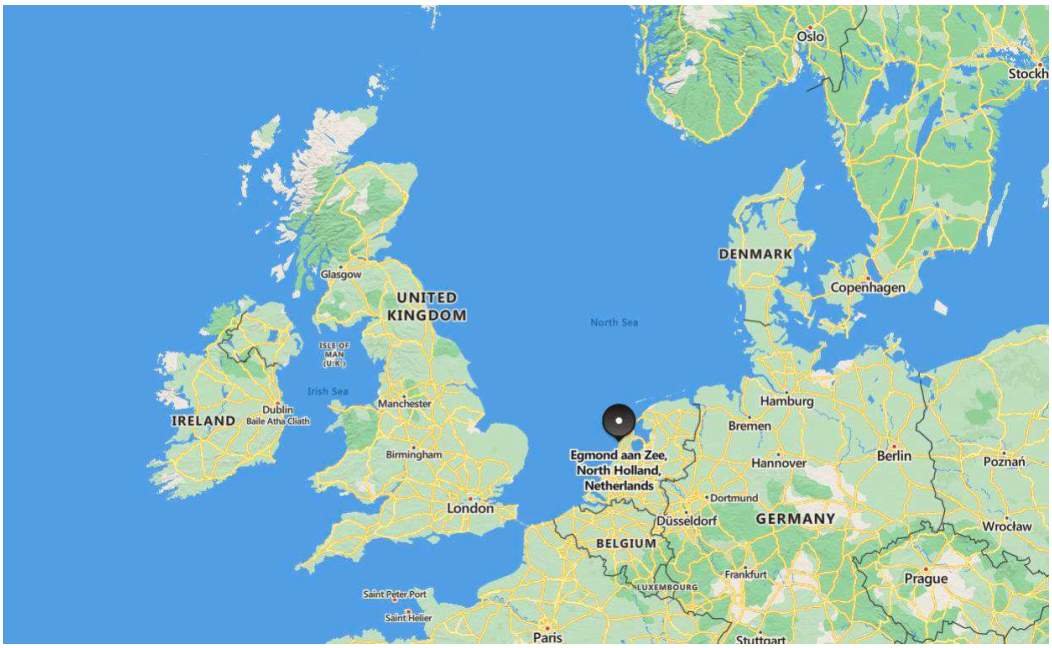
This document gives Pre-Commissioning requirements for the Commissioning & Start-Up of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the coordinating on site of all the means and resources required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

1.1 Overview of Project Scope

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.
Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.



HOLLANDSE KUST NOORD WIND PARK Location Map

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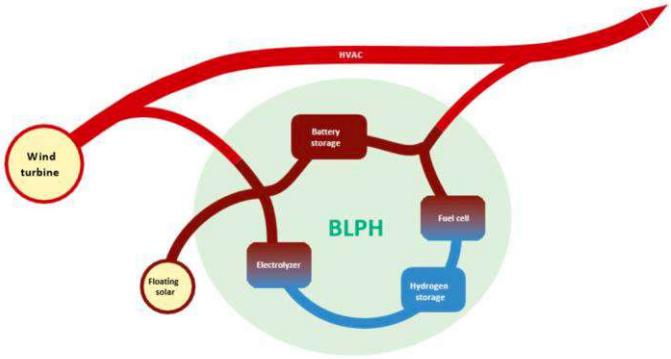


Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.



BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

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The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2. Document Scope

This document describes the detailed activities scope to perform the Pre-Commissioning of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. These operations start straight after the Sub-System Mechanical Completion when the RFC is signed by all parties. ELOGEN's site supervision is responsible for advising the follow up of all activities good practices on site required for the Unit Commissioning & Start-Up in accordance with COMPANY specifications. The main activities are:

- Energizing & Test of Electrical Items such as Pumps, Electrical Heaters, …
- Loop checks of Instrumentation Items such as Pressure Transmitters, Level Transmitters, …
- Package Pre-Commissioning with Vendors (Described in Vendor Documents)
- Gross Leak Test

Electrical & Instrumentation Pre-Commissioning Tests are performed through the Item List follow up: C063-ELO-LST-CO-0001 - BLPH Electrolyser - General Item list. The methodology and guidelines are detailed in C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statements. All ITR's specific to the project are given in this document.

For packages, vendors provide all the documentation including their own suite of ITR's regarding all remaining tests taking place onsite. FAT reports give all the tests already completed. Vendors concerned are:

- OVIVO: for the Water Treatment Package (WTP) – Subsystem 56-03
- PAUMIER: HVAC Glycol Water Loop – Subsystem 66-06
- MSA: SSI-1000: Fire Safety System – Subsystem 25-11
- NIDEC: Transformer & Rectifiers – Subsystem 03-04 & 08-01

Regarding the Hydrogen Purification Package HPP (25-01), Aquagas mobilization onsite will be at the Start-Up. All items are connected directly to ELOGEN UCP. Pre-Commissioning on this package will be performed by CONTRACTOR under ELOGEN supervision. Therefore, this document also includes all 25-01 items.
For all other vendors, SAT Procedures must be provided prior to any operation. Task Risk Assessment to be revisited and possibly updated when approved versions of said document are made available

All the mechanical checks including alignments checks, correct installation such as valves & equipments direction have been monitored prior to the Mechanical Completion.
Piping & Mechanical Pre-Commissioning activity is the Gross Leak Test.
The methodology and guidelines are detailed in C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statements.
Leak Test Packs with ITR's and P&ID Mark Up are given in this document.

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3. Definitions

COMPANY	means CROSSWIND C.V., owner & developer of the offshore WIND FARM Hollandse Kust Noord Wind Park Project.
ELOGEN	means ELOGEN as CONTRACTOR, the contracted party for engineering, and onshore commissioning of the Electrolyzer facilities associated with the PROJECT.
CONTRACTOR	means ROSETTI MARINO S.p.A., and his subcompany FORES for the contracted party for engineering, procurement, construction, offshore installation & commissioning of the facilities associated with the PROJECT.
Pre-Commissioning	Pre-Commissioning relates to the preliminary Commissioning activities to test and check the individual basic functions of individual items within any given system and/or sub-system to confirm they perform as designed.
Commissioning	The phase of the project after Pre-Commissioning. Commissioning consists of a comprehensive series of dynamic and energized Checks and Tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project Documents, Specifications, Standards and Engineering Best Practices.
Commissioning Team	Team established to perform the Commissioning and Handover process from CONTRACTOR Construction Team to COMPANY Operation & Maintenance Team.
Commissioning Spares	"Replacement" and "Consumable" spares required during the final hook-up, Pre-Commissioning, Commissioning and Start-up phases.
Equipment	An item that may be part of a System and be commissioned independently, however, it may or may not be operated independently.
Handover	Transfer of responsibility of the Plant from the Project Team to the Asset Holder.
Inspection Test Records (ITR)	A-ITR – used to record and verify construction scope associated with a tagged item (component). B-ITR – used to record and verify energization and function testing during pre-commissioning of a tagged item
Mechanical Completion	Mechanical Completion is the point in the project when construction is complete, and subsystems are ready to be handed over to the commissioning team. Mechanical Completion is achieved when: - • All ITR-A's for the given system / sub-system have been completed and signed off; • All Category A Punches have been closed. • All open Category B Punches shall be accepted with agreed plan for closure prior to commissioning. • Completion of all documents required to be As-Built Red Line Marked Up. Mechanical Completion for any subsystem is recorded via the completing and signing of the Ready For Commissioning (RFC) certificate.
Operations	Operations include all personnel directly involved with Production Operations and Maintenance of the facility.
Performance Test	The Performance Test takes place following the Commissioning and Site Acceptance Test. A performance test is executed if there is a specific requirement to test performance criteria of an individual piece of equipment, a system, or the plant.

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Performance Test Acceptance Certificate	This certificate shall be issued by the CONTRACTOR certifying that the PERFORMANCE TEST CRITERIAS have been achieved during the PERFORMANCE TESTS.
Plant	Refers to the permanent facilities (Base Load Power Hub) being constructed or to be constructed at WORKSITE resulting from the WORK.
Project	Refers to the BASE LOAD POWER HUB project.
Pre-Start Up Audit (PSUA)	The PSUA is a precursor to the PSSR meeting. The intention is to audit the readiness of the facility to commence start up with the findings being used as part of the PSSR and shall be conducted 6 weeks prior to Start-up.
Pre-Start Up Safety Review (PSSR)	Pre-Start-up Safety review (PSSR) meeting is the final determination that all prerequisites have been met to permit the hydrogen production and shall be conducted 4 weeks prior the RFSU.
Procedure	A document that details the execution of an activity.
Punch List	Work not executed as per approved documents and/or not meeting quality, health, safety, environment, operability/maintainability requirement and/or Standard; and recorded as a list for rectification.
Punch List 'A' Item	Punch List item that will prevent the safe operation of the Equipment, System and Plant and may jeopardize personnel or environment. Such item, as agreed, shall be cleared before the Equipment/System/Plant can progress to the next stage of the Commissioning and Handover phase.
Punch List 'B' Item	Punch List item that will not endanger the safe operation of the Equipment, System and Plant or personnel and/or environment. Such item, as agreed, can be carried over to the next stage and may be cleared later.
Ready For Commissioning Acceptance Certificate (RFC)	RFC is the Proverlis description for a sub-system Mechanical Completion. See definition for Mechanical Completion.
Ready For Operation Acceptance Certificate (RFO)	An RFO Acceptance Certificate shall be raised on the completion of the sub-system commissioning procedure scope.
Ready For Sail Away (RFSA)	All preservation and preparation works are complete.
Ready For Start-up (RFSU)	RFSU applies to the whole or part of the Plant and its associated Facilities and Systems. RFSU signifies that the applicable scopes have been fully commissioned and are ready for safe hydrogen production. RFSU will be authorized with the signing of the RFSU certificate. The RFSU requires that the Pre-Start-Up Audit (PSUA) and the Pre-Start- Up Safety Review have been completed, and all related action/blocking issues have been resolved
SITE	Refers to the offshore location where the PLANT is to be installed and the vicinity thereof (offshore North Sea - Netherlands).
Start-up	The stage at which process fluid is introduced/created into the Plant. It is defined as operation of all the facilities under the project. It can only be performed once Commissioning of all associated utilities and auxiliaries and Pre-Commissioning activities of the Plant have been completed.
Start-up/Ramp-up	It is the initial start-up of processing equipment after first hydrogen, followed by a staged ramp up to full operating conditions. On completion of ramp-up, and after a period of steady state operations, the facility is ready to be performance tested.

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Start Up on Paper (SUOP)	SUOP is an exercise to ensure that the start-up procedure and associated preparations are fit-for-purpose, including risk assessments, controls, mitigating actions and the Emergency Response protocols, procedures and capability are in place.
Site Acceptance Test	An un-interrupted safe operation of equipment, system, or plant, over a certain timeframe usually defined as 72hrs. A prerequisite to the Final Handover Certificate.
Statement of Fitness	As part of the COMPANY's HSE & SP Control Framework, the Statement of Fitness (SoF) before commissioning or introduction of hydrogen / hazardous substances in a New Asset, is a requirement of the Asset Integrity - Process Safety Management Application procedure. The Project and Asset Managers are accountable to develop a SoF to demonstrate asset integrity prior to energization or introduction of hazardous substances.
Sub-Contractor	means any company or person, to whom CONTRACTOR has subcontracted directly or indirectly at any level the performance of any part of the WORK.
System	A System is a major subdivision of a plant, being either process or utility, which performs an operational function of the plant. A System includes all the various equipment that allows it to operate. The division into functional Commissioning Systems corresponds to the prevailing fluids or services.
Sub-system	A Sub-system is a further subdivision of a System, which performs a partial operational function of the System, with little or no interference from the other Sub-systems. The Sub-system is the basic unit for Commissioning.
Systemization	The process of defining Systems for handover. Generally, colour coded on the 'marked up' engineering drawings such as P&IDs, SLD's & Cable Block Diagrams.
Vendor	means any CONTRACTOR's / CPI and/or SUBCONTRACTORS' supplier(s) of CONTRACTOR ITEM(s). VENDORS' presence on WORKSITE & SITE may be required to assist CONTRACTOR and/or COMPANY for the installation, commissioning and startup of such CONTRACTOR ITEMS and during the execution of PERFORMANCE TESTS.
Vendor Package	Skid and Equipment such as hydrogen purification, water purification, chillers, rectifiers, containers, etc.
Workshop(s)	means any location(s), other than WORKSITES, including offices, premises and workshops, where any equipment, materials or manufactured items including CONTRACTOR ITEMS shall be engineered, manufactured and assembled.
WORKSITE	means any construction location(s), where any major parts of the PLANT (such as templates, piles, nodes, jacket structure, modules, decks) shall be fabricated and assembled, excluding all other offices, premises and workshops of CONTRACTOR and SUBCONTRACTORS.
Shall	used to indicate requirements strictly to be followed to conform to the specification and accepted by all involved parties.
Should	used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
May	used to indicate a course of action permissible within the limits of the specification.
Can	used for statements of possibility and capability, whether material, physical or casual.
"he", "him", "his"	are used in relation to CONTRACTOR.
"it", "its"	are used in relation to COMPANY.

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4. Abbreviations

Acronyms / Abbreviations	Description
E&I	Electrical & Instrumentation
ESD	Emergency Shut Down
FAT	Factory Acceptance Test
FT	Functional Test
HSE	Health, Safety, & Environment
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
MC	Mechanical Completion
NO	Normally Open
NC	Normally Closed
N/A	Non-Applicable
OTP	Operation Test Procedure (Commissioning)
PCS	Process Control System
PL	Punchlist
PID (P&ID)	Piping and Instrumentation Diagram

5. E&I Pre-Commissioning

5.1 Item List

Refer to **C063-ELO-LST-CO-0001 - BLPH Electrolyser - General Item list**
A progress KPI can be calculated by the Item tested divided by the total number of Items.

5.2 ITR's

Here are the ITR's list:

ITR Number	ITR Name
C063-ELO-REP-CO-0001	Analog Input
C063-ELO-REP-CO-0002	Digital Input & Output
C063-ELO-REP-CO-0003	Pump Motor
C063-ELO-REP-CO-0004	On Off Valve
C063-ELO-REP-CO-0005	Proportional Valve
C063-ELO-REP-CO-0006	Air Extractor
C063-ELO-REP-CO-0007	Heating Ribbon
C063-ELO-REP-CO-0008	Electrical Heater

All forms can be found in Appendix.

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6. Piping & Mechanical Pre-Commissioning

6.1 Leak Test Pack List

Here is the Leak Test Packs list for Gross Leak Test:

Leak Test Pack	Description	Medium	Test Pressure
LT-01	Anode Water Loop / O2 Production	N2	3 barg
LT-02	Cathode Water Loop / H2 Production	N2	3 barg
LT-03	H2 Purification & Send Out	N2	3 barg

All utilities tightness is verified during the service tests.
66-06 HVAC system tightness is tested with vendor prior to performing the filling with glycol.
All the leak test packs described in the table are performed during Pre-Commissioning as Gross Leak Test.
Before Unit Start-Up, all listed Leak Test Packs are retested with all Stacks connected at 90% of PSV Pressure (See Commissioning Manual).
All Leak Test Pack P&ID Mark-Up can be found in appendix, ready for use.

6.2 Leak Test ITR

The ITR form for Leak Testing is attached to the Appendix with the rest of Pre-Commissioning ITRs.

7. Appendix

7.1 ITR’s

7.2 Leak Test Pack

7.3 General Item list

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elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0001 – ANALOG INPUT**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	
Range	

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK

Test Equipment Used	Serial Number	Calibration Expiry Date

Input Range Unit		Indication Range Unit	

	Rising %					Falling %			
	0	25	50	75	100	75	50	25	0
Input Signal									
HMI Indication									

	Trip or Alarm Setting	Actual Trip or Alarm Point	OK / NOK / NA
HI HI Trip			
HI Alarm			
LO Alarm			
LO LO Trip			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C63-ELO-REP-CO-0002 – DIGITAL INPUT/OUTPUT**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	

ITEM CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	
Range	

ELECTRICAL CHECK	
Wiring Check	
Voltage Measurement	

LOOP CHECK		
Input / Output function	Process	Safety
Test Equipment Used	Serial Number	Calibration Expiry Date

INPUT CHECK			
Switch Contacts	NO	NC	N/A
	Setting (unit)		Switch Contact
Switch Trigger			Open - On / Closed - Off
Reset			Open - On / Closed - Off

OUTPUT CHECK		
Field Device Off Status	On / Open / …	Off / Closed / …
Output Signal to On-Position (activation by setting or forcing)		
Field Device Status Change	On / Open / …	Off / Closed / …
HMI Feedback Display	Yes / No	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0003 – PUMP MOTOR**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	

CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	
Insulation Class	
Nominal Power	
Nominal Intensity	
Supply Voltage	
Speed	
Motor Connection (Star / Delta)	

PRELIMINARY TESTS				
LUBRICATION SYSTEM & SHAFT FREE ROTATION				
Test Fluid				
Measurement Tool				
Winding Resistance	U	V	W	
	Ω	Ω	Ω	
Minimum Insulation between winding (U/V-U/W-V/W)				M Ω
Earth Insulation (U * V * W) / GND				M Ω
Magnetic Fuse Rating (Magnetic Protection)				A
PTC Value				Ω
Bump Check: Motor Rotation Direction	OK / NOK			

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0004 – ON/OFF VALVE**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Valve Type	
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Verify Correct ‘Open’ Limit Switch on HMI	OK / NOK	Verify Correct ‘Closed’ Limit Switch HMI	OK / NOK
Valve ‘Open’ Time (s)		Valve ‘Close’ Time (s)	

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0005 – PROPORTIONAL VALVE**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Valve Type	
Trim (Linear, Square, =%,…)	
Fail Position (Closed / Open)	
PRELIMINARY CHECKS	
Verify the Correct Installation, Cleanliness & Orientation	OK / NOK
Check the conformity to the data sheet	OK / NOK
Check free movement of valve with handwheel (if any)	OK / NOK / NA
Check the installation of heating & insulation (if any)	OK / NOK / NA
Check Power / Air Supply Setting	

LOOP CHECK			
Valve Failure Action On Loss of Air supply	FO	FC	Stay put
Valve Failure Action On Loss of Electrical Signal	FO	FC	Stay put

Valve ‘Open’ Time (s)			Valve ‘Close’ Time (s)						
	Rising %					Falling %			
Command Value	0	25	50	75	100	75	50	25	0
Physical Status (Stroke on Positioner)									
HMI feedback									

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0006 – AIR EXTRACTOR**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Type	
CHECKS & TESTS	
Verify the Correct Installation, Cleanliness & Orientation	
Verify the Electrical Insulation	
Verify the Earth Connection	
Verify the Cable Gland (Ex/Nex)	
Motor Rotation Direction	OK / NOK
Feedback on HMI	OK / NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0007 – HEATING RIBBON**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Type	
Serial Number	
Operating Ambient Temperature	
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	
Verify the Correct Installation	
Check the Resistance	
TEST	
Activation	OK/NOK
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING** **C063-ELO-REP-CO-0008 – ELECTRICAL HEATER**	CROSSWIND

Tag Number	
System / Subsystem Number	
P&ID Number	
CHARACTERISTICS	
Manufacturer	
Serial Number	
Power (kW)	
PRELIMINARY CHECKS	
Verify the Wiring & Earthing	
Verify the Correct Installation	
Check the Resistance	
Bump Check: Motor Rotation Direction	OK / NOK
TEST	
Activation	OK / NOK
Intensity (U)	
Intensity (V)	
Intensity (W)	
Voltage	
Thermal Ajustement	
NOTES	

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

elogen	**PRECOMMISSIONING**	CROSSWIND
	C63-ELO-REP-CO-0101 - LEAK TEST	

TEST CONDITIONS	
Leak Test Pack	
Tested System	
Test Pressure (Barg)	
Test Fluid	

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
END	Date	Time	Pressure (Barg)	Temperature (°C)

RESULT			
Test Duration		Delta P (Bar)	
Snoop Detection without Bubbles	YES / NO / NA		
Gas Detection Without Leaks	YES / NO / NA		
Result	OK / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

AQA-1003

1ROP1.1 — 2ROP1.1 — YP-70 — 1PSP1.1 — 1RFP1

PI 1RO5 — PI 1RO7 — PI 2RO5 — PI 2RO7 — PI 2RO8 — PI 1F1 — PI 1ME2 — PI 1ED1 — PI 1ED2 — PI 1ED4 — PI 1ED6 — PI 2F1 — PI 2F2 — PI 1PS3 — PISA+ 1PS1

TI 1C1 — TI 1RO7 — TI 1ED7 — TI 2RO7 — TI 1B4 — FSA- 1ED3 — FSA 1ED3 — QE 1Z1 — QIA 1Z1 — QISA+ 2RO4 — PSA- 1RO2 — QISA+ 1RO4 — PSA- 1F2 — UI 1ED11 — LISA 1RF1

FI 1ME3 — FI 1RO6 — FI 2RO6 — FI 1ED3 — FI 1ED4 — FI 1ED5 — FIR 1RO8 — FIR 2RO5 — FIR 1ED1 — FIR 2RO3 — FIR 2RO6 — FIR 1RO3 — FIR 1PS4 — QIA 1B4

LO HV-300 — CV-300 — 50 15 — LO HV-300D — 1E — WTP-300

TANK XL-300-SR — DEMIN TANK — LISA 1B1 — REJECT TANK — LALL 301 LALL

FROM LIC-600 PID-003 — TO ST-600 PID-003 — LO PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

300 - 15 - RW - PA22S

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

4A — CAHH 300 CAHH — 5A — 45 20 — PA22S TK22

NOTE 5 — NOTE 1 NOTE 4 NOTE 3 — NOTE 3 — NOTE 9

LO HV-301A — 302A - 25 - PW - PA22S — LP-300A — CV-301A — CV-302A — LO HV-302A — 303A - 25 - PW - PA22S

305 - 15 - PW - PA22S — LO HV-300DA — #300 — 306 - 25 - PW - PA22S

302B - 25 - PW - PA22S — LO HV-301B — 302B - 25 - PW - PA22S — LP-300B — CV-301B — CV-302B — LO HV-302B — 303B - 25 - PW - PA22S

LO HV-300DB — LO HV-303DB

SLO-15 IS 12 — VAR-300A — VAR-300B — SLO-15 IS 12

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404 — 504 - 15 - RW - TK22 — C01 X00 ZONE BREAK — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

ELO GEN — CLIENT — 25 15 — C01 X00 ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — A10 X00 ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — C01 X00 ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

ZONE BREAK C01 X00 — 506 - 15 - RW - TK22 — FROM FCU 402 PID-012

ZONE BREAK C01 X00 — 507 - 15 - RW - TK22 — FROM FCU 403 PID-012

#300 — SLWO-300 — PA22S PB22S — #300 — PA22S PB22S — HV-307V — NNF — 307 - 25 - PW - PB22S — CV-320 — NOTE 2 — TO ST-620 PID-006

FOR START-UP ONLY — FROM LIC-600 PID-003

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 01
Closed Valve

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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Client

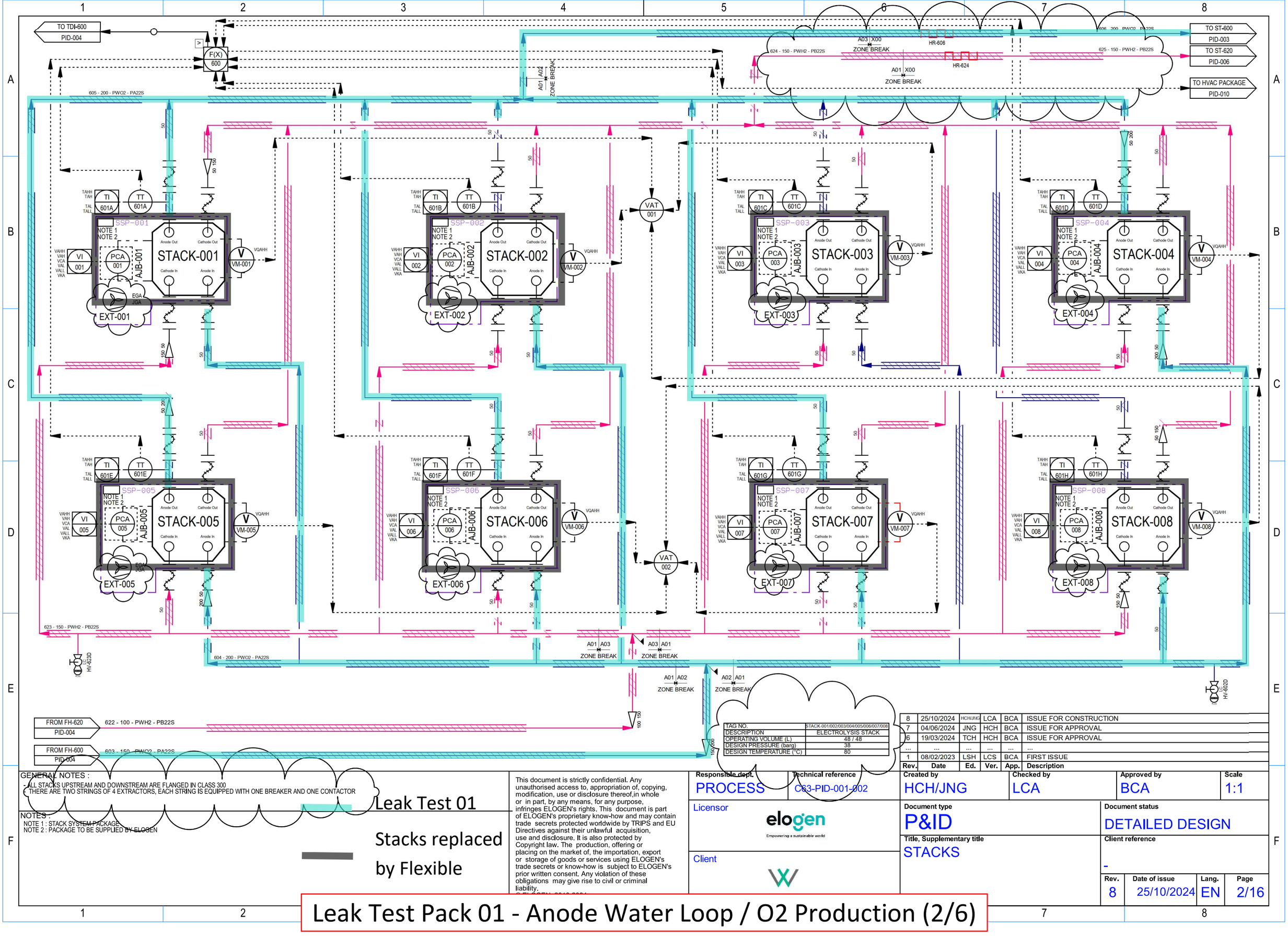
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	1/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (1/6)



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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Leak Test 01

Stacks replaced by Flexible

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-002	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	2/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (2/6)

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

Pressure Safety Valve

Vent Point

Injection Point

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

Leak Test 01

Closed Valve

Valve to Operate

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-003	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title	Client reference
OXYGEN SEPARATION	-

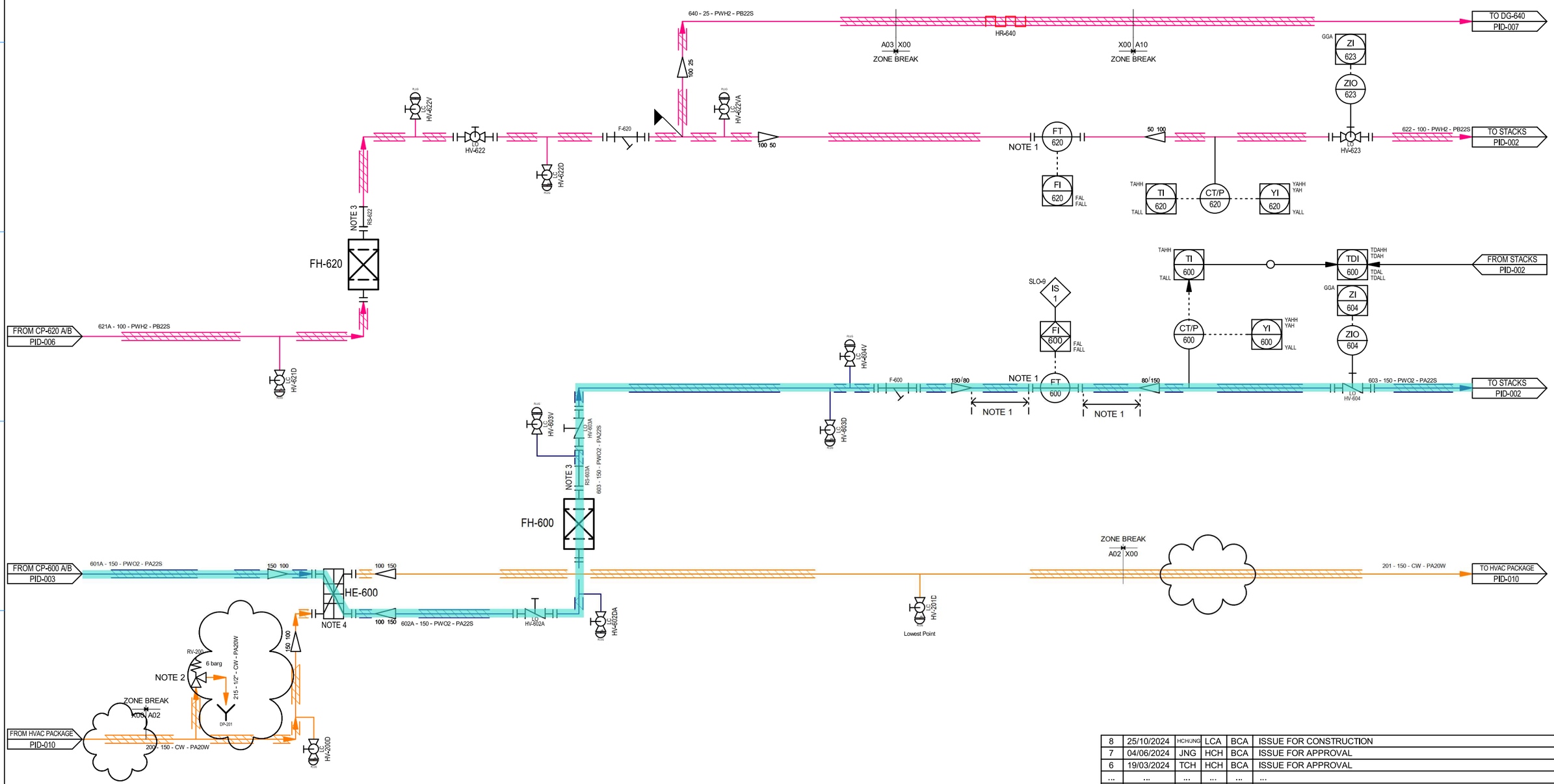
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	3/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (3/6)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 01

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

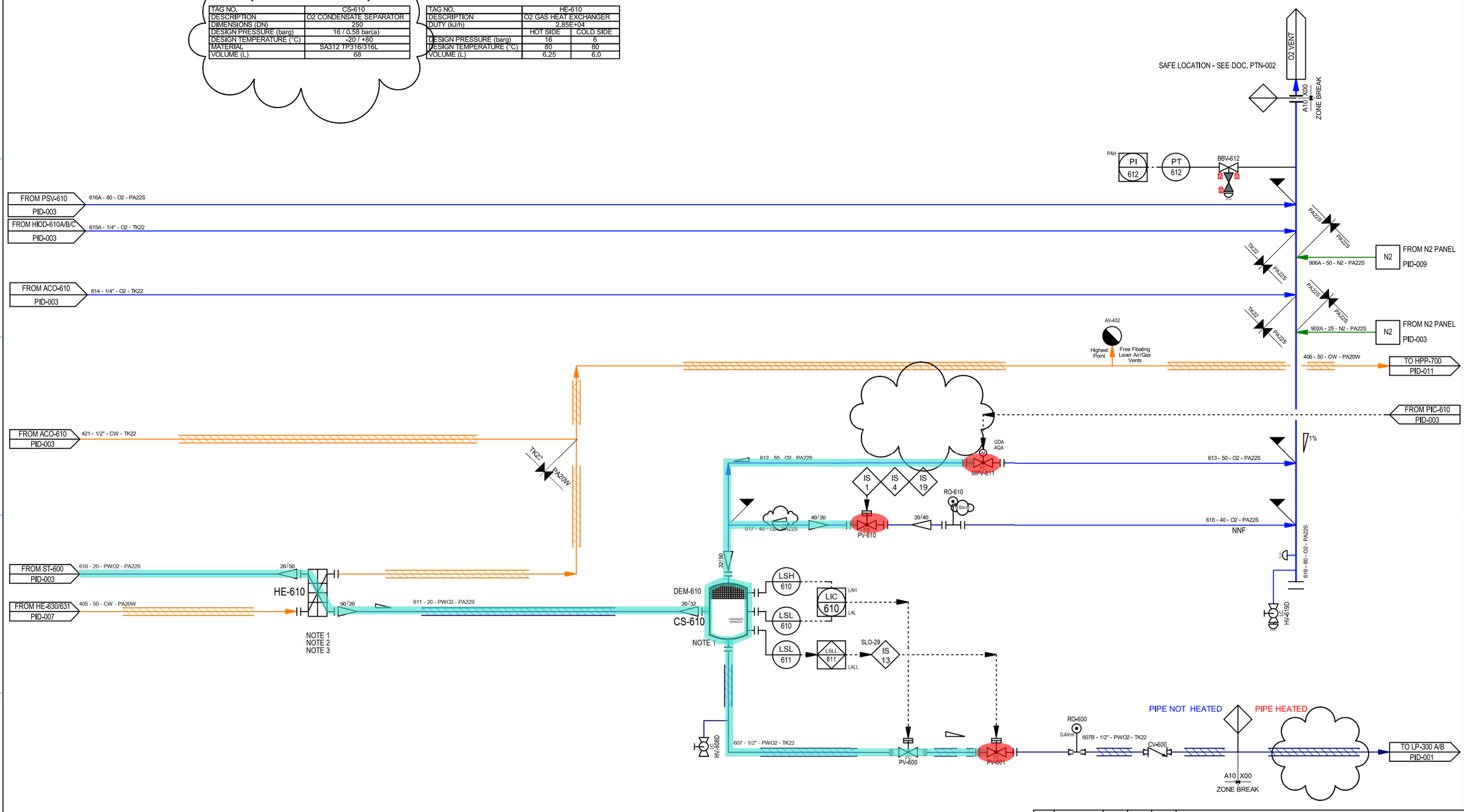
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (4/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Leak Test 01

Closed Valve

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PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (5/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006

FROM MV-632 PID-008

TO ACO-610 PID-003

FROM ST-620 PID-006

FROM WC-400/401 PID-010

FROM RDPC-001 PID-003

FROM FX-630 PID-006

FROM FH-620 PID-004

TO HE-610 PID-005

FROM N2 PANEL PID-006

FROM HPP-700 PID-011

FROM HPP-700 PID-011

FROM RDPC-001 PID-03

TO WATER DRAINAGE PID-001

TO HPP-700 PID-011

FROM PIC-630 PID-006

FROM N2 PANEL PID-009

TO ST-600 PID-003

NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 01

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
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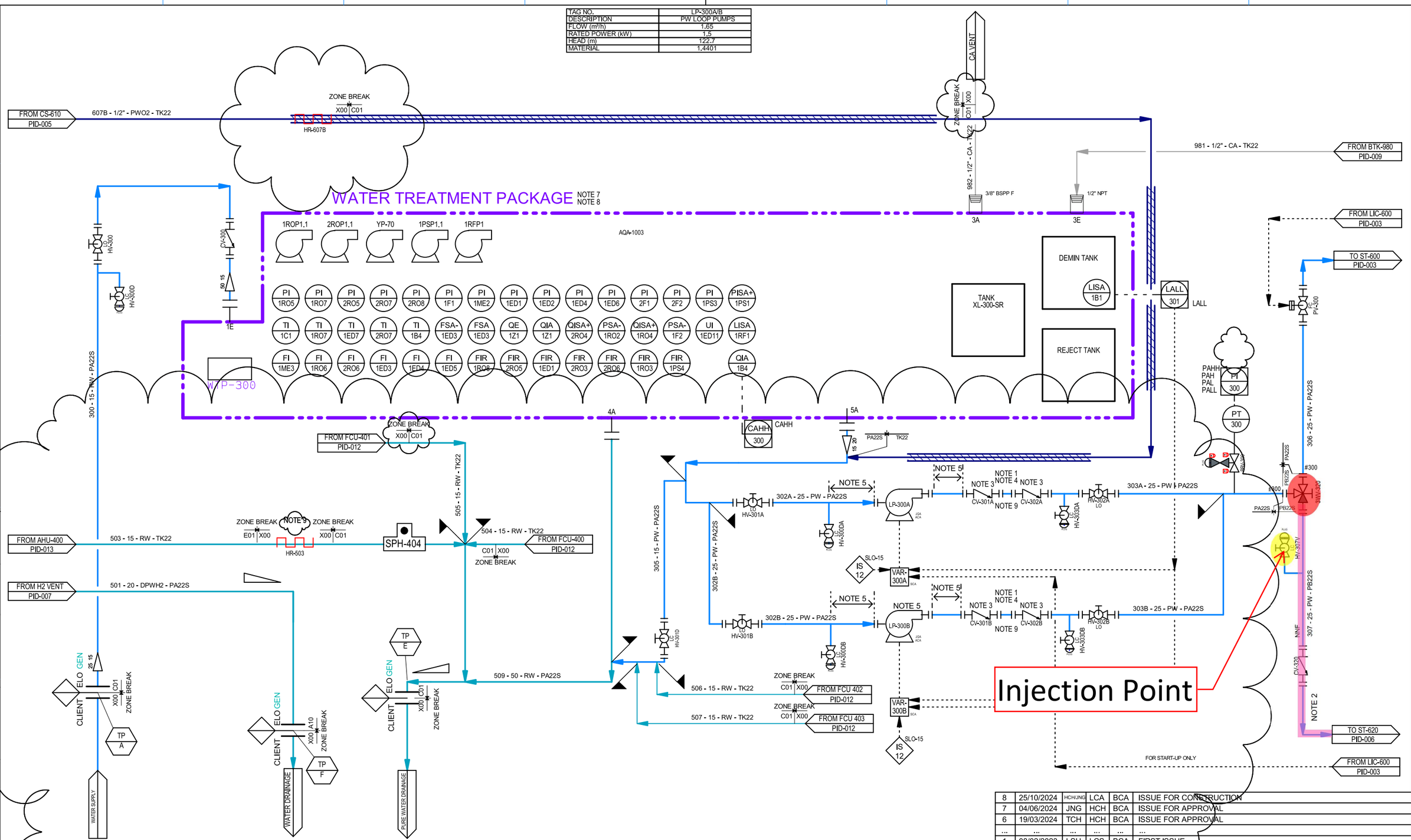
Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401



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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 02

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Valve to Operate

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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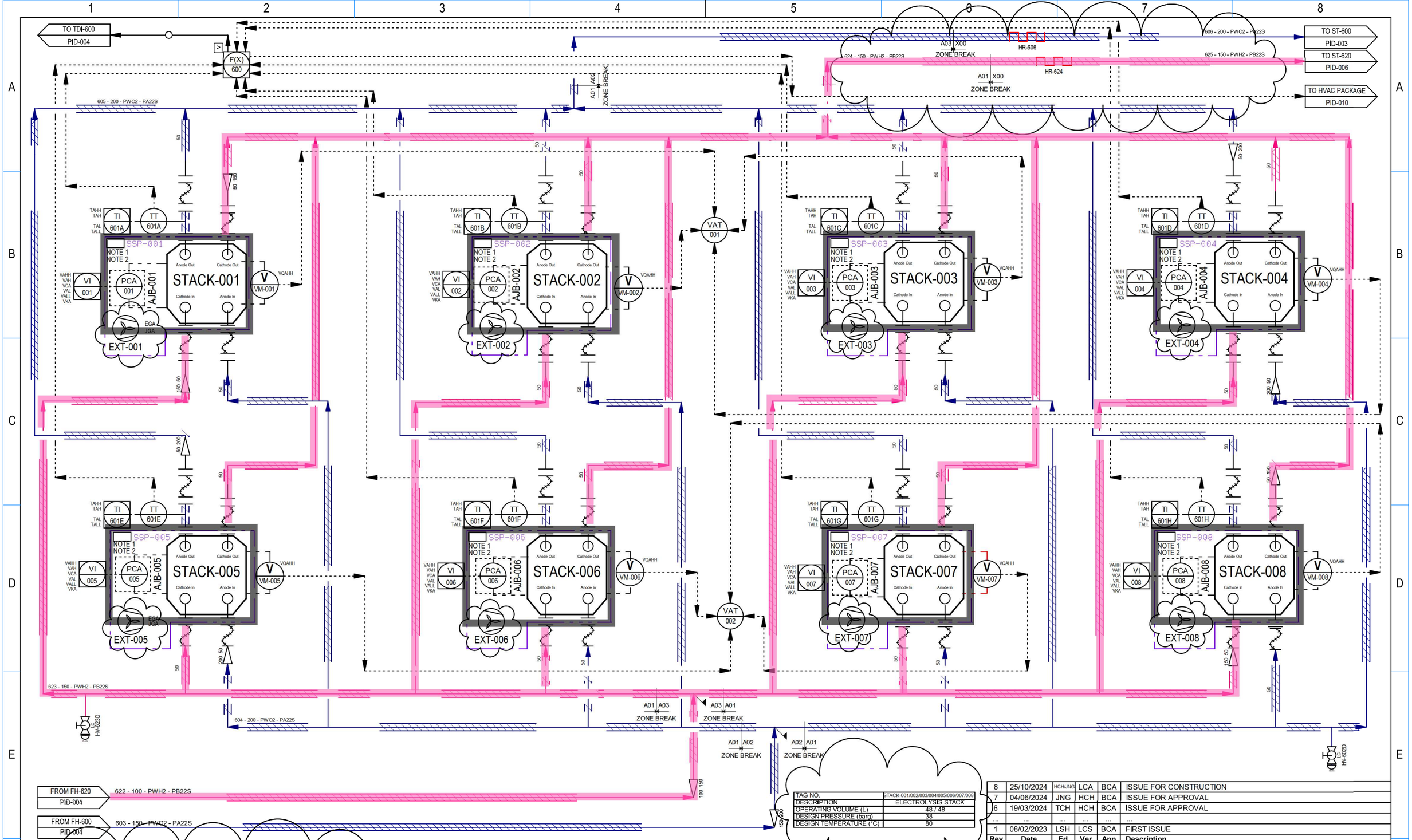
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

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8	25/10/2024	EN	1/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (1/5)



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Leak Test 02
Stacks replaced by Flexible

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-002	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

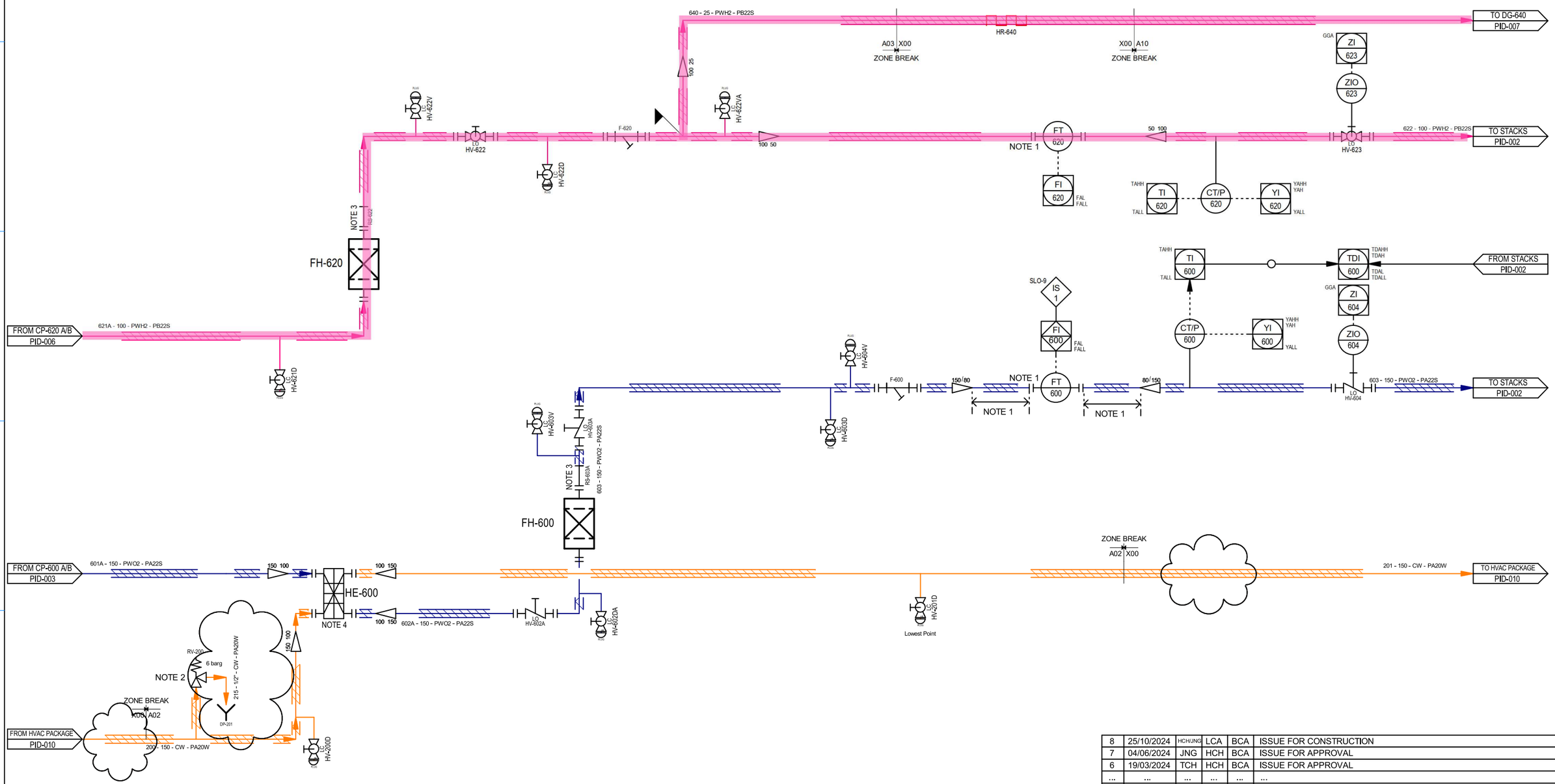
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	2/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (2/5)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 02

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (3/5)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

Pressure Safety Valve

Spade

Vent Point

Leak Test 02

Closed Valve

Valve to Operate

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES (FULLMET) CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN SEPARATION

Client reference: -

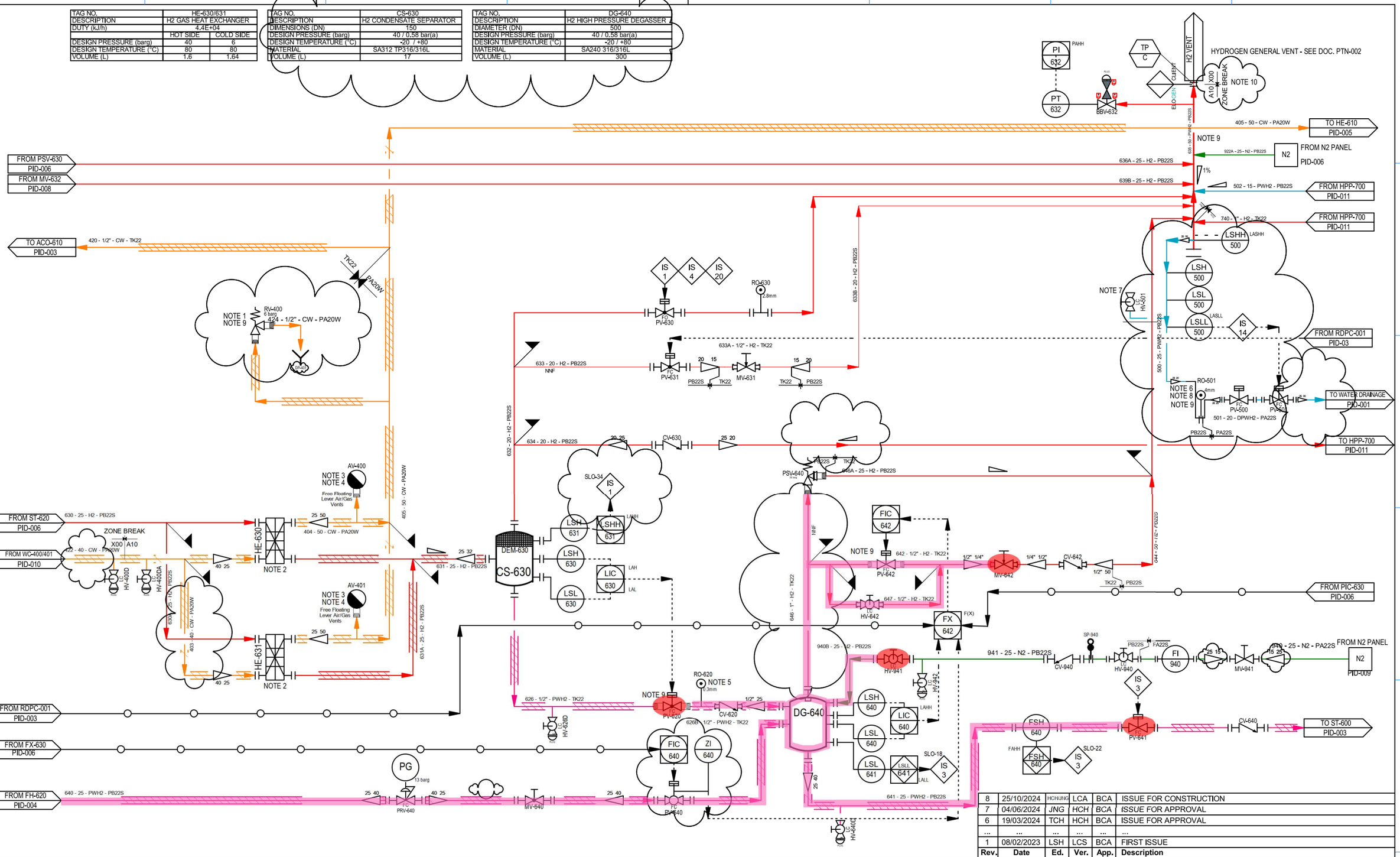
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	6/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (4/5)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 02

Closed Valve

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (5/5)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

TO RDPC-001 PID-003
TO MPV-630 PID-008
TO FX-642 PID-007
TO FIC-640 PID-007
FROM N2 PANEL
N2 PID-009
FROM STACKS PID-002
FROM LP-300 A/B PID-001
TO H2 VENT PID-007
TO HE630/631 PID-007
FROM PT-611 PID-003
TO FH-620 PID-004

PSV-630 36 barg
PIC 630
PT 630
FX 630
IP 15
BBV-630
HV-630
BBV-631
PT 631
PSHH 631
RDPC 002
PDSHH 002
PDSLL 002
FI 920
FT 920
PT 920
PI 920
RD-920 10 BARG
SP-920
BBV-920
CV-920
CV-921
HV-920
PV-920
MV-920
PV-921
MV-921
FT 921
FI 921
HV-922
HV-921
HV-625V
ZI 624
ZIO 624
HV-624
ST-620
DEM-620
LT 620
LI 620
LSL 620
LSLL 620
HV-620D
HV-620
PI 620
PT 620
HV-620A
HV-620DA
HV-620B
HV-620DB
TT 621A
TT 621B
TSHH 621A
TSHH 621B
CP-620A
CP-620B
PT 620A
PI 620A
PT 620B
PI 620B
BBV-620A
BBV-620B
CV-621A
CV-621B
HV-621A
HV-621B
VAR-620A
VAR-620B
IS 17
IS 18
SLO-32
HR-620A
HR-620D
HR-307
ZONE BREAK1
ZONE BREAK
NOTE 1
NOTE 2
NOTE 3
NOTE 4
NOTE 5
MIN.
Auto-start
Shutdown

636A - 25 - H2 - PB22S
636 - 1" - PWH2 - TK22
625 - 150 - PWH2 - PB22S
625 - H2 - PB22S
920A - 40 - N2 - PB22S
922 - 25 - N2 - PB22S
922A - 25 - N2 - PB22S
923 - 15 - N2 - PA22S
620A - 100 - PWH2 - PB22S
620B - 100 - PWH2 - PB22S
621A - 100 - PWH2 - PB22S
621B - 100 - PWH2 - PB22S
307 - 25 - PW - PB22S

PIPE HEATED
PIPE NOT HEATED

Spade

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

Leak Test 03
Closed Valve

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world
Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN SEPARATION
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	6/16

Leak Test Pack 03 - H2 Purification & Send Out (1/5)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

FROM PSV-630 PID-006
FROM MV-632 PID-008
TO ACO-610 PID-003
420 - 1/2" - CW - TK22
NOTE 1 NOTE 9
RV-400 6 barg
424 - 1/2" - CW - PA20W
TK22
PA20W
AV-400 NOTE 3 NOTE 4 Free Floating Lever Air/Gas Vents
405 - 50 - CW - PA20W
FROM ST-620 PID-006
630 - 25 - H2 - PB22S
ZONE BREAK
X00 A10
FROM WC-400/401 PID-010
422 - 40 - CW - PA20W
HV-400
HV-400DA
HE-630
NOTE 2
404 - 50 - CW - PA20W
AV-401 NOTE 3 NOTE 4 Free Floating Lever Air/Gas Vents
HE-631
NOTE 2
631A - 25 - H2 - PB22S
DEM-630
CS-630
631 - 25 - H2 - PB22S
LSH 631
LSHH 631
LAHH
LSH 630
LIC 630
LAH
LAL
LSL 630
SLO-34
IS 1
PI 632
PAHH
PT 632
BBV-632
TP C
H2 VENT
HYDROGEN GENERAL VENT - SEE DOC. PTN-002
CLIENT
ELOGEN
A10 X00
ZONE BREAK
NOTE 10
405 - 50 - CW - PA20W
TO HE-610 PID-005
NOTE 9
922A - 25 - N2 - PB22S
N2
FROM N2 PANEL PID-006
636A - 25 - H2 - PB22S
639B - 25 - H2 - PB22S
1%
502 - 15 - PWH2 - PB22S
FROM HPP-700 PID-011
740 - 1" - H2 - TK22
FROM HPP-700 PID-011
LSHH 500
LASHH
LSH 500
LSL 500
LSLL 500
LASLL
IS 14
NOTE 7
LC HV-501
500 - 25 - PWH2 - PB22S
FROM RDPC-001 PID-03
RO-501
4mm
NOTE 6 NOTE 8 NOTE 9
PV-500
PV-501
501 - 20 - DPWH2 - PA22S
PB22S
PA22S
TO WATER DRAINAGE PID-001
TO HPP-700 PID-011
IS 1
IS 4
IS 20
RO-630
2.8mm
PV-630
633A - 1/2" - H2 - TK22
633 - 20 - H2 - PB22S
FC PV-631
PB22S
TK22
MV-631
15 20
638B - 20 - H2 - PB22S
632 - 20 - H2 - PB22S
634 - 20 - H2 - PB22S
20 25
CV-630
25 20
PSV-640
PA22S
TK22
638A - 25 - H2 - PB22S
INF
646 - 1" - H2 - TK22
FIC 642
NOTE 9
642 - 1/2" - H2 - TK22
FC PV-642
1/2" 1/4"
MV-642
1/4" 1/2"
CV-642
1/2" 50
TK22
PB22S
644 - 50 - H2 - PB22S
FROM PIC-630 PID-006
647 - 1/2" - H2 - TK22
HV-642
FX 642
F(X)
940B - 25 - H2 - PB22S
941 - 25 - N2 - PB22S
SP-940
PB22S
PA22S
FC HV-941
CV-940
FC HV-940
FI 940
MV-941
25 15
15 25
649 - 25 - N2 - PA22S
FROM N2 PANEL
N2
PID-009
HV-941
IS 3
FROM RDPC-001 PID-003
FROM FX-630 PID-006
FROM FH-620 PID-004
Injection Point
626 - 1/2" - PWH2 - TK22
NOTE 9
RO-620
0.3mm
NOTE 5
PV-620
CV-620
1/2" 25
626B - 1/2" - PWH2 - TK22
HV-626D
PG
13 barg
FC PRV-640
640 - 25 - PWH2 - PB22S
MV-640
FIC 640
ZI 640
FC PV-640
DG-640
LSH 640
LSL 640
LIC 640
LAHH
LSL 641
LSLL 641
LALL
SLO-18
IS 3
641 - 25 - PWH2 - PB22S
HV-640DA
FSH 640
FAHH
FSH 640
SLO-22
IS 3
FC PV-641
CV-640
TO ST-600 PID-003

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 400MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 03
Closed Valve
Valve to Operate

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world
Client:

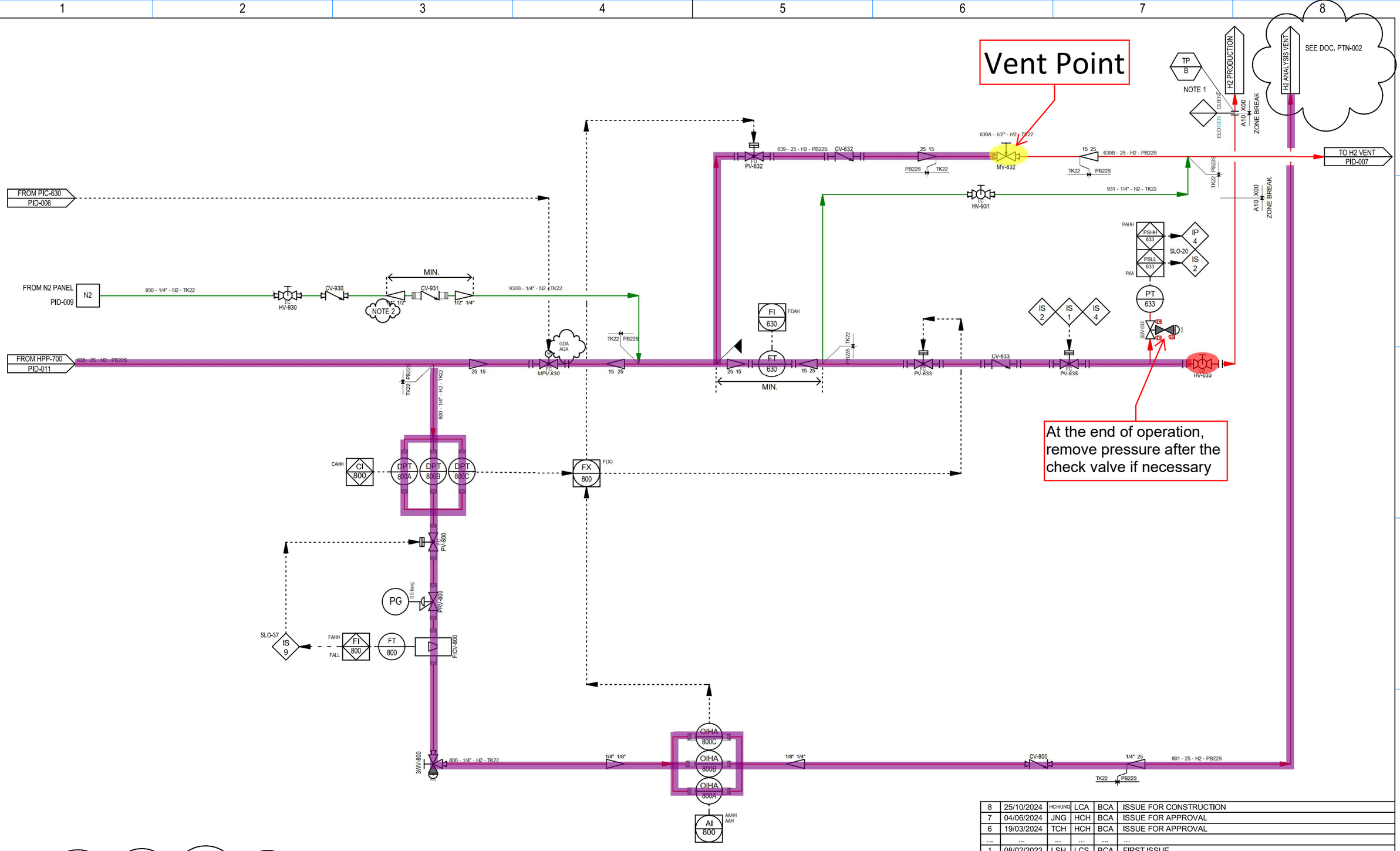
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Leak Test Pack 03 - H2 Purification & Send Out (2/5)



At the end of operation, remove pressure after the check valve if necessary

NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

Leak Test 03
Closed Valve
Valve to Operate

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-008	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world
Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title	Client reference
H2 PANEL	-

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	8/16

Leak Test Pack 03 - H2 Purification & Send Out (3/5)

Pressure Safety Valve

FROM CS-630
PID-007

634 - 20 - H2 - PB22S

TO H2 VENT
PID-007

740 - 1" - H2 - TK22

PSV-631
36 barg

1" GF
1/2" GM
PB22S | TK22

740B - 1" - H2 - TK22

741 - 1" - H2 - TK22

PSV outlet

25 20

25 40

407 - 40 - CW - PA20W

A10 | X00
ZONE BREAK

TO THS-400
PID-010

HE 64.1

HE 61.1

FC
FC-64.1
FSA
FSA LL

TT
TT-60.1
TSA HH
TA H
TSA
TA L
TSA LL

TT
TT-60.2
TSA HH
TA H
TSA
TA L
TSA LL

TT
TT-61.1
TSA HH
TA H
TSA

PT
PT-64.1
PSA HH
PSA
PA L
PSA LL

TT
TT-64.5
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TA H
TA L

TT
TT-64.6
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TSA HH C
TA L

TT
TT-64.7
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TA H
TA L

TT
TT-64.8
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TSA HH C
TA L

HYDROGEN
PURIFICATION
PACKAGE

NOTE 1
NOTE 2

TSH
TS-64.1

TSH
TS-64.2
TSA HH

TSH
TS-64.3
TSA HH
PSV outlet

TSH
TS-64.4
TSA HH

700 - 3/4" - CW - PA20W

DP-700

KSA K01 HH
KSA K01 LL
KSA K02 HH
KSA K02 LL
KSA K03 HH
KSA K03 LL
KSA K04 HH
KSA K04 LL

64 V1
64 V2
64 V3
64 V8
64 V12
64 V17

GSA HH
GSA LL
GS
GS-64.1.1
GS-64.1.2
GS-64.1.3
GS-64.1.4
GS-64.2
GS-64.3
GS-64-T2

RACCORD PNEUFIT 6MM

HY-LOK 8MM FITTING

502 - 15 - PWH2 - PB22S

TO H2 VENT
PID-007

638 - 25 - H2 - PB22S

TO H2 PANEL
PID-008

970 - 1/2" - CA - TK22

FROM BTK-980
PID-009

NOTE 3

15 25

HV-401D

MV-406

50 15

NOTE 3

FROM HE-610
PID-005

406 - 50 - CW - PA20W

MV-408

425 - 40 - CW - PA20W

Leak Test 03

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

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Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-011	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN PURIFICATION PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	11/16

Leak Test Pack 03 - H2 Purification & Send Out (4/5)

No.	Qty.	Modified from	Date	Intr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

N7 Φ6mm Instrument air or Nitrogen

TO CP 64-V17 | TO CP 64-V8 | TO CP 64-V3 | TO CP 64-V2 | TO CP 64-V1 | TO CP 64-V12

TSA HH 64.4 / TS 64.4 ≤60°C

PI 64.1 — 64-V9

AQUAGAS

Customer
Flange
1", 300Lbs
ASME B16.5, 316L
N2 Hydrogen
N10 Vent
Flange
1", 300Lbs
ASME B16.5, A105

66 Particle filter 5µm

PSV 64.1 36bar — N8
PSV 64.2 36bar — N9

GSA LL/HH 64.1.1 / GS 64.1.1 Open=I — 64-V4.1
GSA LL/HH 64.1.2 / GS 64.1.2 Open=I — 64-V4.2
GSA LL/HH 64.1.3 / GS 64.1.3 Open=I — 64-V4.3
GSA LL/HH 64.1.4 / GS 64.1.4 Open=I — 64-V4.4

TSA HH 64.6 L/H / TA 64.6 / TC 64.6 / TI 64.6 / TT 64.6

TT 64.8 / TI 64.8 / TC 64.8 / TA 64.8 L/H / TSA 64.8 HH

TS 64.3 ≤200°C / TSA HH 64.3

TSA HH 64.2 / TS 64.2 / TS(TC) 64.1 — Heater HE64.1 — 64-V14.1 — 64-V14 — 64-V5 LL/HH

GSA 64.2 / GS 64.2 Open=I

FC 64.1 4-20mA — FO — 64-V6

64-V7 — GSA LL/HH 64.3 / GS 64.3 Open=I

64B Dryer — *Note 1

64-T4

TT 64.7 / TI 64.7 / TC 64.7 / TA 64.7 L/H / TSA 64.7 HH

64-V16 — 64-V11

64-T1

TSA HH 64.5 L/H / TA 64.5 / TC 64.5 / TI 64.5 / TT 64.5

64A Dryer — *Note 1

64-V15 — 64-V10

61 Deoxidizer — *Note 1

TSA LL/HH 60.1 L/H / TA 60.1 / TC 60.1 / TI 60.1 / TT 60.1

TSA LL/HH 60.2 L/H / TA 60.2 / TC 60.2 / TI 60.2 / TT 60.2

TSA HH 61.1 L/H / TA 61.1 / TC 61.1 / TI 61.1 / TT 61.1

Trace heater cable HE61.1

Hydrogen
N1
Flange
1", 300Lbs
ASME B16.5
A105

61-V2 — 61-V1

CW N6
CW N5
Flange
1", 150Lbs
ASME B16.5
A105

Customer | AQUAGAS

61-F1.1 — 61-V3 — 61-F1.2

64-F1.1 (1mm) — 64-F1.2 (0,5mm) — 64-V13 (0A/0B) — 64-F2.2 (0,5mm) — 64-V33 — 64-F2.1 (1mm)

0-Deoxo / 0-Dryer — 64-V31 — 64-V32

64-T2 (R-Φ1,0mm) Closed=I — PSA LL/HH 64.1 / PA L/H 64.1 / PT 64.1 — GS 64-T2 / GSA LL/HH 64-T2 — AQUAGAS (R-Φ1,2mm)

G 3/4" PSV-64.3 6bar

Discharge N4

*Note 1: Flange to fill/drain desiccant/catalyst.
– – – – = Customer scope of supply

Leak Test Pack 03 - H2 Purification & Send Out (5/5)

Pos. No.	Qty.	Designation	Material	Dimension	Remark
Design. RE	Drawn RE	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
							Filename 20230443.dwg	Date 23-07-03
							Drawing no. 20230440

R-500/36 OffShore
P&I Diagram

Tel. +46 (0) 8 554 204 70

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C063-ELO-LST-CO-0001

BLPH Electrolyser
General Item List

02	*2nd Issue*	*06-JAN-2025*	*MSA*	*HRO*	*DWA*
01	*1st Issue*	*25-NOV-2024*	*MSA*	*HRO*	*DWA*
REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Subcontractor Document Number	
Client Document Number	

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This document is the Pre-Commissioning Completion Database for Electrical & Instrumentation
Each Column can be filtered within any characteristic

Item List

This part is used for the follow up of the activities

Column	Definition
Item Tag	Item Tag as per P&ID
Item Type	Item Type as per P&ID Symbol
P&ID	P&ID Number where the Item is represented
Discipline	Electrical or Instrumentation
System Number	System Number as per Subsystem Breakdown Procedure
System Name	System Name as per Subsystem Breakdown Procedure
ITR Form	ITR Form number - Suite of ITR's can be found in the Pre-Commissioning Manual
Completion Date	To be filled with the date when the ITR is filled and signed off by all parties

ITR Form List

This page is for having an overview of the correspondance between ITR form and all Item Type

Column	Definition
Item Type Tag	Item Type Abbreviation as per P&ID Symbol
Item Type	Item Type name as per P&ID Symbol
ITR Number	ITR Form number as per the Pre-Commissioning Manual
ITR Name	Form Name
Discipline	Electrical or Instrumentation

Item Tag	Item Type	P&ID	Discipline	System Number	System Name	ITR Form	Completion Date
CP-600A	Centrifugal Pump	C63-PID-001_3	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0003	
CP-600B	Centrifugal Pump	C63-PID-001_3	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0003	
CP-620A	Centrifugal Pump	C63-PID-001_6	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0003	
CP-620B	Centrifugal Pump	C63-PID-001_6	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0003	
HR-306	Heater Ribbon	C63-PID-001_3	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0007	
HR-307	Heater Ribbon	C63-PID-001_6	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0007	
HR-503	Heater Ribbon	C63-PID-001_1	Electrical	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0007	
HR-606	Heater Ribbon	C63-PID-001_2	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0007	
HR-624	Heater Ribbon	C63-PID-001_2	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0007	
HR-625	Heater Ribbon	C63-PID-001_2	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0007	
HR-640	Heater Ribbon	C63-PID-001_4	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0007	
VM-001	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-002	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-003	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-004	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-005	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-006	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-007	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-008	Voltage Meter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-101	Voltage Meter	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
VM-102	Voltage Meter	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PCA-001	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-002	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-003	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-004	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-005	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-006	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-007	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PCA-008	Cell Voltage Monitor	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
IM-001	Current Meter	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
IM-002	Current Meter	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
EXT-001	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-002	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-003	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-004	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-005	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-006	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-007	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
EXT-008	Air Extractor-Stacks	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0006	
MPV-611	Motorised Proportional Valve	C63-PID-001_5	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0005	
MPV-630	Motorised Proportional Valve	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0005	
WLD-001	Water Leak Detection	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
WLD-002	Water Leak Detection	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
WLD-003	Water Leak Detection	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
WLD-004	Water Leak Detection	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
WLD-005	Water Leak Detection	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
WLD-006	Water Leak Detection	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VAT-001	Voltage Absence Tester	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
VAT-002	Voltage Absence Tester	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
SV-500	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-501	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-601	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-610	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-630	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-635	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-641	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-800	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-900	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
SV-920	Solenoid Valve	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0004	
PT-150	Pressure Transmitter	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-300	Pressure Transmitter	C63-PID-001_1	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-600	Pressure Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-600A	Pressure Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	

Item Tag	Item Type	P&ID	Discipline	System Number	System Name	ITR Form	Completion Date
PT-600B	Pressure Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-610	Pressure Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-611	Pressure Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-612	Pressure Transmitter	C63-PID-001_5	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-620	Pressure Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-620A	Pressure Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-620B	Pressure Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-630	Pressure Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-631	Pressure Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-632	Pressure Transmitter	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-633	Pressure Transmitter	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-900	Pressure Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-910	Pressure Transmitter	C63-PID-001_9	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PT-920	Pressure Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
LSH-500	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSH-600	Level Switch	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSH-610	Level Switch	C63-PID-001_5	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSH-630	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSH-631	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSH-640	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSHH-500	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-500	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-600	Level Switch	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-610	Level Switch	C63-PID-001_5	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-611	Level Switch	C63-PID-001_5	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-620	Level Switch	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-630	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-640	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSL-641	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LSLL-500	Level Switch	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
LT-600	Level Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
LT-620	Level Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601A	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601B	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601C	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601D	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601E	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601F	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601G	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-601H	Temperature Transmitter	C63-PID-001_2	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-621A	Temperature Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
TT-621B	Temperature Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
ZIO-604	Limit Switch	C63-PID-001_4	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ZIO-605	Limit Switch	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ZIO-623	Limit Switch	C63-PID-001_4	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ZIO-624	Limit Switch	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
OIHA-800A	Oxygen In Hydrogen Analyser	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
OIHA-800B	Oxygen In Hydrogen Analyser	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
OIHA-800C	Oxygen In Hydrogen Analyser	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
AHD-1000	Ambiant Hydrogen Detection	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
AHD-1001	Ambiant Hydrogen Detection	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
AHD-1002	Ambiant Hydrogen Detection	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
AHD-1003	Ambiant Hydrogen Detection	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
AHD-1004	Ambiant Hydrogen Detection	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
DS-001	Door Switch	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-002	Door Switch	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-003	Door Switch	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-004	Door Switch	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-005	Door Switch	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-006	Door Switch	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-007	Door Switch	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-008	Door Switch	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-009	Door Switch	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	

Item Tag	Item Type	P&ID	Discipline	System Number	System Name	ITR Form	Completion Date
DS-010	Door Switch	C63-PID-001_13	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-011	Door Switch	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
DS-012	Door Switch	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
CT/P-600	Conductivity and Temperature Transmitter	C63-PID-001_4	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
CT/P-620	Conductivity and Temperature Transmitter	C63-PID-001_4	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
DPT-800A	Dew Point Transmitter	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
DPT-800B	Dew Point Transmitter	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
DPT-800C	Dew Point Transmitter	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
ESD-001	Emergency Shutdown Button	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ESD-002	Emergency Shutdown Button	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ESD-003	Emergency Shutdown Button	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ESD-004	Emergency Shutdown Button	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ESD-005	Emergency Shutdown Button	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ESD-006	Emergency Shutdown Button	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
ESD-007	Emergency Shutdown Button	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
FB-001	Fire Button	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
FB-002	Fire Button	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
FB-003	Fire Button	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
FB-004	Fire Button	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
FSH-640	Flow Switch High	C63-PID-001_7	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
FT-600	Flow Transmitter	C63-PID-001_4	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FT-620	Flow Transmitter	C63-PID-001_4	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FT-630	Flow Transmitter	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FT-900	Flow Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FT-901	Flow Transmitter	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FT-920	Flow Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FT-921	Flow Transmitter	C63-PID-001_6	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
PQ-001	Power/Voltage Monitor	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PQ-002	Power/Voltage Monitor	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PQ-003	Power/Voltage Monitor	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
PQ-004	Power/Voltage Monitor	C63-PID-001_12	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	Configuration via User Manual	
VE-001	Visual Element	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-002	Visual Element	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-003	Visual Element	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-004	Visual Element	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-005	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-006	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-007	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-008	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-009	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-010	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-011	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
VE-012	Visual Element	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
BUZ-1001	Buzzer	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
BUZ-1002	Buzzer	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
BUZ-1003	Buzzer	C63-PID-001_14	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-001A	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-001B	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-001C	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-002A	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-002B	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-002C	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-003A	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-003B	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-003C	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-004A	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-004B	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-004C	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-005A	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-005B	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-005C	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-006A	Smoke Dectector	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-006B	Smoke Dectector	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	

Item Tag	Item Type	P&ID	Discipline	System Number	System Name	ITR Form	Completion Date
SD-006C	Smoke Dectector	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-007A	Smoke Dectector	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-007B	Smoke Dectector	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-007C	Smoke Dectector	C63-PID-001_13	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-008A	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-008B	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
SD-008C	Smoke Dectector	C63-PID-001_12	Electrical	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0002	
HIOD-610A	Hydrogen in Oxygen Detector	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
HIOD-610B	Hydrogen in Oxygen Detector	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
HIOD-610C	Hydrogen in Oxygen Detector	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FICV-610A	Flow Indicating Control Valve	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FICV-610B	Flow Indicating Control Valve	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FICV-610C	Flow Indicating Control Valve	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FICV-611	Flow Indicating Control Valve	C63-PID-001_3	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
FICV-800	Flow Indicating Control Valve	C63-PID-001_8	Instrumentation	BLPH 25-11	ELECTROLYSER Stacks & BoP	C063-ELO-REP-CO-0001	
HE 61.1	Electrical Heater-HPP	C63-PID-001_11	Electrical	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0007	
HE 64.1	Electrical Heater-HPP	C63-PID-001_11	Electrical	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0007	
64 V1	Solenoid Valve	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0004	
64 V12	Solenoid Valve	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0004	
64 V17	Solenoid Valve	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0004	
64 V2	Solenoid Valve	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0004	
64 V3	Solenoid Valve	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0004	
64 V8	Solenoid Valve	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0004	
FC-64.1	Flow Controler	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
GS-64.1.1	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
GS-64.1.2	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
GS-64.1.3	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
GS-64.1.4	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
GS-64.2	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
GS-64.3	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
GS-64-T2	Limit Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
PT-64.1	Pressure Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TS-64.1	Temperature Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
TS-64.2	Temperature Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
TS-64.3	Temperature Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
TS-64.4	Temperature Switch	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0002	
TT-60.1	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TT-60.2	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TT-61.1	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TT-64.5	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TT-64.6	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TT-64.7	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
TT-64.8	Temperature Transmitter	C63-PID-001_11	Instrumentation	BLPH 25-01	Hydrogen Purification Package	C063-ELO-REP-CO-0001	
LP-300A	Centrifugal Pump	C63-PID-001_1	Electrical	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0003	
LP-300B	Centrifugal Pump	C63-PID-001_1	Electrical	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0003	
HR-306	Heater Ribbon	C63-PID-001_3	Electrical	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0007	
HR-307	Heater Ribbon	C63-PID-001_6	Electrical	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0007	
PT-300	Pressure Transmitter	C63-PID-001_1	Instrumentation	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0001	
PV-300	Pneumatic Valve	C63-PID-001_1	Instrumentation	BLPH 56-03	ELECTROLYSER Water Treatment Package WTP-300	C063-ELO-REP-CO-0001	

Item Type Tag	Item Type	ITR Number	ITR name	Discipline
CP	Centrifugal Pump	C063-ELO-REP-CO-0003	Pump Motor	Electrical
LP	Centrifugal Pump	C063-ELO-REP-CO-0003	Pump Motor	Electrical
PT	Pressure Transmitter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
TT	Temperature Transmitter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
TT-HY	Temperature Transmitter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
LT	Level Transmitter	C063-ELO-REP-CO-0001	Analogue Input / User Manual for Configuration	Instrumentation
LSL	Level Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
LSLL	Level Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
LSHH	Level Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
LSH	Level Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
FT	Flow Transmitter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
FSH	Flow Switch High	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
CT/P	Conductivity and Temperature Transmitter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
HIOD	Hydrogen in Oxygen Detector	C063-ELO-REP-CO-0001	Analogue Input / User Manual for Calibration	Instrumentation
OIHA	Oxygen In Hydrogen Analyser	C063-ELO-REP-CO-0001	Analogue Input / User Manual for Calibration	Instrumentation
AHD	Ambiant Hydrogen Detection	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
DPT	Dew Point Transmitter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
FICV	Flow Indicating Control Valve	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
EXT	Air Extractor-Stacks	C063-ELO-REP-CO-0006	Air Extractor	Instrumentation
PCA	Cell Voltage Monitor	Configuration via User Manual	User Manual	Instrumentation
VM	Voltage Meter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
EH	Electrical Heater	C063-ELO-REP-CO-0008	Electrical Heater	Electrical
BUZ	Buzzer	C063-ELO-REP-CO-0002	Digital Input & Output	Electrical
DS	Door Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
ESD	Emergency Shutdown Button	C063-ELO-REP-CO-0002	Digital Input & Output	Electrical
HR	Heater Ribbon	C063-ELO-REP-CO-0007	Heating Ribbon	Electrical
SV	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
ZIO	Limit Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
IM	Current Meter	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
PV	Pneumatic Valve	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
MPV	Motorised Proportional Valve	C063-ELO-REP-CO-0005	Proportional Valve	Instrumentation
WLD	Water Leak Detection	C063-ELO-REP-CO-0002	Digital Input & Output	Electrical
VAT	Voltage Absence Tester	Configuration via User Manual	User Manual	Instrumentation
FB	Fire Button	C063-ELO-REP-CO-0002	Digital Input & Output	Electrical
PQ	Power/Voltage Monitor	Configuration via User Manual	Configuration via User Manual	Instrumentation
VE	Visual Element	C063-ELO-REP-CO-0002	Digital Input & Output	Electrical
SD	Smoke Dectector	C063-ELO-REP-CO-0002	Digital Input & Output	Electrical
HE 61.1	Electrical Heater-HPP	C063-ELO-REP-CO-0007	Heating Ribbon	Electrical
HE 64.1	Electrical Heater-HPP	C063-ELO-REP-CO-0007	Heating Ribbon	Electrical
64 V1	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
64 V12	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
64 V17	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
64 V2	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
64 V3	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
64 V8	Solenoid Valve	C063-ELO-REP-CO-0004	On Off Valve	Instrumentation
FC	Flow Controler	C063-ELO-REP-CO-0001	Analogue Input	Instrumentation
GS	Limit Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation
TS	Temperature Switch	C063-ELO-REP-CO-0002	Digital Input & Output	Instrumentation

C063-ELO-PRO-CO-0004

BLPH Electrolyser Commissioning Manual

02	*2nd Issue*	*27-JAN-2025*	*MSA*	*HRO*	*DWA*
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REV.	**DESCRIPTION**	**DATE**	**BY**	**CHECKED**	**APPROVED**

Subcontractor Document Number	
Client Document Number	

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SUMMARY OF REVISION

REV.	DESCRIPTION
Rev 01	First issue
Rev 02	Issue after CWD Comments

REFERENCE DOCUMENTS

DOC NUMBER	REV.	DESCRIPTION
123A90-PML-COM-PRO-03007	01	BLPH Commissioning Strategy
123A90-PML-QHSE-PRO-00117	01	Punch List Management Procedure
123A90-PML-QHSE-PL-00001	01	Project HSE Management Plan
C063-ELO-PRO-CO-0001	01	BLPH Electrolyser Commissioning & Start-Up (CSU) Execution Plan
C063-ELO-PRO-CO-0002	01	BLPH Electrolyser CSU Method Statements
C063-ELO-PRO-CO-0003	01	BLPH Electrolyser Pre-Commissioning Manual
C063-ELO-PRO-CO-0005	01	BLPH Electrolyser Operational Test Procedure
C063-ELO-PRO-CO-0006	01	BLPH Electrolyser Performance Test Procedure
C063-ELO-PRO-CO-0007	01	BLPH Electrolyser O&M Training
C063-ELO-LST-CO-0001	01	BLPH Electrolyser - General Item list
C63-PWI-002	04	Cause & Effect
C63-PUY-001	04	Safety loop description
C63-PWI-003	02	Alarm list
C0063-FOR-DGM-EL-003	00	Power and Control Panel Wiring Diagram
C63-PRE-001	01	Presetting
C63-PWI-001	02	Set point list
STD-ERO-001	02	Electrolyzer Functional Analysis
C63-ERO-002	01	Project specific functional analysis
C63-PID-001	08	Electrolyzer Piping and Instrumentation Diagram
C63-DLO-001	05	Interfaces and Utility List
20230443 DEDR-500_36	03	DEDR-500_36 P&I Diagram Offshore
N/A	00	DEDR 500/36 Installation, Commissioning, O&M Manual
C63-NID-ELO-SAT04	00	SAT Low Voltage & High Voltage Tests Procedure
C63-NID-ELO-SAT07	00	SAT Functional and Performance Tests procedure
C63-PAU-SAT-001	01	HVAC SAT Procedure
SWL0841/Elogen/CP/001	03	Commissioning Plan for OVIVO WTP
SWL0841/MS01	02	Method Statement for OVIVO WTP

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1. Introduction

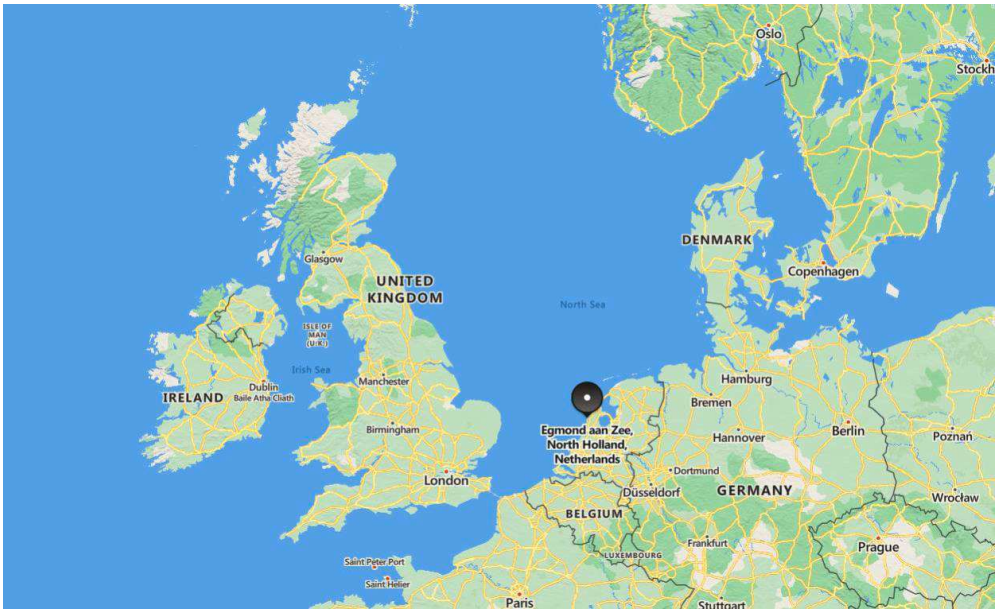
This document gives Commissioning & Pre-Start-Up requirements for the Commissioning & Start-Up of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the coordinating on site of all the means and resources required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

1.1 Overview of Project Scope

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.
Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.



HOLLANDSE KUST NOORD WIND PARK Location Map

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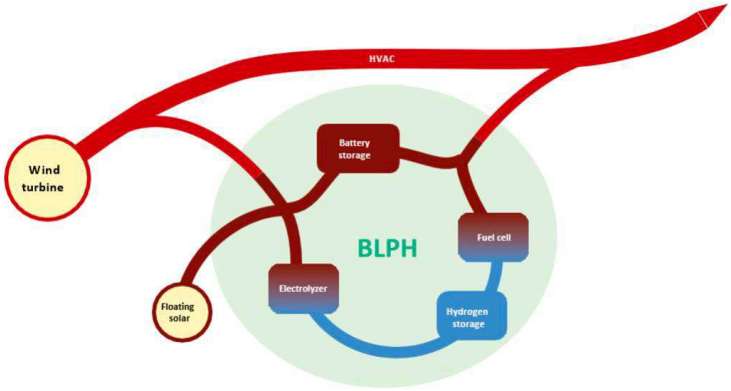


Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.



BLPH Concept

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Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.
The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2. Document Scope

This document describes the detailed activities scope to perform the Commissioning & Pre-Start-Up activities of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the follow up of all activities good practices on site required for the Unit Commissioning & Start-Up in accordance with COMPANY specifications. At this point, all Sub-Systems basic functions have been tested. The next steps are Utilities Operational Test and Unit preparation for Start-Up. The main activities are:

- Control Loop Simulation Test
- Cause & Effect Matrix
- Sequence Simulation Test
- Pure Water Purification & Distribution (56-03) Operational Test with WTP Vendor
- Flushing of Water Loops (25-11)
- Resin Filling into the Filters (25-11)
- Flushing with Resin
- Stacks Installation
- Flushing with Stacks
- Final Leak Test

The methodology and guidelines Simulation Tests and Leak Tests are detailed in C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statements. All ITR's specific to the project are given in this document.

For packages, vendors provide all the documentation including their own suite of ITR's regarding all remaining tests taking place onsite. FAT reports give all tested elements list. Vendors concerned are:

- OVIVO: for the Water Treatment Package (WTP) – Subsystem 56-03
- PAUMIER: HVAC Glycol Water Loop – Subsystem 66-06: All tests referring to the HVAC System here are tested through HVAC SAT Procedure (See C63-PAU-SAT-001).
- MSA: SSI-1000: Fire Safety System – Subsystem 25-11
- NIDEC: Transformer & Rectifiers – Subsystem 03-04 & 08-01

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- Regarding HPP (25-01), Aquagas mobilization onsite will be at the Start-Up. All items are connected directly to ELOGEN UCP. Commissioning on this package will be performed by CONTRACTOR under ELOGEN supervision. Therefore, this document also includes all 25-01 loops.

Regarding the Control System: the ELOGEN automation engineer will confirm onsite the good connection between the different UCPs by testing all the exchange tables. The simulation tests are done with all systems connected between each other's. At this point all should be communicating properly.

3. Definitions

COMPANY	means CROSSWIND C.V., owner & developer of the offshore WIND FARM Hollandse Kust Noord Wind Park Project.
ELOGEN	means ELOGEN as CONTRACTOR, the contracted party for engineering, and onshore commissioning of the Electrolyzer facilities associated with the PROJECT.
CONTRACTOR	means ROSETTI MARINO S.p.A., and his subcompany FORES for the contracted party for engineering, procurement, construction, offshore installation & commissioning of the facilities associated with the PROJECT.
Pre-Commissioning	Pre-Commissioning relates to the preliminary Commissioning activities to test and check the individual basic functions of individual items within any given system and/or sub-system to confirm they perform as designed.
Commissioning	The phase of the project after Pre-Commissioning. Commissioning consists of a comprehensive series of dynamic and energized Checks and Tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project Documents, Specifications, Standards and Engineering Best Practices.
Commissioning Team	Team established to perform the Commissioning and Handover process from CONTRACTOR Construction Team to COMPANY Operation & Maintenance Team.
Commissioning Spares	"Replacement" and "Consumable" spares required during the final hook-up, Pre-Commissioning, Commissioning and Start-up phases.
Equipment	An item that may be part of a System and be commissioned independently, however, it may or may not be operated independently.
Handover	Transfer of responsibility of the Plant from the Project Team to the Asset Holder.
Inspection Test Records (ITR)	A-ITR – used to record and verify construction scope associated with a tagged item (component). B-ITR – used to record and verify energization and function testing during pre-commissioning of a tagged item
Mechanical Completion	Mechanical Completion is the point in the project when construction is complete, and subsystems are ready to be handed over to the commissioning team. Mechanical Completion is achieved when: - • All ITR-A's for the given system / sub-system have been completed and signed off; • All Category A Punches have been closed. • All open Category B Punches shall be accepted with agreed plan for closure prior to commissioning. • Completion of all documents required to be As-Built Red Line Marked Up.

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	Mechanical Completion for any subsystem is recorded via the completing and signing of the Ready For Commissioning (RFC) certificate.
Operations	Operations include all personnel directly involved with Production Operations and Maintenance of the facility.
Performance Test	The Performance Test takes place following the Commissioning and Site Acceptance Test. A performance test is executed if there is a specific requirement to test performance criteria of an individual piece of equipment, a system, or the plant.
Performance Test Acceptance Certificate	This certificate shall be issued by the CONTRACTOR certifying that the PERFORMANCE TEST CRITERIAS have been achieved during the PERFORMANCE TESTS.
Plant	Refers to the permanent facilities (Base Load Power Hub) being constructed or to be constructed at WORKSITE resulting from the WORK.
Project	Refers to the BASE LOAD POWER HUB project.
Pre-Start Up Audit (PSUA)	The PSUA is a precursor to the PSSR meeting. The intention is to audit the readiness of the facility to commence start up with the findings being used as part of the PSSR and shall be conducted 6 weeks prior to Start-up.
Pre-Start Up Safety Review (PSSR)	Pre-Start-up Safety review (PSSR) meeting is the final determination that all prerequisites have been met to permit the hydrogen production and shall be conducted 4 weeks prior the RFSU.
Procedure	A document that details the execution of an activity.
Punch List	Work not executed as per approved documents and/or not meeting quality, health, safety, environment, operability/maintainability requirement and/or Standard; and recorded as a list for rectification.
Punch List ‘A’ Item	Punch List item that will prevent the safe operation of the Equipment, System and Plant and may jeopardize personnel or environment. Such item, as agreed, shall be cleared before the Equipment/System/Plant can progress to the next stage of the Commissioning and Handover phase.
Punch List ‘B’ Item	Punch List item that will not endanger the safe operation of the Equipment, System and Plant or personnel and/or environment. Such item, as agreed, can be carried over to the next stage and may be cleared later.
Ready For Commissioning Acceptance Certificate (RFC)	RFC is the Proverlis description for a sub-system Mechanical Completion. See definition for Mechanical Completion.
Ready For Operation Acceptance Certificate (RFO)	An RFO Acceptance Certificate shall be raised on the completion of the sub-system commissioning procedure scope.
Ready For Sail Away (RFSA)	All preservation and preparation works are complete.
Ready For Start-up (RFSU)	RFSU applies to the whole or part of the Plant and its associated Facilities and Systems. RFSU signifies that the applicable scopes have been fully commissioned and are ready for safe hydrogen production. RFSU will be authorized with the signing of the RFSU certificate. The RFSU requires that the Pre-Start-Up Audit (PSUA) and the Pre-Start- Up Safety Review have been completed, and all related action/blocking issues have been resolved
SITE	Refers to the offshore location where the PLANT is to be installed and the vicinity thereof (offshore North Sea - Netherlands).
Start-up	The stage at which process fluid is introduced/created into the Plant. It is defined as operation of all the facilities under the project. It can only be performed once

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	Commissioning of all associated utilities and auxiliaries and Pre-Commissioning activities of the Plant have been completed.
Start-up/Ramp-up	It is the initial start-up of processing equipment after first hydrogen, followed by a staged ramp up to full operating conditions. On completion of ramp-up, and after a period of steady state operations, the facility is ready to be performance tested.
Start Up on Paper (SUOP)	SUOP is an exercise to ensure that the start-up procedure and associated preparations are fit-for-purpose, including risk assessments, controls, mitigating actions and the Emergency Response protocols, procedures and capability are in place.
Site Acceptance Test	An un-interrupted safe operation of equipment, system, or plant, over a certain timeframe usually defined as 72hrs. A prerequisite to the Final Handover Certificate.
Statement of Fitness	As part of the COMPANY's HSE & SP Control Framework, the Statement of Fitness (SoF) before commissioning or introduction of hydrogen / hazardous substances in a New Asset, is a requirement of the Asset Integrity - Process Safety Management Application procedure. The Project and Asset Managers are accountable to develop a SoF to demonstrate asset integrity prior to energization or introduction of hazardous substances.
Sub-Contractor	means any company or person, to whom CONTRACTOR has subcontracted directly or indirectly at any level the performance of any part of the WORK.
System	A System is a major subdivision of a plant, being either process or utility, which performs an operational function of the plant. A System includes all the various equipment that allows it to operate. The division into functional Commissioning Systems corresponds to the prevailing fluids or services.
Sub-system	A Sub-system is a further subdivision of a System, which performs a partial operational function of the System, with little or no interference from the other Sub-systems. The Sub-system is the basic unit for Commissioning.
Systemization	The process of defining Systems for handover. Generally, colour coded on the 'marked up' engineering drawings such as P&IDs, SLD's & Cable Block Diagrams.
Vendor	means any CONTRACTOR's / CPI and/or SUBCONTRACTORS' supplier(s) of CONTRACTOR ITEM(s). VENDORS' presence on WORKSITE & SITE may be required to assist CONTRACTOR and/or COMPANY for the installation, commissioning and startup of such CONTRACTOR ITEMS and during the execution of PERFORMANCE TESTS.
Vendor Package	Skid and Equipment such as hydrogen purification, water purification, chillers, rectifiers, containers, etc.
Workshop(s)	means any location(s), other than WORKSITES, including offices, premises and workshops, where any equipment, materials or manufactured items including CONTRACTOR ITEMS shall be engineered, manufactured and assembled.
WORKSITE	means any construction location(s), where any major parts of the PLANT (such as templates, piles, nodes, jacket structure, modules, decks) shall be fabricated and assembled, excluding all other offices, premises and workshops of CONTRACTOR and SUBCONTRACTORS.
Shall	used to indicate requirements strictly to be followed to conform to the specification and accepted by all involved parties.

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Should	used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
May	used to indicate a course of action permissible within the limits of the specification.
Can	used for statements of possibility and capability, whether material, physical or casual.
"he", "him", "his"	are used in relation to CONTRACTOR.
"it", "its"	are used in relation to COMPANY.

4. Abbreviations

Acronyms / Abbreviations	Description
E&I	Electrical & Instrumentation
ESD	Emergency Shut Down
FAT	Factory Acceptance Test
FH	Fixed-bed Filter
HSE	Health, Safety, & Environment
ITR	Inspection & Test Record
IP	Interlock Process
IS	Interlock Safety
LC	Locked Closed
LO	Locked Open
MC	Mechanical Completion
NO	Normally Open
NC	Normally Closed
N/A	Non-Applicable
OTP	Operation Test Procedure (Commissioning)
PCS	Process Control System
PL	Punchlist
PID (P&ID)	Piping and Instrumentation Diagram

5. N2 Distribution Panel Service Test

Prior to perform the flushing of the Electrolyser with pure water, the N2 Panel must be operational for purging purposes. The presence of oxygen can affect the efficiency of the flushing required prior to Unit Start-Up.

Steps	Description	Completed By	Witnessed By	Date
01	Ensure Mechanical Completion for N2 sub-system scope described in ELOGEN P&IDs has been completed. ; PID en rev 8 ;	MLE		11/03/25
02	Check that Pre-Commissioning for N2 Distribution has been completed by the CONTRACTOR. The Loop Test ITRs are available for review in ELOGEN supervision on the following items:	X OK par MLE.		11/03/25.

Document PID en rev 9.

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	- PT-910 / PV-900 / PV-901 / MV-900 / MV-901 / FT-900 / FT-901 / PT-900 / FI-940 / MV-941 / PV-920 / PV-921 / MV-920 / MV-921 / FT-920 / FT-921 / PT-920	MLE		11/03
03	Check that BLPH N2 Supply is available at the Battery Limit. (See P&ID 9/16)	OK MLE		11/03
04	Line Up the circuit as per P&ID Mark-Up in Appendix. Close the following valves: - HV-620 / HV-620A / HV-620B / HV-624 - PV-620 / PV-640 / PV-641 / PV-642 / HV-642 / PV-631 / PV-500 / HV-940 / HV-941 - PV-632 / HV-930 / HV-931 / PV-933 / PV-635 - HV-600 / HV-600A / HV-600B / HV-605 - PV-600 / MPV-611 At this stage, all N2 injections are prepared to be routed straight to the vent.	MLE		11/03.
05	Close also the following valves to ST-600 & ST-620: - To ST-620: PV-920 / MV-920 / PV-921 / MV-921 - To ST-600: PV-900 / MV-900 / PV-901 / MV-601	MLE		11/0
06	The goal is now to set the purging flowrate through the Unit to avoid overpressure during Commissioning & Start-Up phases: Open PV-900 & PV-920	MLE		11/03
07	Supply N2 at the battery limit & pressurize the N2 header to normal operating pressure. Check that the pressure in the Electrolyser unit is atmospheric pressure (0 barg).	MLE		11/03
08	By monitoring carefully FI-900 & FI-920, Open slowly MV-900 & MV-921 & set the following flowrate: - MV-900 set for 46 m3/h at FI-900 - MV-920 set for 4 m3/h at FI-920 Ensure also the pressure is not increasing in the whole unit and a flow is detected at both H2 and O2 vents.	FMO		16/03
09	Leave MV-900 & MV-920 on this position, record the % of valve opening for any resetting purposes that happen in the future. Close PV-900 & PV-920	FMO		16/03
10	Proceed to the same operation for the bypasses: Open PV-901 & PV-921 By monitoring carefully FI-901 & FI-921, Open slowly MV-901 & MV-921 & set the following flowrate: - MV-901 set for 78 m3/h at FI-900	FMO		16/03

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	- MV-921 set for 11.7 m3/h at FI-920 Ensure also the pressure is not increasing in the whole unit.	FMO	NGT	14/03
11	Leave MV-901 & MV-921 on this position, record the % of valve opening for any resetting purposes that happen in the future. Close PV-901 & PV-921.	FMO	NGT	14/03

6. Hydrogen Purification Package

The HPU Start-Up is achieved during the Unit Start-Up. Prior to that, some tests and checks are required as per Vendor documentation. Vendor's documentation gives the following steps to be carried out. For more information about the HPU refers to Aquagas documentation DEDR 500/36: Installation, Commissioning, Operation and Maintenance Manual. All LOTO tasks must be performed through CONTRACTOR Procedure.

The Construction & Pre-Commissioning have been done and all ITRs signed off, proceed to the following additional crosschecking if necessary:

- DEDR is properly installed as per above recommendations.
- Check the DEDR sequence by manual operation of the solenoid valves.
- Check the valve limit switches.
- Check that all valves are in the correct position.
- Check that all Hy-Lok connections have the correct torque (green markings are aligned).
- Check the set points of temperature transmitters and temperature switches.
- Check the positioner of valve of flow regulating valve 64-V6.
- Check cooling water flow, temperature, and pressure.
- Check instrument air or nitrogen flow and pressure.
- Check that valves 61-V2, 64-V15 and 64-V16 are open. Put a lock (not included) on them.
- Gross Leak test have been completed during the Pre-Commissioning and a Leak Test at operating pressure will be performed prior to Start-Up: If leakage with a Hylok coupling, retighten until maximum finger tight + ¼ turn with spanner and green markings are aligned. Use Hylok gap inspection tool for checking the torque, if available. Do not over torque!

Once all Pre-Commissioning crosschecking is done, proceed with the Simulation Tests among all simulation tests to be performed in section 6. Fill the corresponding point to the HPU Simulations Tests in section 6.1.

- Without pressure on the system, shut-off fuses for regeneration heater (all fuses except control voltage). Once all signals connected, use the HMI/PLC to step through all sequences, with extra attention to the supplied Control Logic description, to secure that the wiring is correct, and the sequences are working OK without any alarms. Pay extra attention to valves that might open and create a high-pressure peak : 64-V4.1, 64-V4.2, 64-V4.3, 64-V4.4, 64-V5, 64-V6, 64-V7.
  If anything is abnormal, please contact AQUAGAS for advice.

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7. Cause & Effect Matrix

The method statement is described in the document C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statement at the chapter “6.6.9 Cause & Effect Matrix”.
The following two tables in the two next pages give all triggered effects to observe following the causes activation. IP is for Interlock Process and IS for Interlock Safety.
The table given after are all the triggered causes to activate for the test.

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Electrolyzer Package | C63-PWI-002
CAUSE AND EFFECT MATRIX | Rev.004
C63- CrossWind Project | 04 of 05

CAUSE & EFFECT DIAGRAM

Refer to "as-tested" Cause & Effect document, attached at the end of this report

CAUSES

Référence effect

| INTERLOCK PROCESS | DESCRIPTION | EFFECTS | DISPLAY alarm | STOP AND SE Rectifiers (all) (Inlet=0V | DEENERGISE All solenoid val | CLOSE Control valves | CLOSE Control valves PV-630 (FC) | CLOSE PV-631 (FC) | CLOSE H2 purification | CLOSE M3WV-200 (FC | CLOSE PV-633 (FC) - CUSTOMER LINE ISOLATED | CLOSE PV-640 (FC) | CLOSE PV-642 (FC) | START INTERMITTENTLY BUZ-1000 / 1001 / 1002 / 1003 | LIGHT ON CONTINUOUSLY VE-002 / 006 / 010 (Orange) | LIGHT ON FLASHING VE-001 / 005 / 009 (Rouge) | STOP IMMEDIATLY CP-200 | STOP AT THE END OF STOP SEQUENCE CP-200 | STOP IMMEDIATELY BY SETTING VAR600A/B TO 0% (ISTO) THE RUNNING CP-600 (A or B following status) | STOP AT THE END OF STOP SEQUENCE BY SETTING VAR600A/B TO 0% THE RUNNING CP-600 (A or B following status) | STOP IMMEDIATELY BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status) | STOP AT THE END OF STOP SEQUENCE BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status) | STOP AT THE END OF STOP SEQUENCE DC-200 - All rectifiers | STOP IMMEDIATELY H2 purification unit (diodes dryers heating | STOP IMMEDIATELY BY SETTING VAR600A/B TO 0% THE RUNNING LP-300 (A or B following | STOP IMMEDIATELY WC-400 (CP-400 | STOP AT THE END OF STOP SEQUENCE WC-400 (CP-400) | STOP IMMEDIATELY WC-401 (CP-401) | STOP AT THE END OF STOP SEQUENCE WC-401 (CP-401) | OPEN MPV-611 (FC) till depressurisation and/or inerting of ST-600 completed. OPEN PV-610 if MPV-611 is failing. | OPEN PV-631 (FC) till depressurisation and/or inerting of ST-620 completed. OPEN PV-630 if PV-631 is failing. | OPEN PV-901 (FC) till PT-610 reach 0,5 barg | OPEN PV-901 (FC) till inerting of ST-600 completed | OPEN PV-921 (FC) till inerting of ST-620 completed | OPEN PV-921 (FC) till PT-610 reach 0.6 barg | OPEN IMMEDIATLY PV-632 (FO) | OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-630 HH | FORCE STANDBY PRESSURISED Till TT1001 < TAH1001 or TT1002<TAH1002 or TT1003<TAH1003 or TT1004<TAH1004 or TT1005<TAH1005 or TT1006<TAH1006 | FORCE STANDBY After 1200s | SWITCH LP300 - From A to B or B to A | SWITCH CP600 - From A to B or B to A | SWITCH CP620 - From A to B or B to A | GO TO STANDBY PRESSURISED | REDUCE ELECTROLYSER SETPOINT AT 50% |
|---|---|---|---|---

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CAUSE & EFFECT DIAGRAM

Refer to "as-tested" Cause & Effect document, attached at the end of this report

CAUSES		EFFECTS	DISPLAY alarm	ENABLE ESD signal (ASE-001 : P... customer SCADA	ENABLE ESD signal (ASE-002: Fire and Gas to customer SCADA	ACTIVATE MN CONTACTOR Trigger MN Breaker (Main Supply)	STOP AND SET Rectifiers (all) (Used=0V)	ACTIVATE Safety E.Board (06 A) MN Inter DC (ESD Rectifiers), MN Rectifier Breaker	START CONTINUOUSLY (NOT IN S...) BUZ_1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT (NOT IN S...) VE-001 / 005 / 009 / 013 Module	STOP IMMEDIATELY CP-600A/B BY SETTING ... A/B TO 0%	STOP IMMEDIATELY CP-620A/B BY SETTING ... A/B TO 0%	STOP IMMEDIATELY LP-300A/B BY SETTING VAR-... A/B TO 0%	OPEN PV-610 (FO) till d... and/or ... ST-600 completed.	OPEN PV-630 (FO) till d... and/or ... ST-620 completed. OPEN PV-630 (FO) if PV-630 is fail...	OPEN PV-900 (FO) till inerting of ST-600 complete...	OPEN PV-920 (FO) till inerting of ST-620 completed	CLOSE AND LOCK PV-641 (FC)	CLOSE PV-635 (FC)	CLOSE AND LOCK PV-601 (FC)	OPEN IMMEDIATELY PV-610 (FO) till pressure ... PT-611 H-0.2	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-631 H-0.2	CLOSE PV-800	OPEN PV-900 (FO) till PT611 > 0.5 barg	OPEN PV-920 (FO) till PT-631 > 0.5 barg	CLOSE PV-501 (FC)	STOP IMMEDIATELY CP-600A BY SETTING VAR-600A TO 0%	STOP IMMEDIATELY CP-600B BY SETTING VAR-600B TO 0%	STOP IMMEDIATELY CP-620A BY SETTING VAR-620A TO 0%	STOP IMMEDIATELY CP-620B BY SETTING VAR-620B TO 0%	TRIGGER IS1
Référence effect																																
INTERLOCK SAFETY	*DESCRIPTION*																															
IS1	ESD Electrolyser following Process issue SAFETY STOP		X	X		X	X	X	X	X				X	X	X	X		X													
IS2	Isolation from customer H2 line		X																X													
IS3	Isolation balancing line (640)		X															X														
IS4	ESD Electrolyser following Fire & Gas issue		X		X	X	X	X	X	X				X	X	X	X		X													
IS5	Very Low water level in ST-620		X				X					X																				X
IS6	Very Low water level in ST-600		X				X				X																					X
IS9	Very High Flowrate on H2 Analysis Line		X																					X								
IS10	Very Low Pressure on anodic side		X																						X							
IS11	Very Low Pressure on cathodic side		X																							X						
IS12	Very High Level ST-600		X										X																			
IS13	Very Low Level CS-610		X																	X												
IS14	Very Low Level in H2 Vent		X																									X				
IS15	Blocked discharge CP600A		X																										X			
IS16	Blocked discharge CP600B		X																											X		
IS17	Blocked discharge CP620A		X																												X	
IS18	Blocked discharge CP620B		X																													X
IS19	MPV-611 fault - High Oxygen Pressure																						X									
IS20	PV-631 fault - High Hydrogen Pressure																							X								

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
OIHA-800	AAH-800 (ISO22)	5	volppm	IP9	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800	5	TO PLC			
OIHA-800	AAHH-800 (ISO22)	6	volppm	IP1	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-800	1200	TO PLC			
REC-001	ACA-001 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001	-	COM			
REC-002	ACA-002 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002	-	COM			
LP-300A	ACA-300A (C63)	-	-	IP17	LP-300A STARTING FAULT - LP-300A	1	TO PLC			
LP-300B	ACA-300B (C63)	-	-	IP17	LP-300B STARTING FAULT - LP-300B	1	TO PLC			
CP-600A	ACA-600A (ISO22)	-	-	IP6	STARTING MALFUNCTION CP-600A - ERR - CP-600A	60	TO PLC			
CP-600B	ACA-600B (ISO22)	-	-	IP6	STARTING MALFUNCTION CP-600B - ERR - CP-600B	60	TO PLC			
CP-620A	ACA-620A (ISO22)	-	-	IP5	STARTING MALFUNCTION CP-620A - ERR - CP-620A	60	TO PLC			
CP-620B	ACA-620B (ISO22)	-	-	IP5	STARTING MALFUNCTION CP-620B - ERR - CP-620B	60	TO PLC			
DC-200	AQA-200 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-200	-	COM			
DC-201	AQA-201 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-201	-	COM			
WC-400	AQA-400 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-400	-	COM			
WC-401	AQA-401 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-401	-	COM			

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IRSH-001	AQA-1005	-	-	IP1	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER	10	COM			
HVAC PACKAGE	AQA-1006	-	-	IP1	COMMUNICATION FAULT PLC ELOGEN / HVAC	0	COM			
REC-001	AQA-001 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-001	-	COM			
REC-002	AQA-002 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-002	-	COM			
COMMUNICATION WITH CLIENT	AQA-052	-	-	IP1	CUSTOMER/ELOGEN COMMUNICATION SWITCH FAULT, REMOTE MODE	-	COM			
MPV-611	AQA-611	1	-	IP1	MPV-611 Fault	15	TO PLC			
MPV-630	AQA-630	1	-	IP1	MPV-630 Fault	-	TO PLC			
SSI-1000	AQA-1001 (ISO22)	-	-	IP1	FIRE CONTROL PANEL FAULT - ERR - SSI-1000	-	HARDWIRED			
WTP-300	AQA-1003	-	-	IP1	COMMUICATION FAULT PLC ELOGEN / WTP	0	COM			
SSI-1000	AQA-1010 (ISO22)	-	-	IS4	FIRE AND GAS DETECTION - FIRE - SSI-1000	-	HARDWIRED			
PLC	BZ-001 (ISO22)	-	-	IS1	PLC FAULT - ERR - PLC-001	0	HARDWIRED			
HIOD-610	CAH-610 (C63)	25	% LFL	IP9	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3	1	TO PLC			
AHD-1000	CAH-1000 (ISO22)	25	%LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000	1	TO PLC			
AHD-1001	CAH-1001 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
AHD-1002	CAH-1002 (C63)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002	1	TO PLC			
AHD-1003	CAH-1003 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003	1	TO PLC			
AHD-1004	CAH-1004 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004	1	TO PLC			
QIA-1B4	CAHH-300 (C63)	1	µS/cm	IP16	VERY HIGH CONDUCTIVITY LP300 - HH	5	COM			
HIOD-610	CAHH-610 (C63)	50	% LFL	IS4	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3	-	TO PLC			
DPT-800	CAHH-800 (ISO22)	6	ppmv	IP4	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800	1200	TO PLC			
AHD-1000	CAHH-1000 (ISO22)	50	%LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000	1	TO PLC			
AHD-1001	CAHH-1001 (ISO22)	50	%LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001	1	TO PLC			
AHD-1002	CAHH-1002 (C63)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002	1	TO PLC			
AHD-1003	CAHH-1003 (ISO22)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003	1	TO PLC			
AHD-1004	CAHH-1004 (ISO22)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004	1	TO PLC			
EH-1001	EGA-1001 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1001	-	COM			
EH-1002	EGA-1002 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1002	-	COM			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
EH-1003	EGA-1003 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1003	-	COM			
EH-1004	EGA-1004 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1004	-	COM			
EH-1006	EGA-1006 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1006	-	COM			
EH-1007	EGA-1007 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1007	-	COM			
EXT-001	EGA-1101 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001	-	TO PLC			
EXT-002	EGA-1102 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002	-	TO PLC			
EXT-003	EGA-1103 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003	-	TO PLC			
EXT-004	EGA-1104 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004	-	TO PLC			
EXT-005	EGA-1105 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005	-	TO PLC			
EXT-006	EGA-1106 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006	-	TO PLC			
EXT-007	EGA-1107 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007	-	TO PLC			
EXT-008	EGA-1108 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008	-	TO PLC			
PQ-001	EJAHH-001 (C63)	250	V	IP1	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PQ-002	EJAHH-002 (C63)	440	V	IP1	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002	0	TO PLC			
PQ-003	EJAHH-003 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-003	0	TO PLC			
PQ-004	EJAHH-004 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-004	0	TO PLC			
PQ-001	EJALL-001 (C63)	209	V	IP1	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001	0	TO PLC			
PQ-002	EJALL-002 (C63)	380	V	IP1	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002	0	TO PLC			
PQ-003	EJALL-003 (C63)	342	V	IP1	VERY LOW RECTIFIER VOLTAGE - LL - PQ-003	0	TO PLC			
PQ-004	EJALL-004 (C63)	342	V	IP1	VERY LOW RECTIFIER VOLTAGE - LL - PQ-004	0	TO PLC			
FSH-640	FAHH-640 (ISO22-500)	1 (4,9)	- (m3/h)	IS3	DEBIT EQUILIBRAGE ELEVEE - FSH-640 - HH	15	TO PLC			
FICV-800	FAHH-800 (ISO22)	1 (4)	- (NL/min)	IS9	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800	15	TO PLC			
FT-600	FAL-600 (ISO22-500)	79,38	m3/h	IP9	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600	2	TO PLC			
FT-620	FAL-620 (ISO22-500)	30,24	m3/h	IP9	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620	2	TO PLC			
FT-900	FAL-900 (ISO22)	41,4	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-900	1	TO PLC			
FT-901	FAL-901 (ISO22)	70,3	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-901	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
FT-920	FAL-920 (ISO22)	3,6	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-920	1	TO PLC			
FT-921	FAL-921 (ISO22)	10,5	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-921	1	TO PLC			
FT-600	FALL-600 (ISO22-500)	44,1	m3/h	IS1	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600	2	TO PLC			
FICV-610	FALL-610 (ISO22)	0,7	- (NL/min)	IS1	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610	15	TO PLC			
FICV-611	FALL-611 (ISO22)	7,7	- (NL/min)	IP9	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611	15	TO PLC			
FT-620	FALL-620 (ISO22-500)	26,88	m3/h	IP1	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620	2	TO PLC			
FICV-800	FALL-800 (ISO22)	2,1	(NL/min)	IP4	VERY LOW H2 FLOW ANALYSIS - LL - FICV-800	15	TO PLC			
FT-630	FDAH-630 (ISO22)	5	%	IP9	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630	2	TO PLC			
FC 64.1	FSA 64.1	No 4-20	mA	IP1	NO SIGNAL - ERR - FC 64.1	0	TO PLC			
FC 64.1	FSA 64.1 LL	<5.16	mA	IP1	GAS INLET FLOW VERY LOW - LL - FC 64.1	0	TO PLC			
MPV-611	GDA-611 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-611 - ERR - MPV-611	133	TO PLC			

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MPV-630	GDA-630 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-630 - ERR - MPV-630	133	TO PLC			
ZIO-604	GGA-604 (ISO22)	1	-	IS	HV-604 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-604	5	TO PLC			
ZIO-605	GGA-605 (ISO22)	1	-	IS6	HV-605 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-605	5	TO PLC			
ZIO-623	GGA-623 (ISO22)	1	-	IS1	HV-623 VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-623	5	TO PLC			
ZIO-624	GGA-624 (ISO22)	1	-	IS1	HV-624VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-624	5	TO PLC			
GS 64.1.1	GSA 64.1.1 HH	1	-	IP1	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1	5	TO PLC			
GS 64.1.1	GSA 64.1.1 LL	0	-	IP1	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1	5	TO PLC			
GS 64.1.2	GSA 64.1.2 HH	1	-	IP1	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2	5	TO PLC			
GS 64.1.2	GSA 64.1.2 LL	0	-	IP1	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2	5	TO PLC			
GS 64.1.3	GSA 64.1.3 HH	1	-	IP1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3	5	TO PLC			
GS 64.1.3	GSA 64.1.3 LL	0	-	IP1	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3	5	TO PLC			
GS 64.1.4	GSA 64.1.4 HH	1	-	IP1	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4	5	TO PLC			
GS 64.1.4	GSA 64.1.4 LL	0	-	IP1	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4	5	TO PLC			
GS 64.2	GSA 64.2 HH	1	-	IP1	VALVE 64-V5 NOT CLOSED - HH - GS 64.2	5	TO PLC			
GS 64.2	GSA 64.2 LL	0	-	IP1	VALVE 64-V5 NOT OPEN - LL - GS 64.2	5	TO PLC			
GS 64.3	GSA 64.3 HH	1	-	IP1	VALVE 64-V7 NOT CLOSED - HH - GS 64.3	5	TO PLC			

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GS 64.3	GSA 64.3 LL	0	-	IP1	VALVE 64-V7 NOT OPEN - LL - GS 64.3	5	TO PLC			
GS 64.T2	GSA 64.T2 HH	1	-	IP1	VALVE 64-T2 NOT OPEN - HH - GS 64.T2	5	TO PLC			
GS 64.T2	GSA 64.T2 LL	0	-	IP1	VALVE 64-T2 NOT CLOSED - LL - GS 64.T2	5	TO PLC			
IM-001	IAHH-001 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-001	1	TO PLC			
IM-002	IAHH-002 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-002	1	TO PLC			
IM-001	IDAHH-001 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001	2	TO PLC			
IM-002	IDAHH-002 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002	2	TO PLC			
POWER 400V	JGA-001 (ISO22)	-	-	IP1	LOSS OF 400 VAC POWER SUPPLY - ERR	0	TO PLC			
LP-300A	JGA-300A (C63)	-	-	IP17	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A	1	TO PLC			
LP-300B	JGA-300B (C63)	-	-	IP17	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B	1	TO PLC			
CP-600A	JGA-600A (ISO22)	-	-	IP6	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A	0	TO PLC			
CP-600B	JGA-600B (ISO22)	-	-	IP6	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
CP-620A	JGA-620A (ISO22)	-	-	IP5	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A	0	TO PLC			
CP-620B	JGA-620B (ISO22)	-	-	IP5	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B	0	TO PLC			
EH-1001	JGA-1001 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001	0	COM			
EH-1002	JGA-1002 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002	0	COM			
EH-1003	JGA-1003 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003	0	COM			
EH-1004	JGA-1004 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004	0	COM			
EH-1006	JGA-1006 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006	0	COM			
EH-1007	JGA-1007 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007	0	COM			
EXT 001/002/003/004	JGA-1121	-	-	IP9	MALFUNCTION MAIN CIRCUIT BREAKER FOR 4 FANS STACK - ERR - BREAKER STACK 001/002/003/004	0	TO PLC			

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Component TAG	Alarm TAG	SP	Limit	Alarm Type	Alarm Message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
EXT 005/ 006/ 007/ 008	JGA-1122	-	-	IP9	MALFUNCTION COMMON CIRCUIT BREAKER OF 4 FANS STACKS - ERR - BREAKER STACK 005/ 006/ 007/ 008	0	TO PLC			
K01	KSA K01 HH	1	-	IP1	Dryer heater HE 64.1, K01 Not deactivated	5	TO PLC			
K01	KSA K01 LL	0	-	IP1	Dryer heater HE 64.1, contactor K01 Not activated	5	TO PLC			
K02	KSA K02 HH	1	-	IP1	Dryer heater HE 64.1, K02 Not deactivated	5	TO PLC			
K02	KSA K02 LL	0	-	IP1	Dryer heater HE 64.1, K02 Not activated	5	TO PLC			
K03	KSA K03 HH	1	-	IP1	Deoxo Trace heater HE 61.1, K03 Not deactivated	5	TO PLC			
K03	KSA K03 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03	5	TO PLC			
K04	KSA K04 HH	1	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04	5	TO PLC			
K04	KSA K04 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04	5	TO PLC			
LT-600	LAH-600 (C63)	50	%	IP9	HIGH LEVEL ST-600 - H - LT-600	2	TO PLC			
LSH-610	LAH-610 (ISO22)	1	-	IP9	HIGH LEVEL CS-610 - H - LSH-610	60	TO PLC			
LT-620	LAH-620 (C63)	62	%	IP9	HIGH LEVEL ST-620 - H - LT-620	2	TO PLC			
LSH-630	LAH-630 (C63)	1	-	IP15	HIGH LEVEL CS-630 - HH - LSH-630	1080	TO PLC			
WLD-001	LAHH-001 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-001	60	TO PLC			

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WLD-002	LAHH-002 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-002	60	TO PLC			
WLD-003	LAHH-003 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-003	60	TO PLC			
WLD-004	LAHH-004 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-004	60	TO PLC			
WLD-005	LAHH-005 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-005	60	TO PLC			
WLD-006	LAHH-006 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-006	60	TO PLC			
LT-600	LAHH-600 (C63)	52	%	IP1	VERY HIGH LEVEL ST-600 - HH - LT-600	2	TO PLC			
LT-620	LAHH-620 (C63)	71	%	IP1	VERY HIGH LEVEL ST-620 - HH - LT-620	2	TO PLC			
LSH-631	LAHH-631 (ISO22)	1	-	IS1	VERY HIGH LEVEL CS-630 - HH - LSH-631	60	TO PLC			
LSH-640	LAHH-640 (ISO22)	1	-	IP9	HIGH LEVEL DG-640 - HH - LSH-640	60	TO PLC			
LT-600	LAL-600 (C63)	32	%	IP9	LOW LEVEL ST-600 - L	2	TO PLC			
LSL-610	LAL-610 (ISO22)	1	-	IP9	Low Level CS-610 - L- LSL-610	60	TO PLC			
LT-620	LAL-620 (C63)	31	%	IP9	LOW LEVEL ST-620 - L - LT-620	2	TO PLC			
LSL-630	LAL-630 (ISO22)	1	-	IP9	LOW LEVEL CS-630 - L - LSL-630	60	TO PLC			
LALL-301	LALL-300 (C63)	20	%	IP1	VERY LOW LEVEL WTP-300 - LL - LT-300	2	TO PLC			

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LT-600	LALL-600 (C63)	26	%	IP6	VERY LOW LEVEL ST-600 - LL - LT-600	2	TO PLC			
LSL-611	LALL-611 (ISO22)	1	-	IS13	VERY LOW LEVEL CS-510 - LL - LSL-611	60	TO PLC			
LT-620	LALL-620 (C63)	27	%	IP5	VERY LOW LEVEL ST-620 - LL - LT-620	2	TO PLC			
LSH-600	LASHH-600 (ISO22)	1	-	IS12	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600	5	TO PLC			
LSHH-500	LASHH-500 (C63)	1	-	IP1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500	5	TO PLC			
LSL-600	LASLL-600 (C63)	1		IS6	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600	5	TO PLC			
LSL-620	LASLL-620 (C63)	1	-	IS5	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620	5	TO PLC			
LSLL-500	LASLL-500 (C63)	1	-	IS14	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT -LSLL-500	1	TO PLC			
AUC-001	OAR-001 (ISO22)	-	-	IS1	CUSTOMER EMERGENCY STOP - AUC-001	-	HARDWIRED			
DS-001	OAS-001 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-001	5	TO PLC			
DS-002	OAS-002 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-002	5	TO PLC			
DS-003	OAS-003 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-003	5	TO PLC			
DS-004	OAS-004 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-004	5	TO PLC			

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DS-005	OAS-005 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-005	5	TO PLC			
DS-006	OAS-006 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-006	5	TO PLC			
DS-007	OAS-007 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-007	5	TO PLC			
DS-008	OAS-008 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-008	5	TO PLC			
DS-009	OAS-009 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-009	5	TO PLC			
DS-010	OAS-010 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-0010	5	TO PLC			
DS-011	OAS-011 (ISO22)	1		IP1	ELECTROLYSER DOOR OPENED - DS-0011		TO PLC			
DS-012	OAS-012 ISO22)	1		IP1	ELECTROLYSER DOOR OPENED - DS-0012		TO PLC			
ESD-001	OAZ-001 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-001	-	HARDWIRED			
ESD-002	OAZ-002 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-002	-	HARDWIRED			
ESD-003	OAZ-003 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-003	-	HARDWIRED			
ESD-004	OAZ-004 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-004	-	HARDWIRED			
ESD-005	OAZ-005 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-005	-	HARDWIRED			

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ESD-006	OAZ-006 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-006	-	HARDWIRED			
ESD-007	OAZ-007 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-007	-	HARDWIRED			
PT-64.1	PA 64.1 L	15	barg	IP9	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1	15	TO PLC			
PT-150	PAH-150 (ISO22)	8,5	barg	IP9	HIGH INSTRUMENT AIR PRESSURE - H - PT-150	1	TO PLC			
PT-300	PAH-300 (ISO22)	14	barg	IP9	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300	1	TO PLC			
PT-600	PAH-600 (ISO22)	15	barg	IP9	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600	2	TO PLC			
PT-610	PAH-610 (ISO22)	11,8	barg	IP9	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- H - PT-610	1	TO PLC			
PT-612	PAH-612 (ISO22)	0,5	barg	IP9	HIGH OXYGEN VENT PRESSURE - H - PT-612	2	TO PLC			
PT-620	PAH-620 (ISO22)	37	barg	IP9	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620	2	TO PLC			
PT-630	PAH-630 (ISO22)	33	barg	IP9	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630	1	TO PLC			
PT-910	PAH-910 (ISO22)	8,5	barg	IP9	HIGH NITROGEN PRESSURE - H - PT-910	1	TO PLC			
PT-105	PAHH-05 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-05	1	COM			

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Component TAG	Alarm TAG	SP	Unit	Alarm Type	Alarm Message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PT-12	PAHH-12 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-12	1	COM			
PT-15	PAHH-15 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-15	1	COM			
PT-22	PAHH-22 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 2 - HH - PT-22	1	COM			
PT-105	PAHH-105 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 1 - HH - PT-105	1	COM			
PT-112	PAHH-112 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 1 - HH - PT-112	1	COM			
PT-115	PAHH-115 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 2 - HH - PT-115	1	COM			
PT-122	PAHH-122 (C63)	PAU MIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 2 - HH - PT-122	1	COM			
PT-150	PAHH-150 (ISO22)	8,5	barg	IP1	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150	10	TO PLC			
PT-300	PAHH-300 (C63)	16	barg	IP16	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300	1	TO PLC			

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PT-600A	PAHH-600A (C63)	16	barg	IS15	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A	1	TO PLC			
PT-600B	PAHH-600B (C63)	16	barg	IS16	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B	1	TO PLC			
PT-610	PAHH-610 (ISO22)	12	barg	IP1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610	1	TO PLC			
PT-611	PAHH-611 (ISO22)	12,5	barg	IS1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS)- HH - PT-611	1	TO PLC			
PT-620A	PAHH-620A (C63)	38	barg	IS17	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A	1	TO PLC			
PT-620B	PAHH-620B (C63)	38	barg	IS18	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B	1	TO PLC			
PT-630	PAHH-630 (ISO22)	33,5	barg	IP1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630	1	TO PLC			
PT-631	PAHH-631 (ISO22)	34	barg	IS1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631	1	TO PLC			
PT-632	PAHH-632 (C63)	3,6	barg	IP9	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632	1	TO PLC			
PT-633	PAHH-633 (C63)	33	barg	IP4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633	1	TO PLC			
PT-900	PAHH-900 (ISO22)	9	barg	IP1	LEAK ON OXYGEN INERTING LINE - HH - PT-900	1	TO PLC			
PT-910	PAHH-910 (ISO22)	9	barg	IP1	VERY HIGH NITROGEN PRESSURE - HH - PT-910	10	TO PLC			

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PT-920	PAHH-920 (ISO22)	9	barg	IP1	LEAK ON HYDROGEN INERTING LINE - HH - PT-920	10	TO PLC			
PT-150	PAL-150 (ISO22)	6	barg	IP9	LOW INSTRUMENT AIR PRESSURE - L - PT-150	10	TO PLC			
PT-300	PAL-300 (C63)	10,8	barg	IP9	LP300 PUMP PRESSURE LOSS - L - PT300	1	TO PLC			
PT-600	PAL-600 (C63)	2,79	barg	IP9	CP-600 PUMP PRESSURE LOSS - L - PT600	10	TO PLC			
PT-620	PAL-620 (C63)	3,11	barg	IP9	CP-620 PRESSURE LOSS - L - PT-620	10	TO PLC			
PT-910	PAL-910 (ISO22)	6	barg	IP9	LOW NITROGEN PRESSURE - L - PT-910	10	TO PLC			
PT-150	PALL-150 (ISO22)	5,5	barg	IP1	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150	10	TO PLC			
PT-300	PALL-300 (C63)	9,6	barg	IP17	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300	1	TO PLC			
PT-600	PALL-600 (C63)	2,48	barg	IP18	CP- 600 CHANGEOVER UNFORESEEN - LL - PT-600	60	TO PLC			
PT-611	PALL-611 (ISO22)	0	barg	IS10	LOW PRESSURE ON ANODIC SIDE - LL - PT-611	1	TO PLC			
PT-620	PALL-620 (C63)	2,76	barg	IP19	CP-620 CHANGEOVER UNFORESEEN - LL - PT-620	60	TO PLC			
PT-631	PALL-631 (ISO22)	0	barg	IS11	LOW PRESSURE ON CATHODIC SIDE - LL - PT-631	1	TO PLC			
PT-910	PALL-910 (ISO22)	5,5	barg	IP1	VERY LOW NITROGEN PRESSURE - LL - PT910	10	TO PLC			
PT-1001	PALL-1001 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT-1001	1	TO PLC			

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PT-1002	PALL-1002 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002	1	TO PLC			
PT-1003	PALL-1003 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003	1	TO PLC			
PT-1004	PALL-1004 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004	1	TO PLC			
PT-1005	PALL-1005 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005	1	TO PLC			
PT-1006	PALL-1006 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006	1	TO PLC			
DPY-001 = PT630 - PT610	PDAH-001 (ISO22)	21,5	barg	IP9	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610	15	TO PLC			
PT-610	PDAH-610 (ISO22)	1200	s	IP9	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610	0	TO PLC			
PT-630	PDAH-630 (ISO22)	1200	s	IP9	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630	0	TO PLC			
DPY-001 = PT630 - PT610	PDAHH-001 (ISO22)	22	barg	IP1	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610	15	TO PLC			
DPY-002 = PT631 - PT611	PDAHH-002 (ISO22)	23	barg	IS1	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611	15	TO PLC			
DPY-001 = PT630 - PT610	PDAL-001 (ISO22)	-0,1	barg	IP9	REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC			

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DPY-001 = PT630 - PT610	PDALL-001 (ISO22)	-0,5	barg	IP1	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC			
DPY-002 = PT631 - PT611	PDALL-002 (ISO22)	-1	barg	IP1	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611	15	TO PLC			
TT 60.1	TA 60.1 H	>200	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1	0	TO PLC			
TT 60.1	TA 60.1 L	<50	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1	3600	TO PLC			
TT 60.2	TA 60.2 H	>220	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2	0	TO PLC			
TT 60.2	TA 60.2 L	<70	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2	3600	TO PLC			
TT 61.1	TA 61.1 H	>200	°C	IP9	DEOXO TOWER 61, GAS UTLET TEMPERATURE HIGH - H - TT 61.1	0	TO PLC			
TT 64.5	TA 64.5 H	>40	°C	IP9	DRYER TOWER 64A, COOLING FLOW LOW - H - TT 64.5	0	TO PLC			
TT 64.5	TA 64.5 H A	>45	°C	IP9	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5	0	TO PLC			
TT 64.5	TA 64.5 H R	>120	°C	IP9	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5	0	TO PLC			
TT 64.5	TA 64.5 L	<100	°C	IP9	DRYER TOWER 64A, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.5	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT 64.6	TA 64.6 H A	>45	°C	IP9	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6	0	TO PLC			
TT 64.6	TA 64.6 H R	>200	°C	IP9	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6	0	TO PLC			
TT-64.6	TA 64.6 L	<150	°C	IP9	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6	0	TO PLC			
TT-64.7	TA 64.7 H	>40	°C	IP9	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7	0	TO PLC			
TT 64.7	TA 64.7 H A	>45	°C	IP9	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7	0	TO PLC			
TT 64.7	TA 64.7 H R	>120	°C	IP9	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7	0	TO PLC			
TT-64.7	TA 64.7 L	<100	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7	0	TO PLC			
TT 64.8	TA 64.8 H A	>45	°C	IP9	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8	0	TO PLC			
TT 64.8	TA 64.8 H R	>200	°C	IP9	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8	0	TO PLC			
TT-64.8	TA 64.8 L	<150	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC			
TT-600	TAHH-600 (ISO22)	80	°C	IP1	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm group	Completed By	Witnessed By	Date
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC			
TT-620	TAHH-620 (ISO22)	80	°C	IP1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620	0	TO PLC			
TT-1001	TAHH-1001 (C63)	30	°C	IP11	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001	5	TO PLC			
TT-1002	TAHH-1002 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002	5	TO PLC			
TT-1003	TAHH-1003 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003	5	TO PLC			
TT-1004	TAHH-1004 (C63)	35	°C	IP11	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004	5	TO PLC			
TT-1005	TAHH-1005 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005	5	TO PLC			
TT-1006	TAHH-1006 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006	5	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC			
TT-1003	TAL-1003 (ISO22)	10	°C	IP9	AMBIENT TEMPERATURE LOW - L - TT-1003	0				
TT-600	TALL-600 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-600	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC			
TT-620	TALL-620 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-620	0	TO PLC			
TT-HY-1001	TALL-1001 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001	5	TO PLC			
TT-HY-1002	TALL-1002 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002	5	TO PLC			
TT-HY-1003	TALL-1003 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003	5	TO PLC			
TT-HY-1005	TALL-1005 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005	5	TO PLC			
TT-HY-1006	TALL-1006 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006	5	TO PLC			
TT-HY-1004	TALL-1003 (ISO22)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW - LL - TT-1004	5	TO PLC			
TDI-600	TDAH-600 (ISO22)	10	°C	IP9	ANODE DT HIGH - H - TDY-600	0	TO PLC			
TDI-600	TDAHH-600 (ISO22)	12	°C	IP1	ANODE DT VERY HIGH - HH - TDY-600	0	TO PLC			
TDI-600	TDAL-600 (ISO22)	-1	°C	IP9	ANODE DT LOW - L - TDY-600	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TDI-600	TDALL-600 (ISO22)	-2	°C	IP1	ANODE DT VERY LOW - LL - TDY-600	0	TO PLC			
TT 60.1	TSA 60.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.1	0	TO PLC			
TT 60.1	TSA 60.1 HH	>250	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1	0	TO PLC			
TT 60.1	TSA 60.1 LL	<40	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1	3600	TO PLC			
TT 60.2	TSA 60.2	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.2	0	TO PLC			
TT 60.2	TSA 60.2 HH	>250	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2	0	TO PLC			
TT 60.2	TSA 60.2 LL	<50	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2	3600	TO PLC			
TT 61.1	TSA 61.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 61.1	0	TO PLC			
TT 61.1	TSA 61.1 HH	>250	°C	IP1	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1	0	TO PLC			
TS 64.2	TSA 64.2 HH	>400	°C	IP1	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2	0	TO PLC			
TS 64.3	TSA 64.3 HH	>200	°C	IP1	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3	0	TO PLC			
TS 64.4	TSA 64.4 HH	>60	°C	IP1	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4	0	TO PLC			
TT 64.5	TSA 64.5	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.5	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm Type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT 64.5	TSA 64.5 HH A	>50	°C	IP1	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC			
TT 64.5	TSA 64.5 HH R	>150	°C	IP1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC			
TT 64.6	TSA 64.6	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.6	0	TO PLC			
TT 64.6	TSA 64.6 HH A	>50	°C	IP1	DRYER TOWER 64A, TOP ADS. TEMPERATURE VERY HIGH -HH - 64.6	0	TO PLC			
TT-64.6	TSA 64.6 HH C	>40	°C	IP1	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6	0	TO PLC			
TT 64.6	TSA 64.6 HH R	>250	°C	IP1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6	0	TO PLC			
TT 64.7	TSA 64.7	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.7	0	TO PLC			
TT 64.7	TSA 64.7 HH A	>50	°C	IP1	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC			
TT 64.7	TSA 64.7 HH R	>150	°C	IP1	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC			
TT 64.8	TSA 64.8	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.8	0	TO PLC			
TT 64.8	TSA 64.8 HH A	>50	°C	IP1	DRYER TOWER 64B, TOP ADS. TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC			
TT-64.8	TSA 64.8 HH C	>40	°C	IP1	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8	0	TO PLC			
TT 64.8	TSA 64.8 HH R	>250	°C	IP1	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm Type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
TT-621A	TSAHH-621A (ISO22)	80	°C	IP5	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A	0	TO PLC			
TT-621B	TSAHH-621B (ISO22)	80	°C	IP5	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B	0	TO PLC			
PCA-001	VAH-001 (ISO22)	2.2	V/cell	IP9	STACK-001 VERY HIGH CELL VOLTAGE - H - PCA-001	1	TO PLC			
PCA-002	VAH-002 (ISO22)	2.2	V/cell	IP9	STACK-002 VERY HIGH CELL VOLTAGE - H - PCA-002	1	TO PLC			
PCA-003	VAH-003 (ISO22)	2.2	V/cell	IP9	STACK-003 VERY HIGH CELL VOLTAGE - H - PCA-003	1	TO PLC			
PCA-004	VAH-004 (ISO22)	2.2	V/cell	IP9	STACK-004 VERY HIGH CELL VOLTAGE - H - PCA-004	1	TO PLC			
PCA-005	VAH-005 (ISO22)	2.2	V/cell	IP9	STACK-005 VERY HIGH CELL VOLTAGE - H - PCA-005	1	TO PLC			
PCA-006	VAH-006 (ISO22)	2.2	V/cell	IP9	STACK-006 VERY HIGH CELL VOLTAGE - H - PCA-006	1	TO PLC			
PCA-007	VAH-007 (ISO22)	2.2	V/cell	IP9	STACK-007 VERY HIGH CELL VOLTAGE - H - PCA-007	1	TO PLC			
PCA-008	VAH-008 (ISO22)	2.2	V/cell	IP9	STACK-008 VERY HIGH CELL VOLTAGE - H - PCA-008	1	TO PLC			
REC-001	VAH-101 (C63)	975	V	IP9	REC-001 HIGH VOLTAGE - H - VM-101	1	COM			
REC-002	VAH-102 (C63)	975	V	IP9	REC-002 HIGH VOLTAGE - H - VM-102	1	COM			
PCA-001	VAHH-001 (ISO22)	2.3	V/cell	IP1	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001	1	TO PLC			
PCA-002	VAHH-002 (ISO22)	2.3	V/cell	IP1	STACK-002 VERY HIGH CELL VOLTAGE - HH - PCA-002	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm group	Completed By	Witnessed By	Date
PCA-003	VAHH-003 (ISO22)	2.3	V/cell	IP1	STACK-003 VERY HIGH CELL VOLTAGE - HH - PCA-003	1	TO PLC			
PCA-004	VAHH-004 (ISO22)	2.3	V/cell	IP1	STACK-004 VERY HIGH CELL VOLTAGE - HH - PCA-004	1	TO PLC			
PCA-005	VAHH-005 (ISO22)	2.3	V/cell	IP1	STACK-005 VERY HIGH CELL VOLTAGE - HH - PCA-005	1	TO PLC			
PCA-006	VAHH-006 (ISO22)	2.3	V/cell	IP1	STACK-006 VERY HIGH CELL VOLTAGE - HH - PCA-006	1	TO PLC			
PCA-007	VAHH-007 (ISO22)	2.3	V/cell	IP1	STACK-007 VERY HIGH CELL VOLTAGE - HH - PCA-007	1	TO PLC			
PCA-008	VAHH-008 (ISO22)	2.3	V/cell	IP1	STACK-008 VERY HIGH CELL VOLTAGE - HH - PCA-008	1	TO PLC			
REC-001	VAHH-101 (C63)	1023	V	IP1	REC-001 VERY HIGH VOLTAGE - HH - VM-101	1	COM			
REC-002	VAHH-102 (C63)	1023	V	IP1	REC-002 VERY HIGH VOLTAGE - HH - VM-102	1	COM			
PCA-001	VAL-001 (ISO22)	1.55	V/cell	IP9	STACK-001 LOW CELL VOLTAGE - L - PCA-001	1	TO PLC			
PCA-002	VAL-002 (ISO22)	1.55	V/cell	IP9	STACK-002 LOW CELL VOLTAGE - L - PCA-002	1	TO PLC			
PCA-003	VAL-003 (ISO22)	1.55	V/cell	IP9	STACK-003 LOW CELL VOLTAGE - L - PCA-003	1	TO PLC			
PCA-004	VAL-004 (ISO22)	1.55	V/cell	IP9	STACK-004 LOW CELL VOLTAGE - L - PCA-004	1	TO PLC			
PCA-005	VAL-005 (ISO22)	1.55	V/cell	IP9	STACK-005 LOW CELL VOLTAGE - L - PCA-005	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PCA-006	VAL-006 (ISO22)	1.55	V/cell	IP9	STACK-006 LOW CELL VOLTAGE - L - PCA-006	1	TO PLC			
PCA-007	VAL-007 (ISO22)	1.55	V/cell	IP9	STACK-007 LOW CELL VOLTAGE - L - PCA-007	1	TO PLC			
PCA-008	VAL-008 (ISO22)	1.55	V/cell	IP9	STACK-008 LOW CELL VOLTAGE - L - PCA-008	1	TO PLC			
PCA-001	VALL-001 (ISO22)	1.5	V/cell	IP1	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001	1	TO PLC			
PCA-002	VALL-002 (ISO22)	1.5	V/cell	IP1	STACK-002 VERY LOW CELL VOLTAGE - LL - PCA-002	1	TO PLC			
PCA-003	VALL-003 (ISO22)	1.5	V/cell	IP1	STACK-003 VERY LOW CELL VOLTAGE - LL - PCA-003	1	TO PLC			
PCA-004	VALL-004 (ISO22)	1.5	V/cell	IP1	STACK-004 VERY LOW CELL VOLTAGE - LL - PCA-004	1	TO PLC			
PCA-005	VALL-005 (ISO22)	1.5	V/cell	IP1	STACK-005 VERY LOW CELL VOLTAGE - LL - PCA-005	1	TO PLC			
PCA-006	VALL-006 (ISO22)	1.5	V/cell	IP1	STACK-006 VERY LOW CELL VOLTAGE - LL - PCA-006	1	TO PLC			
PCA-008	VALL-008 (ISO22)	1.5	V/cell	IP1	STACK-008 VERY LOW CELL VOLTAGE - LL - PCA-008	1	TO PLC			
PCA-001	VCA-001 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-001 - PCA-001	1	TO PLC			
PCA-002	VCA-002 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-002 - PCA-002	1	TO PLC			
PCA-003	VCA-003 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-003 - PCA-003	1	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
PCA-004	VCA-004 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-004 - PCA-004	1	TO PLC			
PCA-005	VCA-005 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-005 - PCA-005	1	TO PLC			
PCA-006	VCA-006 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-006 - PCA-006	1	TO PLC			
PCA-007	VCA-007 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-007 - PCA-007	1	TO PLC			
PCA-008	VCA-008 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-008 - PCA-008	1	TO PLC			
PCA-001	VKA-001 (ISO22)	10	%	IP1	STACK-001 VOLTAGE DROP - PCA-001 - DROP	0	TO PLC			
PCA-002	VKA-002 (ISO22)	10	%	IP1	STACK-002 VOLTAGE DROP - PCA-002 - DROP	0	TO PLC			
PCA-003	VKA-003 (ISO22)	10	%	IP1	STACK-003 VOLTAGE DROP - PCA-003 - DROP	0	TO PLC			
PCA-004	VKA-004 (ISO22)	10	%	IP1	STACK-004 VOLTAGE DROP - PCA-004 - DROP	0	TO PLC			
PCA-005	VKA-005 (ISO22)	10	%	IP1	STACK-005 VOLTAGE DROP - PCA-005 - DROP	0	TO PLC			
PCA-006	VKA-006 (ISO22)	10	%	IP1	STACK-006 VOLTAGE DROP - PCA-006 - DROP	0	TO PLC			
PCA-007	VKA-007 (ISO22)	10	%	IP1	STACK-007 VOLTAGE DROP - PCA-007 - DROP	0	TO PLC			
PCA-008	VKA-008 (ISO22)	10	%	IP1	STACK-008 VOLTAGE DROP - PCA-008 - DROP	0	TO PLC			

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Refer to "as-tested" sets of Alarm List and Set-point list, attached at the end of this report

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
VM-001	VQAHH-001 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-001 AND VM-001 - HH	5	TO PLC			
VM-002	VQAHH-002 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-002 AND VM-002 - HH	5	TO PLC			
VM-003	VQAHH-003 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-003 AND VM-003 - HH	5	TO PLC			
VM-004	VQAHH-004 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-004 AND VM-004 - HH	5	TO PLC			
VM-005	VQAHH-005 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-005 AND VM-005 - HH	5	TO PLC			
VM-006	VQAHH-006 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-006 AND VM-006 - HH	5	TO PLC			
VM-007	VQAHH-007 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-007 AND VM-007 - HH	5	TO PLC			
VM-008	VQAHH-008 (ISO22)	12.2	V	IP1	VOLTAGE DEVIATION BETWEEN PCA-008 AND VM-008 - HH	5	TO PLC			
CT-600	YAH-600 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT600 - H	5	TO PLC			
CT-620	YAH-620 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT620 - H	5	TO PLC			
CT-600	YAHH-600 (ISO22)	1	µS/cm	IP1	VERY HIGH CONDUCTIVITY CT600 - HH	5	TO PLC			
CT-600	YALL-600 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT600	5	TO PLC			
CT-620	YALL-620 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT620	5	TO PLC			

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Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group	Completed By	Witnessed By	Date
VAR-300A	SCA-300A (C63)	-	-	IP17	ERROR VSD LP-300A - ERR - VAR-300A	1	TO PLC			
VAR-300B	SCA-300B (C63)	-	-	IP17	ERROR VSD LP-300B - ERR - VAR-300B	1	TO PLC			
VAR-600A	SCA-600A	-	-	IP6	ERROR VSD CP-600A - ERR - VAR-600A	1	TO PLC			
VAR-600B	SCA-600B	-	-	IP6	ERROR VSD CP-600B - ERR - VAR-600B	1	TO PLC			
VAR-620A	SCA-620A	-	-	IP5	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC			
VAR-620B	SCA-620B	-	-	IP5	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC			
PT-633	PKA-633 (C63)	-7	barg/s	IS2	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633	0	TO PLC			

8. Simulation Tests

This section is performed straight after the Basic Function Testing described in the document C063-ELO-PRO-CO-0003 - BLPH Electrolyser Pre-Commissioning Manual. In this section, all complex loops and functional sequences are tested with simulated inputs to validate their correct implementation and physical actions.

8.1 Control Loop & Basic Sequences

The method statement is described in the document C063-ELO-PRO-CO-0002 - BLPH Electrolyser CSU Method Statement at the chapter “6.6.7 Multi Loop or Complex Loop Item”. All functions referring to the HVAC System referred here are tested through HVAC SAT Procedure (See C63-PAU-SAT-001).

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	Function - Description	Completed by	Witnessed by	Date	Comment
Regulation Functions	R-CC-200 – 45°C Cooling Loop Control				
	R-CC-200 – 45°C Cooling Loop Control				
	R-CC-201 – 45°C Cooling Loop Control				
	R-CC-400 – H2 gas cooling loop control				
	R-CC-401 – O2 gas cooling loop control				
	R-DPC-001 – Delta Pressure H2/O2 control				
	R-DPC-101 – Delta Pressure H2/O2 control (STANDBY)				
	R-FC-300 – Water purification recirculation				
	R-FC-600 – Oxygen pump setpoint control				
	R-FC-601 – Pure water recirculation (anodic loop)				
	R-FC-620 – Hydrogen pump setpoint control				
	R-FC-621 – Pure water recirculation (cathodic loop)				
	R-LC-300 – PWT-300 water level control.				
	R-LC-600 – ST-600 Water Level Control (Direct Injection)				
	R-LC-610 – CS-610 water level control				
	R-LC-620 – ST-620 Water Level Control (Direct balancing)				
	R-LC-630 – CS-630 water level control				
	R-LC-642 – DG-640 Hydrogen Purge				
	R-LC-500 – Water Level Control of H_2 vent condensates				
	LSLL-500 Very Low Level in H2 Vent Drain				
	LSHH-500 Very High Level in H2 Vent Drain				
	R-PC-150 – Instrument air Pressure Control Loop				

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	Function - Description	Completed by	Witnessed by	Date	Comment
	R-PC-610 – Pressure Control Oxygen Loop				
	R-PC-611 – O2 separator under pressure				
	R-PC-630 – Pressure Control Hydrogen Loop				
	R-PC-631 – H2 separator under pressure				
	R-PC-950 – Regular inerting against air ingress.				
	R-QC-800 – H2 Quality Control				
	R-REC-001 – Rectifier setting current.				
	R-REC-002 – Adjustment of flowrate setpoint in case of WC-400/401 failure				
	R-TC-600 – O2 Water Temperature Control Loop				
	R-TC-601 – O2 & H2 water loop antifreeze				
	R-TC-700 – Hydrogen heating before Deoxo				
	R-TC-1000 – Air extraction & ambient temperature control loop				
Depressurisation	S-PC-610 – O2 Depressurisation				
	S-SPC-610 – O2 Safety Depressurisation				
	S-PC-630 – H2 Depressurisation				
	S-SPC-630 – H2 Safety Depressurisation				
Inerting Sequences	S-FC-900 – O2 Line Inerting				
	S-SFC-900 – Safety O2 line inerting				
	S-FC-920 – H2 Line Inerting				
	S-SFC-920 – Safety H2 line inerting				
	S-PUR-00x – Hydrogen purification unit				
	S-PUR-002 – SEQ 1: Adsorption tower A & regeneration (heating) tower B				

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	Function - Description	Completed by	Witnessed by	Date	Comment
Hydrogen Purification Sequences	S-PUR-003 – SEQ 2: Adsorption tower A & regeneration (cooling) tower B				
	S-PUR-004 – SEQ 3: Adsorption tower B & regeneration (heating) tower A				
	S-PUR-005 – SEQ 4: Adsorption tower B & regeneration (cooling) tower A				
	S-PUR-006 – Condensate sub program				
Rectifier Control	S-REC-001 – Stack polarization				
	S-REC-002 – Rectifier: setting current				
	S-REC-003 – Stop rectifier (decreasing current)				
	S-REC-004 – Rectifier going to Standby from Start (decreasing current)				
Others	S-FC-001 – Start Circulation Pump				
	S-LC-300 – Automatic Filling of PWT-300				
	S-LC-600 – Automatic Filling of ST-600				
	S-LC-620 – Automatic Filling of ST-620				

Refer to Software FAT report, attached at the end of this report

8.2 Operating Sequences

By simulating values, the sequences simulation tests allow the ensure the correct implementation of all steps to ensure a smooth Start-Up.

	Function - Description	Completed By	Witnessed By	Date	Comment
Sequences Functions	S-A0-001 – NO MODE leaving				
	S-F5-001 – MAINTENANCE in progress (from STOP and NO MODE)				
	S-D2-001 – SAFETY in progress (from ALL STATES)				
	S-B0-001 – STOP in progress (from NO MODE or MAINTENANCE)				

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	Function - Description	Completed By	Witnessed By	Date	Comment
	S-A5-001 – STOP in progress (from START/STANDBY/IDLE states)				
	S-A11-001 – IDLE in progress (from STOP)				
	S-A4-001 – IDLE in progress (from STANDBY)				
	S-A7-001 – IDLE in progress (from START)				
	S-A9-001 – STANDBY in progress (from STOP)				
	S-A8-001 – STANDBY in progress (from IDLE)				
	S-A6-001 – STANDBY in progress (from START)				
	S-A10-001 – STANDBY depress. in progress (from STANDBY press.)				
	S-A12-001 – IDLE in progress (from STANDBY press.)				
	S-F2-001 – START in progress (from STOP)				
	S-F3-001 – START in progress (from STANDBY)				
	S-F4-001 – START in progress (from IDLE)				
	S-F6-001 – START in progress (from STANDBY press.)				

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9. Flushing, N2 Purging & Leak Test

Once all simulation tests of process and safety loops and sequences have been tested, the pre-start-up activities can take place. The first operation to take place is the flushing. This following chapter provides material list, conditions and detailed method statement for a safe and efficient flushing of both Water/H2 Loop and Water/O2 prior to the unit start-up. The goal is to reach the necessary conductivity specification to ensure a successful unit start-up and to protect the stacks integrity. During this flushing operation, Nitrogen purging is done because the presence of ambient air can affect the conductivity. Also, the first final Leak test is performed without the stacks and then with the stacks connected only in dynamic.

This specific flushing activity is not a classic flushing activity taking place during the end of construction activities. Indeed, mechanical equipment cleaning and piping cleaning by blowing or flushing have been performed prior to the Mechanical Completion. This operation is a commissioning activity due to the livening up of 56-03 WTP System and both 600 and 620 loops included in 25-11 sub-system.

9.1 Conditions

The flushing can be performed when the mechanical completion certificate for the subsystem has been signed by all parties and after the Pre-Commissioning activities:

- The piping has been tested, cleaned, dried and is free of rust before the instruments and valves are fitted.
- The equipments have been cleaned and permanently closed.
- The reinstatement as per P&ID is completed with all piping, equipment, valves and instruments installed and oriented in the correct direction.
- The equipment, valves and instruments have been visually checked and are free of any damage.
- All Punchlist that does not require the system to be reopened are cleared.
- 25-11 Subsystem Mechanical Completion Certificate has been signed.
- The Gross Leak Test has been performed and forms signed by all parties.
- Vent lines are operational.
- Electrical cabinet / Control System is operational (tested and energized).
- Stacks bypasses are installed.
- Valves & Instruments Loop Testing on the systems has been completed; All valves & instruments are operational.
- Alarms & Trips (Process & Safety Interlocks) relevant to the systems have been tested.
- Pump CP-600A / CP-600B / CP-620A / CP-620B are ready for Start-Up.
- 56-03 Subsystem WTP is operational with feed water availability and pumps LP300A/B ready for start-up.
- If there is no feed water, provide IBC tank of water.
- Nitrogen Purging is operational.
- The system 25-11 is pressurized with around 200 mbarg of positive pressure with Nitrogen.
- A Nitrogen Purging shall be achieved in case the system is not preserved with Nitrogen.
- Select maintenance mode on the HMI.
- All necessary tools for the operation are available.
- All relevant documentation is available in the latest revision.

9.2 Safety

These defining rules shall be applied from the initial (total or partial) energizing of the instrumented systems, until the end of the commissioning activities.

- Appropriate PPE must be always worn during the operation.

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- A permit to work has been delivered.
- No equipment will be definitively energized without the subsystem Mechanical Completion.
- The piping under pressure is clearly identified

Safety rules in accordance with the risk must be applied (e.g. Fluids, Pressure, Electrical Power, etc.).
Risk assessment must be done prior to any test activity.

9.3 Prerequisites

9.3.1 Required Equipments

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches…
- Portable Conductivity meter
- Portable O2 meter
- Flexible for Stack Bypass
- Field telephone or Walkie-Talkie
- Empty IBC Tank (to route the used water from flushing)
- If water is not available: IBC tank of soft water.
- Spare gasket for F-600 and F-620.
- N2/H2 bottle rack mix for Leak Test.

All equipment used must have a serial number and a valid calibration certificate (if applicable).
Soft water quantity and specifications must be as followed:

- For the first fill-in: 2m3
- For the flushing: between 6 and 14 m3 (depending on pipe condition)

For the type of water, the specifications must be as followed:

- Conductivity: Conductivity <703 µS/cm
- TOC (total organic carbon) <3 mg/l
- SDI (Fouling index) <3
- Free chlorine, Total chlorine <0.5 mg/l
- Average Flow Rate: 0.81m3/h
- Pressure: 4-6 barg
- Temperature: 10-35 °C

9.3.2 Required Documents

- This procedure is approved for use.
- Set of PIDs at the last revision.
- Subsystem Mechanical Completion Certificate including the loop signed by all parties.
- Permit To Work delivered and signed.
- Simulation Tests, Cause & Effects Tests completed. (Chapter 7 & 8 inside this procedure)
- N2 Distribution Test completed. (Chapter 5 inside this procedure)

9.3.3 Manpower (Indicative)

- 1 Elogen Automation Engineer
- 1 Elogen Commissioning Engineer (Responsible for the Operation)
- 1 E&I Supervisor
- 2 Helpers (pipefitter)
- 1 LOTO supervisor

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9.4 Flushing Operation of Anode Water Loop / O2 Production

Steps	Description	Completed By	Witnessed By	Date
01	Line Up the valves as per the P&ID Mark Up (See Appendix for Anode Water Loop / O2 Production Flushing P&ID Mark Up): For Water Injection: Check that HV-300, HV-301A, HV-302A, PV-300 are open. Check that the 3ways valve (3WV-320) is open towards the separator tank for the oxygen loop (ST600). Remove the nozzle plate from FH-600. → Non. The system is ready to receive pure water from WTP system. Note: as per the design of WTP, it cannot receive tap water to produce pure water as per its specification. There is no softener in WTP package, so a temporary softener should be used upstream of WTP. RM WTP used. For Venting: Check that HV-615, MPV-611 are open. Check that PV-610 is closed. The system is connected to the O2 Vent during the filling. The system has been inerted with Nitrogen during Nitrogen Service Test. At this stage 8% O2 is acceptable for a good preservation. Check the O2 % at PT-612 vent with a portable O2 meter. → Accès difficile à détecter. Complexité HSE de faire remonter son If O2 is more than 8%, perform a Nitrogen purging by opening PV-900. Also put the following valves in the indicated position: Check that HV-600D, HV-600DA, HV-600DB, HV-601D, HV-602DA, HV-603D, PV-640 are closed. Check that HV-600, HV-600A, HV-600B, HV-601A, HV-601B, HV-602A, HV-603A, HV-604 and HV-605 are open.	Start 13/03 bullage avec Alan de 'sam. MLB		13/03
02	Check the feed water conductivity from WTP measurement. Conductivity measured shall be below 0.1 µS/cm. Record the conductivity value on the Flushing Report.	0,068 µS		13/03

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03	Start the LP-300A in MANUAL mode. Check that there is no overflow by listening to the pump noise and by checking the pump curve versus the actual pressures (WTP outlet Pressure and PI-300). Fill ST-600 and all piping with water until approximately the middle of tank. ✓ During the filling, verify that the air is vented from all dead volumes as much as possible. If needed open some vent to make sure no air below the water level in the ST-600. Monitor ST-600 level on LT-600 during the filling.	Marque d'eau - 13/03. MLE		13/03
04	Stop LP-300A as soon as the alarm LAH-600 is triggered. ?	MLE		13/03
05	**Start CP-600A at minimum speed** and flush the loop pipes. Check that there is no overflow by listening to the pump noise. If necessary, check the pump curve versus the actual pressures. Slightly close partially the outlet valve HV-603A to create a slight pressure loss if necessary. Check the level on LT-600 at the CP-600A start-up. Fill ST-600 with water when the level will decrease (due to the discharge lines filling near HE-600 heat exchanger). + bump test + 60s for check Marq. eau + 300s for avoid air in pipes.	MLE		13/03
06	Monitor the conductivity on the CT/P-600 during the pipes flushing. Record the initial value on the Flushing Report. Check in F-600 if any dirt has been be collected. The goal is to reach a conductivity below **0.5 µS/cm** at the end of the operation.	MLE		08/04
07	If necessary, perform conductivity measurements at different purge points. Drain slightly a part of the used water through HV-602DA & HV-602DB, route the used water flow to an empty IBC tank and fill slowly with fresh water. Repeat this operation until the required conductivity in the loop is reached ($\sigma < 0.5\mu S/cm$). Once the conductivity is reached, check that the conductivity measurements are stable.	MLE		08/04
08	Proceed to the flushing by switching to **CP-600B.** Once the conductivity is reached ($\sigma < 0.5\mu S/cm$), check that the conductivity measurements are stable. Fill the Flushing Report.	MLE		08/04.

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09	Stop the operation for at least 12h.	MLE		08/04
10	Recheck all conductivity measurements after 12h the ensure σ < 0.5µS/cm. Proceed to a flushing (Steps 05-08) or troubleshooting if the conductivity is not OK.	MLE		08/04.
11	Fill the FH-600 with Resin (check the Resin Filling in section 9.)	MLE		08/04
12	Fill the system with water until conditions described in Step 03 Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.	MLE		09/04.
13	Start the pump CP-600A or CP-600B and flush the water loop again with the resin filled in the FH-600. Check in F-600 if any dirt or resin has been collected. If resin is collected, do some troubleshooting at the FH. The goal is to reach a conductivity below **0.1 µS/cm** at the end of the operation. Fill the Flushing Report.	MLE		09/04 -
14	Perform the Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up (Leak Test Pack 01) in Appendix: Pure water is left in place and a mix of N2/H2 is injected till 11.7 barg through HV-902. Follow the methodology explained in the Leak Test chapter in the Method Statement. Do a precise leak check with the H2 sniffer. Fill the Leak Test ITR.	FMO	NG	10/04

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9.5 Flushing Operation of Cathode Water Loop / H2 Production

Steps	Description	Completed By	Witnessed By	Date
01	Line Up the valves as per the P&ID Mark Up (See Appendix for Cathode Water Loop / H2 Production Flushing P&ID Mark Up): For Water Injection: Check that HV-300, HV-301B, HV-302B are open. ✓ Check that the 3ways valve (3WV-320) is open towards the separator tank for the hydrogen loop (ST620). ✓ Remove the nozzle plate from FH-620. The system is ready to receive pure water from WTP system. ✓ Note: as per the design of WTP, it cannot receive tap water to produce the pure water as per its specification. There is no softener in WTP package, so a temporary softener should be used upstream of WTP. ✓ For Venting: Check that PV-631, PV-642 are open. ✓ The system is connected to the H2 Vent during the filling. ✓ The system has been inerted with Nitrogen during Nitrogen Service Test. ✓ At this stage 8% O2 is acceptable for a good preservation. ✓ Check the O2 % at PT-632 vent with a portable O2 meter. ✓ If O2 is more than 8%, perform a Nitrogen purging by opening PV-920. ✓ Also put the following valves in the indicated position: Check that HV-620D, HV-620DA, HV-620DB, HV-621D, HV-622D, PV-600, PV-620, PV640, PV-641 are closed. ✓ Check that HV-620, HV-620A, HV-620B, HV-621A, HV-621B, HV-622, HV-623, HV-624, MV-640 are open. ✓	MOUFOUMA N.	PACCETTI	11/03/25
02	Check the feed water conductivity from WTP measurement. Conductivity measured shall be below 0.1 µS/cm. Record the conductivity value on the Flushing Report.	MOUFOUMA N.	PACCETTI	11/03/25

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03	Start the LP-300B in MANUEL mode. ✓ Check that there is no overflow by listening to the pump noise and by checking the pump curve versus the actual pressures (WTP outlet Pressure and PI-300). ✓ Fill ST-620 and all piping with water until approximately the middle of tank. ✓ During the filling, verify that the air is vented from all dead volumes as much as possible. ✓ If needed open some vent to make sure no air below the water level in the ST-620. ✓ Monitor ST-620 level on LT-620 during the filling. ✓	MOUFOUMA NG	PAOLETTI	11/03/25
04	Stop LP-300B as soon as the alarm LAH-620 is triggered & Close to the vent by closing PV-631. ✓	MOUFOUMA NG	PAOLETTI	11/03/25
05	Start **CP-620A at minimum speed** and flush the loop pipes. ✓ Check that there is no overflow by listening to the pump noise. ✓ If necessary, check the pump curve versus the actual pressures. ✓ Slightly close partially the outlet valves HV-622 to create a slight pressure loss if necessary. ✓ Check the level on LT-620 at the CP-620A start-up. Fill ST-620 with water when the level will decrease. ✓	MOUFOUMA NG	PAOLETTI	11/03/25
06	Monitor the conductivity on the CT/P-620 during the pipes flushing. Record the initial value on the Flushing Report. 3.5µS Check in F-620 if any dirt or resin have been collected. The goal is to reach a conductivity below **0.5 µS/cm** at the end of the operation.	MOUFOUMA NG	PAOLETTI	13/03/25
07	If necessary, perform conductivity measurements at different purge points. Drain slightly a part of the used water through HV-621D, route the used water flow to an empty IBC tank and fill slowly with fresh water. Repeat this operation until the required conductivity in the loop is reached (σ < 0.5µS/cm). Once the conductivity is reached, check that the conductivity measurements are stable.	MOUFOUMA NG	PAOLETTI	04/04/25
08	Proceed to the flushing by switching to **CP-620B.** Once the conductivity is reached (σ < 0.5µS/cm), check that the conductivity measurements are stable. Fill the Flushing Report.	MOUFOUMA NG	PAOLETTI	05/04/25

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09	The next step is to flush the DG-640: Check that PV-642 is open for DG-640 venting purposes. ✓ Check that PRV-640 is fully open. ✓ HV-640D is ready to be used for draining purposes. ✓ Open PV-640 & then open slowly MV-640 to avoid a sudden pressure drop at the CP-620A Pump outlet. ✓ Fill with water when ST-620 level is decreasing excessively during the DG-640 flushing. ✓ The alarm LAL-620 can be used as an indication to top up with water in ST-620. ✓ Overflow at FT-620 can lead to a trip. ✓ Pressurize slightly ST-620 with N2. ✓	FMo	PAOLOTTI	04/04
10	Purge also DG-640 with N2 by opening HV-640, HV-641 then by opening slowly MV-941. While opening MV-941, check that flow doesn't exceed 700 NL/h on FI-940. Once conditions of flushing are stable, close PV-642, HV-640 and ~~HV-641~~ n'existe pas HV-642 Keep MV-941 at the same position for further inerting purposes.	FMo	PAOLOTTI	05/04
11	Monitor the conductivity with a portable conductivity meter on the sampling point HV-640D.	FMo		05/04.
12	Recheck all conductivity measurements after 12h the ensure $\sigma < 0.5\mu S/cm$. Proceed to a flushing (Steps 05-08) or troubleshooting if the conductivity is not OK. Check again in F-620 if any dirt or resin has been collected. Fill the Flushing Report.	FMo		08/04.
13	Fill the FH-620 with Resin (check the Resin Filling in section 9.)	MLE		08/04
14	Fill the system with water until conditions described in Step 03 Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.	MLE		08/04
15	Start the pump CP-620A or CP-620B and flush the water loop again with the resin filled in the FH-620. The goal is to reach a conductivity below **0.1 µS/cm** at the end of the operation. Check in F-620 if any dirt or resin has been collected. If resin is collected, do some troubleshooting at the FH. Fill the Flushing Report.	MLE		09/04.

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16	Perform the Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up (Leak Test Pack 02) in Appendix: Purge HPP with H2/N2 by opening MV-632 in the beginning. Pure water is left in place and a mix of N2/H2 is injected till 32.4 barg through HV-922. Follow the methodology explained in the Leak Test chapter in the Method Statement. Do a precise leak check with the H2 sniffer. Fill the Leak Test ITR.	FMO	11/04	11/04 NC

9.6 Flushing with Stacks

Steps	Description	Completed By	Witnessed By	Date
01	Install the Stacks (check the Stack Installation in section 10.)	FMO		14/04
Important Note: At this stage, H2/Water Loop Pressure should remain always higher than O2/Water Loop Pressure at all times.				
02	Perform a Nitrogen purging to remove the Oxygen. At this stage 8% O2 is acceptable for a good preservation.	FMO		14/04
03	Pressurize with N2 the H2/Water Loop with 2 barg and the O2/Water Loop with 200 mbarg. Note: Each Stack sides are permeable to water.	FMO		14/04
04	Start the pumps CP-600A & CP-620A or CP-600B & CP-620B at their normal speed and flush the water loop again with the resin filled in the FH-600 & FH-620 and all the stacks installed. Monitor carefully the pressure. If necessary, inject N2 to H2/Water Loop to keep the pressure higher than O2/Water Loop Pressure. The goal is to reach a conductivity below **0.1 µS/cm in both sides** at the end of the operation. Fill the Flushing Report. Keep the same pressures in both sides systems. Next step is described in chapter 11.	FMO		14/04

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10. Resin Installation

This following section gives the requirements and steps for the insertion of the resin in the filters housing FH-600 and FH-620. The acceptance criteria for this activity are the conductivity measurement to be kept under 0.5µS/cm on both loops after the flushing with resin. It ensures a good particles and ions adsorption.

10.1 Pre-requisites

This operation is performed straight after the flushing, therefore the Flushing Report this procedure steps for 7. Flushing has been completed and filled out.

10.1.1 Required Equipments

- Toolboxes: screwdrivers, spanners, pliers, wrenches, pipe wrenches...
- Field telephone or Walkie-Talkie
- 1 clean shovel for Resin loading
- 3 flange gaskets for RS-603A 6" (DN150)
- 3 EPDM gaskets (815ID/875OD) for FH-600
- 3 EPDM gaskets (750ID/810OD) for FH-600
- 3 flange gaskets for FH-600 cover 36"150# (DN900)
- 3 flange gaskets for RS-622 4" (DN100)
- 3 EPDM gaskets (505ID/565OD) for FH-620
- 3 EPDM gaskets (440ID/500OD) for FH-620
- 3 flange gaskets for FH-620 cover 24" 300# (DN600)
- 508 L of IRN160 Amberlite resin
- 158 L of IRN160 Amberlite resin.
- 1 torque wrench (range up to 2700 Nm)
- 1 sling to install the nozzle plate
- Keys for the hand valves padlocks
- Fitting hoses for FH drain valves (HV-602DA and HV-621D)
- Empty IBC Tank (to route the water from FH section)
- 1 Allen key

All equipment used must have a serial number and a valid calibration certificate (if applicable).

10.1.2 Required Documents

- Flushing Procedures
- Filter housing datasheet
- This procedure is approved for use
- Set of PIDs at the last revision
- Subsystem RFC Certificate signed by all parties
- Permit To Work delivered and signed

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10.1.3 Manpower (Indicative)

- 1 Elogen Commissioning Engineer
- 2 Mechanical Supervisor
- 2 Helpers (pipefitter)
- 1 LOTO supervisor

The resin filling activities are under the responsibility of the Commissioning Engineer.

10.1.4 Duration

The duration of the activities is 1 day per FH.

10.2 Safety

Main risks during the operation are:

- Slippery floor risk
- Chemical Risks (cf. SDS IRN160 amberlite)
- Heavy load

10.3 Resin Filling Operation

The following procedure is for the FH-600. Same steps are applicable to perform the FH-620 filling. The corresponding tags for FH-620 filling are indicated in brackets.

Blue FH600 Red - FH620

Steps	Description	Completed By	Witnessed By	Date
01	Isolate the FH-600 (FH-620): remove the padlocks (if present) from the HV-602A (HV-621A and HV-621B) and HV-603A (HV-622). Close these FH upstream and downstream valves.		MLE/MLE	08/04 08/04
02	Connect a hose to FH-600 (FH-620) section to drain valve HV-602DA (HV-621D).		MLE/MLE	08/04 08/04
03	Remove the padlock from the HV-602DA (HV-621D) (if present).		MLE/MLE	08/04 08/04
03	Then, open the HV-602DA (HV-621D) to drain the FH-600 (FH-620).		MLE/MLE	08/04 08/04
06	Once the water draining is completed, close HV-602DA (HV-621D) and put the padlock at its original place.		MLE/MLE	08/04 08/04
07	To remove the FH cover, unscrew the flanges at both ends of the removable pipe section RS-603A (RS-622) and remove it. Unscrew the bolts of the FH cover on the top. Turn the cover by using the mounting arm.		MLE/MLE Voir plus.	08/04 08/04
08	Prepare the upper nozzle plate by placing it on a clean and flat surface ready to be installed.		MLE/MLE	08/04 08/04

on peut utiliser les tuyaux, à placer sur le côté.

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09	Fill the housing with resin: for this, use the shovel. 10 cm to the top.		MLE/MLE	08/04
10	Put the upper nozzle plate at its position and tighten to indicated torque with the torque wrench. Be careful with the EPDM Gasket: it must be installed properly without any damage & proper bolt tightening. Otherwise, that affects the integrity of the resin bed.		MLE/MLE	08/04
11	Replace the original flange gasket of the cover with a new one (if necessary).		MLE/MLE	08/04
12	Put the FH cover on the FH. Screw the cover bolts and tighten to a proper torque using the torque wrench. 600 N.m		MLE/MLE.	08/04
13	Put the removable pipe section RS-603A (RS-622) at its original position.		MLE/MLE.	08/04
14	If necessary, replace the original flange gaskets with a new one.		MLE/MLE	08/04
15	Check that all the drain valves are in their original position like it was before the operation.		MLE/MLE	08/04
16	Open the isolating valves HV-602A (HV-621A and HV-621B) and HV-603A (HV-622).		MLE/MLE	08/04
17	Reinstall all the padlocks on all valves.		NA/NA	08/04
18	Perform several cycles of flushing, until obtaining a compliant conductivity (0.1µS/cm on both loops) by following the procedure steps in the section 8. Check in F-600 & F-620 if any resin has been collected	NO	MLE / FMO	09/04 10/04
19	Clean and tidy up the equipment.	MLE./MLE	MLE. /MLE	15/04 15/04

Tight 09/04 - Tight 09/04.

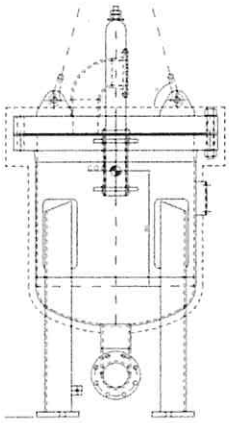


Figure 3. FH-600

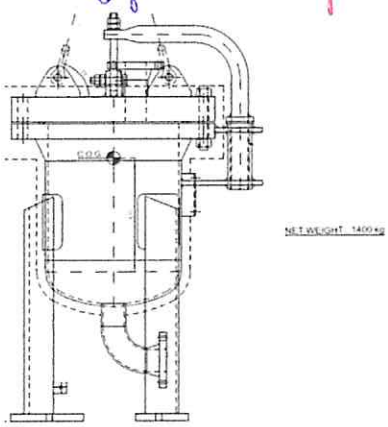


Figure 4. FH-620

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11. Stack Connection

This following section gives the requirements and steps for the stack's installation.

11.1Pre-requisites

This operation is performed after both loops flushing with resin. At this stage, the stacks are already in place and connected electrically with all its instrumentation. The goal is to connect it mechanically to the unit.

11.1.1 Required Equipments

- Torque wrench
- Valve padlocks
- Flexible for draining
- 32 Gaskets Kempchen DN50 PN40
- 192 screw, nuts M16 lg 90 A4

11.1.2 Required Documents

- This procedure is approved for use
- Set of PIDs at the last revision
- Subsystem RFC Certificate signed by all parties
- Permit To Work delivered and signed

11.1.3 Manpower (Indicative)

- 1 Elogen Commissioning Engineer
- 2 Mechanical Supervisor
- 1 Electrician
- 2 Helpers (pipefitter)
- 1 LOTO supervisor

The stacks connection activities are under the responsibility of the Commissioning Engineer.

11.1.4 Duration

The duration of the activities is 0.5 to 1 day per Stack.

11.2 Safety

Main risks during the operation are:

- Slippery floor risk
- Electrical Risks
- Mechanical Risks / Heavy load
- Necessary LOTO for electrical and mechanical must be done

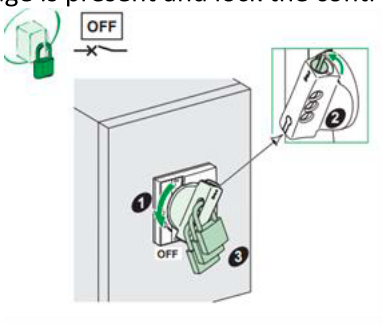
11.3 Stack Connection

The 8 stacks required for electrolysis to produce hydrogen are installed in the electrolyser.

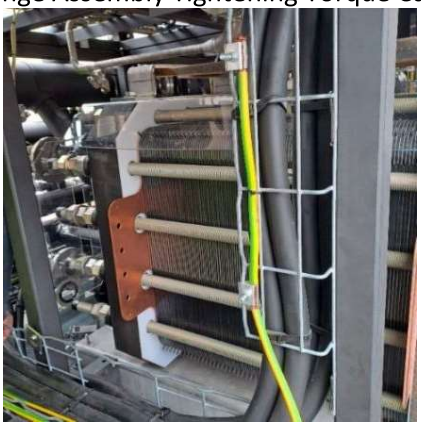
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All Electrical wiring & Instrumentation are connected
Follow the following Steps to connect the stacks mechanically:

- Check that the unit is stopped via the HMI and switch to maintenance mode.
- Check especially that the pumps CP-600A/B and CP-620A/B are switched off and close 3WV-320 valve.
- Check that the power cables to the stacks are not energized:
    - To isolate the 400Vac, open the circuit-breaker and align the handle with the OFF position.
    - Fit padlocks like in the illustration below.
    - Attach a lockout work card.
    - Check with a VAT that no voltage is present and lock the electrical cabinet.
    - Use a VAT to check that no voltage is present and lock the control cabinet.



- Isolate and drain the stacks section to prepare the installation:
    - Close HV-623, HV-624, HV-604, HV-605
    - Open HV-602D and HV-623D to drain the water
    - Remove the flexible
- If Stacks are preserved with pure water, remove the plugs and drain the water to an IBC tank.
- Place the flexible flanges on the stacks and put protection to preserve them from the outside.
- At this stage E&I Mechanical Completion must be completed (PCA, VM, Ground, EXT, DC Power cables, must all be connected). If not connect them at this step.
- Also, E&I Pre-Commissioning must be completed (PCA, VM, Ground, EXT, DC Power cables, must all be tested). If not, proceed to all tests and fill the relevant ITRs (if any).
- Connect the stacks to the manifold, then tighten to 120 N.m (staggered).
  Caution: Confirm torque value with Flange Assembly Tightening Torque Calculation Note



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- Repeat the previous steps to install stacks 2, 3....
- Protect the bipolar plates of each stack with their dedicated Plexiglas protection panels if not already done.
- Open the stacks' isolation valves once the assembly of the stacks is complete.
- Perform several cycles of flushing, until obtaining a compliant conductivity (0.1µS/cm on both loops) by following the procedure steps in the section 8.6

12. Pre-Start-Up Operations

In this section, a check is made on all Cold Operations that have been performed to make the Unit ready for the Start-Up as described in the following document: C063-ELO-PRO-CO-0005 - BLPH Electrolyser Operational Test Procedure.

- All Simulations Tests have been performed (as per chapter 7.)
- All Causes & Effects Tests have been performed (as per chapter 6.)
- Resin & Stacks are properly installed.
- Nitrogen Purging to 3% O2 have been done.
- Final Flushing below 0.1 µS/cm have been performed.
- All containers and ambient items have been tested.
- Fire & Gas detection is operational.
- HVAC Glycol Loop System is operational. PC&C & Start-Up performed by Vendor.
- Transformers & Rectifiers are not energized.
- H2/Water Loop is pressurized at around 2barg > O2/Water Loop at around 200mbarg.

Not available OTP see

Steps	Description	Completed By	Witnessed By	Date
01	Perform the Final Leak Test at 90% of PSV Pressure by using the P&ID Mark-Up in Appendix: - First Pressurize gradually the Leak Test Pack 02 at 32.4 barg using an N2/H2 mix as per step 16 in chapter 9.5. HPP must be purged with N2/H2 by opening MV-632 at the beginning. - After & Only After: Pressurize the Leak Test Pack 01 at 11.7 barg by keeping the pressure in the Leak Test Pack 02 using an N2/H2 mix as per step 14 in chapter 9.4 Stacks are not waterproof, therefore, there is a natural pressure transfer from the H2/Water loop system to the O2/Water loop system. Do only a precise leak check in dynamic with the H2 sniffer: pressure holding for 1h is not applicable. Inject N2/H2 into H2/Water side if needed to hold the pressure. Vent N2/H2 from O2/Water side if the pressure increases. Fill the Leak Test ITR & Hold the pressure for the next step.			
02	Set the N2 pressure at 30 barg at H2/Water Loop side and 11 barg at O2/Water Loop side then from its closed position, open the following manual valves: - MV-631: 6.8 turns - MV-632: 6.8 turns - MV-642: 0.8 turns - FICV-610A/B/C: To be set at 60 NL/h and Low Flow Alarm to be set at 40 NL/h same time as FICV-611			

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	- FICV-611: To be set at 660 NL/h - FICV-800: To be set at 60 NL/h with and High Flow Alarm to be set at 469 NL/h and Low Flow Alarm to be set at 40NL/h - FSH-640: Alarm to be set at 6m3/h with water - MV-640: To be set at 3m3/h using FSH-640			
03	Line-Up the valves as per normal operation. Start-Up the Unit with Transformers & Rectifiers Off. Check that all Utilities have been started up as per the expected sequence. Check that both Water loops (H2 & O2) are working together.			
04	Check that the unit is less than 3% O2 ready for Start-Up and H2 Production. HPP will be purged by H2/N2 coming from the ST-620 once H2 will start to be produced. If necessary, purge very slowly in a control manner to remove the O2 from the unit by opening slightly PV-630 and injecting N2 by opening slightly PV-900. Always monitor carefully that the pressure in H2/Water Loop side remains always higher than O2/Water Loop side.			
05	Once the Unit is considered ready for Start-Up, a PSSR meeting is organized to review all conditions to sign the RFO certificate.			

13. Appendix

13.1 N2 Service Test P&ID Mark Up

13.2 Flushing P&ID Mark Up

13.3 Flushing ITR’s

13.4 Leak Test Pack P&ID Mark Up

13.5 Leak Test ITR’s

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TAG NO.	BTK-980
DESCRIPTION	COMPRESSED AIR BUFFER TANK
DESIGN PRESSURE (barg)	124
DESIGN TEMPERATURE (°C)	45
VOLUME (L)	1

IA SUPPLY
NITROGEN SUPPLY
CLIENT
ELOGEN
A10 X00
ZONE BREAK
TP I
TP D

PSV-900
10 barg
1/2 GF

906A - 50 - N2 - PA22S → N2 TO O2 VENT PID-005

N2 PANEL

PT 910
PI 910
PAHH PAH
PAL PALL
BBV-910
HV-910
HV-911
NOTE 2

906 - 25 - N2 - PA22S
910 - 25 - N2 - PA22S
900 - 15 - N2 - PA22S → N2 TO ST-600 PID-003
920 - 15 - N2 - PA22S → N2 TO ST-620 PID-006
940 - 25 - N2 - PA22S → N2 TO DG-640 PID-007
930 - 1/4" - N2 - TK22 → N2 TO H2 PANEL PID-008
TK22 PA22S

PSV-150
10 Barg
PI 150
PT 150
PAHH PAH
PAL PALL
BBV-150
HV-150
HV-151
NOTE 1

980 - 1/2" - CA - TK22
CV-980
BTK-980
980B - 1/2" - CA - TK22

APC-980
PVI-980

1	MANIFOLD	CA TO PV-631 PID-007
2	MANIFOLD	CA TO PV-632 PID-008
3	MANIFOLD	CA TO PV-600 PID-005
4	MANIFOLD	CA TO PV-300 PID-001
5	MANIFOLD	CA TO PV-901 PID-003
6	MANIFOLD	CA TO PV-921 PID-006
7	MANIFOLD	CA TO PV-620 PID-007
8	MANIFOLD	CA TO PV-642 PID-007
	MANIFOLD	CA TO PV-633 PID-008
	MANIFOLD	CA TO PV-640 PID-007
		CA TO PV-500 PID-007

APC-900
PVI-900

980C - 1/2" - CA - TK22

1	MANIFOLD	CA TO PV-900 PID-003
2	MANIFOLD	CA TO PV-920 PID-006
3	MANIFOLD	CA TO PV-601 PID-005
4	MANIFOLD	CA TO PV-610 PID-005
5	MANIFOLD	CA TO PV-630 PID-007
6	MANIFOLD	CA TO PV-635 PID-008
7	MANIFOLD	CA TO PV-641 PFD-007
8	MANIFOLD	CA TO PV-800 PFD-008
		CA TO PV-501 PFD-007

PVI-901

980D - 1/2" - CA - TK22

1	MANIFOLD	SV-500
2		

981 - 1/2" - CA - TK22 → TO WTP-300 PID-001
970 - 1/2" - CA - TK22 → TO HPP-700 PID-011

N2

NOTES :
NOTE 1 : IA CONNECTION FOR MAINTENANCE PURPOSE IN CASE OF NEED OF COMPRESSED AIR IN A SPECIFIC POINT ON ELECTROLYSER
NOTE 2 : NITROGEN CONNECTION FOR MAINTENANCE/COMISSIONING PURPOSE IN CASE OF NEED OF NITROGEN IN A SPECIFIC POINT ON THE ELECTROLYSER

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Document type: P&ID
Document status: DETAILED DESIGN
Title, Supplementary title: NITROGEN & INSTRUMENT AIR PANEL
Client reference: -

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N2 Distribution Service Test (1/6)

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005
421 - 1/2" - CW - TK22
FROM PT-630 PID-006
FROM HE-630/631 PID-007
420 - 1/2" - CW - TK22
TO RDPC-002 PID-006
TO PV-631 PID-007
TO MPV-611 PID-005
616A - 80 - O2 - PA22S
TO O2 VENT PID-005
TO FX-642 PID-007
616 - 1" - PWO2 - TK22
TO O2 VENT PID-005
902A - 25 - N2 - PA22S
FROM N2 PANEL
900 - 15 - N2 - PA22S
N2 PID-009
900A - 40 - N2 - PA22S
CV-900
CV-901
NOTE 3
NOTE 2
NOTE 3
901 - 15 - N2 - PA22S
TO PV-300 PID-001
MIN.
ACO-610
614A - 1/4" - O2 - TK22
615C - 1/4" - O2 - TK22
615B - 1/4" - O2 - TK22
615A - 1/4" - O2 - TK22
614B - 1/4" - O2 - TK22
TO O2 VENT PID-005
610 - 20 - PWO2 - PA22S
TO HE-610 PID-005
FROM STACKS PID-002
606 - 200 - PWO2 - PA22S
X00 A10 ZONE BREAK
PIPE HEATED
PIPE NOT HEATED
FOR START-UP ONLY
600B - 150 - PWO2 - PA22S
600A - 150 - PWO2 - PA22S
601B - 150 - PWO2 - PA22S
601A - 150 - PWO2 - PA22S
Auto-start
Shutdown
TO HE-600 PID-004
FROM DG-640 PID-007
641A - 25 - PWH2 - PB22S
FROM LP-300 A/B PID-001
306 - 25 - PW - PA22S
HR-306
C01 X00 ZONE BREAK
X00 A02 ZONE BREAK
TO VAR-300A/B PID-001
A10 A02 ZONE BREAK
2 OUT OF 3
Analysis System Package

Instrument to monitor
Closed Valve
Valve to Operate
N2

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Client

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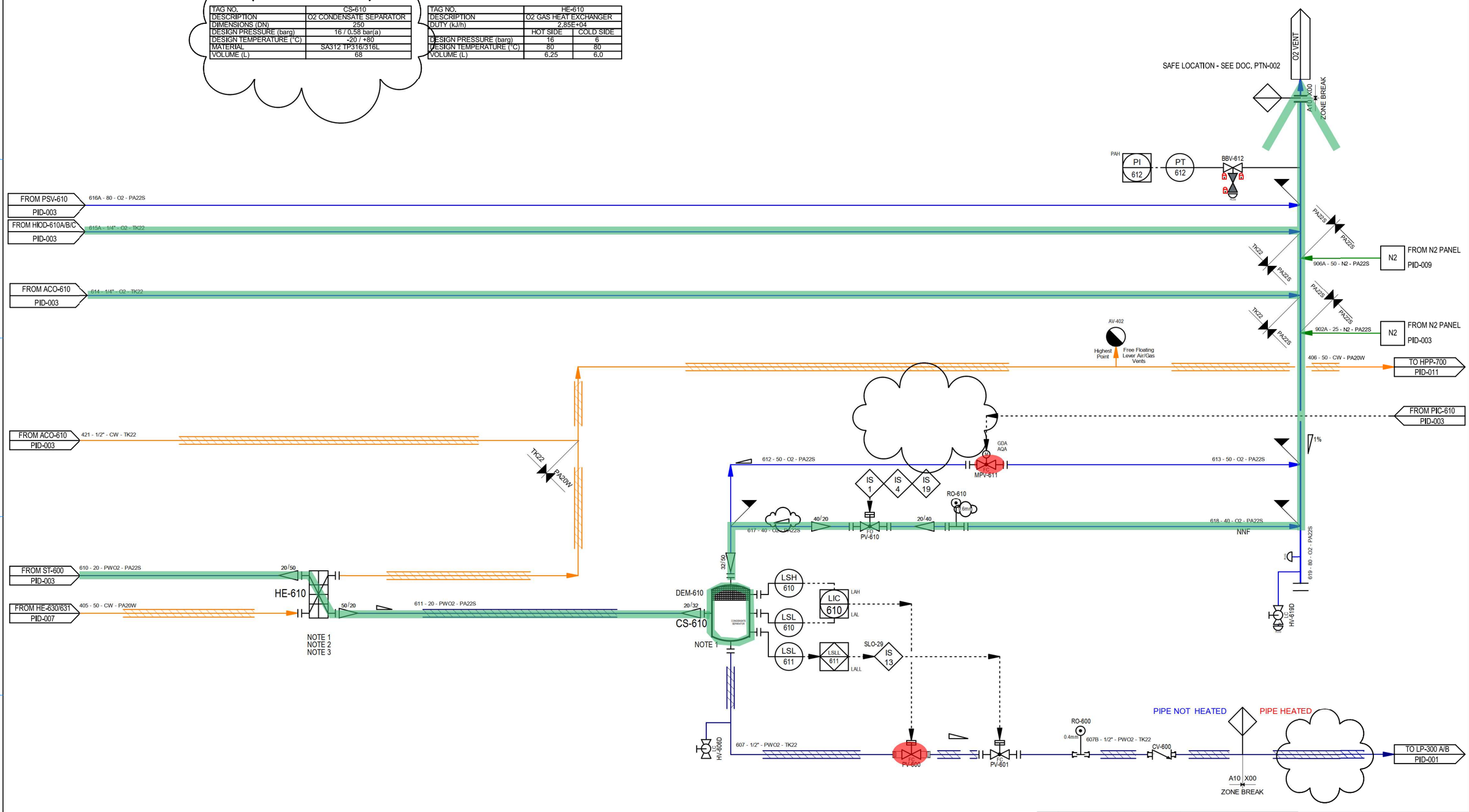
Title, Supplementary title: OXYGEN SEPARATION
Client reference: -

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8	25/10/2024	EN	3/16

N2 Distribution Service Test (2/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Closed Valve

N2

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PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

N2 Distribution Service Test (3/6)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

TO RDPC-001 PID-003
TO MPV-630 PID-008
TO FX-642 PID-007
TO FIC-640 PID-007
TO H2 VENT PID-007
FROM N2 PANEL
N2 PID-009
FROM STACKS PID-002
FROM LP-300 A/B PID-001
TO H2 VENT PID-007
FROM PT-611 PID-003
TO HE630/631 PID-007
TO FH-620 PID-004

PSV-630 36 barg
PIC 630
PT 630
FX 630
IP 15
HV-630
BBV-630
BBV-631
PT 631
PSHH 631
RDPC 002
PDSHH 002
PDSLL 002
RD-920 10 BARG
PT 920
PI 920
FI 920
FT 920
SP-920
BBV-920
CV-920
CV-921
HV-920
HV-921
HV-922
MV-920
MV-921
PV-920
PV-921
FT 921
FI 921
HV-625V
ZI 624
ZIO 624
HV-624
ST-620
LT 620
LI 620
LSL 620
LSLL 620
HV-620
HV-620A
HV-620B
HV-620DA
HV-620DB
CP-620A
CP-620B
TT 621A
TT 621B
TSHH 621A
TSHH 621B
PT 620A
PI 620A
PT 620B
PI 620B
CV-621A
CV-621B
HV-621A
HV-621B
PT 620
PI 620
VAR-620A
VAR-620B
IS 17
IS 18
SLO-32

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

Instrument to monitor
Closed Valve
Valve to Operate
N2

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title	Client reference
HYDROGEN SEPARATION	-

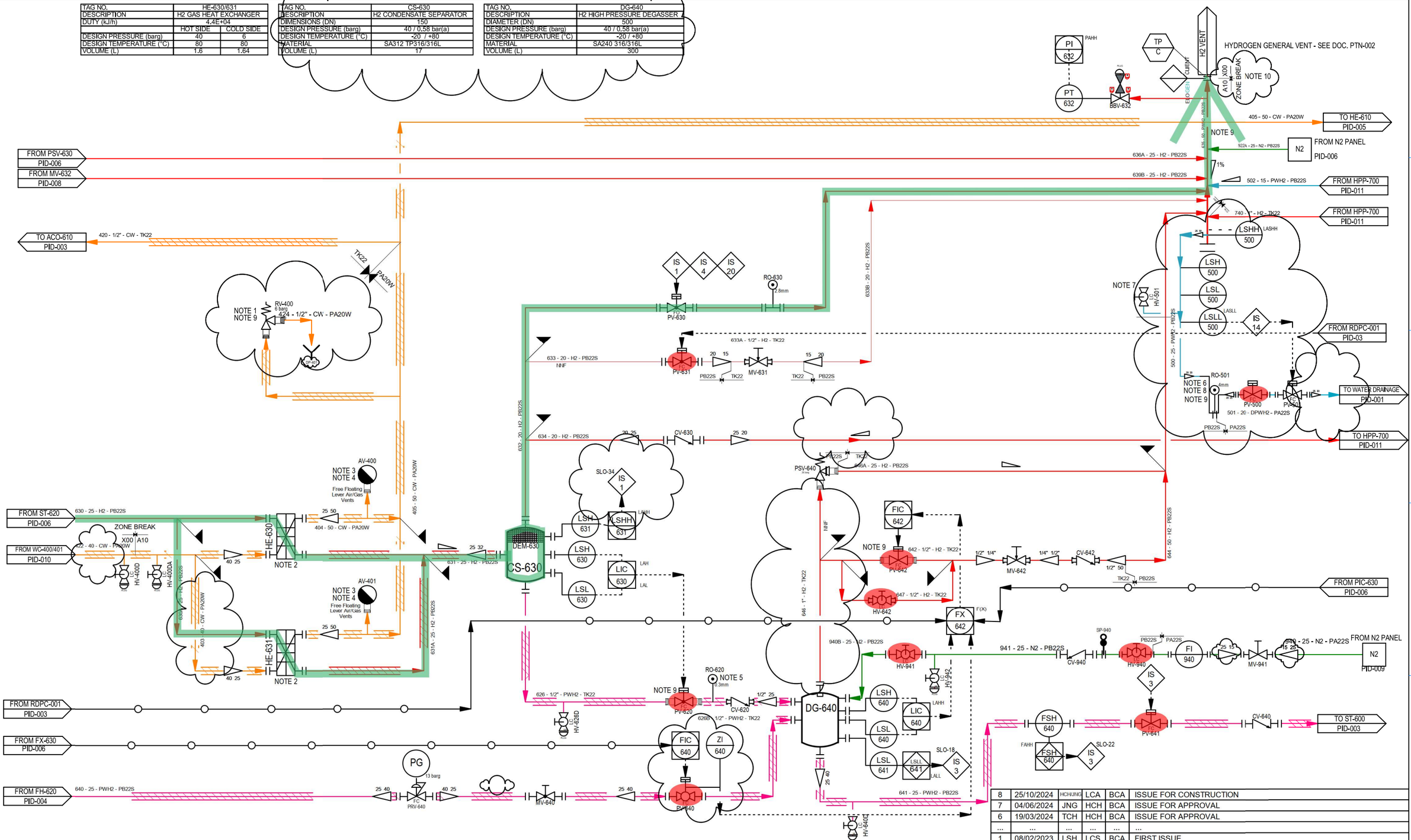
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	6/16

N2 Distribution Service Test (4/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Closed Valve

N2

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PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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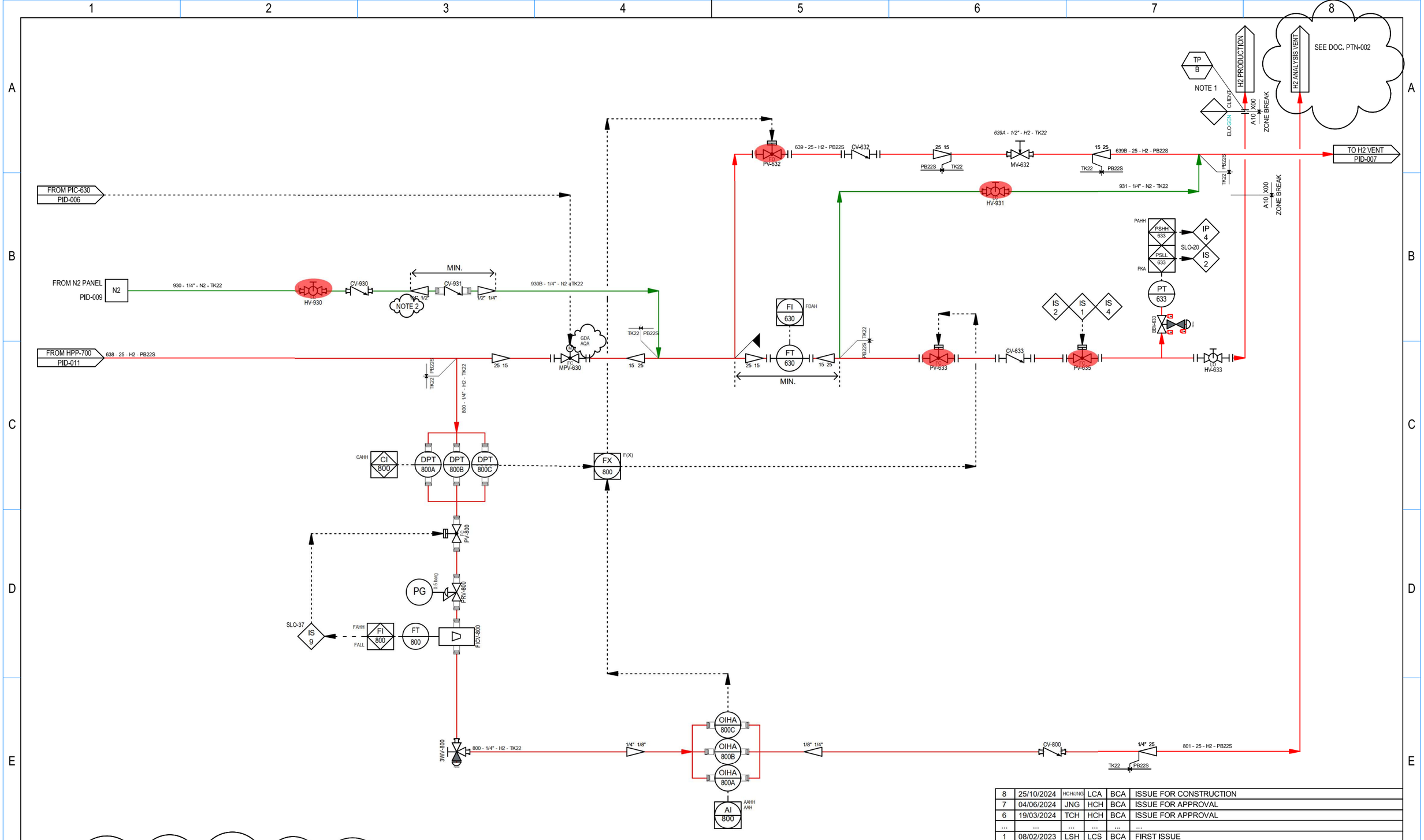
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

N2 Distribution Service Test (5/6)



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

Closed Valve

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PROCESS	C63-PID-001-008	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title	Client reference
H2 PANEL	-

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	8/16

N2 Distribution Service Test (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

WATER TREATMENT PACKAGE

NOTE 7
NOTE 8

FROM CS-610
PID-005

607B - 1/2" - PWO2 - TK22

ZONE BREAK
X00 | C01

HR-607B

982 - 1/2" - CA - TK22

CA VENT

981 - 1/2" - CA - TK22

FROM BTK-980
PID-009

3/8" BSPP F

1/2" NPT

3A

3E

1ROP1.1 | 2ROP1.1 | YP-70 | 1PSP1.1 | 1RFP1

AQA-1003

HV-300

CV-300

HV-300D

50 - 15

300 - 15 - RW - PA22S

WP-300

PI 1RO5	PI 1RO7	PI 2RO5	PI 2RO7	PI 2RO8	PI 1F1	PI 1ME2	PI 1ED1	PI 1ED2	PI 1ED4	PI 1ED6	PI 2F1	PI 2F2	PI 1PS3	PISA+ 1PS1
TI 1C1	TI 1RO7	TI 1ED7	TI 2RO7	TI 1B4	FSA- 1ED3	FSA 1ED3	QE 1Z1	QIA 1Z1	QISA+ 2RO4	PSA- 1RO2	QISA+ 1RO4	PSA- 1F2	UI 1ED11	LISA 1RF1
FI 1ME3	FI 1RO6	FI 2RO6	FI 1ED3	FI 1ED4	FI 1ED5	FIR 1RO8	FIR 2RO5	FIR 1ED1	FIR 2RO3	FIR 2RO6	FIR 1RO3	FIR 1PS4		QIA 1B4

DEMIN TANK

LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 LALL

FROM LIC-600
PID-003

TO ST-600
PID-003

PV-300

PAHH
PAH
PAL
PALL
PI 300

PT 300

4A

5A

CAHH 300 CAHH

≤ 20

PA22S | TK22

FROM FCU-401
PID-012

ZONE BREAK
X00 | C01

505 - 15 - RW - TK22

NOTE 5

NOTE 1
NOTE 4
NOTE 3
NOTE 3
NOTE 9

302A - 25 - PW - PA22S

303A - 25 - PW - PA22S

HV-301A

LP-300A

CV-301A

CV-302A

HV-302A LO

HV-303DA

306 - 25 - PW - PA22S

#300

3WV-320

Open to ST-600

PA22S | PB22S

305 - 15 - PW - PA22S

302B - 25 - PW - PA22S

HV-301D

HV-300DA

SLO-15

IS 12

VAR-300A

NOTE 5

NOTE 1
NOTE 4
NOTE 3
NOTE 3
NOTE 9

303B - 25 - PW - PA22S

HV-301B

LP-300B

CV-301B

CV-302B

HV-302B LO

HV-303DB

HV-300DB

NNF

HV-307V

307 - 25 - PW - PB22S

CV-320

NOTE 2

FROM AHU-400
PID-013

503 - 15 - RW - TK22

ZONE BREAK
E01 | X00

NOTE 9

ZONE BREAK
X00 | C01

HR-503

SPH-404

504 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU-400
PID-012

FROM H2 VENT
PID-007

501 - 20 - DPWH2 - PA22S

509 - 50 - RW - PA22S

506 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU 402
PID-012

507 - 15 - RW - TK22

ZONE BREAK
C01 | X00

FROM FCU 403
PID-012

VAR-300B

SLO-15

IS 12

FOR START-UP ONLY

TO ST-620
PID-006

FROM LIC-600
PID-003

ELO GEN
CLIENT
25 | 15
X00 | C01
ZONE BREAK
TP A

WATER SUPPLY

ELO GEN
CLIENT
X00 | A10
ZONE BREAK
TP F

WATER DRAINAGE

TP E
ELO GEN
CLIENT
X00 | C01
ZONE BREAK

PURE WATER DRAINAGE

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VAL'
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATIO
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Flushing System 600
Valve Open
Valve Closed
Auto Mode

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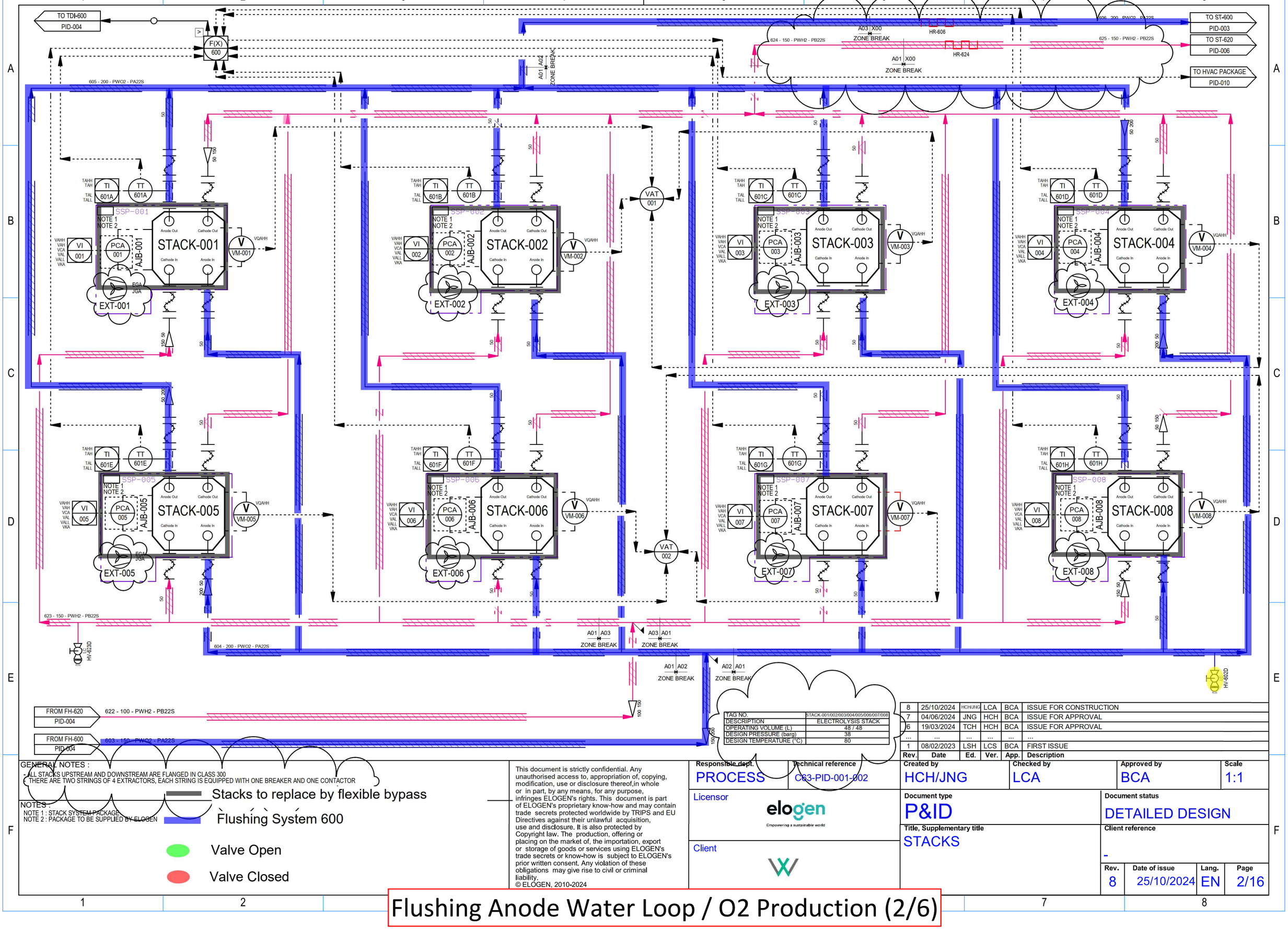
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

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Flushing Anode Water Loop / O2 Production (1/6)



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Stacks to replace by flexible bypass

Flushing System 600

Valve Open

Valve Closed

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PROCESS	C63-PID-001-002	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

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Flushing Anode Water Loop / O2 Production (2/6)

TAG NO.	ST-600
DESCRIPTION	OXYGEN SEPARATOR TANK
DIAMETER (DN)	950
DESIGN PRESSURE (barg)	16
DESIGN TEMPERATURE (°C)	-20 / +80
CAPACITY VOLUME (L)	2259
MATERIAL	SA240 316/316L

TAG NO.	CP-600A/B
DESCRIPTION	O2 LOOP PUMPS
FLOW (m³/h)	88.2
RATED POWER (kW)	11
HEAD (m)	31.83
MATERIAL	1.4401

TO HPP-700 PID-005

421 - 1/2" - CW - TK22

FROM PT-630 PID-006

FROM HE-630/631 PID-007

420 - 1/2" - CW - TK22

TO RDPC-002 PID-006

TO PV-631 PID-007

TO MPV-611 PID-005

TO O2 VENT PID-005

616A - 80 - O2 - PA22S

TO FX-642 PID-007

N2 Purging

FROM N2 PANEL

900 - 15 - N2 - PA22S

PID-009

902A - 25 - N2 - PA22S

900A - 40 - N2 - PA22S

Open to Vent during the Filling with Water

Monitor the level

TO PV-300 PID-001

MIN.

ACO-610

2 OUT OF 3

615C - 1/4" - O2 - TK22

615B - 1/4" - O2 - TK22

615A - 1/4" - O2 - TK22

614B - 1/4" - O2 - TK22

TO O2 VENT PID-005

FROM STACKS PID-002

606 - 200 - PWO2 - PA22S

PIPE HEATED

PIPE NOT HEATED

610 - 20 - PWO2 - PA22S

TO HE-610 PID-005

To start after flushing with A

FROM DG-640 PID-007

641A - 25 - PWH2 - PB22S

FROM LP-300 A/B PID-001

306 - 25 - PW - PA22S

HR-306

600B - 150 - PWO2 - PA22S

601B - 150 - PWO2 - PA22S

600A - 150 - PWO2 - PA22S

601A - 150 - PWO2 - PA22S

TO HE-600 PID-004

TO VAR-300A/B PID-001

Water Supply

Air Vented from System 600

Flushing System 600

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPMENT

NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

NOTE 3 : ACCESSIBLE FOR MAINT...

NOTE 4 : NITROGEN AUTO PURGI...

NOTE 5 : PG CONNECTION

NOTE 6 : FLANGE SUPPLIED WITH...

Valve Open

Valve Closed

Valve to operate

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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-003	HCH/JNG	LCA	BCA	1:1

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Title, Supplementary title: OXYGEN SEPARATION

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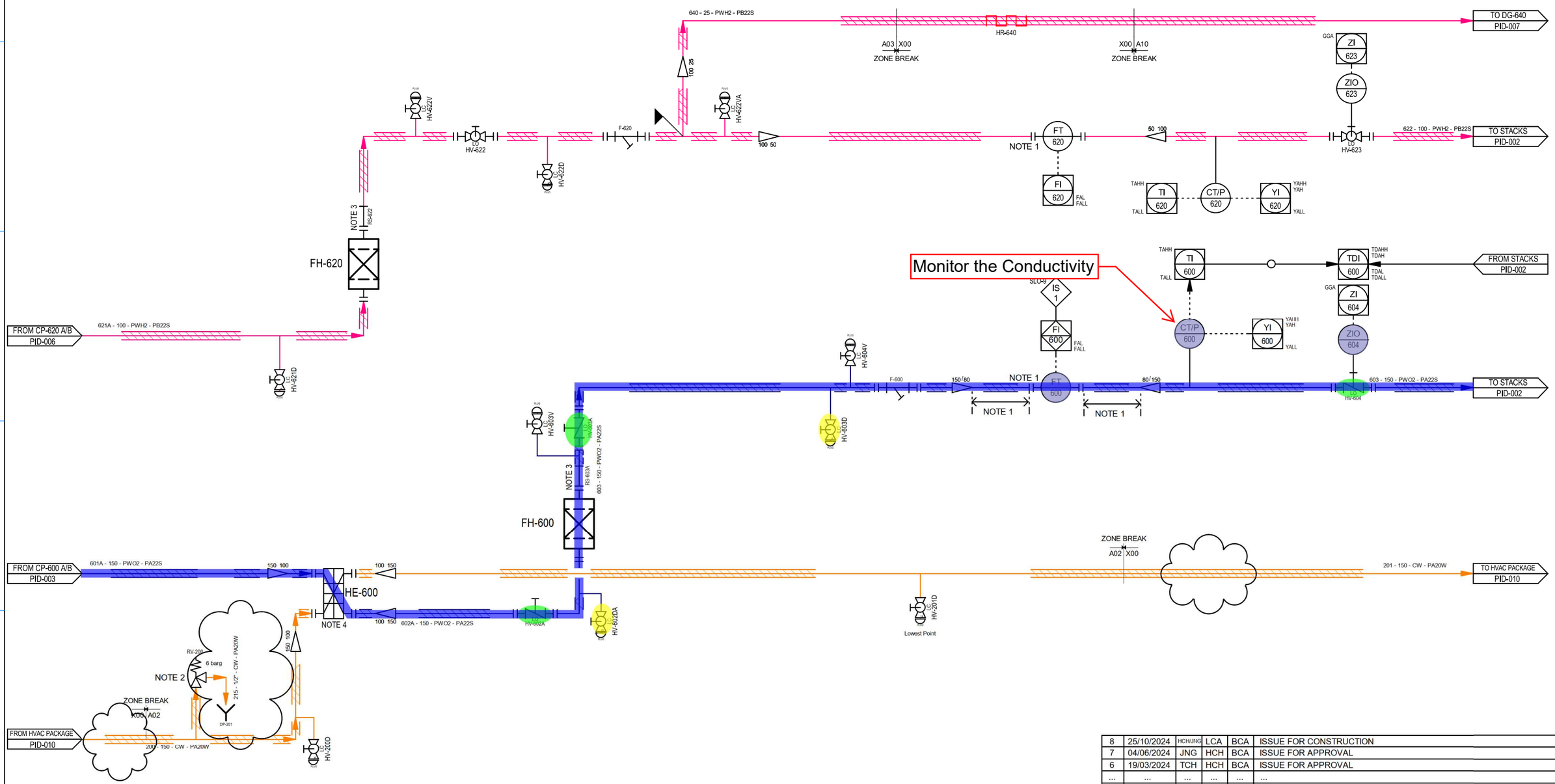
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Flushing Anode Water Loop / O2 Production (3/6)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Flushing System 600
Valve Open
Valve Closed

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PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING
Client reference: -

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8	25/10/2024	EN	4/16

Flushing Anode Water Loop / O2 Production (4/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0

SAFE LOCATION - SEE DOC. PTN-002

O2 VENT

A10 X00 ZONE BREAK

PAH PI 612 PT 612 BBV-612

O2 content to be checked at PT-612 vent

FROM PSV-610 PID-003 — 616A - 80 - O2 - PA22S

FROM HIOD-610A/B/C PID-003 — 615A - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 614 - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 421 - 1/2" - CW - TK22

FROM ST-600 PID-003 — 610 - 20 - PWO2 - PA22S

FROM HE-630/631 PID-007 — 405 - 50 - CW - PA20W

HE-610 — NOTE 1 NOTE 2 NOTE 3

611 - 20 - PWO2 - PA22S

DEM-610 CS-610 NOTE 1

LSH 610 LIC 610 LAH LAL LSL 610 LSL 611 LSLL 611 LALL SLO-29 IS 13

LC HV-606D

607 - 1/2" - PWO2 - TK22

PV-600 PV-601

RO-600 0.4mm 607B - 1/2" - PWO2 - TK22 CV-600

PIPE NOT HEATED PIPE HEATED

A10 X00 ZONE BREAK

TO LP-300 A/B PID-001

N2 FROM N2 PANEL PID-009 — 906A - 50 - N2 - PA22S

N2 FROM N2 PANEL PID-003 — 902A - 25 - N2 - PA22S

AV-402 Highest Point Free Floating Lever Air/Gas Vents

406 - 50 - CW - PA20W

TO HPP-700 PID-011

FROM PIC-610 PID-003

GDA AQA MPV-611

642 - 50 - O2 - PA22S 643 - 50 - O2 - PA22S

IS 1 IS 4 IS 19

RO-610 0.6mm

617 - 40 - O2 - PA22S 40/20 PV-610 20/40

618 - 40 - O2 - PA22S NNF

619 - 80 - O2 - PA22S HV-619D

1%

TK22 PA20W

PA22S TK22

Air Vented from System 600

Flushing System 600

NOTES :
NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO E

Valve Open

Valve Closed

Valve to operate

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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PROCESS	C63-PID-001-005	HCH/JNG	LCA	BCA	1:1

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Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

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8	25/10/2024	EN	5/16

Flushing Anode Water Loop / O2 Production (5/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006
FROM MV-632 PID-008
TO ACO-610 PID-003
FROM ST-620 PID-006
FROM WC-400/401 PID-010
FROM RDPC-001 PID-003
FROM FX-630 PID-006
FROM FH-620 PID-004
TO HE-610 PID-005
FROM N2 PANEL PID-006
FROM HPP-700 PID-011
FROM HPP-700 PID-011
FROM RDPC-001 PID-03
TO WATER DRAINAGE PID-001
TO HPP-700 PID-011
FROM PIC-630 PID-006
FROM N2 PANEL PID-009
TO ST-600 PID-003

NOTES :

Flushing System 600

Valve Open

Valve Closed

Valve to operate

NOTE 1 : TO CONTAINER DRIP P...
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING SUB...
NOTE 8 : HYDRAULIC GUARD HE... L AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL TI...
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

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Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

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8	25/10/2024	EN	7/16

Flushing Anode Water Loop / O2 Production (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

1ROP1.1 2ROP1.1 YP-70 1PSP1.1 1RFP1 — AQA-1003

HV-300 — CV-300 — 50 15 — TE — HV-300D

PI 1RO5 | PI 1RO7 | PI 2RO5 | PI 2RO7 | PI 2RO8 | PI 1F1 | PI 1ME2 | PI 1ED1 | PI 1ED2 | PI 1ED4 | PI 1ED6 | PI 2F1 | PI 2F2 | PI 1PS3 | PISA+ 1PS1

TI 1C1 | TI 1RO7 | TI 1ED7 | TI 2RO7 | TI 1B4 | FSA- 1ED3 | FSA 1ED3 | QE 1Z1 | QIA 1Z1 | QISA+ 2RO4 | PSA- 1RO2 | QISA+ 1RO4 | PSA- 1F2 | UI 1ED11 | LISA 1RF1

FI 1ME3 | FI 1RO6 | FI 2RO6 | FI 1ED3 | FI 1ED4 | FI 1ED5 | FIR 1RO8 | FIR 2RO5 | FIR 1ED1 | FIR 2RO3 | FIR 2RO6 | FIR 1RO3 | FIR 1PS4 | QIA 1B4

WTP-300

DEMIN TANK — LISA 1B1 — TANK XL-300-SR — REJECT TANK — LALL 301 LALL

FROM LIC-600 PID-003 — TO ST-600 PID-003 — LIC 300 PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

300 - 15 - RW - PA22S — 306 - 25 - PW - PA22S — Open to ST-620

4A — 5A — CAHH 300 CAHH — 15 20 — PA22S TK22

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — HR-503 — ZONE BREAK X00 C01 — SPH-404 — 504 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S — 302A - 25 - PW - PA22S — 303A - 25 - PW - PA22S — 302B - 25 - PW - PA22S — 303B - 25 - PW - PA22S

LO HV-301A — LP-300A — CV-301A — CV-302A — HV-302A LO — HV-303DA LO — HV-300DA

LO HV-301B — LP-300B — CV-301B — CV-302B — HV-302B LO — HV-303DB LO — HV-300DB

NOTE 1 NOTE 3 NOTE 4 NOTE 5 NOTE 9

SLO-15 IS 12 — VAR-300A BCA — VAR-300B BCA

#300 — 3WV-320 — PA22S PB22S — HV-307V — NNF — CV-320 — 307 - 25 - PW - PB22S — NOTE 2

TO ST-620 PID-006 — FROM LIC-600 PID-003 — FOR START-UP ONLY

ELO GEN CLIENT — 25 15 — X00 C01 — ZONE BREAK — TP A — WATER IS IPRX Y

ELO GEN CLIENT — X00 A10 — ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN CLIENT — X00 C01 — ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VAL'
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 2...,

Flushing System 620
Valve Open
Auto Mode
MENT
67001_02)

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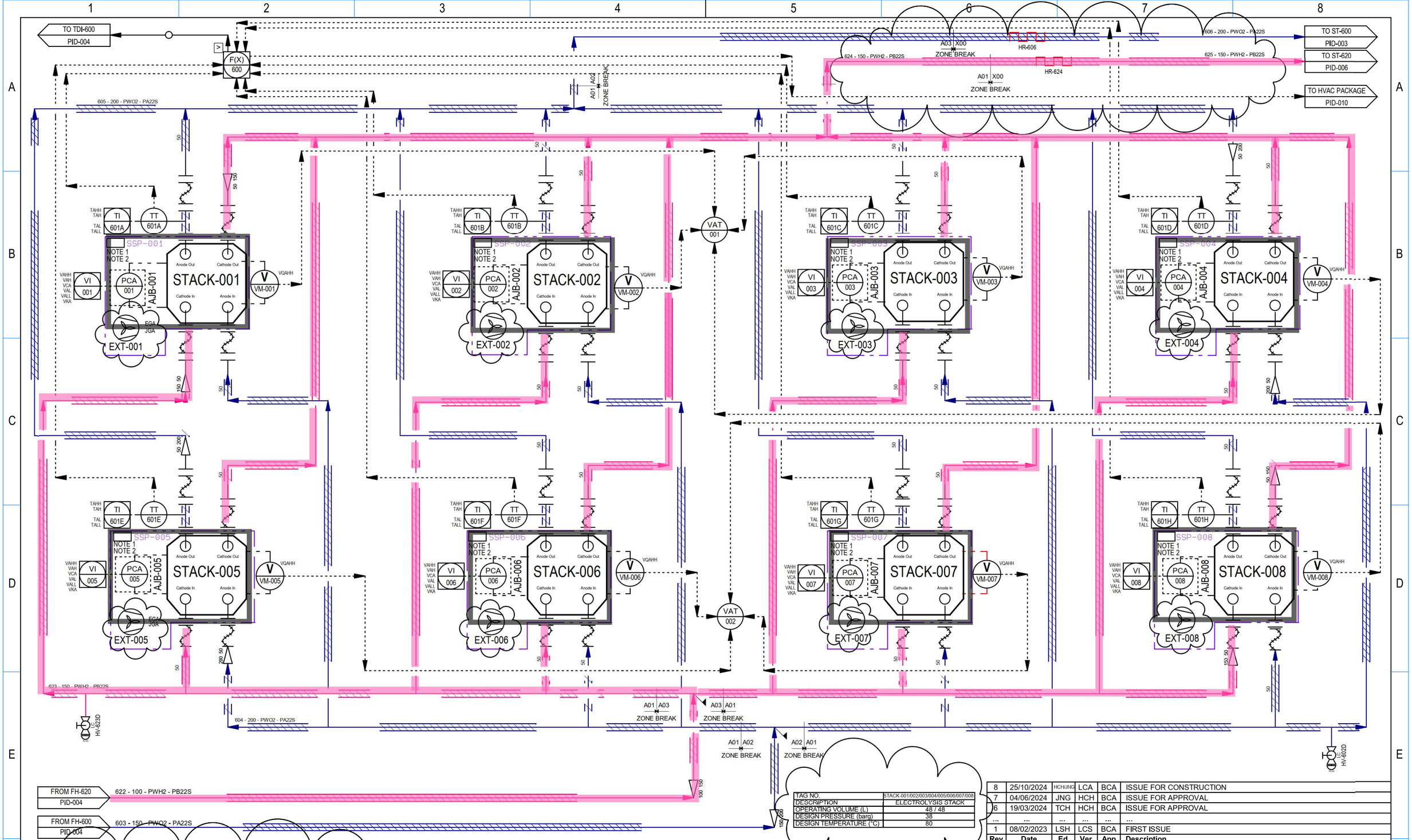
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

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Flushing Cathode Water Loop / H2 Production (1/5)



Rev.	Date	Ed.	Ver.	App.	Description
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GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Stacks to replace by flexible bypass

Flushing System 620 & 640

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Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

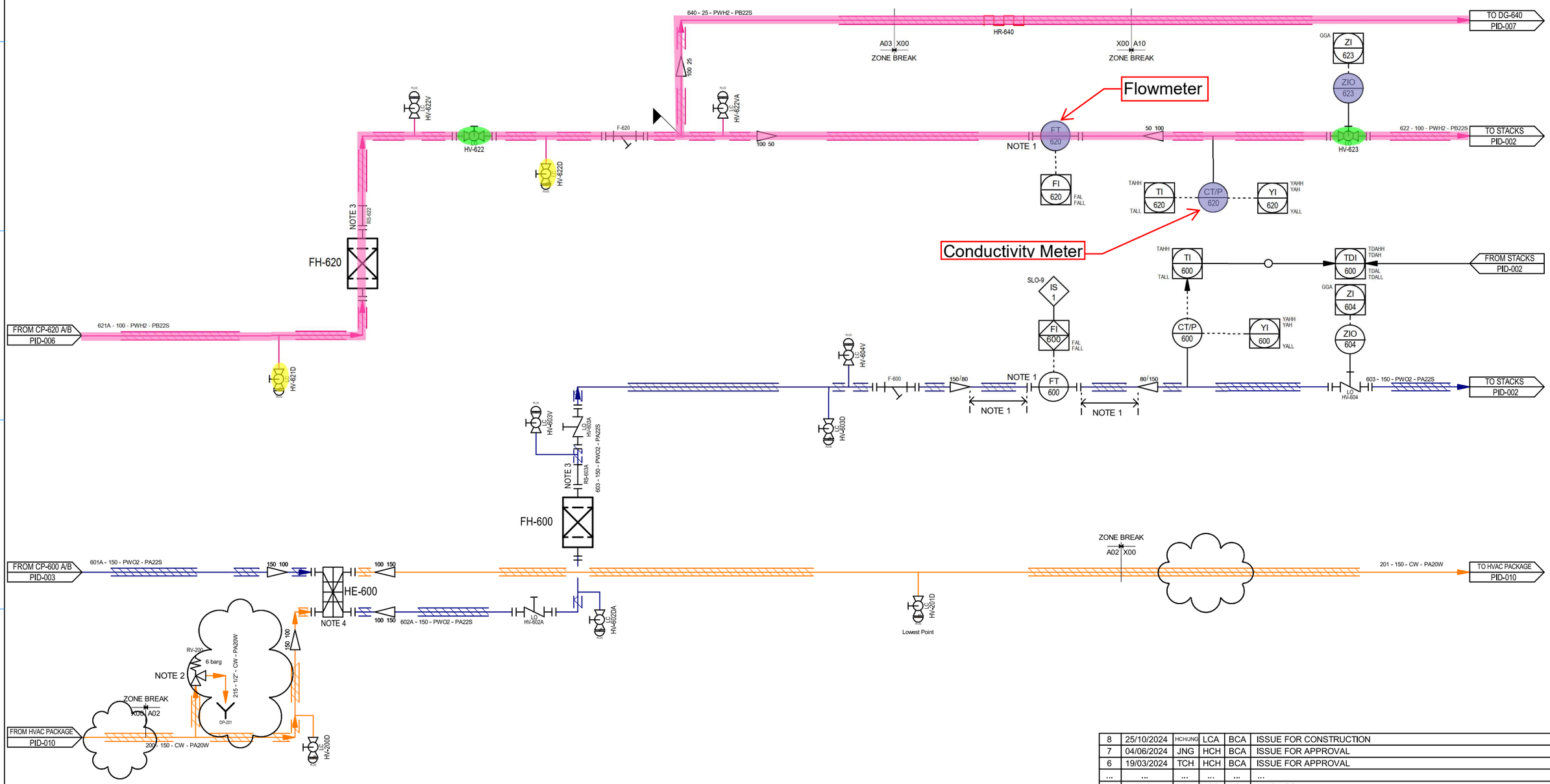
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Flushing Cathode Water Loop / H2 Production (2/5)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Flushing System 620 & 640

Valve Open

Valve to operate

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Flushing Cathode Water Loop / H2 Production (3/5)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

TO RDPC-001 PID-003
TO MPV-630 PID-008
TO FX-642 PID-007
TO FIC-640 PID-007
TO H2 VENT PID-007
FROM PT-611 PID-003
TO HE630/631 PID-007
FROM N2 PANEL
N2 PID-009
FROM STACKS PID-002
FROM LP-300 A/B PID-001
TO FH-620 PID-004

N2 Purging

Vent Open for Filling

To start after flushing with A

PSV-630 36 barg
TK22 1/2" GF
PB22S 15 25
1/2" GM
21/1000
636A - 25 - H2 - PB22S
RDPC 002
PDAHH
PDALL
SLO-19
SLO-7
SLO-33
PT 631
PSHH 631
PAHH
PAH
PALL
BBV-631
HV-630
PIC 630
PDAH
PT 630
FX 630
BBV-630
IP 15
TO H2 VENT PID-007
N2
922A - 25 - N2 - PB22S
RD-920 10 BARG
PT 920
PI 920
PAHH
HR-920
SP-920
BBV-920
FI 920
FAL
FT 920
#300
CV-920
CV-921
NOTE 2
NOTE 3
920A - 40 - N2 - PB22S
HV-922
HV-921
IS 1
IS 4
IS 11
NOTE 4
HV-920
PV-920
MV-920
PV-921
MV-921
922 - 15 - N2 - PA22S
FT 921
FI 921
636 - 1" - PWH2 - TK22
MIN.
SLO-17
HV-625V
ZI 624
ZIO 624
HV-624
625 - 150 - PWH2 - PB22S
PIPE HEATED
PIPE NOT HEATED
X00 A10
ZONE BREAK
ST-620
DEM-620
LT 620
LI 620
LAHH
LAH
LAL
LALL
LSL 620
LSLL 620
LASLL
SLO-32
HV-620D
HV-620
HR-620A
HR-620D
ZONE BREAK1
NOTE 5
PLUG 1/2" NPT F
620A - 100 - PWH2 - PB22S
HV-620A
HV-620AA
TSAHH
TSHH 621A
TT 621A
NOTE 1
CP-620A
RS-620A
RS-621A
CV-621A
HV-621A
621A - 100 - PWH2 - PB22S
PT 620A
PI 620A
PAHH
IS 17
BBV-620A
PT 620
PI 620
PAH
PAL
PALL
BBV-620
Auto-start
VAR-620A
IS 17
SLO-32
IS 5
620B - 100 - PWH2 - PB22S
HV-620B
HV-620BB
TSHH 621B
TT 621B
CP-620B
RS-620B
RS-621B
CV-621B
HV-621B
621B - 100 - PWH2 - PB22S
PT 620B
PI 620B
IS 18
BBV-620B
Shutdown
VAR-620B
IS 18
IS 5
SLO-32
307 - 25 - PW - PB22S
NNF
C01 X00
ZONE BREAK
HR-307
X00 A10
ZONE BREAK

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...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION

Air Vented from System 620 & 640
Flushing System 620 & 640
Valve Open
Valve Closed
Valve to operate

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Title, Supplementary title: HYDROGEN SEPARATION
Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	6/16

Flushing Cathode Water Loop / H2 Production (4/5)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

O2 content to be checked at PT-632 vent

Open to Vent during the Filling with Water

Vent Open for Filling

N2 Purging

Operate Slowly in Manual Mode to start DG-640 flushing

Drain for DG-640

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006

FROM MV-632 PID-008

TO ACO-610 PID-003

TO HE-610 PID-005

FROM N2 PANEL PID-006

FROM HPP-700 PID-011

FROM HPP-700 PID-011

FROM RDPC-001 PID-03

TO WATER DRAINAGE PID-001

TO HPP-700 PID-011

FROM ST-620 PID-006

FROM WC-400/401 PID-010

FROM RDPC-001 PID-003

FROM FX-630 PID-006

FROM FH-620 PID-004

FROM PIC-630 PID-006

TO ST-600 PID-003

NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYD
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Air Vented from System 620 & 640

Flushing System 620 & 640

Valve Open

Valve Closed

Valve to operate

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Flushing Cathode Water Loop / H2 Production (5/5)

elogen	**COMMISSIONING**	CROSSWIND
	C63-ELO-REP-CO-0102 - FLUSHING	

TEST CONDITIONS	
Procedure Reference	C063-ELO-PRO-CO-0004 - BLPH Electrolyser Commissioning Manual
System Flushing	
Reference Sampling Point	
Online Conductivity Meter Tag	
Water from WTP conductivity value (µS.cm-1)	

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date
Portable Conductivity Meter		
O2 Meter		

FLUSHING OPERATION				
	Date	Time	Conductivity (µS.cm-1)	Temperature (°C)
Beginning				
End				
After 12h				
After Resin Filling				
After Stacks Installation				

RESULT		
Pure Water Flushing		
Conductivity	σ < 0.1 µS.cm-1 on all sampling points	OK / NOK
Nitrogen Purging		
Inerting	O2 Content < 3 % on all sampling points	OK / NOK

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E) — 981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

AQA-1003

1ROP1.1 — 2ROP1.1 — YP-70 — 1PSP1.1 — 1RFP1

PI 1RO5 — PI 1RO7 — PI 2RO5 — PI 2RO7 — PI 2RO8 — PI 1F1 — PI 1ME2 — PI 1ED1 — PI 1ED2 — PI 1ED4 — PI 1ED6 — PI 2F1 — PI 2F2 — PI 1PS3 — PISA+ 1PS1

TI 1C1 — TI 1RO7 — TI 1ED7 — TI 2RO7 — TI 1B4 — FSA- 1ED3 — FSA 1ED3 — QE 1Z1 — QIA 1Z1 — QISA+ 2RO4 — PSA- 1RO2 — QISA+ 1RO4 — PSA- 1F2 — UI 1ED11 — LISA 1RF1

FI 1ME3 — FI 1RO6 — FI 2RO6 — FI 1ED3 — FI 1ED4 — FI 1ED5 — FIR 1RO8 — FIR 2RO5 — FIR 1ED1 — FIR 2RO3 — FIR 2RO6 — FIR 1RO3 — FIR 1PS4 — QIA 1B4

WTP-300

DEMIN TANK — LISA 1B1

TANK XL-300-SR

REJECT TANK

LALL 301 — LALL

FROM LIC-600 PID-003

TO ST-600 PID-003

PV-300

PAHH PAH PAL PALL — PI 300 — PT 300

306 - 25 - PW - PA22S

300 - 15 - RW - PA22S

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

CAHH 300 — CAHH

4A — 5A — PA22S — TK22

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404 — 504 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

305 - 15 - PW - PA22S

302A - 25 - PW - PA22S — 303A - 25 - PW - PA22S — LP-300A — HV-301A — HV-300DA — CV-301A — CV-302A — HV-302A — HV-303DA — NOTE 5 — NOTE 1 NOTE 4 NOTE 3 NOTE 9

302B - 25 - PW - PA22S — 303B - 25 - PW - PA22S — LP-300B — HV-301B — HV-300DB — CV-301B — CV-302B — HV-302B — HV-303DB

SLO-15 — IS 12 — VAR-300A — VAR-300B

#300 — SLW-320 — PB22S — PA22S

HV-307V — NNF — CV-320 — 307 - 25 - PW - PB22S — NOTE 2

TO ST-620 PID-006 — FROM LIC-600 PID-003 — FOR START-UP ONLY

ELO GEN — CLIENT — ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — ZONE BREAK — PURE WATER DRAINAGE

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

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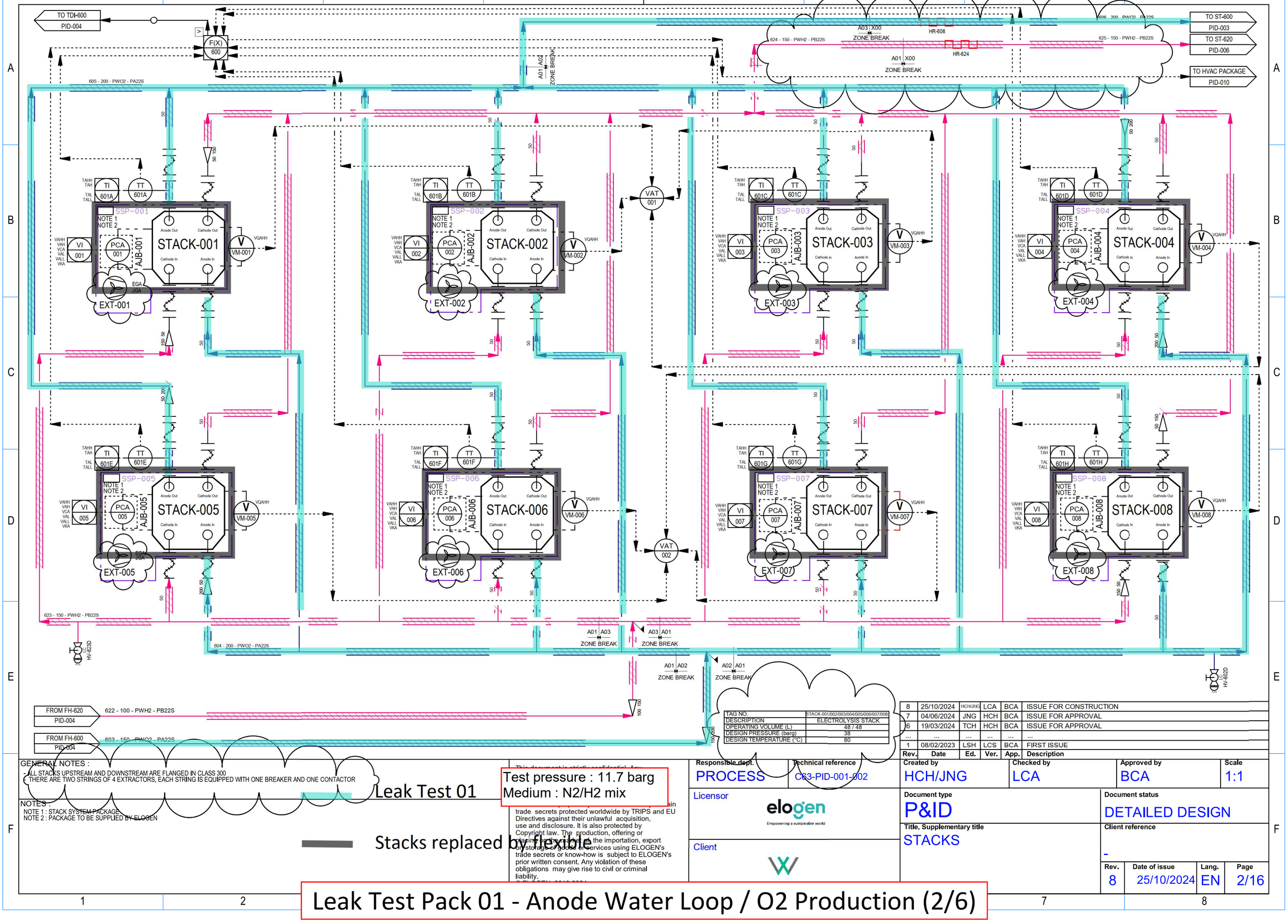
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

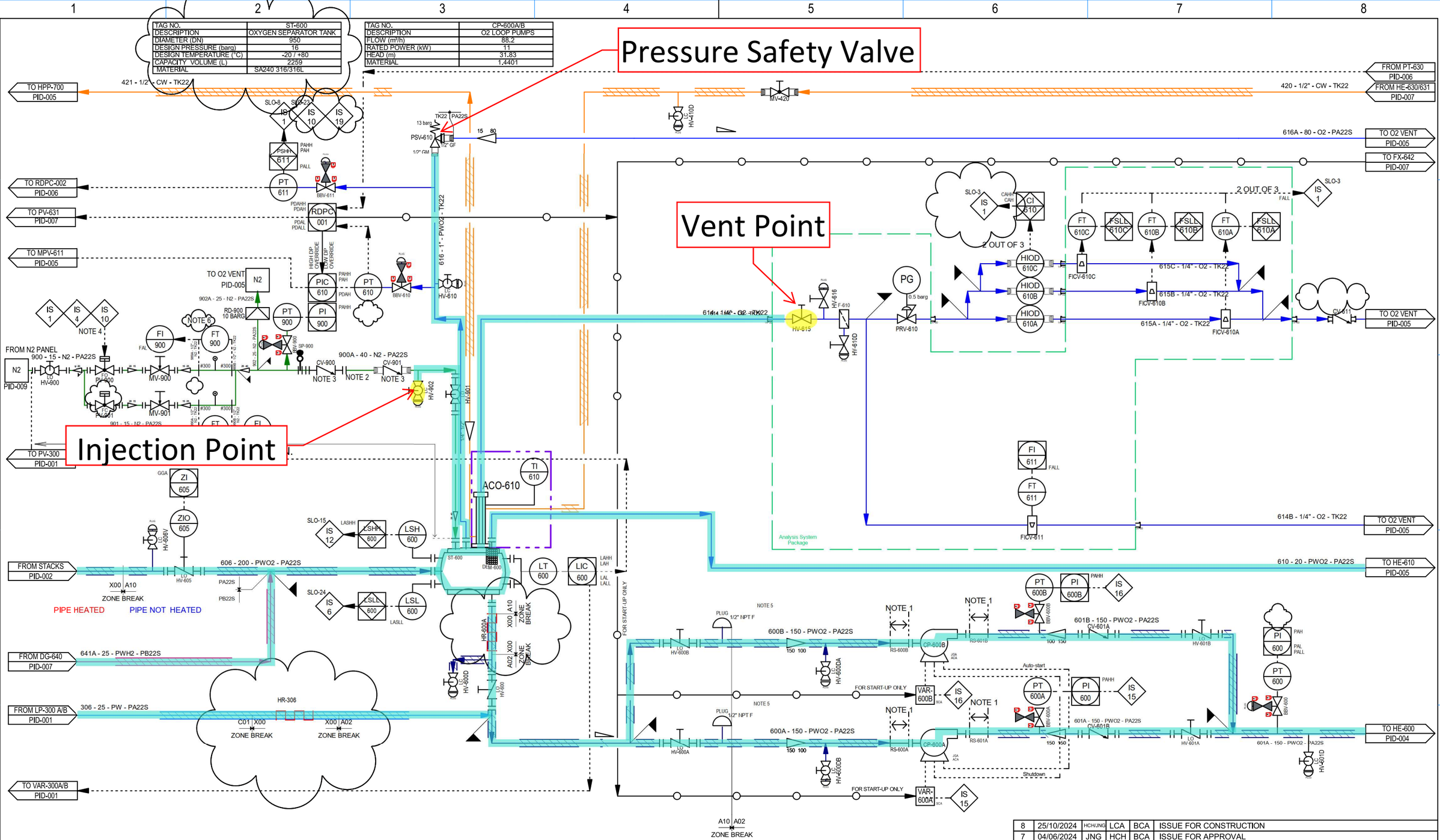
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Leak Test Pack 01 - Anode Water Loop / O2 Production (1/6)



Leak Test Pack 01 - Anode Water Loop / O2 Production (2/6)



NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : NITROGEN AUTO PURGING CONTROL
NOTE 5 : PG CONNECTION
NOTE 6 : FLANGE SUPPLIED WITH FT. COUNTERFLANGE CLASS 300 NOT SUPPLIED.

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept. PROCESS	Technical reference C63-PID-001-003	Created by HCH/JNG	Checked by LCA
Approved by BCA	Scale 1:1		
Licensor elogen Empowering a sustainable world		Document type P&ID	Document status DETAILED DESIGN
Client		Title, Supplementary title OXYGEN SEPARATION	Client reference -

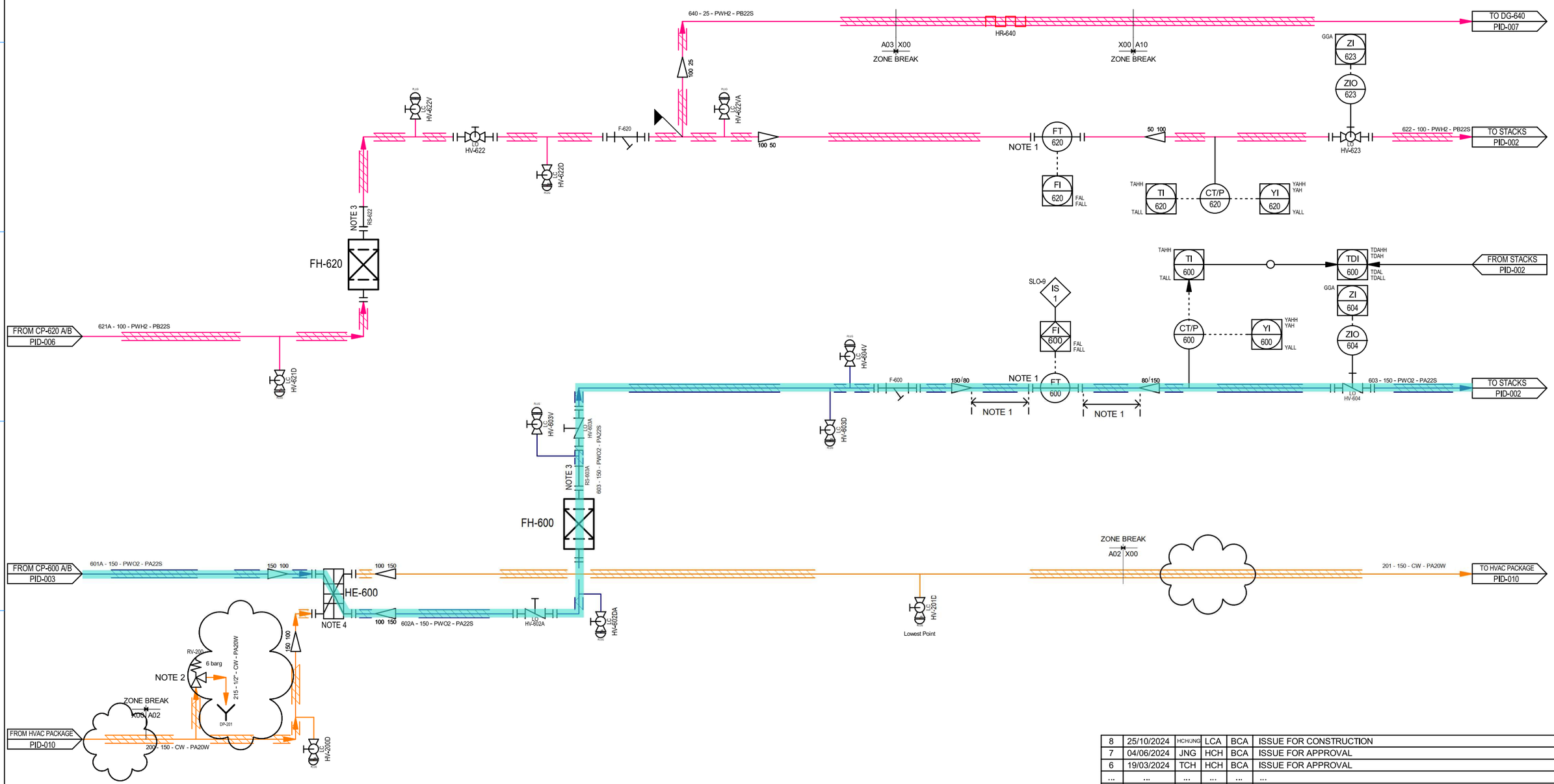
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8	25/10/2024	EN	3/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (3/6)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 01

Test pressure : 11.7 barg
Medium : N2/H2 mix

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Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (4/6)

TAG NO.	CS-610
DESCRIPTION	O2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	250
DESIGN PRESSURE (barg)	16 / 0.58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	68

TAG NO.	HE-610	
DESCRIPTION	O2 GAS HEAT EXCHANGER	
DUTY (kJ/h)	2,85E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	6.25	6.0

SAFE LOCATION - SEE DOC. PTN-002

O2 VENT

A10 X00

ZONE BREAK

PAH

PI 612

PT 612

BBV-612

FROM PSV-610 PID-003 — 616A - 80 - O2 - PA22S

FROM HIOD-610A/B/C PID-003 — 615A - 1/4" - O2 - TK22

FROM ACO-610 PID-003 — 614 - 1/4" - O2 - TK22

FROM N2 PANEL PID-009 — 906A - 50 - N2 - PA22S

FROM N2 PANEL PID-003 — 902A - 25 - N2 - PA22S

AV-402 — Highest Point — Free Floating Lever Air/Gas Vents

TO HPP-700 PID-011 — 406 - 50 - CW - PA20W

FROM PIC-610 PID-003

FROM ACO-610 PID-003 — 421 - 1/2" - CW - TK22

GDA AQA

FO MFV-611

612 - 50 - O2 - PA22S

613 - 50 - O2 - PA22S

IS 1 / IS 4 / IS 19

RO-610 0,6mm

40/20

617 - 40 - O2 - PA22S

FO PV-610

20/40

618 - 40 - O2 - PA22S NNF

619 - 80 - O2 - PA22S

HV-619D

FROM ST-600 PID-003 — 610 - 20 - PWO2 - PA22S

FROM HE-630/631 PID-007 — 405 - 50 - CW - PA20W

HE-610

NOTE 1
NOTE 2
NOTE 3

611 - 20 - PWO2 - PA22S

DEM-610

CS-610

NOTE 1

LSH 610

LIC 610 LAH LAL

LSL 610

LSL 611

LSLL 611 LALL

SLO-29 IS 13

HV-606D

607 - 1/2" - PWO2 - TK22

FO PV-600

PV-601

RO-600 0,4mm

607B - 1/2" - PWO2 - TK22

CV-600

PIPE NOT HEATED

PIPE HEATED

A10 X00 ZONE BREAK

TO LP-300 A/B PID-001

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8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : COLD INSULATION
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CONNECTION TYPE TO BE DEFINED AFTER HAZOP CLOSEOUT.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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Title, Supplementary title: OXYGEN CONDENSATE SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	5/16

Leak Test Pack 01 - Anode Water Loop / O2 Production (5/6)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

NOTES :

NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 01

Closed Valve

Test pressure : 11.7 barg
Medium : N2/H2 mix

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6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
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Document type: P&ID

Document status: DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

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Leak Test Pack 01 - Anode Water Loop / O2 Production (6/6)

TAG NO.	LP-300A/B
DESCRIPTION	PW LOOP PUMPS
FLOW (m³/h)	1.65
RATED POWER (kW)	1,5
HEAD (m)	122.7
MATERIAL	1.4401

WATER TREATMENT PACKAGE NOTE 7 NOTE 8

FROM CS-610 PID-005 — 607B - 1/2" - PWO2 - TK22 — ZONE BREAK X00 C01 — HR-607B

CA VENT — ZONE BREAK C01 X00 — 982 - 1/2" - CA - TK22 — 3/8" BSPP F (3A) — 1/2" NPT (3E)

981 - 1/2" - CA - TK22 — FROM BTK-980 PID-009

FROM LIC-600 PID-003

TO ST-600 PID-003

1ROP1.1 2ROP1.1 YP-70 1PSP1.1 1RFP1 — AQA-1003

PI 1RO5	PI 1RO7	PI 2RO5	PI 2RO7	PI 2RO8	PI 1F1	PI 1ME2	PI 1ED1	PI 1ED2	PI 1ED4	PI 1ED6	PI 2F1	PI 2F2	PI 1PS3	PISA+ 1PS1	
TI 1C1	TI 1RO7	TI 1ED7	TI 2RO7	TI 1B4	FSA- 1ED3	FSA 1ED3	QE 1Z1	QIA 1Z1	QISA+ 2RO4	PSA- 1RO2	QISA+ 1RO4	PSA- 1F2	UI 1ED11	LISA 1RF1	
FI 1ME3	FI 1RO6	FI 2RO6	FI 1ED3	FI 1ED4	FI 1ED5	FIR 1RO8	FIR 2RO5	FIR 1ED1	FIR 2RO3	FIR 2RO6	FIR 1RO3	FIR 1PS4		QIA 1B4	

DEMIN TANK — LISA 1B1 — LALL 301 LALL

TANK XL-300-SR

REJECT TANK

FROM BTK-980 PID-009 — 981 - 1/2" - CA - TK22

FROM LIC-600 PID-003

TO ST-600 PID-003

LO HV-300 — CV-300 — 50 15 — 1E — LO HV-300D

WTP-300

300 - 15 - RW - PA22S

PAHH PAH PAL PALL — PI 300 — PT 300

306 - 25 - PW - PA22S

4A

CAHH 300 — CAHH — 5A — 15 20 — PA22S TK22

FROM FCU-401 PID-012 — ZONE BREAK X00 C01 — 505 - 15 - RW - TK22

NOTE 5 — NOTE 1 NOTE 4 NOTE 3 — NOTE 3 — NOTE 5

302A - 25 - PW - PA22S — LO HV-301A — LP-300A — CV-301A — CV-302A — HV-302A LO — 303A - 25 - PW - PA22S

NOTE 9

305 - 15 - PW - PA22S

LO HV-300DA

302B - 25 - PW - PA22S — LO HV-301B — LP-300B — CV-301B — CV-302B — HV-302B LO — 303B - 25 - PW - PA22S

LO HV-300DB

LO HV-301D

SLO-15 — IS 12 — VAR-300A — VAR-300B — SLO-15 — IS 12

FROM AHU-400 PID-013 — 503 - 15 - RW - TK22 — ZONE BREAK E01 X00 — NOTE 9 — ZONE BREAK X00 C01 — HR-503 — SPH-404

504 - 15 - RW - TK22 — C01 X00 ZONE BREAK — FROM FCU-400 PID-012

FROM H2 VENT PID-007 — 501 - 20 - DPWH2 - PA22S

509 - 50 - RW - PA22S

506 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 402 PID-012

507 - 15 - RW - TK22 — ZONE BREAK C01 X00 — FROM FCU 403 PID-012

ELO GEN — CLIENT — 25 15 — C01 X00 ZONE BREAK — TP A — WATER SUPPLY

ELO GEN — CLIENT — X00 A10 ZONE BREAK — TP F — WATER DRAINAGE

TP E — ELO GEN — CLIENT — C01 X00 ZONE BREAK — PURE WATER DRAINAGE

#300 — PA22S — PB22S — 300/320 — HV-307V — NNF — 307 - 25 - PW - PB22S — CV-320 — NOTE 2 — TO ST-620 PID-006

FOR START-UP ONLY — FROM LIC-600 PID-003

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- FOR ALL PACKAGES, REFER TO THE SUPPLIER P&ID FOR COMPLETE INFORMATION
- FOR EACH SLO REFERENCE PLEASE REFER TO C63-PUY-001
- DRAIN VALVES TO BE INSTALLED AT LOWEST POINTS
- ALL EQUIPMENTS AND PIPING OUTSIDE CONTAINERS ARE HEATED USING HEATING RIBBONS

NOTES :
NOTE 1 : BRITISH STANDARD PIPE PARALLEL (TO INSTALL BETWEEN FLANGES)
NOTE 2 : COMMISSIONING AND INITIAL START-UP
NOTE 3 : ACCESSIBLE FOR MAINTENANCE
NOTE 4 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT
NOTE 5 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 6 : REMOVABLE LINE, USED ONLY FOR MAINTENANCE
NOTE 7 : REFER TO WATER TREATMENT PACKAGE DOCUMENTATION FROM OVIVO FOR COMPLETE P&ID - P&ID N° (90767001_02)
NOTE 8 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 9 : SECTION OUTSIDE CONTAINER SHALL BE INSULATED (X00 zone)

Leak Test 02

Closed Valve

Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-001	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

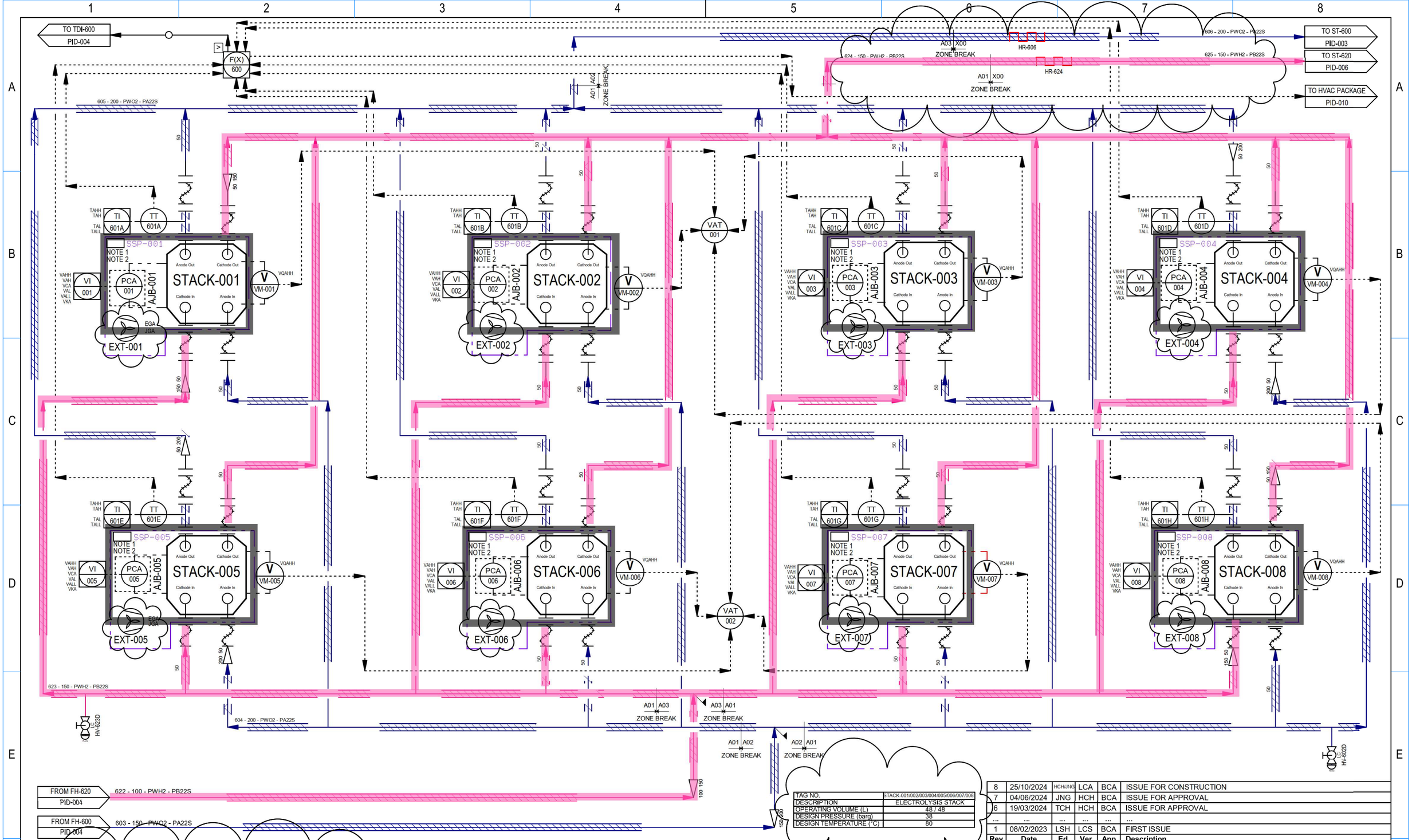
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: WATER TREATMENT PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	1/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (1/8)



TAG NO.	STACK-001/002/003/004/005/006/007/008
DESCRIPTION	ELECTROLYSIS STACK
OPERATING VOLUME (L)	48 / 48
DESIGN PRESSURE (barg)	38
DESIGN TEMPERATURE (°C)	80

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

GENERAL NOTES :
- ALL STACKS UPSTREAM AND DOWNSTREAM ARE FLANGED IN CLASS 300
- THERE ARE TWO STRINGS OF 4 EXTRACTORS, EACH STRING IS EQUIPPED WITH ONE BREAKER AND ONE CONTACTOR

NOTES :
NOTE 1 : STACK SYSTEM PACKAGE
NOTE 2 : PACKAGE TO BE SUPPLIED BY ELOGEN

Leak Test 02

Stacks replaced by flexible

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Test pressure : 32.4 barg
Medium : N2/H2 mix

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	CG3-PID-001-002	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: STACKS

Client reference: -

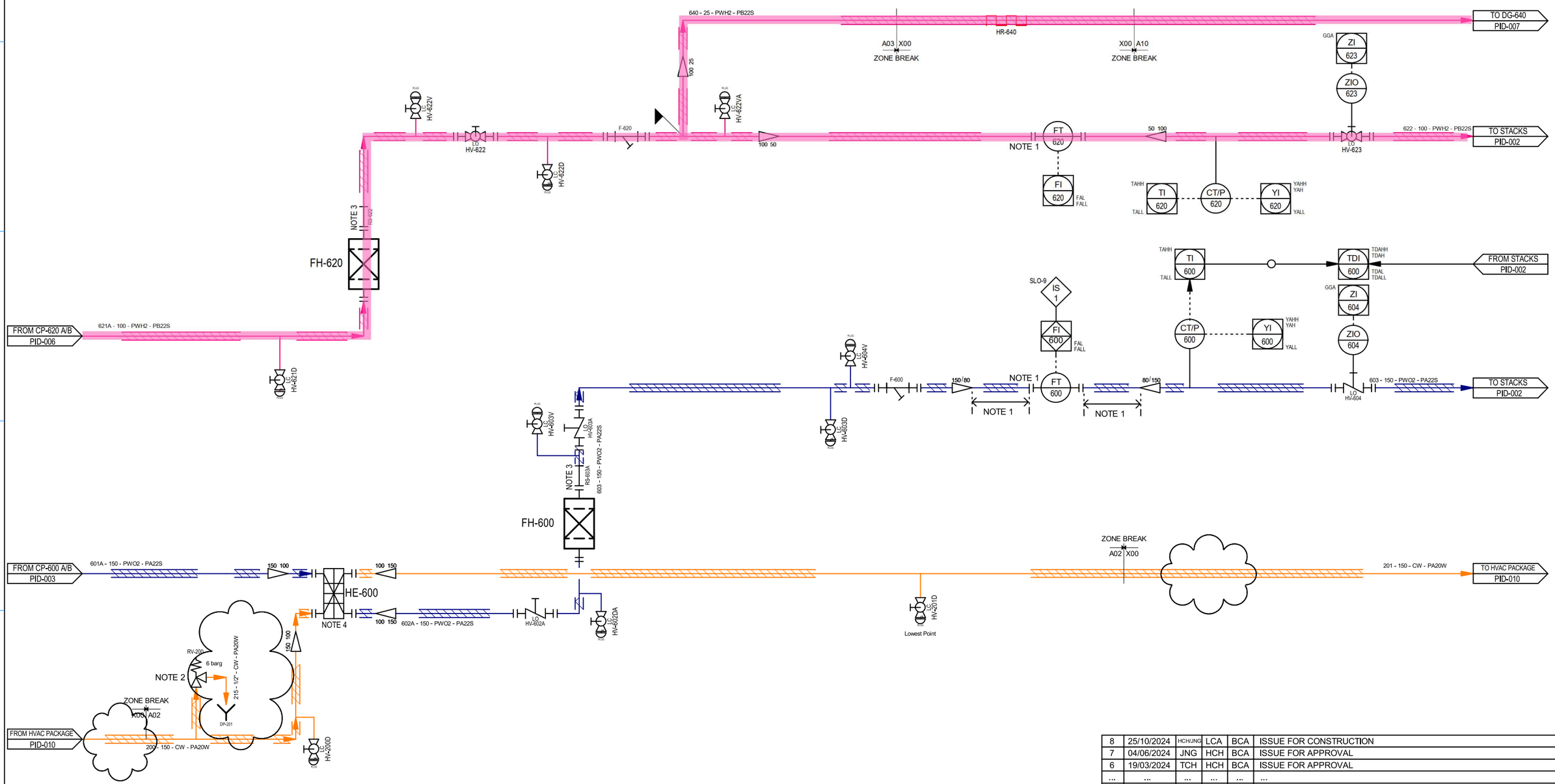
Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	2/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (2/8)

TAG NO.	FH-600
DESCRIPTION	O2 LOOP RESIN FILTERS HOUSING
DESIGN FLOW (m³/h)	88.2
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	640

TAG NO.	FH-620
DESCRIPTION	H2 LOOP RESIN FILTER HOUSING
DESIGN FLOW (m³/h)	33.6
DESIGN PRESSURE (barg)	16 / 0,58 bara
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	206

TAG NO.	HE-600	
DESCRIPTION	O2 LOOP HEAT EXCHANGER	
DUTY (kJ/h)	3.71E+06	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	16	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	43.1	36.5



Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT
NOTE 2 : TO CONTAINER DRIP PAN
NOTE 3 : USE FOR MAINTENANCE
NOTE 4 : COUNTER-CURRENT INSTALLATION

Leak Test 02

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-004	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: PURE WATER RESIN FILTERING

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	4/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (3/8)

TAG NO.	ST-620
DESCRIPTION	HYDROGEN SEPARATOR TANK
DIAMETER (DN)	600
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
VOLUME (L)	662

TAG NO.	CP-620A/B
DESCRIPTION	H2 LOOP PUMPS
FLOW (m³/h)	33,6
RATED POWER (kW)	5,5
HEAD (m)	35,2
MATERIAL	1.4404

Pressure Safety Valve

Injection Point

TO RDPC-001 PID-003

TO MPV-630 PID-008

TO FX-642 PID-007

TO FIC-640 PID-007

TO H2 VENT PID-007

FROM N2 PANEL

N2 PID-009

FROM STACKS PID-002

FROM LP-300 A/B PID-001

TO H2 VENT PID-007

FROM PT-611 PID-003

TO HE630/631 PID-007

TO FH-620 PID-004

PSV-630 36 barg

TK22 1/2" GF

PB22S 15 25

636A - 25 - H2 - PB22S

RDPC 002

PDAHH PDALL

PDSHH 002

PDSLL 002

PT 631

PSHH 631

PAHH PAH PALL

BBV-631

HV-630

PIC 630

PT 630

FX 630

BBV-630

IP 15

SLO-19

SLO-7

SLO-33

IS 1

IS 11

IS 20

IS 4

IS 17

IS 18

IS 5

IS 15

NOTE 4

FI 920

FT 920

PT 920

PI 920

RD-920 10 BARG

SP-920

BBV-920

CV-920

CV-921

NOTE 2

NOTE 3

HV-920

HV-921

HV-922

MV-920

MV-921

PV-920

PV-921

920A - 40 - N2 - PB22S

922 - 25 - N2 - PB22S

922 - 15 - N2 - PA22S

636 - 1" - PWH2 - TK22

MIN.

SLO-17

HV-625V

ZI 624

ZIO 624

HV-624

625 - 150 - PWH2 - PB22S

PIPE HEATED

PIPE NOT HEATED

X00 A10

ZONE BREAK

ST-620

DEM-620

LT 620

LI 620

LAHH LAH LAL LALL

LSL 620

LSLL 620

LASLL

SLO-32

HR-620A

HV-620D

HV-620C

ZONE BREAK1

625 - 25 - H2 - PB22S

NOTE 5

PLUG 1/2" NPT F

620A - 100 - PWH2 - PB22S

HV-620A

HV-620DA

620B - 100 - PWH2 - PB22S

HV-620B

HV-620DB

TSAHH

TSHH 621A

TT 621A

NOTE 1

CP-620A

RS-620A

RS-621A

100 80

50 100

Auto-start

VAR-620A

CV-621A

HV-621A

621A - 100 - PWH2 - PB22S

PT 620A

PI 620A

IS 17

BBV-620A

TSHH 621B

TT 621B

CP-620B

RS-620B

RS-621B

Shutdown

VAR-620B

CV-621B

HV-621B

621B - 100 - PWH2 - PB22S

PT 620B

PI 620B

IS 18

BBV-620B

PI 620

PT 620

BBV-620

307 - 25 - PW - PB22S

NNF

C01 X00

HR-307

ZONE BREAK

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :

NOTE 1 : DISTANCE OF 5*D REQUIRED UPSTREAM AND DOWNSTREAM OF THE EQUIPEMENT

NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES FULLMEET CLASS 1 REQUIREMENT

NOTE 3 : ACCESSIBLE FOR MAINTENANCE

NOTE 4 : NITROGEN AUTO PURGING CONTROL

NOTE 5 : PG CONNECTION

Leak Test 02

Closed Valve

Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-006	HCH/JNG	LCA	BCA	1:1

Licensor: elogen — Empowering a sustainable world

Client

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN SEPARATION

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	6/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (4/8)

TAG NO.	HE-630/631	
DESCRIPTION	H2 GAS HEAT EXCHANGER	
DUTY (KJ/h)	4,4E+04	
	HOT SIDE	COLD SIDE
DESIGN PRESSURE (barg)	40	6
DESIGN TEMPERATURE (°C)	80	80
VOLUME (L)	1.6	1.64

TAG NO.	CS-630
DESCRIPTION	H2 CONDENSATE SEPARATOR
DIMENSIONS (DN)	150
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA312 TP316/316L
VOLUME (L)	17

TAG NO.	DG-640
DESCRIPTION	H2 HIGH PRESSURE DEGASSER
DIAMETER (DN)	500
DESIGN PRESSURE (barg)	40 / 0,58 bar(a)
DESIGN TEMPERATURE (°C)	-20 / +80
MATERIAL	SA240 316/316L
VOLUME (L)	300

HYDROGEN GENERAL VENT - SEE DOC. PTN-002

FROM PSV-630 PID-006
FROM MV-632 PID-008
TO ACO-610 PID-003
420 - 1/2" - CW - TK22
424 - 1/2" - CW - PA20W
RV-400 6 barg
NOTE 1 NOTE 9
TO HE-610 PID-005
405 - 50 - CW - PA20W
NOTE 9
FROM N2 PANEL PID-006
922A - 25 - N2 - PB22S
636A - 25 - H2 - PB22S
639B - 25 - H2 - PB22S
502 - 15 - PWH2 - PB22S
FROM HPP-700 PID-011
740 - 1" - H2 - TK22
FROM HPP-700 PID-011
PI 632 PAHH
PT 632
BBV-632
TP C
H2 VENT
CLIENT
ELOGEN
A10 X00
ZONE BREAK
NOTE 10
LSHH 500
LSH 500
LSL 500
LSLL 500
LASLL
IS 14
NOTE 7
LC HV-511
FROM RDPC-001 PID-03
500 - 25 - PWH2 - PB22S
RO-501 4mm
NOTE 6 NOTE 8 NOTE 9
PV-500 PV-501
501 - 20 - DPWH2 - PA22S
TO WATER DRAINAGE PID-001
TO HPP-700 PID-011
IS 1 IS 4 IS 20
RO-630 2.8mm
PV-630
633A - 1/2" - H2 - TK22
633 - 20 - H2 - PB22S
PV-631
MV-631
638B - 20 - H2 - PB22S
634 - 20 - H2 - PB22S
CV-630
SLO-34
LSH 631
LSHH 631
LSH 630
LIC 630
LSL 630
DEM-630
CS-630
AV-400 NOTE 3 NOTE 4 Free Floating Lever Air/Gas Vents
AV-401 NOTE 3 NOTE 4 Free Floating Lever Air/Gas Vents
FROM ST-620 PID-006
630 - 25 - H2 - PB22S
ZONE BREAK
X00 A10
FROM WC-400/401 PID-010
422 - 40 - CW - PA20W
HE-630
HE-631
NOTE 2
404 - 50 - CW - PA20W
405 - 50 - CW - PA20W
631 - 25 - H2 - PB22S
631A - 25 - H2 - PB22S
PSV-640
PA22S TK22
638A - 25 - H2 - PB22S
HNF
646 - 1" - H2 - TK22
NOTE 9
FIC 642
642 - 1/2" - H2 - TK22
PV-642
1/2" 1/4"
MV-642
1/4" 1/2"
CV-642
1/2" 50
644 - 50 - H2 - PB22S
TK22 PB22S
FROM PIC-630 PID-006
647 - 1/2" - H2 - TK22
HV-642
FX 642
F(X)
940B - 25 - H2 - PB22S
HV-941
941 - 25 - N2 - PB22S
SP-940
CV-940
HV-940
FI 940
MV-941
941A - 25 - N2 - PA22S
FROM N2 PANEL PID-009
IS 3
PV-641
CV-640
TO ST-600 PID-003
FSH 640
FAHH
FSH 640
SLO-22
IS 3
FROM RDPC-001 PID-003
FROM FX-630 PID-006
FROM FH-620 PID-004
640 - 25 - PWH2 - PB22S
PG 13 barg
PRV-640
MV-640
PA640
626 - 1/2" - PWH2 - TK22
NOTE 9
RO-620 NOTE 5 0.3mm
PV-620
CV-620
626B - 1/2" - PWH2 - TK22
HV-626D
DG-640
LSH 640
LIC 640
LAHH
LSL 640
LSL 641
LSLL 641
LALL
SLO-18
IS 3
641 - 25 - PWH2 - PB22S
HV-640D
HV-400
HV-400DA
HV-626D
HV-640D

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

NOTES :
NOTE 1 : TO CONTAINER DRIP PAN
NOTE 2 : COUNTER-CURRENT INSTALLATION
NOTE 3 : CLOSEST TO AHD
NOTE 4 : HIGHEST POINT
NOTE 5 : DESIGNED FOR PSV-640
NOTE 6 : AWAITING 3D DEFINITION
NOTE 7 : USED FOR FILLING DURING START-UP
NOTE 8 : HYDRAULIC GUARD HEIGHT = 600MM. LSLL AND LSL DISTANCE = 200MM. LSL AND LSH DISTANCE = 400MM.
NOTE 9 : SEE PTN-002 FOR ALL THE CONNECTION LOCATION ON HYDROGEN VENT.
NOTE 10 : FOR ATEX PURPOSE, ROSETTI VALVE MV-002 WAS ADDED BEFORE TIE-IN POINT C AND INSIDE THE A10 CONTAINER.

Leak Test 02

Closed Valve

Test pressure : 32.4 barg
Medium : N2/H2 mix

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-007	HCH/JNG	LCA	BCA	1:1

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Client

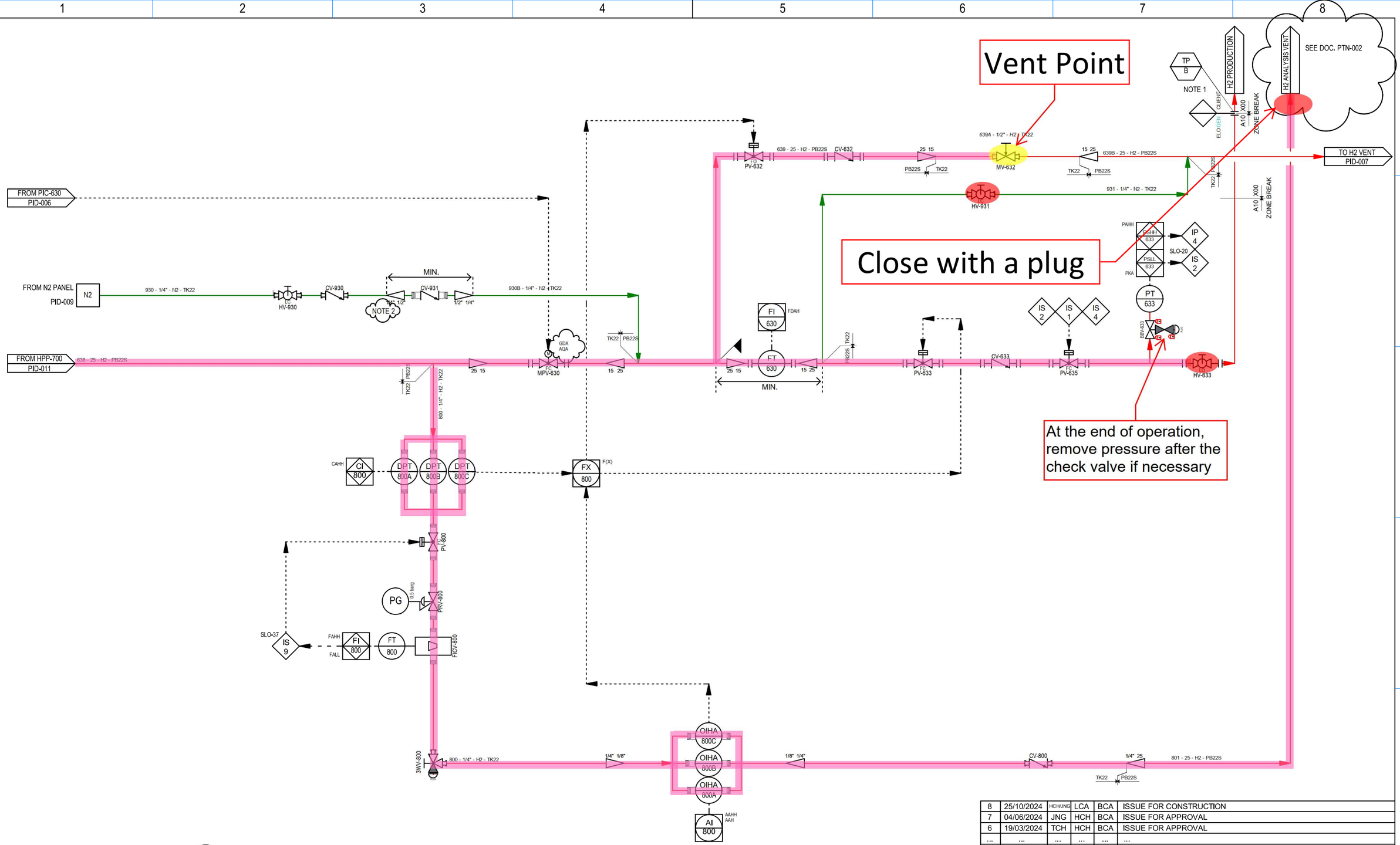
Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 CONDESATE SEPARATION AND PURE WATER BALANCING LOOP

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	7/16

Leak Test Pack 02 - Cathode Water Loop / H2 Production (5/8)



NOTES :
NOTE 1 : ALL OUTDOOR FLANGES MUST BE EQUIPPED WITH FLANGE GUARD DUCTED TO H2 VENT
NOTE 2 : DISSIMILAR TECHNOLOGY BETWEEN THE TWO CHECK VALVES/ CHECK VALVE SHALL MEET CLASS 1 REQUIREMENT

Leak Test 02

Closed Valve

Valve to Operate

Test pressure : 32.4 barg
Medium : N2/H2 mix

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7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
6	19/03/2024	TCH	HCH	BCA	ISSUE FOR APPROVAL
...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-008	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: H2 PANEL

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	8/16

Leak Test Pack 02 - H2 Purification & Send Out (6/8)

Pressure Safety Valve

FROM CS-630
PID-007

634 - 20 - H2 - PB22S

TO H2 VENT
PID-007

740 - 1" - H2 - TK22

PSV-631
36 barg

1" GF

1/2" GM

PB22S | TK22

740B - 1" - H2 - TK22

741 - 1" - H2 - TK22

PSV outlet

25 20

25 40

407 - 40 - CW - PA20W

A10 | X00
ZONE BREAK

TO THS-400
PID-010

HE 64.1

HE 61.1

FC
FC-64.1
FSA
FSA LL

TT
TT-60.1
TSA HH
TA H
TSA
TA L
TSA LL

TT
TT-60.2
TSA HH
TA H
TSA
TA L
TSA LL

TT
TT-61.1
TSA HH
TA H
TSA

PT
PT-64.1
PSA HH
PSA
PA L
PSA LL

TT
TT-64.5
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TA H
TA L

TT
TT-64.6
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TSA HH C
TA L

TT
TT-64.7
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TA H
TA L

TT
TT-64.8
TSA HH A
TSA HH R
TSA
TA H A
TA H R
TSA HH C
TA L

HYDROGEN
PURIFICATION
PACKAGE

NOTE 1
NOTE 2

TSH
TS-64.1

TSH
TS-64.2
TSA HH

TSH
TS-64.3
TSA HH
PSV outlet

TSH
TS-64.4
TSA HH

700 - 3/4" - CW - PA20W

DP-700

KSA K01 HH
KSA K01 LL
KSA K02 HH
KSA K02 LL
KSA K03 HH
KSA K03 LL
KSA K04 HH
KSA K04 LL

64 V1
64 V2
64 V3
64 V8
64 V12
64 V17

GSA HH
GSA LL
GS
GS-64.1.1
GS-64.1.2
GS-64.1.3
GS-64.1.4
GS-64.2
GS-64.3
GS-64-T2

RACCORD PNEUFIT 6MM

HY-LOK 8MM FITTING

502 - 15 - PWH2 - PB22S

TO H2 VENT
PID-007

638 - 25 - H2 - PB22S

TO H2 PANEL
PID-008

970 - 1/2" - CA - TK22

FROM BTK-980
PID-009

NOTE 3

15 25

HV-401D

MV-406

50 15

NOTE 3

FROM HE-610
PID-005

406 - 50 - CW - PA20W

MV-408

425 - 40 - CW - PA20W

Leak Test 02

Test pressure : 32.4 barg
Medium : N2/H2 mix

NOTES :
NOTE 1 : PACKAGE TO BE SUPPLIED BY ELOGEN
NOTE 2 : REFER TO HYDROGEN PURIFICATION PACKAGE DOCUMENTATION FROM AQUAGAS FOR COMPLETE P&ID - P&ID N° 20230440
NOTE 3 : A SECTION OF 200 MM INSULATION SHALL BE REMOVABLE FOR THE TEMPORARY INSTALLATION OF ULTRASONIC FLOWMETER. IT SHALL BE LOCATED HORIZONTALLY ON A STRAIGHT SECTION OF PIPE WITH 5D UPSTREAM AND DOWNSTREAM.

Rev.	Date	Ed.	Ver.	App.	Description
8	25/10/2024	HCH/JNG	LCA	BCA	ISSUE FOR CONSTRUCTION
7	04/06/2024	JNG	HCH	BCA	ISSUE FOR APPROVAL
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...	...	...	...	...	...
1	08/02/2023	LSH	LCS	BCA	FIRST ISSUE

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Responsible dept.	Technical reference	Created by	Checked by	Approved by	Scale
PROCESS	C63-PID-001-011	HCH/JNG	LCA	BCA	1:1

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Client:

Document type	Document status
P&ID	DETAILED DESIGN

Title, Supplementary title: HYDROGEN PURIFICATION PACKAGE

Client reference: -

Rev.	Date of issue	Lang.	Page
8	25/10/2024	EN	11/16

Leak Test Pack 02 - H2 Purification & Send Out (7/8)

No.	Qty.	Modified from	Date	Intr.	Appr.
1	.	Added CW safety valve PSV64.3	2023-11-10	RE	CJ
2	.	ASME Flanges N5 & N6, Vent line pipe added	2023-12-05	RE	CJ
3	.	Changed connection N5,N6 & N10, material & p. class	2024-01-19	RE	CJ

N7 Φ6mm Instrument air or Nitrogen

TO CP 64-V17 | TO CP 64-V8 | TO CP 64-V3 | TO CP 64-V2 | TO CP 64-V1 | TO CP 64-V12

TSA HH 64.4 / TS 64.4 ≤60°C

PI 64.1 — 64-V9

AQUAGAS

Customer
Flange
1", 300Lbs
ASME B16.5, 316L
N2 Hydrogen
N10 Vent
Flange
1", 300Lbs
ASME B16.5, A105

66 Particle filter 5µm

PSV 64.1 36bar — N8 — 64-V4.1
PSV 64.2 36bar — N9 — 64-V4.2

GSA LL/HH 64.1.1 / GS 64.1.1 Open=I
GSA LL/HH 64.1.3 / GS 64.1.3 Open=I
GS 64.1.2 / GSA LL/HH 64.1.2 Open=I
GS 64.1.4 / GSA LL/HH 64.1.4 Open=I

64-V4.3 | 64-V4.4

TSA HH 64.6 / TA L/H 64.6 / TC 64.6 / TI 64.6 / TT 64.6

TT 64.8 / TI 64.8 / TC 64.8 / TA L/H 64.8 / TSA HH 64.8

TS 64.3 / TSA HH 64.3 ≤200°C

TSA HH 64.2 / TS 64.2 / TS(TC) 64.1 — Heater HE64.1 — 64-V14 — 64-V14.1

64-V7 — GSA LL/HH 64.3 / GS 64.3 Open=I

64B Dryer

TSA HH 64.5 / TA L/H 64.5 / TC 64.5 / TI 64.5 / TT 64.5

GSA LL/HH 64.2 / GS 64.2 Open=I

64A Dryer

FC 64.1 4-20mA — 64-V5 — 64-V6 — 64-T4

TT 64.7 / TI 64.7 / TC 64.7 / TA L/H 64.7 / TSA HH 64.7

64-V15 — 64-V10 — 64-T1 — 64-V16 — 64-V11

G 3/4" PSV-64.3 6bar

Discharge N4

Hydrogen N1
Flange
1", 300Lbs
ASME B16.5
A105

61-V2 — 61-V1

TSA HH 61.1 / TA 61.1 / TC 61.1 / TI 61.1 / TT 61.1

TSA LL/HH 60.1 / TA L/H 60.1 / TC 60.1 / TI 60.1 / TT 60.1

TSA LL/HH 60.2 / TA L/H 60.2 / TC 60.2 / TI 60.2 / TT 60.2

*Note 1

61 Deoxidizer

Trace heater cable HE61.1

CW N6
CW N5
Flange
1", 150Lbs
ASME B16.5
A105

Customer | AQUAGAS

64-F1.1 1mm — 64-F1.2 0,5mm — 64-V13 — 64-F2.2 0,5mm — 64-V33 — 64-F2.1 1mm

61-F1.1 — 61-F1.2 — 61-V3

64-V31 — 64-T2 — GS 64-T2 Closed=I / GSA LL/HH 64-T2

Test pressure : 32.4 barg
Medium : N2/H2 mix

Leak Test 02

Closed Valve

*Note 1: Flange to fill/drain desiccant/catalyst.

– – – – = Customer scope of supply

Leak Test Pack 02 - H2 Purification & Send Out (8/8)

Pos. No.	Qty.	Designation	Material	Dimension	Remark
Design. RE	Drawn RE	Copy	Checked	Stand.	Appr.	Scale	Replaces	Replaced of
							Filename 20230443.dwg	Date 23-07-03

R-500/36 OffShore
P&I Diagram
Drawing no. 20230440

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elogen	**PRECOMMISSIONING**	CROSSWIND
	C63-ELO-REP-CO-0101 - LEAK TEST	

TEST CONDITIONS	
Leak Test Pack	
Tested System	
Test Pressure (Barg)	
Test Fluid	

EQUIPEMENT USED		
Test Equipment Used	Serial Number	Calibration Expiry Date

TEST				
BEGINNING	Date	Time	Pressure (Barg)	Temperature (°C)
END	Date	Time	Pressure (Barg)	Temperature (°C)

RESULT			
Test Duration		Delta P (Bar)	
Snoop Detection without Bubbles	YES / NO / NA		
Gas Detection Without Leaks	YES / NO / NA		
Result	OK / NOK		

ATTACHMENTS

- Leak Test Pack P&ID Mark-Up used for System line-up
- Picture of Manometer showing the Pressure and the Time at the beginning and at the end

NOTES

	FORES	ELOGEN	CROSSWIND
NAME			
DATE			
SIGNATURE			

C63-PWI-002

CAUSE AND EFFECT MATRIX

(Phase 2)

C63- CrossWind Project

As built - 18/04/25

Luc Paoletti

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
006	6th Issuance (Ph2) - IFC	21/03/2025	DPI	JNG	BCA
005	5th Issuance (Ph2) - IFC	28/01/2025	DPI	BCA	IDI
004	4thrd Issuance (Ph2) - IFC	04/09/2024	BCA	HCH	BBA
003	3thrd Issuance (Ph2) - IFA	26/04/2024	JNG	HCH	BCA
002	2end Issuance (Ph1)	18/08/2023	JLB	LSH	EGR
001	1st Issuance (Ph1)	14/04/2023	LSH	BCA/LSH	EGR

Elogen Project Document Number	C63-PWI-002
Elogen Project Document Name	CAUSE & EFFECT MATRIX
Elogen Document File Name	C63-PWI-002_Rev.006

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REVISION LIST

REV.	DESCRIPTION
003	*General update as per PID and HAZOP recommendations*
004	*General update*
005	General update according to CRS rev. 04
006	Update following Software implementation to have matching between Software and C&E (and software programming constraints) Adding IS7 following request from customer to separate Gas alarm from Fire Alarm. Gas Alarm will trigger a distinct alarm at Customer side, IS7 will be triggered by AHD-1000, 1001, 1002, 1003, 1004

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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Bonjour vous venez d'ouvrir la Cause and Effect
Ce document liste les interlocks process et safety
Vous retrouverez les différentes séquences ou actions singulières qui existent dans l'anlayse fonctionnelle
Les codes des séquences sont associés ensuite avec ceux présents dans la table d'alarme, on peut ainsi déterminer quels sont les initiateurs
Le document associé est le CXX - PWI-003- Alarm list

Hello, you just opened the Cause and Effect
This document makes the list of interlocks process and safety
You will find the different sequences or singular actions existing in the functional analysis
The codes of sequences are associated with the one present in the alarm table, then it is possible to determine the initiating cause
The document associated is CXX - PWI-003- Alarm list

CAUSE & EFFECT DIAGRAM	EFFECTS	DISPLAY alarm	TRIGGER Safety Relay	ENABLE ESD signal (ASE-001 - Process) to customer SCADA	ENABLE ESD signal (ASE-002- Fire and Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger Main Circuit Breaker	STOP AND SET Emergency stop (Supervisor)	DEENERGISE All solenoid valves Back to rest position	CLOSE Control valves MPV-011 (FC)	CLOSE Control valves MPV-001 (FC)	CLOSE PV-011 (FC)	CLOSE H2 purification unit pneumatic valves	CLOSE MSWV-200 (FC)	CLOSE PV-200 (FC) - CUSTOMER LINE ISOLATED	CLOSE SV-042 (FC)	CLOSE SV-042 (FC)	START CONTINUOUSLY BSC 1000 / 1001 / 1002 / 1003
CAUSES																	
Référence effect																	
INTERLOCK PROCESS																	
IP1		X					X	X		X		X	X	X	X	X	
IP2		X															
IP3		X					X	X		X		X	X	X	X	X	
IP4		X												X			
IP5		X					X	X		X		X	X	X	X	X	
IP6		X					X	X		X		X	X	X	X	X	
IP7		X					X	X		X		X	X	X	X	X	

	A	B	C	D	E	G	H	I	J
1	Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Alarm message (FR)	Timer (sec)	Alarm Group
2	OIHA-800	AAH-800	7	volppm	IP9	%O2 in H2 detector OIHA800 - H	Détection d'O2 dans l'H2 OIHA800 - H	5	DEFAULT
3	OIHA-800	AAHH-800	10	volppm	IP1	%O2 in H2 detector OIHA800 - HH	Détection d'O2 dans l'H2 OIHA800 - HH	1200	DEFAULT
4	REC-001	ACA-001	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
5	REC-002	ACA-002	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
6	REC-003	ACA-003	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
7	REC-004	ACA-004	600	s	IP1	Waiting too long before starting rectifier	Temps de démarrage redresseur trop long		DEFAULT
8	CP-600	ACA-600	-	-	IP6	Starting of CP-600 failed.	Le démarrage de la CP-600 a échoué.	-	DEFAULT

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CAUSE & EFFECT DIAGRAM

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CAUSES		EFFECTS	DISPLAY alarm	STOP AND SET Rectifiers (all) (Uset=0V)	DEENERGISE All solenoid valves. Back to rest position	CLOSE Control valves MPV-611 (FC)	CLOSE Control valves MPV-630 (FC)	CLOSE PV-631 (FC)	CLOSE H2 purification unit pneumatic valves	CLOSE M3WV-200 (FC)	CLOSE PV-633 (FC) - CUSTOMER LINE ISOLATED	CLOSE PV-640 (FC)	CLOSE PV-642 (FC)	START INTERMITTENTLY BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT VE-002 / 006 / 010 (Orange)	LIGHT ON FLASHING VE-001 / 005 / 009 (Rouge)	STOP IMMEDIATLY CP-200	STOP AT THE END OF STOP SEQUENCE CP-200	STOP IMMEDIATELY BY SETTING VAR600A/B to 0% (STO) THE RUNNING CP-600 (A or B following status)	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR600A/B TO 0% THE RUNNING CP-600 (A or B following status)	STOP IMMEDIATELY BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)	STOP AT THE END OF STOP SEQUENCE DC-200 - Alt motors	STOP IMMEDIATELY H2 purification unit dcoxo dryers heating	STOP IMMEDIATELY BY SETTING VAR300A/B TO 0% THE RUNNING LP-300 (A or B following status)	STOP IMMEDIATELY WC-400 (CP-400)	STOP AT THE END OF STOP SEQUENCE WC-400 (CP-400)	STOP IMMEDIATELY WC-401 (CP-401)	STOP AT THE END OF STOP SEQUENCE WC-401 (CP-401)	OPEN MPV-611 (FC) till depressurisation and/or inerting of ST-600 completed. OPEN PV-610 if MPV-611 is failling.	OPEN PV-631 (FC) till depressurisation and/or inerting of ST-620 completed. OPEN PV-630 if PV-631 is failing.	OPEN PV-901 (FC) till PT-610 reach 0,5 barg	OPEN PV-901 (FC) till inerting of ST-600 completed	OPEN PV-921 (FC) till inerting of ST-620 completed	OPEN PV-921 (FC) till PT-610 reach 0,6 barg	OPEN IMMEDIATELY PV-632 (FO)	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-630_HH	FORCE STANDBY PRESSURISED Till(TT1001 < TAH1001 or TT1002<TAH1002 or TT1003<TAH1003 or TT1004<TAH1004 or TT1005<TAH1005 or TT1006<TAH1006	FORCE STANDBY PRESSURISED After 1200s	SWITCH LP300 - From A to B or B to A	SWITCH CP600 - From A to B or B to A	SWITCH CP620 - From A to B or B to A	GO TO STANDBY PRESSURISED	REDUCE ELECTROLYSER SETPOINT AT 50%	Rectifier current is set instantly to 0A (no ramp down)
Effect reference																																														
INTERLOCK PROCESS	*DESCRIPTION*																																													
IP1	Major Fault		X	X	X		X		X	X	X	X	X			X		-		X		X		X		-		-	X	X			X	X										
IP2	LALL-600 - Low Level in ST-600		X	X	X		X		X	X	X	X	X			X		-	X	X		X		X	-	X	X	-		-	X	X			X	X									x
IP3	LALL-620 - Low Level in ST-620		X	X	X		X		X	X	X	X	X			X		-		X	X	X	-	X	X		-		-	X	X			X	X									
IP4	Hydrogen Purity not reached or Hydrogen pressure too high		X								X																											X		X					
IP5A	Problem on CP-620A requiring start of the CP-620B pump		X								X																											X		X					
IP5B	Problem on CP-620B requiring start of the CP-620A pump		X																																					X		-			
IP6A	Problem on CP-600A requiring start of the CP-600B pump		X																																					X		X		X	
IP6B	Problem on CP-600B requiring start of the CP-600A pump		X																																					X		X		X	
IP7	Problem on LP-300A/B requiring instant stop of the running pump		X												X										X																				
IP8	Low Temperature in anodic/cathodic water loop and ambient		X							X				X	X																														
IP9	Process value out of regular operating value		X												X																														
IP10	*Not Used*																																													
IP11	High Ambient temperature - Loss of AHU		X												X																										X					
IP12	*Not Used*																																													
IP13	Hydrogen Ambient Detection High		X											X	X																															
IP17B	Problem on LP-300B requiring start of the LP-300A		X																																						X					
IP15	*Not Used*																																													
IP16	Problem on pure water feed to anodic loop		X																						X																				
IP17A	Problem on LP-300A requiring start of the LP-300B		X																																						X					
IP20	LOSS OF HALF OF THERMAL POWER (THS-400 or THS-200)		X																																									X	-

Notes:

Modification VS Rev05 are in yellow

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elogen	Electrolyzer Package																												Document Code		C63-PWI-002	
	CAUSE AND EFFECT MATRIX																												Revision		Rev.006	
	C63- CrossWind Project																												Page Number		05 of 05	
CAUSE & EFFECT DIAGRAM	**EFFECTS**	DISPLAY alarm	ENABLE ESD signal (ASE-001 : Process) to customer SCADA	ENABLE ESD signal (ASE-002: Fire issue) to customer SCADA	ENABLE ESD signal (ASE-003:Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger MN Breaker (Main Supply)	STOP AND SET Rectifiers (all) (Uset=0V)	ACTIVATE Safety E.Board 061A2, MN Inter DC (ESD Rectifiers), MN Rectifer Breaker	START CONTINOUSLY (NOT IN SIS) BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT (NOT IN SIS) VE-001 / 005/ 009 / 013 (Rouge)	STOP IMMEDIATELY CP-600A/B BY SETTING VAR-600A/B TO 0%	STOP IMMEDIATELY CP-620A/B BY SETTING VAR-620A/B TO 0%	STOP IMMEDIATELY LP-300A/B BY SETTING VAR-300A/B TO 0%	OPEN PV-610 (FO) till depressurisation and/or inerting of ST-600 completed.	OPEN PV-630 (FO) till depressurisation and/or inerting of ST-620 completed. OPEN PV-631 if PV-630 is failling.	OPEN PV-900 (FO) till inerting of ST-600 completed	OPEN PV-920 (FO) till inerting of ST-620 completed	CLOSE AND LOCK PV-641 (FC)	CLOSE PV-635 (FC)	CLOSE AND LOCK PV-601 (FC)	OPEN IMMEDIATELY PV-610 (FO) till pressure < PT-611_H-0.2	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-631_H-0.2	CLOSE PV-800	OPEN PV-900 (FO) till PT611 > 0,5 barg	OPEN PV-920 (FO) till PT-631 > 0,5 barg	CLOSE PV-501 (FC)	STOP IMMEDIATELY CP-600A BY SETTING VAR-600A TO 0%	STOP IMMEDIATELY CP-600B BY SETTING VAR-600B TO 0%	STOP IMMEDIATELY CP-620A BY SETTING VAR-620A TO 0%	STOP IMMEDIATELY CP-620B BY SETTING VAR-620B TO 0%	TRIGGER IS1
CAUSES																																
Effect reference																																
INTERLOCK SAFETY	***DESCRIPTION***																															
IS1	ESD Electrolyser following Process issue SAFETY STOP		X	X			X	X	X	X	X				X	X	X	X		X												
IS2	Isolation from customer H2 line		X																	X												
IS3	Isolation balancing line (640)		X																X													
IS4	ESD Electrolyser following Fire issue		X		X		X	X	X	X	X				X	X	X	X		X												
IS5	Very Low water level in ST-620		X					X					X																			X
IS6	Very Low water level in ST-600		X					X				X																				X
IS7	ESD Electrolyser following Gas issue		X			X	X	X	X	X	X				X	X	X	X		X												
IS8	*Not Used*																															
IS9	Very High Flowrate on H2 Analysis Line		X																				X									
IS10	Very Low Pressure on anodic side		X																					X								
IS11	Very Low Pressure on cathodic side		X																						X							
IS12	Very High Level ST-600		X											X																		
IS13	Very Low Level CS-610		X																	X												
IS14	Very Low Level in H2 Vent		X																							X						
IS15	Blocked discharge CP600A		X																								X					
IS16	Blocked discharge CP600B		X																									X				
IS17	Blocked discharge CP620A		X																										X			
IS18	Blocked discharge CP620B		X																											X		
IS19	MPV-611 fault - High Oxygen Pressure																				X											
IS20	PV-631 fault - High Hydrogen Pressure																					X										

Notes:

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Electrolyser Package
CAUSE AND EFFECT MATRIX
C&S CrossWind Project

Document Code	C&S-PWI-002
Revision	Rev.006
Page Number	94 of 95

CAUSE & EFFECT DIAGRAM

MARK UP BCA - 14/04/2025

CAUSES

Effect reference		EFFECTS
INTERLOCK PROCESS	DESCRIPTION	
IP1	Major Fault	DISPLAY alarm
IP2	LALL-600 - Low Level in ST-600	STOP AND SET (Hydrolyser Unit) (Hydrolyser)
IP3	LALL-620 - Low Level in ST-620	DEENERGISE
IP4	Hydrogen Purity not reached or Hydrogen pressure too high	Air solenoid valves Back to rest position
IP5A	Problem on CP-620A requiring start of the CP-620B pump	CLOSE Control valves MPV-611 (FC)
IP5B	Problem on CP-620B requiring start of the CP-620A pump	CLOSE Control valves MPV-630 (FC)
IP6A	Problem on CP-600A requiring start of the CP-600B pump	CLOSE PV-631 (FC)
IP6B	Problem on CP-600B requiring start of the CP-600A pump	CLOSE H2 purification unit pneumatic valves
IP7	Problem on LP 300A/B requiring instant stop of the running pump	CLOSE M3WV-200 (FC)
IP8	Low Temperature in anodic/cathodic water loop and Ambient	CLOSE PV-633 (FC) - CUSTOMER LINE ISOLATED
IP9	Process value out of regular operating value	CLOSE PV-640 (FC)
IP10	*Not Used*	CLOSE PV-642 (FC)
IP11	High Ambient temperature - Loss of AHU	START INTERMITTENTLY (SU2: 1000 / 1001 / 1002 / 1003
IP12	*Not Used*	LIGHT ON CONSTANT VE-002 / 006 / 010 (Orange)
IP13	Hydrogen Ambient Detection High	LIGHT ON FLASHING VE-001 / 005 / 009 (Rouge)
IP17B	Problem on LP 300B requiring start of the LP 300A	STOP IMMEDIATELY CP-200
IP15	*Not Used*	STOP AT THE END OF STOP SEQUENCE CP-200
IP16	Problem on pure water feed to anodic loop	STOP IMMEDIATELY BY SETTING VAR600A/B to 0% (STO) THE RUNNING CP-600 (A or B following status)
IP17A	Problem on LP 300A requiring start of the LP 300B	STOP AT THE END OF STOP SEQUENCE BY SETTING VAR600A/B TO 0% THE RUNNING CP-600 (A or B following status)
IP20	LOSS OF HALF OF THERMAL POWER (THS-400 or THS-200)	STOP IMMEDIATELY BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)
		STOP AT THE END OF STOP SEQUENCE BY SETTING VAR620A/B TO 0% THE RUNNING CP-620 (A or B following status)
		STOP AT THE END OF STOP SEQUENCE DC-200 - All motors
		STOP IMMEDIATELY H2 purification unit deoxo dryers heating
		STOP IMMEDIATELY BY SETTING VAR300A/B TO 0% THE RUNNING LP-300 (A or B following status)
		STOP IMMEDIATELY WC-400 (CP-400)
		STOP AT THE END OF STOP SEQUENCE WC-400 (CP-400)
		STOP IMMEDIATELY WC-401 (CP-401)
		STOP AT THE END OF STOP SEQUENCE WC-401 (CP-401)
		OPEN MPV-611 (FC) till depressurisation and/or inerting of ST-600 completed. OPEN PV-610 if MPV-611 is failing
		OPEN PV-631 (FC) till depressurisation and/or inerting of ST-620 completed. OPEN PV-630 if PV-631 is failing.
		OPEN PV-901 (FC) till PT-610 reach 0.5 barg
		OPEN PV-901 (FC) till inerting of ST-600 completed
		OPEN PV-921 (FC) till inerting of ST-620 completed
		OPEN PV-921 (FC) till PT-610 reach 0.6 barg
		OPEN IMMEDIATELY PV-631 (FC)
		OPEN IMMEDIATELY PV-630 (FC) till pressure < PT-630 HH
		FORCE STANDBY PRESSURISED TT-1003-1 TAH-1003 or TT-1004-1 TAH-1004 or TT-1005-1 TAH-1005 or TT-1006-1 TAH-1006
		FORCE STANDBY PRESSURISED After 1100s
		SWITCH LP-300 - From A to B or B to A
		SWITCH CP-600 - From A to B or B to A
		SWITCH CP-620 - From A to B or B to A
		GO TO STANDBY PRESSURISED
		REDUCE ELECTROLYSER SETPOINT AT 50%
		Rectifier current is set instantly to 0A (no ramp down)

Notes:

Modification V5 Rev06 are in yellow

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DAVE MUSGROVE 17/04/2025
LUC PAOLETTI 17/04/2025

elogen

Electrolyzer Package

CAUSE AND EFFECT MATRIX

C63- CrossWind Project

Document Code	C63-PWI-002
Revision	Rev.006
Page Number	05 of 05

CAUSE & EFFECT DIAGRAM

CAUSES		EFFECTS	DISPLAY alarm	ENABLE ESD signal (ASE-001 : Process) to customer SCADA	ENABLE ESD signal (ASE-002: Fire issue) to customer SCADA	ENABLE ESD signal (ASE-003:Gas) to customer SCADA	ACTIVATE MN CONTACTORS Trigger MN Breaker (Main Supply)	STOP AND SET Rectifiers (all) (Uset=0V)	ACTIVATE Safety E.Board ~~Green~~ 360KA1 MN Inter DC (ESD Rectifiers), MN Rectifier Breaker	START CONTINOUSLY (NOT IN SIS) BUZ-1000 / 1001 / 1002 / 1003	LIGHT ON CONSTANT (NOT IN SIS) VE-001 / 005 / 009 / 013 ~~Orange~~ Red	STOP IMMEDIATELY CP-600A/B BY SETTING VAR-600A/B TO 0%	STOP IMMEDIATELY CP-620A/B BY SETTING VAR-620A/B TO 0%	STOP IMMEDIATELY LP-300A/B BY SETTING VAR-300A/B TO 0%	OPEN PV-610 (FO) till depressurisation and/or inerting of ST-600 completed.	OPEN PV-630 (FO) till depressurisation and/or inerting of ST-620 completed. OPEN PV-631 if PV-630 is failing.	OPEN PV-900 (FO) after inerting of ST-600 completed	OPEN PV-920 (FO) after inerting of ST-620 completed	CLOSE AND LOCK PV-641 (FC)	CLOSE PV-635 (FC)	CLOSE AND LOCK PV-601 (FC)	OPEN IMMEDIATELY PV-610 (FO) till pressure < PT-611_H-0,2	OPEN IMMEDIATELY PV-630 (FO) till pressure < PT-631_H-0,2	CLOSE PV-800	OPEN PV-900 (FO) till PT611 > 0.5 barg	OPEN PV-920 (FO) till PT-631 > 0.5 barg	CLOSE PV-501 (FC)	STOP IMMEDIATELY CP-600A BY SETTING VAR-600A TO 0%	STOP IMMEDIATELY CP-600B BY SETTING VAR-600B TO 0%	STOP IMMEDIATELY CP-620A BY SETTING VAR-620A TO 0%	STOP IMMEDIATELY CP-620B BY SETTING VAR-620B TO 0%	TRIGGER IS1
Effect reference																																	
INTERLOCK SAFETY	*DESCRIPTION*																																
IS1	ESD Electrolyser following Process issue SAFETY STOP		X	X			X	X	X	X	X				X	X	X	X		X													
IS2	Isolation from customer H2 line		X																	X													
IS3	Isolation balancing line (640)		X																X														
IS4	ESD Electrolyser following Fire issue		X		X		X	X	X	X	X				X	X	X	X		X													
IS5	Very Low water level in ST-620		X					X					X																				X 360KA1
IS6	Very Low water level in ST-600		X					X				X																					X 360KA1
IS7	ESD Electrolyser following Gas issue		X			X	X	X	X	X	X				X	X	X	X		X													
IS8	*Not Used*																																
IS9	Very High Flowrate on H2 Analysis Line		X																							X							
IS10	Very Low Pressure on anodic side		X																								X						
IS11	Very Low Pressure on cathodic side		X																									X					
IS12	Very High Level ST-600		X											X																			
IS13	Very Low Level CS-610		X																														
IS14	Very Low Level in H2 Vent		X																										X				
IS15	Blocked discharge CP600A		X																											X			
IS16	Blocked discharge CP600B		X																												X		
IS17	Blocked discharge CP620A		X																													X	
IS18	Blocked discharge CP620B		X																														X
IS19	MPV-611 fault - High Oxygen Pressure		X																														
IS20	PV-631 fault - High Hydrogen Pressure		X																										X				

Notes:

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IS15 & IS16 TO FOR RANGE 16 BAR

DAVE MUSGROVE 17/04/2025

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elogen	Electrolyzer Package	Document Code	
	Smoke Detector Zone List	Revision	Rev.0
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LEGEND

D-OSD	OPTICAL SMOKE DETECTOR
X-OSD	OPTICAL SMOKE DETECTOR ATEX
D-MCP	MANUAL CALL POINT

C&E MATRIX

TYPE	DESCRIPTION
FAULT	if a MCP is in fault status, the SSI panel activate the fault output
	if 1 sensor is in fault status, the SSI panel activate the fault output
	if the SSI panel has an internal fault status (battery fault, card fault ecc..), the SSI panel activate the fault output
FIRE	if a MCP is pressed, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in alarm status, the SSI panel activate the fire alarm output
	if 2 sensor in the same zone are in fault status, the SSI panel activate the fire alarm output
	if there is 1 sensor in alarm and 1 sensor in fault in the same zone, the SSI panel activate the fire alarm output

SD-00xA	SD-00xB	SD-00xC	OUT
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

TESTED 11.4.25
JOHN MACKILLOP

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elogen	Electrolyzer Package						Document Code	
	Smoke Detector Zone List						Revision	Rev.0
	C63- CrossWind Project						Page Number	4 of 4
NAME	CARD	RACK	POS	CHANNEL	TYPE	LEVEL	ZONE	LOGIC
SD-001A_SMOKE DET.	F7009	1	1	1	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001B_SMOKE DET.	F7009	1	1	2	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-001C_SMOKE DET.	F7009	1	1	3	D-OSD	00	1 - STACK ROOM	2oo3 alarm, 1oo3 fault
SD-002A_SMOKE DET.	F7009	1	1	4	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002B_SMOKE DET.	F7009	1	1	5	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-002C_SMOKE DET.	F7009	1	1	6	D-OSD	00	2 - NIDEC	2oo3 alarm, 1oo3 fault
SD-003A_SMOKE DET.	F7009	1	1	7	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003B_SMOKE DET.	F7009	1	1	8	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-003C_SMOKE DET.	F7009	1	1	9	D-OSD	00	3 - H2 ZONE	2oo3 alarm, 1oo3 fault
SD-004A_SMOKE DET.	F7009	1	1	10	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004B_SMOKE DET.	F7009	1	1	11	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-004C_SMOKE DET.	F7009	1	1	12	D-OSD	00	4 - OVIVO	2oo3 alarm, 1oo3 fault
SD-005A_SMOKE DET.	F7009	1	1	13	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005B_SMOKE DET.	F7009	1	1	14	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-005C_SMOKE DET.	F7009	1	1	15	D-OSD	00	5 - O2 ZONE	2oo3 alarm, 1oo3 fault
SD-006A_SMOKE DET.	F7009	1	1	16	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006B_SMOKE DET.	F7009	1	1	17	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-006C_SMOKE DET.	F7009	1	1	18	X-OSD	01	6 - WP3	2oo3 alarm, 1oo3 fault
SD-007A_SMOKE DET.	F7009	1	1	19	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007B_SMOKE DET.	F7009	1	1	20	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-007C_SMOKE DET.	F7009	1	1	21	D-OSD	01	7 - WP4	2oo3 alarm, 1oo3 fault
SD-008A_SMOKE DET.	F7009	1	1	22	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008B_SMOKE DET.	F7009	1	1	23	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
SD-008C_SMOKE DET.	F7009	1	1	24	D-OSD	00	8 - 20-UCP-001	2oo3 alarm, 1oo3 fault
FB-001_FIRE BUTT.	F7009	1	1	25	D-MCP	00	8 - 20-UCP-001	1 = ALARM
FB-002_FIRE BUTT.	F7009	1	1	26	D-MCP	00	9 - LEVEL 00	1 = ALARM
FB-003_FIRE BUTT.	F7009	1	1	27	D-MCP	01	10 - LEVEL 01	1 = ALARM
FB-004_FIRE BUTT.	F7009	1	1	28	D-MCP	01	10 - LEVEL 01	1 = ALARM

TESTED 11.04.25
JOHN MACKILLOP
E. [illegible]

CAUSE & EFFECT Checklist

Project Name :	C63 - SHELL	**Version :**	0
Location :	Italie	**Date :**	11/01/2025
		Document code :	XXX

REVISION HISTORY

VERSION	DATE	AUTHOR	COMMENTS
0	11/01/2025	SDE	Creation

INTRODUCTION

This document is the **CAUSE & EFFECT Checklist** of the PLC quoted here below - Please refer to the corresponding item in the "Network Equipement List" for further information about the concerned PLC.

The **CAUSE & EFFECT Checklist** is based on a frozen version of the **CAUSE & EFFECT** - This version number is registered here below.
This document, based on the CAUSE & EFFECT, is used as a checklist to support testing of the effects of alarms during the COLD and HOT commissioning phases.
It is constantly updated throughout the commissioning phases to track the progress of each effects of alarms. It then provides an overview of the progress and overall completion of alarmes cause and effect tests.

DESCRIPTION OF TEST CONDITIONS

PLC CONCERNED

TAG	C63 CPU 1
ITEM	SIEMENS SIMATIC S7-1500F CPU 1516F-3 PN/DP
DESCRIPTION	6ES7516-3FN01-0AB0

REFERENCE DOCUMENTS

CAUSE & EFFECT

FILE NAME	C63-PWI-002_04 - Cause and effect
REVISION	6
DATE	21/03/2025
COMMENTS	6th Issuance (Ph2) - IFC

CAUSE & EFFECT OVERVIEW 19%

CAUSE & EFFECT INTERLOCK	47
NOT TESTED	8
SPARE	0
Partially OK	30
OK	9
% of USED validated	19%

LEGEND

DATE	**Date** when the related Process Block has been tested
STATUS	**Status** of the related Process Block in regards to the Cold and Hot commissioning - Meaning of each status is described below :
NOT TESTED	The Process Block is ready to be tested but has not been tested yet
SPARE	The Process Block is just a spare (it not used in the programme) - then it does not need to be tested
Partially OK	the test is validated with reserve it must be retested later
OK	The Process Block has been tested and is properly working
COMMENTS	**Open comments** about the Process Block, where/when required

	CAUSE & EFFECT INTERLOCK	COMMENTS		CAUSE & EFFECT Checklist		
				DATE	STATUS	COMMENTS
INTERLOCK PROCESS	IP1			17/04/2025	Partially OK	Testé avec le client en simulation
	IP2			10/04/2025	Partially OK	Testé avec le client en simulation
	IP3			17/04/2025	Partially OK	Testé avec le client en simulation
	IP4			16/04/2025	Partially OK	Testé avec le client en simulation
	IP5A			17/04/2025	Partially OK	Testé avec le client en simulation
	IP5B			10/04/2025	Partially OK	Testé avec le client en simulation
	IP6A			16/04/2025	Partially OK	Testé avec le client en simulation
	IP6B			16/04/2025	Partially OK	Testé avec le client en simulation
	IP7			16/04/2025	Partially OK	Testé avec le client en simulation
	IP8			10/04/2025	Partially OK	Testé avec le client en simulation
	IP9			10/04/2025	Partially OK	Testé avec le client en simulation
	IP11			10/04/2025	Partially OK	Testé avec le client en simulation
	IP13			10/04/2025	Partially OK	Testé avec le client en simulation
	IP17B			10/04/2025	Partially OK	Testé avec le client en simulation
	IP15			10/04/2025	Partially OK	Testé avec le client en simulation
	IP16			10/04/2025	Partially OK	Testé avec le client en simulation
	IP17A			10/04/2025	Partially OK	Testé avec le client en simulation
	IP5B			10/04/2025	Partially OK	Testé avec le client en simulation
	IP6B			10/04/2025	Partially OK	Testé avec le client en simulation
	IP20			16/04/2025	Partially OK	Testé avec le client en simulation
INTERLOCK SAFETY	IS1			17/04/2025	OK	Testé avec le client
	IS2			17/04/2025	Partially OK	Testé avec le client en simulation
	IS3			17/04/2025	Partially OK	Testé avec le client en simulation
	IS4			16/04/2025	OK	Testé avec le client
	IS5			15/04/2025	Partially OK	Testé avec le client en simulation
	IS6			15/04/2025	Partially OK	Testé avec le client en simulation
	IS7			15/04/2025	OK	Testé avec le client
	IS9			15/04/2025	Partially OK	Testé avec le client en simulation
	IS10			16/04/2025	OK	Testé avec le client
	IS11			16/04/2025	OK	Testé avec le client
INTERLOCK SAFETY	IS12			16/04/2025	Partially OK	Testé avec le client en simulation
	IS13			16/04/2025	OK	Testé avec le client
	IS14			16/04/2025	OK	Testé avec le client
	IS15			15/04/2025	Partially OK	Testé avec le client en simulation
	IS16			15/04/2025	Partially OK	Testé avec le client en simulation
	IS17			15/04/2025	Partially OK	Testé avec le client en simulation
	IS18			15/04/2025	Partially OK	Testé avec le client en simulation
	IS19			15/04/2025	OK	Testé avec le client
	IS20			15/04/2025	OK	Testé avec le client

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C63-PWI-003

Alarm List

C63- CrossWind Project

As built - 18/04/25

Luc Paoletti

REV.	STATUS	DESCRIPTION	DATE	BY	CHECK	APPR.
4	IFC	Issued For Construction	11/03/2025	JNG	DPI	BCA
3	Detailed Design	Issued For Construction	28/01/2025	DPI	BCA	IDI
2	Detailed Design	Issued For Construction	15/11/2024	JNG	HCH	BCA
1	Detailed Design	First issue	26/04/2024	JNG	HCH	BCA

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elogen	Electrolyzer Package					Document Code	C63-PWI-003
	Alarm List					Revision	04
Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
OIHA-800	AAH-800 (ISO22)	5	volppm	IP9	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800	5	TO PLC
OIHA-800	AAHH-800 (C63)	6	volppm	IP4	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-800	1200	TO PLC
REC-001	ACA-001 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001	-	COM
REC-002	ACA-002 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002	-	COM
LP-300A	ACA-300A (C63)	-	-	IP17A	LP-300A STARTING FAULT - LP-300A	1	TO PLC
LP-300B	ACA-300B (C63)	-	-	IP17B	LP-300B STARTING FAULT - LP-300B	1	TO PLC
CP-600A	ACA-600A (ISO22)	-	-	IP6A	STARTING MALFUNCTION CP-600A - ERR - CP-600A	60	TO PLC
CP-600B	ACA-600B (ISO22)	-	-	IP6B	STARTING MALFUNCTION CP-600B - ERR - CP-600B	60	TO PLC
CP-620A	ACA-620A (ISO22)	-	-	IP5A	STARTING MALFUNCTION CP-620A - ERR - CP-620A	60	TO PLC
CP-620B	ACA-620B (ISO22)	-	-	IP5B	STARTING MALFUNCTION CP-620B - ERR - CP-620B	60	TO PLC
PQ-001	AQA-016 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION PQ001 - ERR	1	TO PLC
PQ-002	AQA-017 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION PQ002 - ERR	1	TO PLC
DC-200	AQA-200 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-200	-	COM
DC-201	AQA-201 (C63)	-	-	IP20	DRY COOLER FAULT - ERR - DC-201	-	COM
WC-400	AQA-400 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-400	-	COM
WC-401	AQA-401 (C63)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-401	-	COM
RSP-001	AQA-1005	-	-	IP1	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER	0	COM
HVAC PACKAGE	AQA-1006	-	-	IP1	DEFAULT COMMUNICATION PLC Elogen / HVAC	0	COM
REC-001	AQA-001 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-001	-	COM
REC-002	AQA-002 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-002	-	COM

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
RIO_MAIN	AQA-005 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO MAIN - ERR	1	TO PLC
RIO1	AQA-006 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO 1 - ERR	1	TO PLC
RIO2	AQA-007 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO 2 - ERR	1	TO PLC
PN-001	AQA-008 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN001 - ERR	1	TO PLC
PN-002	AQA-009 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN002 - ERR	1	TO PLC
PN-003	AQA-010 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN003 - ERR	1	TO PLC
PN-004	AQA-011 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN004 - ERR	1	TO PLC
PN-005	AQA-012 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN005 - ERR	1	TO PLC
PN-006	AQA-013 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN006 - ERR	1	TO PLC
PN-007	AQA-014 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN007 - ERR	1	TO PLC
PN-008	AQA-015 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CAN/PN008 - ERR	1	TO PLC
RIO_BURKERT	AQA-018 (C63)			IP1	LOSS OF COMMUNICATION RIO BURKERT - ERR	1	TO PLC
N/A	AQA-052	-	-	IP1	CUSTOMER/ELOGEN communication switch fault, in remote mode.	-	TO PLC
SSI-1000	AQA-1001 (ISO22)	-	-	IP1	FIRE CONTROL PANEL FAULT - ERR - SSI-1000	-	HARDWIRED
WTP-300	AQA-1003	-	-	IP1	COMMUNICATION FAULT PLC ELOGEN / WTP	0	COM
SSI-1000	AQA-1010 (ISO22)	-	-	IS4	FIRE AND GAS DETECTION - FIRE - SSI-1000	-	HARDWIRED
PLC	BZ-001 (ISO22)	-	-	IS1	PLC FAULT - ERR - PLC-001	0	HARDWIRED
HIOD-610	CAH-610 (C63)	25	% LFL	IP9	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3	1	TO PLC
AHD-1000	CAH-1000 (ISO22)	25	%LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000	1	TO PLC
AHD-1001	CAH-1001 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001	1	TO PLC
AHD-1002	CAH-1002 (C63)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002	1	TO PLC
AHD-1003	CAH-1003 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
AHD-1004	CAH-1004 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004	1	TO PLC
QIA-1B4	CAHH-300 (C63)	1	µS/cm	IP16	CONDUCTIVITY TOO HIGH UPSTREAM LP300 - HH	5	COM
HIOD-610	CAHH-610 (C63)	50	% LFL	IS1	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3	-	TO PLC
DPT-800	CAHH-800 (ISO22)	6	ppmv	IP1	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800	1200	TO PLC
AHD-1000	CAHH-1000 (C63)	50	%LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000	1	TO PLC
AHD-1001	CAHH-1001 (C63)	50	%LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001	1	TO PLC
AHD-1002	CAHH-1002 (C63)	50	% LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002	1	TO PLC
AHD-1003	CAHH-1003 (C63)	50	% LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003	1	TO PLC
AHD-1004	CAHH-1004 (C63)	50	% LFL	IS7	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004	1	TO PLC
400VAC	EGA-002 (C63)	-	-	IS1	FAULT -PHASE MONITORING RELAY - 1U1	1	TO PLC
REC-001/002	EGA-003 (C63)	-	-	IS1	RECTIFIER 1 & 2 + ESD-008 TRIGGERED - 360KA1	1	TO PLC
EH-1001	EGA-1001 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1001	-	COM
EH-1002	EGA-1002 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1002	-	COM
EH-1003	EGA-1003 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1003	-	COM
EH-1004	EGA-1004 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1004	-	COM
EH-1006	EGA-1006 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1006	-	COM
EH-1007	EGA-1007 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1007	-	COM
EXT-001	EGA-1101 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001	-	TO PLC
EXT-002	EGA-1102 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002	-	TO PLC
EXT-003	EGA-1103 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003	-	TO PLC
EXT-004	EGA-1104 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004	-	TO PLC
EXT-005	EGA-1105 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005	-	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
EXT-006	EGA-1106 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006	-	TO PLC
EXT-007	EGA-1107 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007	-	TO PLC
EXT-008	EGA-1108 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008	-	TO PLC
PQ-001	EJAHH-001 (C63)	250	V	IP1	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001	0	TO PLC
PQ-002	EJAHH-002 (C63)	440	V	IP1	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002	0	TO PLC
PQ-003	EJAHH-003 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-003	0	TO PLC
PQ-004	EJAHH-004 (C63)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-004	0	TO PLC
REC-001/002	EJAHH-006 (C63)	-	-	IP1	RECTIFIER HIGH VOLTAGE MODULE - ERR - REC-001/002	1	TO PLC
PQ-001	EJALL-001 (C63)	209	V	IP9	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001	0	TO PLC
PQ-002	EJALL-002 (C63)	380	V	IP9	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002	0	TO PLC
PQ-003	EJALL-003 (C63)	342	V	IP9	VERY LOW RECTIFIER VOLTAGE - LL - PQ-003	0	TO PLC
PQ-004	EJALL-004 (C63)	342	V	IP9	VERY LOW RECTIFIER VOLTAGE - LL - PQ-004	0	TO PLC
FSH-640	FAHH-640(ISO22-E500)	1 (4,9)	- (m3/h)	IS3	BALANCING FLOW HIGH - FSH-640 - HH	15	TO PLC
FICV-800	FAHH-800 (C63)	1 - (3.9)	NL/min	IS9	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800	15	TO PLC
FT-600	FAL-600 (ISO22-500)	79,38	m3/h	IP9	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600	2	TO PLC
FT-620	FAL-620 (ISO22-500)	30,24	m3/h	IP9	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620	2	TO PLC
FT-900	FAL-900 (C63)	41,4	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-900	1	TO PLC
FT-901	FAL-901 (C63)	70,3	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-901	1	TO PLC
FT-920	FAL-920 (C63)	3,6	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-920	1	TO PLC
FT-921	FAL-921 (C63)	10,5	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-921	1	TO PLC
FT-600	FALL-600 (ISO22-500)	44,1	m3/h	IS1	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600	2	TO PLC
FICV-610	FALL-610 (ISO22)	0,7	- (NL/min)	IS1	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610	15	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
FICV-611	FALL-611 (ISO22)	7,7	- (NL/min)	IP9	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611	15	TO PLC
FT-620	FALL-620 (ISO22-500)	26,88	m3/h	IP1	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620	2	TO PLC
FICV-800	FALL-800 (C63)	1 - (2.1)	NL/min	IP1	VERY LOW H2 ANALYSIS FLOWRATE - LL - FICV-800	15	TO PLC
FT-630	FDAH-630 (ISO22)	5	%	IP9	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630	2	TO PLC
FC 64.1	FSA 64.1	No 4-20	mA	IP1	NO SIGNAL - ERR - FC 64.1	0	TO PLC
FC 64.1	FSA 64.1 LL	<5.16	mA	IP1	GAS INLET FLOW VERY LOW - LL - FC 64.1	0	TO PLC
MPV-611	GDA-611 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-611 - ERR - MPV-611	133	TO PLC
MPV-630	GDA-630 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-630 - ERR - MPV-630	133	TO PLC
ZIO-604	GGA-604 (C63)	1	-	IP1	HV-604 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-604	5	TO PLC
ZIO-605	GGA-605 (C63)	1	-	IP1	HV-605 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-605	5	TO PLC
ZIO-623	GGA-623 (C63)	1	-	IP1	HV-623 VALVE CLOSED ON ANODIC LOOP - ERR - ZIO-623	5	TO PLC
ZIO-624	GGA-624 (ISO22)	1	-	IS1	HV-624 VALVE CLOSED ON CATHODIC LOOP - ERR - ZIO-624	5	TO PLC
GS 64.1.1	GSA 64.1.1 HH	1	-	IP1	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1	5	TO PLC
GS 64.1.1	GSA 64.1.1 LL	0	-	IP1	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1	5	TO PLC
GS 64.1.2	GSA 64.1.2 HH	1	-	IP1	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2	5	TO PLC
GS 64.1.2	GSA 64.1.2 LL	0	-	IP1	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2	5	TO PLC
GS 64.1.3	GSA 64.1.3 HH	1	-	IP1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3	5	TO PLC
GS 64.1.3	GSA 64.1.3 LL	0	-	IP1	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3	5	TO PLC
GS 64.1.4	GSA 64.1.4 HH	1	-	IP1	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4	5	TO PLC
GS 64.1.4	GSA 64.1.4 LL	0	-	IP1	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4	5	TO PLC
GS 64.2	GSA 64.2 HH	1	-	IP1	VALVE 64-V5 NOT CLOSED - HH - GS 64.2	5	TO PLC
GS 64.2	GSA 64.2 LL	0	-	IP1	VALVE 64-V5 NOT OPEN - LL - GS 64.2	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
GS 64.3	GSA 64.3 HH	1	-	IP1	VALVE 64-V7 NOT CLOSED - HH - GS 64.3	5	TO PLC
GS 64.3	GSA 64.3 LL	0	-	IP1	VALVE 64-V7 NOT OPEN - LL - GS 64.3	5	TO PLC
GS 64.T2	GSA 64.T2 HH	1	-	IP1	VALVE 64-T2 NOT OPEN - HH - GS 64.T2	5	TO PLC
GS 64.T2	GSA 64.T2 LL	0	-	IP1	VALVE 64-T2 NOT CLOSED - LL - GS 64.T2	5	TO PLC
IM-001	IAHH-001 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-001	1	TO PLC
IM-002	IAHH-002 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-002	1	TO PLC
IM-001	IDAHH-001 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001	2	TO PLC
IM-002	IDAHH-002 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002	2	TO PLC
HVAC	JGA-010 (C63)	-	-	IP1	HVAC PANEL CIRCUIT BREAKER AUXILIARY CONTACT - 102QM1	1	TO PLC
WC-400	JGA-400 (C63)	-	-	IP9	BREAKER WC-400 - CHILLER 1 - 102QM5	1	TO PLC
WC-401	JGA-401 (C63)	-	-	IP9	BREAKER WC-401 - CHILLER 2 - 102QM7	1	TO PLC
POWER 400V	JGA-001 (ISO22)	-	-	IP1	LOSS OF 400 VAC POWER SUPPLY - ERR	0	TO PLC
REC-001/002	JGA-002 (C63)	-	-	IP1	OVERVOLTAGE - SURGE PROTECTION - RF8	1	TO PLC
UPS	JGA-003 (C63)	-	-	IP1	FAULT - UPS CIRCUIT BREAKER AUXILIARY CONTACT - QF5	1	TO PLC
AUX2	JGA-004 (C63)			IP1	BREAKER - AUXILIARY TYPE 2 - 120QM1	1	TO PLC
230_AUX	JGA-005 (C63)	-	-	IP1	FAULT - RECTIFIER 230Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF1	1	TO PLC
400Vac	JGA-006 (ISO22)	-	-	IS1	REC_MAIN_BREK_DEF	-	TO PLC
TSF-001	JGA-007 (C63)			IP1	TRANSFORMER GAS PRESSURE TEMPERATURE DETECTION FAULT	1	TO PLC
REC-001/002	JGA-008 (C63)	-	-	IP1	FAULT - HCU RECTIFIER 400Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF3	1	TO PLC
DEOXO	JGA-009 (C63)	-	-	IP1	FAULT - DEOXO CIRCUIT BREAKER AUXILIARY CONTACT - 101QF1	1	TO PLC
SOCKET	JGA-011 (C63)	-	-	IP9	BREAKER SOCKET - 124QFx	1	TO PLC
ALIM1_24	JGA-012 (C63)	-	-	IP9	BREAKER DC ALIM1 24VDC - 130QF1	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
ALIM2_24	JGA-013 (C63)	-	-	IP9	BREAKER DC ALIM2 24VDC - 130QF3	1	TO PLC
REC_UPS	JGA-014 (C63)	-	-	IP1	FAULT - RECTIFIER UPS POWER SUPPLY 1 CIRCUIT BREAKER AUXILIARY CONTACT - 130QF5	1	TO PLC
RIO1	JGA-015 (C63)	-	-	IP1	RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF1	-	TO PLC
RIO2	JGA-016 (C63)	-	-	IP1	RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF3	-	TO PLC
LP-300A	JGA-300A (C63)	-	-	IP17A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A	1	TO PLC
LP-300B	JGA-300B (C63)	-	-	IP17B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B	1	TO PLC
WTP-300	JGA-301 (C63)	-	-	IP20	WTP300 - ERR - WTP-300	1	TO PLC
WTP-300	JGA-302 (C63)	-	-	IP1	BREAKER WTP300 - 102QF3	1	TO PLC
HR-306	JGA-306 (C63)	-	-	IP9	FAULT - HEAT RIBBON 306 CIRCUIT BREAKER AUXILIARY CONTACT - 122QF7	1	TO PLC
HR-307	JGA-307 (C63)	-	-	IP9	FAULT - HEAT RIBBON 307 CIRCUIT BREAKER AUXILIARY CONTACT - 123QF1	1	TO PLC
HR-503	JGA-503 (C63)	-	-	IP9	FAULT - HEAT RIBBON 503 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-600A	JGA-600A (C63)	-	-	IP9	FAULT - HEAT RIBBON 600A CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
CP-600A	JGA-600A (ISO22)	-	-	IP6A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A	0	TO PLC
CP-600B	JGA-600B (ISO22)	-	-	IP6B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B	0	TO PLC
HR-606	JGA-606 (C63)	-	-	IP9	FAULT - HEAT RIBBON 606 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-607B	JGA-607B (C63)	-	-	IP9	FAULT - HEAT RIBBON 607B CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-620A	JGA-620A (C63)	-	-	IP9	FAULT - HEAT RIBBON 620A CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
CP-620A	JGA-620A (ISO22)	-	-	IP5A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A	0	TO PLC
CP-620B	JGA-620B (ISO22)	-	-	IP5B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B	0	TO PLC
HR-625	JGA-625 (C63)	-	-	IP9	FAULT - HEAT RIBBON 625 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
HR-640	JGA-640 (C63)	-	-	IP9	FAULT - HEAT RIBBON 640 CIRCUIT BREAKER AUXILIARY CONTACT	1	TO PLC
SSI-1000	JGA-1000 (C63)	-	-	IP1	SSI-1000 POWER FAILURE - 130QF7	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
EH-1001	JGA-1001 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001	0	COM
EH-1002	JGA-1002 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002	0	COM
EH-1003	JGA-1003 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003	0	COM
EH-1004	JGA-1004 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004	0	COM
EH-1006	JGA-1006 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006	0	COM
EH-1007	JGA-1007 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007	0	COM
EXT 001/002/003/004	JGA-1121	-	-	IP9	MALFUNCTION MAIN CIRCUIT BREAKER FOR 4 FANS STACK - ERR - BREAKER STACK 001/002/003/004	0	TO PLC
EXT 005/ 006/ 007/ 008	JGA-1122	-	-	IP9	MALFUNCTION COMMON CIRCUIT BREAKER OF 4 FANS STACKS - ERR - BREAKER STACK 005/ 006/ 007/ 008	0	TO PLC
K01	KSA K01 HH	1	-	IP1	Dryer heater HE 64.1, K01 Not deactivated	5	TO PLC
K01	KSA K01 LL	0	-	IP1	Dryer heater HE 64.1, contactor K01 Not activated	5	TO PLC
K02	KSA K02 HH	1	-	IP1	Dryer heater HE 64.1, K02 Not deactivated	5	TO PLC
K02	KSA K02 LL	0	-	IP1	Dryer heater HE 64.1, K02 Not activated	5	TO PLC
K03	KSA K03 HH	1	-	IP1	Deoxo Trace heater HE 61.1, K03 Not deactivated	5	TO PLC
K03	KSA K03 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03	5	TO PLC
K04	KSA K04 HH	1	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04	5	TO PLC
K04	KSA K04 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04	5	TO PLC
LT-600	LAH-600 (C63)	50	%	IP9	HIGH LEVEL ST-600 - H - LT-600	2	TO PLC
LSH-610	LAH-610 (ISO22)	1	-	IP9	HIGH LEVEL CS-610 - H - LSH-610	60	TO PLC
LT-620	LAH-620 (C63)	62	%	IP9	HIGH LEVEL ST-620 - H - LT-620	2	TO PLC
LSH-630	LAH-630 (C63)	1	-	IP1	HIGH LEVEL CS-630 - HH - LSH-630	1080	TO PLC
WLD-001	LAHH-001 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-001	60	TO PLC
WLD-002	LAHH-002 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-002	60	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
WLD-003	LAHH-003 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-003	60	TO PLC
WLD-004	LAHH-004 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-004	60	TO PLC
WLD-005	LAHH-005 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-005	60	TO PLC
WLD-006	LAHH-006 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-006	60	TO PLC
LT-600	LAHH-600 (C63)	52	%	IP1	VERY HIGH LEVEL ST-600 - HH - LT-600	2	TO PLC
LT-620	LAHH-620 (C63)	71	%	IP1	VERY HIGH LEVEL ST-620 - HH - LT-620	2	TO PLC
LSH-631	LAHH-631 (ISO22)	1	-	IS1	VERY HIGH LEVEL CS-630 - HH - LSH-631	60	TO PLC
LSH-640	LAHH-640 (ISO22)	1	-	IP9	HIGH LEVEL DG-640 - HH - LSH-640	60	TO PLC
LT-600	LAL-600 (C63)	32	%	IP9	LOW LEVEL ST-600 - LT-600 - L	2	TO PLC
LSL-610	LAL-610 (ISO22)	1	-	IP9	LOW LEVEL CS-610 - L - LSL-610	60	TO PLC
LT-620	LAL-620 (C63)	31	%	IP9	LOW LEVEL ST-620 - L - LT-620	2	TO PLC
LSL-630	LAL-630 (ISO22)	1	-	IP9	LOW LEVEL CS-630 - L - LSL-630	60	TO PLC
LISA-1B1	LALL-301 (C63)	20	%	IP16	VERY LOW LEVEL WTP-300 - LL - LT-300	2	TO PLC
LT-600	LALL-600 (C63)	26	%	IP2	VERY LOW LEVEL ST-600 - LL - LT-600	2	TO PLC
LSL-611	LALL-611 (ISO22)	1	-	IS13	VERY LOW LEVEL CS-610 - LL - LSL-611	60	TO PLC
LT-620	LALL-620 (C63)	27	%	IP3	VERY LOW LEVEL ST-620 - LL - LT-620	2	TO PLC
LSH-600	LASHH-600 (ISO22)	1	-	IS12	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600	5	TO PLC
LSHH-500	LASHH-500 (C63)	1	-	IP1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500	5	TO PLC
LSL-600	LASLL-600 (C63)	1		IS6	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600	5	TO PLC
LSL-620	LASLL-620 (C63)	1	-	IS5	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620	5	TO PLC
LSLL-500	LASLL-500 (C63)	1	-	IS14	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT -LSLL-500	1	TO PLC
LSL-641	LALL-641 (ISO22)	1	-	IS3	VERY LOW LEVEL DG-640 (SIS) - LL - LSL-641	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
AUC-001	OAR-001 (C63)	-	-	IS1	CUSTOMER EMERGENCY STOP - AUC-001 - SIS XS-001	-	HARDWIRED
DS-001	OAS-001 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-001	5	TO PLC
DS-002	OAS-002 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-002	5	TO PLC
DS-003	OAS-003 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-003	5	TO PLC
DS-004	OAS-004 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-004	5	TO PLC
DS-005	OAS-005 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-005	5	TO PLC
DS-006	OAS-006 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-006	5	TO PLC
DS-007	OAS-007 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-007	5	TO PLC
DS-008	OAS-008 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-008	5	TO PLC
DS-009	OAS-009 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-009	5	TO PLC
DS-010	OAS-010 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-0010	5	TO PLC
DS-011	OAS-011 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-011	5	TO PLC
DS-012	OAS-012 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-012	5	TO PLC
ESD-001	OAZ-001 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-001	-	HARDWIRED
ESD-002	OAZ-002 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-002	-	HARDWIRED
ESD-003	OAZ-003 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-003	-	HARDWIRED
ESD-004	OAZ-004 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-004	-	HARDWIRED
ESD-005	OAZ-005 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-005	-	HARDWIRED
ESD-006	OAZ-006 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-006	-	HARDWIRED
ESD-007	OAZ-007 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-007	-	HARDWIRED
PLC	ODA-001 (C63)	-	-	IP9	DIVERGENCE REMOTE / LOCAL	1	TO PLC
PT-64.1	PA 64.1 L	15	barg	IP9	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1	15	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PT-150	PAH-150 (ISO22)	8,5	barg	IP9	HIGH INSTRUMENT AIR PRESSURE - H - PT-150	1	TO PLC
PT-300	PAH-300 (ISO22)	14	barg	IP9	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300	1	TO PLC
PT-600	PAH-600 (ISO22)	15	barg	IP9	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600	2	TO PLC
PT-610	PAH-610 (ISO22)	11,8	barg	IP9	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- H - PT-610	1	TO PLC
PT-612	PAH-612 (ISO22)	0,5	barg	IP9	HIGH OXYGEN VENT PRESSURE - H - PT-612	2	TO PLC
PT-620	PAH-620 (ISO22)	37	barg	IP9	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620	2	TO PLC
PT-630	PAH-630 (ISO22)	33	barg	IP9	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630	1	TO PLC
PT-910	PAH-910 (ISO22)	8,5	barg	IP9	HIGH NITROGEN PRESSURE - H - PT-910	1	TO PLC
PT-105	PAHH-05 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-05	1	COM
PT-12	PAHH-12 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-12	1	COM
PT-15	PAHH-15 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-15	1	COM
PT-22	PAHH-22 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 2 - HH - PT-22	1	COM
PT-105	PAHH-105 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 1 - HH - PT-105	1	COM
PT-112	PAHH-112 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 1 - HH - PT-112	1	COM
PT-115	PAHH-115 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 2 - HH - PT-115	1	COM
PT-122	PAHH-122 (C63)	PAUMIER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 2 - HH - PT-122	1	COM
PT-150	PAHH-150 (ISO22)	9	barg	IP1	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150	10	TO PLC
PT-300	PAHH-300 (C63)	16	barg	IP16	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300	1	TO PLC
PT-600A	PAHH-600A (C63)	16	barg	IS15	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A	1	TO PLC
PT-600B	PAHH-600B (C63)	16	barg	IS16	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B	1	TO PLC
PT-610	PAHH-610 (ISO22)	12	barg	IP1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610	1	TO PLC
PT-611	PAHH-611 (ISO22)	12,5	barg	IS1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS)- HH - PT-611	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PT-620A	PAHH-620A (C63)	38	barg	IS17	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A	1	TO PLC
PT-620B	PAHH-620B (C63)	38	barg	IS18	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B	1	TO PLC
PT-630	PAHH-630 (ISO22)	33,5	barg	IP1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630	1	TO PLC
PT-631	PAHH-631 (ISO22)	34	barg	IS1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631	1	TO PLC
PT-632	PAHH-632 (C63)	3,6	barg	IP9	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632	1	TO PLC
PT-633	PAHH-633 (C63)	33	barg	IP4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633	1	TO PLC
PT-900	PAHH-900 (ISO22)	9	barg	IP1	LEAK ON OXYGEN INERTING LINE - HH - PT-900	1	TO PLC
PT-910	PAHH-910 (ISO22)	9	barg	IP1	VERY HIGH NITROGEN PRESSURE - HH - PT-910	10	TO PLC
PT-920	PAHH-920 (ISO22)	9	barg	IP1	LEAK ON HYDROGEN INERTING LINE - HH - PT-920	10	TO PLC
PT-150	PAL-150 (ISO22)	6	barg	IP9	LOW INSTRUMENT AIR PRESSURE - L - PT-150	10	TO PLC
PT-300	PAL-300 (C63)	10,8	barg	IP9	LP300 PUMP PRESSURE LOSS - L - PT300	10	TO PLC
PT-600	PAL-600 (C63)	2,79	barg	IP9	CP-600 PUMP PRESSURE LOSS - L - PT600	10	TO PLC
PT-620	PAL-620 (C63)	3,11	barg	IP9	CP-620 PRESSURE LOSS - L - PT-620	10	TO PLC
PT-910	PAL-910 (ISO22)	6	barg	IP9	LOW NITROGEN PRESSURE - L - PT-910	10	TO PLC
PT-150	PALL-150 (ISO22)	5,5	barg	IP1	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150	10	TO PLC
PT-300	PALL-300 (C63)	9,6	barg	IP17A/B	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300	10	TO PLC
PT-600	PALL-600 (C63)	2,48	barg	IP6A/B	CP-600 CHANGEOVER UNFORESEEN - LL - PT-600	60	TO PLC
PT-611	PALL-611 (ISO22)	0	barg	IS10	LOW PRESSURE ON ANODIC SIDE - LL - PT-611	1	TO PLC
PT-620	PALL-620 (C63)	2,76	barg	IP5A/B	CP-620 CHANGEOVER UNFORESEEN - LL - PT-620	60	TO PLC
PT-631	PALL-631 (ISO22)	0	barg	IS11	LOW PRESSURE ON CATHODIC SIDE - LL - PT-631	1	TO PLC
PT-910	PALL-910 (ISO22)	5,5	barg	IP1	VERY LOW NITROGEN PRESSURE - LL - PT910	10	TO PLC
PT-1001	PALL-1001 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT-1001	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PT-1002	PALL-1002 (C63)	10	Pa	IP1	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002	1	TO PLC
PT-1003	PALL-1003 (C63)	10	Pa	IP1	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003	1	TO PLC
PT-1004	PALL-1004 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004	1	TO PLC
PT-1005	PALL-1005 (C63)	10	Pa	IP9	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005	1	TO PLC
PT-1006	PALL-1006 (C63)	10	Pa	IP1	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006	1	TO PLC
DPY-001 = PT630 - PT610	PDAH-001 (ISO22)	21,5	barg	IP9	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610	15	TO PLC
PT-610	PDAH-610 (ISO22)	1200	s	IP9	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610	0	TO PLC
PT-630	PDAH-630 (ISO22)	1200	s	IP9	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630	0	TO PLC
DPY-001 = PT630 - PT610	PDAHH-001 (ISO22)	22	barg	IP1	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610	15	TO PLC
DPY-002 = PT631 - PT611	PDAHH-002 (ISO22)	23	barg	IS1	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611	15	TO PLC
DPY-001 = PT630 - PT610	PDAL-001 (ISO22)	-0,1	barg	IP9	REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC
DPY-001 = PT630 - PT610	PDALL-001 (ISO22)	-0,5	barg	IP1	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610	15	TO PLC
DPY-002 = PT631 - PT611	PDALL-002 (ISO22)	-1	barg	IS1	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611	15	TO PLC
PT-633	PKA-633 (C63)	-7	barg/s	IS2	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633	0	TO PLC
PT-64.1	PSA 64.1	No 4-20	mA	IP1	PT 64.1 NO SIGNAL - ERR - PT 64.1	0	TO PLC
PT-64.1	PSA 64.1 HH	-	barg	IP1	CONDENSATE PRESSURE VERY HIGH - HH - PT 64.1	0	TO PLC
PT 64.1	PSA 64.1 LL	14.9	barg	IP1	CONDENSATE, PRESSURE VERY HIGH - LL - PT-64-1	15	TO PLC
PS-001	PSA-001 (C63)	-	-	IP1	RECTIFIER COOLING NETWORK PRESSURE SWITCH - PS001	1	TO PLC
PT-611	PZAH-611 (C63)	12.3	barg	IS19	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS) OPENING PV-610 - H - PT-611	1	TO PLC
PT-631	PZAH-631 (C63)	33.8	barg	IS20	HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS) OPENING PV-630 - H - PT-631	1	TO PLC
VAR-300A	SCA-300A (C63)	-	-	IP17A	ERROR VSD LP-300A - ERR - VAR-300A	1	TO PLC
VAR-300B	SCA-300B (C63)	-	-	IP17B	ERROR VSD LP-300B - ERR - VAR-300B	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
VAR-600A	SCA-600A	-	-	IP6A	ERROR VSD CP-600A - ERR - VAR-600A	1	TO PLC
VAR-600B	SCA-600B	-	-	IP6B	ERROR VSD CP-600B - ERR - VAR-600B	1	TO PLC
VAR-620A	SCA-620A	-	-	IP5A	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC
VAR-620B	SCA-620B	-	-	IP5B	ERROR VSD CP-620B - ERR - VAR-620B	1	TO PLC
TT 60.1	TA 60.1 H	>200	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1	0	TO PLC
TT 60.1	TA 60.1 L	<50	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1	3600	TO PLC
TT 60.2	TA 60.2 H	>220	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2	0	TO PLC
TT 60.2	TA 60.2 L	<70	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2	3600	TO PLC
TT 61.1	TA 61.1 H	>200	°C	IP9	DEOXO TOWER 61, GAS UTLET TEMPERATURE HIGH - H - TT 61.1	0	TO PLC
TT 64.5	TA 64.5 H	>40	°C	IP9	DRYER TOWER 64A, COOLING FLOW LOW - H - TT 64.5	0	TO PLC
TT 64.5	TA 64.5 H A	>45	°C	IP9	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5	0	TO PLC
TT 64.5	TA 64.5 H R	>120	°C	IP9	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5	0	TO PLC
TT 64.5	TA 64.5 L	<100	°C	IP9	DRYER TOWER 64A, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.5	0	TO PLC
TT 64.6	TA 64.6 H A	>45	°C	IP9	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6	0	TO PLC
TT 64.6	TA 64.6 H R	>200	°C	IP9	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6	0	TO PLC
TT-64.6	TA 64.6 L	<150	°C	IP9	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6	0	TO PLC
TT-64.7	TA 64.7 H	>40	°C	IP9	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7	0	TO PLC
TT 64.7	TA 64.7 H A	>45	°C	IP9	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7	0	TO PLC
TT 64.7	TA 64.7 H R	>120	°C	IP9	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7	0	TO PLC
TT-64.7	TA 64.7 L	<100	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7	0	TO PLC
TT 64.8	TA 64.8 H A	>45	°C	IP9	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8	0	TO PLC
TT 64.8	TA 64.8 H R	>200	°C	IP9	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8	0	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT-64.8	TA 64.8 L	<150	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b...	0	TO PLC
TT-600	TAHH-600 (ISO22)	80	°C	IP1	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b...	0	TO PLC
TT-620	TAHH-620 (ISO22)	80	°C	IP1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620	0	TO PLC
TT-1001	TAHH-1001 (C63)	30	°C	IP11	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001	5	TO PLC
TT-1002	TAHH-1002 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002	5	TO PLC
TT-1003	TAHH-1003 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT-1004	TAHH-1004 (C63)	35	°C	IP11	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004	5	TO PLC
TT-1005	TAHH-1005 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005	5	TO PLC
TT-1006	TAHH-1006 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006	5	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b...	0	TO PLC
TT-600	TALL-600 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-600	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b...	0	TO PLC
TT-620	TALL-620 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-620	0	TO PLC
TT-HY-1001	TALL-1001 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001	5	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT-HY-1002	TALL-1002 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002	5	TO PLC
TT-HY-1003	TALL-1003 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003	5	TO PLC
TT-1004	TALL-1004 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW ELECTRICAL ROOM -LL - TT-1004	5	TO PLC
TT-HY-1005	TALL-1005 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005	5	TO PLC
TT-HY-1006	TALL-1006 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006	5	TO PLC
TDI-600	TDAH-600 (ISO22)	10	°C	IP9	ANODE DT HIGH - H - TDY-600	0	TO PLC
TDI-600	TDAHH-600 (ISO22)	12	°C	IP1	ANODE DT VERY HIGH - HH - TDY-600	0	TO PLC
TDI-600	TDAL-600 (ISO22)	-1	°C	IP9	ANODE DT LOW - L - TDY-600	0	TO PLC
TDI-600	TDALL-600 (ISO22)	-2	°C	IP1	ANODE DT VERY LOW - LL - TDY-600	0	TO PLC
TT 60.1	TSA 60.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.1	0	TO PLC
TT 60.1	TSA 60.1 HH	>250	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1	0	TO PLC
TT 60.1	TSA 60.1 LL	<40	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1	3600	TO PLC
TT 60.2	TSA 60.2	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.2	0	TO PLC
TT 60.2	TSA 60.2 HH	>250	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2	0	TO PLC
TT 60.2	TSA 60.2 LL	<50	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2	3600	TO PLC
TT 61.1	TSA 61.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 61.1	0	TO PLC
TT 61.1	TSA 61.1 HH	>250	°C	IP1	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1	0	TO PLC
TS 64.2	TSA 64.2 HH	>400	°C	IP1	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2	0	TO PLC
TS 64.3	TSA 64.3 HH	>200	°C	IP1	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3	0	TO PLC
TS 64.4	TSA 64.4 HH	>60	°C	IP1	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4	0	TO PLC
TT 64.5	TSA 64.5	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.5	0	TO PLC
TT 64.5	TSA 64.5 HH A	>50	°C	IP1	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
TT 64.5	TSA 64.5 HH R	>150	°C	IP1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5	0	TO PLC
TT 64.6	TSA 64.6	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.6	0	TO PLC
TT 64.6	TSA 64.6 HH A	>50	°C	IP1	DRYER TOWER 64A, TOP ADS. TEMPERATURE VERY HIGH -HH - 64.6	0	TO PLC
TT-64.6	TSA 64.6 HH C	>40	°C	IP1	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6	0	TO PLC
TT 64.6	TSA 64.6 HH R	>250	°C	IP1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6	0	TO PLC
TT 64.7	TSA 64.7	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.7	0	TO PLC
TT 64.7	TSA 64.7 HH A	>50	°C	IP1	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC
TT 64.7	TSA 64.7 HH R	>150	°C	IP1	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7	0	TO PLC
TT 64.8	TSA 64.8	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.8	0	TO PLC
TT 64.8	TSA 64.8 HH A	>50	°C	IP1	DRYER TOWER 64B, TOP ADS. TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC
TT-64.8	TSA 64.8 HH C	>40	°C	IP1	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8	0	TO PLC
TT 64.8	TSA 64.8 HH R	>250	°C	IP1	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8	0	TO PLC
TT-621A	TSAHH-621A (ISO22)	80	°C	IP5A	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A	0	TO PLC
TT-621B	TSAHH-621B (ISO22)	80	°C	IP5B	CP-620A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B	0	TO PLC
PCA-001	VAH-001 (ISO22)	2.2	V/cell	IP9	STACK-001 VERY HIGH CELL VOLTAGE - H - PCA-001	1	TO PLC
PCA-002	VAH-002 (ISO22)	2.2	V/cell	IP9	STACK-002 VERY HIGH CELL VOLTAGE - H - PCA-002	1	TO PLC
PCA-003	VAH-003 (ISO22)	2.2	V/cell	IP9	STACK-003 VERY HIGH CELL VOLTAGE - H - PCA-003	1	TO PLC
PCA-004	VAH-004 (ISO22)	2.2	V/cell	IP9	STACK-004 VERY HIGH CELL VOLTAGE - H - PCA-004	1	TO PLC
PCA-005	VAH-005 (ISO22)	2.2	V/cell	IP9	STACK-005 VERY HIGH CELL VOLTAGE - H - PCA-005	1	TO PLC
PCA-006	VAH-006 (ISO22)	2.2	V/cell	IP9	STACK-006 VERY HIGH CELL VOLTAGE - H - PCA-006	1	TO PLC
PCA-007	VAH-007 (ISO22)	2.2	V/cell	IP9	STACK-007 VERY HIGH CELL VOLTAGE - H - PCA-007	1	TO PLC
PCA-008	VAH-008 (ISO22)	2.2	V/cell	IP9	STACK-008 VERY HIGH CELL VOLTAGE - H - PCA-008	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
REC-001	VAH-101 (C63)	975	V	IP9	REC-001 HIGH VOLTAGE - H - VM-101	1	COM
REC-002	VAH-102 (C63)	975	V	IP9	REC-002 HIGH VOLTAGE - H - VM-102	1	COM
PCA-001	VAHH-001 (ISO22)	2.3	V/cell	IP1	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001	1	TO PLC
PCA-002	VAHH-002 (ISO22)	2.3	V/cell	IP1	STACK-002 VERY HIGH CELL VOLTAGE - HH - PCA-002	1	TO PLC
PCA-003	VAHH-003 (ISO22)	2.3	V/cell	IP1	STACK-003 VERY HIGH CELL VOLTAGE - HH - PCA-003	1	TO PLC
PCA-004	VAHH-004 (ISO22)	2.3	V/cell	IP1	STACK-004 VERY HIGH CELL VOLTAGE - HH - PCA-004	1	TO PLC
PCA-005	VAHH-005 (ISO22)	2.3	V/cell	IP1	STACK-005 VERY HIGH CELL VOLTAGE - HH - PCA-005	1	TO PLC
PCA-006	VAHH-006 (ISO22)	2.3	V/cell	IP1	STACK-006 VERY HIGH CELL VOLTAGE - HH - PCA-006	1	TO PLC
PCA-007	VAHH-007 (ISO22)	2.3	V/cell	IP1	STACK-007 VERY HIGH CELL VOLTAGE - HH - PCA-007	1	TO PLC
PCA-008	VAHH-008 (ISO22)	2.3	V/cell	IP1	STACK-008 VERY HIGH CELL VOLTAGE - HH - PCA-008	1	TO PLC
REC-001	VAHH-101 (C63)	1023	V	IP1	REC-001 VERY HIGH VOLTAGE - HH - VM-101	1	COM
REC-002	VAHH-102 (C63)	1023	V	IP1	REC-002 VERY HIGH VOLTAGE - HH - VM-102	1	COM
PCA-001	VAL-001 (ISO22)	1.55	V/cell	IP9	STACK-001 LOW CELL VOLTAGE - L - PCA-001	1	TO PLC
PCA-002	VAL-002 (ISO22)	1.55	V/cell	IP9	STACK-002 LOW CELL VOLTAGE - L - PCA-002	1	TO PLC
PCA-003	VAL-003 (ISO22)	1.55	V/cell	IP9	STACK-003 LOW CELL VOLTAGE - L - PCA-003	1	TO PLC
PCA-004	VAL-004 (ISO22)	1.55	V/cell	IP9	STACK-004 LOW CELL VOLTAGE - L - PCA-004	1	TO PLC
PCA-005	VAL-005 (ISO22)	1.55	V/cell	IP9	STACK-005 LOW CELL VOLTAGE - L - PCA-005	1	TO PLC
PCA-006	VAL-006 (ISO22)	1.55	V/cell	IP9	STACK-006 LOW CELL VOLTAGE - L - PCA-006	1	TO PLC
PCA-007	VAL-007 (ISO22)	1.55	V/cell	IP9	STACK-007 LOW CELL VOLTAGE - L - PCA-007	1	TO PLC
PCA-008	VAL-008 (ISO22)	1.55	V/cell	IP9	STACK-008 LOW CELL VOLTAGE - L - PCA-008	1	TO PLC
PCA-001	VALL-001 (ISO22)	1.5	V/cell	IP1	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001	1	TO PLC
PCA-002	VALL-002 (ISO22)	1.5	V/cell	IP1	STACK-002 VERY LOW CELL VOLTAGE - LL - PCA-002	1	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
PCA-003	VALL-003 (ISO22)	1.5	V/cell	IP1	STACK-003 VERY LOW CELL VOLTAGE - LL - PCA-003	1	TO PLC
PCA-004	VALL-004 (ISO22)	1.5	V/cell	IP1	STACK-004 VERY LOW CELL VOLTAGE - LL - PCA-004	1	TO PLC
PCA-005	VALL-005 (ISO22)	1.5	V/cell	IP1	STACK-005 VERY LOW CELL VOLTAGE - LL - PCA-005	1	TO PLC
PCA-006	VALL-006 (ISO22)	1.5	V/cell	IP1	STACK-006 VERY LOW CELL VOLTAGE - LL - PCA-006	1	TO PLC
PCA-007	VALL-007 (ISO22)	1.5	V/cell	IP1	STACK-007 VERY LOW CELL VOLTAGE - LL - PCA-007	1	TO PLC
PCA-008	VALL-008 (ISO22)	1.5	V/cell	IP1	STACK-008 VERY LOW CELL VOLTAGE - LL - PCA-008	1	TO PLC
PCA-001	VCA-001 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-001 - PCA-001	1	TO PLC
PCA-002	VCA-002 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-002 - PCA-002	1	TO PLC
PCA-003	VCA-003 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-003 - PCA-003	1	TO PLC
PCA-004	VCA-004 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-004 - PCA-004	1	TO PLC
PCA-005	VCA-005 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-005 - PCA-005	1	TO PLC
PCA-006	VCA-006 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-006 - PCA-006	1	TO PLC
PCA-007	VCA-007 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-007 - PCA-007	1	TO PLC
PCA-008	VCA-008 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-008 - PCA-008	1	TO PLC
PCA-001	VKA-001 (ISO22)	10	%	IP1	STACK-001 VOLTAGE DROP - PCA-001 - DROP	0	TO PLC
PCA-002	VKA-002 (ISO22)	10	%	IP1	STACK-002 VOLTAGE DROP - PCA-002 - DROP	0	TO PLC
PCA-003	VKA-003 (ISO22)	10	%	IP1	STACK-003 VOLTAGE DROP - PCA-003 - DROP	0	TO PLC
PCA-004	VKA-004 (ISO22)	10	%	IP1	STACK-004 VOLTAGE DROP - PCA-004 - DROP	0	TO PLC
PCA-005	VKA-005 (ISO22)	10	%	IP1	STACK-005 VOLTAGE DROP - PCA-005 - DROP	0	TO PLC
PCA-006	VKA-006 (ISO22)	10	%	IP1	STACK-006 VOLTAGE DROP - PCA-006 - DROP	0	TO PLC
PCA-007	VKA-007 (ISO22)	10	%	IP1	STACK-007 VOLTAGE DROP - PCA-007 - DROP	0	TO PLC
PCA-008	VKA-008 (ISO22)	10	%	IP1	STACK-008 VOLTAGE DROP - PCA-008 - DROP	0	TO PLC

Component TAG	Alarm TAG	SP	Unit	Alarm type	Alarm message (EN)	Timer (sec)	Alarm Group
REC-001/002	VPA-001 (ISO22)	600	s	IP9	POLARIZATION TIME TOO LONG	-	TO PLC
VM-001	VQAHH-001 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-001 AND VM-001 - HH	5	TO PLC
VM-002	VQAHH-002 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-002 AND VM-002 - HH	5	TO PLC
VM-003	VQAHH-003 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-003 AND VM-003 - HH	5	TO PLC
VM-004	VQAHH-004 (ISO22)	12.2	V	IP9	VOLTAGE DEVIATION BETWEEN PCA-004 AND VM-004 - HH	5	TO PLC
VM-005	VQAHH-005 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-005 ET VM-005 - HH	5	TO PLC
VM-006	VQAHH-006 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-006 ET VM-006 - HH	5	TO PLC
VM-007	VQAHH-007 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-007 ET VM-007 - HH	5	TO PLC
VM-008	VQAHH-008 (ISO22)	12.2	V	IP9	DEVIATION DE TENSION ENTRE PCA-008 ET VM-008 - HH	5	TO PLC
CT-600	YAH-600 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT600 - H	5	TO PLC
CT-620	YAH-620 (ISO22)	0,5	µS/cm	IP9	HIGH CONDUCTIVITY CT620 - H	5	TO PLC
CT-600	YAHH-600 (ISO22)	1	µS/cm	IP1	VERY HIGH CONDUCTIVITY CT600 - HH	5	TO PLC
CT-620	YAHH-620 (ISO22)	1	µS/cm	IP1	VERY HIGH CONDUCTIVITY CT620 - HH	5	TO PLC
CT-600	YALL-600 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT600	5	TO PLC
CT-620	YALL-620 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT620	5	TO PLC

Legend:

	Update compare to rev03

PLC ALARMS CHECK

Project Name :	C63 - SHELL	**Version :**	2
Location :	Italie	**Date :**	24/01/2025
		Document code :	C63-PWI-03-Alarm List

REVISION HISTORY

VERSION	DATE	AUTHOR	COMMENTS
2	**24/01/2025**	**SDE**	**MAJ Process**
1	11/01/2025	SDE	Creation

INTRODUCTION

This document is the **PLC ALARMS CHECK LIST** of the PLC quoted here below - Please refer to the corresponding item in the "Network Equipement List" for further information about the concerned PLC.

The **PLC ALARMS CHECK** LIST is based on a frozen version of the PLC Alarm List - This version number is registered here below.
This document, based on the PLC Alarm List, is used as a Checklist and allows to support the follow-up of **PLC Alarms Tests** during FAT & Commissioning/SAT phases.
It is constanly updated along the FAT/SAT Phases to track the progress throught the status of each Alarms - It then gives an **overview of the progress** and global completion of the PLC Alarms List Tested.

DESCRIPTION OF TEST CONDITIONS

PLC CONCERNED

TAG	C63 CPU 1
ITEM	SIEMENS SIMATIC S7-1500F CPU 1516F-3 PN/DP
DESCRIPTION	6ES7516-3FN01-0AB0

ALARMS CHECK OVERVIEW

	Alarm
NOT READY	118
NOT TESTED	0
FAULTY	19
SPARE	0
Partially OK	0
OK	317

PLC ALARMS CHECK

elogen

REFERENCE DOCUMENTS

ELECTRICAL DIAGRAMS	Alarm List Reference	PLC ALARM CHECK LIST	
FILE NAME	C63-PWI-003_03 - Alarm List	FILE NAME	C63 PLC ALARMS CHECK LIST
REVISION	3	REVISION	2
DATE	15/01/2025	DATE	24/01/2025
COMMENTS	Issued For Construction	COMMENTS	MAJ Process

LEGEND

DATE	**Date** when the related IO has been tested
STATUS	**Status** of the related IO in regards to the FAT/SAT Tests - Meaning of each status is described below :
NOT READY	Alarm is not ready to be tested ("Equipement not electrically connected" as exemple)
NOT TESTED	Alarm is ready to be tested but has not been tested yet
FAULTY	Alarm has been tested but is faulty - a description of the reason why it is considered as faulty MUST be detailed in the column "COMMENTS"
SPARE	Alarm is just a spare (ie : nothing connected to it) - then it does not need to be tested
OK	Alarm has been tested and is properly working
COMMENTS	**Open comments** about the related Alarm, where/when required

PLC Alarms Check List

(N.B: If this TEMPLATE/Document is used only to create/complement the PLC Alarms Check List and the sections Alarms Trees Checklist (green) is not required at this stage, simply "hide" the green sections or collapse it as well as the Sim S/W).

#	REV	COMPONENT TAG	ALARM TAG	SETPOINT	UNIT	ALARM TYPE	NAME	TEST PHASE	DESCRIPTION	COMMENTS
1	1	OIHA-800	AAH-800 (ISO22)	5	volppm	IP9	HIGH OXYGEN CONCENTRATION IN H2 - H - OIHA-800	SAT		
2	1	OIHA-800	AAHH-800 (CE3)	6	volppm	IP4	VERY HIGH OXYGEN CONCENTRATION IN H2 - HH - OIHA-800	FAT		
3	1	REC-001	ACA-001 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-001			
4	1	REC-002	ACA-002 (ISO22)	600	s	IP1	WAITING TOO LONG BEFORE STARTING RECTIFIER - HH - REC-002			
5	1	LP-300A	ACA-300A (CE3)	-	-	IP17A	LP-300A STARTING FAULT - LP-300A			
6	1	LP-300B	ACA-300B (CE3)	-	-	IP17B	LP-300B STARTING FAULT - LP-300B			
7	1	CP-600A	ACA-600A (ISO22)	-	-	IP6A	STARTING MALFUNCTION CP-600A - ERR - CP-600A			
8	1	CP-600B	ACA-600B (ISO22)	-	-	IP6B	STARTING MALFUNCTION CP-600B - ERR - CP-600B			
9	1	CP-620A	ACA-620A (ISO22)	-	-	IP5A	STARTING MALFUNCTION CP-620A - ERR - CP-620A			
10	1	CP-620B	ACA-620B (ISO22)	-	-	IP5B	STARTING MALFUNCTION CP-620B - ERR - CP-620B			
11	1	PQ-001	AQA-016 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION PQ001 - ERR			
12	1	PQ-002	AQA-017 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION PQ002 - ERR			
13	1	DC-200	AQA-200 (CE3)	-	-	IP20	DRY COOLER FAULT - ERR - DC-200		Presence de Paumier requise	
14	1	DC-201	AQA-201 (CE3)	-	-	IP20	DRY COOLER FAULT - ERR - DC-201		Presence de Paumier requise	
15	1	WC-400	AQA-400 (CE3)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-400		Presence de Paumier requise	
16	1	WC-401	AQA-401 (CE3)	-	-	IP20	WATER CHILLER DEFAULT - ERR - WC-401		Presence de Paumier requise	
17	1	RSP-001	AQA- 1005	-	-	IP1	DEFAULT COMMUNICATION PLC ELOGEN / RECTIFIER			
18	1	HVAC PACKAGE	AQA- 1006	-	-	IP1	DEFAULT COMMUNICATION PLC Elogen / HVAC			
19	1	REC-001	AQA-001 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-001			
20	1	REC-002	AQA-002 (ISO22)	-	-	IP1	RECTIFIER FAULT - ERR - REC-002			
21	1	RIO_MAIN	AQA-005 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO MAIN - ERR			
22	1	RIO1	AQA-006 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO 1 - ERR			
23	1	RIO2	AQA-007 (ISO22)	-	-	IP1	LOSS OF COMMUNICATION RIO 2 - ERR			
24	1	PN-001	AQA-008 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN001 - ERR			
25	1	PN-002	AQA-009 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN002 - ERR			
26	1	PN-003	AQA-010 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN003 - ERR			
27	1	PN-004	AQA-011 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN004 - ERR			
28	1	PN-005	AQA-012 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN005 - ERR			
29	1	PN-006	AQA-013 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN006 - ERR			
30	1	PN-007	AQA-014 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN007 - ERR			
31	1	PN-008	AQA-015 (ISO22)	-	-	IP9	LOSS OF COMMUNICATION CANPN008 - ERR			
32	1	RIO_BURKERT	AQA-018 (CE3)	-	-	IP1	LOSS OF COMMUNICATION RIO BURKERT - ERR			
33	1	N/A	AQA-052	-	-	IP1	Défaut du switch communication CLIENT/ÉLOGEN, en mode à distance.			
34	1	SSI- 1000	AQA- 1001 (ISO22)	-	-	IP1	FIRE CONTROL PANEL FAULT - ERR - SSI- 1000			
35	1	WTP- 300	AQA- 1003	-	-	IP1	DEFAULT COMMUNICATION PLC Elogen / WTP			
36	1	SSI- 1000	AQA- 1010 (ISO22)	-	-	IS4	FIRE AND GAS DETECTION - FIRE - SSI- 1000			
37	1	PLC	BZ- 001 (ISO22)	-	-	IS1	PLC FAULT - ERR - PLC-001			
38	1	HIOD-610	CAH-610 (CE3)	25	% LFL	IP9	HIGH H2 CONCENTRATION IN O2 - H - HIOD-610A/B/C 2oo3			
39	1	AHD-1000	CAH-1000 (ISO22)	25	%LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1000			
40	1	AHD-1001	CAH-1001 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1001			
41	1	AHD-1002	CAH-1002 (CE3)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1002			
42	1	AHD-1003	CAH-1003 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1003			
43	1	AHD-1004	CAH-1004 (ISO22)	25	% LFL	IP13	HIGH HYDROGEN CONCENTRATION IN AIR - H - AHD-1004			
44	1	QIA- 184	CAHH-300 (CE3)	1	µS/cm	IP16	CONDUCTIVITY TOO HIGH UPSTREAM LP300 - HH			
45	1	HIOD-610	CAHH-610 (CE3)	50	% LFL	IS1	VERY HIGH H2 CONCENTRATION IN O2 - HH - HIOD-610A/B/C 2oo3			
46	1	DPT-800	CAHH-800 (ISO22)	6	ppmv	IP4	VERY HIGH H2O CONCENTRATION in H2 - HH - DPT-800			
47	1	AHD-1000	CAHH-1000 (ISO22)	50	%LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1000			
48	1	AHD-1001	CAHH-1001 (ISO22)	50	%LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1001			
49	1	AHD-1002	CAHH- 1002 (CE3)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1002			
50	1	AHD-1003	CAHH-1003 (ISO22)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1003			
51	1	AHD-1004	CAHH-1004 (ISO22)	50	% LFL	IS4	VERY HIGH HYDROGEN CONCENTRATION IN AIR - HH - AHD-1004			
52	1	RCP-001	EGA-002 (CE3)	-	-	IS1	FAULT -PHASE MONITORING RELAY - 1U1			
53	1	REC-001/002	EGA-003 (CE3)	-	-	IS1	RECTIFIER 1 & 2 + ESD-008 TRIGGERED - 360KA1			
54	1	EH-1001	EGA-1001 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1001			
55	1	EH-1002	EGA-1002 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1002			
56	1	EH-1003	EGA-1003 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1003			
57	1	EH-1004	EGA-1004 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1004			
58	1	EH-1006	EGA-1006 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1006			
59	1	EH-1007	EGA-1007 (ISO22)	-	-	IP9	MALFUNCTION RELAY ELECTRICAL HEATER - ERR - RELAY EH-1007			
60	1	EXT-001	EGA-1101 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-001			
61	1	EXT-002	EGA-1102 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-002			
62	1	EXT-003	EGA-1103 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-003			
63	1	EXT-004	EGA-1104 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-004			
64	1	EXT-005	EGA-1105 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-005			
65	1	EXT-006	EGA-1106 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-006			
66	1	EXT-007	EGA-1107 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-007			
67	1	EXT-008	EGA-1108 (ISO22)	-	-	IP9	MALFUNCTION RELAY FAN STACK - ERR - RELAY EXT-008			
68	1	PQ-001	EIAHH-001 (CE3)	250	V	IP1	HIGH 230V-NETWORK VOLTAGE - HH - PQ-001			
69	1	PQ-002	EIAHH-002 (CE3)	440	V	IP1	HIGH 400V-NETWORK VOLTAGE - HH - PQ-002			
70	1	PQ-003	EIAHH-003 (CE3)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-003			
71	1	PQ-004	EIAHH-004 (CE3)	396	V	IP1	HIGH RECTIFIER VOLTAGE - HH - PQ-004			
72	1	REC-001/002	EIAHH-006 (CE3)	-	-	IP1	RECTIFIER HIGH VOLTAGE MODULE - ERR - REC-001/002			
73	1	PQ-001	EIALL-001 (CE3)	209	V	IP9	VERY LOW 230V-NETWORK VOLTAGE - LL - PQ-001			
74	1	PQ-002	EIALL-002 (CE3)	380	V	IP9	VERY LOW 400V-NETWORK VOLTAGE - LL - PQ-002			
75	1	PQ-003	EIALL-003 (CE3)	342	V	IP9	VERY LOW RECTIFIER VOLTAGE - LL - PQ-003			
77	1	PQ-004	EIALL-004 (CE3)	342	V	IP9	VERY LOW RECTIFIER VOLTAGE - LL - PQ-004			
78	1	FSH-640	FAHH-640(ISO22-ESD0)	1 (4.9)	- (m3/h)	IS3	DEBIT EQUILIBRAGE ELEVEE - FSH-640 - HH			
79	1	FICV-800	FAHH-800 (ISO22)	1 (4)	- (NL/min)	IS9	VERY HIGH H2 ANALYSIS FLOWRATE - HH - FICV-800			
80	1	FT-600	FAL-600 (ISO22-500)	79,38	m3/h	IP9	LOW FLOW ON ANODIC CIRCULATION LOOP - L - FT-600			
81	1	FT-620	FAL-620 (ISO22-500)	30,24	m3/h	IP9	LOW FLOW ON CATHODIC CIRCULATION LOOP - L - FT-620			
82	1	FT-900	FAL-900 (CE3)	41,4	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-900			
83	1	FT-901	FAL-901 (CE3)	70,3	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-901			
84	1	FT-920	FAL-920 (CE3)	5,6	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-920			
85	1	FT-921	FAL-921 (CE3)	10,5	m3/h	IP9	LOW N2 FLOWRATE FOR PURGE - L - FT-921			
86	1	FT-600	FALL-600 (ISO22-500)	44,1	m3/h	IS1	VERY LOW FLOW ON ANODIC CIRCULATION LOOP - LL - FT-600			
87	1	FICV-610	FALL-610 (ISO22)	0,7	- (NL/min)	IS1	VERY LOW O2 ANALYSIS FLOWRATE - LL - FICV-610			
88	1	FICV-611	FALL-611 (ISO22)	7,7	- (NL/min)	IP9	VERY LOW O2 FAST LOOP FLOWRATE - LL - FICV-611			
89	1	FT-620	FALL-620 (ISO22-500)	26,88	m3/h	IP1	VERY LOW FLOW ON CATHODIC CIRCULATION LOOP - LL - FT-620			
90	1	FICV-800	FALL-800 (ISO22)	2,1	(NL/min)	IP4	LOW H2 FLOW ANALYSIS - LL - FICV-800			
91	1	FT-630	FDAH-630 (ISO22)	5	%	IP9	HIGH DEVIATION H2 PRODUCTION VS H2 FLOWMETER - HH - FT-630			
92	1	FC 64.1	FSA 64.1	No 4-20	mA	IP5	FC 64.1 non alimenté par courant 4-20 mA			Aucun moyen de faire ce défaut
93	1	FC 64.1	FSA 64.1 LL	<5.16	mA	IP1	Débit entrée HHU FC 64.1 - LL			
94	1	MPV-611	GDA-611 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-611 - ERR - MPV-611			
95	1	MPV-630	GDA-630 (ISO22)	5,00	%	IP9	POSITION DEVIATION OF MPV-630 - ERR - MPV-630			
96	1	ZIO-604	GGA-604 (CE3)	1	-	IP1	Vanne HV-604 pas complètement ouverte - ZIO-604			Fais en simulation
97	1	GGA-605	GGA-605 (CE3)	1	-	IP1	Vanne HV-605 pas complètement ouverte - ZIO-605			Fais en simulation
98	1	ZIO-623	GGA-623 (CE3)	1	-	IP1	Vanne HV-623 pas complètement ouverte - ZIO-623			Fais en simulation
99	1	ZIO-624	GGA-624 (ISO22)	1	-	IS1	Vanne HV-624 pas complètement ouverte - ZIO-624			Fais en simulation
100	1	GS 64.1.1	GSA 64.1.1 HH	1	-	IP1	VALVE 64-V4.1 NOT CLOSED - HH - GS 64.1.1			Fais en simulation
101	1	GS 64.1.1	GSA 64.1.1 LL	0	-	IP1	VALVE 64-V4.1 NOT OPEN - LL - GS 64.1.1			Fais en simulation
102	1	GS 64.1.2	GSA 64.1.2 HH	1	-	IP1	VALVE 64-V4.2 NOT CLOSED - HH - GS 64.1.2			Fais en simulation
103	1	GS 64.1.2	GSA 64.1.2 LL	0	-	IP1	VALVE 64-V4.2 NOT OPEN - LL - GS 64.1.2			Fais en simulation
104	1	GS 64.1.3	GSA 64.1.3 HH	1	-	IP1	VALVE 64-V4.3 NOT CLOSED - HH - GS 64.1.3			Fais en simulation
105	1	GS 64.1.3	GSA 64.1.3 LL	0	-	IP1	VALVE 64-V4.3 NOT OPEN - LL - GS 64.1.3			Fais en simulation
106	1	GS 64.1.4	GSA 64.1.4 HH	1	-	IP1	VALVE 64-V4.4 NOT CLOSED - HH - GS 64.1.4			Fais en simulation
107	1	GS 64.1.4	GSA 64.1.4 LL	0	-	IP1	VALVE 64-V4.4 NOT OPEN - LL - GS 64.1.4			Fais en simulation
108	1	GS 64.2	GSA 64.2 HH	1	-	IP1	VALVE 64-V5 NOT CLOSED - HH - GS 64.2			Fais en simulation
109	1	GS 64.2	GSA 64.2 LL	0	-	IP1	VALVE 64-V5 NOT OPEN - LL - GS 64.2			Fais en simulation
110	1	GS 64.3	GSA 64.3 HH	1	-	IP1	VALVE 64-V7 NOT CLOSED - HH - GS 64.3			Fais en simulation
111	1	GS 64.3	GSA 64.3 LL	0	-	IP1	VALVE 64-V7 NOT OPEN - LL - GS 64.3			Fais en simulation
112	1	GS 64.72	GSA 64.72 HH	1	-	IP1	VALVE 64-T2 NOT OPEN - HH - GS 64.72			Fais en simulation
113	1	GS 64.72	GSA 64.72 LL	0	-	IP1	VALVE 64-T2 NOT CLOSED - LL - GS 64.72			Fais en simulation
114	1	IM-001	IAHH-001 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-001			
115	1	IM-002	IAHH-002 (ISO22)	1689,5	A	IP1	HIGH CURRENT RECTIFIER - HH - IM-002			
116	1	IM-001	IDAIH-001 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-001			
117	1	IM-002	IDAIH-002 (ISO22)	5	%	IP1	HIGH RECTIFIER CURRENT DEVIATION - HH - INTERNAL RECTIFIER CURRENT PROBE - IM-002			
118	1	HVAC	JGA-010 (CE3)	-	-	IP1	HVAC PANEL CIRCUIT BREAKER AUXILIARY CONTACT - 102QM1			
119	1	WC- 400	JGA-400 (CE3)	-	-	IP9	BREAKER WC-400 - CHILLER 1 - 102QM5			
120	1	WC- 401	JGA-401 (CE3)	-	-	IP9	BREAKER WC-401 - CHILLER 2 - 102QM7			
121	1	POWER 400V	JGA-001 (ISO22)	-	-	IP1	LOSS OF 400 VAC POWER SUPPLY - ERR			
122	1	REC-001/002	JGA- 002 (CE3)	-	-	IP1	OVERVOLTAGE - SURGE PROTECTION - RFB			
123	1	UPS	JGA-003 (CE3)	-	-	IP1	FAULT - UPS CIRCUIT BREAKER AUXILIARY CONTACT - 100QF5			
124	1	AUX2	JGA-004 (CE3)	-	-	IP1	BREAKER - AUXILIARY TYPE 2 - 120QM1			
125	1	230_AUX	JGA-005 (CE3)	-	-	IP1	FAULT - RECTIFIER 230Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF1			
126	1	REC-001/002	JGA-006 (ISO22)	-	-	IP1	REC_MAIN_BREK_DEF			
127	1	TSF-001	JGA-007 (CE3)	-	-	IP1	TRANSFORMER GAS PRESSURE TEMPERATURE DETECTION FAULT			
128	1	REC-001/002	JGA-008 (CE3)	-	-	IP1	FAULT - HCU RECTIFIER 400Vac POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 100QF3			
129	1	DEOXO	JGA-009 (CE3)	-	-	IP1	FAULT - DEOXO CIRCUIT BREAKER AUXILIARY CONTACT - 101QF1			
130	1	SOCKET	JGA-011 (CE3)	-	-	IP9	BREAKER SOCKET - 124QFx			
131	1	ALIM1_24	JGA-012 (CE3)	-	-	IP9	BREAKER DC ALIM1 24VDC - 130QF1			
132	1	ALIM2_24	JGA-013 (CE3)	1	-	IP9	BREAKER DC ALIM2 24VDC - 130QF3			
133	1	REC_UPS	JGA-014 (CE3)	-	-	IP1	FAULT - RECTIFIER UPS POWER SUPPLY 1 CIRCUIT BREAKER AUXILIARY CONTACT - 130QF5			
134	1	RIO1	JGA-015 (CE3)	-	-	IP1	RIO 1 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF1			
135	1	RIO2	JGA-016 (CE3)	-	-	IP1	RIO 2 PANEL POWER SUPPLY CIRCUIT BREAKER AUXILIARY CONTACT - 131QF3			
136	1	LP-300A	JGA-300A (CE3)	-	-	IP17A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300A			
137	1	LP-300B	JGA-300B (CE3)	-	-	IP17B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER LP-300B			
138	1	WTP-300	JGA-301 (CE3)	-	-	IP20	WTP300 - ERR - WTP-300			
139	1	WTP-300	JGA-302 (CE3)	-	-	IP1	BREAKER WTP300 - 102QF3			
140	1	HR-306	JGA-306 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 306 CIRCUIT BREAKER AUXILIARY CONTACT - 122QF7			
141	1	HR-307	JGA-307 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 307 CIRCUIT BREAKER AUXILIARY CONTACT - 123QF1			
142	1	HR-503	JGA-503 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 503 CIRCUIT BREAKER AUXILIARY CONTACT			
143	1	HR-600A	JGA-600A (CE3)	-	-	IP9	FAULT - HEAT RIBBON 600A CIRCUIT BREAKER AUXILIARY CONTACT			
144	1	CP-600A	JGA-600A (ISO22)	-	-	IP6A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600A			
145	1	CP-600B	JGA-600B (ISO22)	-	-	IP6B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-600B			
146	1	HR-606	JGA-606 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 606 CIRCUIT BREAKER AUXILIARY CONTACT			
147	1	HR-6078	JGA-6078 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 6078 CIRCUIT BREAKER AUXILIARY CONTACT			
148	1	HR-620A	JGA-620A (CE3)	-	-	IP9	FAULT - HEAT RIBBON 620A CIRCUIT BREAKER AUXILIARY CONTACT			
149	1	CP-620A	JGA-620A (ISO22)	-	-	IP5A	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620A			
150	1	CP-620B	JGA-620B (ISO22)	-	-	IP5B	MALFUNCTION CIRCUIT BREAKER PUMP - ERR - BREAKER CP-620B			
151	1	HR-625	JGA-625 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 625 CIRCUIT BREAKER AUXILIARY CONTACT			
152	1	HR-640	JGA-640 (CE3)	-	-	IP9	FAULT - HEAT RIBBON 640 CIRCUIT BREAKER AUXILIARY CONTACT			
153	1	SSI- 1000	JGA- 1000 (CE3)	-	-	IP1	SSI- 1000 POWER FAILURE - 130QF7			
154	1	EH-1001	JGA- 1001 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1001		Presence de Paumier requise	
155	1	EH-1002	JGA- 1002 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1002		Presence de Paumier requise	
156	1	EH-1003	JGA- 1003 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1003		Presence de Paumier requise	
157	1	EH-1004	JGA- 1004 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1004		Presence de Paumier requise	
158	1	EH-1006	JGA- 1006 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1006		Presence de Paumier requise	

PLC Alarms Check List (FAT/SAT)

(*) COPY AND PASTE the PLC Alarm List document to create the PLC Alarm Check LIST (FAT/SAT) as a document on its own, independant from the PLC Alarm List document (*).

#	DATE	STATUS	COMMENTS
1		NOT READY	
2		NOT READY	
3		NOT READY	
4		NOT READY	
5		NOT READY	
6		NOT READY	
7		NOT READY	
8		NOT READY	
9	19/03/2024	OK	
10	19/03/2024	OK	
11	11/03/2025	OK	
12	11/03/2025	OK	
13		NOT READY	
14		NOT READY	
15		NOT READY	
16		NOT READY	
17		NOT READY	
18		NOT READY	
19		NOT READY	
20		NOT READY	
21	19/03/2025	OK	
22	11/03/2025	OK	
23	11/03/2025	OK	
24	11/03/2025	OK	
25	11/03/2025	OK	
26	11/03/2025	OK	
27	11/03/2025	OK	
28	11/03/2025	OK	
29	11/03/2025	OK	
30	11/03/2025	OK	
31	11/03/2025	OK	
32	19/03/2025	OK	
33	27/03/2025	OK	
34	24/03/2025	OK	
35	27/03/2025	OK	
36	24/03/2025	OK	
37	08/04/2025	OK	
38		NOT READY	
39	26/03/2025	OK	
40	26/03/2025	OK	
41	26/03/2025	OK	
42	08/04/2025	OK	
43	26/03/2025	OK	
44	19/03/2025	OK	
45		NOT READY	
46		NOT READY	
47	26/03/2025	OK	
48	24/03/2025	OK	
49	26/03/2025	OK	
50	08/04/2025	OK	
51	26/03/2025	OK	
52	11/03/2025	OK	
53	13/03/2025	OK	
54		NOT READY	
55		NOT READY	
56		NOT READY	
57		NOT READY	
58		NOT READY	
59		NOT READY	
60	19/03/2025	OK	
61	19/03/2025	OK	
62	19/03/2025	OK	
63	19/03/2025	OK	
64	19/03/2025	OK	
65	19/03/2025	OK	
66	19/03/2025	OK	
67	19/03/2025	OK	
68	19/03/2025	OK	
69	19/03/2025	OK	
70	19/03/2025	OK	
71	19/03/2025	OK	
72		NOT READY	
73	11/03/2025	OK	
74	11/03/2025	OK	
75	19/03/2025	OK	
77	19/03/2025	OK	
78		NOT READY	
79		NOT READY	
80	27/03/2025	OK	
81	19/03/2025	OK	
82	08/04/2025	OK	
83	08/04/2025	OK	
84	08/04/2025	OK	
85	08/04/2025	OK	
86	27/03/2025	OK	
87		NOT READY	
88		NOT READY	
89	13/03/2025	OK	
90		NOT READY	
91		NOT READY	
92		FAULTY	Aucun moyen de faire ce défaut
93		NOT READY	
94	19/03/2025	OK	
95	19/03/2025	OK	
96	21/02/2025	OK	Fais en simulation
97	21/02/2025	OK	Fais en simulation
98	21/02/2025	OK	Fais en simulation
99	21/02/2025	OK	Fais en simulation
100	22/03/2025	OK	Fais en simulation
101	22/03/2025	OK	Fais en simulation
102	22/03/2025	OK	Fais en simulation
103	22/03/2025	OK	Fais en simulation
104	22/03/2025	OK	Fais en simulation
105	22/03/2025	OK	Fais en simulation
106	22/03/2025	OK	Fais en simulation
107	22/03/2025	OK	Fais en simulation
108	22/03/2025	OK	Fais en simulation
109	22/03/2025	OK	Fais en simulation
110	22/03/2025	OK	Fais en simulation
111	22/03/2025	OK	Fais en simulation
112	22/03/2025	OK	Fais en simulation
113	22/03/2025	OK	Fais en simulation
114	08/04/2025	OK	
115	08/04/2025	OK	
116		NOT READY	
117		NOT READY	
118	21/02/2025	OK	
119	21/02/2025	OK	
120	21/02/2025	OK	
121	08/04/2025	OK	
122	19/03/2025	OK	
123	11/03/2025	OK	
124	19/03/2025	OK	
125	19/03/2025	OK	
126	27/03/2025	OK	
127		NOT READY	
128	27/03/2025	OK	
129		FAULTY	a verifier
130	26/03/2025	OK	
131	27/03/2025	OK	
132	27/03/2025	OK	
133	19/03/2025	OK	
134	11/03/2025	OK	
135	11/03/2025	OK	
136	11/03/2025	OK	
137	11/03/2025	OK	
138	08/04/2025	OK	
139	19/03/2025	OK	
140		FAULTY	N'existe pas
141	27/03/2025	OK	
142		FAULTY	N'existe pas
143		FAULTY	N'existe pas
144	11/03/2025	OK	
145	11/03/2025	OK	
146		FAULTY	N'existe pas
147		FAULTY	N'existe pas
148		FAULTY	N'existe pas
149	11/03/2025	OK	
150	11/03/2025	OK	
151		FAULTY	N'existe pas
152		FAULTY	N'existe pas
153	24/03/2025	OK	
154		NOT READY	
155		NOT READY	
156		NOT READY	
157		NOT READY	
158		NOT READY	

PLC Alarms Check List

(*) If this TEMPLATE/Document is used only to create/represent the PLC Alarms Check List and the sections Alarms Tests Checklist (green) is not required at this stage, simply "hide" the green sections or collapse it as well as the line 3 (*).

#	REV	COMPONENT TAG	ALARM TAG	SETPOINT	UNIT	ALARM TYPE	NAME	TEST PHASE	DESCRIPTION	COMMENTS
159	1	EH-1007	JGA-1007 (ISO22)	-	-	IP9	MALFUNCTION CIRCUIT BREAKER ELECTRICAL HEATER - ERR - BREAKER EH-1007			Presence de Paumier requise
160	1	EXT 001/002/003/004	JGA-1121	-	-	IP9	Disjoncteur commun des 4 Ventilateurs stack en défaut - STACK 005/ 006/ 007/ 008			
161	1	EXT 005/ 006/ 007/ 008	JGA-1122	-	-	IP9	Disjoncteur commun des 4 Ventilateurs stack en défaut - STACK 001/002/003/004			
162	1	K01	KSA K01 HH	1	-	IP1	Dryer heater HE 64.1, K01 Not deactivated			
163	1	K01	KSA K01 LL	0	-	IP1	Dryer heater HE 64.1, contactor K01 Not activated			
164	1	K02	KSA K02 HH	1	-	IP1	Dryer heater HE 64.1, K02 Not deactivated			
165	1	K02	KSA K02 LL	0	-	IP1	Dryer heater HE 64.1, K02 Not activated			
166	1	K03	KSA K03 HH	1	-	IP1	Deoxo Trace heater HE 61.1, K03 Not deactivated			
167	1	K03	KSA K03 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT ACTIVATED - LL - K03			
168	1	K04	KSA K04 HH	1	-	IP1	DEOXO TRACE HEATER HE 61.1, K03 NOT DEACTIVATED - HH - K04			
169	1	K04	KSA K04 LL	0	-	IP1	DEOXO TRACE HEATER HE 61.1, K04 NOT ACTIVATED - LL - K04			
170	1	LT-600	LAH-600 (CE3)	50	%	IP9	HIGH LEVEL ST-600 - H - LT-600			
171	1	LSH-610	LAH-610 (ISO22)	1	-	IP9	HIGH LEVEL CS-610 - H - LSH-610			
172	1	LT-620	LAH-620 (CE3)	62	%	IP9	HIGH LEVEL ST-620 - H - LT-620			
173	1	LSH-630	LAH-630 (CE3)	1	-	IP1	HIGH LEVEL CS-630 - HH - LSH-630			
174	1	WLD-001	LAHH-001 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-001			
175	1	WLD-002	LAHH-002 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-002			
176	1	WLD-003	LAHH-003 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-003			
177	1	WLD-004	LAHH-004 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-004			
178	1	WLD-005	LAHH-005 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-005			
179	1	WLD-006	LAHH-006 (ISO22)	1	-	IP1	WATER LEAK DETECTION - HH - WLD-006			
180	1	LT-600	LAHH-600 (CE3)	52	%	IP1	VERY HIGH LEVEL ST-600 - HH - LT-600			
181	1	LT-620	LAHH-620 (CE3)	71	%	IP1	VERY HIGH LEVEL ST-620 - HH - LT-620			
182	1	LSH-631	LAHH-631 (ISO22)	1	-	IS1	VERY HIGH LEVEL CS-630 - HH - LSH-631			
183	1	LSH-640	LAHH-640 (ISO22)	1	-	IP9	HIGH LEVEL DG-640 - HH - LSH-640			
184	1	LT-600	LAL-600 (CE3)	32	%	IP9	LOW LEVEL ST-600 - LT-600 - L			
185	1	LSL-610	LAL-610 (ISO22)	1	-	IP9	HIGH LEVEL CS-610 - H - LSH-610			
186	1	LT-620	LAL-620 (CE3)	31	%	IP9	LOW LEVEL ST-620 - L - LT-620			
187	1	LSL-630	LAL-630 (ISO22)	1	-	IP9	LOW LEVEL CS-630 - L - LSL-630			
188	1	USA-181	LALL-301 (CE3)	20	%	IP16	VERY LOW LEVEL WTP-300 - LL - LT-300			
189	1	LT-600	LALL-600 (CE3)	26	%	IP2	VERY HIGH LEVEL ST-600 - LL - LT-600			
190	1	LSL-611	LALL-611 (ISO22)	1	-	IS13	VERY LOW LEVEL CS -610 - LL - LSL-611			
191	1	LT-620	LALL-620 (CE3)	27	%	IP3	VERY LOW LEVEL ST-620 - LL - LT-620			
192	1	LSH-600	LASH-600 (ISO22)	1	-	IS12	VERY HIGH LEVEL ST600 (SIS) - HH - LSH-600			
193	1	LSHH-500	LASHH-500 (CE3)	1	-	IP1	VERY HIGH LEVEL WATER DRAIN ON VENT - LSHH-500			
194	1	LSL-600	LASLL-600 (CE3)	1		IS6	VERY LOW LEVEL ST600 (SIS) - LL - LSL-600			
195	1	LSL-620	LASLL-620 (CE3)	1	-	IS5	VERY LOW LEVEL ST620 (SIS) - LL - LSL-620			
196	1	LSLL-500	LASLL-500 (CE3)	1	-	IS14	VERY LOW DRAIN WATER LEVEL ON HYDROGEN VENT - LSLL-500			
197	1	LSL-641	LALL-641 (ISO22)	1	-	IS3	VERY LOW LEVEL DG-640 (SIS) - LL - LSL-641			
198	1	AUC-001	OAR-001 (CE3)	-	-	IS1	CUSTOMER EMERGENCY STOP - AUC-001 - SIS XS-001			
199	1	DS-001	OAS-001 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-001			
200	1	DS-002	OAS-002 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-002			
201	1	DS-003	OAS-003 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-003			
202	1	DS-004	OAS-004 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-004			
203	1	DS-005	OAS-005 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-005			
204	1	DS-006	OAS-006 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-006			
205	1	DS-007	OAS-007 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-007			
206	1	DS-008	OAS-008 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-008			
207	1	DS-009	OAS-009 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-009			
208	1	DS-010	OAS-010 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-0010			
209	1	DS-011	OAS-011 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-011			
210	1	DS-012	OAS-012 (ISO22)	1	-	IP1	ELECTROLYSER DOOR OPENED - DS-012			
211	1	ESD-001	OAZ-001 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-003			
212	1	ESD-002	OAZ-002 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-002			
213	1	ESD-003	OAZ-003 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-003			
214	1	ESD-004	OAZ-004 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-004			
215	1	ESD-005	OAZ-005 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-005			
216	1	ESD-006	OAZ-006 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-006			
217	1	ESD-007	OAZ-007 (ISO22)	1	-	IS1	EMERGENCY SHUTDOWN BUTTON - ESD-007			
218	1	PLC	OOA-001 (CE3)	-	-	IP9	DIVERGENCE REMOTE / LOCAL			
219	1	PT-64.1	PA 64.1 L	15	barg	IP9	CONDENSATE, PT 64.1 SET POINT NOT REACHED - L - PT-64-1			Presence de Paumier requise
220	1	PT-150	PAH-150 (ISO22)	8,5	barg	IP9	HIGH INSTRUMENT AIR PRESSURE - H - PT-150			
221	1	PT-300	PAH-300 (ISO22)	14	barg	IP9	HIGH PRESSURE DOWNSTREAM LP-300 - H - PT300			
222	1	PT-600	PAH-600 (ISO22)	15	barg	IP9	HIGH PRESSURE DOWNSTREAM CP600A/B - H - PT-600			
223	1	PT-610	PAH-610 (ISO22)	11,8	barg	IP9	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS) - H - PT-610			
224	1	PT-612	PAH-612 (ISO22)	0,5	barg	IP9	HIGH OXYGEN VENT PRESSURE - H - PT-612			
225	1	PT-620	PAH-620 (ISO22)	37	barg	IP9	HIGH PRESSURE DOWNSTREAM CP620A/B - H - PT-620			
226	1	PT-630	PAH-630 (ISO22)	33	barg	IP9	HIGH HYDROGEN PRESSURE HYDROGEN SIDE - H - PT-630			
227	1	PT-910	PAH-910 (ISO22)	8,5	barg	IP9	HIGH NITROGEN PRESSURE - H - PT-910			
228	1	PT-105	PAHH-05 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-05			
229	1	PT-112	PAHH-12 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-12			
230	1	PT-15	PAHH-15 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 1 - HH - PT-15			
231	1	PT-22	PAHH-22 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 400 DOWNSTREAM PUMP 2 - HH - PT-22			
232	1	PT-105	PAHH-105 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 1 - HH - PT-105			
233	1	PT-112	PAHH-112 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 1 - HH - PT-112			
234	1	PT-115	PAHH-115 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 200 UPSTREAM PUMP 2 - HH - PT-115			
235	1	PT-122	PAHH-122 (CE3)	PAUMER	barg	IP1	VERY HIGH PRESSURE LOOP 200 DOWNSTREAM PUMP 2 - HH - PT-122			
236	1	PT-150	PAHH-150 (ISO22)	9	barg	IP1	VERY HIGH INSTRUMENT AIR PRESSURE - HH - PT-150			
237	1	PT-300	PAHH-300 (CE3)	16	barg	IP16	VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300			
238	1	PT-600A	PAHH-600A (CE3)	16	barg	IS15	VERY HIGH PRESSURE DOWNSTREAM OF CP600A - HH - PT-600A			
239	1	PT-600B	PAHH-600B (CE3)	16	barg	IS16	VERY HIGH PRESSURE DOWNSTREAM OF CP600B - HH - PT-600B			
240	1	PT-610	PAHH-610 (ISO22)	12	barg	IP1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610			
241	1	PT-611	PAHH-611 (ISO22)	12,5	barg	IS1	VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS)- HH - PT-611			
242	1	PT-620A	PAHH-620A (CE3)	38	barg	IS17	VERY HIGH PRESSURE DOWNSTREAM OF CP620A - HH - PT-620A			
243	1	PT-620B	PAHH-620B (CE3)	38	barg	IS18	VERY HIGH PRESSURE DOWNSTREAM OF CP620B - HH - PT-620B			
244	1	PT-630	PAHH-630 (ISO22)	33,5	barg	IP1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (BPCS)- HH - PT-630			
245	1	PT-631	PAHH-631 (ISO22)	34	barg	IS1	VERY HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS)- HH - PT-631			
246	1	PT-632	PAHH-632 (CE3)	3,6	barg	IP9	VERY HIGH PRESSURE ON HYDROGEN VENT - HH - PT-632			
247	1	PT-633	PAHH-633 (CE3)	33	barg	IP4	VERY HIGH PRESSURE ON HYDROGEN CUSTOMER LINE - HH - PT-633			
248	1	PT-900	PAHH-900 (ISO22)	9	barg	IP1	LEAK ON OXYGEN INERTING LINE - HH - PT-900			
249	1	PT-910	PAHH-910 (ISO22)	9	barg	IP1	VERY HIGH NITROGEN PRESSURE - HH - PT-910			
250	1	PT-920	PAHH-920 (ISO22)	9	barg	IP1	LEAK ON HYDROGEN INERTING LINE - HH - PT -920			
251	1	PT-150	PAL-150 (ISO22)	6	barg	IP9	LOW INSTRUMENT AIR PRESSURE - L - PT-150			
252	1	PT-300	PAL-300 (CE3)	10,8	barg	IP9	LP300 PUMP PRESSURE LOSS - L - PT300			
253	1	PT-600	PAL-600 (CE3)	2,79	barg	IP9	CP-600 PUMP PRESSURE LOSS - L - PT600			
254	1	PT-620	PAL-620 (CE3)	3,11	barg	IP9	CP-620 PRESSURE LOSS - L - PT-620			
255	1	PT-910	PAL-910 (ISO22)	6	barg	IP9	LOW NITROGEN PRESSURE - L - PT -910			
256	1	PT-150	PALL-150 (ISO22)	5,5	barg	IP1	VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150			
257	1	PT-300	PALL-300 (CE3)	9,6	barg	IP17A/B	LP-300 PUMP CHANGEOVER UNFORESEEN - LL - PT300			
258	1	PT-600	PALL-600 (CE3)	2,48	barg	IP5A/B	CP 600CHANGEOVER UNFORESEEN - LL - PT-600			
259	1	PT-611	PALL-611 (ISO22)	0	barg	IS10	LOW PRESSURE ON ANODIC SIDE - LL - PT-611			
260	1	PT-620	PALL-620 (CE3)	2,76	barg	IP8A/B	CP-620 CHANGEOVER UNFORESEEN - LL - PT -620			
261	1	PT-631	PALL-631 (ISO22)	0	barg	IS11	LOW PRESSURE ON CATHODIC SIDE - LL - PT -631			
262	1	PT-910	PALL-910 (ISO22)	5,5	barg	IP1	VERY LOW NITROGEN PRESSURE - LL - PT910			
263	1	PT-1001	PALL-1001 (CE3)	10	Pa	IP9	VERY LOW PRESSURE IN WTP ROOM - LOSS OF VENTILATION - LL - PT -1001			
264	1	PT-1002	PALL-1002 (CE3)	10	Pa	IP1	VERY LOW PRESSURE IN O2/H2 ROOM - LOSS OF VENTILATION - LL - PT-1002			
265	1	PT-1003	PALL-1003 (CE3)	10	Pa	IP1	VERY LOW PRESSURE IN STACK ROOM - LOSS OF VENTILATION - LL - PT-1003			
266	1	PT-1004	PALL-1004 (CE3)	10	Pa	IP9	VERY LOW PRESSURE IN ELECTRICAL ROOM - LOSS OF VENTILATION - LL - PT-1004			
267	1	PT-1005	PALL-1005 (CE3)	10	Pa	IP9	VERY LOW PRESSURE IN HVAC CONTAINER - LOSS OF VENTILATION - LL - PT-1005			
268	1	PT-1006	PALL-1006 (CE3)	10	Pa	IP1	VERY LOW PRESSURE IN PROCESS CONTAINER - LOSS OF VENTILATION - LL - PT-1006			
269	1	DPY-001 = PT630 - PT610	PDAH-001 (ISO22)	21,5	barg	IP9	IMPORTANT DIFFERENTIAL PRESSURE - H - PT630-PT610			
270	1	PT-610	PDAH-610 (ISO22)	1200	s	IP9	OXYGEN SIDE DEPRESSURISATION TOO LONG - H - PT-610			
271	1	PT-630	PDAH-630 (ISO22)	1200	s	IP9	HYDROGEN SIDE DEPRESSURISATION TOO LONG - H - PT-630			
272	1	DPY-001 = PT630 - PT610	PDAHH-001 (ISO22)	22	barg	IP1	VERY IMPORTANT DIFFERENTIAL PRESSURE - HH - PT630-PT610			
273	1	DPY-002 = PT631 - PT611	PDAHH-002 (ISO22)	23	barg	IS1	VERY HIGH DIFFERENTIAL PRESSURE - HH - PT631-PT611			
274	1	DPY-001 = PT630 - PT610	PDAL-001 (ISO22)	-0,1	barg	IP9	REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610			
275	1	DPY-001 = PT630 - PT610	PDALL-001 (ISO22)	-0,5	barg	IP1	IMPORTANT REVERSE DIFFERENTIAL PRESSURE - LL - PT630-PT610			
276	1	DPY-002 = PT631 - PT611	PDALL-002 (ISO22)	-1	barg	IS1	VERY LOW DIFFERENTIAL PRESSURE - LL - PT631-PT611			
277	1	PT-633	PKA-633 (CE3)	-7	barg/s	IS2	LEAKAGE ON CLIENT LINE - CLOSING PV635 - PT-633			
278	1	PT-64.1	PSA 64.1	No 4-20	mA	IP1	PT 64.1 NO SIGNAL - ERR - PT 64.1			
279	1	PT-64.1	PSA 64.1 HH	-	barg	IP1	CONDENSATE PRESSURE VERY HIGH - HH - PT 64.1			
280	1	PT 64.1	PSA 64.1 L	14.9	barg	IP1	CONDENSATE, PRESSURE VERY HIGH - LL - PT-64-1			
281	1	PS-001	PSA-001 (CE3)	-	-	IP1	RECTIFIER COOLING NETWORK PRESSURE SWITCH - PS001			
282	1	PT-611	PZAH-611 (CE3)	12,3	barg	IS20	HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (SIS) OPENING PV-610 - H - PT-611			
283	1	PT-631	PZAH-631 (CE3)	33,8	barg	IS19	HIGH PRESSURE IN HYDROGEN SEPARATOR ST-620 (SIS) OPENING PV-630 - H - PT-631			
284	1	VAR-300A	SCA-300A (CE3)	-	-	IP17A	ERROR VSD LP-300A - ERR - VAR-300A			
285	1	VAR-300B	SCA-300B (CE3)	-	-	IP17B	ERROR VSD LP-300B - ERR - VAR-300B			
286	1	VAR-600A	SCA-600A	-	-	IP6A	ERROR VSD CP-600A - ERR - VAR-600A			
287	1	VAR-600B	SCA-600B	-	-	IP6B	ERROR VSD CP-600B - ERR - VAR-600B			
288	1	VAR-620A	SCA-620A	-	-	IP5A	ERROR VSD CP-620B - ERR - VAR-620B			
289	1	VAR-620B	SCA-620B	-	-	IP5B	ERROR VSD CP -620B - ERR - VAR-620B			
290	1	TT 60.1	TA 60.1 H	>200	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE HIGH - H - TT 60.1			
291	1	TT 60.1	TA 60.1 L	<50	°C	IP9	DEOXO TOWER 61, SURFACE TEMPERATURE LOW - L - TT 60.1			
292	1	TT 60.2	TA 60.2 H	>220	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE HIGH - H - TT 60.2			
293	1	TT 60.2	TA 60.2 L	<70	°C	IP9	DEOXO TRACE HEATER HE 61.1, TEMPERATURE LOW - L - TT 60.2			
294	1	TT 61.1	TA 61.1 H	>200	°C	IP9	DEOXO TOWER 61, GAS OUTLET TEMPERATURE HIGH - H - TT 61.1			
295	1	TT 64.5	TA 64.5 H	>40	°C	IP9	Température liquide de refroidissement sécheur 64A TT 64.5 - H			
296	1	TT 64.5	TA 64.5 H A	>45	°C	IP9	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.5			
297	1	TT 64.5	TA 64.5 H R	>120	°C	IP9	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.5			
298	1	TT 64.5	TA 64.5 L	<100	°C	IP9	Température bas sécheur 64A régénération TT 64.5 - L			
299	1	TT 64.6	TA 64.6 H A	>45	°C	IP9	DRYER TOWER 64A, TOP ADS. TEMPERATURE HIGH - H - 64.6			
300	1	TT 64.6	TA 64.6 H R	>200	°C	IP9	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE HIGH - H - 64.6			
301	1	TT 64.6	TA 64.6 L	<150	°C	IP9	TOP DRYER TOWER 64A REGENERATION TEMPERATURE - L - TT 64.6			
302	1	TT 64.7	TA 64.7 H	>40	°C	IP9	DRYER TOWER 64B, BOTTOM COOLIN FLOW LOW - H - TT 64.7			
303	1	TT 64.7	TA 64.7 H A	>45	°C	IP9	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE HIGH - H - TT 64.7			
304	1	TT 64.7	TA 64.7 H R	>120	°C	IP9	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE HIGH - H - TT 64.7			
305	1	TT-64.7	TA 64.7 L	<100	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE BOTTOM LOW - L - TT 64.7			
306	1	TT 64.8	TA 64.8 H A	>45	°C	IP9	DRYER TOWER 64B, TOP ADS. TEMPERATURE HIGH - H - 64.8			
307	1	TT 64.8	TA 64.8 H R	>200	°C	IP9	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE HIGH - H - 64.8			
308	1	TT-64.8	TA 64.8 L	<150	°C	IP9	DRYER TOWER 64B, REGENERATION TEMPERATURE TOP LOW - L- TT 64.8			
309	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
310	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
311	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
312	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
313	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
314	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
315	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
316	1	TT-601x	TAH-601 (ISO22)	70	°C	IP9	ANODE TEMPERATURE OUTLET STACK HIGH - H - TT-601a,b..			
317	1	TT-600	TAHH-600 (ISO22)	80	°C	IP1	ANODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-600			
318	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..			
319	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..			

PLC Alarms Check List (FAT/SAT)

(*) COPY AND PASTE the PLC Alarm List document to create the PLC Alarms Check LIST (FAT/SAT) as a document on its own, independant from the PLC Alarm List document (*).

DATE	STATUS	COMMENTS
	NOT READY	
19/03/2025	OK	
19/03/2025	OK	
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
11/03/2024	OK	
19/03/2025	OK	
19/03/2025	OK	
11/03/2024	OK	
18/02/2025	OK	
18/02/2025	OK	
18/02/2025	OK	
18/02/2025	OK	
24/02/2025	OK	
24/02/2025	OK	
11/03/2024	OK	
11/03/2024	OK	
19/03/2025	OK	
19/03/2025	OK	
11/03/2024	OK	
11/03/2024	OK	
19/03/2025	OK	
19/03/2025	OK	
11/03/2025	OK	
19/03/2025	OK	
11/03/2024	OK	
11/03/2024	OK	
19/03/2025	OK	
11/03/2024	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025

PLC Alarms Check List

(N.B If this TEMPLATE/Document is used only to create/represent the PLC Alarms Check list and the section Alarms Tests Checklist (green) is not required at this stage, simply "hide" the green section in column P as well as this line 2 /!\)

#	REV	COMPONENT TAG	ALARM TAG	SETPOINT	UNIT	ALARM TYPE	NAME	TEST PHASE	DESCRIPTION	COMMENTS
320	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..	2		
321	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..	2		
322	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..	2		
323	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..	2		
324	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..	2		
325	1	TT-601x	TAHH-601 (ISO22)	80	°C	IP1	ANODE TEMPERATURE OUTLET STACK VERY HIGH - HH - TT-601a,b..	2		
326	1	TT-620	TAHH-620 (ISO22)	80	°C	IP1	CATHODE TEMPERATURE INLET STACK VERY HIGH - HH - TT-620	2		
327	1	TT-1001	TAHH-1001 (C63)	30	°C	IP11	AMBIENT TEMPERATURE VERY HIGH WTP ROOM - HH - TT-1001	2		
328	1	TT-1002	TAHH-1002 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH O2/H2 LOOP CONTAINER - HH - TT-1002	2		
329	1	TT-1003	TAHH-1003 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH STACK ROOM - HH - TT-1003	2		
330	1	TT-1004	TAHH-1004 (C63)	35	°C	IP11	AMBIENT TEMPERATURE VERY HIGH ELECTRICAL ROOM - HH - TT-1004	2		
331	1	TT-1005	TAHH-1005 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH HVAC CONTAINER - HH - TT-1005	2		
332	1	TT-1006	TAHH-1006 (C63)	45	°C	IP11	AMBIENT TEMPERATURE VERY HIGH PROCESS CONTAINER - HH - TT-1006	2		
333	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
334	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
335	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
336	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
337	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
338	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
339	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
340	1	TT-601x	TAL-601 (ISO22)	10	°C	IP9	ANODE TEMPERATURE LOW - L - TT-601a,b..	2		
341	1	TT-1003	TAL-1003 (ISO22)	10	°C	IP9	AMBIENT TEMPERATURE LOW - L - TT-1003	2		
342	1	TT-600	TALL-600 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-600	2		
343	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
344	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
345	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
346	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
347	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
348	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
349	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
350	1	TT-601x	TALL-601 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-601a,b..	2		
351	1	TT-620	TALL-620 (ISO22)	5	°C	IP8	ANODE TEMPERATURE VERY LOW - LL - TT-620	2		
352	1	TT-HY-1001	TALL-1001 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW WTP ROOM - LL - TT-1001	2		
353	1	TT-HY-1002	TALL-1002 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW O2/H2 LOOP CONTAINER - LL - TT-1002	2		
354	1	TT-HY-1003	TALL-1003 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW STACK ROOM - LL - TT-1003	2		
355	1	TT-HY-1005	TALL-1005 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW HVAC CONTAINER - LL - TT-1005	2		
356	1	TT-HY-1006	TALL-1006 (C63)	5	°C	IP9	AMBIENT TEMPERATURE VERY LOW PROCESS CONTAINER - LL - TT-1006	2		
357	1	TT-1003	TALL-1003 (ISO22)	5	°C	IP8	AMBIENT TEMPERATURE VERY LOW - LL - TT-1003	2		
358	1	TDI-600	TDAH-600 (ISO22)	10	°C	IP9	ANODE DT HIGH - H - TDY-600	1		
359	1	TDI-600	TDAHH-600 (ISO22)	12	°C	IP1	ANODE DT VERY HIGH - HH - TDY-600	1		
360	1	TDI-600	TDAL-600 (ISO22)	-1	°C	IP9	ANODE DT LOW - L - TDY-600	1		
361	1	TDI-600	TDALL-600 (ISO22)	-2	°C	IP1	ANODE DT VERY LOW - LL - TDY-600	1		
362	1	TT 60.1	TSA 60.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.1	1		
363	1	TT 60.1	TSA 60.1 HH	>250	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY HIGH - HH - TT 60.1	2		
364	1	TT 60.1	TSA 60.1 LL	<40	°C	IP1	DEOXO TOWER 61, SURFACE TEMPERATURE VERY LOW - LL - TT 60.1	2		
365	1	TT 60.2	TSA 60.2	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 60.2	2		
366	1	TT 60.2	TSA 60.2 HH	>250	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY HIGH - HH - TT 60.2	2		
367	1	TT 60.2	TSA 60.2 LL	<50	°C	IP1	DEOXO TRACE HEATER HE 61.1, TEMPERATURE VERY LOW - LL - TT 60.2	2		
368	1	TT 61.1	TSA 61.1	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 61.1	2		
369	1	TT 61.1	TSA 61.1 HH	>250	°C	IP1	DEOXO TOWER 61, GAS UTLET TEMPERATURE VERY HIGH - HH - TT 61.1	2		
370	1	TS 64.2	TSA 64.2 HH	>400	°C	IP1	DRYER HEATER HE 64.1, SURFACE TEMPERATURE VERY HIGH - HH - TS 64.2	2		
371	1	TS 64.3	TSA 64.3 HH	>200	°C	IP1	GAS TEMPERATURE AFTER HEATER HE64.1 VERY HIGH - HH - TS 64.3	2		
372	1	TS 64.4	TSA 64.4 HH	>60	°C	IP1	PRODUCT GAS TEMPERATURE AT UNIT OUTLET VERY HIGH - HH - TS 64.4	2		
373	1	TT 64.5	TSA 64.5	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.5	2		
374	1	TT 64.5	TSA 64.5 HH A	>60	°C	IP1	DRYER TOWER 64A, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.5	2		
375	1	TT 64.5	TSA 64.5 HH R	>150	°C	IP1	DRYER TOWER 64A, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.5	2		
376	1	TT 64.6	TSA 64.6	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.6	2		
377	1	TT 64.6	TSA 64.6 HH A	>50	°C	IP1	DRYER TOWER 64A, TOP ADS. TEMPERATURE VERY HIGH-HH - 64.6	2		
378	1	TT-64.6	TSA 64.6 HH C	>40	°C	IP1	DRYER TOWER 64A, COOLING FLOW VERY LOW - HH - 64.6	2		
379	1	TT 64.6	TSA 64.6 HH R	>250	°C	IP1	DRYER TOWER 64A, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.6	2		
380	1	TT 64.7	TSA 64.7	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.7	2		
381	1	TT 64.7	TSA 64.7 HH A	>50	°C	IP1	DRYER TOWER 64B, BOTTOM ADS. TEMPERATURE VERY HIGH - HH - TT 64.7	2		
382	1	TT 64.7	TSA 64.7 HH R	>150	°C	IP1	DRYER TOWER 64B, BOTTOM REGENERATION TEMPERATURE VERY HIGH - HH - TT 64.7	2		
383	1	TT 64.8	TSA 64.8	No 4-20	mA	IP1	NO SIGNAL - ERR - TT 64.8	2		
384	1	TT 64.8	TSA 64.8 HH A	>50	°C	IP1	DRYER TOWER 64B, TOP ADS. TEMPERATURE VERY HIGH - HH - 64.8	2		
385	1	TT-64.8	TSA 64.8 HH C	>40	°C	IP1	DRYER TOWER 64B, COOLING FLOW TOO LOW - HH - TT 64.8	2		
386	1	TT 64.8	TSA 64.8 HH R	>250	°C	IP1	DRYER TOWER 64B, TOP REGENERATION TEMPERATURE VERY HIGH - HH - 64.8	2		
387	1	TT-621A	TSAHH-621A (ISO22)	80	°C	IP1A	CP-E20A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621A	1		
388	1	TT-621B	TSAHH-621B (ISO22)	80	°C	IP1B	CP-E20A HIGH TEMPERATURE MAGNETIC COUPLING - HH - TT-621B	1		
389	1	PCA-001	VAH-001 (ISO22)	2,2	V/cell	IP9	STACK-001 VERY HIGH CELL VOLTAGE - H - PCA-001	1		
390	1	PCA-002	VAH-002 (ISO22)	2,2	V/cell	IP9	STACK-002 VERY HIGH CELL VOLTAGE - H - PCA-002	1		
391	1	PCA-003	VAH-003 (ISO22)	2,2	V/cell	IP9	STACK-003 VERY HIGH CELL VOLTAGE - H - PCA-003	1		
392	1	PCA-004	VAH-004 (ISO22)	2,2	V/cell	IP9	STACK-004 VERY HIGH CELL VOLTAGE - H - PCA-004	1		
393	1	PCA-005	VAH-005 (ISO22)	2,2	V/cell	IP9	STACK-005 VERY HIGH CELL VOLTAGE - H - PCA-005	1		
394	1	PCA-006	VAH-006 (ISO22)	2,2	V/cell	IP9	STACK-006 VERY HIGH CELL VOLTAGE - H - PCA-006	1		
395	1	PCA-007	VAH-007 (ISO22)	2,2	V/cell	IP9	STACK-007 VERY HIGH CELL VOLTAGE - H - PCA-007	1		
396	1	PCA-008	VAH-008 (ISO22)	2,2	V/cell	IP9	STACK-008 VERY HIGH CELL VOLTAGE - H - PCA-008	1		
397	1	REC-001	VAH-101 (C63)	975	V	IP9	REC-001 HIGH VOLTAGE - H - VM-101	1		
398	1	REC-002	VAH-102 (C63)	975	V	IP9	REC-002 HIGH VOLTAGE - H - VM-102	1		
399	1	PCA-001	VAHH-001 (ISO22)	2,3	V/cell	IP1	STACK-001 VERY HIGH CELL VOLTAGE - HH - PCA-001	1		
400	2	PCA-002	VAHH-002 (ISO22)	2,3	V/cell	IP1	STACK-002 VERY HIGH CELL VOLTAGE - HH - PCA-002	1		
401	2	PCA-003	VAHH-003 (ISO22)	2,3	V/cell	IP1	STACK-003 VERY HIGH CELL VOLTAGE - HH - PCA-003	1		
402	2	PCA-004	VAHH-004 (ISO22)	2,3	V/cell	IP1	STACK-004 VERY HIGH CELL VOLTAGE - HH - PCA-004	1		
403	2	PCA-005	VAHH-005 (ISO22)	2,3	V/cell	IP1	STACK-005 VERY HIGH CELL VOLTAGE - HH - PCA-005	1		
404	2	PCA-006	VAHH-006 (ISO22)	2,3	V/cell	IP1	STACK-006 VERY HIGH CELL VOLTAGE - HH - PCA-006	1		
405	2	PCA-007	VAHH-007 (ISO22)	2,3	V/cell	IP1	STACK-007 VERY HIGH CELL VOLTAGE - HH - PCA-007	1		
406	2	PCA-008	VAHH-008 (ISO22)	2,3	V/cell	IP1	STACK-008 VERY HIGH CELL VOLTAGE - HH - PCA-008	1		
407	2	REC-001	VAHH-101 (C63)	1023	V	IP1	REC-001 VERY HIGH VOLTAGE - HH - VM-101	1		
408	2	REC-002	VAHH-102 (C63)	1023	V	IP1	REC-002 VERY HIGH VOLTAGE - HH - VM-102	1		
409	2	PCA-001	VAL-001 (ISO22)	1,55	V/cell	IP9	STACK-001 LOW CELL VOLTAGE - L - PCA-001	1		
410	2	PCA-002	VAL-002 (ISO22)	1,55	V/cell	IP9	STACK-002 LOW CELL VOLTAGE - L - PCA-002	1		
411	2	PCA-003	VAL-003 (ISO22)	1,55	V/cell	IP9	STACK-003 LOW CELL VOLTAGE - L - PCA-003	1		
412	2	PCA-004	VAL-004 (ISO22)	1,55	V/cell	IP9	STACK-004 LOW CELL VOLTAGE - L - PCA-004	1		
413	2	PCA-005	VAL-005 (ISO22)	1,55	V/cell	IP9	STACK-005 LOW CELL VOLTAGE - L - PCA-005	1		
414	2	PCA-006	VAL-006 (ISO22)	1,55	V/cell	IP9	STACK-006 LOW CELL VOLTAGE - L - PCA-006	1		
415	2	PCA-007	VAL-007 (ISO22)	1,55	V/cell	IP9	STACK-007 LOW CELL VOLTAGE - L - PCA-007	1		
416	2	PCA-008	VAL-008 (ISO22)	1,55	V/cell	IP9	STACK-008 LOW CELL VOLTAGE - L - PCA-008	1		
417	2	PCA-001	VALL-001 (ISO22)	1,5	V/cell	IP1	STACK-001 VERY LOW CELL VOLTAGE - LL - PCA-001	1		
418	2	PCA-002	VALL-002 (ISO22)	1,5	V/cell	IP1	STACK-002 VERY LOW CELL VOLTAGE - LL - PCA-002	1		
419	2	PCA-003	VALL-003 (ISO22)	1,5	V/cell	IP1	STACK-003 VERY LOW CELL VOLTAGE - LL - PCA-003	1		
420	2	PCA-004	VALL-004 (ISO22)	1,5	V/cell	IP1	STACK-004 VERY LOW CELL VOLTAGE - LL - PCA-004	1		
421	2	PCA-005	VALL-005 (ISO22)	1,5	V/cell	IP1	STACK-005 VERY LOW CELL VOLTAGE - LL - PCA-005	1		
422	2	PCA-006	VALL-006 (ISO22)	1,5	V/cell	IP1	STACK-006 VERY LOW CELL VOLTAGE - LL - PCA-006	1		
423	2	PCA-007	VALL-007 (ISO22)	1,5	V/cell	IP1	STACK-007 VERY LOW CELL VOLTAGE - LL - PCA-007	1		
424	2	PCA-008	VALL-008 (ISO22)	1,5	V/cell	IP1	STACK-008 VERY LOW CELL VOLTAGE - LL - PCA-008	1		
425	2	PCA-001	VCA-001 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-001 - PCA-001	1		
426	2	PCA-002	VCA-002 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-002 - PCA-002	1		
427	2	PCA-003	VCA-003 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-003 - PCA-003	1		
428	2	PCA-004	VCA-004 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-004 - PCA-004	1		
429	2	PCA-005	VCA-005 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-005 - PCA-005	1		
430	2	PCA-006	VCA-006 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-006 - PCA-006	1		
431	2	PCA-007	VCA-007 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-007 - PCA-007	1		
432	2	PCA-008	VCA-008 (ISO22)	600	s	IP9	WAITING DEPOLARISATION STACK-008 - PCA-008	1		
433	2	PCA-001	VKA-001 (ISO22)	10	%	IP1	STACK-001 VOLTAGE DROP - PCA-001 - DROP	1		
434	2	PCA-002	VKA-002 (ISO22)	10	%	IP1	STACK-002 VOLTAGE DROP - PCA-002 - DROP	1		
435	2	PCA-003	VKA-003 (ISO22)	10	%	IP1	STACK-003 VOLTAGE DROP - PCA-003 - DROP	1		
436	2	PCA-004	VKA-004 (ISO22)	10	%	IP1	STACK-004 VOLTAGE DROP - PCA-004 - DROP	1		
437	2	PCA-005	VKA-005 (ISO22)	10	%	IP1	STACK-005 VOLTAGE DROP - PCA-005 - DROP	1		
438	2	PCA-006	VKA-006 (ISO22)	10	%	IP1	STACK-006 VOLTAGE DROP - PCA-006 - DROP	1		
439	2	PCA-007	VKA-007 (ISO22)	10	%	IP1	STACK-007 VOLTAGE DROP - PCA-007 - DROP	1		
440	2	PCA-008	VKA-008 (ISO22)	10	%	IP1	STACK-008 VOLTAGE DROP - PCA-008 - DROP	1		
441	2	VM-001	VQAH-001 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-001 ET VM-001 - HH	1		
442	2	VM-002	VQAH-002 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-002 ET VM-002 - HH	1		
443	2	VM-003	VQAH-003 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-003 ET VM-003 - HH	1		
444	2	VM-004	VQAH-004 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-004 ET VM-004 - HH	1		
445	2	VM-005	VQAH-005 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-005 ET VM-005 - HH	1		
446	2	VM-006	VQAH-006 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-006 ET VM-006 - HH	1		
447	2	VM-007	VQAH-007 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-007 ET VM-007 - HH	1		
448	2	VM-008	VQAH-008 (ISO22)	12,2	V	IP9	DEVIATION DE TENSION ENTRE PCA-008 ET VM-008 - HH	1		
449	2	CT-600	YAH-600 (ISO22)	0,5	µS/cm	IP9	CONDUCTIVITE ELEVEE CT600 - H	2		
450	2	CT-620	YAH-620 (ISO22)	0,5	µS/cm	IP9	CONDUCTIVITE ELEVEE CT620 - H	2		
451	2	CT-600	YAHH-600 (ISO22)	1	µS/cm	IP1	CONDUCTIVITE TRES ELEVEE CT600 - HH	1		
452	2	CT-620	YAHH-620 (ISO22)	1	µS/cm	IP1	CONDUCTIVITE TRES ELEVEE CT620 - HH	1		
453	2	CT-600	YALL-600 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT600	1		
454	2	CT-620	YALL-620 (ISO22)	0,03	µS/cm	IP1	CALIBRATION FAULT - CT620	1		
455	2	TT-1004	TALL-1004 (C63)	10	°C	IP9	AMBIENT TEMPERATURE VERY LOW ELECTRICAL ROOM -LL - TT-1004	2		

PLC Alarms Check List (FAT/SAT)

(!\ COPY AND PASTE the PLC Alarm List document to create the PLC Alarm Check LIST (FAT/SAT) as a document on its own, independant from the PLC Alarm List document /!\)

DATE	STATUS	COMMENTS
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
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17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
17/04/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
19/03/2025	OK	
	NOT READY	
	NOT READY	
	NOT READY	
	NOT READY	
22/03/2025	OK	
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation
22/03/2025	OK	Fais en simulation

C63-PWI-001

SETPOINT LIST

(Phase 2)

C63 - CrossWind Project

As-Built - 18/04/25

Luc Paoletti

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
003	Updated according to CRS	21/03/2025	JNG	DPI	BCA
002	2st Issuance (Ph2)	18/11/2024	HCH	LCA	BCA
001	1st Issuance (Ph1)	26/04/2024	CBO	BCA	HCH

Elogen Project Document Number	C63-PWI-001
Elogen Project Document Name	SETPOINT LIST
Elogen Document File Name	C63-PWI-001_Rev.003

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REVISION LIST

REV.	DESCRIPTION
002	*2st Issuance (Ph2): Issued For Construction*
003	3rd Issuance (Ph2): Issued For Construction

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

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CONSTANT PARAMETERS TABLE

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
1	**Cells_Number**	106	[-]	INT	Not accessible	Number of cells per stack.	Rectifer setting current	
2	**COUNTER_CP600**	3	[-]	INT	Accessible IHM	The number of attempts to start the **CP-600** pump before triggering the AQA-600 alarm.	Start circulation pump	
3	**COUNTER_CP620**	3	[-]	INT	Accessible IHM	The number of attempts to start the **CP-620** pump before triggering the AQA-620 alarm.	Start circulation pump	
4	**Cycle_PH2**	31	barg	INT	Accessible IHM	Each time the pressure in **ST-620** reaches Cycle_PH2, a counter is incremented in order to consider the stress on the **ST-620**.	Pressure cycle counter	
5	**Cycle_PO2**	11	barg	INT	Accessible IHM	Each time the pressure in **ST-600** reaches Cycle_PO2, a counter is incremented in order to consider the stress on the **ST-600**.	Pressure cycle counter	
6	**Cycle_T**	65	°C	INT	Accessible IHM	Each time the temperature after stacks reaches Cycle_T, an counter is incremented in order to consider the stress on the **ST-600** and **ST-620**.	Temperature cycle counter	
7	**dP_H**	21	barg	FLOAT	Accessible IHM	During depressurisation, it is possible to reach high pressure differential. To avoid triggering the PDAH-001 (and PDAHH-001) alarm improperly, the threshold dP_H is added to reduce the ΔP when needed. First alarm at 21,5 barg	O2 Depresurisation H2 Depresurisation	
8	**dP_min_balance** or **PT630_min_balance**	11	barg	FLOAT	Accessible IHM	Above dP_min_balance, the balancing line become operational. Before, in order to avoid a reverse dP during start_up, the balancing is not authorized. Pressure reducing valve (PRV-640) being passing in reverse flow. Balancing line shall be kept closed while Oxygen loop is not pressurise as a reverse flow from DG-640 could happen and lead to trip with HIOD Remark: by setting dP_min_balance higher, we will delay the first	ST-620 Water Level Control (Direct Balancing)	
9	**DP_reg_arret**	0	barg	FLOAT	Accessible IHM	In STOP state, there is no pressure differential as the machine is depolarised and depressurised.	O2 Depresurisation H2 Depresurisation	
10	**DP_reg_prod_H2**	20	barg	FLOAT	Accessible IHM	During production, a pressure differential needs to be maintain between the anodic and the cathodic side. This help to maintain sealing on large stack.	Delta pressure H_2/O_2 control (START)	
11	**DP_reg_standby**	2	barg	FLOAT	Accessible IHM	In STANDBY press. state the H_2 pressure is lowered but a pressure differencial is still maintained to avoid H_2/O_2 mix.	Delta pressure H_2/O_2 control (STANDBY)	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
12	**EpsPol**	0.05	[-]	FLOAT	Accessible IHM	The voltage regulation can be not precise. An epsilon is added in order to prevent the code to be interrrupted.	Rectifier setting current Stack polarization Rectifier: setting current Stop rectifier (decreasing current) Rectifier going to Standby from Start (decreasing current)	
13	**I_maxCS**	423	A	FLOAT	Accessible IHM	During a cold start (i.e. water is below 50°C), the stacks are controlled very carefully to avoid degrading them. That is why the intensity through the stacks must not exceed I_maxCS.	Rectifier: setting current	
14	**I_POL**	20	A	INT	Accessible IHM	Max capacitive current allowed to load the electrolysis stack.	Oxygen pump setpoint control Hydrogen pump setpoint control Hydrogen heating before deoxo Air extraction and ambient temperature control loop Stack polarisation Rectifier going to STANDBY from START (decreasing current) IDLE in progress (from START) STANDBY in progress (from STOP) STANDBY in progress (from START) IDLE in progress (from STOP)	
15	**I_PURIFICATION**	0	A	FLOAT	Accessible IHM	The electrolyser needs to warranty that the correct flowrate is produced and injected to the client. The electrolyser needs to overproduce the compensate the H_2 flowrate lost by the regeneration flow of the **HPP-700**. I_PURIFICATION corresponds to the additional current needed to produce the H_2 flowrate which will be vented.	Rectifier setting current	
16	**INERTING_H2_DEPRESS**	86400	s	INT	Accessible IHM	When electrolyser is depressurised, ambient air can enter the piping. To avoid this, a regular inerting must be done every INERTING_H2_DEPRESS.	Regular inerting aigainst air ingress	
17	**INERTING_O2_DEPRESS**	2160	s	INT	Accessible IHM	When electrolyser is depressurised, ambient air can enter the piping and create an explosive mixture if some hydrogen is also present. To avoid this, a regular inerting must be done every INERTING_O2_DEPRESS.	Regular inerting aigainst air ingress	
18	**INERTING_TIME_SAFETY_H2**	1760	s	INT	Accessible IHM	During a safety stop, the hydrogen side of the unit is flushed for INERTING_TIME_SAFETY_H2. It corresponds to the inerting time required for the given nitrogen flowrate to reduce hydrogen concentration from 100%vol to 1%vol.	H2 line inerting	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
19	**INERTING_TIME_SAFETY_O2**	196	s	INT	Accessible IHM	During a safety stop, the oxygen side of the unit is flushed for INERTING_TIME_SAFETY_O2. It corresponds to the inerting time required for the given nitrogen flowrate to reduce hydrogen concentration from 4%vol to 1%vol.	O2 line inerting	
20	**INERTING_TIME_START_H2**	119	s	INT	Accessible IHM	During a start-up, the hydrogen side of the unit is flushed for INERTING_TIME_START_H2. It corresponds to the inerting time required for the given nitrogen flowrate to reduce hydrogen concentration from 2%vol to 1%vol.	H2 line inerting	
21	**INERTING_TIME_START_O2**	33.8	s	INT	Accessible IHM	During a start-up, the unit is flushed for INERTING_TIME_START_O2. It corresponds to the inerting time required for the given nitrogen flowrate to reduce hydrogen concentration from 2%vol to 1%vol.	O2 line inerting	
22	**INERTING_TIME_STOP_H2**	600	s	INT	Accessible IHM	During a stop, the unit is flushed for INERTING_TIME_STOP_H2. It corresponds to the inerting time required for the given nitrogen flowrate to reduce hydrogen concentration from 2%vol to 1%vol.	H2 line inerting	
23	**INERTING_TIME_STOP_O2**	130	s	INT	Accessible IHM	During a stop, the unit is flushed for INERTING_TIME_STOP_O2. It corresponds to the inerting time required for the given nitrogen flowrate to reduce hydrogen concentration from 2%vol to 1%vol.	O2 line inerting	
24	**K_LM**	2391.5	[-]	FLOAT	Not accessible	Constant defined to convert Nm^3 to Amp.	Rectifier setting current	
25	**LOG_OUT_TIME**	3600	s	INT	Accessible IHM	Log out time on HMI in Maintenance Mode. Maintenance operators will need to press anything on the HMI every LOG_OUT_TIME to prevent logging out. Otherwise, the machine goes automatically in STOP state.	MAINTENANCE in progress (from STOP and NO MODE)	
26	**MinFlow600**	54.222	m^3/h	INT	Accessible IHM	The minimum flow in 600 loop needed to be sure that CP-600 pump have started.	Start circulation pump	
27	**MinFlow620**	28.71	m^3/h	INT	Accessible IHM	The minimum flow in 620 loop needed to be sure that CP-620 pump have started.	Start circulation pump	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
28	**N1_MAX_CURRENT**	1410	A	INT	Accessible IHM	The electrolyser is sized to handle a certain amount of hydrogen flowrate. Thus, it cannot exceed a certain current. N1_MAX_CURRENT is the maximal current that can deliver each rectifier which operate independtly each train of stacks.	Rectifier setting current Rectifier : setting current	
29	**N1_MIN_CURRENT**	141	A	INT	Accessible IHM	The electrolyser cannot run below 10% of its nominal rated power. Else there is a potential risk of cross permetation (HIOD value will increase) and the electrolyser will not operate safely. N1_MIN_CURRENT is the minimal current that can deliver each rectifier which operate independtly each train of stacks.	Rectifier setting current Rectifier going to Standby from Start (decreasing current)	
30	**nb_stacks_serie**	4	[-]	INT	Not accessible	Number of stack per train of stacks (and so supplied by the same rectifier).	Stack polarization Rectifier: setting current Rectifier going to Standby from Start (decreasing current)	
31	**POLARIZATION_TIME**	600	s	INT	Accessible IHM	If the stack polarization lasts more than POLARIZATION_TIME, it reveals a problem and the VPA-00x alarm is triggered.	Stack polarization	
32	**PT610_DEPRESSURISED**	0.15	barg	FLOAT	Accessible IHM	In order to validate that the unit is depressurised, it is not possible to wait the electrolyser to reach 0 barg it will take age. At PT610_DEPRESSURIZED, it is considered that the unit is depressurised. PT610_DEPRESSURIZED is a little bit lower than PT630_DEPRESSURISED to avoid a reverse dP.	O2 Depressurisation O2 safety depressurisation H2 Depressurisation O2 line inerting Automatic filling of ST-600	
33	**PT611_DEPRESSURISED**	0.15	barg	FLOAT	Accessible IHM	During a Safety Stop, the O2 side is depressurised through the restriction orifice **RO-610** which creates a counter pressure. So, it is considered that the unit is depressurised at PT611_DEPRESSURIZED in case of depressurisation through **RO-610.**	O2 safety depresurisation	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
34	**PT630_DEPRESSURISED**	0.15	barg	FLOAT	Accessible IHM	In order to validate that the unit is depressurised, it is not possible to wait the electrolyser to reach 0 barg it will take age. At 0,5 barg, it is considered that the unit is depressurised. Due to Rosetti backpresssure additionnal backpressure of 0,15 barg	O2 Depressurisation H2 Depressurisation H2 safety depressurisation H2 line inerting Automatic filling of ST-620	
35	**PT631_DEPRESSURISED**	0.15	barg	FLOAT	Accessible IHM	During a Safety Stop, the H2 side is depressurised through the restriction orifice **RO-630** which creates a counter pressure. So, it is considered that the unit is depressurised at PT631_DEPRESSURIZED in case of depressurisation through **RO-630.**	H2 safety depresurisation	
36	**Rectifier_efficiency**	0.97	[-]	FLOAT	Not accessible	Efficiency of the rectifier (or pair of rectifiers). It is supposed to be the same for all the rectifiers of the same project.	Rectifier setting current	
37	**Rectifier_Number**	2	[-]	INT	Not accessible	Number of rectifiers (or pair of rectifiers) that operate a train of stacks (i.e. nb_stack_serie stacks) independently.	Rectifier setting current Stop rectifiers (decreasing current)	
38	**Rectifier_Number_Stacks**	1	[-]	INT	Not accessible	Number of rectifiers that operate each train of stacks.		
39	**REGENERATION_FLOW**	NA	Nm^3/h	FLOAT	Not accessible	When H_2 purication unit (**HPU-700**) can stop only if regeneration is finished (typically *Sertronic*), the electrolyser must produce at least REGENERTION_FLOW of H_2 to allow **HPU-700** to properly finish its sequence.	STOP in progress (from START/STANDBY/IDLE)	
40	**T_BETWEEN_INERTING**	1800	s	INT	Accessible IHM	If a nitrogen inerting has been done in the last T_BETWEEN_INERTING no inerting is done when the machine goes in START state. Saving nitrogen (as the unit is still safe) is the objective.	H2 line inerting	
41	**T_DEPOLARIZATION**	600	s	INT	Accessible IHM	If the stack depolarization lasts more than T_DEPOLARIZATION, it reveals a problem and the VCA-00x alarm is triggered.	Stop rectifier (decreasing current)	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
42	**T_DEPRESS_H2**	1200	s	INT	Accessible IHM	If the depressurisation exceed T_DEPRESS_H2 (valve block or other) the safety depressurisation (S-SPC-630 function) is started.	H2 Depressurisation	
43	**T_DEPRESS_O2**	1200	s	INT	Accessible IHM	If the depressurisation exceed T_DEPRESS_O2 (valve block or other) the safety depressurisation (S-SPC-610 function) is started.	O2 Depressurisation	
44	**T_DEPRESS_SAFETY_H2**	2400	s	INT	Not accessible	If the safety depressurisation exceed T_DEPRESS_SAFETY_H2 (valve block or other) the PDAH-630 alarm is triggered. Normally should be around 15 min to depressurise.	H2 Safety depressurisation	
45	**T_DEPRESS_SAFETY_O2**	2400	s	INT	Not accessible	If the safety depressurisation exceed T_DEPRESS_SAFETY_O2 (valve block or other) the PDAH-610 alarm is triggered. Normally should be around 15 min to depressurise.	O2 Safety depressurisation	
46	**T_EVENTAGE**	338	s	INT	Accessible IHM	Hydrogen is vented during T_EVENTAGE at starting in order to remove the nitrogen remaining inside the vessels.	H2 Quality control	
47	**Timer_before_checking**	5	s	INT	Accessible IHM	If the flowrate of the pump remains steady above a minimal value for T1_END time. The pump starting is considered as ok	Start circulation pump	
48	**T3_END**	20	s	INT	Accessible IHM	An attempt to start circulation pumps last about T3_END.	Start circulation pump	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
49	**Timer_of_work**	86400	s	INT	Accessible IHM	In case of redounded pumps, with pump A on normal operation and pump B the spare pump shut-off, once timer Timer_of_work ends pump A is shut-off while pump B is started.	Start circulation pump	
50	**TIMER_RCG_H2**	86400	s	INT	Accessible IHM	In STOP and IDLE states (where pumps do not run), water in 600 and 620 loops needs to circulate every TIMER_RCG_H2 through ion exchange resins to prevent polution due to stagnation.	Pure Water Recirculation (cathodic loop)	
51	**TIMER_RCG_O2**	86400	s	INT	Accessible IHM	In STOP and IDLE states (where pumps do not run), water in 600 and 620 loops needs to circulate every TIMER_RCG_O2 through ion exchange resins to prevent polution due to stagnation.	Pure Water Recirculation (anodic loop)	
52	**TIMER_RECIRCULATION_H2**	447	s	INT	Accessible IHM	In STOP and IDLE states (where pumps do not run), water in 600 loop needs to circulate every TIMER_RCG_H2 and during TIMER RECIRCULATION_H2 through ion exchange resins to prevent polution due to stagnation.	Pure Water Recirculation (cathodic loop)	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
53	**TIMER_RECIRCULATION_O2**	472	s	INT	Accessible IHM	In STOP and IDLE states (where pumps do not run), water in 600 loop needs to circulate every **TIMER_RCG_O2** and during **TIMER RECIRCULATION_O2** through ion exchange resins to prevent polution due to stagnation.	Pure Water Recirculation (cathodic loop)	
54	**TIMER_SAFETY**	600	s	INT	Accessible IHM	During a Safety fault, if **AHD-100x** still detects hydrogen in the ambient after TIMER_SAFETY, a message is displayed to indicate that the location is hazardous.	SAFETY in progress (from ALL STATES)	
55	**TIMER_STANDBY**	3600	s	INT	Accessible IHM	The STANDBY press. state lasts at most **TIMER_STANDBY**. (Nota: STANDBY depress. and IDLE states are not limited in time as the machine is depressurised)	STANDBY in progress (from STOP) STANDBY in progress (from IDLE) STANDBY in progress (from START)	

	Parameter	Value	Unit	Type	Application	Process meaning	Function	Remarks / Tuned values after commissioning
56	**U_pol**	132.5	V	INT	Accessible IHM	U_pol is the voltage needed at the terminal of the stack to polarise the electrolysis stack. Above U_pol the stack is polarized that it means it consumes current to produce hydrogen.	Rectifier setting current Stack polarization Stop rectifier (decreasing current) Rectifier going to Standby from Start (decreasing current)	
57	**U_setCS**	763.2	V	FLOAT	Accessible IHM	During a cold start (i.e. water is below 50°C), the stacks are controlled very carefully to avoid degrading them. That is why the stack voltage must not exceed U_setCS.	Rectifier: setting current	

Legend:

	Updates VS rev02

If some modification have been done (during commissioning) :
Name of the commisioner
Date of modification
Name of the automation engineer
Date of computer program modification

REGULATING PARAMETERS TABLE

Spécifique au projet C63

	TAG Composant	Low Regulation (LR)	High Regulation (HR)	Set Point (SP)	Low Regulation 2 (LR2)	High Regulation 2 (HR2)	Set Point 2 (SP2)	DROP	Unit	Comments	Remarks / Tuned values after commissioning
1	**DPT-800A/B**	4.9	5	-	-	-	-	-	volppm		
2	**HR-xxx**	-	-	20	-	-	-	-	°C	HR-xxx must start heating at HRxxx_SP	
3	**LISA-1B1**	TBT(1)	TBT(1)	TBT(1)	-	-	-	-	%	Level transmitter in the demin water tank (equivalent to our usual LT-300)	
4	**LT-600**	38	48	-	-	-	-	-	% of ST-600 height	Data from *C63-DTV-001 - Technical Specifications* ; can be adjusted during commisioning.	
5	**LT-620**	35	54	-	-	-	-	-	% of ST-620 height	Data from *C63-DTV-001 - Technical Specifications* ; can be adjusted during commisioning.	
6	**OIHA-800A/B**	4.9	5	-	-	-	-	-	ppm		
7	**PT-610**	10.8	11.5	11	0.1	0.3	-	-	barg	LR2 & HR2 used as O2 min presure reg	
8	**PT-630**	29.7	31.5	30	0.1	0.3	-	-	barg	LR2 & HR2 used as H2 min presure reg	
9	**ΔP = PT-630 - PT-610**	-	20.5	-	-	-	-	-	barg		
10	**TT-601**	-	70	65	-	-	-	-	°C	TT601_SP used for M3WV-200 regulation (R-TC-600 function) TT601_HR used for control the CP-600 speed when electrolyser is not producing (R-FC-600 function)	
11	**TT-700**	See HPP Manufacturer	See HPP Manufacturer	-	-	-	-	-	°C		
12	**VAR-300A/B**	55	-	91	-	-	-	-	%	Low value according to Manufacturer. High value see LP-300 curve ('Variators' tab)	
13	**VAR-600A/B**	55	-	97	-	-	-	-	%	Low value according to Manufacturer. High value see CP-600 curve ('Variators' tab)	
14	**VAR-620A/B**	65	-	100	-	-	-	-	%	Low value : arbitrary. High value see CP-620 curve ('Variators' tab)	
15	**TT-60 (PAUMIER)**	-	-	7	-	-	-	-	°C		

Note:
(1) : TBT : To be tuned during commissioning according OVIVO data

NB:
The regulation of all the ambient temperature transmitters (TT-100x), the ambient electrical heaters (EH-100x) and the temperature transmitters from the cooling loops are insured by the HVAC package.

If some modifications have been done (during commissioning):	
Name of the commisioner	
Date of modification	
Name of the automation engineer	
Date of computer program modification	

ELECTROLYSER
BLPH
SOFTWARE FAT REPORT

Rev. N°	Date	Description	By	Check.	Appr.
01	06/02/2025	First emission	SDE	LPA	LDG

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2. Introduction

This main subject of the SOFTWARE FAT is to prove the good conception of the program. The SOFTWARE FAT has been performed by ELOGEN site representatives and witnessed by the final customer CWD representatives in reference to C063-ELO-QIX-AU-001_B_IFC – UCP FAT PROCEDURE Part 7 and Part 9.

The C063-ELO-QIX-AU-001_B_IFC – UCP FAT PROCEDURE include both FAT of the SOFTWARE and FAT of the Packages communication with UCP.

The aim of the SOFTWARE FAT is to validate the good conception of the program, hence only refer to Part 7 and Part 9 of the C063-ELO-QIX-AU-001_B_IFC – UCP FAT PROCEDURE.

Note: Part 6 of the C063-ELO-QIX-AU-001_B_IFC – UCP FAT PROCEDURE has been performed too and allows to anticipate the future oncoming complete UCP FAT. The report of theses anticipated tests is attached in appendix of the SOFTWARE FAT.

3. Alarms test

PART 7: Perform a test for each alarm of the UCP:

- Simulate a variation in the relevant variable furthest from the fault generation bloc to trigger the alarm at the expected value. If possible, simulate this triggering by using a 4-20mA injector
- Fill in the table 1 below with in RED MAJOR FAULTS and in ORANGE MINOR FAULTS

_____

Table 1. Check list for alarms

Alarm	Number	OW Variable?	Injecting 4-20 mA?	Record completed by	Witnessed by	Validated on
VERY LOW INSTRUMENT AIR PRESSURE - LL - PT-150	PALL-150 (ISO22)	N/A	N/A	SDE	SBE	05/02/25
VERY HIGH PRESSURE IN OXYGEN SEPARATOR ST-600 (BPCS)- HH - PT-610	PAHH-610 (ISO22)	N/A	N/A	SDE	SBE	05/02/25
VERY HIGH LEVEL ST-600 - HH - LT-600	LAHH-600 (C63)	N/A	N/A	SDE	SBE	05/02/25
POSITION DEVIATION	GDA-611 (ISO22)	N/A	N/A	SDE	SBE	06/02/25

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OF MPV-611 - ERR - MPV-611						
LP300 PUMP PRESSURE LOSS - L - PT300	PAL-300 (C63)	N/A	N/A	SDE	SBE	06/02/25
VERY HIGH PRESSURE DOWNSTREAM OF LP300A/B - HH - PT-300	PAHH-300 (C63)	N/A	N/A	SDE	SBE	06/02/25

4. Software simulations

PART 9: Perform Software Simulations

4.1. Simulations scenarios

Table 3. simulation list

Simulation	Record completed by	Witnessed by	Validated on
STARTING SEQUENCE (Stop -> Start)	SDE	SBE	04/02/25
STOPPING SEQUENCE (Start -> Stop)	SDE	SBE	04/02/25
SIMULATION PROCESS BLOCK*	SDE	SBE	05/02/25

*: the following 3Nr. Simulation Process Block listed in the C063-ELO-QIX-AU-001_B_IFC – UCP FAT PROCEDURE cannot be tested as these are not included in the ELO Electrolyser SOFTWARE:

- Ambiant Temperature control (controlled & regulated by HVAC Software, that is loaded on the HVAC separate/dedicated UCP)

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- Outside Water Pipe Antifreeze (controlled & regulated by the Antifreeze / heat tracing system own thermostats)
- 3°C Loop Temp CTRL (controlled & regulated by HVAC Software, that is loaded on the HVAC separate/dedicated UCP)

These 3 Nr. Tests should not have been included / listed in the C063-ELO-QIX-AU-001_B_IFC – UCP FAT PROCEDURE Part 7 & Part 9.

5. FAT Conclusion

Table 4. Attendee's signatures

Name	Enterprise	Function	Date	FAT result (OK/NOK)	Signature
Stephan BREMNER	CROSSWIND	Project Manager	06/02/25		
Sebastien DEXHEIMER	ELOGEN	Automatician Engineer	06/02/25	OK	
Maxime LAFARGUE	ELOGEN	Commissioning Supervisor	06/02/25	OK	
Fray MOUFOUMA	ELOGEN	Commissioning Supervisor	06/02/25	OK	
Luc PAOLETTI	ELOGEN	Commissioning Superintendent	06/02/25	OK	

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6. APPENDIX

INPUT / OUTPUT TEST ➔ C63 PLC IOTests Checlist

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PLC IO Check List

#	REV	#RACK	POS.	#MOD	TYPE	SIS	Ex i	TAG	NAME
1	1	BLPH	CARD1	201AP10	E-TOR	yes	no	ESD-005	Emergency shutdown button - Level 1
2	1	BLPH	CARD1	201AP10	E-TOR	yes	no	ESD-001	Emergency shutdown button - Level 0
3	1	BLPH	CARD1	201AP10	E-TOR	yes	no	SSI-1000	Fire Alarm System General Failure
4	1	BLPH	CARD1	201AP10	E-TOR	yes	no	SM-001	Emergency Shutdown from Safety Module
5	1	BLPH	CARD1	201AP10	E-TOR	yes	no	CP-600B	Feedback Safe Torque Off A CP-600B
6	1	BLPH	CARD1	201AP10	E-TOR	yes	no	LP-300A	Feedback Safe Torque Off A LP-300A
7	1	BLPH	CARD1	201AP10	E-TOR	yes	no	SPARE	SPARE
8	1	BLPH	CARD1	201AP10	E-TOR	yes	no	SPARE	SPARE
9	1	BLPH	CARD2	201AP11	E-TOR	yes	no	ESD-006	Emergency shutdown button - Level 1
10	1	BLPH	CARD2	201AP11	E-TOR	yes	no	ESD-004	Emergency shutdown button - Level 0
11	1	BLPH	CARD2	201AP11	E-TOR	yes	no	ESD-002	Emergency shutdown button - Level 0
12	1	BLPH	CARD2	201AP11	E-TOR	yes	no	Plant SIS	Shutdown command from Plant SIS
13	1	BLPH	CARD2	201AP11	E-TOR	yes	no	CP-620A	Feedback Safe Torque Off A CP-620A
14	1	BLPH	CARD2	201AP11	E-TOR	yes	no	LP-300B	Feedback Safe Torque Off A LP-300B
15	1	BLPH	CARD2	201AP11	E-TOR	yes	no	SPARE	SPARE
16	1	BLPH	CARD2	201AP11	E-TOR	yes	no	SPARE	SPARE
17	1	BLPH	CARD2	201AP11	E-TOR	yes	no	SPARE	SPARE
18	1	BLPH	CARD3	201AP12	E-TOR	yes	no	ESD-007A	Emergency shutdown button - Level 2
19	1	BLPH	CARD3	201AP12	E-TOR	yes	no	XA-001A	Confirmed Fire Alarm
20	1	BLPH	CARD3	201AP12	E-TOR	yes	no	ESD-003A	Emergency shutdown button - Level 0
21	1	BLPH	CARD3	201AP12	E-TOR	yes	no	FB-STO-600A	Feedback Safe Torque Off A CP-600A
22	1	BLPH	CARD3	201AP12	E-TOR	yes	no	FB-STO-620B	Feedback Safe Torque Off A CP-620B
23	1	BLPH	CARD3	201AP12	E-TOR	yes	no	YS-101M	Reset
24	1	BLPH	CARD3	201AP12	E-TOR	yes	no	YS-057A	Phase Monitoring Relay
25	1	BLPH	CARD3	201AP12	E-TOR	yes	no	SPARE	SPARE
26	1	BLPH	CARD4	201AP20	S-TOR	yes	no	XS-003A	Rectifier Emergency Stop 1 Channel 1
27	1	BLPH	CARD4	201AP20	S-TOR	yes	no	XA-001	Confirmed Gas Alarm to plant F&G
28	1	BLPH	CARD4	201AP20	S-TOR	yes	no	STO_A-600A	Safe Torque Off A CP-600A
29	1	BLPH	CARD4	201AP20	S-TOR	yes	no	STO_B-600B	Safe Torque Off B CP-600B
30	1	BLPH	CARD4	201AP20	S-TOR	yes	no	STO_A-620B	Safe Torque Off A CP-620B
31	1	BLPH	CARD4	201AP20	S-TOR	yes	no	STO_B-300A	Safe Torque Off B CP-300A
32	1	BLPH	CARD5	201AP21	S-TOR	yes	no	XS-004A	Rectifier Emergency Stop 2 Channel 1
33	1	BLPH	CARD5	201AP21	S-TOR	yes	no	XA-003	Electrolyzer PLC Failure to plant SIS
34	1	BLPH	CARD5	201AP21	S-TOR	yes	no	STO_B-600A	Safe Torque Off B CP-600A
35	1	BLPH	CARD5	201AP21	S-TOR	yes	no	STO_A-620A	Safe Torque Off A CP-620A
36	1	BLPH	CARD5	201AP21	S-TOR	yes	no	STO_B-620B	Safe Torque Off B CP-620B
37	1	BLPH	CARD5	201AP21	S-TOR	yes	no	STO_A-300B	Safe Torque Off A CP-300B
38	1	BLPH	CARD6	201AP22	S-TOR	yes	no	????	RECTIFIERS START/STOP
39	1	BLPH	CARD6	201AP22	S-TOR	yes	no	XA-002	Confirmed Smoke Alarm to plant F&G
40	1	BLPH	CARD6	201AP22	S-TOR	yes	no	STO_A-600B	Safe Torque Off A CP-600B
41	1	BLPH	CARD6	201AP22	S-TOR	yes	no	STO_B-620A	Safe Torque Off B CP-620A
42	1	BLPH	CARD6	201AP22	S-TOR	yes	no	STO_A-300A	Safe Torque Off A CP-300A
43	1	BLPH	CARD6	201AP22	S-TOR	yes	no	STO_B-300B	Safe Torque Off B CP-300B
44	1	BLPH	CARD6	201AP22	S-TOR	yes	no	SPARE	SPARE DO-S
45	1	BLPH	CARD6	201AP22	S-TOR	yes	no	XS-101	Safety Module Reset
46	1	BLPH	CARD7	201AP30	E-TOR	no	no	SPARE	SPARE DI
47	1	BLPH	CARD7	201AP30	E-TOR	no	no	LP-300A	Pump LP-300A VFD powered
48	1	BLPH	CARD7	201AP30	E-TOR	no	no	SPARE	SPARE DI
49	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-003	24Vdc power supply module 1 power failure
50	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-017	HVAC panel circuit breaker auxiliary contacts
51	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-024	VFD LP-300B circuit breaker auxiliary contacts
52	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-031	Air Extractor group 1 circuit breaker auxiliary contacts
53	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-038	Air Extractor 6 contactor auxiliary contacts
54	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-045	Heat Ribbon 307 circuit breaker auxiliary contacts
55	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-052	Utilities area socket circuit breakers auxiliary contacts
56	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-059	Main Circuit Breaker Local/Remote Selector
57	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-105	RIO 1 - 24Vdc converter - Power supply status
58	1	BLPH	CARD7	201AP30	E-TOR	no	no	SPARE	SPARE DI
59	1	BLPH			E-TOR	no	no	FS-206	Flow Switch
60	1	BLPH	CARD7	201AP30	E-TOR	no	no	YS-106	RIO 2 - 24Vdc converter - Power supply status
61	1	BLPH	CARD8	201AP31	E-TOR	no	no	SPARE	SPARE
62	1	BLPH	CARD8	201AP31	E-TOR	no	no	LP-300B	Pump LP-300B VFD powered

PLC IO Tests Checklist (FAT/SAT)

DATE	STATUS	COMMENTS
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
22/01/2025	Partially OK	Tested to the relay
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
	NOT READY	
	NOT READY	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	NOT READY	
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block

PLC IO Check List

#	REV	#RACK	POS.	#MOD	TYPE	SIS	Ex i	TAG	NAME
63	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-004	24Vdc power supply module 2 power failure
64	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-011	HE61.1 Deoxo trace heater circuit breaker auxiliaty contact
65	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-018	Water Treatment Package circuit breaker auxiliary contacts
66	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-025	VFD LP-620A circuit breaker auxiliary contacts
67	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-032	Air Extractor 1 contactor auxiliary contacts
68	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-039	Air Extractor 7 contactor auxiliary contacts
69	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-046	Heat Ribbon 501 circuit breaker auxiliary contacts
70	1	BLPH	CARD8	201AP31	E-TOR	no	no	SPARE	SPARE DI
71	1	BLPH	CARD8	201AP31	E-TOR	no	no	YS-061	Rectifier UPS power supply 1 circuit breaker auxiliary contact
72	1	BLPH	CARD8	201AP31	E-TOR	no	no	DS-009	Door switch open/close
73	1	BLPH	CARD8	201AP31	E-TOR	no	no	DS-010	Door switch open/close
74	1	BLPH	CARD8	201AP31	E-TOR	no	no	DS-011	Door switch open/close
75	1	BLPH	CARD9	201AP32	E-TOR	no	no	DS-012	Door switch open/close
76	1	BLPH	CARD9	201AP32	E-TOR	no	no	WLD-003	Water leak detector_Level 0
77	1	BLPH	CARD9	201AP32	E-TOR	no	no	SPARE	SPARE DI
78	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-012	HE 61.1 Deoxo trace heater contactor auxiliaty contact
79	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-019	Chiller 1 circuit breaker auxiliary contacts
80	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-026	VFD LP-620B circuit breaker auxiliary contacts
81	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-033	Air Extractor 2 contactor auxiliary contacts
82	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-040	Air Extractor 8 contactor auxiliary contacts
83	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-047	Heat Ribbon 509 circuit breaker auxiliary contacts
84	1	BLPH	CARD9	201AP32	E-TOR	no	no	SPARE	SPARE DI
85	1	BLPH	CARD9	201AP32	E-TOR	no	no	YS-063	SSI-1000 power failure
86	1	BLPH	CARD9	201AP32	E-TOR	no	yes	YA-002F	Rectifier-2 Fault
87	1	BLPH	CARD9	201AP32	E-TOR	no	yes	SPARE	SPARE
88	1	BLPH	CARD10	201AP33	E-TOR	no	no	CP-600A	Pump CP-600A VFD powered
89	1	BLPH	CARD10	201AP33	E-TOR	no	yes	WLD-004	Water leak detector_Level 0
90	1	BLPH	CARD10	201AP33	E-TOR	no	yes	YS-006	Rectifier 400Vac power supply circuit breaker auxiliary contact
91	1	BLPH	CARD10	201AP33	E-TOR	no	yes	YS-013	Spare circuit breaker auxiliary contacts
92	1	BLPH	CARD10	201AP33	E-TOR	no	yes	YS-020	Chiller 2 circuit breaker auxiliary contacts
93	1	BLPH	CARD10	201AP33	E-TOR	no	no	YS-027	VFD LP-600A circuit breaker auxiliary contacts
94	1	BLPH	CARD10	201AP33	E-TOR	no	yes	YS-034	Air Extractor 3 contactor auxiliary contacts
95	1	BLPH	CARD10	201AP33	E-TOR	no	no	YS-041	Spare circuit breaker auxiliary contacts
96	1	BLPH	CARD10	201AP33	E-TOR	no	no	YS-048	RIO1 panel power supply circuit breaker auxiliary contact
97	1	BLPH	CARD10	201AP33	E-TOR	no	no	YS-055	Lighting circuit breakers auxiliary contacts
98	1	BLPH	CARD10	201AP33	E-TOR	no	no	XA-001R	Emergency Stop feedback 1
99	1	BLPH	CARD10	201AP33	E-TOR	no	no	YS-102	Rectifier-2 In Operation
100	1	BLPH	CARD10	201AP33	E-TOR	no	no	SPARE	SPARE
101	1	BLPH	CARD10	201AP33	E-TOR	no	no	SPARE	SPARE
102	1	BLPH	CARD11	201AP34	E-TOR	no	no	CP-600B	Pump CP-600B VFD powered
103	1	BLPH	CARD11	201AP34	E-TOR	no	no	WLD-006	Water leak detector_Level 1
104	1	BLPH	CARD11	201AP34	E-TOR	no	no	SPARE	SPARE DI
105	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-014	Spare contactor auxiliary contacts
106	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-021	Spare circuit breaker auxiliary contacts
107	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-028	VFD LP-600B circuit breaker auxiliary contacts
108	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-035	Air Extractor 4 contactor auxiliary contacts
109	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-042	Spare circuit breaker auxiliary contacts
110	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-049	RIO2 Panel power supply circuit breaker auxiliary contact
111	1	BLPH	CARD11	201AP34	E-TOR	no	no	YS-056	Surge Protector Device auxiliary contact
112	1	BLPH	CARD11	201AP34	E-TOR	no	no	XA-002R	Emergency Stop feedback 2 (from Safety Module)
113	1	BLPH	CARD11	201AP34	E-TOR	no	no	SPARE	SPARE
114	1	BLPH	CARD11	201AP34	E-TOR	no	no	SPARE	SPARE
115	1	BLPH	CARD12	201AP35	E-TOR	no	no	CP-620A	Pump CP-620A VFD powered
116	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-001	General circuit breaker auxiliary contacts
117	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-008	UPS circuit breaker auxiliary contacts
118	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-015	HE64.1 Dryer regeneration heater circuit breaker auxiliary contacts
119	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-022	Spare circuit breaker auxiliary contacts
120	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-029	Auxiliary equipment type 2 circuit breaker auxiliary contacts
121	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-036	Air Extractor group 2 circuit breaker auxiliary contacts
122	1	BLPH	CARD12	201AP35	E-TOR	no	no	YS-043	Heat Ribbon 201 circuit breaker auxiliary contacts
123	1	BLPH	CARD12	201AP35	E-TOR	no	no	SPARE	SPARE DI
124	1	BLPH	CARD12	201AP35	E-TOR	no	no	SPARE	SPARE DI

PLC IO Tests Checklist (FAT/SAT)

DATE	STATUS	COMMENTS
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
	NOT READY	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
	NOT READY	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
21/01/2023	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
	SPARE	
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
	NOT READY	
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	

PLC IO Check List

PLC IO Tests Checklist (FAT/SAT)

#	REV	#RACK	POS.	#MOD	TYPE	SIS	Ex i	TAG	NAME	DATE	STATUS	COMMENTS
125	1	BLPH	CARD12	201AP3S	E-TOR	no	no	SPARE	SPARE DI		SPARE	
126	1	BLPH	CARD12	201AP3S	E-TOR	no	no	SPARE	SPARE DI		SPARE	
127	1	BLPH	CARD12	201AP3S	E-TOR	no	no	SPARE	SPARE DI		SPARE	
128	1	BLPH	CARD12	201AP3S	E-TOR	no	no	SPARE	SPARE DI		SPARE	
129	1	BLPH	CARD13	201AP36	E-TOR	no	no	CP-620B	Pump CP-620B VFD powered	22/01/2025	Partially OK	Tested to the terminal block
130	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-002	Rectifier 230Vac power supply circuit breaker auxiliary contact	22/01/2025	Partially OK	Tested to the terminal block
131	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-016	HE64.1 _ Dryer regeneration heater contactor auxiliary contacts	22/01/2025	Partially OK	Tested to the terminal block
132	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-023	VFD LP-300A circuit breaker auxiliary contacts	22/01/2025	Partially OK	Tested to the terminal block
133	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-030	Auxiliary equipment type 2 contactor auxiliary contacts	22/01/2025	Partially OK	Tested to the terminal block
134	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-037	Air Extractor 5 contactor auxiliary contacts	22/01/2025	Partially OK	Tested to the terminal block
135	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-044	Heat Ribbon 306 circuit breaker auxiliary contacts	22/01/2025	Partially OK	Tested to the terminal block
136	1	BLPH	CARD13	201AP36	E-TOR	no	no	SPARE	SPARE DI		SPARE	
137	1	BLPH	CARD13	201AP36	E-TOR	no	no	YS-058	CIRCUIT BREAKER AUXILIARY CONTACT		SPARE	
138	1	BLPH	CARD13	201AP36	E-TOR	no	no	SPARE	SPARE DI		SPARE	
139	1	BLPH	CARD13	201AP36	E-TOR	no	no	SPARE	SPARE DI		SPARE	
140	1	BLPH	CARD13	201AP36	E-TOR	no	no	SPARE	SPARE DI		SPARE	
141	1	BLPH	CARD13	201AP36	E-TOR	no	no	PS-001	RECTIFIER PS-001 PRESSURE SWITCH	22/01/2025	Partially OK	Tested to the terminal block
142	1	BLPH	CARD13	201AP36	E-TOR	no	no	SPARE	SPARE		SPARE	
143	1	BLPH	CARD14	202AP40	E-ANA	no	no	PT-300	Pure water out WTP to Services	22/01/2025	Partially OK	Tested to the terminal block
144	1	BLPH	CARD14	202AP40	E-ANA	no	no	TT-60	TT-60	22/01/2025	Partially OK	Tested to the terminal block
145	1	BLPH	CARD14	202AP40	E-ANA	no	no	TT-154	TT-154	22/01/2025	Partially OK	Tested to the terminal block
146	1	BLPH	CARD14	202AP40	E-ANA	no	no	SPARE	SPARE		SPARE	
147	1	BLPH	CARD14	202AP40	E-ANA	no	no	M3WV-200	Motorized proportional Valve position	22/01/2025	Partially OK	Tested to the terminal block
148	1	BLPH	CARD14	202AP40	E-ANA	no	no	VM-001	Voltmeter STACK-001	22/01/2025	Partially OK	Tested to the terminal block
149	1	BLPH	CARD14	202AP40	E-ANA	no	no	VM-002	Voltmeter STACK-002	22/01/2025	Partially OK	Tested to the terminal block
150	1	BLPH	CARD14	202AP40	E-ANA	no	no	VM-003	Voltmeter STACK-003	22/01/2025	Partially OK	Tested to the terminal block
151	1	BLPH	CARD15	202AP41	E-ANA	no	no	VM-004	Voltmeter STACK-004	22/01/2025	Partially OK	Tested to the terminal block
152	1	BLPH	CARD15	202AP41	E-ANA	no	no	VM-005	Voltmeter STACK-005	22/01/2025	Partially OK	Tested to the terminal block
153	1	BLPH	CARD15	202AP41	E-ANA	no	no	IM-001	Rectifier 1 Output Current	22/01/2025	Partially OK	Tested to the terminal block
154	1	BLPH	CARD15	202AP41	E-ANA	no	no	VM-006	Voltmeter STACK-006	22/01/2025	Partially OK	Tested to the terminal block
155	1	BLPH	CARD15	202AP41	E-ANA	no	no	VM-007	Voltmeter STACK-007	22/01/2025	Partially OK	Tested to the terminal block
156	1	BLPH	CARD15	202AP41	E-ANA	no	no	VM-008	Voltmeter STACK-008	22/01/2025	Partially OK	Tested to the terminal block
157	1	BLPH	CARD16	202AP42	E-ANA	no	no	SPARE	SPARE		SPARE	
158	1	BLPH	CARD16	202AP42	E-ANA	no	no	SPARE	SPARE		SPARE	
159	1	BLPH	CARD16	202AP42	E-ANA	no	no	IM-002	Rectifier 2 Output Current	22/01/2025	Partially OK	Tested to the terminal block
160	1	BLPH	CARD16	202AP42	E-ANA	no	no	VM-101	Rectifier 1 DC Voltage	22/01/2025	Partially OK	Tested to the terminal block
161	1	BLPH	CARD17	202AP43	E-ANA	no	no	SPARE	SPARE		SPARE	
162	1	BLPH	CARD17	202AP43	E-ANA	no	no	SPARE	SPARE		SPARE	
163	1	BLPH	CARD17	202AP43	E-ANA	no	no	SPARE	SPARE		SPARE	
164	1	BLPH	CARD17	202AP43	E-ANA	no	no	VM-102	Rectifier 2 DC Voltage	22/01/2025	Partially OK	
165	1	BLPH	CARD18	202AP50	S-TOR	no	no	YS-103	Electrolyzer 1 System Healthy	22/01/2025	Partially OK	Tested to the relay
166	1	BLPH	CARD18	202AP50	S-TOR	no	no	?????	HIGH VOLTAGE CIRCUIT BREAKER OPEN		SPARE	
167	1	BLPH	CARD18	202AP50	S-TOR	no	no	EXT-0002	Air extractor EXT-0002 contactor command	22/01/2025	Partially OK	Tested to the relay
168	1	BLPH	CARD18	202AP50	S-TOR	no	no	EXT-0005	Air extractor EXT-0005 contactor command	22/01/2025	Partially OK	Tested to the relay
169	1	BLPH	CARD18	202AP50	S-TOR	no	no	EXT-0008	Air extractor EXT-0008 contactor command	22/01/2025	Partially OK	Tested to the relay
170	1	BLPH	CARD18	202AP50	S-TOR	no	no	ES-014	Spare contactor command		SPARE	
171	1	BLPH	CARD18	202AP50	S-TOR	no	no	SPARE	SPARE DO		SPARE	
172	1	BLPH	CARD18	202AP50	S-TOR	no	no	VE-003	Light Column - Level 0 - Green	22/01/2025	Partially OK	Tested to the terminal block
173	1	BLPH	CARD18	202AP50	S-TOR	no	no	VE-015	Front Panel Green Light	22/01/2025	OK	
174	1	BLPH	CARD18	202AP50	S-TOR	no	no	HS-001	Main Circuit Breaker Open command	22/01/2025	Partially OK	Tested to the relay
175	1	BLPH	CARD19	202AP51	S-TOR	no	no	YS-104	Electrolyzer 2 System Healthy	22/01/2025	Partially OK	Tested to the relay
176	1	BLPH	CARD19	202AP51	S-TOR	no	no	HS-101	Rectifier Start/Stop Command	22/01/2025	Partially OK	Tested to the relay
177	1	BLPH	CARD19	202AP51	S-TOR	no	no	EXT-0003	Air extractor EXT-0003 contactor command	22/01/2025	Partially OK	Tested to the relay
178	1	BLPH	CARD19	202AP51	S-TOR	no	no	EXT-0006	Air extractor EXT-0006 contactor command	22/01/2025	Partially OK	Tested to the relay
179	1	BLPH	CARD19	202AP51	S-TOR	no	no	ES-030	Auxiliary equipment type 2 contactor command	22/01/2025	Partially OK	Tested to the relay
180	1	BLPH	CARD19	202AP51	S-TOR	no	no	ES-012	HE61.1 Deoxo trace heater contactor command	22/01/2025	Partially OK	Tested to the relay
181	1	BLPH	CARD19	202AP51	S-TOR	no	no	VE-001	Light Column - Level 0 - Red	22/01/2025	Partially OK	Tested to the terminal block
182	1	BLPH	CARD19	202AP51	S-TOR	no	no	VE-004	Light Column - Level 0 - Blue	22/01/2025	Partially OK	Tested to the terminal block
183	1	BLPH	CARD19	202AP51	S-TOR	no	no	VE-013	Front Panel Red Light	22/01/2025	OK	
184	1	BLPH	CARD19	202AP51	S-TOR	no	no	????	Main Circuit Breaker Close command		NOT READY	
185	1	BLPH	CARD20	202AP52	S-TOR	no	no	????	HIGH VOLTAGE CIRCUIT BREAKER CLOSED		SPARE	
186	1	BLPH	CARD20	202AP52	S-TOR	no	no	EXT-0001	Air extractor EXT-0001 contactor command	22/01/2025	Partially OK	Tested to the relay

PLC IO Check List

#	REV	#RACK	POS.	#MOD	TYPE	SIS	Ex i	TAG	NAME
187	1	BLPH	CARD20	202AP52	S-TOR	no	no	EXT-0004	Air extractor EXT-0004 contactor command
188	1	BLPH	CARD20	202AP52	S-TOR	no	no	EXT-0007	Air extractor EXT-0007 contactor command
189	1	BLPH	CARD20	202AP52	S-TOR	no	no	ES-016	HE64.1 Dryer regeneration heater contactor command
190	1	BLPH	CARD20	202AP52	S-TOR	no	no	VE-002	Light Column - Level 0 - Orange
191	1	BLPH	CARD20	202AP52	S-TOR	no	no	BUZ-1001	Buzzer - Level 0
192	1	BLPH	CARD20	202AP52	S-TOR	no	no	SPARE	SPARE DO
193	1	BLPH	CARD20	202AP52	S-TOR	no	no	VE-014	Front Panel Orange Light
194	1	BLPH	CARD20	202AP52	S-TOR	no	no	????	DEOXO CONTACTOR COMMAND
195	1	BLPH	CARD21	202AP60	S-ANA 4-20mA	no	no	M3WV-200F	Motorized proportional Valve feedback
196	1						no		
197	1	RIO1	CARD22	201AP10	E-TOR	yes	no	ZI-604	HV-604 Valve Open position PWO2 to STACKS
198	1	RIO1	CARD22	201AP10	E-TOR	yes	no	ZI-623	HV-623 Valve Open position PWO2 to STACKS
199	1	RIO1	CARD23	201AP20	E-ANA	yes	no	PI-600A	PWO2 outlet CP-600A
200	1	RIO1	CARD23	201AP20	E-ANA	yes	no	PI-620A	PWH2 outlet CP-620A
201	1	RIO1	CARD23	201AP20	E-ANA	yes	no	AHD-1002	Ambient Hydrogen detector Level 1
202	1	RIO1	CARD24	201AP21	E-ANA	yes	no	PI-600B	PWO2 outlet CP-600B
203	1	RIO1	CARD24	201AP21	E-ANA	yes	no	PI-620B	PWH2 outlet CP-620B
204	1	RIO1	CARD24	201AP21	E-ANA	yes	no	AHD-1003	Ambient Hydrogen detector Level 1
205	1	RIO1	CARD24	201AP21	E-ANA	yes	no	SPARE	SPARE
206	1	RIO1	CARD25	201AP22	E-ANA	yes	no	FI-600	PWO2 to STACKS
207	1	RIO1	CARD25	201AP22	E-ANA	yes	no	AHD-1001	Ambient Hydrogen detector Level 0
208	1	RIO1	CARD26	201AP30	E-TOR	no	no	DS-001	Door switch open/close_Level 0
209	1	RIO1	CARD26	201AP30	E-TOR	no	no	DS-002	Door switch open/close_Level 0
210	1	RIO1	CARD26	201AP30	E-TOR	no	no	DS-003	Door switch open/close_Level 0
211	1	RIO1	CARD26	201AP30	E-TOR	no	no	WLD-001	Water leak detector_Level 0
212	1	RIO1	CARD26	201AP30	E-TOR	no	no	WLD-002	Water leak detector_Level 0
213	1	RIO1	CARD26	201AP30	E-TOR	no	no	DS-008	Door switch
214	1	RIO1	CARD27	201AP40	E-ANA	no	no	SPARE	SPARE AI
215	1	RIO1	CARD27	201AP40	E-ANA	no	no	SPARE	SPARE AI
216	1	RIO1	CARD27	201AP40	E-ANA	no	no	PT-600	PWO2 to HE600
217	1	RIO1	CARD27	201AP40	E-ANA	no	no	SPARE	SPARE AI
218	1	RIO1	CARD27	201AP40	E-ANA	no	no	TAHH-621B	Motor CP-620B windings Temperature
219	1	RIO1	CARD27	201AP40	E-ANA	no	no	FT-620	PWH2 to STACKS
220	1	RIO1	CARD28	201AP41	E-ANA	no	no	SPARE	SPARE AI
221	1	RIO1	CARD28	201AP41	E-ANA	no	no	SPARE	SPARE AI
222	1	RIO1	CARD28	201AP41	E-ANA	no	no	TT-600	PWO2 temperature to STACKS
223	1	RIO1	CARD28	201AP41	E-ANA	no	no	SPARE	SPARE AI
224	1	RIO1	CARD28	201AP41	E-ANA	no	yes	TT1001	TT1001
225	1	RIO1	CARD28	201AP41	E-ANA	no	no	CT-620	PWH2 conductivity to STACKS
226	1	RIO1	CARD29	201AP42	E-ANA	no	no	SPARE	SPARE AI
227	1	RIO1	CARD29	201AP42	E-ANA	no	no	SPARE	SPARE AI
228	1	RIO1	CARD29	201AP42	E-ANA	no	no	CT-600	PWO2 conductivity to STACKS
229	1	RIO1	CARD29	201AP42	E-ANA	no	no	PT-620	PWH2 to FH-620
230	1	RIO1	CARD29	201AP42	E-ANA	no	no	TT1003	TT1003
231	1	RIO1	CARD30	201AP43	E-ANA	no	no	SPARE	SPARE AI
232	1	RIO1	CARD30	201AP43	E-ANA	no	no	SPARE	SPARE AI
233	1	RIO1	CARD30	201AP43	E-ANA	no	no	PT-612	PT612
234	1	RIO1	CARD30	201AP43	E-ANA	no	no	TAHH-621A	Motor CP-620A windings Temperature
235	1	RIO1	CARD30	201AP43	E-ANA	no	no	TT-1004	TT1004
236	1	RIO1	CARD30	201AP43	E-ANA	no	no	TT-620	PWH2 temperature to STACKS
237	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-005	Light Column - Level 1 - Red
238	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-006	Light Column - Level 1 - Orange
239	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-007	Light Column - Level 1 - Green
240	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-008	Light Column - Level 1 - Blue
241	1	RIO1	CARD31	201AP50	S-TOR	no	no	BUZ-1002	Buzzer - Level 1
242	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-009	Light Column - Level 2 - Red
243	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-010	Light Column - Level 2 - Orange
244	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-011	Light Column - Level 2 - Green
245	1	RIO1	CARD31	201AP50	S-TOR	no	no	VE-012	Light Column - Level 2 - Blue
246	1	RIO1	CARD31	201AP50	S-TOR	no	no	BUZ-1003	Buzzer - Level 2
247	1	RIO1	CARD25	202AP60	S-ANA	no	no	VAT-001	Voltage Display
248	1	RIO1	CARD25	202AP60	S-ANA	no	no	VAT-002	Voltage Display

PLC IO Tests Checklist (FAT/SAT)

DATE	STATUS	COMMENTS
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the terminal block
22/01/2025	Partially OK	Tested to the terminal block
	SPARE	
22/01/2025	OK	
22/01/2025	Partially OK	Tested to the relay
22/01/2025	Partially OK	Tested to the terminal block
	NOT TESTED	
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
	SPARE	
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
30/01/2025	Partially OK	Tested to the terminal block
	SPARE	
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
	SPARE	
	SPARE	
30/01/2025	Partially OK	Tested to the terminal block
	SPARE	
30/01/2025	FAULTY	not present in the latest version of the diagrams (rev 1)
30/01/2025	FAULTY	Present on the previous path
	SPARE	
	SPARE	
	SPARE	
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	not present in the latest version of the diagrams
	SPARE	
	SPARE	
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	not present in the latest version of the diagrams
30/01/2025	FAULTY	Tested to the terminal block Barrier power supply checked
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block
30/01/2025	Partially OK	Tested to the terminal block

PLC IO Check List

#	REV	#RACK	POS.	#MOD	TYPE	SIS	Ex i	TAG	NAME
249	1	RIO1	CARD25	202AP70	E-ANA RTD	no	no	TI-601A	PWO2 out STACK-001
250	1	RIO1	CARD25	202AP70	E-ANA RTD	no	no	TI-601D	PWO2 out STACK-004
251	1	RIO1	CARD25	202AP70	E-ANA RTD	no	no	TI-601G	PWO2 out STACK-007
252	1	RIO1	CARD26	202AP71	E-ANA RTD	no	no	TI-601B	PWO2 out STACK-002
253	1	RIO1	CARD26	202AP71	E-ANA RTD	no	no	TI-601E	PWO2 out STACK-005
254	1	RIO1	CARD26	202AP71	E-ANA RTD	no	no	TI-601H	PWO2 out STACK-008
255	1	RIO1	CARD27	202AP72	E-ANA RTD	no	no	TI-601C	PWO2 out STACK-003
256	1	RIO1	CARD27	202AP72	E-ANA RTD	no	no	TI-601F	PWO2 out STACK-006
257						no	no		
258	1	RIO2	CARD28	201AP10	E-TOR	yes	no	ZIO-605	HV-605 Valve Open position
259	1	RIO2	CARD28	201AP10	E-TOR	yes	no	FICV-610A	ST-600 low low flow sampling O2 to vent
260	1	RIO2	CARD28	201AP10	E-TOR	yes	no	SPARE	SPARE O
261	1	RIO2	CARD28	201AP10	E-TOR	yes	no	LSL-620	Low Low Level ST-620
262	1	RIO2	CARD28	201AP10	E-TOR	yes	no	LSLL-500	Low Low Level H2 header
263	1	RIO2	CARD28	201AP10	E-TOR	yes	no	FICV-800	High High flow Hydrogen to Vent Analisys
264	1	RIO2	CARD29	201AP11	E-TOR	yes	no	LSH-600	High High Level ST-600
265	1	RIO2	CARD29	201AP11	E-TOR	yes	no	FICV-610B	ST-600 low low flow sampling O2 to vent
266	1	RIO2	CARD29	201AP11	E-TOR	yes	no	LSL-611	Low CS-610
267	1	RIO2	CARD29	201AP11	E-TOR	yes	no	LSH-631	High High Level CS-630
268	1	RIO2	CARD29	201AP11	E-TOR	yes	no	LSL-641	Low Level DG-640
269	1	RIO2	CARD29	201AP11	E-TOR	yes	no	FICV-800	Low Low flow Hydrogen to Vent Analisys
270	1	RIO2	CARD30	201AP12	E-TOR	yes	no	LSL-600	Low Low Level ST-600
271	1	RIO2	CARD30	201AP12	E-TOR	yes	no	FICV-610C	ST-600 low low flow sampling O2 to vent
272	1	RIO2	CARD30	201AP12	E-TOR	yes	no	ZIO-624	HV-624 Valve Open position
273	1	RIO2	CARD30	201AP12	E-TOR	yes	no	LSHH-500	High High Level H2 header
274	1	RIO2	CARD30	201AP12	E-TOR	yes	no	FSH-640	High flow PWH2 to ST-600
275	1	RIO2	CARD31	201AP20	E-ANA	yes	no	PT-611	Oxygen out ST-600
276	1	RIO2	CARD31	201AP20	E-ANA	yes	no	HIOD-610C	Hydrogen in Oxygen detection ST-600 sampling O2 to vent
277	1	RIO2	CARD31	201AP20	E-ANA	yes	no	AHD-1000	Ambient Hydrogen detector Level 1
278	1	RIO2	CARD32	201AP21	E-ANA	yes	no	HIOD-610A	Hydrogen in Oxygen detection ST-600 sampling O2 to vent
279	1	RIO2	CARD32	201AP21	E-ANA	yes	no	PT-631	High High pressure Hydrogen out ST-620 to Vent
280	1	RIO2	CARD32	201AP21	E-ANA	yes	no	AHD-1004	Ambient Hydrogen detector Level 1
281	1	RIO2	CARD33	201AP22	E-ANA	yes	no	HIOD-610B	Hydrogen in Oxygen detection ST-600 sampling O2 to vent
282	1	RIO2	CARD33	201AP22	E-ANA	yes	no	PI-633	Hydrogen to Production
283	1	RIO2	CARD34	201AP30	S-TOR	yes	no	SV-500	Solenoid Valve command PV-500
284	1	RIO2	CARD34	201AP30	S-TOR	yes	no	SV-601	Solenoid Valve command SV-601
285	1	RIO2	CARD34	201AP30	S-TOR	yes	no	SV-641	Solenoid Valve command SV-641
286	1	RIO2	CARD35	201AP31	S-TOR	yes	no	SV-501	Solenoid Valve command PV-501
287	1	RIO2	CARD35	201AP31	S-TOR	yes	no	SV-610	Solenoid Valve command SV-610
288	1	RIO2	CARD35	201AP31	S-TOR	yes	no	SV-800	Solenoid Valve command SV-800
289	1	RIO2	CARD36	201AP32	S-TOR	yes	yes	SV-900	Solenoid Valve command SV-900
290	1	RIO2	CARD36	201AP32	S-TOR	yes	yes	SV-630	Solenoid Valve command SV-630
291	1	RIO2	CARD37	201AP33	S-TOR	yes	yes	SV-920	Solenoid Valve command SV-920
292	1	RIO2	CARD37	201AP33	S-TOR	yes	yes	SV-635	Solenoid Valve command SV-635
293	1	RIO2	CARD38	202AP40	E-TOR	no	yes	FICV-611	ST-600 low low flow O2 to vent
294	1	RIO2	CARD38	202AP40	E-TOR	no	yes	LSL-610	Low Level CS-610
295	1	RIO2	CARD38	202AP40	E-TOR	no	yes	LSL-630	Low Level CS-630
296	1	RIO2	CARD38	202AP40	E-TOR	no	yes	LSL-500	Low Level H2 header
297	1	RIO2	CARD38	202AP40	E-TOR	no	yes	LSL-640	Low Level DG-640
298	1	RIO2	CARD38	202AP40	E-TOR	no	yes	DS-005	Door switch open/close_Level 1
299	1	RIO2	CARD38	202AP40	E-TOR	no	yes	DS-007	Door switch open/close_Level 1
300	1	RIO2	CARD38	202AP40	E-TOR	no	yes	ZSH-64.1.1	Valve 64V4.1 Open
301	1	RIO2	CARD38	202AP40	E-TOR	no	yes	ZSH-64.1.2	Valve 64V4.2 Open
302	1	RIO2	CARD38	202AP40	E-TOR	no	yes	ZSH-64.2	Valve 64V5 Open
303	1	RIO2	CARD38	202AP40	E-TOR	no	yes	TSHH-64.3	High High Temperature
304	1	RIO2	CARD38	202AP40	E-TOR	no	yes	TSHH-64.2	High High Temperature Heater HE64.1
305	1	RIO2	CARD39	202AP41	E-TOR	no	no	LSH-610	High Level CS-610
306	1	RIO2	CARD39	202AP41	E-TOR	no	no	LSH-630	High Level CS-630
307	1	RIO2	CARD39	202AP41	E-TOR	no	yes	LSH-500	High Level H2 header
308	1	RIO2	CARD39	202AP41	E-TOR	no	yes	LSH-640	High Level DG-640
309	1	RIO2	CARD39	202AP41	E-TOR	no	yes	DS-004	Door switch open/close_Level 1
310	1	RIO2	CARD39	202AP41	E-TOR	no	yes	DS-006	Door switch open/close_Level 1

PLC IO Tests Checklist (FAT/SAT)

DATE	STATUS	COMMENTS
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	NOT READY	Waiting for the necessary equipment
	SPARE	
01/02/2025	Partially OK	Tested to the terminal block
01/02/2025	Partially OK	Tested to the terminal block
	SPARE	
01/02/2025	Partially OK	Tested to the terminal block
01/02/2025	Partially OK	Tested to the terminal block
01/02/2025	Partially OK	Tested to the terminal block

PLC IO Check List

PLC IO Tests Checklist (FAT/SAT)

#	REV	#RACK	POS.	#MOD	TYPE	SIS	Ex i	TAG	NAME	DATE	STATUS	COMMENTS
311	1	RIO2	CARD39	202AP41	E-TOR	no	yes	WLD-005	Water leak detector_Level 1	31/01/2025	Partially OK	Tested to the terminal block
312	1	RIO2	CARD39	202AP41	E-TOR	no	yes	ZSH-64.1.3	Valve 64V4.3 Open	31/01/2025	Partially OK	Tested to the terminal block
313	1	RIO2	CARD39	202AP41	E-TOR	no	yes	ZSH-64.1.4	Valve 64V4.4 Open	31/01/2025	Partially OK	Tested to the terminal block
314	1	RIO2	CARD39	202AP41	E-TOR	no	yes	ZSH-64.3	Valve 64V7 Open	31/01/2025	Partially OK	Tested to the terminal block
315	1	RIO2	CARD39	202AP41	E-TOR	no	yes	ZSL-64.T2	Valve 64Vxx Closed	31/01/2025	Partially OK	Tested to the terminal block
316	1	RIO2	CARD39	202AP41	E-TOR	no	yes	TSHH-64.4	High High Temperature	31/01/2025	Partially OK	Tested to the terminal block
318	1	RIO2	CARD40	202AP50	E-ANA	no	no	PT-610	Oxygen out ST-600	31/01/2025	Partially OK	Tested to the terminal block
319	1	RIO2	CARD40	202AP50	E-ANA	no	no	TT60.1	Temperature TT60.1	31/01/2025	Partially OK	Tested to the terminal block
320	1	RIO2	CARD40	202AP50	E-ANA	no	no	PT-630	Hydrogen out ST-620 to Vent	31/01/2025	Partially OK	Tested to the terminal block
321	1	RIO2	CARD40	202AP50	E-ANA	yes	no	FT-630	Hydrogen to Production	31/01/2025	Partially OK	Tested to the terminal block
322	1	RIO2	CARD40	202AP50	E-ANA	yes	no	OIHA-800A	Oxygen in Hydrogen to Production	31/01/2025	Partially OK	Tested to the terminal block
323	1	RIO2	CARD40	202AP50	E-ANA	yes	no	PT-150	Compressed air to services	31/01/2025	Partially OK	Tested to the terminal block
324	1	RIO2	CARD40	202AP50	E-ANA	yes	no	MPV-611	Motorized proportional Valve position	31/01/2025	Partially OK	Tested to the terminal block
325	1	RIO2	CARD40	202AP50	E-ANA	yes	no	FT-920	N2 to ST 620	31/01/2025	Partially OK	Tested to the terminal block
326	1	RIO2	CARD41	202AP51	E-ANA	yes	no	PT-900	Oxygen out ST-600	31/01/2025	Partially OK	Tested to the terminal block
327	1	RIO2	CARD41	202AP51	E-ANA	yes	no	HPP-700	Temperature TT60.2	31/01/2025	Partially OK	Tested to the terminal block
328	1	RIO2	CARD41	202AP51	E-ANA	yes	no	PT-920	Pressure Nitrogen to ST-620	31/01/2025	Partially OK	Tested to the terminal block
329	1	RIO2	CARD41	202AP51	E-ANA	no	no	DPT-800A	Dew Point in Hydrogen to Production	31/01/2025	Partially OK	Tested to the terminal block
330	1	RIO2	CARD41	202AP51	E-ANA	no	no	OIHA-800B	Oxygen in Hydrogen to Production	31/01/2025	Partially OK	Tested to the terminal block
331	1	RIO2	CARD41	202AP51	E-ANA	no	no	FS-400	FLOW SWITCH CW IN HPP	31/01/2025	Partially OK	Tested to the terminal block
332	1	RIO2	CARD41	202AP51	E-ANA	no	no	MPV-630	Motorized proportional Valve position	31/01/2025	Partially OK	Tested to the terminal block
333	1	RIO2	CARD41	202AP51	E-ANA	no	no	FT-921	N2 to ST 620	31/01/2025	Partially OK	Tested to the terminal block
334	1	RIO2	CARD42	202AP52	E-ANA	no	no	FT-900	N2 to ST 600	31/01/2025	Partially OK	Tested to the terminal block
335	1	RIO2	CARD42	202AP52	E-ANA	no	no	SPARE	SPARE	31/01/2025	Partially OK	Tested to the terminal block
336	1	RIO2	CARD42	202AP52	E-ANA	no	no	TT61.1	Temperature TT61.1	31/01/2025	Partially OK	Tested to the terminal block
337	1	RIO2	CARD42	202AP52	E-ANA	no	no	DPT-800B	Dew Point in Hydrogen to Production	31/01/2025	Partially OK	Tested to the terminal block
338	1	RIO2	CARD42	202AP52	E-ANA	no	no	TT64.7	Temperature TT64.7	31/01/2025	Partially OK	Tested to the terminal block
339	1	RIO2	CARD42	202AP52	E-ANA	no	no	OIHA-800C	Oxygen in Hydrogen to Production	31/01/2025	Partially OK	Tested to the terminal block
340	1	RIO2	CARD42	202AP52	E-ANA	no	no	FS-401	FLOW SWITCH CW OUT HPP	31/01/2025	Partially OK	Tested to the terminal block
341	1	RIO2	CARD42	202AP52	E-ANA	no	no	PT-612	Oxygen header to Vent	31/01/2025	Partially OK	Tested to the terminal block
342	1	RIO2	CARD43	202AP53	E-ANA	no		FT-901	N2 to ST 600	31/01/2025	Partially OK	Tested to the terminal block
343	1	RIO2	CARD43	202AP53	E-ANA	no		SPARE	SPARE		SPARE	
344	1	RIO2	CARD43	202AP53	E-ANA	no		TT64.5	Temperature TT64.5	31/01/2025	Partially OK	Tested to the terminal block
345	1	RIO2	CARD43	202AP53	E-ANA	no		PT-910	Nitrogen to services	31/01/2025	Partially OK	Tested to the terminal block
346	1	RIO2	CARD43	202AP53	E-ANA	no		TT-1005	SPARE AI		SPARE	
347	1	RIO2	CARD43	202AP53	E-ANA	no		TT64.8	Temperature TT64.8	31/01/2025	Partially OK	Tested to the terminal block
348	1	RIO2	CARD43	202AP53	E-ANA	no		PT64.1	Pressure PT64.1	31/01/2026	Partially OK	Tested to the terminal block
349	1	RIO2	CARD44	MOD37	E-ANA	no		LT-600	Level indication ST-600	31/01/2027	Partially OK	Tested to the terminal block
350	1	RIO2	CARD44	MOD38	E-ANA	no		SPARE	SPARE	31/01/2028	Partially OK	Tested to the terminal block
351	1	RIO2	CARD44	MOD38	E-ANA	no		LT-620	Level indication ST-620	31/01/2029	Partially OK	Tested to the terminal block
352	1	RIO2	CARD44	MOD38	E-ANA	no		DPT-800C	Dew Point in Hydrogen to Production	31/01/2030	Partially OK	Tested to the terminal block
353	1	RIO2	CARD44	MOD38	E-ANA	no		PT-632	Hydrogen out CS-630 to Vent	31/01/2031	Partially OK	Tested to the terminal block
354	1	RIO2	CARD44	MOD39	E-ANA	no		TT64.6	Temperature TT64.6	31/01/2032	Partially OK	Tested to the terminal block
355	1	RIO2	CARD45	MOD39	S-TOR	no		HC-6401	Valve 64-V1 command	31/01/2033	Partially OK	Tested to the terminal block
356	1	RIO2	CARD45	MOD39	S-TOR	no		HC-6402	Valve 64-V2 command	31/01/2034	Partially OK	Tested to the terminal block
357	1	RIO2	CARD45	MOD39	S-TOR	yes		HC-6403	Valve 64-V3 command	31/01/2035	Partially OK	Tested to the terminal block
358	1	RIO2	CARD45	MOD40	S-TOR	yes		HC-6408	Valve 64-V8 command	31/01/2036	Partially OK	Tested to the terminal block
359	1	RIO2	CARD45	MOD40	S-TOR	yes		HC-6412	Valve 64-V12 command	31/01/2037	Partially OK	Tested to the terminal block
360	1	RIO2	CARD45	MOD40	S-TOR	yes		HC-6417	Valve 64-V17 command	31/01/2038	Partially OK	Tested to the terminal block
361	1	RIO2	CARD46	MOD40	S-ANA 0-10V	yes		MPV-611	Motorized proportional Valve command	31/01/2039	Partially OK	Tested to the terminal block
362	1	RIO2	CARD46	MOD41	S-ANA 0-10V	yes		MPV-630	Motorized proportional Valve command	31/01/2040	Partially OK	Tested to the terminal block
363	1	RIO2	CARD46	MOD41	S-ANA 0-10V	yes		FC-64.1	Flow Control Valve FV-64-1 command	31/01/2041	Partially OK	Tested to the terminal block

C063-ELO-PRO-CO-0006

BLPH Electrolyzer Performance Test Procedure

			Daniela Picon		
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Revision / Change Log

Rev.	Description
01	First issue
02	Second issue: Format updated. Sections 5 and 7 updated.

Reference documents

Doc Number	Rev.	Description
C63-PID-001	08	Electrolyzer Piping and Instrumentation Diagram
123A90-PML-COM-PRO-03007	01	BLPH Commissioning Strategy
123A90-PML-QHSE-PRO-00117	01	Punch List Management Procedure
123A90-PML-QHSE-PL-00001	01	Project HSE Management Plan
C063-ELO-PRO-CO-0001	01	BLPH Electrolyser Commissioning & Start-Up (CSU) Execution Plan
C063-ELO-PRO-CO-0002	01	BLPH Electrolyser CSU Method Statements
C063-ELO-PRO-CO-0003	01	BLPH Electrolyser Pre-Commissioning Manual
C063-ELO-PRO-CO-0004	01	BLPH Electrolyser Commissioning Manual
C063-ELO-PRO-CO-0005	01	BLPH Electrolyser Operational Test Procedure
C063-ELO-PRO-CO-0007	01	BLPH Electrolyser O&M Training
C063-ELO-LST-CO-0001	01	BLPH Electrolyser - General Item list

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1. Introduction

This document describes the philosophy, organization and milestones required for the Commissioning & Start-Up of the ELOGEN hydrogen production unit by water electrolysis for the Crosswind Project. ELOGEN's site supervision is responsible for advising the coordinating on site of all the means and resources required for the Unit Commissioning & Start-Up of the unit in accordance with COMPANY specifications.

1.1 Overview of Project Scope

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

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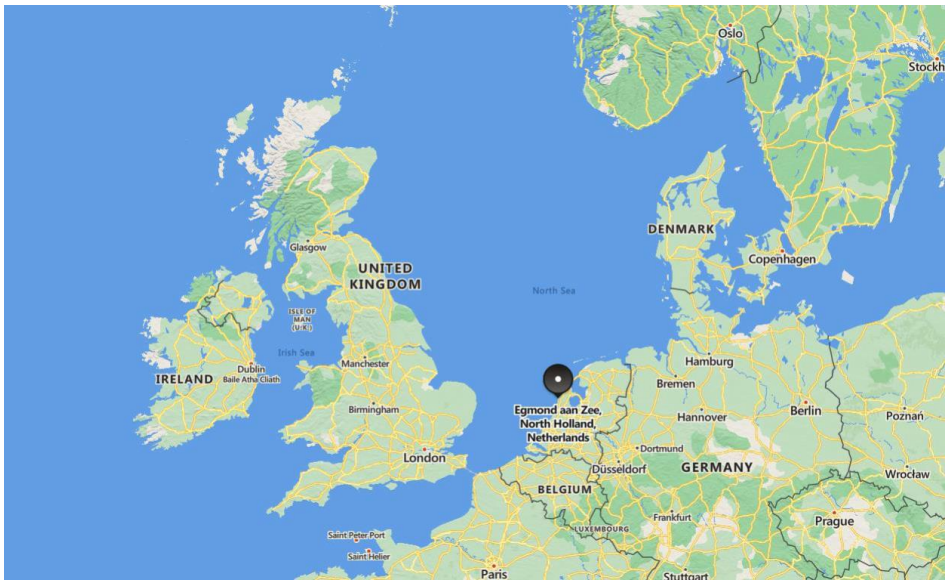


Figure 1. *HOLLANDSE KUST NOORD WIND PARK Location Map*



Figure 2. *Wind Park Details*

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

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1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

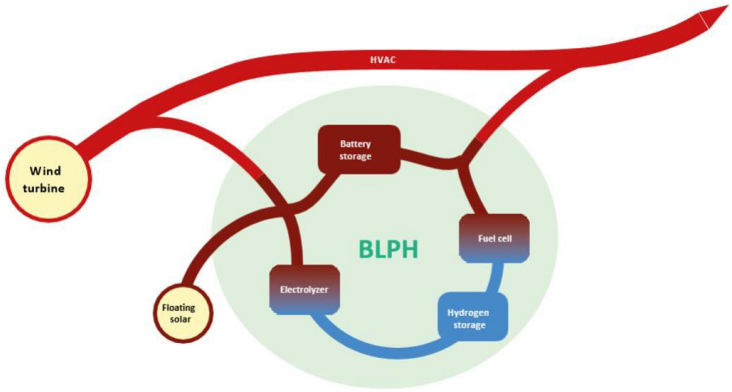


Figure 3. *BLPH Concept*

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2. Document Scope

In this document are described the activities developed to evaluate the performance of the electrolysis unit. This activities are carried out after achieving completion on the hydrogen production from 10% to 100% of nominal flowrate, which is from 50 Nm^3/h up to 500 Nm^3/h (cf. C063-ELO-PRO-CO-0005).

In the section 0 are given the steps to conclude if the unit performs as expected and established by the contract. In addition to the operation description, are given the prerequisites, acceptance criteria, as well as the time required for each operation.

The performance of the electrolysis unit is evaluated towards the following parameters:

- Hydrogen production rate
- Hydrogen purity
- Efficiency at maximum capacity
- Hot start time
- Energy consumption in hot stand-by
- Cold start time
- Energy consumption in cold stand-by
- Ramp down time
- Ramp up time
- Fresh water consumption

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3. Definitions

Table 1. Table of definitions

Term	Definition
COMPANY	means CROSSWIND C.V., owner & developer of the offshore WIND FARM Hollandse Kust Noord Wind Park Project.
ELOGEN	means ELOGEN as CONTRACTOR, the contracted party for engineering, and onshore commissioning of the Electrolyzer facilities associated with the PROJECT.
Pre-Commissioning	Pre-Commissioning relates to the preliminary Commissioning activities to test and check the individual basic functions of individual items within any given system and/or sub-system to confirm they perform as designed.
Commissioning	The phase of the project after Pre-Commissioning. Commissioning consists of a comprehensive series of dynamic and energized Checks and Tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project Documents, Specifications, Standards and Engineering Best Practices.
Equipment	An item that may be part of a System and be commissioned independently, however, it may or may not be operated independently.
Inspection Test Records (ITR)	A-ITR – used to record and verify construction scope associated with a tagged item (component). B-ITR – used to record and verify energization and function testing during pre-commissioning of a tagged item
Operations	Operations include all personnel directly involved with Production Operations and Maintenance of the facility.
Performance Test	The Performance Test takes place following the Commissioning and Site Acceptance Test. A performance test is executed if there is a specific requirement to test performance criteria of an individual piece of equipment, a system, or the plant.
Plant	Refers to the permanent facilities (Base Load Power Hub) being constructed or to be constructed at WORKSITE resulting from the WORK.

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Term	Definition
Project	Refers to the BASE LOAD POWER HUB project.
Procedure	A document that details the execution of an activity.
Punch List	Work not executed as per approved documents and/or not meeting quality, health, safety, environment, operability/maintainability requirement and/or Standard; and recorded as a list for rectification.
SITE	Refers to the offshore location where the PLANT is to be installed and the vicinity thereof (offshore North Sea - Netherlands).
Start-up	The stage at which process fluid is introduced/created into the Plant. It is defined as operation of all the facilities under the project. It can only be performed once Commissioning of all associated utilities and auxiliaries and Pre-Commissioning activities of the Plant have been completed.
Start-up/Ramp-up	It is the initial start-up of processing equipment after first hydrogen, followed by a staged ramp up to full operating conditions. On completion of ramp-up, and after a period of steady state operations, the facility is ready to be performance tested.
System	A System is a major subdivision of a plant, being either process or utility, which performs an operational function of the plant. A System includes all the various equipment that allows it to operate. The division into functional Commissioning Systems corresponds to the prevailing fluids or services.
Sub-system	A Sub-system is a further subdivision of a System, which performs a partial operational function of the System, with little or no interference from the other Sub-systems. The Sub-system is the basic unit for Commissioning.
WORKSITE	means any construction location(s), where any major parts of the PLANT (such as templates, piles, nodes, jacket structure, modules, decks) shall be fabricated and assembled, excluding all other offices, premises and workshops of CONTRACTOR and SUBCONTRACTORS.
Shall	used to indicate requirements strictly to be followed to conform to the specification and accepted by all involved parties.
Should	used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.

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Term	Definition
May	used to indicate a course of action permissible within the limits of the specification.
Can	used for statements of possibility and capability, whether material, physical or casual.

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4. Abbreviations

Table 2. *Table of abbreviations*

Term	Definition
BLPH	Base Load Power Hub
BOP	Balance of plant
CSU	Commissioning & Start-Up
FT	Functional Transmitter
HMI	Human Machine Interface
HPP	Hydrogen Purification Unit[1]
QHSE	Quality, Health, Safety, & Environment
ITR	Inspection & Test Record
PID (P&ID)	Piping and Instrumentation Diagram
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
PV	Pneumatic Valve
UPS	Uninterruptible Power Supply

[1] It could also be referred as HPU (Hydrogen Purification Unit) in other documents

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5. Requirements

Electrolyser's unit performance test activities can be performed when the Start-up report for the entirety of the electrolysis unit has been signed by all parties:

- All Punchlist that does not require the system to be reopened are cleared.
- All relevant documentation is available in the latest revision.
- The UPS is loaded at 100%.
- All Utilities are operational.
- The electrolyzer is stopped depressurized and cold (T < 40 °C).
- Electrolyzer Unit Start-Up & Ramp Up procedure has been completed and the corresponding ITRs have been completed and signed (cf. C063-ELO-PRO-0005).
- All systems are power-up and available to start automatically.
- Appropriate PPE must be always worn during loop testing.
- A permit to work has been delivered.
- In any case this procedure shall not conflict with, or supersede, the electrical lock-out procedure. Only electrical system leaders will be authorized to remove padlocks in electrical cabinets.
- Written authorization has been obtained to send hydrogen through the client's installation (**Figure 4** piping highlighted in turquoise, PV-633 open and PV-632 close). In the absence of such authorization, the hydrogen will be directed through the designated hydrogen vent (**Figure 4** piping highlighted in yellow, PV-633 close and PV-632 open).

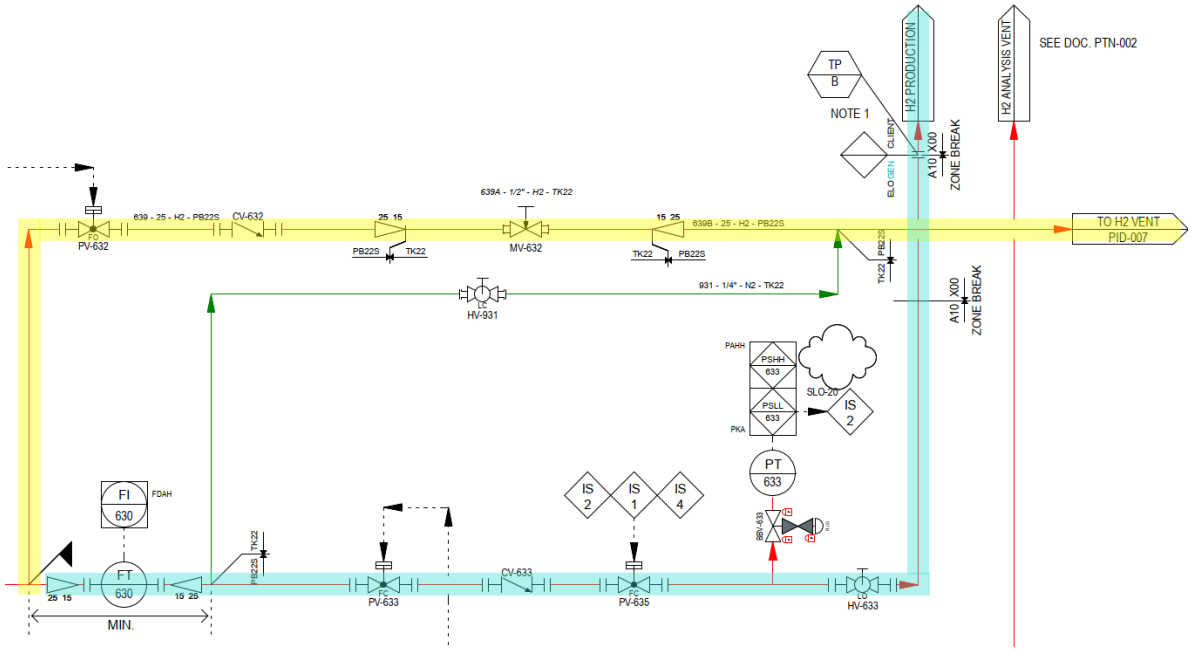


Figure 4. *Hydrogen production routing*

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5.1 Required Equipment

- Toolboxes (e.g. screwdrivers, wrenches, pliers, spanners).
- ATEX Field telephone or Walkie-Talkie.
- Portable Ultrasonic flow meter Endress+Hauser Prosonic Flow 93T (ref. 500075)[2]
- Chronometer.
- Personal hydrogen detectors for each people on site, calibrated up to date.

All equipment used must have a serial number and a valid calibration certificate up to date (if applicable).

Table 3. Test equipment register

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2 Required Documents

- This procedure approved.
- A work permit has been issued and signed.
- Signed report test for the Start-up activities (cf. C063-ELO-PRO-CO-0005).

5.3 Required Manpower (Indicative)

For all the operations it is required the presence of a commissioning engineer and an automation engineer. The presence of the client is optional.

In case of any additional test, maintenance or trouble shooting for one or more components in the unit, it is recommended to count with a mechanical, electrical, piping and instrument technician, as well as the site supervisor.

[2] This reference is provided in case a flowmeter for the freshwater intake is not installed on site.

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6. Risk

6.1 Gas risk

The hydrogen produced in the electrolysis unit is an odorless, colorless and flammable gas, that can be released up to 500 Nm^3/h. The principal risks related to hydrogen are:

- Risk of inflammation or explosion. In the event of inflammation, hydrogen produces a flame invisible to the bare eye.
- Risk of anoxia due to the replacement of oxygen.

The nitrogen used to purge the system during stop and start sequences is an odorless gas, naturally present in the air. The principal risk related to this gas is anoxia due to replacement of oxygen.

6.2 Fire risk

The fire risk is induced by the presence of hydrogen gas in the system, as well as by the presence of electrical equipment. All sources of ignition (electric sparks, hot surfaces, static electricity, mechanical hot spots…), and a presence of hydrogen leak, could lead to a fire risk.

⚠	The external fire case is not covered by the machine safety system and is under the responsibility of the operator.

6.3 Electrical and electrostatic risk

The system is composed of elements operating at voltage higher than the safety voltage (400 Vac for certain auxiliaries) and can therefore cause significant damage to people and property. The design and manufacture of the electrolysis unit is compliant with the CE Low Voltage Directive (2014/35/EU). There are three types of electrical risk:

- Residual polarisation voltage: after a machine's shutdown, and even after electrical lockout, the stacks keep a residual polarisation voltage that can last up to three days.
- Electrostatic: eliminated generally by periodically checking the grounding of the installation and the use of suitable PPE.
- Electrical: controlled by the compliance of the cabling of the installation and the good practice following the recommendations given by the procedures.

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⚠	All elements in the system must be connected to a grounding surface connected to the ground terminal and checked at every intervention.

6.4 Thermal risk

The thermal risk carried is related to burns on contact with hot surfaces. The process globally carries fluids reaching 165 °C[3], which can cause second degree burns. The electric heater presents in the containers (indicated as EH- on the P&ID) can reach even higher surface temperatures.

6.5 Pressure risk

The risk associated with pressure devices is due to the amount of energy released in the event of a device rupturing or bursting due to sudden release of fluid.

6.6 Risk of falling

Maintenance operations on the roof of the electrolyser must be carried out by personnel trained and authorised to work at height. Operators must be attached in such a way as to limit the risk of falling. Operations may be carried out from a platform if necessary.

⚠	Risk of injury. Respect safety measures for working at height when working on the roof of the electrolyser.

[3] particularly on the HPP, the BOP reaches temperatures of 65 °C

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7. Operation description

The validation of the performance tests is concluded through the **Table 7** to **Table 16**, where each step is described in a row and the columns "Completed by", "Witnessed by" and "Date" are used to register the compliance of the activity. Take note of the results obtained, and if it is compliant according to the expected value.

If the test is interrupted by any factor (major or safety fault, or due to an external situation), the test is not longer valid, and it must be re-started.

Despite the independence of the tests, they can be carried out in an optimized circuit, to avoid waiting times and limit the stops of the electrolyser. In **Figure 5** is presented a recommended planning for the activities. The descriptions given in **Table 7** to Table 16 do not consider a continuity between the performance tests, so the operator can perform the test whenever is convenient according to situations presented on site.

The main views of the HMI used during this procedure are presented on **Figure 6**, **Figure 7** and **Figure 8**. The information displayed on the HMI that is referenced in the description of the activities (**Table 7** to **Table 16**) is identified by the numbers 1 to 11.

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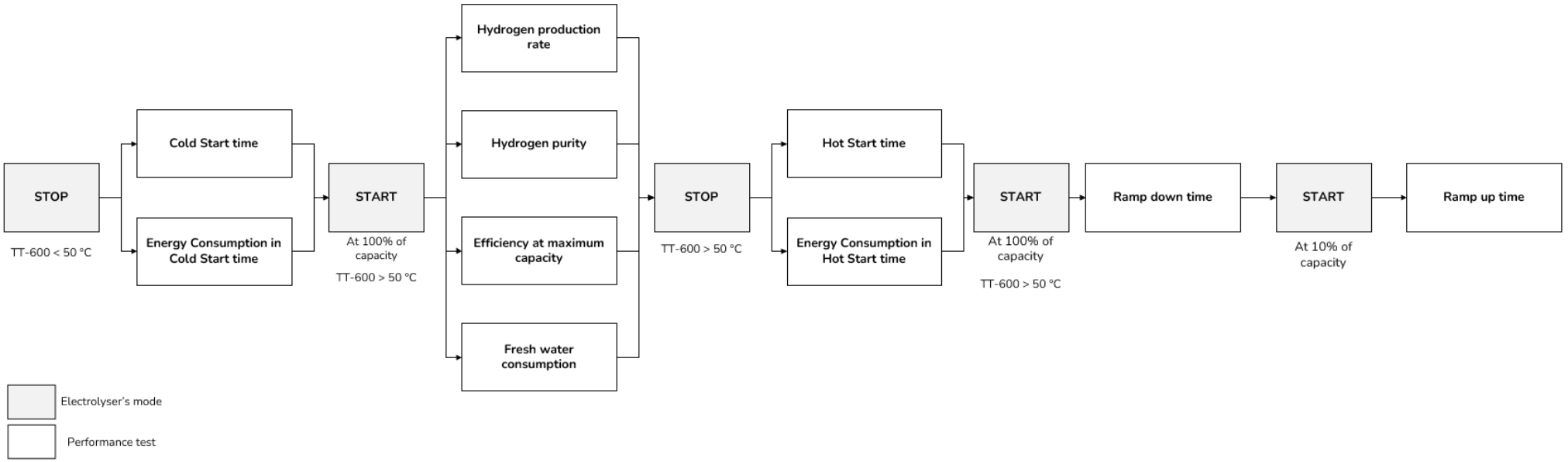


Figure 5. *Planning performance test*

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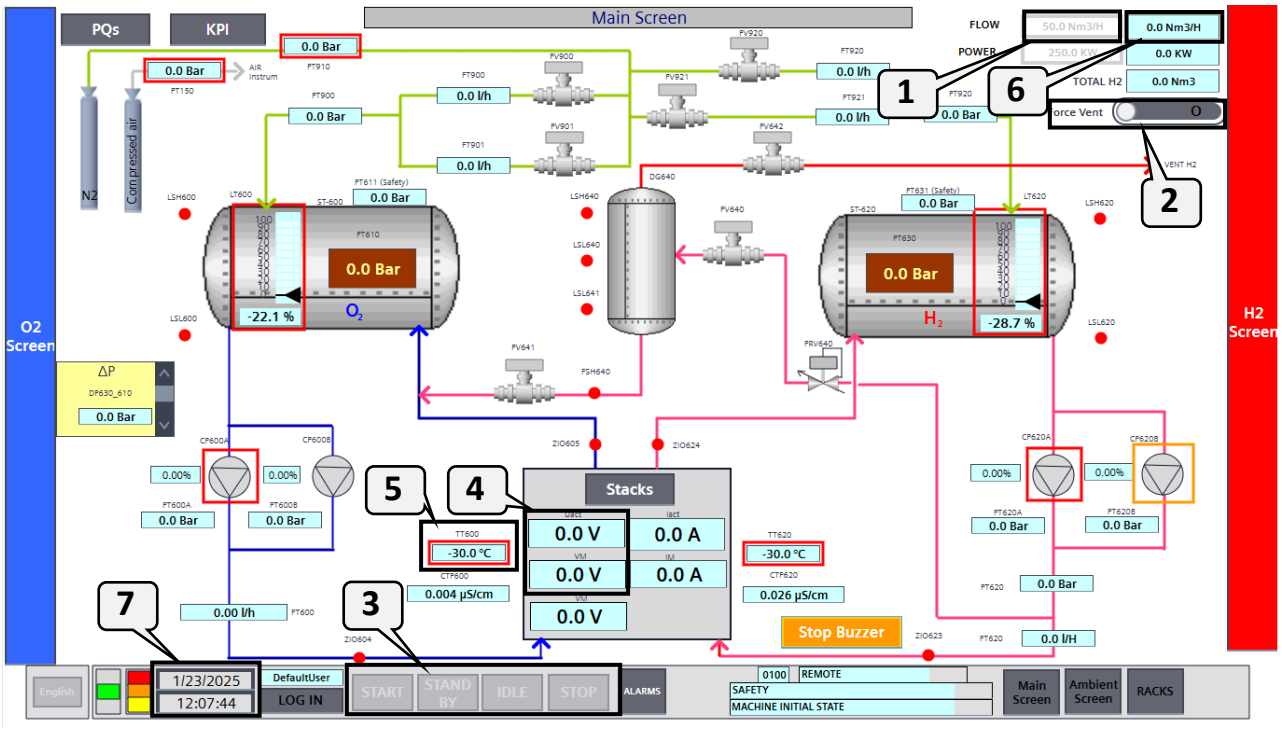


Figure 6. *Main process HMI view*

Table 4*. Reference points on Main process HMI view*

Reference point	Designation
1	Hydrogen flowrate setpoint selected by the user [Nm^3/h].
2	Force vent selector for H_2.
3	Electrolyser's mode panel. Buttons to change the mode of the electrolyser (START, STANDBY, IDLE, STOP).
4	Total voltage (both rectifiers). Value on top corresponds to the voltage measured by the rectifiers. Value on bottom, measured by the stacks.
5	Temperature at the inlet stream of the stacks.
6	Hydrogen production calculated by the PLC [Nm^3/h]
7	Date and hour display

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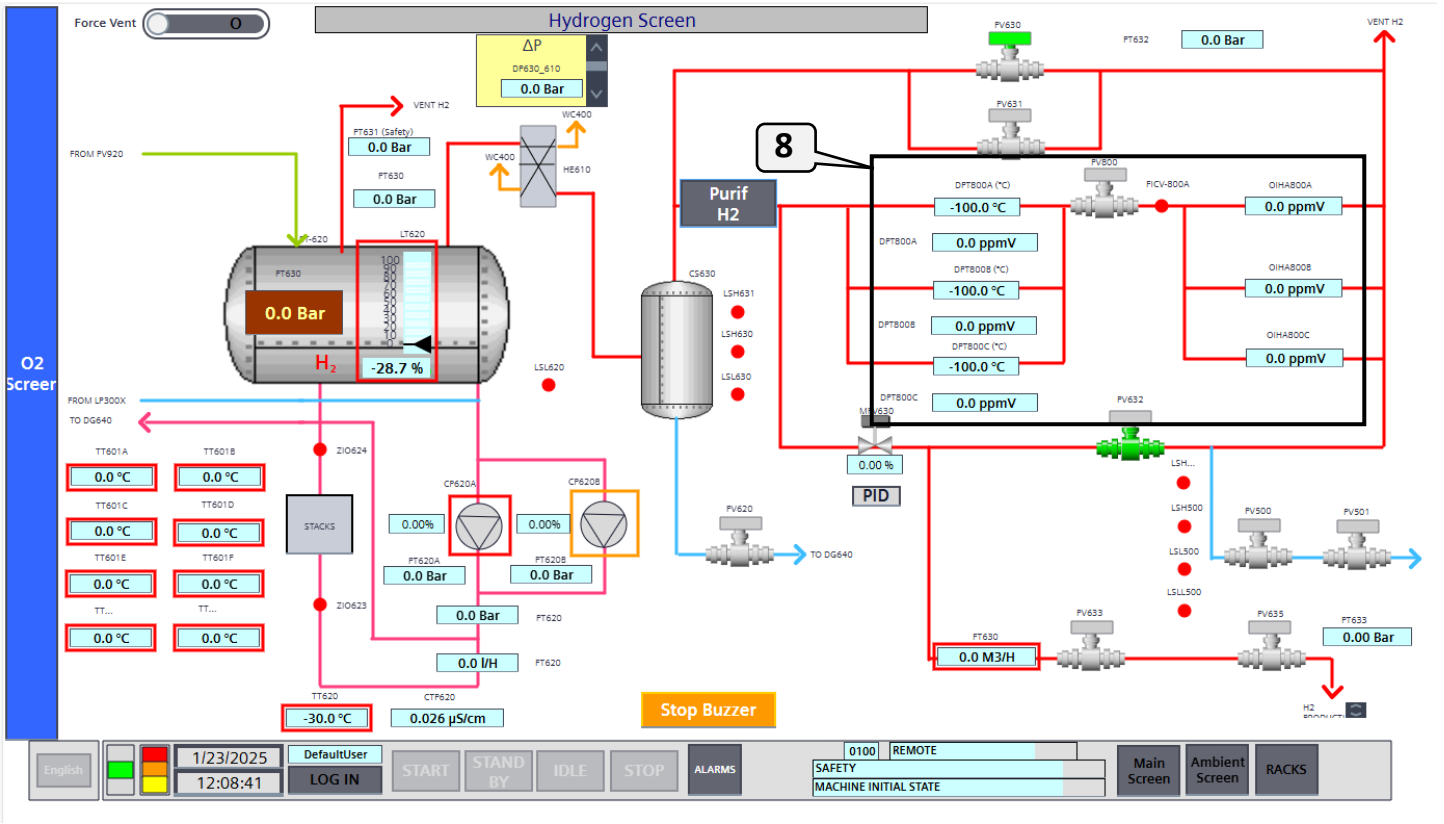


Figure 7. *H2 HMI view*

Table 5. *Reference points on H2 page HMI view*

Reference point	Designation
8	Display of measured oxygen and water content (OIHA-800A/B/C and DPT-800A/B/C).

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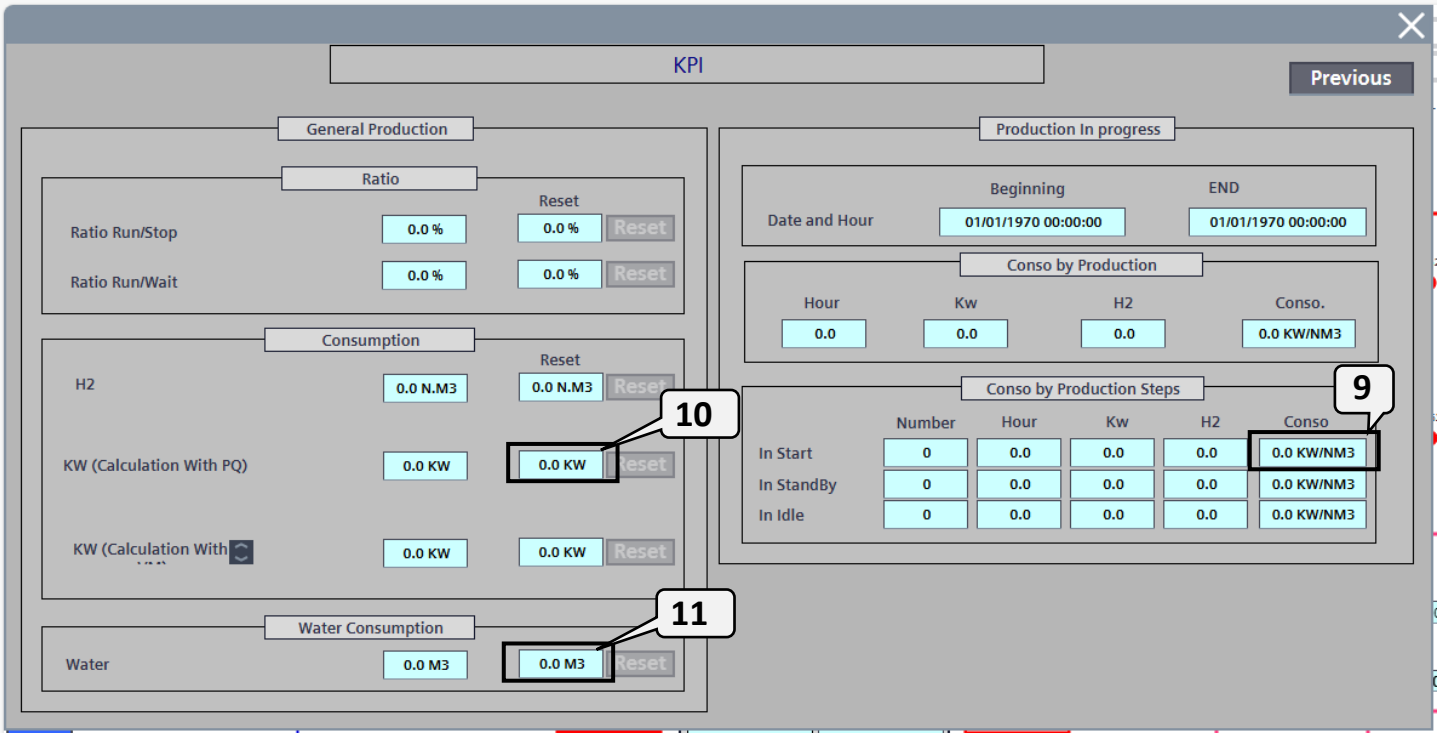


Figure 8. *KPI view on HMI*

Table 6. *Reference points on KPI HMI view*

Reference point	Designation
9	Electrolysis efficiency in start mode
10	Energy consumption by the electrolysis unit
11	Fresh water consumption

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7.1 Hydrogen production rate

Table 7. *Hydrogen production rate*

Time required	Pre-requisites	Validation criteria
2 hours	Electrolyser initial state displayed on HMI: STOP	Hydrogen production rate at maximum capacity is 500 ± 1,25 Nm^3/h

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.			
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [4].			
03	On the HMI, enter 10% of the maximum hydrogen flow rate in Nm^3/h (50 Nm^3/h). (Figure 6 point **1**).			
04	(If applicable) On the hydrogen separator tank view of the HMI, select the button "Force Event" to force the hydrogen production to the vent. (Figure 6 point **2**).			

[4] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
05	Press the "START" button on the HMI navigator. (Figure 6 point **3**).			
06	Check that the stacks are being polarized at a ramp of 5 V per second up to a voltage equal to 1,25 x Number of Cells for each stack (1,25*106 V=**132.5 V**). The polarization phase ends once the rectifier voltage is higher than or equal to the polarisation point (i.e. **530 V** per rectifier and **1060 V** in total[5]). (Figure 6 point **4**). **Note:** in regard of the possible fluctuations of stacks voltage, it is considered that the polarization point is achieved once the voltage per stacks is above **119.25 V** (i.e. **477 V** per rectifier and **954 V** in total)**.**			
07	Let the electrolyser run at 10% of the maximum production setpoint to heat the water inlet to stacks up to 50°C (TT-600). This value measured can be read directly on the HMI. The operation should last about 30 minutes. (Figure 6 point **5**).			
08	Once the temperature measured by the TT-600, reaches 50 °C, enter the maximum production setpoint on the HMI (500 Nm3/h). (Figure 6 point **1**).			
09	The current passing through the stacks should start to ramp up. The production should reach the setpoint within 30 s to 5 min after setting the process at its maximum production (500 Nm^3/h).			

[5] The systems is constituted by eight stacks of 106 cells each. The stacks are grouped by 4 and each group is supplied by one rectifier.

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Step	Description	Completed by	Witnessed by	Date
	Note: During the current ramp up phase, make sure that no cell in the stacks is subjected to a voltage higher than **2,1 V** (**890,4 V** per rectifier) by checking on the HMI (Figure 6 point **4**). The software will display an alarm and stop production if that is the case.			
10	Monitor the hydrogen production flow rate on the HMI measure by the FT-630. Once it has reached its maximum value, let the system run for 30 minutes to reach stability. Throughout during this period, the hydrogen flow must be within the targeted value with a deviation of 0,25 %. (500 ± 1,25 Nm^3/h). (Figure 6 point **6**).			
11	Record the hydrogen production flow rate measures during 1h for each second (sampling rate of 1 Hz).			
12	Calculate the average value between the measures. The obtained value must be inside the range of uncertainty indicated (500 ± 1,25 Nm^3/h).			

Result						
Hydrogen production rate at maximum capacity: _____ Nm^3/h	Compliant (YES/NO)		Completed by		Date	

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7.2 Hydrogen purity

The hydrogen produced by the electrolysis process, after going through the separator and condensation vessels, is polluted by molecules of water and oxygen. The expected purity of 99,999% is reached while the hydrogen goes through the HPP. Hence, at client's stream (flowrate measured by the FT-630), the oxygen and water content are both limited to 5 ppmv. This section describes the method to validate the oxygen and water content in the hydrogen produced at maximum capacity (i.e. 500 Nm^3/h).

Table 8. *Hydrogen purity*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	The electrolyser has run at its maximum capacity recently[6]. Electrolyser initial state displayed on HMI: STOP Temperature of the cold loop TT-60 between 3 and 5 °C. Temperature at the inlet of stacks TT-600 > 50 °C.	Dew point is lower than 5 ± 0,15 ppmv at atmospheric pressure. Oxygen content in the hydrogen is lower than 5 ± 0,1 ppmv.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.			

[6] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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Step	Description	Completed by	Witnessed by	Date
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [7].			
03	On the HMI, enter 100% of the maximum hydrogen flowrate in Nm^3/h (500 Nm^3/h). (Figure 6 point **1**).			
04	Press the "START" button on the HMI navigator. (Figure 6 point **3**).			
05	Verify that the hydrogen production flowrate is at a steady state, that is, the hydrogen production flow is according to the setpoint (500 Nm^3/h) for at least 30 minutes. (Figure 6 point **6**).			
06	If the electrolyzer is operating at a steady state, go to the "H2 page" view on the HMI. Read the values of the DPT-800 and OIHA-800 (**Figure 7** point **8**).			
07	For 1 hour, record the values sent by DPT-800 and OIHA-800 every second (sampling rate of 1 Hz).			
08	Calculate the average value of the measurements of DPT-800A/B/C. The obtained value must be lower than 5 ± 0,15 ppmv.			

[7] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
09	Calculate the average value of the measurements of OIHA-800 A/B/C. The obtained value must be lower than 5 ± 0,1 ppmv.			

Result						
Hydrogen purity at maximum capacity: _____ (average DPT) water ppmv _____ (average OIHA) oxygen ppmv	Compliant (YES/NO)		Completed by		Date	

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7.3 Efficiency at maximum capacity

The efficiency of the electrolysis unit is measured as the energy consumed per Nm^3/h of hydrogen produced. This value is directly calculated by the PLC and displayed on the HMI. This procedure described the steps to validate the performance of the electrolysis related to efficiency at its maximum capacity (i.e. 500 Nm^3/h).

Table 9. *Efficiency at maximum capacity*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	The electrolyser has run at its maximum capacity recently[8]. Electrolyser initial state displayed on HMI: STOP Temperature of the cold loop TT-60 between 3 and 5 °C. Temperature of stacks TT-600 > 50 °C.	The power consumed by the electrolyser divided by the produced hydrogen flow rate is lower than 5 ± 0,06 kWh/Nm^3H_2 at its maximum capacity at the beginning of life of the electrolyser.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the “Expert” mode.			

[8] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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Step	Description	Completed by	Witnessed by	Date
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [9].			
03	On the HMI, enter 100% of the maximum hydrogen flow rate in Nm3/h (500 Nm^3/h). (Figure 6 point **1**).			
04	Press the "START" button on the HMI navigator (Figure 6 point **3**).			
05	Verify that the hydrogen production flow rate is at a steady state, that is, the hydrogen production flow is according to the setpoint (500 Nm^3/h) for at least 30 minutes (Figure 6 point **6**).			
06	If the electrolyzer is operating at a steady state, go to the "KPI" view of the HMI. Read the values of the efficiency on the "Conso by production steps" "In start" field (Figure 8 point **9**).			
07	For 1 hour, record the values of the efficiency every second (sampling rate of 1 Hz).			
08	Calculate the average value of the reported values. The result must be lower than 5 ± 0,06 $kWh/Nm^3\ H_2$.			

Result						
Efficiency at maximum capacity _____ kWh/Nm^3H_2	Compliant (YES/NO)		Completed by		Date	

[9] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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7.4 Hot start time

The term "Hot Start" stands for the process in which the electrolyzer goes from the "STANDBY" mode to the "START" mode[10]. In "STANDBY" mode the electrolyzer is pressurized (if it has been less than 1 hour that it was running in "START" mode), the oxygen and hydrogen loop pumps (CP-600A/B and CP-620A/B) are running and the stacks are polarized (i.e. 1,25 V per cell, 132.5 V per rectifier). Hence, in a "STANDBY" mode the unit is pre-started, which enables a faster initiation of hydrogen production. In this section, the steps are given to evaluate the duration of a Hot Start.

	The pressurized "*Standby*" mode is limited to 1 hour to avoid an H_2/O_2 mixture.

Table 10. *Hot start time*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	The electrolyser has run at its maximum capacity recently[11]. Temperature of the cold loop TT-60 between 3 and 5 °C. Temperature of stacks TT-600 > 50 °C.	Hot start completed within 5 to 15 minutes.

[10] This time is noted in the contract as "Hot Stand-by to full production", indicating as initial state the pressurized STANDBY mode.

[11] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the “Expert” mode.			
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [12].			
03	Set the electrolyzer in “START” mode at 100% of nominal flow (500 Nm^3/h). Let the electrolyzer run at a steady state for at least 15 minutes or until the temperature of the stacks reaches 65 °C (TT-600) (Figure 6 points **1** and **5**).			
04	Press the “STANDBY” button to switch from the maximum hydrogen flow rate to “STANDBY” mode (in this state the machine is pressurized, and the stacks are polarized) (Figure 6 point **3**).			
05	The voltage and current feeding the stacks will drop to the polarization point. Once the "Standby" state is reached (STANDBY button turns green in the HMI screen), let the system run on this state for at least 30 minutes. **During this 30 minutes in STANDBY mode, the Energy consumption in hot stand-by test can be carried out**.			
06	Once the 30 minutes elapsed, enter the maximum hydrogen production setpoint on the HMI (500 Nm3/h).			

[12] For more details about the use of the HMI, check the Start-up procedure (cf. C063-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
07	Press the START button and take note of the time displayed on the HMI (Figure 6 point **7**) (point A). **Time:** _____			
08	The current passing through the stacks should start to ramp up as well as the hydrogen production flow rate (Figure 6 point **6**).			
09	Monitor the produced hydrogen flow rate (FT-630). Once it has reached the maximum setpoint value (500 ± 1,25 Nm^3/h) take note of the time displayed on the HMI (Figure 6 point **7**) (point B). **Time:** _____			
10	The electrolyzer shall remain in START mode for at least 15 minutes. During this time, the produced hydrogen flowrate must remain steady (500 Nm^3/h ±5%). The time interval between point A and point B determines the hot start time.			
11	Verify the hot start was completed within 5 to 15 minutes.			

Result						
Hot start time: _____ min	Compliant (YES/NO)		Completed by		Date	

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7.5 Energy consumption in hot stand-by

The energy consumption is given by the Power Monitoring Device Control panel present on the unit (**Figure 9**). This value could also be read on the HMI "KPI" view "consommation" area (Figure 8).

This section describes the method to set the unit in Hot Standby (or pressurized STANDBY) and to establish the energy consumed during this state. In Hot Standby the unit is kept pressurized, the pumps (CP-600A/B and CP-620A/B) are running and the stacks are polarized. No hydrogen is being produced.

The aim is to evaluate the energy cost for letting the unit pre-started, as defined in the previous section.



Figure 9. *Reported energy consumption on the Power Monitoring Device onsite.*

⚠	The pressurized "*Standby*" mode is limited to 1 hour to avoid an H_2/O_2 mixture.

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Table 11. *Energy consumption in hot stand-by*

Time required	Pre-requisites	Validation criteria
1 hour	The electrolyser has run at its maximum capacity recently[13]. Temperature of the cold loop TT-60 between 3 and 5 °C. Temperature of stacks TT-600 > 50 °C.Hot start time test in progress.	Energy consumption must be 90 ± 1 KWh.

Step	Description	Completed by	Witnessed by	Date
01	Once the "Standby" state is reached (STANDBY button turns green on the HMI screen), go to the “KPI” view “consommation” area, and read the values displayed for the energy consumption (Figure 8 point **10**). This value must correspond to the value displayed by the Power Monitoring Device Control panel (Figure 9). **Note:** Make sure that the initial value of energy consumed is set at zero, to take into consideration just the energy consumed during this test.			
02	For 30 minutes, record the values of the total energy consumed every second (sampling rate of 1 Hz) (Figure 8 point **10**).			
03	Calculate the average energy of the reported values. The result must be 90 ± 1 KWh.			

Result						
Energy consumption in hot stand-by: _____ kWh	Compliant (YES/NO)		Completed by		Date	

[13] Less than 1 hour, this to guarantee that the systems is pressurized, and the temperature of the stacks is already above 50 °C so the current will ramp up to maximum capacity.

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7.6 Cold start time

The term "Cold Start" stands for the process in which the electrolyzer goes from the "IDLE" mode to the "START" mode[14]. In "IDLE" mode the electrolyzer is depressurized, the oxygen and hydrogen loop pumps (CP-600A/B and CP-620A/B) are stopped and the stacks are polarized (i.e. 1,25 V per cell, 132.5 V per rectifier). Hence, in a "IDLE" mode the unit is pre-started, which enables a faster initiation of the hydrogen production, but in theory longer than the Hot start since the system is depressurized. In this section, the steps are given to evaluate the duration of a Cold Start.

Additionally, since the unit is not pressurized, the duration of this mode is not restricted to 1 hour, compared to the pressurized Standby.

Table 12. *Cold start time*

Time required	Pre-requisites	Validation criteria
1 hour and 30 minutes	Performance test of Hydrogen completed. The temperature of the stacks TT-600 is below 50 °C[15]. Electrolyser initial state displayed on HMI: STOP	Cold start time below 30 minutes.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the "Expert" mode.			

[14] This time is noted in the contract as "Cold Stand-by to full production" indicating as initial state the IDLE mode.

[15] The estimate duration of this transition consider that the temperature of oxygen and hydrogen loop are around 15 °C, and that the cold loop is at 10 °C initially.

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Step	Description	Completed by	Witnessed by	Date
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [16].			
03	Press the "IDLE" button to switch from "Stop" to "Idle" mode (In this state, the system is depressurized, the stacks are polarized, and no hydrogen is produced) (**Figure 6** point 3). Check that the stacks are being polarized at a ramp of 5 V per second up to a voltage equal to 1,25 x Number of Cells for each stack (1,25*106 V=**132.5 V**). The polarization phase ends once the rectifier voltage is higher than or equal to the polarisation point (i.e. **530 V** per rectifier and **1060 V** in total[17]). (Figure 6 point **4**). **Note:** in regard of the possible fluctuations of stacks voltage, it is considered that the polarization point is achieved once the voltage per stacks is above **119.25 V** (i.e. **477 V** per rectifier and **954 V** in total)**.**			
04	The voltage and current sent to the stacks will be set at the polarization point. Once the "Idle" state is reached (button IDLE turns green in the HMI screen), let the system run on this state for at least 30 minutes. **During this 30 minutes in IDLE mode, theEnergy consumption in cold stand-by test can be carried out.**			

[16] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

[17] The systems is constituted by eight stacks of 106 cells each. The stacks are grouped by 4 and each group is supplied by one rectifier.

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Step	Description	Completed by	Witnessed by	Date
05	Once the 30 minutes elapsed, enter the maximum hydrogen setpoint on the HMI (500 Nm^3/h).			
07	Press the START button and take note of the time displayed on the HMI (**Figure 6** point **7**) (point A). **Time: _____**			
08	The current passing through the stacks should start to ramp up and the hydrogen production flowrate should start to increase.			
09	Monitor the produced hydrogen flowrate. Once it has reached its maximum capacity (500 Nm^3/h) take note of the time displayed on the HMI (**Figure 6** point **7**) (point B). **Time: _____**			
10	The electrolyzer shall remain in operation for at least 15 minutes. During this time, the produced hydrogen flow rate must remain steady (500 Nm^3/h). The time interval between point A and point B determines the cold start time.			
11	Verify the cold start takes less than 30 minutes.			

Result						
Cold start time: _____ min	Compliant (YES/NO)		Completed by		Date	

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7.7 Energy consumption in cold stand-by

The energy consumption is given by the Power Monitoring Device Control panel present on the unit (Figure 9). This value could also be read on the HMI "KPI" view "consommation" area (Figure 8). This section describes the method to set the unit in Cold Standby (also known as IDLE mode) and read the energy consumed during this. In IDLE mode the unit is depressurized, the pumps (CP-600A/B and CP-620A/B) are stopped and the stacks are polarized. No hydrogen is being produced.

The aim is to evaluate the energy cost of letting the unit polarized, as defined in the previous section.

Table 13. *Energy consumption in cold stand-by*

Time required	Pre-requisites	Validation criteria
1 hour	Performance test of Hydrogen completed. The temperature of the stacks TT-600 is below 50 °C[18]. Cold start time test in progress.	Energy consumption must be around 34 ± 1 kWh.

[18] The estimate duration of this transition consider that the temperature of oxygen and hydrogen loop is around 15 °C, and that the cold loop is at 10 °C initially.

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Step	Description	Completed by	Witnessed by	Date
01	Once the "Idle" state is reached (confirmed by the IDLE button turning into green on the HMI screen), go to the "KPI" view "consommation" area, and read the values displayed for the energy consumption (Figure 8 point **10**). This value must correspond to the value displayed by the Power Monitoring Device Control panel (Figure 9). The transition from the maximum hydrogen flow rate to "Idle" takes under 10 minutes. **Note:** Make sure that the initial value of energy consumed is set at zero, to take into consideration just the energy consumed during this test.			
02	For 30 minutes, record the values of the total energy consumed every second (sampling rate of 1 Hz) (Figure 8 point **10**).			
03	Calculate the average energy of the reported values. The result must be approximately 34 ± 1 KWh.			

Result						
Energy consumption in cold stand-by: _____ kWh	Compliant (YES/NO)		Completed by		Date	

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7.8 Ramp down time

The ramp down time is described as the duration of the transition from START mode at 100% of the nominal flow, to 10% of the nominal flow. In other terms, is the time that takes to decrease the current sent to the electrolysis stacks and consequently, the hydrogen produced by them. In this sections are given the steps to execute this transition and to evaluate its duration.

Table 14. *Ramp down time*

Time required	Pre-requisites	Validation criteria
1 hour	The electrolyser is initially running at its maximum capacity (500 ± 1,25 Nm^3/h)	Ramp down time below 30 seconds.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the “Expert” mode.			
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [19].			

[19] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
03	Verify that the hydrogen production flow rate is at 500 ± 1,25 Nm^3/h for at least 30 minutes**.** Hydrogen production flow rate can be read directly on the HMI, in the "Hydrogen Process" view.			
04	Once the 30 minutes elapsed, enter the minimal production setpoint on the HMI (10% of the maximum hydrogen flow rate, 50 Nm^3/h) and take note of the time displayed on the HMI (**Figure 6** point **7**) (point A). **Time: _____**			
05	The current passing through the stacks should start to ramp down as well as the hydrogen production flow rate.			
06	Monitor the flow of hydrogen produced. Once it has reached the minimal production (50 ± 0,12 Nm^3/h) take note of the time displayed on the HMI (**Figure 6** point **7**) (point B). **Time: _____**			
07	The electrolyzer shall remain in operation for at least 15 minutes. During this time, the produced hydrogen flow rate must remain steady at a minimum setpoint (50 Nm^3/h). The time elapsed between point A and point B determines the ramp down duration.			
08	Verify that the ramp down takes less than 30 seconds.			

Result						
Ramp down time: _____ seconds	**Compliant (YES/NO)**		**Completed by**		**Date**	

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7.9 Ramp up time

The ramp up time is described as the duration of the transition from START mode at 10% of the nominal flow, to 100% of the nominal flow. In other terms, is the time that takes to increase the current sent to the electrolysis stacks and consequently, the hydrogen produced by them. In this sections are given the steps to execute this transition and to evaluate its duration.

Table 15. *Ramp up time*

Time required	Pre-requisites	Validation criteria
1 hour	The electrolyser is initially running at its minimum capacity (50 ± 0,12 Nm^3/h).	Ramp up time below 30 seconds.

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the “Expert” mode.			
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms [20].			
03	Verify that the hydrogen production flow rate is at 50 Nm^3/h for at least 30 minutes**.** Hydrogen production flow rate can be read directly on the HMI, in the “Hydrogen Process” view.			

[20] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
04	Once the 30 minutes have elapsed, enter the maximum production setpoint on the HMI (100% of the maximum hydrogen flow rate, 500 ± 1,25 Nm^3/h) and take note of the time displayed on the HMI (**Figure 6** point **7**) (point A). **Time: _____**			
05	The current passing through the stacks should start to ramp up as well as the hydrogen production flow.			
06	Monitor the produced hydrogen flow rate. Once it has reached the maximum production (500 Nm^3/h) take note of the time displayed on the HMI (**Figure 6** point **7**) (point B). **Time: _____**			
07	The electrolyzer shall remain in operation for at least 15 minutes. During this time, the produced hydrogen flow rate must remain steady at 500 Nm^3/h. The time elapsed between point A and point B determines the duration of ramp up.			
08	Verify that the ramp up takes less than 30 seconds.			

Result						
Ramp up time: _____ seconds	Compliant (YES/NO)		Completed by		Date	

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7.10Fresh water consumption

This section aims to describe the method to evaluate freshwater consumption (at WTP inlet) when the electrolysis unit is set at its maximum capacity (500 Nm^3/h).

Table 16. *Fresh water consumption*

Time required	Pre-requisites	Validation criteria
2 hours	The electrolyser is initially running at its maximum capacity (500 ± 1,25 Nm^3/h). If there is no flowmeter installed at the upstream of the WTP, install a portable flowmeter (see Required Equipment) at the proximities of the CV-300 (cf. C63-PID-001).	Fresh water consumption at maximum hydrogen production is 930 ± 5 L/h

Step	Description	Completed by	Witnessed by	Date
01	Login to the HMI in the “Expert” mode.			
02	Check that there are no alarms or faults indicated on the HMI. (If there are, solve them first). Reset the alarms[21].			

[21] For more details about the use of the HMI, check the Start-up procedure (cf. C63-ELO-PRO-SU-0500)

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Step	Description	Completed by	Witnessed by	Date
03	Verify that the hydrogen production is at steady state at 500 Nm^3/h for at least 30 minutes. Hydrogen production flowrate can be read directly on the HMI (**Figure 6** point **6**).			
04	If the electrolyzer is operating at a steady state as explained previously, read on the flowmeter installed onsite (**Figure 8** point **11**), or on the portative one, the freshwater consumed volume or the flowrate measured.			
05	For 1 hour, record the values of the flow (or the volume consumed) every second (sampling rate of 1 Hz), while the electrolyzer is in "Start" mode at its maximum capacity.			
06	Calculate the average of the reported values. The result must be around 930 ± 19 L/h.			

Result						
Freshwater consumption at 500 Nm^3/h H_2: _____ seconds	Compliant (YES/NO)		Completed by		Date	

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8. Conclusion

Table 17. *Performance test overall report*

Criterion	Expected value	Reported value	Performed by	Approved by	Comments
Hydrogen production rate	500 ± 1,25 Nm^3/h				
Hydrogen purity	H_2O 5 ± 0,15 ppmv O_2 5 ± 0,1 ppmv				
Efficiency at maximum capacity	< 5 ± 0,06 kWh/Nm^3H_2				
Hot start time	< 5 min - 15 min				
Energy consumption in hot stand-by	90 ± 1 KWh.				
Cold start time	< 30 min				
Energy consumption in cold stand-by	34 ± 1 kWh				
Ramp-up time	< 30 s				
Ramp-down time	< 30 s				
Fresh water consumption	930 ± 5 L/h				

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ELECTROLYSER
BLPH
FAT UCP

Rev. N°	Date	Description	By	Check.	Appr.
02	20/12/2024	Update simulation tests	VTI	HRO	DWA
01	13/11/2024	First emission	MLA	HRO	DWA

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2. Introduction

This main subject of this FAT is to prove the good conception of the program and the good pre-cabling of the cabinets. It will be performed by ELOGEN team and witnessed by the final customer.

3. Prerequisites

- Control cabinets are exempt of punch list
- 24Vdc of the PLC are working
- Free access to work zones
- Communication cable between various PLC installed and connected

4. Required documents

- Detailed electrical drawings:
    - Control cabinet
    - First PLC
    - Second PLC
    - HVAC PLC
    - Rectifier PLC
    - WTP PLC
- Works Permits

5. Required Tools

- Electrician/instrumentist hand tools: Multimeters / 4-20mA generator or Hart Communicators
- Laptop with dedicated software for program and HMI

6. Input and Output test

Perform input testing by using terminals blocks.

- For the digital inputs, use a wire or turn the element if it's possible.
- For analog inputs, use a 4-20 mA injector
- For digital outputs, overwrite the variable on TIA PORTAL and check the good execution on terminal bloke with a multimeter in position "Ohmeter".
- For analog outputs, overwrite the variable on TIA PORTAL and check the good execution on terminal bloke with a 4-20 mA reader

Fill in the Annex 1: *C63 PLC IOTests Checlist.xlsx*

Expected test duration : 2 days (internal tests Elogen) – Test with client : random check of some Inputs/Output to be witnessed tested with Elogen

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7. Alarms test

Perform a test for each alarm of the UCP:

- Simulate a variation in the relevant variable furthest from the fault generation bloc to trigger the alarm at the expected value. If possible, simulate this triggering by using a 4-20mA injector
- Fill in the table 1 below

Precise the serial number and the calibration due to date of the 4-20 mA injector if using:

Expected test duration: 3 days (internal tests Elogen) – Witness test with client : random check of 3 major faults and 3 minor faults from a list)

_____

Table 1. Check list for alarms

Alarm	Number	OW Variable?	Injecting 4-20 mA?	Record completed by	Witnessed by	Validated on

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8. UCP Packages connections

Via TIA PORTAL, check the communication of UCP of each package:

Expected test duration : ½ day

Table 2. check list for UCP

UCP	OK/NOK	Serial number	Record completed by	Witnessed by	Validated on
WTP					
Rectifier					
HVAC					

9. Software simulations

9.1. Simulations conditions

The tool is mainly dedicated for automation engineers to simulate, check and valid the coding of the PLC performed and to do an advanced troubleshooting of the regulation and sequences which can be tested in this context. If some concrete results can be observed, some observations could be more “abstract” and require some interpretations. This point must be kept in mind while observing simulations.

Simulation tool set up at Elogen is still under development and allows “simple” tests (“testing at elementary brick level” and not the whole electrolyser on its own). Simulations tools used by Elogen is normally dedicated for internal use only and usually not shown to customer. However, considering the importance of showing proof of good functioning of the PLC coding, the simulations scenarios listed below can be presented to Elogen client.

All of this being considered, the presentation will last around 1 hour. The results will be used to prove the correct operation of the control functions/sequences listed from the Functional Analysis.

9.2. Simulations scenarios

1. **STARTING SEQUENCE (Stop -> Start)**

INITIAL CONDITIONS : Electrolyser stopped

ACTION : push on START

OBSERVATIONS & VALIDATION CRITERIA :

Start-up of pumps (pumps turn green),

Voltage rises to polarization voltage (displayed in Uact and VM boxes),

Switch to production mode (amperage increase in Iact box),

Pressure rise (PT610 and PT630)

2. **STOPPING SEQUENCE (Start -> Stop)**

INITIAL CONDITIONS: Electrolyser in production

ACTION: push on STOP or activation/simulation of a fault

OBSERVATIONS & VALIDATION CRITERIA:

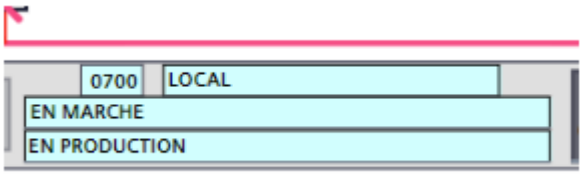
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Rectifier shutdown (displayed in Uact and VM boxes),

ST depressurization (lowering of PT610 and PT630 pressure, opening of MPV611 and SV631),

Pump shutdown, Inerting (opening of sv900 and sv920).

The different stages (=status) of the electrolyser are displayed and indicate the status



3. SIMULATION PROCESS BLOCK

- **Ambiant Temperature control**

  INITIAL CONDITIONS & ACTION: Simulation of high/low ambient temperature

  OBSERVATIONS & VALIDATION CRITERIA: Set HVAC start bit

- **02 Separator Under pressure**

  INITIAL CONDITIONS & ACTION: Simulation of low pressure in the ST600

  OBSERVATIONS & VALIDATION CRITERIA: SV900 opening - ST600 pressure build-up

- **H2 Separator Under pressure**

  INITIAL CONDITIONS & ACTION: Simulation of a pressure drop in the ST620

  OBSERVATIONS & VALIDATION CRITERIA: SV920 opening - ST620 pressure build-up

- **Outside Water Pipe Antifreeze**

  INITIAL CONDITIONS & ACTION: (to be detailed)

  OBSERVATIONS & VALIDATION CRITERIA: (to be detailed)

- **Water level control of H2 event condensates**

  INITIAL CONDITIONS & ACTION: LSH500 and LSL500 status change (level simulation)

  OBSERVATIONS & VALIDATION CRITERIA: Opening the SV500

- **ST600 Water level control direct injection**

  INITIAL CONDITIONS & ACTION: Simulation of ST600 level dropping below LR level

  OBSERVATIONS & VALIDATION CRITERIA: Starting up the LP300

- **ST620 Water level control direct balancing**

  INITIAL CONDITIONS & ACTION: ST620 level raised above HR level

  OBSERVATIONS & VALIDATION CRITERIA: Opening the SV641

- **CS610 Water level control**

  INITIAL CONDITIONS & ACTION: LSH610 and LSL610 status change

  OBSERVATIONS & VALIDATION CRITERIA: Opening the SV600

- **CS630 Water level control**

  INITIAL CONDITIONS & ACTION: LSH630 and LSL630 status change

  OBSERVATIONS & VALIDATION CRITERIA: Opening the SV620

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- **Stack fan ctrl**

  INITIAL CONDITIONS & ACTION: Electrolyser in production

  OBSERVATIONS & VALIDATION CRITERIA: Activation of stack fans

- **3°C Loop Temp ctrl**

  INITIAL CONDITIONS & ACTION: (to be detailed)

  OBSERVATIONS & VALIDATION CRITERIA: (to be detailed)

- **Oxygen Pump Setpoint control**

  INITIAL CONDITIONS & ACTION: Electrolyser in production

  OBSERVATIONS & VALIDATION CRITERIA: Pump activation

- **DG640 Hydrogen Purge FB117**

  INITIAL CONDITIONS & ACTION: LSH640 and LSL640 status change

  OBSERVATIONS & VALIDATION CRITERIA: Opening SV642

- **MAJOR FAULT**

  (3 taken at random from a list)

- **MINOR FAULT**

  (3 taken at random from a list)

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10. Software modification

All software modification performed during the FAT have to be written below:

- Modification 1:

Short explanation of the modification

11. Software back up

Save the version of the software and write below the folder:

_____

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12.FAT Conclusion

At the end of the FAT, edit the punch list if some subjects are remaining:

Table 3. Attendees' signatures

Name	Enterprise	Function	Date	FAT result (OK/NOK)	Comments

Write below over comments:

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C63-PLO-003

Spare parts list 2 years operation (Phase 2)

With indicative price list

C63- CrossWind Project

001	*1st Issuance (Ph1)*	*03/02/2025*	*ABO*	*VFE*	*IDI*
REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
Elogen Project Document Number			C63-PLO-003		
Elogen Project Document Name			Spare parts list 2 years operation		
Elogen Document File Name			C63-PLO-003		

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
Loop 200 & 400 Paumier package											
Frigo chiller P.0608871.L.02.103	Frigo chiller P.0608871.L.02.103 repère 1	Oil level switch	2	34796201	1	1	6	299,2	299,2		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Oil temperature sensor	2	34703203	1	1	6	110,5	110,5		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Pressure sensor HP	3	34731919	1	1	6	86,7	86,7		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Pressure sensor LP	3	34731920	1	1	6	86,7	86,7		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Oil heater	3	34321309 (400V)	1	1	6	105,4	105,4		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 4	Pressure switch HP/LP	3	KP17	1	1	5	129,2	129,2		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 7	Vibration eliminators HP	2	EVCYAC 13 MMS	1	1	4	132,6	132,6		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 8	Temperature transmitter LP	2	ALTM2-I	1	1	5	142,8	142,8		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 15	Liquid indicator	2	VCYLS 21	1	1	4	63,75	63,75		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 17	Temperature Transmitter	1	QAZ21-682/101	1	1	5	98,6	98,6		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 17	Pressure transmitter	1	CPS-1/9-4/20	1	1	5	183,6	183,6		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 17	Regulator	1	RWR462-10	1	1	5	623,9	623,9		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 20	Pressure transmitter	1	060G2049	1	1	6	261,8	261,8		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 21	Low pressure bottle	2	LCY 3621	1	1	4	1292	1292		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 22	Vibration eliminators LP	2	EVCYAC 21 MMS	1	1	4	204	204		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 24	Pressure transmitter	1	060G2049	1	1	6	261,8	261,8		Estimative Price Ex Works
Chilled water circuit P.0608871.L.02.104	Chilled water circuit P.0608871.L.02.104 repère 1	Safety valve	2	32220	1	1	4	25,5	25,5		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 5	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 10	Pressure gauges	3	8191006	1	1	4	52,7	52,7		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 12	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 15	Pressure transmitter	2	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 22	Pressure transmitter	2	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 25	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 33	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 34	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 42	Antifreeze thermostat	1	KP71-060L 111366	1	1	6	79,9	79,9		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 43	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 44	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 60	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 101	Safety valve	2	32220	1	1	4	25,5	25,5		Estimative Price Ex Works
Condensation circuit P.0608871.L.02.104	Condensation circuit P.0608871.L.02.104 repère 105	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 112	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 115	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 122	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 126	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 141	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 149	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 154	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 176/177	Fan	1	M1106706	1	1	8	3874	3874		Estimative Price Ex Works
		Electric box	2	M3206157	1	1	8	5938	5938		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 206	Flowswitch	1	SA5000	1	1	3	319,60 €	319,60 €		Estimative Price Ex Works
FCU Type H8 P.0608871.L.02.201	FCU 201/202/203/204 repère 8	Fan	1		8	2	6	153,00 €	306,00 €		Estimative Price Ex Works
		Cooling battery	2		4	1	10	552,50 €	552,50 €		Estimative Price Ex Works
		Electrical heating	2		9	1	10	91,80 €	91,80 €		Estimative Price Ex Works
Aéraulic circuit P.0608871.L.02.003-1	AHU 100	Fan	1	D09/FU	1	1	8	2 762,50 €	2 762,50 €		Estimative Price Ex Works
		Cooling battery	2	Cu-Cu-FeZn P3012AR-9R-26T-800A-2,5Pa 15C 1 1/2	1	1	10	1 987,70 €	1 987,70 €		Estimative Price Ex Works
		Thermostat	2	KP77	1	1	6	79,90 €	79,90 €		Estimative Price Ex Works
		Electrical heating	2	1TAK9A359016	1	1	10	102,00 €	102,00 €		Estimative Price Ex Works
	TT 101	Temperature sensor A10 - Hydrogen Process Container - ATEX	2	SCH-TFR-2G	1	1	5	294,10 €	294,10 €		Estimative Price Ex Works
	TT 103	Temperature sensor E01 - AHU Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	TT 201	Temperature sensor B01 - Rectifier Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	TT 203	Temperature sensor A01 - Stack Room	2	AFTF-I	1	1	5	266,90 €	266,90 €		Estimative Price Ex Works
	TT 205	Temperature sensor A03+A02 - H2 Process Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	TT 206	Temperature sensor C01 - Water Treatment package	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 101	Humidity sensor A10 - Hydrogen Process Container - ATEX	2	SCH-FFR-2G	1	1	5	1 303,90 €	1 303,90 €		Estimative Price Ex Works
	HY 103	Humidity sensor E01 - AHU Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 201	Humidity sensor B01 - Rectifier Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 203	Humidity sensor A01 - Stack Room	2	AFTF-I	1	1	5	266,90 €	266,90 €		Estimative Price Ex Works
	HY 205	Humidity sensor A03+A02 - H2 Process Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 206	Humidity sensor C01 - Water Treatment package	2	AFTF-I	1	1	5				Estimative Price Ex Works
	PT 101	Pressure transmitter A10 - Hydrogen Process Container - ATEX	2	SCH-Ex-Cos-P-250	1	1	5	1 917,50 €	1 917,50 €		Estimative Price Ex Works
	PT 103	Pressure transmitter E01 - AHU Room	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	PT 201	Pressure transmitter B01 - Rectifier Room	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	PT 203	Pressure transmitter A01 - Stack Room	2	PREMASGARD 1121-I	1	1	5	193,80 €	193,80 €		Estimative Price Ex Works
	PT 205	Pressure transmitter A03+A02 - H2 Process Room	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	PT 206	Pressure transmitter C01 - Water Treatment package	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	CT 102	Regulation damper A10 - Hydrogen Process Container - ATEX	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 104	Regulation damper E01 - AHU Room	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 202	Regulation damper B01 - Rectifier Room	2	GLS150	1	1	12	547,40 €	547,40 €		Estimative Price Ex Works
	CT 204	Regulation damper A01 - Stack Room	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 208	Regulation damper A03+A02 - H2 Process Room	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 207	Draught damper C01 - Water Treatment package	2	GLS150	1	1	12				Estimative Price Ex Works
Wall Heater	Wall heater E01 - HVAC Room		2		1	1	3				Estimative Price Ex Works
	Wall heater B01 - Rectifier Room + control cabinet		2		1	1	3				Estimative Price Ex Works
	Wall heater A01 - FCU Stack Room		2		1	1	3	110,50 €	110,50 €		Estimative Price Ex Works
	Wall heater A03+A02 - O2/H2 Process		2		1	1	3				Estimative Price Ex Works
	Wall heater C01 - Water Treat. Pack		2		1	1	3				Estimative Price Ex Works
Drive		Fan assembly	3	130B1017	1	1	10	127,50 €	127,50 €	35 (450x270x230)	Estimative Price Ex Works
		Internal fan	3	134B7134	1	1	10	64,60 €	64,60 €		Estimative Price Ex Works
		External fan	3	134B7132	1	1	10	141,10 €	141,10 €		Estimative Price Ex Works
		Fan assembly	3	130B1017	1	1	10	127,50 €	127,50 €	35 (450x270x230)	Estimative Price Ex Works
		VLT Control panel	3	130B1107	1	1	10	222,70 €	222,70 €		Estimative Price Ex Works
Chiller electrical wiring PAU001 + PAU002 P.0608871.L.02.302		PRIMARY CUTTING POWER SUPPLY, INPUT: THREE-PHASE, OUTPUT: 24VDC 5A	2	2903153	2	1	6	165,85 €	165,85 €		Estimative Price Ex Works
		PRE-EQUIPPED RELAY MODULE WITH PUSH-IN CONNECTION, 2 NC, 24VDC	2	2903334	14	1	6	12,33 €	12,33 €		Estimative Price Ex Works
		PUSH-IN RELAY MODULE, SEMI-CONDUCTOR RELAY INPUT VOLTAGE: 24VDC	2	2905295	8	1	6	29,31 €	29,31 €		Estimative Price Ex Works
		LED LAMP T5 ECO WITH SWITCH, 120/230 VAC, 5W	2	NSYLAMT5LD1	2	1	6	89,88 €	89,88 €		Estimative Price Ex Works
		ROTARY SWITCH WITH BLACK HANDLE, ROUND, 2 FIXED POSITIONS, 1NO, D22	2	XB5AD21	2	1	6	11,46 €	11,46 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, GREEN, D22	2	XB5AVB3	2	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, RED, D22	2	XB5AVB4	2	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		HARMONY XB5, 3-PHASE PRESENCE INDICATOR, RED/GREEN/YELLOW LED, 400VAC	2	XB5EV57K4	2	1	6	91,02 €	91,02 €		Estimative Price Ex Works
		PUSHBUTTON HEAD Ø 40mm - PUSH-TURN - Ø22 - RED	2	XB5AS8445	2	1	6	21,59 €	21,59 €		Estimative Price Ex Works
		AC-3 CONTACTOR 3kW/400V, 3P 1NO, CONTROL: 24VDC	2	3RT2015-1BB41	2	1	6	27,91 €	27,91 €		Estimative Price Ex Works
		CONTACTOR, 3P, 30kW/400V, 1NO+1NC, 230VAC 50/60 Hz, S2	2	3RT2037-1AL20	4	1	6	178,84 €	178,84 €		Estimative Price Ex Works
		AUXILIARY CONTACT FOR LATER INSTALLATION, 2NO FOR LS CIRCUIT BREAKER P=7	2	5ST3011	6	1	6	22,27 €	22,27 €		Estimative Price Ex Works
		INSTA CONTACTOR 400-230VAC, 20A, 2NO - 24VAC/DC	2	5TT5000-2	2	1	6	54,62 €	54,62 €		Estimative Price Ex Works
		SIMATIC HMI, KTP900 BASIC, BASIC PANEL, TOUCH/KEYPAD, 9" TFT SCREEN, 655	2	6AV2123-2JB03-0AX0	2	1	6	1 580,64 €	1 580,64 €		Estimative Price Ex Works
		SIMATIC S7-1200, CPU 1214C COMPACT DEVICE, 24VDC, 14DI/10DO, 2AI 0-1	2	6ES7214-1AG40-0XB0	2	1	6	516,49 €	516,49 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1223, I/O MODULE 8DI/8DO	2	6ES7223-1BH32-0XB0	2	1	6	236,98 €	236,98 €		Estimative Price Ex Works

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
		SIMATIC S7-1200, SM 1231, ANALOG INPUT MODULE 4AI x 13bit, 0-20mA	2	6ES7231-4HD32-0XB0	2	1	6	306,26 €	306,26 €		Estimative Price Ex Works
		SIMATIC S7-1200, CM 1241, RS422/485 COMMUNICATION MODULE	2	6ES7241-1CH32-0XB0	2	1	6	173,77 €	173,77 €		Estimative Price Ex Works
		SIMATIC MEMORY CARD 4MB	2	6ES7954-8LC04-0AA0	2	1	6	71,01 €	71,01 €		Estimative Price Ex Works
		AUXILIARY CONTACT T 1NO+1NC FOR SIRCO	2	22990031	2	1	6	34,26 €	34,26 €		Estimative Price Ex Works
HVAC electrical cabinet PAU003 P.0608871.L.02.303		AXIOLINE SMART ELEMENTS, ANALOG INPUT MODULE, 4AI, 4-20mA, CONNECTOR	2	1088062	5	1	6	229,91 €	229,91 €		Estimative Price Ex Works
		AXIOLINE SMART ELEMENTS, ANALOG INPUT MODULE, 4AI, 0-10V, CONNECTOR A	2	1088104	2	1	6	229,91 €	229,91 €		Estimative Price Ex Works
		AXIOLINE SMART ELEMENTS, ANALOG OUTPUT MODULE, 4AO, 0-10V, CONNECTOR	2	1088126	3	1	6	248,23 €	248,23 €		Estimative Price Ex Works
		AXIOLINE F, MODULE CARRIER, 4 SLOTS FOR AXIOLINE SMART ELEMENTS	2	1088135	3	1	6	98,29 €	98,29 €		Estimative Price Ex Works
		PRIMARY CUTTING POWER SUPPLY, INPUT: THREE-PHASE, OUTPUT: 24VDC 20A	2	2903155	1	1	6	318,53 €	318,53 €		Estimative Price Ex Works
		PRE-EQUIPPED RELAY MODULE WITH PUSH-IN CONNECTION, 4 NC, 24VDC	2	2903308	2	1	6	14,72 €	14,72 €		Estimative Price Ex Works
		PRE-EQUIPPED RELAY MODULE WITH PUSH-IN CONNECTION, 2 NC, 24VDC	2	2905291	24	1	6	15,03 €	15,03 €		Estimative Price Ex Works
		DOOR CONTACT NO+NC 10A 500V	2	NSYINLCRN	1	1	6	48,62 €	48,62 €		Estimative Price Ex Works
		LED LAMP T5 ECO WITH SWITCH, 120/230 VAC, 10W	2	NSYLAMT5LD2	1	1	6	132,11 €	132,11 €		Estimative Price Ex Works
		ROTARY SWITCH WITH BLACK HANDLE, ROUND, 2 FIXED POSITIONS, 1NO, D22	2	XB5AD21	3	1	6	11,46 €	11,46 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, GREEN, D22	2	XB5AVB3	3	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, RED, D22	2	XB5AVB4	5	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		HARMONY XB5, 3-PHASE PRESENCE INDICATOR, RED/GREEN/YELLOW LED, 400VAC	2	XB5EV57K4	1	1	6	91,02 €	91,02 €		Estimative Price Ex Works
		PUSHBUTTON HEAD Ø 40mm - PUSH-TURN - Ø22 - RED	2	XB5AS8445	1	1	6	21,59 €	21,59 €		Estimative Price Ex Works
		CONTACTOR, 3P, 7.5kW/400V, 1NO+1NC, 24VDC, SIZE S0 SCREW MOUNTED	2	3RT2025-1BB40	1	1	6	78,49 €	78,49 €		Estimative Price Ex Works
		CONTACTOR, 3P, 11kW/400V, 1NO+1NC, 24VDC, SIZE S0 SCREW MOUNTED	2	3RT2026-1BB40	1	1	6	93,64 €	93,64 €		Estimative Price Ex Works
		AUXILIARY CONTACT FOR LATER INSTALLATION, 2NO FOR LS CIRCUIT BREAKER P=7	2	5ST3011	25	1	6	22,27 €	22,27 €		Estimative Price Ex Works
		INSTA CONTACTOR 400-230VAC, 20A, 2NO - 24VAC/DC	2	5TT5000-2	12	1	6	54,62 €	54,62 €		Estimative Price Ex Works
		AUXILIARY CONTACTS WITH 2NO CONTACTS, 230/400VAC FOR 5TT5	2	5TT5910-0	12	1	6	38,28 €	38,28 €		Estimative Price Ex Works
		SIMATIC HMI, KTP1200 BASIC, BASIC PANEL, TOUCH/KEYPAD, 12" TFT SCREEN,	2	6AV2123-2MB03-0AX0	1	1	6	1 735,62 €	1 735,62 €		Estimative Price Ex Works
		SIMATIC S7-1200, CPU 1214C COMPACT DEVICE, 24VDC, 14DI/10DO, 2AI 0-1	2	6ES7214-1AG40-0XB0	1	1	6	516,49 €	516,49 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1223, I/O MODULE 16DI/16DO TRANSISTOR 0.5A, 24VD	2	6ES7223-1BL32-0XB0	3	1	6	374,31 €	374,31 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1231, ANALOG INPUT MODULE 8AI, +/-2.5/5/10V, 0/4-20m	2	6ES7231-4HF32-0XB0	2	1	6	497,06 €	497,06 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1232, ANALOG OUTPUT MODULE 4AO, +/-10V, 0(4)-20mA	2	6ES7232-4HD32-0XB0	2	1	6	306,26 €	306,26 €		Estimative Price Ex Works
		AUXILIARY CONTACT - FIRST	2	26990031	1	1	6	34,26 €	34,26 €		Estimative Price Ex Works
		AUXILIARY CONTACT - SECOND	2	26990032	1	1	6	24,14 €	24,14 €		Estimative Price Ex Works
Loop 300 Ovivo package	Rotary vane pump	Rotary vane pump 100 l/h, SS with accessories without motor	1	907911	1	1	6	647,13 €	647,13 €	(est 300mm x 200mm x 200mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	UV lamp	UV lamp 170	1	727461	1	2	6	2 612,54 €	5 225,09 €	2 litre (est 1 metre long) (50 mm x 50mm x 1000mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	RO element	RO element ESPA1-4040	1	410016	1	5	6	18 874,94 €	94 374,72 €	10 litres (est 100mm x 100mm x 1000mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Vacuum pump	Vacuum pump type 70 3600l/h, 230V, 100W	1	405547	1	1	6	1 018,70 €	1 018,70 €	5 litres (est 200mm x 200mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Centrifugal pump	Centrifugal pump V420 1.4301/EPDM / PN25 3x400V / 50 Hz, 3 kW	1	405639	1	1	6	3 313,57 €	3 313,57 €	50 litres (250mm x 250mm x 800mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Centrifugal pump	Centrifugal pump M205 1.4404/EPDM 3x400V/50 Hz, 0,55 kW 1,5A Rp1 PN10	1	405644	1	1	6	2 133,15 €	2 133,15 €	15 litres (500mm x 250mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Switch contact	Switch contact MAX for flowmeter DN10,15,20	1	526019	1	1	6	131,83 €	131,83 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	2/2-way solenoid valve	2/2-way solenoid valve 24VDC Stainless steel, positively controlled 0-16bar 3/4"i Viton, NC	1	528099	1	1	6	659,14 €	659,14 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	2/2 ways solenoid valve	2/2 ways solenoid valve 24VDC stainless steel, servo 0,3-20 bar 1/2"i Viton NC inside: V2A	1	528127	1	1	6	348,72 €	348,72 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Solenoid valve	Solenoid valve2/2, 1/2"i, NC 24VDC, brass/EPDM 0-12bar, direct	1	528128	1	1	6	240,11 €	240,11 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Solenoid valve	Solenoid valve SS 1/2" f 0-10 bar, 24V DC, NC, FKM forced pilot	1	529171	1	1	6	275,63 €	275,63 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure gauge	Pressure gauge 0-6 bar G1/4"B hinten, Glyzerine SS, ø 63 mm	1	534128	1	1	6	76,69 €	76,69 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure gauge	Pressure gauge 0-10 bar G1/4"B hinten, Glyzerine SS, ø 63 mm	1	534131	1	1	6	76,69 €	76,69 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure gauge	Pressure gauge 0-6 bar G1/4" B unten, Glyzerine SS, ø 50 mm	1	534137	1	1	6	64,71 €	64,71 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Frequency converter	Frequency converter 0,55 kW 3AC 380-480V Power Module IP55/UL	1	625391	1	1	6	790,68 €	790,68 €	10 litres (est 450mm x 150mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Frequency converter	Frequency converter 4 kW 3AC380 -480V Power Module IP55/UL	1	625401	1	1	6	1 503,97 €	1 503,97 €	10 litres (est 450mm x 150mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Flow sensor with display	Flow sensor with display 2...40 l/min IO-Link -10..90ºC 12 bar G 1/2 DN10	1	737961	1	1	6	671,10 €	671,10 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Flow sensor with display	Flow sensor with display 1...20 l/min IO-Link -10..90ºC 12 bar G 1/2 DN8	1	741807	1	1	6	617,17 €	617,17 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure sensor	Pressure sensor with IO-Link -1-25 bar, IO-Link G 1/4" AG, V4A, -40-90ºC	1	741708	1	1	6	269,64 €	269,64 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure sensor	Pressure sensor with IO-Link -1-10 bar, IO-Link G 1/4" AG, V4A, -40-90 ºC	1	741709	1	1	6	269,64 €	269,64 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure sensor	Pressure sensor front-flush -125-2500 mbar, IO-Link 4-20mA, G 1/2" AG, V4A	1	741710	1	1	6	772,97 €	772,97 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Conductivity sensor	Conductivity sensor IO-Link 0,04-1000µS/cm, 4...20mA G 1/2" AG, V4A, 25...100ºC	1	742408	1	1	6	1 797,60 €	1 797,60 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Motor control	Motor control needle valve kv0,2, G 1/2", 24VAC/DC	1	744651	1	1	10	2 942,07 €	2 942,07 €	2 litres (80mm x 50mm x 50mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Motor control	Motor control needle valve kv0,6, G 1/2", 24VAC/DC	1	744652	1	1	10	2 942,07 €	2 942,07 €	2 litres (80mm x 50mm x 50mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
Loop 600	CP-600A/B	Centrifugal pump 90.37 m3/h H2O + O2 cl150 degreased	1	PMP-1014	2	1	8	10 513,50 €	10 513,50 €		Estimative Price Ex Works
	FT-600	Flow transmitter 100 m3/h H2O+O2 Atex sil degreased	1	CPT-1414	1	1	16	2 983,62 €	2 983,62 €		Estimative Price Ex Works
	LSH-600 - LSL-600-LSL-611	Level switch DN25 class150 200mm Atex degreased sil	1	CPR-1049	3	1	3	832,50 €	832,50 €		Estimative Price Ex Works
	CT/P-600	CoDNuctivity aDN temperature transmitter Atex degreased	1	CPT-1803	2	1	7	3 122,46 €	3 122,46 €		Estimative Price Ex Works
	TT-601A/B/C/D/E/F/G/H	Temperature transmitter -20/80 deg 1/2" nptm Atex degreased	1	CPT-2015	8	3	8	296,81 €	890,42 €		Estimative Price Ex Works
	SV-601,SV-610,SV-630,SV-635,SV-641,SV-800,SV-900,SV-920	Solenoid valve nc Atex sil	1	VAN-7610	8	3	2	152,22 €	456,66 €		Estimative Price Ex Works
	PT-600-PT-610-612-PT-900	Pressure transmitter 16 barg O2 Atex sil degreased	2	CPT-1106	4	2	2	919,26 €	1 838,53 €		Estimative Price Ex Works
	PT-600A/B	Pressure transmitter 16 barg O2 Atex sil degreased	2	CPT-1013	2	1	2	967,40 €	967,40 €		Estimative Price Ex Works
	PV-600	Pneumatic valve nc KV 20 DN15 PN40 H2O Atex	2	VAN-8121	4	2	5	384,69 €	769,38 €		Estimative Price Ex Works
	PV-601	Pneumatic valve nc KV 3.9 DN15 cl150 Atex degreased	2	VAN-8117	1	1	6	324,44 €	324,44 €		Estimative Price Ex Works
	CV-600	Check valve poppet 1/2" od cf 0.03bar degreased	2	CAR-3033	1	1	2	199,31 €	199,31 €		Estimative Price Ex Works
	CV-601A/B	Check valve double bat DN 150 cl150	2	CAR-3015	1	1	6	3 307,13 €	3 307,13 €		Estimative Price Ex Works
	F-600	M200 dégraissée O2 pour FIG3616 DN150	3	1663680-X	1	1	6	1 021,25 €	1 021,25 €		Estimative Price Ex Works
	HV-600 - HV-600A/B - HV-601A/B - HV-602A -HV-603A	Butterfly valve DN 150 H2O+O2 cl150/PN16 Atex sil degreased	3	VAN-2420	7	2	2	1 438,24 €	2 876,49 €		Estimative Price Ex Works
	HV-600D/DA/DB- HV-601D-HV-602D/HV-602DA- HV-603D - HV-603V HV-604V-HV-606D-HV-606V-HV-619D-HV-620D-HV-620DA-HV-620DB-HV-621D-HV-622D-HV-622V-HV-622VA-HV-623D-HV-625V-HV-626D-HV-640D- HV-902-HV-911-HV-922-HV-942	Ball valve DN15 PN63 butt weld KV 31 degreased	3	VAN-5255	27	6	4	148,80 €	892,81 €		Estimative Price Ex Works
	HV-604	Butterfly valve with switch DN150 cl150 Atex sil degreased	3	VAN-2445	1	1	2	2 198,73 €	2 198,73 €		Estimative Price Ex Works
	HV-605	Butterfly valve with switch DN200 cl150 Atex sil degreased	3	VAN-2446	1	1	4	2 967,00 €	2 967,00 €		Estimative Price Ex Works
Loop 610	HIOD-610A/B/C	Hydrogen in oxygen detector 0-100% lie Atex sil with xcell ULTIMA X5000 - XCELL - H2	1	CPT-1531	3	3	3	1 986,60 €	5 959,80 €		Estimative Price Ex Works
	FICV-610A//B	Variable area flowmeter 18-170 nl/h Atex sil degreased	1	CPT-1450	3	2	8	1 223,24 €	2 446,49 €		Estimative Price Ex Works
	FICV-611	Variable area flowmeter+limit switch 360-2600 nl/h Atex degreased	1	CPT-1453	1	1	8	1 407,50 €	1 407,50 €		Estimative Price Ex Works
	LSH-610	Level switch DN25 cl150 200mm Atex degreased	1	CPR-1048	1	1	3	796,13 €	796,13 €		Estimative Price Ex Works
	LSL-610-LSH-630-LSH-631-LSL-630-LSH-640-LSL-640	Level switch DN25 class300 200mm Atex degreased	1	CPR-1050	6	2	3	992,88 €	1 985,76 €		Estimative Price Ex Works
	PSV-610	Pressure safety valve 13 barg O2 Atex degreased	1	SOU-2405	1	1	16	577,30 €	577,30 €		Estimative Price Ex Works
	PV-610-PV-630	Pneumatic valve no KV 7.2 DN20 CL300 Atex sil degreased	2	VAN-8112	2	2	6	606,68 €	1 213,35 €		Estimative Price Ex Works
	MPV-611	Motorised proportional valve KV 2.5 O2 DN50 CL300 Atex degreased	2	VRE-1011	1	1	6	5 453,48 €	5 453,48 €		Estimative Price Ex Works
	CV-611-CV-800-CV-930	Check valve poppet 1/4" od cf 0.07bar degreased	2	CAR-3032	3	2	2	98,04 €	196,08 €		Estimative Price Ex Works
	HV-610-HV-630-HV-642	Hand valve 1/2" od O2 degreased	3	VAN-1006	3	1	2	297,02 €	297,02 €		Estimative Price Ex Works
Loop 620	CP-620A/B	Centrifugal pump 31.9 m3/h H2O + H2 CL300 Atex degreased	1	PMP-1108	2	1	12	9 925,48 €	9 925,48 €		Estimative Price Ex Works
	LSL-620-LSL-641	Level switch DN25 class300 200mm Atex degreased sil	1	CPR-1051	2	1	3	1 029,24 €	1 029,24 €		Estimative Price Ex Works
	PT-620-PT-630-PT-910-PT-920	Pressure transmitter 40 barg H2/N2 Atex	2	CPT-1107	4	2	3	992,86 €	1 985,72 €		Estimative Price Ex Works
	PT-620A/B-PT-631-PT-633	Pressure transmitter 40 barg H2/N2 Atex sil	2	CPT-1105	4	2	2	0,00 €	0,00 €		Estimative Price Ex Works
	TT-621B	Temperature transmitter 0/120 deg Atex	1	CPT-2014	1	1	5	0,00 €	0,00 €		Estimative Price Ex Works
	CV-621A/B	Check valve double bat DN 100 CL300	2	CAR-3019	2	1	6	1 546,71 €	1 546,71 €		Estimative Price Ex Works
	HV-620,HV-620A,HV-620B,HV-621A,HV-621B,HV-622	Hand valve DN 100 H2O+H2 CL300 Atex degreased	3	VAN-2437	6	3	10	3 226,10 €	9 678,29 €		Estimative Price Ex Works
	HV-623	Hand valve with switch DN100 CL300 Atex sil degreased	3	VAN-2447	1	1	2	2 431,65 €	2 431,65 €		Estimative Price Ex Works
	HV-624	Hand valve with switch DN150 CL300 Atex sil degreased	3	VAN-2448	1	1	4	6 023,23 €	6 023,23 €		Estimative Price Ex Works
	F-620	Strainer M200 dégraissée O2 pour FIG36 DN100	3	1660680-X	1	1	6	886,88 €	886,88 €		Estimative Price Ex Works
	FT-630	Flow transmitter 750 nm3/h h2 atex degreased	1	CPT-1102	1	1	8	5 501,64 €	5 501,64 €		Estimative Price Ex Works
	PSV-630,PSV-631	Pressure safety valve 36 barg 6mm h2 atex degreased	1	SOU-2303	2	2	4	889,27 €	1 778,54 €		Estimative Price Ex Works
	PV-631,PV-900,PV-901,PV-920,PV-921	Pneumatic valve nc kv 8.5 DN20 cl300 atex sil degreased	2	VAN-8110	5	2	6	617,43 €	1 234,85 €		Estimative Price Ex Works

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
Loop 630	PV-632	Pneumatic valve no kv 11 DN25 cl300 atex degreased	2	VAN-8113	1	1	6	724,60 €	724,60 €		Estimative Price Ex Works
	PV-633,PV-635	Pneumatic valve nc kv 12 DN25 cl300 atex sil degreased	2	VAN-8111	2	1	6	724,60 €	724,60 €		Estimative Price Ex Works
	MPV-611	Motorised proportional valve KV 2.5 O2 DN50 CL300 Atex degreased	2	VRE-1100	1	1	6	4 848,25 €	4 848,25 €		Estimative Price Ex Works
	CV-630,CV-632	Check valve disc DN 25 pn40 degreased	2	CAR-3005	2	2	6	160,82 €	321,64 €		Estimative Price Ex Works
	HV-633,HV-940,HV-941	Hand valve DN 25 H2O+H2 cl300 Atex degreased	3	VAN-2433	3	1	10	706,30 €	706,30 €		Estimative Price Ex Works
Loop 640	FSH-640	Flow switch high right to left DN25 cl300 atex sil degreased	1	CPR-1101	1	1	8	2 454,23 €	2 454,23 €		Estimative Price Ex Works
	PSV-640	Pressure safety valve 36 barg 10mm h2o atex degreased	1	SOU-2455	1	1	4	827,38 €	827,38 €		Estimative Price Ex Works
	PV-640	Pneumatic valve nf + actuator d80 + actuator cover d80	2	VAN-8012	1	1	8	1 056,10 €	1 056,10 €		Estimative Price Ex Works
	PV-641	Pneumatic valve nc kv 170 DN40 cl300 h2 atex sil degreased	2	VAN-8306	1	1	4	1 086,96 €	1 086,96 €		Estimative Price Ex Works
	PRV-640	PRESSURE REDUCING VALVE DN40 CL300 CV 3.79 H2O+H2 DEGREASED	3	DET-1105	1	1	4	3 268,00 €	3 268,00 €		Estimative Price Ex Works
Loop 700	**Instruments**										
	TT 60.1, TT 60.2, TT 60.3	Temperature SensorFor surface contact Type PT100 Range 0-300°C	3	PT100 90.2550 Ref. 00380207	3	1	4	164,00 €	164,00 €		Estimative Price Ex Works
	TT 61.1, TT 64.5, TT 64.6, TT 64.7, TT 64.8 T	Temperature SensorFor Thermowell Type PT100 Range 0-300°C	3	PT100 90.2150 Ref.00415733	5	1	4	179,00 €	179,00 €		Estimative Price Ex Works
	TT 60.1, TT 60.2, TT 60.3, TT 61.1, TT 64.5, TT 64.6, TT 64.7, TT 64.8	Temperature Transmitter + Clip Analog signal : 4-20 mA	3	5333D + 8421	8	1	4	196,00 €	196,00 €		Estimative Price Ex Works
	GS 64.1.1, GS 64.1.2, GS 64.1.3, GS 64.1.4GS 64.2, GS 64.3, GS 64-T2	Sensor Electrical limit switch	3	SRBG-C1-N-20N-ZCM12-EX5	8	1	4	133,00 €	133,00 €		Estimative Price Ex Works
	GS 64.1.1, GS 64.1.2, GS 64.1.3, GS 64.1.4GS 64.2, GS 64.3, GS 64-T2	Indicator Electrical limit switch	3	SASF-S2-BF-A3	7	1	4	16,00 €	16,00 €		Estimative Price Ex Works
	PT 64.1	Pressure transmitter Analog signal : 4-20 mA	3	2088G3S22B2K1Q4	7	1	TBD	1 207,00 €	1 207,00 €		Estimative Price Ex Works
	PI 64.1	Pressure indicator gauge	3	WIKA 2940 Ø63mm ATEXRange: 0-60 bar(g)	1	1	5	206,00 €	206,00 €		Estimative Price Ex Works
	TS 64.3	Temperature switchSetting: <200 °C	3	ML1H-H454S-EXISensor temp. Range -18 ... +260 °C	1	1	6	1 188,00 €	1 188,00 €		Estimative Price Ex Works
	TS 64.4	Temperature switchSetting: <60 °C	3	ML1H-H203S-EXISensor temp. Range -73 ... +121 °C	1	1	6	1 188,00 €	1 188,00 €		Estimative Price Ex Works
	Solenoid valves										
	64-V1, 64-V2, 64-V3, 64-V8, 64-V12, 64-V17	Solenoid valve	1	MFH-3-1/8-EX	6	1	4	116,00 €	116,00 €		Estimative Price Ex Works
	64-V1, 64-V2, 64-V3, 64-V8, 64-V12, 64-V17	Solenoid coil	1	VACF-B-K1-1-5-Ex4 M	6	1	4	129,00 €	129,00 €		Estimative Price Ex Works
	Flow control										
	FC 64.1	Electro Pneumatic PositionerAnalog signal : 4-20 mA	3	EPR-IN2SN4NTR,Exia IIC T6	1	1	5	830,00 €	830,00 €		Estimative Price Ex Works
	Heater elements										
	HE 61.1	Deoxo trace heater	3	HAQ2N660, 3 kW , 230 V	1	1	TBD	1 800,00 €	1 800,00 €		Estimative Price Ex Works
	Automatic Valves										
	64-V4.1, 64-V4.2, 64-V5, 64-V6, 64-V14	2-way ball valve	1	A44-6666RT BWJ DN20 PCTFE/Viton	5	1	3	660,00 €	660,00 €		Estimative Price Ex Works
	64-V4.1, 64-V4.2, 64-V5, 64-V6, 64-V14	Maintenance kit for 2-way ball valve	1	A44-ARK44-RV DN20 PCTFE/Viton	5	5	3	72,00 €	360,00 €		Estimative Price Ex Works
	64-V4.3, 64-V4.4, 64-V7	2-way valve (high temperature)	1	A44-6666PV BWJ DN20 Fluorofill/Viton		1	3	884,00 €	884,00 €		Estimative Price Ex Works
	64-V4.3, 64-V4.4, 64-V7	Maintenance kit Polyfill/Vitonfor 2-way ball valve	1	A44-ARK44-PV DN20 Polyfill/Viton	3	3	3	144,00 €	432,00 €		Estimative Price Ex Works
	64-V4.1, 64-V4.2, 64-V4.3, 64-V4.4	Pneumatic Actuator Double Acting	2	APM2DA	3	1	3	344,00 €	344,00 €		Estimative Price Ex Works
	64-V5, 64-V7	Pneumatic Actuator Spring Loaded (Normally Closed)	2	APM2SR (NC)	2	1	3	472,00 €	472,00 €		Estimative Price Ex Works
	64-V6	Pneumatic Actuator Spring Loaded (Normally Open)	2	APM2SR (NO)	1	1	3	472,00 €	472,00 €		Estimative Price Ex Works
	64-V31, 64-V13	3-way valve for 8 mm tube	1	SAH1B3S-H-8M-PK-M-WH, Series 105	2	1	4	285,00 €	285,00 €		Estimative Price Ex Works
	64-T2	2-way valve for 8 mm tube	1	SAH1B-H-8M-PK-M-WH, Series 105	1	1	4	207,00 €	207,00 €		Estimative Price Ex Works
	64-V31, 64-V13, 64-T2	Pneumatic Actuator Spring Loaded (NC)	2	C15-SR-1B2 EX IIC	3	1	4	295,00 €	295,00 €		Estimative Price Ex Works
	Manual Valves										
	61-V1, 61-V2,64-V10, 64-V11, 64-V15, 64-V16	2-way ball valve	1	A44-6666RV BWJ DN20 PCTFE/Viton	6	1	3	660,00 €	660,00 €		Estimative Price Ex Works
	61-V1, 61-V2,64-V10, 64-V11, 64-V15, 64-V16	Maintenance kit for 2-way ball valve	1	A44-ARK44-RT DN20 PCTFE/Viton	6	6	3	72,00 €	432,00 €		Estimative Price Ex Works
	61-V3, 64-V32, 64-V-33	Plug valve for 8 mm tube	1	P1V-H-8M-S316, Series P	3	1	2	95,00 €	95,00 €		Estimative Price Ex Works
	64-V9	Plug valve for 6 mm tube	1	P1V-H-6M-S316, Series P	1	1	2	87,00 €	87,00 €		Estimative Price Ex Works
	64-V14.1	Needle valve for 8 mm tube	1	NV2H-8M-R , Series NV	1	1	4	98,00 €	98,00 €		Estimative Price Ex Works
	Orifices										
	R Ø1.0 mm	Calibrated orifice tube	1	Orifice tube R Ø1.0 mm	1	1	2	35,00 €	35,00 €		Estimative Price Ex Works
	R Ø1.2 mm	Calibrated orifice tube	1	Orifice tube R Ø1.2 mm	1	1	2	35,00 €	35,00 €		Estimative Price Ex Works
	Filter										
	61-F1.1	Condensate Y-strainer	3	Insert for Y611 - 0124/08-3/4" - 1 mm	1	3	2	76,00 €	228,00 €		Estimative Price Ex Works
	61-F1.2	Condensate filter	3	Insert for HyLok FTH-8M-50 modif.0,5mm	1	3	2	40,00 €	120,00 €		Estimative Price Ex Works
	Pressure Safety Valves										
	PSV-64.1, PSV-64.2	Pressure safety valve	3	461tGFO-8m/f-08/15 PTFE36 bar(g) setting	2	1	6	1 736,00 €	1 736,00 €		Estimative Price Ex Works
	PSV-64.3	Pressure safety valve	3	861tGFO-15m/f-15/15 PTFE6 bar(g) setting	1	1	6	992,00 €	992,00 €		Estimative Price Ex Works
Loop 800	OIHA800A/B/C	OXY.IQ-131-00	1	CPT-1700	3	3		3 722,62 €	11 167,85 €		Estimative Price Ex Works
	FICV-800	Variable area flowmeter + 2 limit switch 370nl/h atex	1	CPT-1460	1	1	4	1 823,20 €	1 823,20 €		Estimative Price Ex Works
	PRV-800	PRESSURE REDUCING VALVE CV 0.02 H2 ATEX DEGREASED	3	DET-1106	1	1	4	1 023,40 €	1 023,40 €		Estimative Price Ex Works
	3WV-800	Three way valve 1/4" cf h2 atex	2	VAN-2105	1	1	4	201,11 €	201,11 €		Estimative Price Ex Works
Loop 900	FT-900,FT-920	Flow transmitter dif pressure 500MBAR atex degreased sil	1	CPT-1435	2	1	5	4 067,34 €	4 067,34 €		Estimative Price Ex Works
	FT-901,FT-921	Flow transmitter dif pressure 500MBAR atex degreased	1	CPT-1436	2	1	5	3 971,08 €	3 971,08 €		Estimative Price Ex Works
	FI-940	Flow indicator DN15 atex (1" 300lb)	1	CPT-1017	1	1	4	1 625,40 €	1 625,40 €		Estimative Price Ex Works
	PSV-900	Pressure safety valve 10 barg 18mm n2 atex degreased	1	SOU-1304	1	1	16	1 037,50 €	1 037,50 €		Estimative Price Ex Works
	CV-900-CV-920	Check valve disc DN 40 pn40 degreased	2	CAR-3007	2	2	4	408,50 €	817,00 €		Estimative Price Ex Works
	CV-901, CV-921	Check valve piston DN40 bspH2O/N2 atex degreased	2	CAR-3027	2	2	4	140,61 €	281,22 €		Estimative Price Ex Works
	CV-931	Check valve piston DN15 bspH2O/N2 atex degreased	2	CAR-3023	1	1	2	131,33 €	131,33 €		Estimative Price Ex Works
	HV-900,HV-920	Hand valve DN 15 h2o+o2 cl150 atex degreased	3	VAN-2405	2	1	10	451,52 €	451,52 €		Estimative Price Ex Works
	HV-901	Hand valve DN 40 h2o+o2 cl150 atex degreased	3	VAN-2409	1	1	16	814,85 €	814,85 €		Estimative Price Ex Works
	HV-910	Hand valve DN 25 h2o+o2 cl150 atex degreased	3	VAN-2407	1	1	5	642,87 €	642,87 €		Estimative Price Ex Works
	HV-921	Hand valve DN 40 h2o+h2 cl300 atex degreased	3	VAN-2434	1	1	16	1 102,95 €	1 102,95 €		Estimative Price Ex Works
	HV-930	Hand valve 1/4" od o2 degreased	3	VAN-1005	1	1	12	171,57 €	171,57 €		Estimative Price Ex Works
	HV-931	Hand valve 1/4" od h2	3	VAN-2440	1	1	2	148,89 €	148,89 €		Estimative Price Ex Works
	MV-900, MV-901 MV-920, MV-921 ,MV-941	Globe valve DN15 nitrogen eq percentage	3	VAN-6125	5	2	2	436,16 €	872,32 €		Estimative Price Ex Works
Container Electrolyser	AHD-1000/1001/1002/1003/1004	X5000 (10214104) + Fiber Sealing (10178579) + Cable Gland (10102516)	1	CPT-1530	5	2	4	1 854,38 €	3 708,75 €		Estimative Price Ex Works
	PCA-001-002-003-004-005-006-007-008	CELL VOLTAGE MONITORING	1	AEE-1405	8	3	4	2 626,23 €	7 878,68 €		Estimative Price Ex Works
	WLD-001/002/003/004/005/006	OPTISWITCH 6600 C IP 67-69K (VGPA411130000)	1	CPT-3102	6	2	8	263,38 €	526,75 €		Estimative Price Ex Works
TRANSFORMER & RECTIFIERS	TRANSFORMER & RECTIFIERS	AC/DC power module AD5W740J	1	1000397250	8	1	36	12 500,00 €	12 500,00 €	200 Kg	Estimative Price Ex Works
		AD5000 control box	1	1000397423	2	1	16	4 000,00 €	4 000,00 €	<5Kg	Estimative Price Ex Works
		MODULE STO	1	1000275441	2	1	16	450,00 €	450,00 €	<1Kg	Estimative Price Ex Works
		SPDM	1	1000397448	2	1	16	4 600,00 €	4 600,00 €	5,00 €	Estimative Price Ex Works
		SPDM SYNCHRO TRANSFOMER	1	1000403581	2	1	16	240,00 €	240,00 €	7,00 €	Estimative Price Ex Works
		AC line filter			2	1	12	3 950,00 €	3 950,00 €	250,00 €	Estimative Price Ex Works
		Reactor	1	1000401335	4	1					Estimative Price Ex Works
		Capacitor	1	1000360998	6	1					Estimative Price Ex Works
		Set of fuses			1	1	8	560,00 €	560,00 €	<5Kg	Estimative Price Ex Works
		FUSES HPC SIZE 14X51 - 2AgG	1	60520002	4	1					Estimative Price Ex Works
		FUSIBLE UR 690V 14X51 32A	1	170L1432	6	1					Estimative Price Ex Works
		FUSIBLES NH gPV 1000VDC - 25A	1	373210	4	2					Estimative Price Ex Works
		Lot for control part including :			1	1	16	6 290,00 €	6 290,00 €	<5Kg	Estimative Price Ex Works
		PLC DTBOX	1	1000392861	1	1					Estimative Price Ex Works
		ET200SP PN remote I/O coupler	1	6ES7 155-6AA01-0BN0	1	1					Estimative Price Ex Works
		ET200SP AI 8xI 2-/4-wire BA	1	6ES7 134-6GF00-0AA1	1	1					Estimative Price Ex Works
		ET200SP DI 8x24VDC HF	1	6ES7 131-6BF00-0CA0	11	1					Estimative Price Ex Works
		ET200SP DO 8x24VDC/0,5A HF	1	6ES7132-6BF01-0BA0	5	1					Estimative Price Ex Works
		Switch SCALANCE XB008	1	6GK5008-0BA10-1AB2	2	1					Estimative Price Ex Works
		Interface relay	1	8921120000	22	2					Estimative Price Ex Works
		PN/PN Coupler	1	6ES7158-3AD10 -0XA0	1	1					Estimative Price Ex Works
		ET200SP AO 4XU/I	1	6ES7 135-6HD00-0BA1	1	1	6	260,00 €	260,00 €		Estimative Price Ex Works
		Lot for Cooling System part including :		(Pump, PT, TT)	1	1	16	1 150,00 €	1 150,00 €		Estimative Price Ex Works
		Pump 1,1kW	4	Medana L.1002-2-V-E-10T	2	1				12,00 €	Estimative Price Ex Works
		Pressure transmitter 0-6b - 4-20mA	1	PT5415	2	1				<1,5Kg	Estimative Price Ex Works
		Temperature transmitter PT100 - 4-20mA	1	TA2417	2	1				<1,5Kg	Estimative Price Ex Works

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
Automatic Cards	Module ETOR(DI) DI16 X24 VDC ST	6ES7131-6BF00-0CAO	1	_	7	1	2	82,78 €	82,78 €		Estimative Price Ex Works
	Module STOR(DQ) DQ 8X2 4V DC/0.5 A HF	6ES7132-6BF00-0CAO	1	_	3	1	2	70,95 €	70,95 €		Estimative Price Ex Works
	Module EANA(AI) 'AI 8XI 2-/4 Wire basic	6ES7134-6GF00-0AA1	1	_	4	1	2	220,38 €	220,38 €		Estimative Price Ex Works
	Module SANA(AQ) 'AQ 4XU/I ST	6ES7132-6HD00-0BA1	1	_	1	1	2	166,63 €	166,63 €		Estimative Price Ex Works
	Module SETOR(F-DI) F-DI 8X24 VDC HF	6ES7136-6BA0A-0CAO	1	_	3	1	2	215,00 €	215,00 €		Estimative Price Ex Works
	Module SEANA(F-DQ) F-DQ 8X24VDC/0.5A PP HF	6ES7136-6DC00-0CAO	1	_	3	1	2	279,50 €	279,50 €		Estimative Price Ex Works

C63-PMO-001

User Manual
(Phase 2)

C63 - CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
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RISK OF FIRE OR EXPLOSION

FAILURE TO FOLLOW SAFETY INSTRUCTIONS CAN HAVE SERIOUS CONSEQUENCES FOR PROPERTY AND PEOPLE

- Keep away from flames and sparks – Do not smoke.
- Keep away from combustible materials.
- Installation and commissioning must be carried out by trained personnel.
- Do not use in the event of immersion or penetration of water into electrical parts.

IN THE EVENT OF A PROBLEM, CONTACT THE MANUFACTURER.

BEFORE PERFORMING ANY OPERATION, IT IS ESSENTIAL TO READ THE SAFETY RECOMMENDATIONS (SEE §4).

THE FOLLOWING IS STRICTLY PROHIBITED:

- Disassembly and reassembly of (fluid and/or electrical) internal components of the container and of the external components of the container in the absence of ELOGEN staff or personnel from another company designated by ELOGEN.
- The performance of maintenance work without having previously checked/controlled for the absence of voltage and of pure oxygen or hydrogen gas in the pipes and equipment.

						
Risk of electric shock	Automatic start	Hot surface, Risk of burns	Risk of anoxia	Obstacles at height	General hazard	No open flames or smoking



TAKE PRECAUTIONS TO AVOID INJURIES.
It is important to read and understand the service manual before operating this product.

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1. TECHNICAL TERMS AND ABBREVIATIONS

AHD	Ambient Hydrogen Detector
ATEX	ATmospheres EXplosibles - Equipment for potentially explosible atmospheres
Bara	Bar absolute (absolute pressure, absolute vacuum equal to 0 bara, atmospheric pressure at sea level is 1.013 bara)
Barg	Bar gauge (relative pressure measured by a manometer, atmospheric pressure is equal to 0 barg)
BOL	Beginning of Life
BPCS	Basic Process Control Systems
BSPP	British Standard Pipe Parallel
CO_2	Carbon dioxide
CP	Circulating Pump
C/TP	Conductivity & Temperature Probe
DPT	Dew Point Transmitter
EOL	End Of Life
ESD	Emergency Shut-Down
ESR	Essential Safety Requirements
F	Mechanical Filter
FH	Filter Housing
FICV	Flow Indicator Control Valve
FS	Flow Switch
H_2	Dihydrogen gas
HIOD	Hydrogen In Oxygen Detector
HMI	Human Machine Interface
Hz	Hertz
HV	Hand Valve
kVA	kilo Volt Ampere
lb	pound
LEL	Low Explosive Limit
LS	Level Switch
LSA	Level Switch Amplifier
O_2	Dioxygen gas
OIHA	Oxygen In Hydrogen Analyser
mm	millimetre
N_2	Dinitrogen gas
Nm^3/h	Normal cubic metre per hour (normal conditions: 1.013 bara and 0 °C)
NC	Normally Closed
NO	Normally Opened
PEM	Proton Exchange Membrane
PLC	Programmable Logic Controller
PS	Pressure Switch
PSV	Pressure Safety Valve
PT	Pressure Transmitter

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PWT	Pure Water Tank
ST	Separator Tank
Stack	Assembly of electrolyser cells
STD	States Transition Diagram
TT	Temperature Transmitter
T	Tonne
VAC	Volts Alternating Current
VDC	Volt Direct Current

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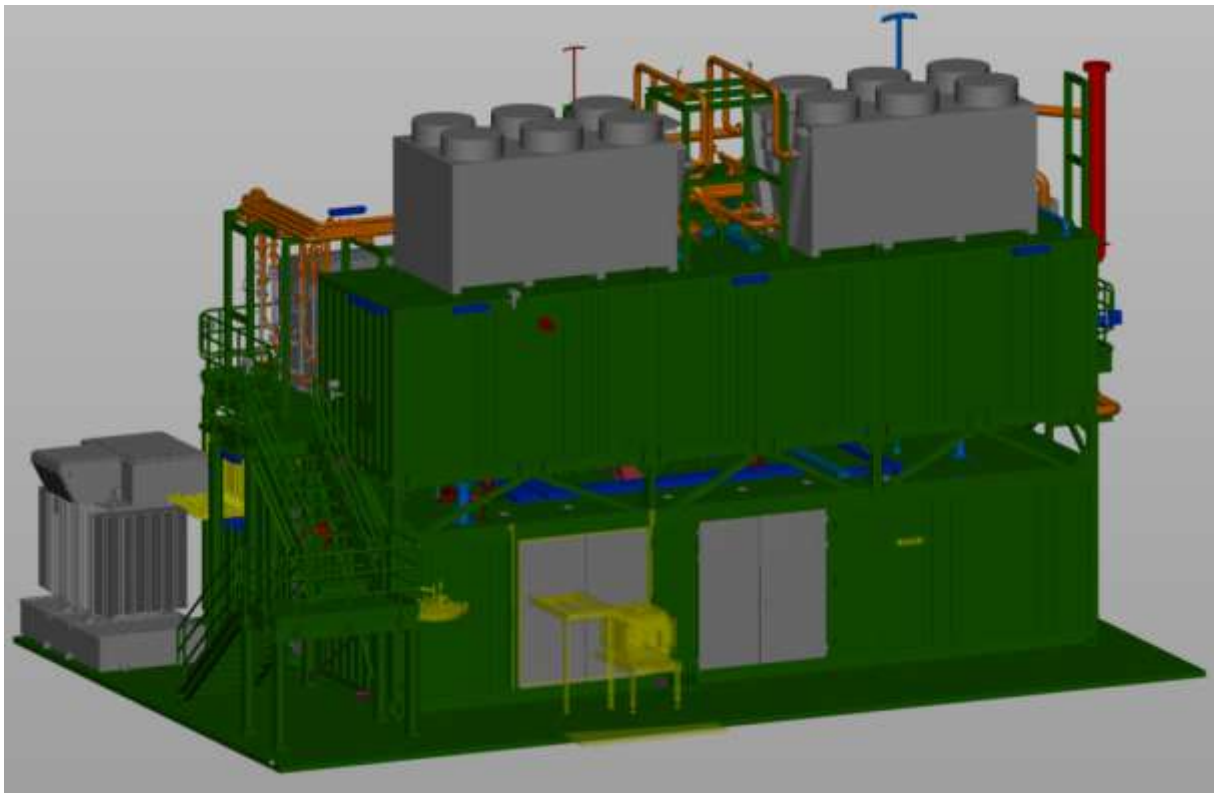


Figure 1: General view of the ELOGEN electrolyser E500.

2. INTRODUCTION

This manual provides information for the installation, operation and maintenance of the machines E500.

The electrolyser is a proton exchange membrane (PEM) water electrolysis system designed for 8 PEM electrolysis stacks producing up to 500 Nm^3/h at a pressure of 30 barg. The purity of the hydrogen at the outlet of the machine is 99.999%.

This electrolyser is used to produce hydrogen. The unit produces hydrogen and oxygen continuously. The oxygen is vented outside without treatment via the vent provided for this purpose. The collection of oxygen-based products from this hydrogen generator is prohibited.

This electrolyser is designed for outdoor operation in a safe environment.

⚠	THIS ELECTROLYSER SHOULD ONLY BE OPERATED AS INTENDED BY THE MANUFACTURER. THE OPERATOR IS RESPONSIBLE FOR THE USE AND INSTALLATION OF THE ELECTROLYSER, WHICH MUST COMPLY WITH THE PROVISIONS OF LOCAL AUTHORITIES AS WELL AS APPLICABLE REGULATIONS.

The system comprises 9 zones:

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- A01: Process stack ground level
- A02: Process BOP ground level O2
- A03: Process BOP ground level H2
- A10: Process BOP upper level
- B01: Electrical ground level
- C01: Water treatment package
- D01: Area between containers 1&2
- E01: HVAC
- X00: Interconnection & outdoor containers area

	For more detail, please refer to C63-GAD-001 – General Arrangement Drawing

2.1.1. System Overview

The main elements of the electrolysis system are shown in the following figures.

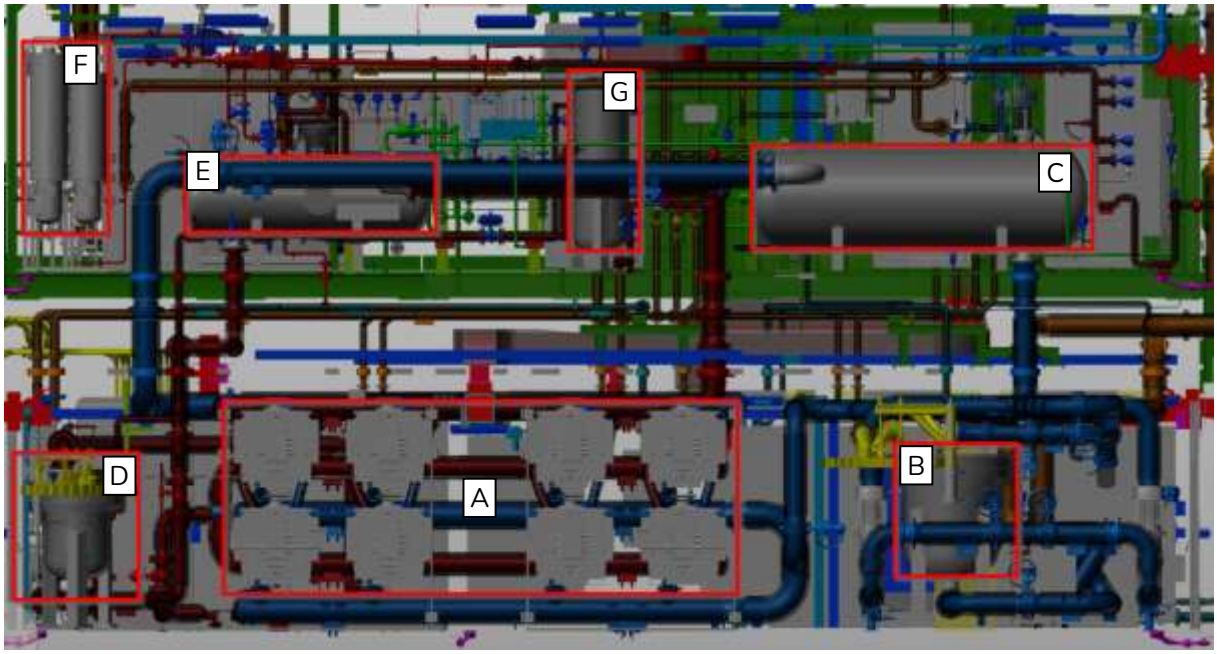


Figure 2: view from the south face of the electrolyser

Item	Equipment / skid
A	Stacks
B	Anode filter housing (**FH-600**)
C	Oxygen separator (**ST-600**)
D	Cathode filter housing (**FH-620**)
E	Hydrogen separator (**ST-620**)
F	Hydrogen purification unit
G	Degasser (**DG-640**)

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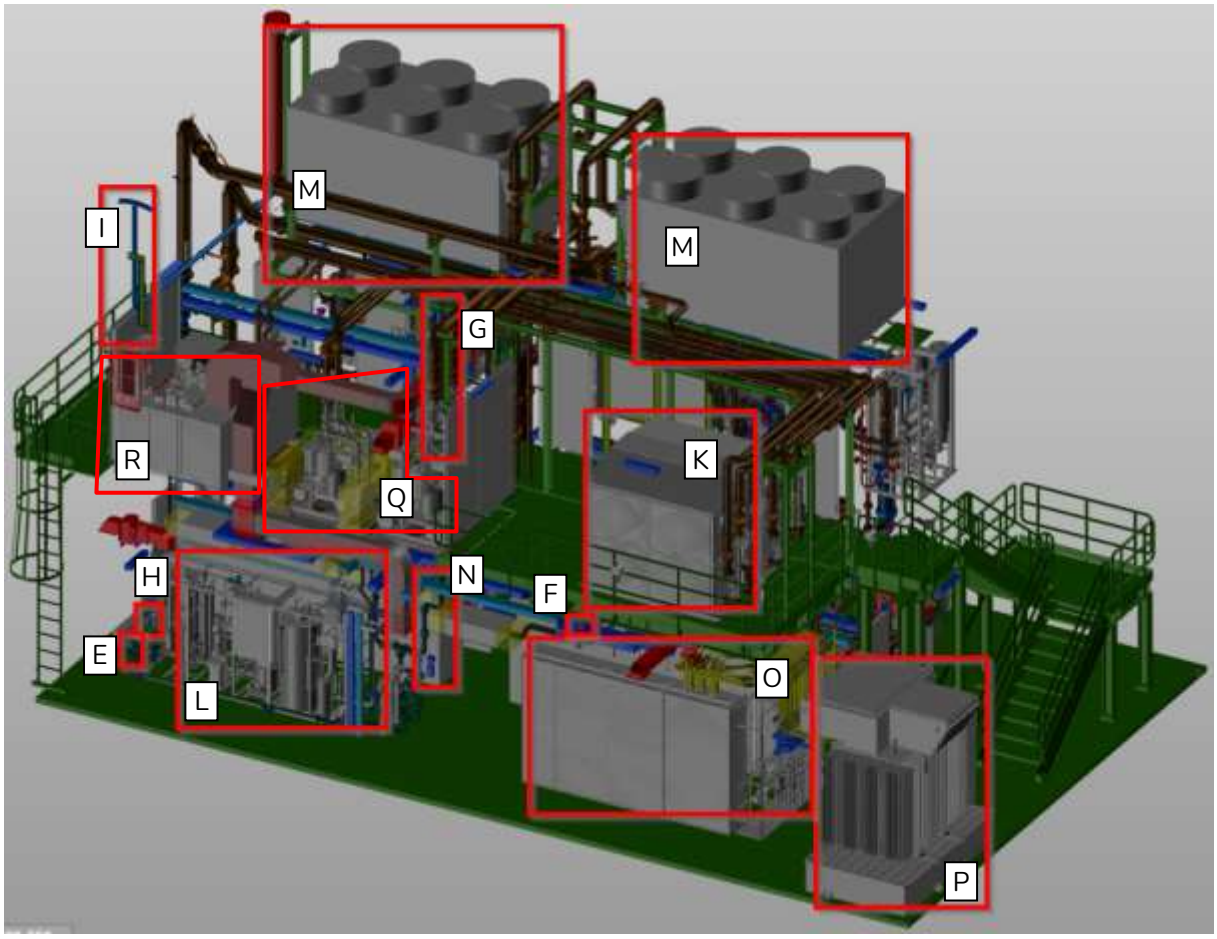


Figure 3: view of utility and electrical containers

Item	Equipment / skid
E	Water supply
F	H_2 production
G	H_2 Analysis vent
H	Drain from water treatment package
I	Oxygen vent
J	Oxygen vent (O_2)
K	Water chillers (**WC-400** & **WC-401**)
L	Water treatment package
M	Dry coolers (**DC-200** & **DC-201**)
N	Control cabinet
O	Rectifiers (**REC-001** & **REC-002)**
P	Transformer
Q	Distribution skid and condensation skid
R	Air Handling Unit (**AHU-400**)

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3. SAFETY RECOMMENDATIONS

The safety recommendations presented here do not cover all situations, and it is essential to refer to good practices for implementing systems using reactive gases, particularly recommendations for implementing storage systems and supply networks.

3.1. GENERAL INFORMATION

The system operation area must be kept free of any combustible materials. Flammable vapours and liquids should especially be avoided.

All system openings must be kept clear.

When the symbol  is present, please refer to this notice for information on the nature of the potential hazard and actions to be taken.

The electrolysis process has undergone a risk assessment in accordance with APPENDIX 1 of the Pressure Equipment Directive 2014/68/UE. The results of this analysis are detailed on document **C63-PED-001**, which includes any information required in the event of non-compliance with ESR.

3.2. EXPLOSIVE ATMOSPHERE AREAS – ATEX

3.2.1. Area Classification

The system is designed to be operated outside ATEX areas.

 The system can intermittently generate explosive atmospheres:

- The compartment A10 is classified as **Zone 2**. An explosive atmosphere may be generated in the event of a leak at a connection (2nd degree release).
- The compartment D01 has two small sections classified as **Zone 2**. An explosive atmosphere may be generated in the event of a leak at one of those connections (2nd degree release). Specifically on the flange connecting the hydrogen piping between containers 1 and 2 and on the flange of the hydrogen outlet to the customer.
- The inside of Hydrogen Analysis Vent is also considered **Zone 2**.

Note: According to Directive 1999/92/EC, **ATEX Zone 2** refers to an area where an explosive atmosphere consisting of gas, vapor, or dust is unlikely to occur under normal operation.

3.2.2. ATEX Area Identification

3.2.2.1. External ATEX Areas

	See C63-DUO-001 – Presentation of ATEX Areas

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3.2.2.2. Internal ATEX Areas

	See C63-DUO-001 – Presentation of ATEX Areas

This ATEX area is delimited by the signage:



The distance to be kept is indicated and there is a notice of access restriction, such as: “Access restricted to authorised personnel”.

3.3. USE OF GASES

3.3.1. Hydrogen

	• Risk of fire or explosion. • Make sure the system is operated outdoors and is kept away from any source of ignition. • Entry into the process compartment is prohibited during operation.

The hydrogen produced in the system is an odourless, colourless and flammable gas.
The electrolyser can release up to 500 Nm^3/h of hydrogen.

The main risks associated with hydrogen are:
- Risk of ignition or explosion
- Risk of anoxia due to oxygen replacement. In the event of ignition, hydrogen produces a flame that is invisible to a human eye.

To mitigate these risks, the following preventive measures must be implemented:
- Do not enter the process compartment during operation.
- Keep openings and vents clear of any obstacles.
- Follow the installation and operating specifications.

In the event of a hydrogen leak, the system is designed to go into safety mode, stopping electrolysis and depressurising the separators. This operation lasts approximately **9 minutes**.

	The hydrogen purification unit remains pressurised.

In the event of a fire, use type B and E extinguishers (not included) without putting yourself in danger.

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	The machine operator is responsible for contracting fire extinguisher maintenance services with a specialised company.

3.3.2. Nitrogen

	Risk of anoxia due to oxygen substitution. Make sure the system is operated outdoors. Do not enter the process compartment during operation.

The system uses nitrogen during the shutdown and startup phases. Nitrogen is an odourless gas that is naturally found in the air.
The electrolyser can release up to 265 Nm^3/h of nitrogen.

The main risk related to nitrogen is anoxia due to oxygen substitution.

To mitigate these risks, the following preventive measures must be implemented:

- Do not enter the process compartment during operation.
- Before carrying out any work on the system, make sure that it is turned off and close the nitrogen bottle valves.
- Utilize a portable O2 and H2 detector mounted on a pole to monitor the container's atmosphere prior to entry or performing any work.
- Keep openings and vents clear of any obstacles.
- Follow the installation and operating specifications.

3.4. FIRE RISK

	Fire risk due to the presence of flammable gas. Make sure the system is operated outdoors and away from any source of ignition.

The risk of fire is created by the presence of hydrogen gas in the system, as well as by the presence of electrical equipment.

To mitigate these risks, the following preventive measures must be implemented:

- Limit potential sources of leaks.
- Remove potential sources of ignition.
- Ensure the availability of appropriate fire extinguishers (classes ABC).
- Provide evacuation instructions and means to sound an alarm.
- Follow the owner's safety instructions, particularly the prohibition against smoking and the storage of flammable materials near the system.

In the event of an incident, please refer to the owner's instructions.
The following can be done, at least:

- Trigger the alert.

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- Notify emergency services.
- Evacuate the hazardous area.

External fire is not covered by the machine's safety system and is the responsibility of the owner.

3.5. ELECTRIC AND ELECTROSTATIC RISK

	Risk of electric shock and electrocution. Make sure the system is properly grounded. Only authorised personnel may enter the machine.

The system is composed of elements operating at voltages higher than the safety voltage (400 VAC for certain auxiliary elements) and can therefore cause significant damage to property and people.

The design and manufacturing of the system comply with the CE Low Voltage Directive.
Find below electrical risks:

3.5.1. Polarization voltage

After stopping the machine, and even after electrical lockout, the stacks retain a residual polarization voltage that can last up to three days. The following recommendations apply:

- Before working in stack areas, check the residual voltage displayed on the VAT-001/002 and stack voltage on HMI.
- Never touch the stacks.
- Only ELOGEN personnel or a subcontractor authorised by ELOGEN may work on the stacks.
- Avoid contact between metal objects and the stacks or dropping metal objects on the stacks.
- Do not remove the protective cover.

3.5.2. Static Electricity

Static electricity risk is generally eliminated by periodically checking the grounding of the installation.

3.5.3. Electricity

Electrical risk is minimised by the following operations and recommendations:

- Do not remove protections during operation.
- Check for the absence of voltage before carrying out any work on the system. In particular, do not top up water in the separator tanks (**ST-600** and **ST-620**) using a system other than the pump (**LP -300**).
- Any work on electrical equipment must be performed by qualified and authorised personnel.
- Grounding of the installation.
- The installation must comply with regulations and be inspected periodically.

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3.5.4. Input electrical characteristics

For 8 stack units:

- ICCmax; 36KA
- General power supply is provided by a circuit breaker 1250A equipped with a protection unit EKIP HI TOUCH LSIG.

Switchboard prefix:	BLPH
Distribution:	FourPoles
Ik Max [kA]:	16,258
Rated operating voltage [V]:	400
Rated insulation voltage[V]:	
Frequency [Hz]:	50
Icw (1s) [kA]:	36
Degree of protection IP:	IP55
Code:	BLPH

Figure 4: Input electrical values [1]

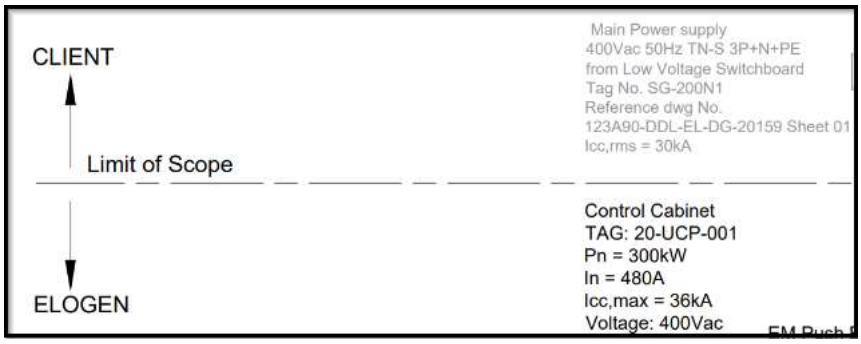


Figure 5: Input electrical values [2]

3.5.5. Lightning protection

To ensure the safety of personnel and equipment, and to minimize the risk of production stoppages and losses due to lightning strikes, it is essential that the installation complies with applicable lightning protection standards and regulations.

The customer's responsibility includes protection of the electrolyser's electrical interfaces, including power supplies upstream of the electrolyser.
The customer is responsible for the design and installation of a lightning conductor, if required, in compliance with local norms and standards. The sizing, supply and installation of this device are not included in the scope of supply, nor are they the responsibility of ELOGEN.

⚠	For the power supply section (rectifier and transformer), please refer to the power supply user manual.

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3.6. THERMAL RISK

⚠	Risk of burns. Avoid any contact with the process during operation and with the thermal skid.

The primary thermal risk is the potential for burns upon contact with hot surfaces. The process involves the distribution of fluids reaching temperatures of up to **65 °C**, which can cause second-degree burns. Additionally, the hydrogen purification unit can attain temperatures around **180 °C** during the regeneration cycle.

To mitigate these risks, the following preventive measures must be implemented:

- Do not enter the process compartment before it has completely cooled.
- Do not touch the equipment or pipes during operation and cooling.
- Do not touch the components of the hydrogen purification unit.
- Do not touch the components of the thermal skid.
- Do not touch water cooler components.
- Do not touch ambient heaters.

Hot surfaces on the process are indicated with the signage in Figure 6.



Figure 6. Thermal hazard signage

3.7. PRESSURE RISK

⚠	Risk of sudden expansion. Depressurise the gas lines before carrying out any work on the system.

The hazard associated with pressure vessels arises from the significant energy release if a vessel ruptures or bursts due to sudden fluid expansion.

The safety measures required to avoid any incidents are:

- Verify the conformity and condition of equipment containing gas: construction code, periodic checks, tests.
- Periodically inspect valves.
- Follow connection/disconnection procedures.
- Check for the absence of pressure before carrying out any work on the system.

3.8. GENERAL OPERATING INSTRUCTIONS

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The owner is responsible for the implementation of the system. The owner must provide the operator with this manual, in addition to the safety instructions associated with the host facility.

Safety instructions must consider the system's specific characteristics, especially the risks associated with the gases used and the host site.
Safety data sheets are available providing the main safety instructions and recommendations regarding the handling of fluids used during the operation of this electrolyser. The following table provides the reference of these safety data sheets for each fluid used.

Table 1: Safety Datasheet list

Fluid	Document
Hydrogen	C63-SDS-001
Oxygen	C63-SDS-002
Nitrogen	C63-SDS-003
Water	C63-SDS-004
Oil transformer	C63-SDS-005
Demineralized water	C63-SDS-006
MPG 40%	C63-SDS-007
R513-a	C63-SDS-008
Amberlite IRN 160	C63-SDS-010



These safety data sheets must be made available to the operator who is required to read them.

	Operation and maintenance of the electrolyser are restricted to qualified, trained, and authorized personnel only.

	Access to the machine is restricted to authorized personnel only.

	Entry into the A10 area while the machine is in Production, Stand-by, Sleep or Shutdown mode is STRICTLY PROHIBITED.

	Do not smoke near the electrolyser.

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	Do not use mobile phones near the electrolyser.

	Do not use heat or ignition sources near the electrolyser.

Wear protective equipment when working near the machine:

					
Safety goggles	Safety shoes	Safety helmet	Ear plugs/hearing protection	EXAT protective clothing	Gloves



THE FOLLOWING IS MANDATORY: Prior to entering the machine, inspect its interior using a portable oxygen and hydrogen detector. Ensure that sensors are present, functional, and worn by personnel during maintenance operations.

Use only tools suitable for electrical work (insulated tools).

Any modification of the electrolyser or its components is subject to authorisation from Elogen. Any modification without Elogen's authorisation will invalidate the Licensor's warranty.

Do not use the machine outside normal outdoor operating temperatures:
-8.4 °C to + 25 °C.

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4. TECHNICAL SPECIFICATIONS

4.1. MAIN TECHNICAL DATA

CHARACTERISTIC	VALUE	UNIT
GENERAL		
NUMBER OF STACKS	8	[-]
HYDROGEN FLOW PER STACK	31.25-62.5	Nm^3/h
OXYGEN FLOW PER STACK	15.75-31.25	Nm^3/h
PERFORMANCE		
HYDROGEN PRODUCTION	50-500	Nm^3/h
HYDROGEN OPERATING PRESSURE	0 - 30	barg
HYDROGEN PURITY	99.999	% vol
WATER CONTENT	< 5	ppm vol
OXYGEN CONTENT	< 5	ppm vol
OXYGEN PRODUCTION	25-250	Nm^3/h
OXYGEN OPERATING PRESSURE	0 - 11	barg
OXYGEN PURITY	99.89	% vol
WATER SUPPLY		
AVERAGE CONSUMPTION	402-804	L/h
PRESSURE	2 to 6	barg
SUPPLY WATER QUALITY		
CLOGGING INDEX	< 10	CFU/mL
CONDUCTIVITY	< 0,1	µS/cm (@25°C)
RECOMMENDED TEMPERATURE	5 to 35	°C
NITROGEN SUPPLY		
PRESSURE	7 to 9	barg
PURITY	99.8	% vol
COOLING LOOP 35 °C (ATMOSPHERIC LOOP)		
COOLING FLUID	MPG 40% with corrosion inhibitors	[-]
LOOP VOLUME (ESTIMATE)	2220	L
RECOMMENDED	-20 to 65	°C (@ atm)
FLOW (TO HE-600)	97	m^3/h
PUMP OUTLET PRESSURE	0 – 4	barg

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CHARACTERISTIC	VALUE	UNIT
HYDROGEN GAS COOLING LOOP 5 °C (ATMOSPHERIC LOOP)		
COOLING FLUID	MPG 40% with corrosion inhibitors	[-]
LOOP VOLUME (ESTIMATE)	770	L
TEMPERATURE	Inlet **WC-400/401** 11°C – Outlet 5°C	°C
FLOW	31	m^3/h
PUMP OUTLET PRESSURE	0 – 2.8	barg
OXYGEN GAS COOLING LOOP – 3 °C (ATMOSPHERIC LOOP)		
COOLING FLUID	MPG 40% with corrosion inhibitors	[-]
LOOP VOLUME (ESTIMATE)	770	L
TEMPERATURE	Inlet **WC-400/401** 11°C – Outlet 5°C	°C
FLOW	12	m^3/h
PUMP OUTLET PRESSURE	0 – 2.8	barg
EXTERNAL PARAMETERS		
AMBIENT OPERATING TEMPERATURE	-8.4 / +25	°C (@ atm)
AMBIENT STORAGE TEMPERATURE	+5 / 50	°C (@ atm)
MAXIMUM WIND SPEED	162	km/h
ATMOSPHERIC PRESSURE	1013	hPa (@ 0 m altitude)
MAXIMUM HUMIDITY RATE	95	%
ELECTRICAL DATA		
SPECIFICATIONS GRID	400V / 50Hz ± 2% / 3P + N + PE 6.6kV / 50Hz ± 2% / 3P	[-]
RATED ELECTROLYSIS POWER (RECTIFIERS & AUXILIARIES)	3423	kVA
RATED AUXILIARIES POWER	282	kVA
SYSTEM CHARACTERISTICS		
WEIGHT	Approx. 110500	kg
SOUND POWER	< 85	dB(A) @10 m

	The system requires an electricity supply for its climate regulation and frost protection functions. In the event of a power outage and negative outside temperatures, the operator has 1 hour[1] to put the machine in frost protection mode.

[1] According to UPS autonomy

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4.2. FLUID DIAGRAM

	See C63-PID-001 – Process and Instrumentation Diagram

4.3. ELECTRICAL DIAGRAM

	See C0063-FOR-DGM-EL-003 – Electrolyser Wiring Diagram

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5. PROCESS DESCRIPTION

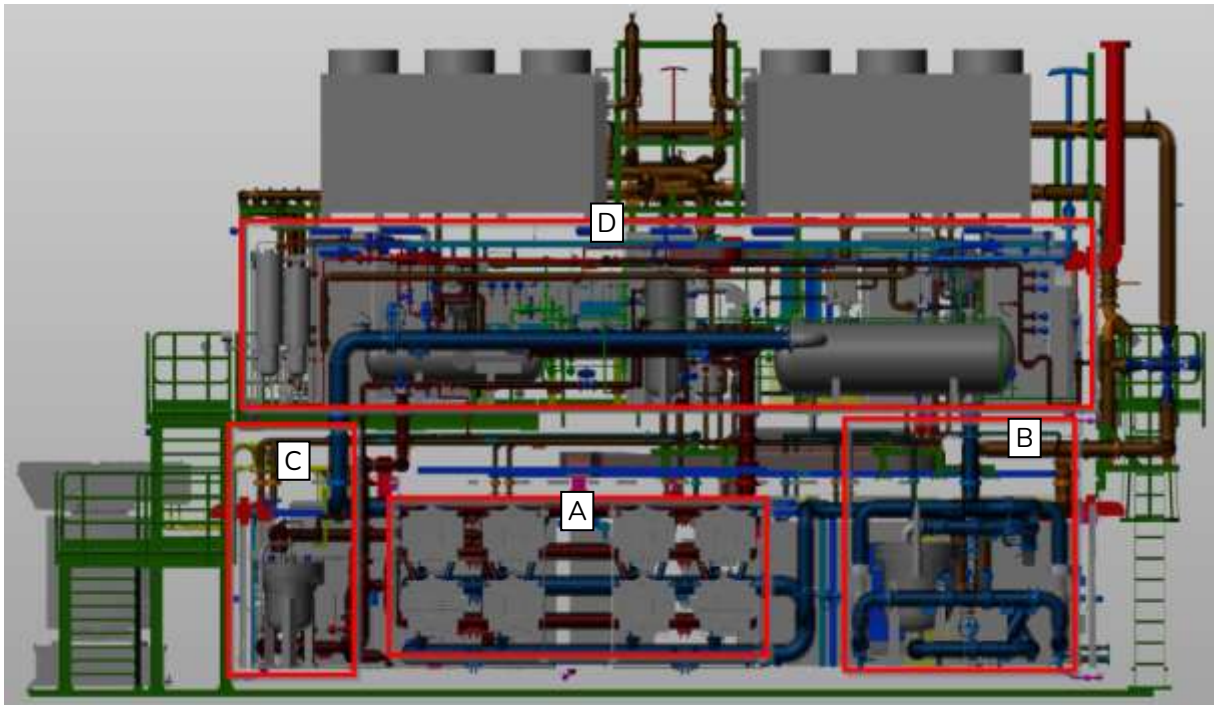


Figure 7. Zone division in the electrolyser - south view

Table 2. Items represented on electrolyser's south view

Item	Equipment / skid
A	A01: Process stack ground level
B	A02: Process BOP ground level O2
C	A03: Process BOP ground level H2
D	A10: Process BOP upper level

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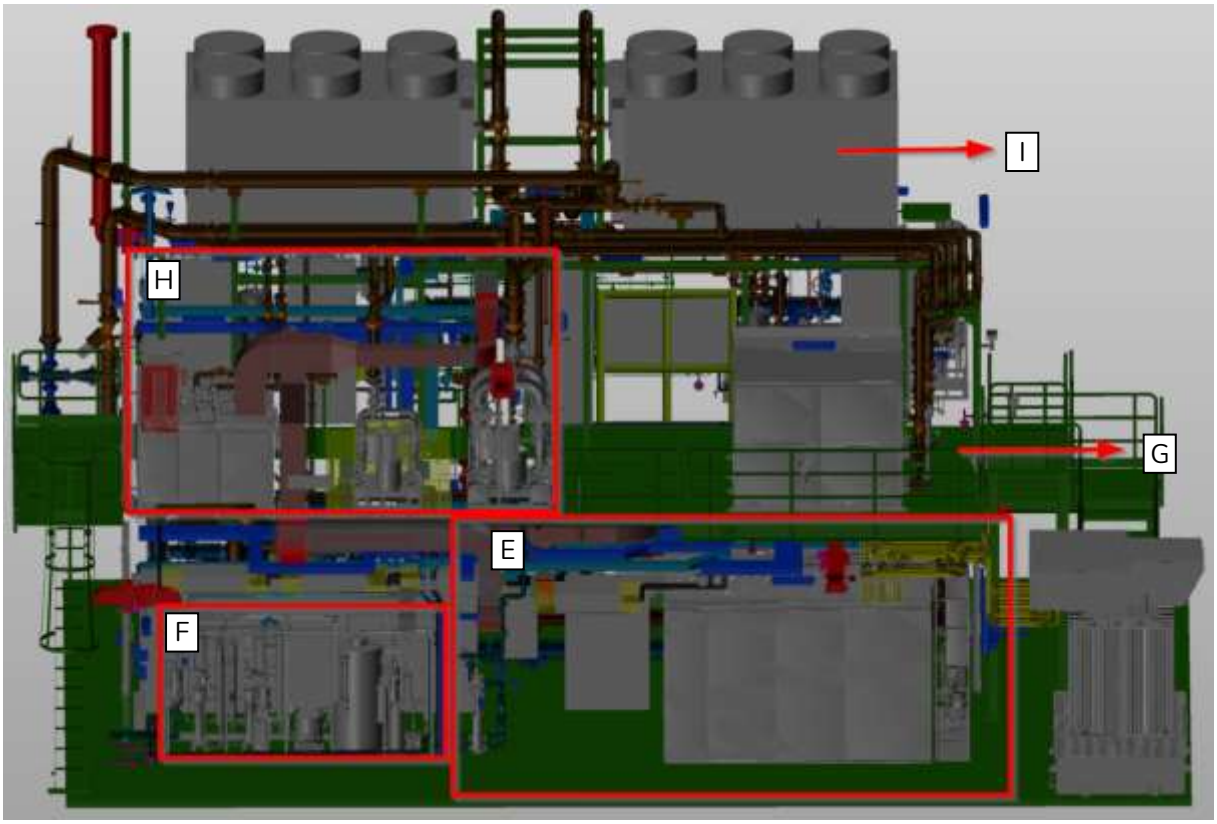


Figure 8: Zone division in the electrolyser - back view

Table 3. Items represented on electrolyser's back view

Item	Equipment / skid
E	B01: Electrical ground level
F	C01: WTP
G	D01: Area between containers 1&2
H	E01: HVAC container
I	X00: Interconnection & outdoor containers area

The purpose of this paragraph is to describe the electrolyser's operating process. Each component is identified by a **TAG number** in the fluid diagram (see section 4.2).

5.1. ELECTROLYSIS STACKS

Objective	Hydrogen production (H_2)
Reference	C63-PID-001, Folio 2/16
Zone	Process

The PEM stacks are supplied with ultra-pure water at anode and cathode. The electrolysis stacks are powered with direct current supplying enough energy to carry out the electrochemical reaction and move protons from anode to cathode through membrane. Hydrogen is produced at the cathode.

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The tension of each stack is monitored by a voltmeter (**VM-00X, X:1-8**) and the tension of each cell of a stack is monitored using the performance cell analyser (**PCA-00X, X:1-8**).

5.2. O_2 LOOP – *600*

Line number	600
Objective	Supply the set flowrate of pure water to the electrolysis stack Ensure thermal regulation of the stack
Reference	C63-PID-001, Folio 2,3&4/16
Zone	Process

The process is exothermic and requires ultra-pure water for its operation. The pumps **CP-600A/B** (2x 100% configuration) ensure a sufficient flowrate of pure water to the electrolysis stacks. The pressure transmitter PT-600 control the discharge pressure of the pumps, **PT-600** will start up the standby pump in case of the failure of the main pump or every 24hrs.

If the Electrolyser is stopped between this period the last pump which was running remains in memory, so the machine restart with the other pump and timer is reset. The pumps are equipped with a variator VAR-600A/B. They start the pump smoothly to prevent pressure surge and water hammer in the piping during every pump start-up.

A level switch low **LSL-600** (SIS) is installed to prevent dry run of the pumps **CP-600A/B**.

The pressure transmitter **PT-600A/B** are downstream each pump and measure the pressure of each pump to avoid exceeding design pressure of the loop.

HE-600 heat exchanger allows heat transfer from process to the secondary cooling loop 200.

The ion exchange resin contained in the filter housing **FH-600** allow to keep water at the set conductivity which is controlled by the combined conductivity and temperature sensor **CT/P-600**.

A flow transmitter **FT-600** (SIS) verifies that the flow rate to the electrolysis stacks is sufficient.

A mechanical filter **F-600** prevents the particles from entering in the flow into the stacks.

At the outlet of the stacks, temperature is controlled by temperature sensors (**TT-601X, X: A-H**).

Stacks can be isolated with the manual valve **HV-604** upstream and the manual valve HV-605 downstream. Those valves are respectively equipped with a limit switch **ZIO-604** and **ZIO-605** to prevent operation of the stacks with those valves closed.

Oxygen separator **ST-600** separates oxygen gas from water. Water level in oxygen separator **ST-600** is controlled by the level transmitter **LT-600**. When water level is low, the separator is filled with pure water thanks to the lift pumps **LP-300A/B** (2x 100% configuration), which pump the water from

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storage water tank (included in the water treatment package **WTP-300**) to **ST-600** through the valve **PV-300**. This valve is an ON/OFF pneumatic valve and is controlled by the **LT-600**. The pressure transmitter **PT-300** control the discharge pressure of the pumps, **PT-300** will start up the standby pump in case of the failure of the main pump.

A level switch high **LSH-600** (SIS) is installed to prevent water overfilling of the separator and flooding of the oxygen panel.

A level switch low **LSL-600** (SIS) is installed to prevent any damage to the pumps **CP-600 A/B**.

Pressure monitoring and control

In case of an overpressure in **ST-600**, a first alarm will be triggered when a set pressure, measured by the pressure transmitter **PT-610**, is reached. **PT-610** is mounted on a block and bleed valve (BBV-610) which allows the calibration of the pressure transmitter. If the pressure continues to rise higher than alarm pressure of PT-610, pressure transmitter **PT-611** (SIS) will trigger a safety stop when its set pressure is reached. Consequently, it stops the entire electrolyser (please refer to the cause &effect matrix for further details, C63-PWI-002) . PT-611 is mounted on a block and bleed valve (**BBV-611**) which allows the calibration of the pressure transmitter for safety purpose Finally, the last level of protection is the pressure safety valve **PSV-610**, which cracks at its set pressure.

Depressurization

During a normal stop, the electrolyser is depressurized through the motorized proportional valve **MPV-611**. During a safety stop (in case of an emergency), the electrolyser is slowly depressurized through the solenoid valve **PV-610**. The flow is restricted by the restriction orifice **RO-610** to limit the speed of the depressurization. In case the oxygen vent is obstructed, hence an overpressure is caused, the pressure transmitter PT-612 triggers a warning. A progressive blockage on the oxygen vent during operation occurred. For that, a maintenance operation cleaning is needed.

PT-612 is mounted on a block and bleed valve (**BBV-612**) which allows the calibration of the pressure transmitter.

A demister (**DEM-600**) is installed at the top of the oxygen separator **ST-600** outlet to remove water droplets from the gas flowing to the analysis panel.

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Prior to be either vented, or valorised for production, oxygen is directed through the heat exchanger **HE-610** to condense the residual liquid in the gas stream. Then it is conducted to the condensate separator **CS-610** to separate liquid water (condensate) from the oxygen gas.

The liquid water fills the condensate separator till the level switch high **LSH-610** is reached. This last trigger the opening of the solenoid valve **PV-600**, allowing the transfer of the condensate to the pure water supply, upstream lift pumps **LP-300A/B**, through the restriction orifice **RO-600**. When the level switch low is triggered **LSL-610** the transfer is stopped.
An additional pneumatic valve **PV-601** is closed if the level switch low **LSL-611** (SIS) is triggered to avoid transferring oxygen to the pure water line.

5.3. H_2 LOOP – *620*

Line number	620
Objective	Renew water at cathode
Reference	C63-PID-001, Folio 2,4&6/16
Zone	Process

The pumps **CP-620A/B** (2x 100% configuration) supplies a minimal flow (55% of the pump flowrate) required at the stack cathode. The pump is equipped with a variator **VAR-620A/B**. It starts the pump smoothly to prevent pressure surge and water hammer in the piping during every pump start-up.
The pressure transmitter **PT-620** control the discharge pressure of the pumps, **PT-620** will start up the standby pump in case of the failure of the main pump or every 24hrs. If the Electrolyser is stopped between this period the last pump to run remains in memory, so the machine restart with the other pump and timer is reset.
The pressure transmitter **PT-620A/B** are downstream each pump and measure the pressure of each pump to avoid exceeding design pressure of the loop.
A level switch low **LSL-620** (SIS) is installed in the **ST-620** to prevent a dry run of the pumps **CP-620A/B**.
Like loop 600, conductivity of water is kept at the set value thanks to the ion exchange resin contained in the filter housing **FH-620**. The conductivity is monitored with the combined conductivity and temperature sensor **CT/P-620**.
A mechanical filter **F-620** removes particles from water and a flow transmitter **FT-620** checks that the flow rate to the electrolysis stacks is sufficient.

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Hydrogen separator **ST-620** separates hydrogen from water. Water level in hydrogen separator ST-620 is controlled by the level transmitter **LT-620**. A low level will be detected by level switch low **LSL-620** (SIS).
The water level rise in the **ST-620** due to electro-osmotic flow (transfer from anodic water loop 600 to cathodic water loop 620). The level is controlled with the balancing line loop 640 which transfers the electro-osmotic flow from **ST-620** to **ST-600**.

The condensate separator **CS-630** separates liquid water from the hydrogen gas. The level switch high **LSH-631** on the **CS-630** aims to prevents water overfilling of downstream hydrogen gas lines.

The condensate liquid water fills the condensate separator till the level switch high **LSH-630** is reached. This last trigger the opening of the pneumatic valve **PV-620**, allowing the transfer of condensate liquid to the high-pressure degasser **DG-640** through the restriction orifice **RO-620**. When the level switch low **LSL-630** is triggered **the PV-620** closes stopping the transfer.

Pressure monitoring and control

The pressure in separator **ST-620** is controlled by the pressure transmitter **PT-630**. In case of an overpressure in **ST-620**, a first alarm will be triggered when a set pressure, measured by **PT-630**, is reached. **PT-630** is mounted on a block and bleed valve (**BBV-630**) which allows the calibration of the pressure transmitter. If the pressure rises higher than set pressure of PT-630, the pressure transmitter **PT-631** (SIS) triggers a safety stop when its set pressure is reached. **PT-631** is mounted on a block and bleed valve (**BBV-631**) which allows the calibration of the pressure transmitter for safety purpose. Finally, the last level of protection is the pressure safety valve **PSV-630** which cracks at its set pressure.

Depressurization

During a normal stop, the electrolyser is depressurized through the valve **PV-631** and a metering valve **MV-631**, which limits the flow of fluid. During a safety stop, the electrolyser is slowly depressurized through the valve **PV-630** and the restriction orifice **RO-630**, which regulates the flow and the speed of depressurizing. In case the vent is obstructed, hence an overpressure is caused, the pressure transmitter **PT-632** triggers a warning. **PT-632** is mounted on a block and bleed valve (**BBV-632**) which allows the calibration of the pressure transmitter.

Differential pressure between ST-600 and ST-620

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Differential pressure between the two separator is kept constant thanks to a control function based on **PT-630** and **PT-610**, which acts on the opening of a motorized proportional valve (**MPV-611**) and the ON/OFF pneumatic valve **PV-631**.

A reverse differential pressure or/and a too high differential pressure can damage the stacks, a safety stop is triggered as well by **PT-631** (SIS) and **PT-611** (SIS) if the differential threshold is exceeded.

5.4. INSTRUMENT PANEL

5.4.1. Oxygen Analysis Panel - 610

Line number[2]	610
Objective	Keep minimum pressure in oxygen gas analysis loop Control hydrogen content in oxygen produced
Reference	C63-PID-001, Folio 3/16
Area	Process

Prior to be analysed, oxygen is cooled down through the **ACO-610**, which condensates residual liquid in the gas stream and traps suspended droplets. The mechanical filter **F-610** removes the last traces of water from the oxygen gas to not distort the analysis measure. This filter can be drained by opening the manual valve **HV-610D**.

Fast loop is pressurized at 11 barg, the flow sent to the vent is 11 NL/min and controlled by the **FICV-611**. The fast loop allows the sample to be drawn under pressure, so that it can be brought more quickly to the analyser. This reduces the response time of the analysis system.

Sample for analysis is taken from this fast loop through the pressure reducing valve **PRV-610**.

The **PRV-610** expands the gas from 11 barg to around 0.5 barg. The pressure of the gas analysis line can be visually controlled with the pressure gauge PG mounting on the **PRV-610**.

The hydrogen in oxygen detectors **HIOD-610A/B/C** (SIS) (2oo3 voting) continuously control hydrogen content in the produced oxygen. A safety stop is triggered when 50% of LEL, which present 2% vol. (according to ISO 22734) is reached on two of the three detectors.

The flow analysed in each of these three detectors is 1 NL/min. This analysis flow is controlled and monitored by the flowrate indicator control valves **FICV-610A/B/C** (SIS), which trigger an alarm and safety stop when flowrate is too low on two of the three flow indicators.

[2] All components located in the oxygen section (oxygen separator's vapor line) are depicted in the fluid diagram with tag numbers beginning with 61X.

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The hydrogen in oxygen detectors **HIOD-610A/B/C** are calibrated thanks to a dedicated line closed by **HV-616**.

The following figure shows the arrangement of the oxygen zone contained in the instrument panel.

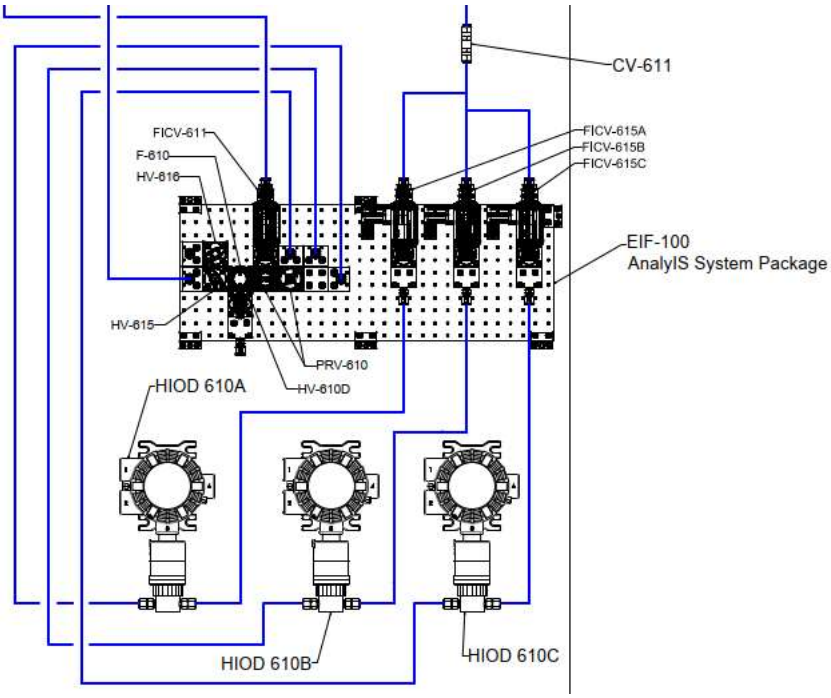


Figure 9: Oxygen section on instrument panel

The HV-616 valve is only used to calibrate the HIOD-610.

5.4.2. Hydrogen Analysis Panel – 800

Line number[3]	800
Objective	Analyze produced hydrogen
Reference	C63-PID-001, Folio 8/16
Zone	Process

The hydrogen is analysed before being sent to the customer's network. Analysed hydrogen is vented.

Pressure is reduced at 0.5 barg with the valve **PRV-800**.

The dew point transmitter **DPT-800A/B/C** (2oo3 voting) determines water content of the gas.

The oxygen content is measured using the oxygen in hydrogen detectors **OIHA-800A/B/C** (2oo3 voting). The control valve **FICV-800** (SIS) ensures a minimal flow analysed through **DPT-800A/B/C** and **OHIA-800A/B/C**.

[3] All components located in the hydrogen analysis section are depicted in the fluid diagram with tag numbers beginning with 80X.

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The 3-way valve **3WV-800** is used to calibrate the detectors **OIHA-800A/B/C**.

The **FICV-800** (SIS) ensures that a maximal hydrogen flow is not exceeded to avoid creating an hazardous area at the outlet of the Hydrogen Analysis Vent, if the rated flow is exceeded (4 NL/min) then the pneumatic valve **PV-800** is closed.

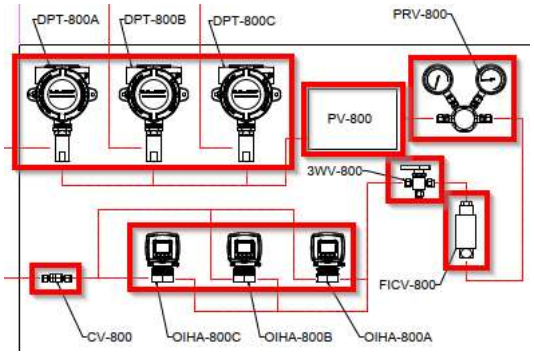


Figure 10: Hydrogen section on instrument panel

The 3-way valve (3WV-800) is used to calibrate the OIHA-800A/B/C.

5.4.3. Instrument air distribution panel – 150/980

Line number	980
Objective	Supply instrument air to pneumatic valves
Reference	C63-PID-001, Folio 9/16
Zone	Process

The actuation of pneumatic valves of both process and hydrogen purification package is insured by compressed air. A compressed air flow between 5 and 7 barg is required for the proper actuation of pneumatic valves. The pressure transmitter **PT-150** enables to check the pressure in the compressed air line, in case of a pressure below the set point, the pressure transmitter will trigger an alarm and stops the electrolyser. **PT-150** is mounted on a block and bleed valve (**BBV-150**).

A compressed air maintenance connection **HV-151** is predicted on the compressed air panel which enables the technician to use compressed air for compressor maintenance or cleaning.

The compressed air is delivered to the buffer tank **BTK-980** via the check valve **CV-980**. Downstream the buffer tank, compressed air is supplied to:

- the pneumatic valves of the hydrogen purification package **HPP-700**,
- the pneumatic valves of the water treatment package **WTP-300**,
- the pneumatic valve island **PVI-980** which is a distributor to **PV-631**, **PV-632**, **PV-632, PV-300**, **PV-901**, **PV-921**, **PV-620**, **PV-642**, **PV-633**, **PV-500** and **PV-640**,

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- the pneumatic valve island **PVI-900** which is a distributor to all pneumatic valves involved in the stop sequence: **PV-900**, **PV-920**, **PV-601**, **PV-610**, **PV-630**, **PV-635**, **PV-641**, **PV-800**, **PV-501**. Each pneumatic valve is piloted thanks to a solenoid valve. **SV-900**, **SV-920**, **SV-601**, **SV-610**, **SV-630**, **SV-635**, **SV-641**, **SV-800** and **SV-501**.

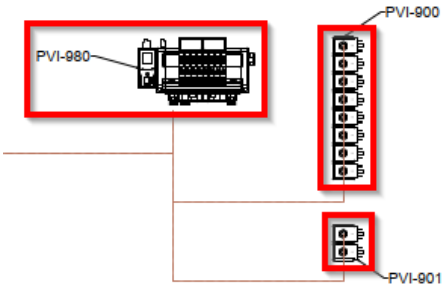


Figure 11: Compressed air section on instrument panel

5.5. H_2 LINE – *630*

Line number	630
Objective	Pre-dry hydrogen by condensation before purification
Reference	C63-PID-001, Folio 6&7/16
Zone	Process

A demister **DEM-620** installed at the top of the hydrogen separator **ST-620** to ensure no water droplet in the outlet hydrogen flow.

The produced hydrogen is directed to the heat exchangers **HE-630** and **HE-631** (2x 50% configuration). These heat exchangers cool down the hydrogen thanks to the secondary cooling fluid flow of loop 400 and also take a part of the water content in the gas by condensation. The condensed water is directed back to the process by means of the condensate separator **CS-630**, where liquid water is separated from the gas.

A demister **DEM-630** installed at the top of the condensate separator **CS-630** to ensure no water droplet in the outlet flow.

5.6. BALANCING LINE - *640*

Line number	640
Objective	Transfer water from hydrogen loop 620 to oxygen loop 600
Reference	C63-PID-001, Folio 7/16
Zone	Process

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In normal operation, the electrolysis stack transfers water from anode to cathode. This phenomenon, called cross-permeation, regularly increases the water level in the hydrogen loop. To keep the balancing between hydrogen separator and oxygen separator, a water transfer line from hydrogen separator ST-620 to oxygen separator ST-600 should be provided.

The differential pressure between hydrogen loop and oxygen loop is used to direct water from the hydrogen separator **ST-620** to the oxygen separator **ST-600** (differential pressure controlled with two transmitters PT-630 and **PT-610** and secure by two others **PT-631** (SIS) and **PT-610** (SIS)).

The pressure of the water is decreased until 13 barg by the water pressure reducer valve **PRV-640** and its flowrate is manually regulated by the metering valve **MV-640**. A flow switch **FSH-640** helps to set the right flowrate and trigger an alarm if the flowrate is too high. **FSH-640** closes **PV-641** and trigger a safety stop if the rated balancing flowrate is exceeded. It prevents transferring water from hydrogen separator **ST-620** to oxygen separator **ST-600** which has not spent sufficient time in the degasser **DG-640** to remove hydrogen bubbles.

The opening of the valve **PV-640** is controlled by the water levels in **ST-600** and **ST-620**, whereas the opening of the valve **PV-642** is controlled by the water level in the degasser **DG-640**. Hydrogen is flushed to vent through the metering valve **MV-642**.

Due to pressure decrease, the hydrogen dissolved in water is degassed in the **DG-640** and goes upward in the top of the **DG-640** creating a small pocket of hydrogen.

Level control loop is based on **LSH-640** and **LSL-640**. When **LSL-640** is triggered, **PV-642** is opened till the hydrogen gaseous sky reaches **LSH-640**.

The level switch **LSL-641** (SIS) is triggered when the level of water in the degasser **DG-640** is too low. It triggers fault and closes **PV-641** to avoid transferring hydrogen gas (from **DG-640**) to oxygen separator **ST-600**.

5.7. H_2 PURIFICATION – *700*

Line number	700
Objective	Dry and purify produced hydrogen
Reference	C63-PID-001, Folio 11/16
Zone	Process

After the hydrogen/water separation thanks to cooling/condensation, the hydrogen is directed to the hydrogen purification package **HPP-700** to enter the deoxidizer reactor **61** to eliminate oxygen traces by recombining oxygen with hydrogen on a palladium catalyst.

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The hydrogen is then dried up by either drying columns **64A** or **64B**. One column dries up the gas while the other is either regenerated or is in standby.

Each pressure vessel from the purification unit is protected by a pressure safety valve (**PSV 64.1** and **PSV 64.2**)

Please refer to the user manual of the hydrogen purification package (DEDR 500_36 Installation Commissioning Operation and Maintenance Manual Rev.0) for more information about its operation.

5.8. H_2 DISTRIBUTION PANEL – *631*

Line number	631
Objective	Manage the hydrogen distribution to customer at set pressure and purity
Reference	C63-PID-001, Folio 8/16
Zone	Process

The back pressure valve **MPV-630** keeps the hydrogen pressure stable in the electrolyser regardless of the produced hydrogen flowrate.

The check valve **CV-633** prevents hydrogen in downstream network from coming back to the machine.

The controlled isolation valve **PV-633** (SIS) isolates customer installation when machine stops or hydrogen purity unachieved.

The valve **PV-632** evacuates non-compliant hydrogen to vent. Hydrogen is vented through **MV-632**.

The hand valve **HV-931** connects to the vent the flow transmitter **FT-630** to purge it with nitrogen (by opening the hand valve **HV-930**) for replacement/maintenance purposes.

The valve **PV-635** is used to isolate the customer line from the electrolyser in case of a sudden and important pressure drop in hydrogen pressure (leak case). The pressure transmitter **PT-633 (SIS)** measures the pressure of the customer line.

Hydrogen produced flowrate is measured using the flowrate transmitter FT-630.

5.9. WATER SUPPLY – *300*

Line number	300
Objective	Supply pure water: • Loop 600, only in production • Loops 600 and 620 in maintenance mode
Reference	C63-PID-001, Folio 1/16
Zone	Process

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At the electrolyser inlet, desalinated water is purified by the water treatment package **WTP-300** and is stored in a demineralized tank. Water level of this storage tank is monitored with the level transmitter **LISA-1B1**.

The conductivity of the water stored in the demineralized tank is under 0,1 µS/cm and is controlled by the conductivity indicator **QIA-1B4**. Water in the demineralized tank can be drained by **HV-301D**.

The pumps **LP-300A/B** (2x 100% configuration) feed the oxygen loop 600 through the three-way valve **3WV-320**.

For the first start up, **ST-620** is filled thanks to the same **3WV-320** and **LP-300A/B**.

5.10. N_2 DISTRIBUTION PANEL – *900*

Line number	900
Objective	Supply nitrogen to process for blanketing
Reference	C63-PID-001, Folio 9/16
Zone	Process

The nitrogen flow at a minimum pressure of 7 barg is required for the maintenance and blanketing of the electrolyser. If the inlet nitrogen pressure, measured by the pressure transmitter PT-910, is too low, the electrolyser triggers an alarm and stops. **PT-910** is mounted on a block and bleed valve (BBV-910). Customer shall install the appropriate regulator when needed, for instance downstream a nitrogen cylinder rack.

The pressure safety valve **PSV-900** set to 10 barg protects the nitrogen supply against overpressure in case the regulator installed on the nitrogen rack fails. Should it fail, nitrogen would be flushed to the oxygen vent. The pressure transmitter **PT-910** enables to check the pressure of the nitrogen supply line.

A nitrogen maintenance connection **HV-911** is available on the nitrogen panel which enables the technician to use nitrogen for tooling or cleaning.

Nitrogen can be delivered to:

- O2 separator **ST-600** by two different paths: through **PV-900/MV-900/FT-900** and through **PV-901/MV-901/FT-901** respectively for a safety and a normal blanketing,
- H2 separator **ST-620** by two different paths: through **PV-920/MV-920/FT-920** and through **PV-921/MV-921/FT-921** respectively for a safety and normal blanketing,
- Hydrogen distribution panel (for maintenance of **FT-630**) through the manual valves **HV-930** and **HV-931**,

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- High pressure degasser **DG-640** through the manual **valve HV-940** (for maintenance)

The nitrogen flowrate for O2 side blanketing can be manually controlled by the metering valves **MV-900** and **MV-901** which can be properly set with the help of the flow transmitters **FT-900** and **FT-901**.

Depending on the type of blanketing (namely normal or safety blanketing), one of the two pneumatic valves **PV-900** and **PV-901** opens (respectively **PV-901** or **PV-900**) allowing the supply of nitrogen to the **ST-600** at the appropriate rate and during the appropriate time for each type of blanketing.

In case of double check valve leak (**CV-900** & **CV-901** – using 2 different technology), the pressure transmitter **PT-900** will indicate a rise in pressure due to oxygen presence and will stop the machine without nitrogen purge. **PT-900** is mounted on a block and bleed valve (**BBV-900**).

The H2 side blanketing is realized with the same method than the O2 side.

5.11. THERMAL LOOPS – *200* & *400*

These secondary loops regulate the temperature of the primary loops:

- Loop 200 (45°C) is used to cool the process and the water cooler condenser.
- Loop 400 (3°C) is used to cool the hydrogen and oxygen gases.

The cooling fluid in loop 200 and loop 400 is Monopropylene glycol (MPG) at 40% containing corrosion inhibitors that protect the loops against freezing to -20°C.

These coolants are managed in the **THS-200** thermal skid and **WC-400** and **WC-401** water coolers. The **DC-200** and **DC-201** air coolers are associated with the cooling loop 200.

Optional: two connections can be made available to collect fluid from the cooling circuit to restore its thermal power.

5.11.1. Process cooling loop – *200*

Line number	200
Objective	Regulates process temperature
Reference	C63-PID-001, Folio 10/16
Zone	Process – Utilities

The cooling fluid circulates through the process heat exchanger **HE-600** to cool down the water injected in the stacks since the electrochemical reaction is exothermic. The cooling fluid comes back from the process skid in a temperature of 45°C and cools down in the dry coolers **DC-200** and **DC-**

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201 (2x 50% configuration) down to around 35°C. After the dry coolers, the cooling fluid circulates through the condensation water skid where **CP-200A** (PUMP N°3) and **CP-200B** (PUMP N°4) (2x 100% configuration) send it back to **HE-600**.

The motorised three-way valve **M3WV-200** controls the amount of cooling fluid to the heat exchanger **HE-600** and recirculated within the **DC-200/201** and **THS-200**.

The **TS-154** measures the temperature of MPG40% downstream heat exchanger (**HE-600**) and the **TT-126** measures the temperature of MPG40% upstream the **HE-600**.

The relief valve **RV-200** protects the O2 loop cooling loop against overpressure due to dilatation.

5.11.2. Gas cooling loop – *400*

Line number	400
Objective	Cool down the gas H2 and O2 For internal HVAC needs (FCUs, AHU). Cool down the rectifiers via Hydraulic cooling unit. Cooling need for HPP system
Reference	C63-PID-001, Folio 10/16
Zone	Process – Utilities

The cooling loop-400 is composed mainly from skid pump distribution (**THS-400**), and two water chillers **WC-400/401** (2x 50% configuration) with two independent refrigerating circuits (refrigerant fluid: R513a).

This chilled water is used for three different purposes explained below.

- Gas cooling

The oxygen flows out of **ST-600** and passes through heat exchanger **HE-610**, which condensates the residual liquid in the oxygen gas stream.

For the same goal, the hydrogen flows out of **ST-620** is directed to heat exchangers **HE-630** and **HE-631**.

Cooling fluid is cooled down through the water chiller **WC-400** and **WC-401** and directed to **HE-630** and **HE-631** at 5°C via the metering valve **MV-320**. Then the cooling fluid goes to **HE-610** and **ACO-610**. Finally, it goes to the hydrogen purification package **HPP-700** to condensate water in the hydrogen used for regeneration.

The **TT-60** measures the temperature of MPG downstream both **WC-400/401**. The **TT-25** measures the temperature of MPG downstream thermal load.

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The relief valve **RV-400** protects the hydrogen gas cooling loop from overpressure.

An air vent is installed downstream each heat exchanger allowing to degas the bubbles present at the first start or in case of a heat exchanger failure (**AV-400** for **HE-630**, **AV-401** for **HE-631** and **AV-402** for **HE-610**).

- Ambient air cooling (HVAC system)

The electrolyser is equipped with an air handling unit (**AHU-400**) in the HVAC room E01 for the treatment of fresh air in different rooms. It also ensures the overpressure to prevent the air infiltration in rooms.

The **AHU-400** deals with heat dissipation and air renewal in the following rooms:

- A01– Stack room
- B01–Electrical room (Rectifiers+ control cabinets)
- C01–Water Treatment Package room
- E01–HVAC room
- A10 – Hydrogen process container
- A02 – O2 process room
- A03 – H2 process room

The **AHU-400** distribute fresh air to rooms thanks to ductwork.

The B01 room,which has the most important heat load, is equipped also with 4 fan coil units (**FCU-400/401/402/403)**) where heat is transferred to the cooling water. Cold battery of each unit is connected to cooling water network and controlled by a three-way-valve.

- Rectifier cooling

The hydraulic cooling unit **HCU-400** is supplied by cooling water at 5°C through the metering valve **MV-318**. Then the cooling water is divided to cool down the two rectifiers **REC-001** and **REC-002**.

The **HCU-400** allows to avoid cooling down the rectifier's units with too cold temperatures, thus, no condensation are expected.

5.12. DRAIN – *500*

Line number	500
Objective	Collect all drains present in the electrolyser
Reference	C63-PID-001, Folio 1/16
Zone	Utilities – Process

Loop 500 collects, on one hand, the retentate of the water purification package **WTP-300**, condensate water from **FCU-400/401/402/403** and **AHU-400** and, on the other hand, the condensates from hydrogen vent condensates and hydrogen purification condensates

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At the lowest point of the hydrogen vent collector a siphon prevents water to go back to hydrogen vent. Four level switches monitor the level of the collected condensate in the hydrogen vent: **LSH-500** and **LSHH-500** (SIS) for too high level, **LSL-500** and **LSLL-500** (SIS) for too low level.

5.13. AMBIENT – *1000*

Line number	1000
Objective	Monitor hydrogen content in the ambient area Declaring an emergency Monitor minimal ambient temperature in the rooms
Reference	C63-PID-001, Folio 12&13/16
Zone	Process area

5.13.1. Safety devices

The ambient hydrogen detectors AHD-1001 (SIS) and AHD-1004 (SIS) are installed on the level 00. They are respectively located in the H2 process room (A03 area) and in the stack room (A01 area). Both are closed to the ventilation exit to detect any hydrogen leak in these areas.
The AHD-1000 (SIS), AHD-1003 (SIS) and AHD-1002 (SIS) are installed on the level 01. One of them (AHD-1000), catalytic technology, is installed close the hydrogen purification which is the unit full of hydrogen showing the biggest number of fittings. A similar detector (AHD-1003) is located at the opposite side. The entire upper level is finally covered with detection of hydrogen leak thanks to the AHD-1002.

Three light columns **VE** coupled with a buzzer **BUZ** are installed on three prominent extremities of the whole installation. The light column can either be a continuous light or flashing. Its colour and flashing type have different meanings, which are listed hereafter:

Colour	Meaning
STEADY GREEN	Electrolyser powered, off or on standby.
GREEN BLINKING (1 s ON / 1 s OFF)	In production
STEADY ORANGE	Presence of a Warning
BLINKING RED (1 s ON / 1 s OFF)	Presence of a Major Fault
STEADY RED	Presence of a Safety Fault
STEADY BLUE	At least one maintenance task must be performed
BLINKING BLUE (1 s ON / 1 s OFF)	At least one maintenance task will arrive soon
BUZZER ACTIVATED	At least one Safety Fault is present
INTERMITTENT BUZZER (2 s ON / 2 s OFF)	Warning on HIOD-610 Warning on **AHD-100X (X,0:4)**

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SSI-1000 stands for *System Security Incendies*, in case of detected fire by the following devices:

- smoke detectors installed (2oo3 voting) inside:
  - A01 – Stack room: SD-001A/B/C
  - A02 – O2 process room: SD-005A/B/C
  - A03 – H2 process room: SD-003A/B/C
  - **A10** – Hydrogen process container: SD-006A/B/C.
  - **E01** – HVAC container: SD-007A/B/C.
  - **B01** – Electrical room: SD-002A/B/C
  - **C01** – Water treatment package: SD-004A/B/C
  - Control cabinet (in B01 area): SD-008A/B/C

- fire buttons (**FB-00X, X:1,5)** triggered by an operator. They are installed outside and inside containers; the SSI-1000 sends a safety signal to stop the installation.

Emergency Shutdown Devices (ESD-00X, X:1-7). Five of them are present outside the containers and the two others are inside, all triggering a safety shutdown of the installation.

Customer has an **AUC** ("Arret Urgence Client" in French, Emergency Shutdown Customer in English) to trigger a safety stop from their installation. Electrolyser package sends two safety signals to the PLC of client. **ASE-001** for fire and gas case, **ASE-002** for all other safety stop case.
Door switches (**DS-00X, X:1-12**) trigger a normal stop (Major Fault) of the installation when the doors are opened by operator to prevent any physical harm.

5.13.2. Complementary devices

The heating preventing the system from freezing is done by electrical wall heaters (EH-100X, X:1-7) installed in each room. The electrical supply of heater is controlled thanks to the temperature & hydrometry transmitter (**TT/HY**-100X, X:1-7) present inside each room:

- **B01** – Electrical room: **EH-1001** & **TT/HY-1004**
- **C01** – Water treatment package: **EH-1002** & **TT/HY-1001**
- **A01** – Stack room: **EH-1003** &**TT/HY-1003**
- **A02** – O2/H2process room: **EH-1004** & **TT-HY-1002**
- **A10** – Hydrogen process container: **EH-1006** & **TT/HY1006**

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- **E01** – HVAC container: **EH-1007**& **TT/HY-1005**

All the piping, instrumentation and equipment installed outdoor containing water needs to be protected from freezing. heating ribbons (**HR-xxx**) are installed for that purpose. The heat ribbons are detailed in the C63-PID-001

Water leak detector (**WLD-00X, X:1-6)** installed in lowest point aim to detect any water leak: **WLD-001** for A02, **WLD-002** for A01, **WLD-003** for rectifier room, **WLD-004** for water treatment room, **WLD-005** for process room (level 01), **WLD-006** for HVAC container.

Electric meters **PQ-001/002/003/004** measure the power consumption of the electrolyser.
Rectifiers **REC-001/002** convert alternative to continuous current for the stacks. On these rectifiers, current and tension are monitored with **IM-001/002** and **VM-009/010**.

6. INSTALLATION

6.1. GENERAL RECOMMENDATIONS

The system must be installed outdoors on flat, horizontal ground (slope < 1%) compatible with the loads presented on General Arrangement Drawing (C63-GAD-001).

The installation area must provide a connection point for the containers to be grounded.

All doors and emergency stop buttons must always be clear.

All maintenance easements must be clear and accessible for forklift-type handling equipment.

6.2. TRANSPORTATION, STORAGE AND HANDLING

	The system must be shut down according to the procedure provided for this purpose. Gas and electricity connections must be disconnected from the networks.

Parameter	Values
Transport and storage temperature	+5°C / +50°C
Ambient relative humidity	30 to 95%

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6.3. HANDLING & ELECTROLYSER INSTALLATION

6.3.1. Electrolyser & Auxiliaries

	For more details, please refer to the **FORES** Instruction of Lifting and manutention.

6.3.2. Special considerations for Oxygen and Hydrogen vents

6.3.2.1. H_2 Analysis vent

The H_2 vent is secured using the H_2 vent connection plate.

1. First ensure that the protective cap on the H2 vent pipe has been removed.
2. Check that the vent is clean.
3. Check that the vent is properly grounded (resistance < 25 ohms)

	Ground continuity must be ensured at the vent. Resistance must not exceed 25 ohms.



Figure 12: Hydrogen Analysis vent

6.3.2.2. O_2 vent

The O_2 vent is fixed using the O_2 vent connection plate.

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1. Check that vent is clean.
2. Install and secure the O2 vent to the mounting flange, taking care to install the flange gasket.
3. Check that the vent is properly grounded (resistance < 25 ohms).

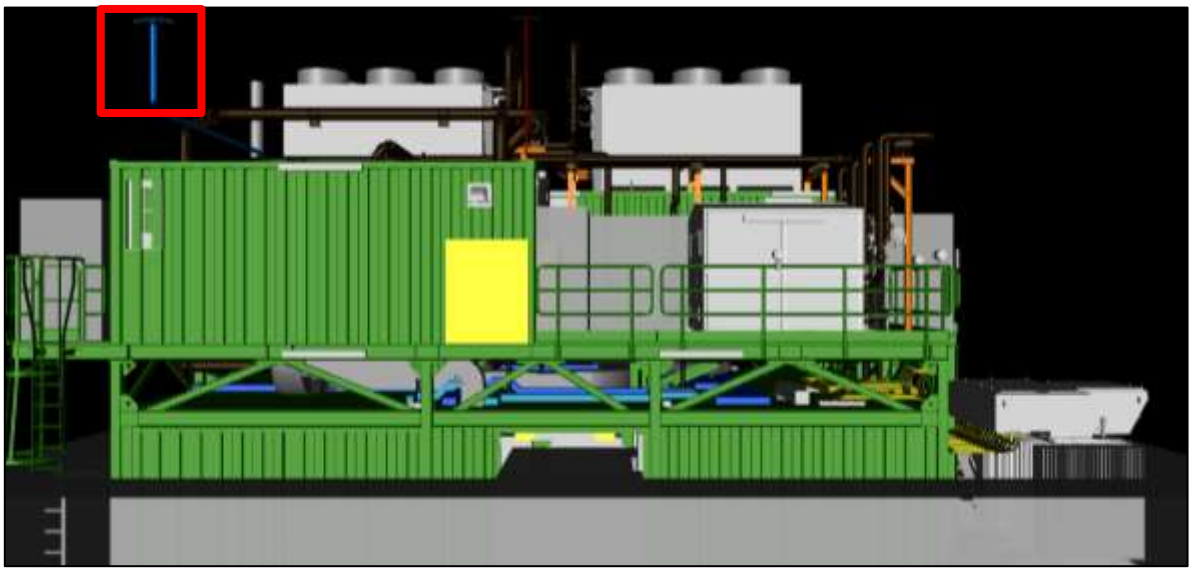
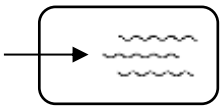
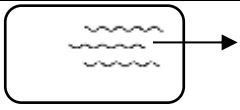


Figure 13: O2 vent

⚠	Ground continuity must be ensured at the vent. Resistance must not exceed 25 ohms.

6.4. PROCESS CONNECTIONS

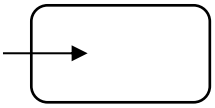
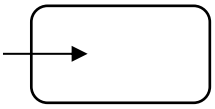
6.4.1. Liquid Interfaces

POINTS OF REFERENCE	DESCRIPTION
 Raw Water (6 barg max)	Refer to **C60-ESE-PE-001-D(GAD) – General Arrangement Drawing** ⚠ Protection of the inlet against frost is strongly recommended. Clean the supply hose before connecting it to the machine.
 Drain water (Atm)	Refer to **C60-ESE-PE-001-D(GAD) – General Arrangement Drawing**

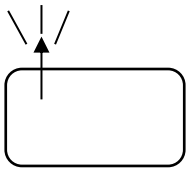
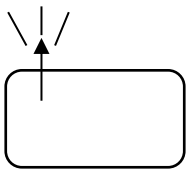
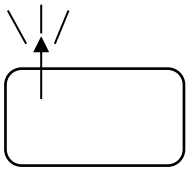
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POINTS OF REFERENCE	DESCRIPTION
	H2 traces are expected in drain water
	Protection of the drain against frost is strongly recommended. Reduction of the drain section and installation of components or elements that could obstruct drainage are prohibited.

6.4.2. Gas Interface

POINTS OF REFERENCE	DESCRIPTION
 H_2 production (30 barg)	Refer to **C60-ESE-PE-001-D(GAD) – General Arrangement Drawing** Use only materials compatible with hydrogen gas. Do not reduce the pipe section.
 N2 (7 barg)	Refer to **C60-ESE-PE-001-D(GAD) – General Arrengement Drawing** Pressure reducing valves allowing the supply of gas at a pressure of 7 barg are not supplied with the electrolyser and must be installed by the customer.
 Instrument Air (7 barg)	Refer to **C60-ESE-PE-001-D(GAD) – General Arrengement Drawing** Pressure reducing valves allowing the supply of gas at a pressure of 7 barg are not supplied with the electrolyser and must be installed by the customer.

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POINTS OF REFERENCE	DESCRIPTION
 H_2 vent connection	Refer to **C60-ESE-PE-001-D(GAD) – General Arrangement Drawing**
 H_2 Analysis vent	Refer to **C60-ESE-PE-001-D(GAD) – General Arrangement Drawing**
 O_2 vent connection	Refer to **C60-ESE-PE-001-D(GAD) – General Arrangement Drawing**

6.5. ELECTRICAL CONNECTIONS

	BEFORE ANY ATTEMPT TO CONNECT THE ELECTRICAL POWER CABLES, ENSURE THAT: ➢ all fluid connections are properly installed; ➢ all manual valves are properly adjusted; ➢ the main transformer is de-energised.

	BEFORE ANY ATTEMPT TO CONNECT THE ELECTRICAL POWER CABLES, ENSURE THAT: ➢ The main circuit breaker of the machine is turned off.

	USE ONLY ELECTRICALLY INSULATED TOOLS.

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⚠	ONLY QUALIFIED AND AUTHORISED PERSONNEL CAN WORK ON ELECTRICAL CONNECTIONS.

⚠	IT IS THE CUSTOMER'S RESPONSIBILITY TO COMPLY WITH THE ABOVE REQUIREMENTS.

6.5.1. Power

The electrolyser control panel is powered by a main power supply with the following characteristics: 400 VAC, 3P (three-phase) + N (neutral) + PE (protective earthing), 50Hz.

The electrical supply must be protected against an overcurrent/overload of 630A circuit breaker.
The maximal short circuit current of the control panel is 36kA. The earth diagram is TN-S.

6.5.2. Grounding

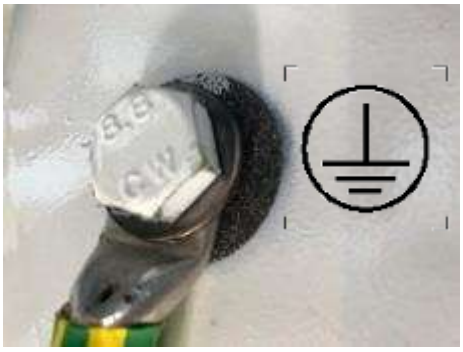
TYPE	DESCRIPTION
400 VAC power supply	The LV power cables pass between the rectifier container and transformer are connected to the electrolyser at the location provided for this purpose. Refer to the electrical diagram for connecting the cables and the "**Technical Specification for Interconnection Lines**" document. There is a circuit breaker (**1QF3**) on the electrical control cabinet that can be used to turn off and isolate from the general 400 VAC power supply coming from client's LV switchgear. See: "*Appendix B: Electrical Diagram*" ⚠ The installer must provide adequate protection on this power supply. The size of the protection must comply with applicable local standards and installation neutral system guidelines.

The earth bars in the container must be grounded by the customer. The container must also be connected grounded using the earth stakes outdoors (no M12X1.5 screw).

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⚠	Testing of earthing resistance must comply with CEI 60204-1.

⚠	Check that electrical contacts are: ➢ not corroded ➢ or damaged

BAD PRACTICE	GOOD PRACTICE
 	  

6.5.3. Communication

6.5.3.1. Piloting

Via Profinet

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To connect to the electrolyser via Profinet, a Profinet cable can be connected to the PN/PN coupler, in accordance with the electrical diagram.

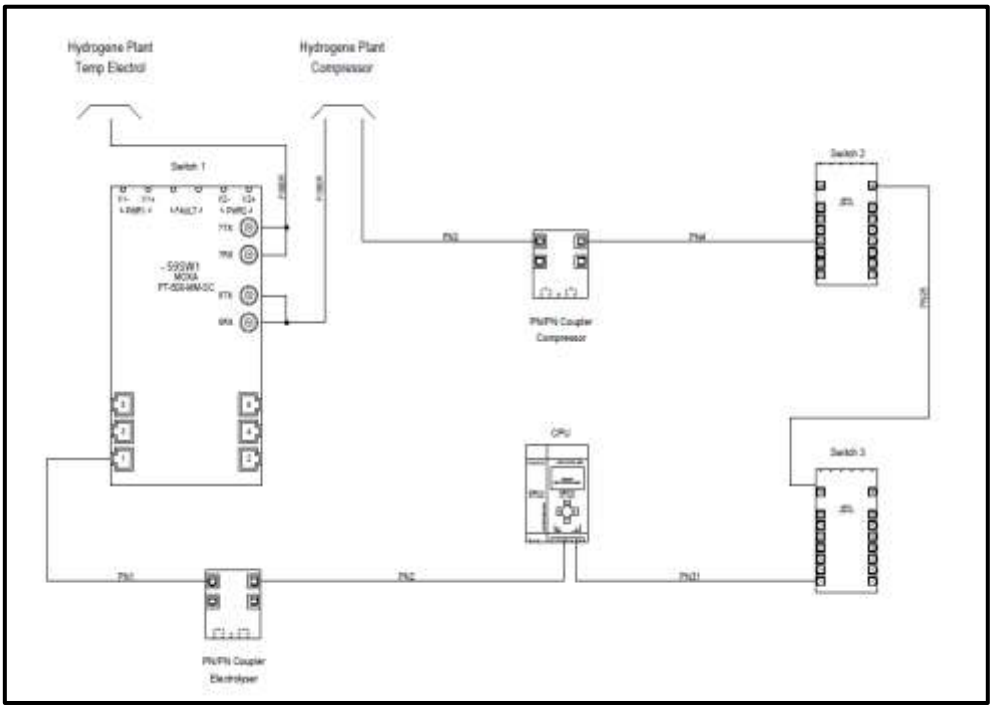


Figure 14: Connection to electrolyser via the PN/PN coupler

6.5.3.2. Interfaces with the customer

Some communication cables/buttons are connected to the customer network. The connections are detailed in the following table by terminal block:

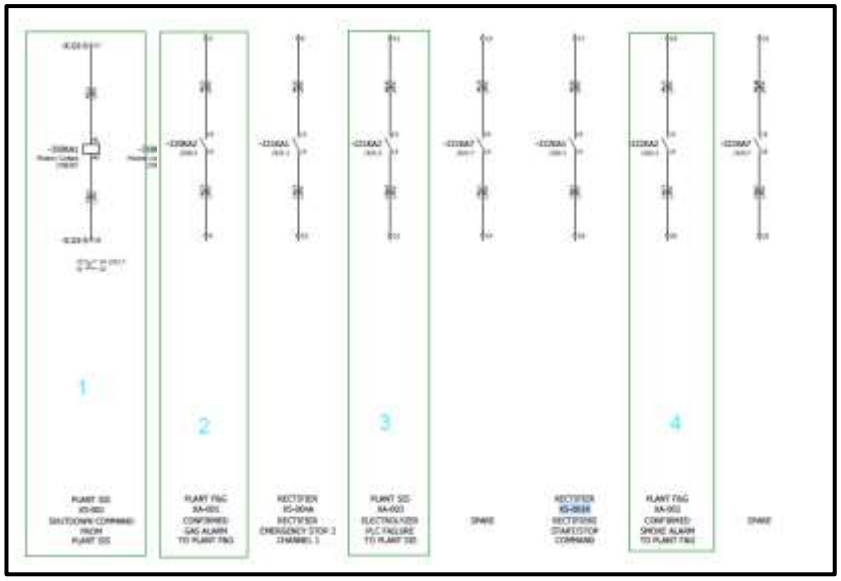
Item	Description
XM1 terminal block	

Figure 15: XM1 terminal block

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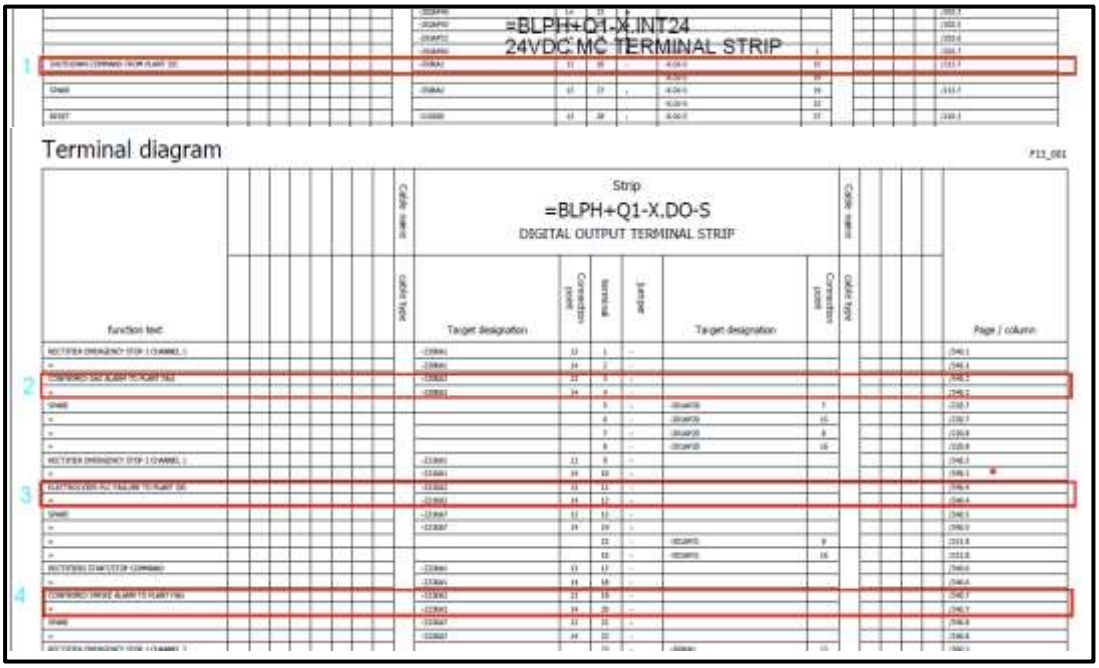
<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td></td><td>


Figure 16: Terminal diagram. Digital output terminal strip.
The connections of the customer interfaces on this terminal block are detailed below:
<table>
<tr><th>Diagram number</th><th>Signal type</th><th>Cable name</th><th>Process tag</th><th>Electrolyser input/output</th><th>Cable specification</th></tr>
<tr><td>1</td><td>Power setpoint</td><td>Customer power set</td><td></td><td>Input</td><td>LYFLEX B 2x1^2</td></tr>
</table>
</td></tr>
<tr><td>XT-2 terminal block</td><td>
The customer interfaces on this terminal block are detailed below:
<table>
<tr><th>Diagram number</th><th>Signal type</th><th>Cable name</th><th>Process tag</th><th>Electrolyser input/output</th></tr>
<tr><td>1</td><td>SHUTDOWN COMMAND FROM PLANT SIS</td><td>AUC-001</td><td>XS-001</td><td>Input</td></tr>
<tr><td>2</td><td>CONFIRMED GAS ALARM TO PLANT F&G</td><td>AUC-002</td><td>XA-001</td><td>Output</td></tr>
<tr><td>3</td><td>ELECTROLYZER PLC FAILURE TO PLANT SIS</td><td></td><td>XA-003</td><td>Output</td></tr>
<tr><td>4</td><td>CONFIRMED SMOKE ALARM TO PLANT F&G</td><td></td><td>XA-002</td><td>Output</td></tr>
</table>
</td></tr>
</table>

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7. SYSTEM OPERATION

7.1. GENERAL REMARKS

	Note: the electrolyser is equipped with a TSA hydrogen purification system. Regeneration is automatically controlled by the PLC and requires no human intervention.

	Caution: In the event of a normal machine shutdown, if regeneration is in progress, the electrolyser will continue to run at reduced output until the column is fully regenerated. Only an IP1 or SIS Fault will stop regeneration.

7.1.1. Operator Training

The system is operated by persons duly trained by Elogen or a company designated by Elogen.

7.1.2. System Commissioning

The system is commissioned by Elogen or a company designated by Elogen.

7.2. FIRST START

7.2.1. Stage

STAGE	ACTION	DESCRIPTION
1	Preliminary checks	1. The system is installed in accordance with paragraph 6 - INSTALLATION. 2. Check the grounding resistance. 3. The installation site meets the above requirements. 4. Close the **HV-300** valve. 5. Open the public water supply to the machine. 6. Check water conductivity. If conductivity is greater than 1000µs/cm, use another water supply. 7. Open the **HV-300** valve. 8. Open manual valves in accordance with the P&ID. 9. Close manual valves in accordance with the P&ID.  Refer to C63-PID-001 – Process and Instrumentation Diagram

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<table>
<tr><td>2</td><td>Powering up the machine</td><td>1. Switch ON 400Vac on customer switchgear (SG-200N1).
2. Switch ON 400Vac on the control cabinet (1QF3)
3. 3 Phases presence indicator is lit (1FU1)
4. Switch ON the UPS by the CB (100QF5) and the 24VDC power supply by (130QF1 & 130QF3)
5. Wait for PLC to start up
6. Log into Maintenance mode on HMI
7. On the “Production Control” page, select Local and Manual mode.
7. Wait 3min and acknowledge all HMI alarms by pressing the HMI acknowledge button.
8. Press the yellow Reset button on the front of the control panel.
9. Acknowledge all HMI alarms again.
10. Disconnect (if necessary)

6600 Vac network:
1. Power up the 6600 Vac on the customer MV switchgear SG-100D1, to energize the transformer

  See C0063-FOR-DGM-EL-001– Electrical Single Line Diagram to see have more information about the electrical distribution architecture.

2. Wait until PLC has finished starting up.
3. Log into Maintenance mode on the HMI.
4. On the “Production Control” page, select Local and Manual mode.
5. Wait 3 minutes and acknowledge all HMI alarms by pressing the HMI acknowledge button.
6. Press the yellow Reset button on the front of the control panel.
7. Acknowledge all HMI alarms again.
8. Disconnect (if necessary).</td></tr>
<tr><td>3</td><td>Nitrogen supply</td><td>  If hoses are used, equip them with a securing system.

1. Close the HV-910 valve.
2. Connect the electrolyser to the customer nitrogen network via a pressure reducing valve if the network is not at 7 barg.
3. Open the HV-910 valve and all the other nitrogen network valves in accordance with the P&ID.

  See C63-PID-001 – Process and Instrumentation Diagram</td></tr>
<tr><td>4</td><td>Preparation of thermal loop 200</td><td>1. Filling the loop:
Follow the R1-COM-200 procedure
2. Flow adjustment:
Follow the R1-COM-201 procedure</td></tr>
</table>

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<table>
<tr><td>5</td><td>Preparation of thermal loop 400</td><td>1. Filling the loop:
Follow the R1-COM-400 procedure
2. Flow adjustment:
Follow the R1-COM-201 procedure</td></tr>
<tr><td>6</td><td>Fill drain siphon</td><td>1. Fill the H2 Vent Siphon using HV-501</td></tr>
<tr><td>7</td><td>Filling the PWT-300</td><td>1. Fill the water tank of WTP-300 by starting the WTP-300</td></tr>
<tr><td>8</td><td>Filling loop 620</td><td>1. Filling the loop
Follow the R1-COM-620 procedure</td></tr>
<tr><td>9</td><td>Filling loop 600</td><td>1. Filling the loop
Follow the R1-COM-600 procedure</td></tr>
<tr><td>10</td><td>Clean Air bubble in DG-640</td><td>1. Open HV-642
2. Set MV-941
3. Reverse SP-940
4. Open HV-940
5. Flush with N2 the DG-640 for 30s
6. Close HV-940
7. Reverse SP-940
8. Close HV-642</td></tr>
<tr><td>10</td><td>Set all metering valve</td><td>1. Based PRE-001 – Pre-setting document, set all the needle and metering valve according to instructions.</td></tr>
<tr><td>11</td><td>AHU-400</td><td>1. Ensure that power is on
2. Start AHU-400 unit by following the user manual provided

For more information, consult the AHU-400 user manual.</td></tr>
<tr><td>12</td><td>Instrument Air supply</td><td>  If hoses are used, equip them with a securing system.
1. Close the HV-150 valve.
2. Connect the electrolyser to the customer Instrument Air network via a pressure reducing valve if the network is not at 7 barg.
3. Open the HV-150 valve and all the other Instrument Air network valves in accordance with the P&ID.
  See C63-PID-001 – Process and Instrumentation Diagram</td></tr>
</table>

7.2.2. List of prerequisites

	See **C63-PLO-001 - Prerequisites**

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7.3. ELECTROLYSER OPERATION

The electrolyser is controlled via an HMI (Human-Machine interface). All of the features needed to operate the machine are accessible on the IHM.

	For more detail, please refer to **C63-PMO-100 – HMI Manual User**

7.3.1. Description of the different operating modes of the electrolyser

The electrolyser can operate in three modes, as described below. Switching from one mode to the other is done exclusively via the selector switch located on the control panel.



Figure 17: Example of selector knob for choosing electrolyser operating mode

7.3.1.1. Local Mode

LOCAL

-The electrolyser is controlled via the HMI (Human-Machine Interface).
- The HMI is located on the control panel.

7.3.1.2. Remote Mode

REMOTE

-The electrolyser is remotely controlled via PROFINET communication.

7.3.1.3. Maintenance Mode

MAINTENANCE

-For maintenance tasks.
-Each piece of equipment can be tested individually (Except Rectifiers).

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7.3.2. Description of the different connection identifiers

For each mode, the user must log in with a username and password. The electrolyser has two login credentials:

- “Expert” reserved for ELOGEN starters,
- ”Operator” used by the customer.

The difference between these two logins is the possibility of adjusting the value of the control parameters for the “Expert” log-in, which is mainly used when commissioning the electrolyser.



Figure 18: Example of selector knob for choosing electrolyser operating mode

7.3.3. Description of the different operating states of the electrolyser

The electrolyser is in different states depending on its use. These states are described below.

7.3.3.1. POWER OFF



POWER OFF

-The power supply has been cut off, the electrolyser is not switched on.

7.3.3.2. NO MODE



NO MODE

- Initialization of the main control components.
- No production.
- Non-pressurized machine.
- Non-polarized stacks.
- Few control loops activated.

The electrolyser is in NO MODE status on first start-up or after an emergency stop.

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The electrolyser automatically exits NO MODE status (to STOP status) when:

- The power supply (400Vac and 230Vac if present) is connected,
- All alarms have been acknowledged (see section 8.3).

7.3.3.3. Status: Production (START)



START

e in Local and Remote modes.
roduction.
ed machine.
stacks.
rol loops are active

To start hydrogen production, follow the steps described below:

1. Identify yourself on the HMI
2. Acknowledge all alarms (refer to section 8.3).

	If a “Major Fault” (IP1) or “Safety Fault” (IS1 or IS4) is present. Do not operate the machine until you have determined the cause of the fault.

3. Enter a hydrogen flow value and press “Enter”.
4. Select the range of variation of the low-pressure storage tank (Optional)

	During production, if the outlet pressure reaches the maximum pressure of the low pressure storage tank, the electrolyser automatically switches to STANDBY. As soon as the pressure has dropped below the minimum pressure of the low pressure storage tank, the electrolyser will automatically start filling the tank. The electrolyser will adapt its flow rate to fill the external tank in this control mode, the fuller the tank, the lower the flow rate.

5. Press the **Start** button

	The start-up procedure takes approximately 30 minutes after a long shutdown. Hydrogen production rate and buffer tank pressure can be modified at any time.

7.3.3.4. Status: Idle (Cold)



IDLE

- Accessible in Local and Remote modes.
- Non-pressurized machine.
- Polarized stacks.
- Main control loops active.
- Machine ready for rapid cold start (less efficient than STANDBY).

Idle status can be activated from Start or Stop mode.
To do this:

1. Log in to the HMI.

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2. Press the **IDLE** button

	When the machine is at a complete stop. Press the IDLE button to prepare the machine for a quick start.

7.3.3.5. Status: Standby (Hot)



STANDBY

- Accessible in Local and Remote mode.
- No production.
- Semi-pressurized machine (13 barg H2).
- Polarized stacks.
- Main control loops active.
- Machine ready for rapid hot start (more efficient).
- Limited to 1 hour (automatic switch to IDLE after this time).

Standby status can be activated from Start or Stop mode.
To do this:

1. Log in to the HMI.
2. Press the **Standby** button

	When the machine is at a complete stop. Press the Standby button to prepare the machine for a quick start.

7.3.3.6. Status: Stop



STOP

- Accessible in Local and Remote modes.
- No production.
- Non-pressurized machine.
- Stacks not polarized.
- Control loops not active (except protection loops).

Stop status can be activated from any other status with the exception of the SAFETY status. To do this:

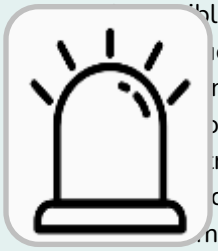
1. Log in to the HMI.
2. Press the **Stop** button

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	Stopping the machine takes about 15 minutes from a pressurised condition.

7.3.3.7. Status: Emergency stop

SAFETY



ble in Local, Remote and Maintenance modes.
ction.
not pressurized.
ot polarized.
rol loops activated.
de-energized.
machine.

To trigger an emergency stop (Safety Stop), carry out the following action:

1. Press the emergency stop button on the electrical cabinet (or the container)
2. An emergency stop will be triggered and set off an “Electrolyser Safety Alarm” (**ASE**)

	The emergency stop button should only be used in the event of an imminent hazardous situation.

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7.3.3.1. Electrolyser Status

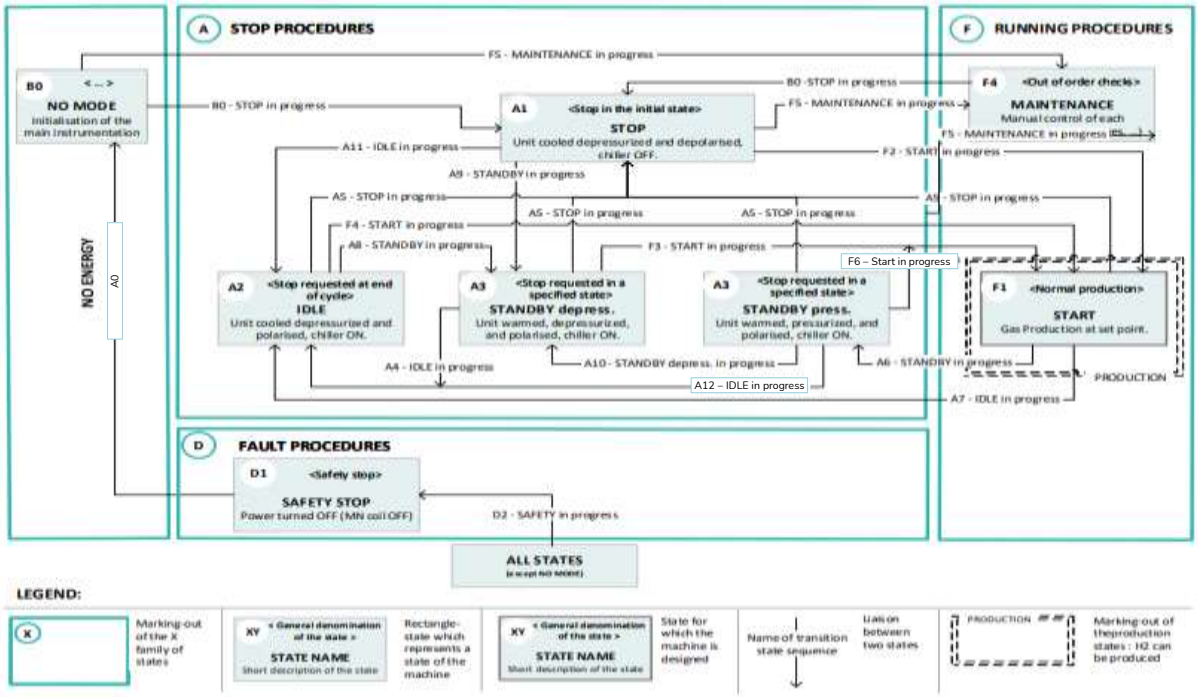


Figure 19: Run and stop mode study guide (GEMMA)

7.3.3.2. Electrolyser Status Table

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Etat initial \ Etat final		No mode	STOP	IDLE (cold standby)	STANDBY (hot standby)		START	SAFETY STOP	MAINTENANCE
					depress.	press.			
No mode			S-B0-001 O2 side : NI H2 side : I						S-F5-001
STOP				S-A11-001	S-A9-001		S-F2-001	S-D2-001	S-F5-001
IDLE (cold standby)			S-A5-001		S-A8-001		S-F4-001	S-D2-001	
STANDBY (hot standby)	depress.		S-A5-001	S-A4-001			S-F3-001	S-D2-001	
	press.		S-A5-001	S-A4-001	S-A10-001		S-F6-001	S-D2-001	
START			S-A5-001	S-A7-001		S-A6-001		S-D2-001	
SAFETY STOP		S-D2-001							
MAINTENANCE								S-D2-001	

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Function code – Function name	No mode	STOP		IDLE				STANDBY DEPRESS			STANDBY	START				MAINTEN	SAFETY
	S-A0-001	S-B0-001	S-A5-001	S-A11-001	S-A4-001	S-A12-001	S-A7-001	S-A9-001	S-A8-001	S-A10-001	S-A6-001	S-F2-001	S-F4-001	S-F6-001	S-F3-001	S-F5-001	S-D2-001
Depressurisation sequences																	
S-PC-610 – O2 Depressurisation			X			X	X			X							
S-SPC-610 – O2 Safety Depressurisation																	X
S-PC-630 – H2 Depressurisation			X			X	X			X							
S-SPC-630 – H2 Safety Depressurisation																	
Inerting sequences																	
S-FC-900 – O2 Line Inerting			X			X				X		X	X		X		
S-SFC-900 – Safety O2 line inerting																	X
S-FC-920 – H2 Line Inerting			X									X	X		X		
S-SFC-920 – Safety H2 line inerting																	X
Hydrogen purification sequences																	

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S-PUR-00x – Hydrogen purification unit												X	X	X	X		
S-PUR-002 – SEQ 1: Adsorption tower A & regeneration (heating) tower B.												X	X	X	X		
S-PUR-003 – SEQ 2: Adsorption tower A & regeneration (cooling) tower B.												X	X	X	X		
S-PUR-004 – SEQ 3: Adsorption tower B & regeneration (heating) tower A.												X	X	X	X		
S-PUR-005 – SEQ 4: Adsorption tower B & regeneration (cooling) tower A.												X	X	X	X		
S-PUR-006 – Condensate sub program.												X	X	X	X		
Rectifier control																	
S-REC-001 – Stack polarization				X			(1)	(1)			(1)	X	X		X		
S-REC-002 – Rectifier: setting current												X	X		X		
S-REC-003 – Stop rectifier (decreasing current)			X														

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S-REC-004 – Rectifier going to Standby from Start (decreasing current)							X				X							
Others																		
S-LC-300 – Automatic Filling of PWT-300																X		
S-LC-600 – Automatic Filling of ST-600																X		
S-LC-620 – Automatic Filling of ST-620																X		

Notes:

(1) S-REC-001 is called by R-REC-001

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Function code – Function name	NO MODE	NO MODE	STOP	STOP		IDLE	IDLE				STANDBY DEPRESSURISED	STANDBY DEPRESS			STANDBY PRESSURISED	STANDBY PRESS	START	START				MAINTENANCE	MAINTENANCE	SAFETY STOP	SAFETY STOP
		S-A0-001 (4)		S-B0-001	S-A5-001		S-A11-001	S-A4-001	S-A7-001	S-A12-001		S-A9-001	S-A8-001	S-A10-001		S-A6-001		S-F2-001	S-F4-001	S-F6-001	S-F3-001		S-F5-001		S-D2-001
R-CC-200 – 45°C Cooling Loop Control **(C63)**[6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-CC-201 – 45°C Cooling Loop Control **(C63)** [6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-CC-400 – Water chiller – 5°C cooling loop A **(C63)** [6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-CC-401 – Water chiller – 5°C cooling loop B **(C63)** [6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-DPC-001 – Delta Pressure H2/O2 control	D	D	D	D	S	D	D	D	S	D	D	D	D	D	D	S	A	E	E	E	E	D	D	D	S
R-DPC-101 – Delta Pressure H2/O2 control (STANDBY)	D	D	D	D	S	D	D	D	D	S	D	D	D	S	A	E	D	D	D	S	D	D	D	D	S
R-FC-300 – Water purification recirculation	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-FC-600 – Oxygen pump setpoint control	D	D	D	D	D	D	D	S	S	S	A	E	E	A	A	A	A	E	E	A	A	D	D	D	S
R-FC-601 – Pure water recirculation (anodic loop)	D	D	A	E	A	A	A	E	E	E	D	S	S	D	D	D	D	S	S	D	D	D	S	D	S
R-FC-620 – Hydrogen pump setpoint control	D	D	D	D	D	D	D	S	S	S	A	E	E	A	A	A	A	E	E	A	A	D	D	D	S
R-FC-621 – Pure water recirculation (cathodic loop)	D	D	A	E	A	A	A	E	E	E	D	S	S	D	D	D	D	S	S	D	D	D	S	D	S
R-LC-300 – PWT-300 water level control.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-LC-600 – ST-600 Water Level Control (Direct Injection)	D	D	D	D	D	A	E	A	A	A	A	E	A	A	A	A	A	E	A	A	A	D	D	D	S
R-LC-610 – CS-610 water level control	D	D	D	D	D	A	E	A	A	A	A	E	A	A	A	A	A	E	A	A	A	D	D	D	S

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R-LC-620 – ST-620 Water Level Control (Direct balancing)	D	D	D	D	D	A	E	A	A	A	A	E	A	A	A	A	A	E	A	A	A	D	D	D	S
R-LC-630 – CS-630 water level control	D	D	D	D	D	A	E	A	A	A	A	E	A	A	A	A	A	E	A	A	A	D	D	D	S
R-LC-642 – DG-640 Hydrogen Purge	D	D	D	D	D	D	D	D	S	S	D	D	D	S	A	A	A	E	E	A	E	D	D	D	S
R-PC-610 – Pressure Control Oxygen Loop	D	D	D	D	D	D	D	D	S	D	D	D	D	D	D	S	A	E	E	E	E	D	D	D	S
R-PC-611 – O2 separator underpressure	D	D	A	E	A	A	A	A	E	E	A	A	A	E	D	D	D	S	S	D	S	D	S	D	S
R-PC-630 – Pressure Control Hydrogen Loop	D	D	D	D	D	D	D	D	S	D	D	D	D	D	D	S	A	E	E	E	E	D	D	D	S
R-PC-631 – H2 separator underpressure	D	D	A	E	A	A	A	A	E	E	A	A	A	E	D	D	D	S	S	D	S	D	S	D	S
R-PC-632 – H2 outlet pressure control	D	D	D	D	D	D	D	D	S	D	D	D	D	D	D	S	A	E	E	E	E	D	D	D	S
R-QC-800 – H2 Quality Control	D	D	D	D	D	D	D	D	S	D	D	D	D	D	D	S	A	E	E	E	E	D	D	D	S
R-REC-001 – Rectifier setting current.	D	D	D	D	D	A	E	A	A	A	A	E	A	A	A	A	A	E	E	A	A	D	D	D	S
R-TC-600 – O2 Water Temperature Control Loop	D	D	D	D	D	D	D	S	S	S	A	E	E	A	A	A	A	E	E	A	A	D	D	D	S
R-TC-601 – O2 & H2 water loop antifreeze **(C63)** [6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-TC-700 – Hydrogen heating before deoxo	D	D	D	D	D (2)	D	D	D	S (2)	D	D	D	D	D	D	S (2)	A	E	E	E	E	D	D	D	S (2)
R-TC-1000 – Air extraction & ambient temperature control loop **(C63)**	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-TC-1001 – Process Ambient Temperature Control **(C63)** [6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S
R-STK-001 – Stack fan control	D	D	D	D	D	D	D	D	S	S	D	D	D	A	A	A	A	E	E	A	E	D	D	D	S
R-FC-001 – Start Circulating Pump (Redundant)	(1)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	D	S
R-CC-1000 – HVAC Package Management **(C63)** [6]	D	D	A	E	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	D	A	D	S
R-LC-500 – Water level control of H2 Vent Condensates **(C63)** [6]	D	D	A	E	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	D	A	D	S
R-REC-002 – Adjustement of H2 Flowrate setpoint in case of loss of cooling power **(C63)** [6]	D	D	D	D	D	A	E	A	A	A	A	E	A	A	A	A	A	E	E	A	A	D	D	D	S
R-CC-402 - Hydraulic Cooling Unit Management **(C63)** [6]	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	D	S

Notes:

(1) This control loop is performed by a local controller (Package PLC)

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(2) voir S-PUR-xxx
(4) In the S-A0-001, all the regulations are stopped in order to be sure that no regulation are still active. But all regulation status shall be Disabled
(5) R-FC-001 is called by R-FC-600, R-FC-601, R-FC-620 and R-FC-621
(6) Those Regulations shall be started at the beginning of the sequence

Legend:

A: Activated
D : Disabled
E : Enabling
S : Stopping

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7.3.3.1. Acknowledging alarms or emergency stops

To acknowledge alarms or emergency stops, proceed as follows:

1. Check that any immediate danger has been eliminated and that operating conditions are safe.
2. Disable the emergency stop button(s).
3. Acknowledge alarms on the HMI screen ("RESET"). Press until the button's green light turns off.
4. Press the yellow RESET button on the front of the electric cabinet. This will reset the safety relays.
5. Activate Main Circuit Breaker and Rectifier Breakers.
6. The 400 Vac presence indicator lights up.
7. Wait for the PLC to finish starting.
8. Press the yellow Reset button on the front of the control panel.
9. Acknowledge all the alarms on the HMI again.
10. Press the **Start** button.

	The emergency stop button should only be used in the event of a situation of imminent danger.

	DO NOT USE THE EMERGENCY STOP BUTTON AS A STOP BUTTON

	After an emergency stop, system water levels may need to be readjusted. To do this, refer to the **R1-COM-600** and **R1-COM-620** procedure.

7.3.3.2. Alarms

Most alarm can be categorised in 3 different categories: Minor Fault, Major Fault and Safety Fault.
Each type will trigger the same effects.
Some alarms are triggered special effect. Effects are described in the C63-PWI-002 – Cause & Effect.
The link between effect and alarm is described in C63-PWI-003 – Alarm Table.

7.3.3.2.1. Minor fault (IP9)

These alarms appear when an alert level is reached. It indicates a deviation from the process which has no impact on safety or the machine process (quality/capacity).
This notification must be acknowledged on the IHM.

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7.3.3.2.2. Major fault (IP1)

This alarm appears when a critical level is reached. This error triggers a controlled stop of the electrolyser including the rectifiers.
This error must be acknowledged on the IHM.

7.3.3.2.3. Safety Fault (IS1 and IS4)

“Safety Faults” appear when a hazardous level is reached. This error triggers an emergency stop of the machine and turns off all the electrical equipment, except for signalling, command control and lighting.
This error must be acknowledged on the IHM and the machine must be reset using the YELLOW button on the front of the cabinet.

Note: for more information about the categorization of alarms, please refer to C63-PWI-002 – Cause and Effect

7.4. ELECTROLYSER STORAGE

	The electrolyser must be ALWAYS stored at a temperature above 5°C. Install an electric heater if necessary.

If the electrolyser needs to be stored for a long period (> 3 months), take the following steps:

- Disconnect all “process” connections.
- Replace stoppers on gas and fluids.

	If the electrolyser needs to be for more than 3 months, the electrolysis stacks must be removed and stored in a safe place in a controlled atmosphere (> 5°C). To do this, follow the **R2-COM-004** procedure. Pure water circulation must be maintained in the stack to preserve its performance level and optimise its lifespan.

7.4.1. Inerting the Hydrogen Purification Unit

Refer to procedure **R2-HPU-700**.

	Proceed with caution with hydrogen gas under pressure.

7.4.2. Draining the Process Water Loops

Refer to procedure **R2-COM-004**.

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	Before draining all the loops, contact Elogen.

7.4.3. Draining Main Cooling Loop 200

Refer to procedure **R1-COM-200**.

	Even if the level indicated by the level indicator is low, there may still be coolant in the loop.

7.4.3.1. Draining Main Cooling Loop 400

Refer to procedure **R1-COM-400**.

	Even if the level indicated by the level indicator is low, there may still be coolant in the loop.

7.4.3.2. Powering off the electrolyser

Refer to procedure **R2-DEC-002**.
Refer to procedure **R2-DEC-001**.

	Only authorised personnel trained in the use of electrical devices can carry out this procedure.

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8. Description of Human-Machine Interface

Communication between the electrolyser and its user takes place via several elements presented in this section. These are:
- The electrical cabinet, with switches, buttons, indicator lights and dataloggers on its front panel, to ensure safe operation of the electrolyser.
- The light column informing users of the status of the electrolyser.
- The HMI touch screen, enabling the user to control the electrolyser and acquire detailed information.

8.1. ELECTRICAL CABINET

The front panel of the control panel features several buttons and indicator lights, which are described in detail in this section.

	Indicator lights cannot be used as reliable indicators of absence of voltage. No electrical work should be done without previously turning off and locking out the main circuit breakers. Only staff authorised and trained by Elogen can work on electrical equipment.

- Left panel

The left-hand door of the electrical cabinet houses several components shown in Figure 21 and described in the table below:

Item	Element description
A	Meter (**PQ-001**) for measuring electrical quantities on the 400Vac feeder
B	Meter (**PQ-002**) for measuring electrical quantities on the 230Vac feeder of type 2 auxiliaries
C	A joystick (2) dedicated to the switch-disconnector for isolating and disconnecting the 230Vac uninterruptible power supply. This same switch-disconnector isolates and disconnects the UPS feeder, as well as the feeder for type 2 auxiliary circuits

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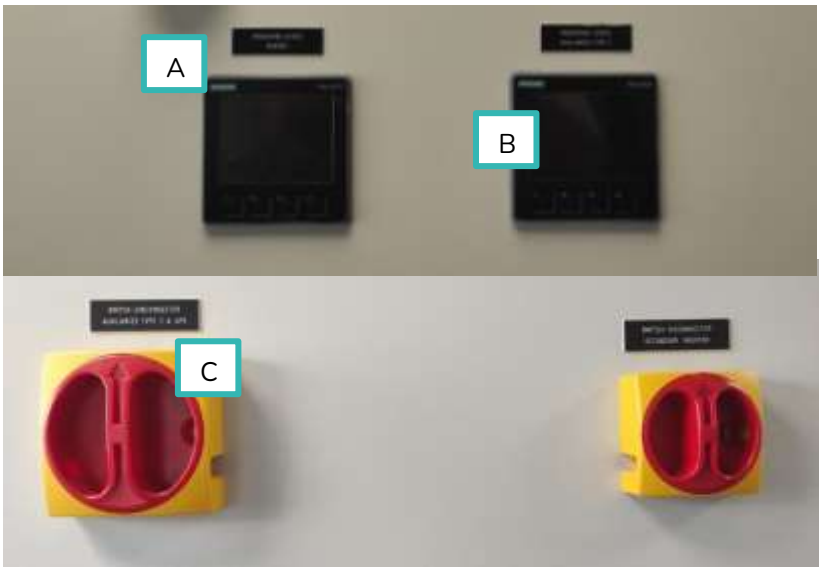


Figure 20: Location of elements on the left-hand front of the electrical cabinet[4]

The **PQ-001** and **PQ-002** dataloggers can be used to monitor and analyze the following electrical quantities:

- Current (phase and neutral)
- Frequency
- Active, reactive and apparent powers and energies
- Power factor

These dataloggers can also be used to monitor network quality parameters such as:

- Overall voltage THD
- Overall current THD

- Right panel

On the right-hand panel, at the top of the cabinet, three indicator lights are installed, as shown in Figure 33 and described in the table below.

Item	Description
A	Indicator light for correct phase sequence L1, L2, L3.
B	System consisting of three LEDs indicating the presence of normal 400Vac mains voltage on phases L1, L2 and L3
C	230Vac auxiliary power supply type 2 indicator light.

[4] PQ-001 and PQ-002 are located inside the control panel.

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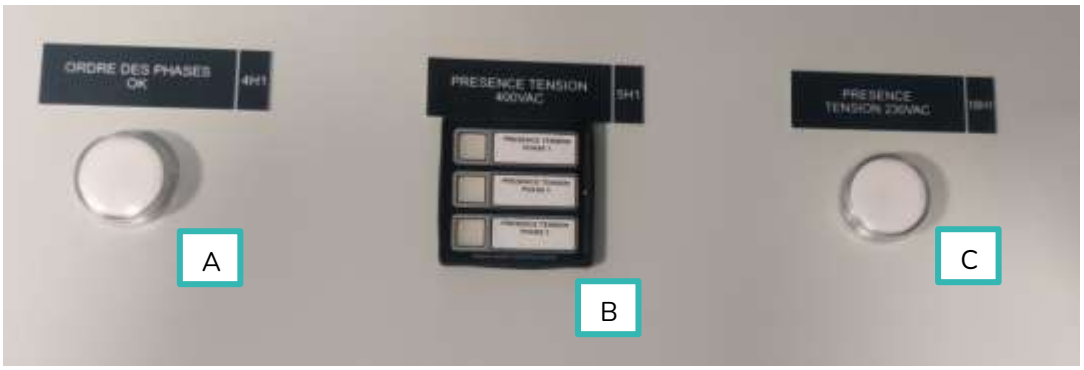


Figure 21: Control cabinet indicator lights (right panel)

Below the indicator lights and the HMI, there are seven elements on the right-hand side of the control panel, as shown in Figure 35 and described in the table below.

Item	Description
A	UPS ON/OFF control selector: allows the user to switch the UPS on and off, powering all safety devices.
B	Yellow Reset button: allows the user to reset the safety module to allow machine start-up.
C	Selector switch to inhibit machine shutdown in the event of a container door opening Process. To be used only in Maintenance mode.
D	Button for testing verrine operation. They light up and buzzers activate when this button is pressed (see §9.2).
E	RJ45 Ethernet communication port under the HMI display for connecting a computer directly to the machine's PLC.
F	Local / Remote / Maintenance mode selector to select the machine control mode (see §8.3).
G	Emergency stop button enables the user to trigger an emergency stop, bringing the machine to an immediate halt.

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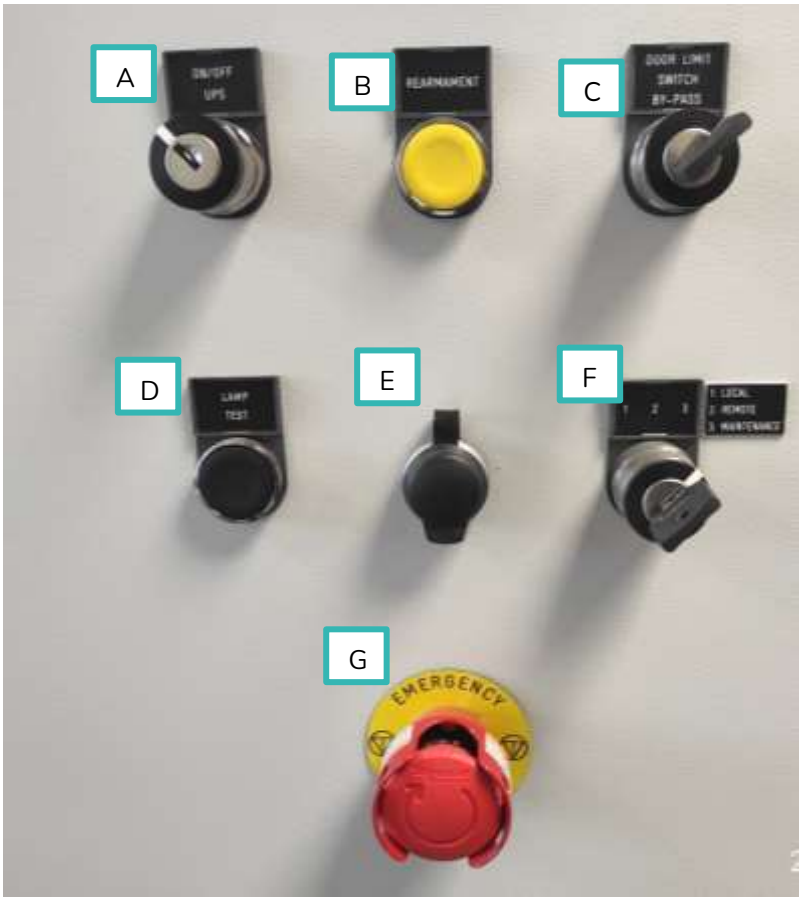


Figure 22: Control cabinet knobs (right-hand door)[5]

8.2. LIGHTING COLUMN

The electrolyser is equipped with a glass case (similar to the one shown in Figure 24) in four different colours, and a buzzer emitting an audible signal, to distinguish the different statuses of the electrolyser.

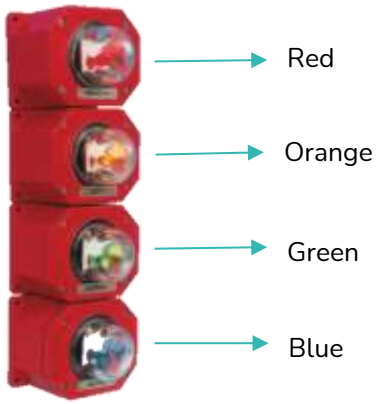


Figure 24: Lighting column



Figure 23: Buzzer

[5] Switch identified as "F" has been replaced in this unit by a button on HMI main page.

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The meaning of each colour is described in the table below:

Colour	Meaning
ABANDON	All persons must leave the plant
ALERT	Alarm
NORMAL	Presence of a minor fault
HAZARD	Presence of an "IP1"[6]

8.3. HMI TOUCH SCREEN

	Please refer to the **C63-PMO-100** HMI User Manual.

9. MAINTENANCE

9.1. INTRODUCTION

Appropriate maintenance must be carried out on the electrolyser in order to preserve its performance level and optimise its lifespan.

Maintenance of the electrolyser must be carried out by trained and qualified personnel with the agreement of ELOGEN. There are 2 levels of maintenance detailed below.

Personnel responsible for the operation and maintenance of the electrolyser described in this manual must read, understand and apply the instructions in this manual. Special attention must be paid to the safety chapter.

Failure to carry out a maintenance operation within the scheduled timeframe may result in the loss of the manufacturer's warranty.

	The electrolyser must be stopped, depressurised, inerted with nitrogen and cooled to a temperature below 40°C before carrying out any maintenance operation.

To do this, press the "Stop" button on the machine and wait for it to cool down.

[6] See PWI-002 – Cause and Effect

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	Warning: after a stop order is sent, the machine may still undergo depressurisation. Wait until the system indicates a pressure of 0 barg across the entire system and the network temperature has dropped below 40°C.

	Warning: if a maintenance action must be carried out on the hydrogen purification unit or in the surrounding area, follow the procedure detailed in 7.4.1.

9.2. LEVEL 1 MAINTENANCE

Level 1 system maintenance is performed in the context of nominal use of the equipment. It is presented in the Level 1 user manual.

9.2.1. Level 1 Maintenance Operations

First level maintenance operations are described in the paragraph below. These can be carried out by trained personnel, without specific skills.

	See **C63-PMX-001 – Level 1 Service Manual**

9.3. LEVEL 2 MAINTENANCE

Level 2 system maintenance is not performed within the scope of this manual. It consists of the most common troubleshooting operations performed on this type of system.

9.3.1. Operator Training

Level 2 system maintenance must be carried out by operators duly trained by ELOGEN or by a company designated by ELOGEN.

9.3.2. Safety Devices maintenance

To prevent overpressure there are two main protection levels: instrumental and mechanical devices. The first ones are considered as the pressure transmitter and the second ones as the pressure safety valves and rupture discs.

9.3.3. Regulation devices maintenance

To ensure the reliability of the safety loop as defined in the process, the maintenance of the regulatory devices must be performed within the stablished intervals and in accordance with the provided instructions. These are pneumatic and solenoid valves.

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9.3.4. Safety loop maintenance

The validation, operation, use and maintenance of each safety loop, established on **C63-PUY-001,** are detailed in the procedures compiled in **C63-I1-SIF-00X** and **C63-V1-SIF-00X**.

9.3.5. Level 2 Maintenance Operations

Level 2 system maintenance is carried out by operations described in instruction sheets.

	Note: Before any maintenance action, electrical equipment must be locked out. Lockout must be carried out by qualified and authorised personnel. Lockout must comply with standard NFC 18-510.

	See **C63-PMX-002 – Level 2 Service Manual**

9.4. OTHER OPERATIONS

Any other operation not described in this manual and carried out without the consent of ELOGEN will result in the loss of warranties.

9.5. MAINTENANCE INTERVALS

All maintenance operations are described in document C63-PMO-003. Each operation is detailed in the maintenance procedures or in the manuals for the different components.

	See **C63-PMO-002** (Maintenance)

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10. Contraindications

The following is prohibited:

- Installing equipment on the system.
- Obstructing the system air inlets and outlets.
- Operating with one or more system doors open (except for maintenance).
- Operating the system under climate conditions outside the ranges indicated in paragraph **5**.
- Turning off the system if the outside temperature is or may be outside the temperature range specified in paragraph **5**.
- Installing the system on a floor that does not meet the requirements established in paragraph **7**.
- Commissioning the machine in the absence of an ELOGEN operator.
- Removing/reinstalling the internal (fluid and/or electrical) components of the container and the external components of the container without the physical presence of ELOGEN staff or personnel from another company designated by ELOGEN.
- Carrying out maintenance work without first checking for the absence of voltage and the absence of pressure.
- Using tap water that does not meet the criteria established in paragraph **5**.
- Using a cooling fluid that does not meet the criteria specified in this document, and especially replacing the cooling fluid with another fluid.
- Using nitrogen that does not meet the criteria established in paragraph **5** and especially replacing the nitrogen with another fluid.

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C63-PMX-001

Electrolyser Service Manual – Level 1 (R1)

C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
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1. Maintenance of water chiller

<table>
<tr><th colspan="2">C63-R1-COM-001</th></tr>
<tr><td colspan="2"></td></tr>
<tr><th>Objective</th><th>Validation criteria</th></tr>
<tr><td>• Check the compliance of the condition for the cooling loop 400 (5 °C).</td><td>• Maintenance has been carried out according to user manual's recommendations.
• The setpoint temperature of the loop is achieved within normal operation.
• There are no leaks on the 5 °C cooling loop.</td></tr>
<tr><th>Required personnel</th><th>Required materials and consumables</th></tr>
<tr><td>• 1 technician.</td><td>• Refer to procedure C63-R1-COM-400</td></tr>
<tr><th>Potential risks (Safety and Environment)</th><th>Prevention and protection measures</th></tr>
<tr><td>Chemical risk: (refer to Safety Data Sheet C63-SDS-007- MPG 40%)
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation.
Electrical risk: Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits.</td><td>• Wear PPE (Personal Protective Equipment)
• Personal gas monitor for each operator (calibration and ATEX certificate up to date)</td></tr>
<tr><th colspan="2">Prerequisites</th></tr>
<tr><td colspan="2">1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X).
2. The status displayed on the HMI should be "STOP".
3. Make sure that all the HVAC packages are stopped through HVAC Control Unit.</td></tr>
<tr><th colspan="2">Operation description</th></tr>
<tr><td colspan="2">1. Log in to "Maintenance" mode.
The detailed instructions for the maintenance for the water chiller are given in the document P.0608871.L.02.406_Ind.B.

Required time & periodicity: cf. P.0608871.L.02.406_Ind.B</td></tr>
</table>

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2. General inspection of the cleanliness of the unit

R1-COM-003	
Objective	**Validation criteria**
• General maintenance of the electrolyser: cleanliness check, cleaning of external parts of components (if necessary), emptying of retention tanks (if necessary)	• Electrolyser is clean • No water in the unit
Required personnel	**Required materials and consumables**
• 2 x people	• 1 submersible pump or water vacuum cleaner • Standard cleaning equipment • 1 bucket
Potential risks (Safety and Environment)	**Prevention and protection measures**
Anoxia risk	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date).

Prerequisites

1. Make sure the electrolyser is stopped, depressurized and wait until the pipes have cooled down.
2. Open all the access doors to the electrolyser.

Operation description

- **Checking the general cleanliness of the electrolyser**

1. Perform an external inspection and cleaning of the electrolyser components (pressurized tanks, piping lines, instrumentation, etc.) present in A10 area.
   a. Check thoroughly if the ATEX component enclosure are not damaged (impact, scratch, …).
   b. Check thoroughly fittings of the hydrogen purification unit
   c. Check if there is no water around Separators & Degasser (**ST-600** / **ST-620** / **DG-640**)
   d. Check drip pan
2. Perform an external inspection and cleaning of the electrolyser components (Pumps, piping, strainer) present in A02 & A03 area
3. Perform an external inspection and cleaning of A01
   a. Check thoroughly cleanliness of stacks (Fitting, cover, electrical wiring)
   b. Check thoroughly instrumentation
4. Perform an external inspection and cleaning of the element in B01
   a. Check presence of moisture in that area
   b. Check if electrical cabinet are not damaged
   c. Check if siphons (**SPH-400**, **SPH-401**, **SPH-402**, **SPH-403**) are cleaned
5. Perform an external inspection and cleaning of the element in C01
   a. Check presence of moisture in that area

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b. Check thoroughly instrumentation
c. Check that conductivity meter, pressure gauge, etc are not displaying bad value

6. Perform an external inspection and cleaning of the element in E01
   a. Check presence of moisture in that area
   b. Check if there is water in drip pan
   c. Check level indicator and pressure of expansion vessels
7. Perform an external inspection and cleaning of interconnection (X00) and Area between containers (D01)
8. Report any leaks, even minor ones, and degradation of the external parts of the components.
9. Clean dust, residue and other dirt.
10. Remove water if water is detected using submersible pump or water vacuum cleaner

Required time: 4 hours
Periodicity: 6 months

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3. Topping up and checking fluid quality on the cooling loop at 45°C

<table>
<tr><th colspan="2">C63-R1-COM-200</th></tr>
<tr><td colspan="2"></td></tr>
<tr><th>Objectives</th><th>Validation criteria</th></tr>
<tr><td>• Optimum coolant level in the cooling loop 45°C
• Optimum coolant quality</td><td>• The fluid network must be at 0.5 barg.
• The refractometer shall indicate 40% MPG</td></tr>
<tr><th>Required personnel</th><th>Required materials and consumables</th></tr>
<tr><td>• 1 x person (qualified to work at height)</td><td>• Transfer pump
• Refractometer
• Flexible connection between pump and Dry Coolers
• Storage tank
• Coolant quality (40% monopropylene glycol by weight, with pH between 7.5 and 8.5)</td></tr>
<tr><th>Potential risks (Safety and Environment)</th><th>Prevention and protection measures</th></tr>
<tr><td>Chemical risk: (refer to Safety Data Sheet C63-SDS-007- MPG 40%)
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation.
Electrical risk: Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits.</td><td>• Wearing PPE
• Personal gas monitor for each operator (calibration and ATEX certificate up to date).</td></tr>
<tr><th colspan="2">Prerequisites</th></tr>
<tr><td colspan="2">1. Ensure that the electrolyser is stopped and cold (Stacks temperature under 40 °C – TT-601X) and that its status indicates “Stop”.
2. Log in to “Maintenance” mode.</td></tr>
<tr><th colspan="2">Operation description</th></tr>
<tr><td colspan="2">• Component inspection
All maintenance work must be carried out by qualified, authorized personnel. Before performing any work:
1. Disconnect the power supply from the unit and protect it from being inadvertently reactivated.
2. Perform a visual inspection of all the fitting and control the torque of the fittings
3. A maintenance program with biannual checks for leaks, regulator settings and pipe tightness.
4. Monthly checks of fan bearings, heat transfer fluid condition and level, and for any damage to system components.
5. We recommend running for at least 4 hours after a month's downtime. Do not overload the machine. Do not overload the collectors or use them as lifting points.</td></tr>
</table>

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- **Filling lines - Loop 200**

The detailed instructions for filling for the water chiller are given in the document **P.0608871.L.02.406_Ind.B - Operating and maintenance manual for Chiller.**

- **Checking coolant quality (process stopped)**

1. Use a purge valve (**HV-166, HV-167** or equivalent) to extract a sample of cooling water.
2. Take a sample of the coolant.
3. Use the refractometer to check that the fluid has the correct proportion (40% by weight or melting point at -23.3°C).

Warning: Incorrect mixing may cause the loop to freeze and damage the machine.

4. Test conductivity with a pH test strip or conductivity meter. The pH must be between 7.5 and 8.5.
5. If the fluid quality does not meet the criteria, drain the coolant and replace it with a new one.

Required time & periodicity: cf. P.0608871.L.02.406_Ind.B

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4. Checking the flowrate of cooling fluid – loop 200 (45 °C)

C63-R1-COM-201	
Objective	**Validation criteria**
• Check the compliance of the cooling loop 45 °C flowrate, according to design specifications.	• The flowrate of 45 °C loop, at maximum capacity of skid pump condensation, is around 97.9 m^3/h (1.54 m/s ± 0.14[1]).
Required personnel	**Required materials and consumables**
• 1 technician.	
Potential risks (Safety and Environment)	**Prevention and protection measures**
Chemical risk: (refer to Safety Data Sheet C63-SDS-007- MPG 40%)	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**" 3. Make sure that all the HVAC packages are stopped through HVAC Control Unit.	
Operation description	
1. Log in to "**Maintenance**" mode. 2. Go to the Oxygen view on the HMI, select the "THERMAL SKID" page (Figure 1). Completely open the M3WV-200 by setting the PID[2] output at 100%.	

[1] Accuracy of 7% of measured value (c.f. Flow switch datasheet SA5000 SAD10XDBFRKG/US-100)

[2] Proportional-Integral-Derivative feedback control loop

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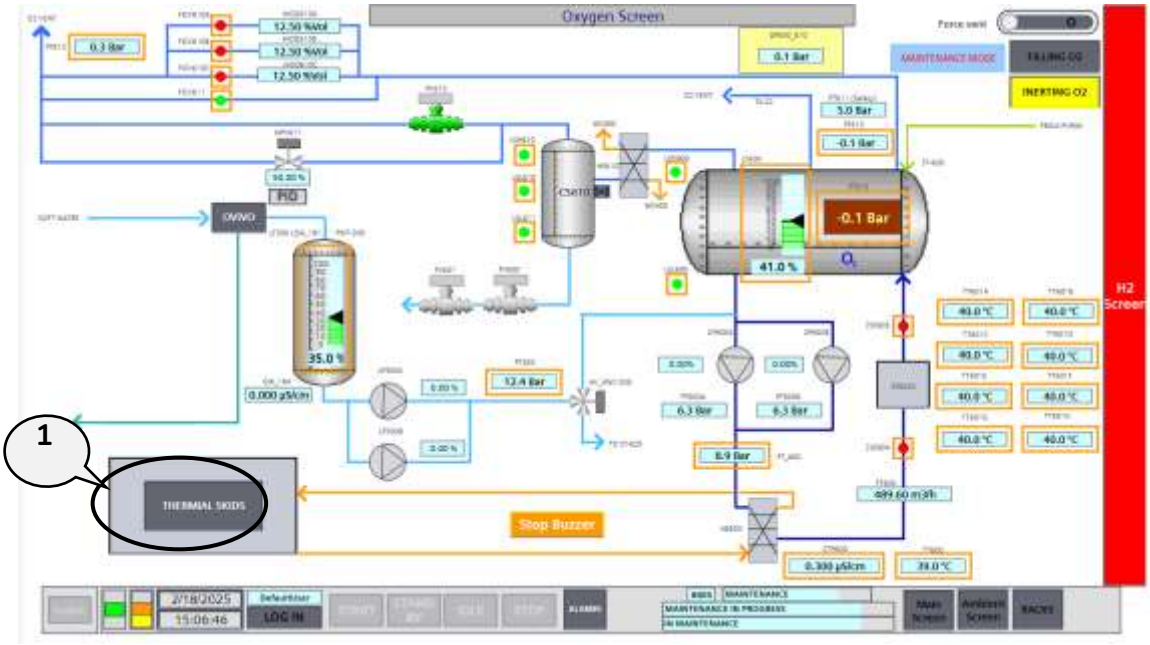


Figure 1. Oxygen view - Access to Thermal Skid view

3. Wait until this valve is fully open.
4. Start one of the CP-200A/B.
5. Check that there is no leakage close to connections.
6. Go to the thermal skid and check on the flow switch display (Figure 2) the flow velocity (given in m/s). The displayed value should be **1,54 m/s** (corresponding to a flow rate **of 97,9 m³/h**).

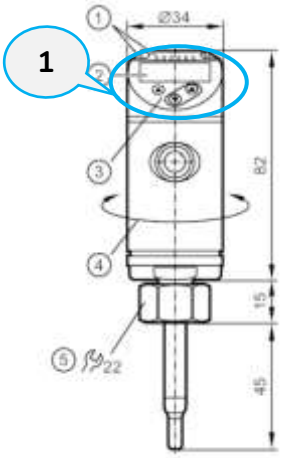


Figure 2. Flow switch on thermal skid 200 loop (45 °C)

7. Once checked the flowrate with the pump selected, stop it via the HMI and start the spare. Repeat steps 6 and stop the pump at once finished the procedure.
8. At the end of the cooling fluid flowrate check, switch from “Maintenance” mode to “Distance” mode via the HMI and observe that the pump is stopped and the **M3WV-200** returns to its normal position.

Required time: 2 hours
Periodicity: 12 months.

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5. Topping up and checking fluid quality on the 5°C cooling loop

<table>
<tr><th colspan="2">C63-R1-COM-400</th></tr>
<tr><td colspan="2"></td></tr>
<tr><th>Objectives</th><th>Validation criteria</th></tr>
<tr><td>• Optimum coolant level in the glycol 5°C cooling loop
• Optimum coolant quality</td><td>• The fluid network must be at 0.5 barg.
• Coolant quality is valid (MPG content in water is 40%, pH must be between 7.5 and 8.5)</td></tr>
<tr><th>Required personnel</th><th>Required materials and consumables</th></tr>
<tr><td>• 1 x person (qualified to work at height)</td><td>• 1 x Refractometer
• 1 x pH strip or conductivity meter
• Detergent / cleaning agent
• Demineralized water supply
• City water supply
• 770 L of 40% MPG mix with inhibitors and demineralized water
• Transfer pump
• Flexible connection
• Storage tank</td></tr>
<tr><th>Potential risks (Safety and Environment)</th><th>Prevention and protection measures</th></tr>
<tr><td>Chemical risk: (refer to Safety Data Sheet C63-SDS-007- MPG 40%)</td><td>• Wear PPE (Personal Protection Equipment)
• Personal gas monitor for each operator (calibration and ATEX certificate up to date).</td></tr>
<tr><th colspan="2">Prerequisites</th></tr>
<tr><td colspan="2">1. Ensure that the electrolyser is stopped and cold, and that its status indicates “Stop”.
2. Log in to “Maintenance” mode.</td></tr>
<tr><th colspan="2">Operation description</th></tr>
<tr><td colspan="2">• Checking coolant quality (process stopped)
1. Use a purge valve (HV-147, HV-139, HV-30, HV-40 or equivalent) to extract a sample of cooling water.
2. Take a sample of the coolant.
3. Use the refractometer to check that the fluid has the correct proportion (40% by weight or melting point at -23.3°C).
Warning: Incorrect mixing may cause the loop to freeze and damage the machine.
4. Test conductivity with a pH test strip or conductivity meter. The pH must be between 7.5 and 8.5.
5. If the fluid quality does not meet the criteria, drain the coolant and replace it with a new one.

Note: If the missing component is water, demineralized water can be added in the correct proportion.

The detailed instructions for filling for the water chiller are given in the document
P.0608871.L.02.406_Ind.B - Operating and maintenance manual for Chiller.
Required time & periodicity: cf. P.0608871.L.02.406_Ind.B</td></tr>
</table>

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6. Water top-up for the electrolysis (Oxygen side)

C63-R1-COM-600	
Objective	**Validation criteria**
• The level of water in the oxygen water loop is optimal to start the hydrogen production.	• The level displayed by the LT-600 on the HMI is stable around 43%.
Required personnel	**Required materials and consumables**
• 1 technician.	• Ultra-pure water or water that can be purified with the **WTP-300**
Potential risks (Safety and Environment)	**Prevention and protection measures**
Electrical risk: Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date).

Prerequisites

1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X).
2. The status displayed on the HMI should be "**STOP**"
3. Log in to "**Maintenance**" mode via the HMI.
4. Check that the Water Treatment Package is available to start in automatic operation. Refer to IOM Manual Crosswind Project – Ovivo in case trouble shooting operation is required.

Operation description

1. Check that the **3WV-320** is open towards oxygen loop.

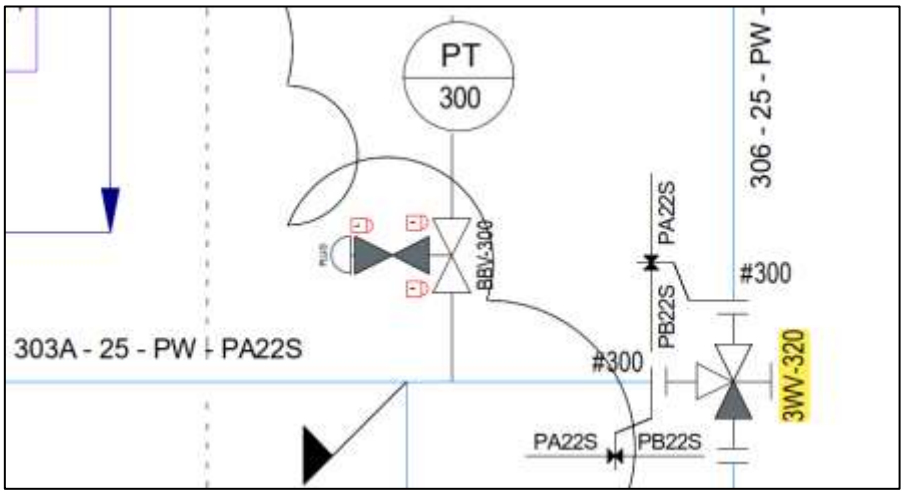


Figure 3. Open position of 3WV-320 towards O2 loop (cf. C63-PID-001).

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2. Check that all the hand valves locked position present on oxygen loop are as indicated on the P&ID (cf. C63-PID-001).
3. Check that the level on the pure water buffer tank (depicted as DEMIN TANK on the P&ID) is high enough to perform the operation (the LALL-301 is not active) (Figure 4, reference point #1).

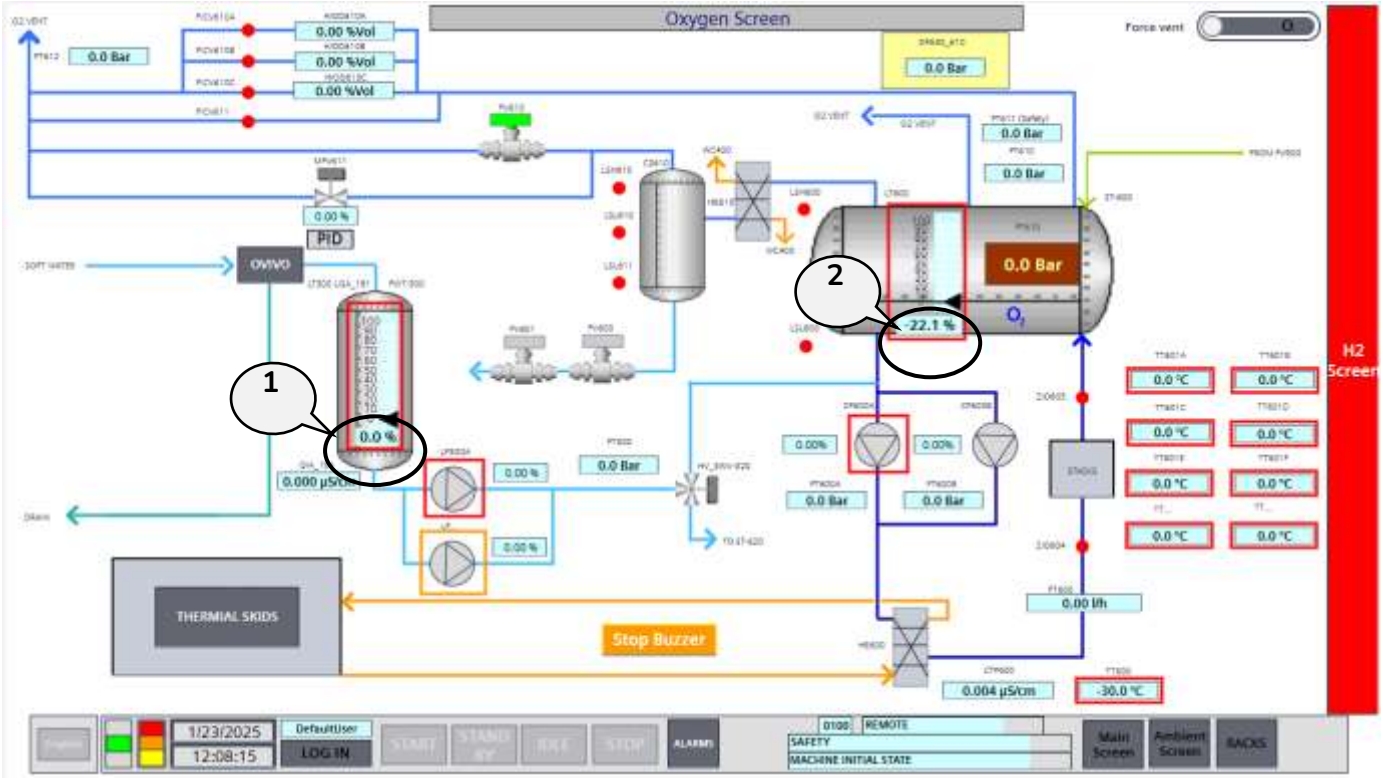


Figure 4. HMI Oxygen view

4. Set the LP-300A/B to **55%** of its speed in case the oxygen separator tank (ST-600) is depressurized to prevent overflows.
5. Follow the increase on the level of ST-600 displayed on the HMI (Figure 4**Erreur ! Source du renvoi introuvable.**, reference point #2).
6. Stop the LP-300 once the LT-600 displays **43%**.
7. Start the CP-600. The water level should decrease.
8. Stop the CP-600.
9. Repeat the sequence from steps #5 to #9, until the water level of ST-600 is stable at **43%**.

Note: Ensure that the CP-600 does not exceed the maximum number of starts per hour. (cf. CR, CRN 95-255 Installation and operating instructions, section: Frequency of starts and stops)

Time required: 1 hour.
Periodicity: As required.

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7. Fluid make-up on water circulation loop (hydrogen side)

C63-R1-COM-620	
Objective	**Validation criteria**
• To have optimum water level in the H2-side water circulation loop	• Water level indicated by **LT-620** water level sensor is at 45%
Required personnel	**Required materials and consumables**
• 1 x person	• Ultra-pure water or water that can be purified with the **WTP-300**
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is depressurized, and its status indicates STOP. 2. Prepare a pure water supply: make sure the **WTP-300** is filled with pure water.	
Operation description	
1. Check that the Water Treatment Package (**WTP-300**) is powered. 2. On the electrolyser control panel, activate “Maintenance” mode, then log on to the HMI. 3. Unlock valve **3WV-320** and move it to the open position from the **LP-300** pump to the **ST-620** hydrogen separator tank.	

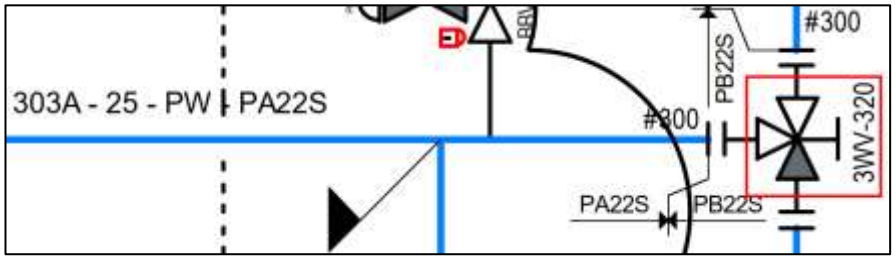


Figure 5. 3WV-320 towards H2 loop (cf. C63-PID-001)

4. Start the **LP-300** pump via the HMI at 55% of its capacity.

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5. When the water level in the **ST-620** separator tank reaches 45%:

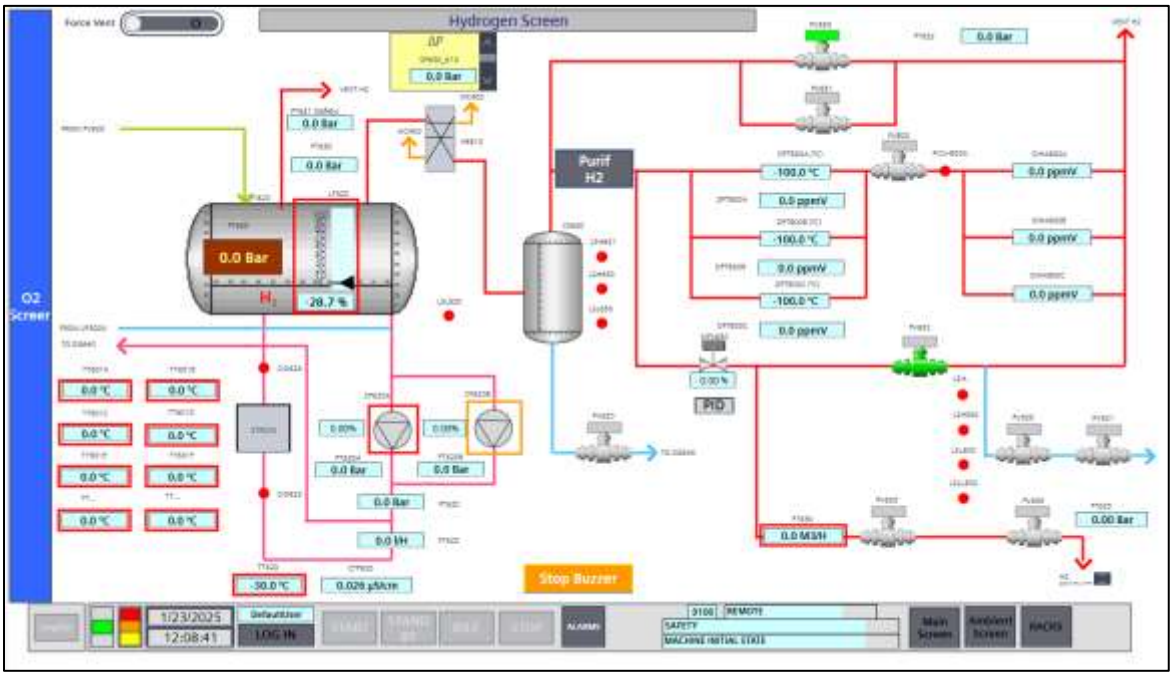


Figure 6. HMI Oxygen view.

6. Stop the **LP-300** pump.
7. Start **CP-620** pump. Water level should drop.
8. Stop **CP-620** pump.
9. Repeat the sequence from step 5 to step 8 until the water level in the **ST-620** separator tank has stabilized at 45%.

If the water level in the **ST-620** separator tank has stabilized at 45%:

10. Return valve **3WV-320** to its normal position, i.e. from the **LP-300** pump to the **ST-600** oxygen separator tank. Lock it.

Time required: 1 hour.
Periodicity: As required or after purging loop 620.

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8. Filling hydrogen vent siphon

R1-COM-621	
Objective	**Validation criteria**
• Fill the hydrogen siphon with pure water	• Siphon is filled; LSL-500 is triggered
Required personnel	**Required materials and consumables**
• 1 x person	• Watering can • 3 L of pure water • Key of HV-501 • Teflon tape • Wear an Oxygen detector
Potential risks (Safety and Environment)	**Prevention and protection measures**
Anoxia risk	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurized and wait until the pipes have cooled down. 2. Make sure the H2 vent is nitrogen flushed 3. Make sure there is no backpressure from general H2 vent 4. Open all the access doors to the electrolyser.	
Operation description	

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- **Checking the general cleanliness of the electrolyser**

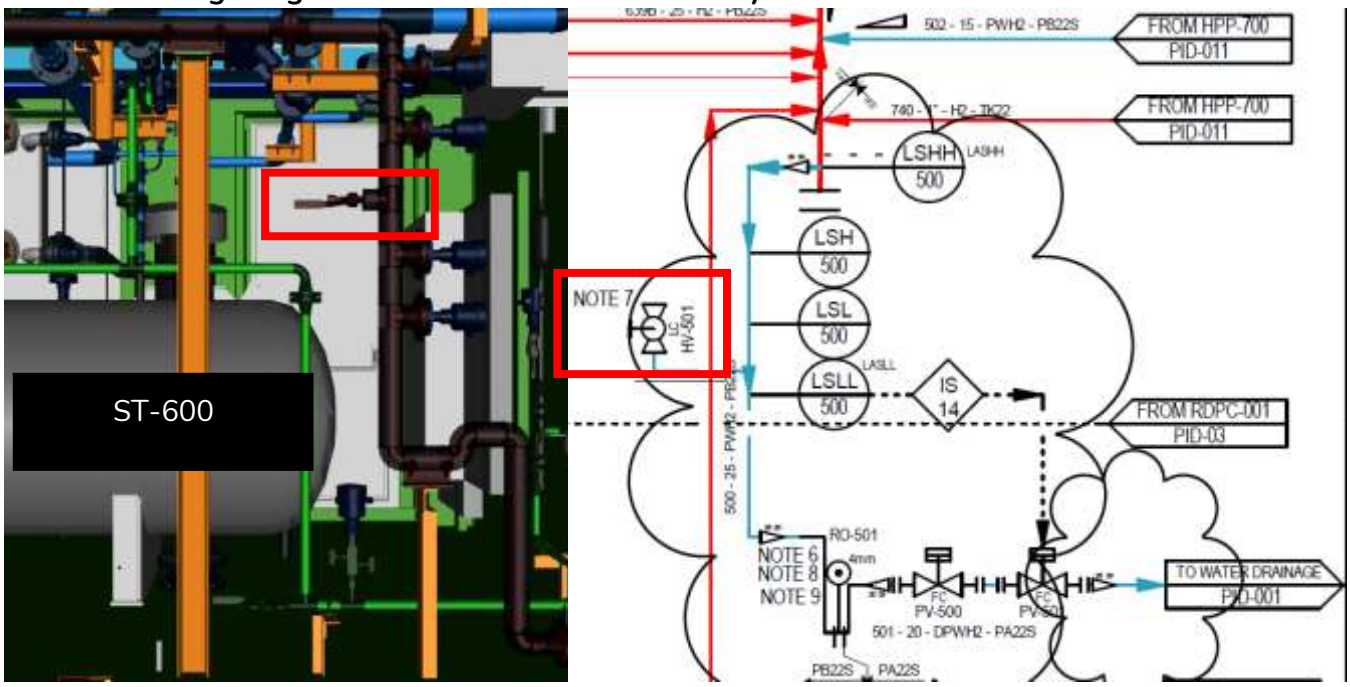


Figure 7. Extract from 3D and PID

1. Unlock HV-501, Remove the plug
2. Open HV-501
3. Fill the siphon till the LSL-500 is triggered (generally 2L are required)
4. Close HV-501 and lock it
5. Reinstall the plug using Teflon tape

Time required: 1 hour
Periodicity: At every Start-up

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C63-PMX-002

Electrolyzer Service Manual – Level 2

C63- CrossWind Project

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1. C63-R2-ASP-610 - Maintenance of ASP-610

Objective	Validation criteria
• To check the functioning of the Analysis system package.	• The filter is clean, and FICVs function properly.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Adequate wrenches for flanges. • Pure water.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Electrical risk: Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical risk:** Risk associated with the handling of hydrogen. Check the Material Safety Data (C63-SDS-001). **Anoxia risk**	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date)
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to maintenance mode.	
Operation description	
Filter F-610 1. Close the valve HV-615. 2. Remove the plug on the valve HV-610D and open the valve. 3. Open the filter F-610 and check the condition of the filter, replace it if necessary. 4. Put back the filter, close the valve HV-610D, put back the plug, and open the valve HV-615. **Setting of PRV and FICV** 1. Pressurize the ST-600 at 3 barg with nitrogen. 2. Check that the pressure at the outlet of the PRV-610 is 0.5 barg. 3. Check that the FICV-610A/B/C are set at 1 NL/min.	

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4. Check that the FICV-611 is set at 10 NL/min.

Time required: 30 minutes

Periodicity: 6 months

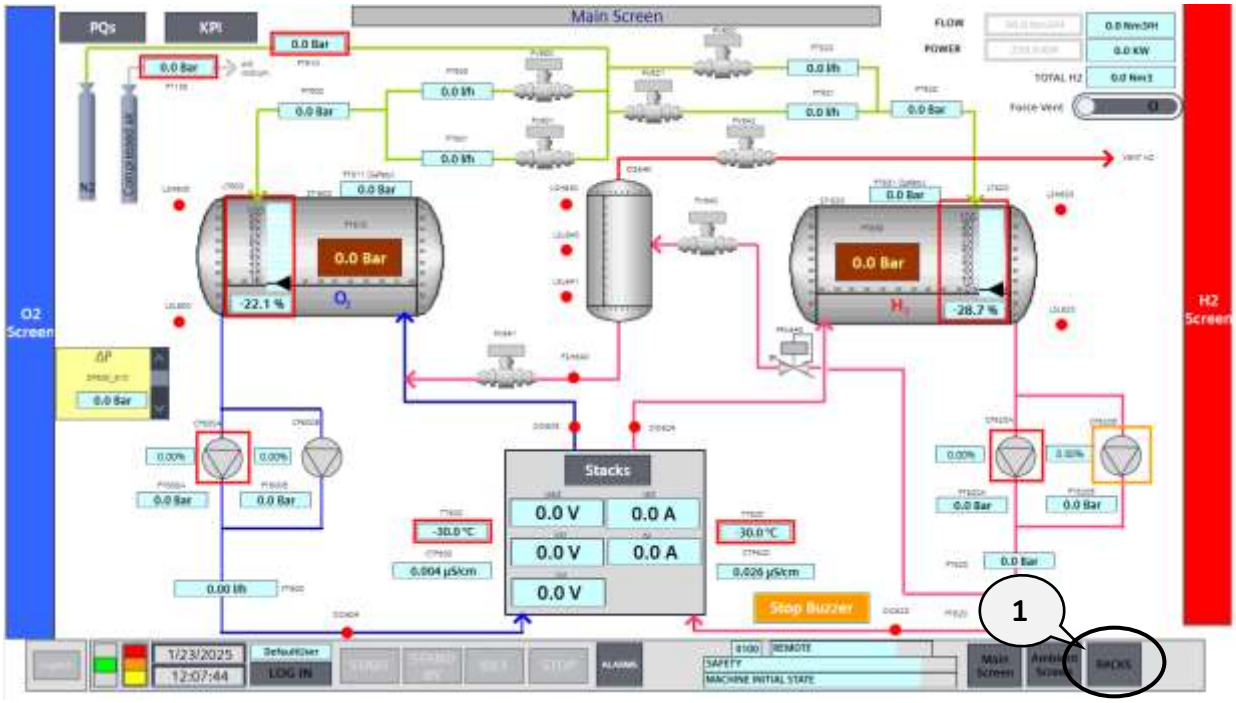
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2. C63-R2-CAP-001 - Ambient hydrogen sensor calibration

Objective	Validation criteria
• Check the measuring system related to the ambient hydrogen detectors presents on the electrolysis unit: AHD-1000/1001/1002/1003/1004. • Perform a zero adjustment and a sensibility calibration.	• The analysis cell status is displayed as "Good[1]". • The deviation in the measure is below 100 ppm.
Required personnel	**Required materials and consumables**
1 x technician.	• 1 standard gas cylinder (2% H2 in air) (ref. SPR-1011) • Fixed flow regulator (1.5 L/Mn 1000 psi max)
Potential risks (Safety and Environment)	**Prevention and protection measures**
ATEX atmosphere risk **Thermal Risk:** Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical risk:** Risk associated with the handling of hydrogen bottle at 2%. Check the Material Safety Data (C63-SDS-001). **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.

[1] According to ULTIMA® X5000 Operation & Maintenance instructions, the "Good" state occurs when the currently calibrated scale sensitivity is greater than 50% of the range between the initial calibration sensitivity and the scale sensitivity at the end of its lifespan.

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Prerequisites
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**"
Operation description
3. Log in to "**Maintenance**" mode. 4. Check on the "Racks" view that the feedback of the AHD to be calibrated is not in default (value displayed at zero or within the range established in the Setpoint list C63-PWI-001.    *Figure 1. HMI main view.*

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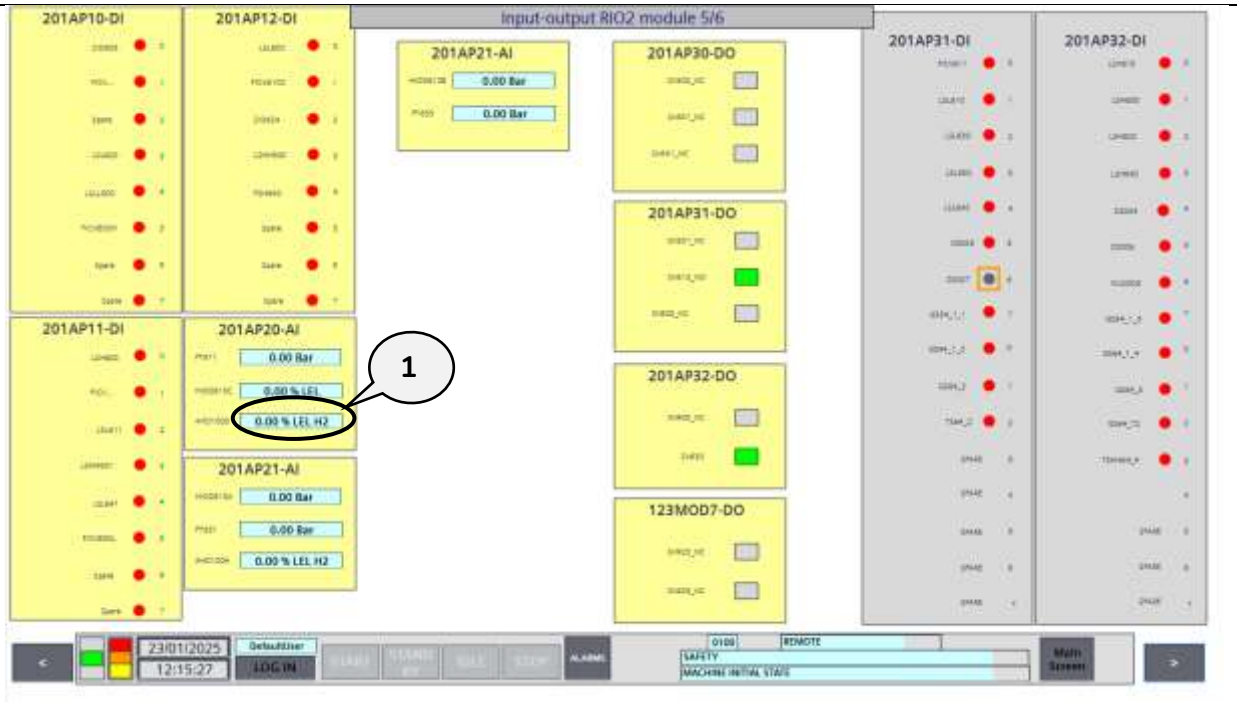


Figure 2. HMI Racks view – AHD displayed value

5. See ULTIMA® X5000 Operation & Maintenance instructions chapter 5 and follow the instructions given, as well as the specific requirements for the operation.

Time required: 1 hour.

Periodicity: 12 months.

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3. C63-R2-CAP-002 - Control of temperature sensor deviation

Objective	Validation criteria
• Determine temperature sensor deviation (**TT-621A/B**, **TT-601A/B/C/D/E/F/G/H**)	• Temperature sensor deviation lower than 0.5 °C.
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x calibrated ambient temperature sensor. • 1 x spare temperature sensor.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "Maintenance" mode.	
Operation description	
1. Install a calibrated room temperature sensor in the process zone and a room temperature sensor in the utilities zone. 2. Wait 30 minutes for the probes to reach room temperature. 3. At regular intervals of 5 minutes, record the measured values of all the machine's temperature probes. 4. Register any deviations. 5. If need it, replace any sensors.	

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Time required: 8 hours

Periodicity: 12 months

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4. C63-R2-CAP-003 - Calibration and cell replacement for an oxygen-in-hydrogen analyser

Objective	Validation criteria
• To calibrate the OIHA-800A/B/C. • To replace the analysis cell for the OIHA-800A/B/C.	• OIHA calibrated according to this procedure[2]. • There are no leaks on the instrument and analyse cell fittings.
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x Analysis cell spare and its user manual (GE Measurement & Control oxy.IQ 910-296). • PTFE tape (oxygen compatible). • 1 calibration cylinder (span gas: 50 ppm of O_2 in N_2) ref. SPR-1017. • 1 x Fixed flow regulator adapted to the span gas cylinder. • 1 x hose. • Adjustable Wrench. • Leak detector (leak detection solution). • Viton® O-ring. • Nitrogen cylinder (for leak test). • Compressed air cylinder (for Air calibration). • 1 x Fixed flow regulator adapted to the compressed air cylinder.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Chemical risk: Risk associated with the handling of oxygen. Refer to Safety Data Sheet C63-SDS-002 - Oxygen. **Thermal Risk:** Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.

[2] Refer to GE Measurement & Control oxy.IQ 910-296 to check the accuracy of the measure at the calibration point.

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Electrical risk: Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	

Prerequisites

1. Make sure the electrolyzer is stopped, depressurized and cold (Stacks temperature under 40 °C – TT-601X).
2. The status displayed on the HMI should be "**STOP**".
3. Log in to "**Maintenance**" mode.

Operation description

1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).

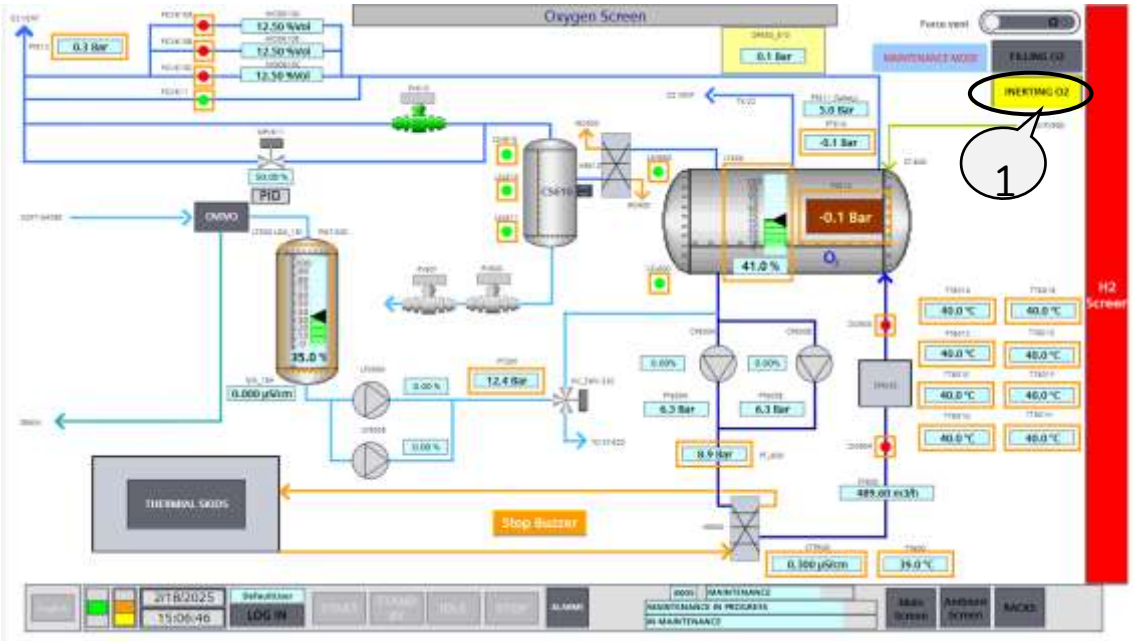


Figure 3. Inerting oxygen side

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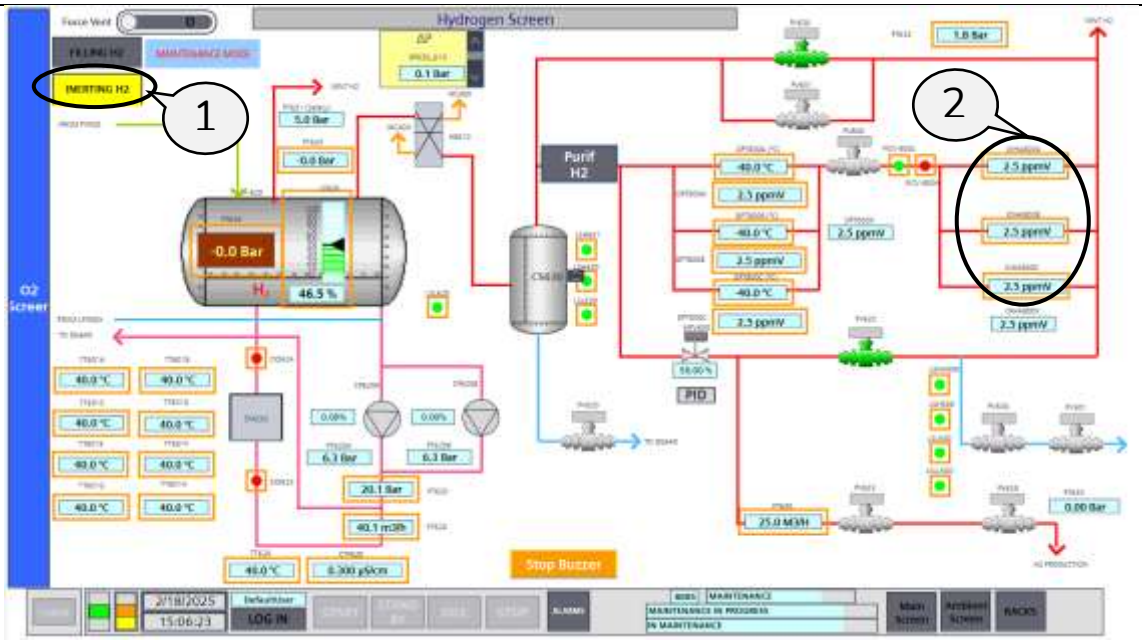


Figure 4. Inerting hydrogen side

Air calibration

1. Make sure the compressed air cylinder is closed (fixed flow regulator properly placed on the cylinder and regulating valve completely closed).
2. Once the inerting is completed, isolate the line by turning the three-way valve (**3WV-800**) towards the calibration cylinder connection (Figure 5).
3. Connect the cylinder of compressed air, via a flexible hose and the fixed flow regulator, to the plug placed on the three-way valve.
4. Follow the instructions given in OIHA user manual (GE Measurement & Control oxy.IQ 910-296) to conduct air calibration (section 3.3.3).
5. Turn the **3WV-800** on its original position (Figure 6).

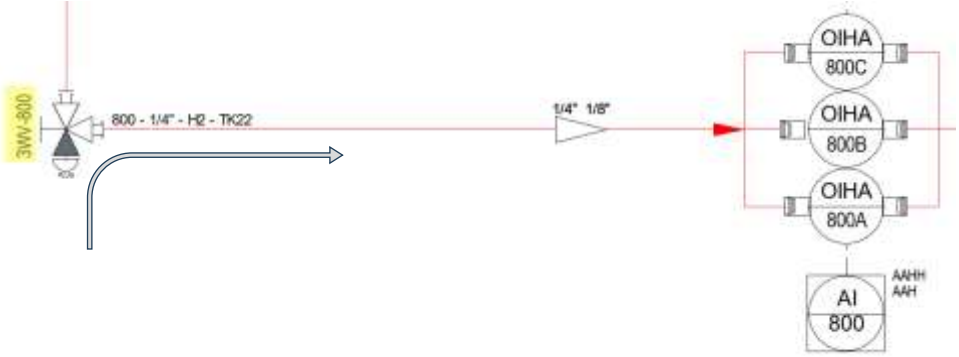


Figure 5. 3MV-800 position for OIHA calibration

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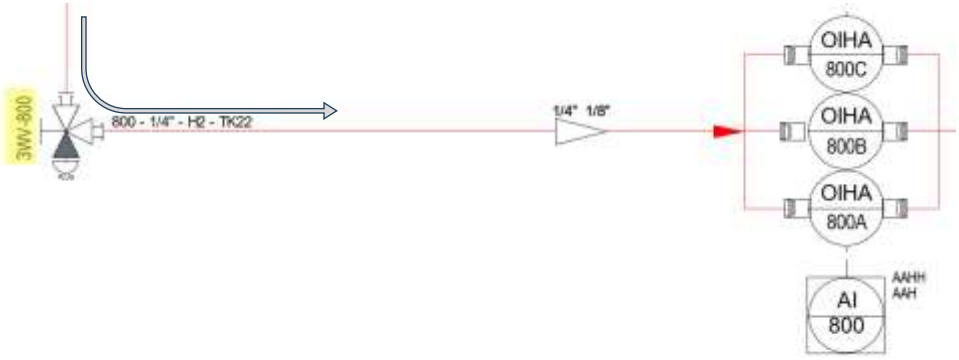


Figure 6. 3MV-800 normal operating position.

Span gas calibration

1. Make sure the pure hydrogen calibration cylinder is closed (fixed flow regulator properly placed on the calibration cylinder and regulating valve completely closed).
2. Isolate the line by turning the three-way valve (**3WV-800**) towards the calibration cylinder connection (Figure 5).
3. Connect the gas calibration cylinder via the hose attached to the fixed flow regulator, to the analysis cell.
4. Follow the instructions given in OIHA user manual (GE Measurement & Control oxy.IQ 910-296) to conduct air calibration (section 3.3.4).
5. Once the calibration is conducted, make sure that the flow regulator on the calibration gas cylinder is closed.
6. Disconnect the cylinder and then turn the **3WV-800** into its original position (Figure 6).

Analysis cell replacement

1. Once the inerting is completed, isolate the line by turning the three-way valve (**3WV-800**) towards the calibration cylinder connection (Figure 5).
2. Check that the **PG-800** shows 0 barg and **FICV-800** 0 L/min otherwise wait.
3. Switch off 400 Vac power supply as described in **C63-R2-DEC-001**.
4. Disconnect electrically the OIHA.
5. Follow the instructions given on the User Manual (GE Measurement & Control oxy.IQ 910-296) to conduct the installation of the new cell, section 2.3.
6. Make sure to replace the O-ring seal when reassembling.
7. Electrically connect the sensor.
8. Perform a leak test.
9. Restore the 400 VAC power supply. Please refer to network lockout procedure **C63-R2-DEC-001.**
10. Check the OIHA feedback on the HMI (Figure 4, reference point #2).

Leak test

1. Apply the bubble solution to the fittings surrounding the OIHA.

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2. Connect the nitrogen cylinder equipped with the fixed flow regulator to the **3WV-800**.
3. Rotate the three-way (**3WV-800**) valve as illustrated in Figure 5 to isolate the OIHA and facilitate the passage of nitrogen through it.
4. Pressurise up to 30 barg.
5. observe the presence of bubbles around the fittings, indicating the presence of a leak.
6. Upon completion of this procedure, return the **3WV-800** to its original position (Figure 6).

Time required: 2 hours

Periodicity: 12 months

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5. C63-R2-CAP-004 - Control of pressure sensor deviation

Objective	Validation criteria
• Determine the deviation of **Pressure Transmitters**	• No deviation higher than 0.5 bar registered on pressure sensor
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x pressure calibrator. • 1 x PTFE tape roll.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "**Maintenance**" mode.	
Operation description	
1. Inert the machine using the Inert O_2 (Figure 7) and Inert H_2 (Figure 8) buttons on the machine HMI.	

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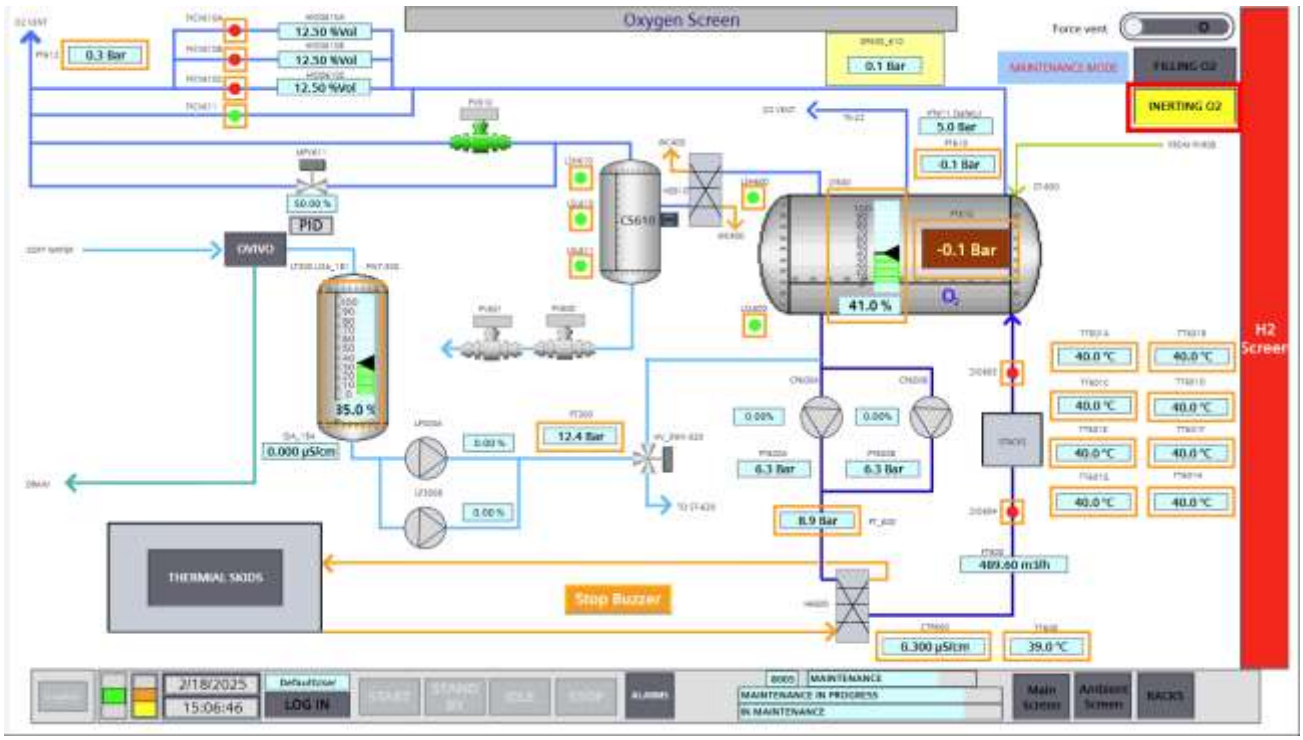


Figure 7. Oxygen screen on HMI

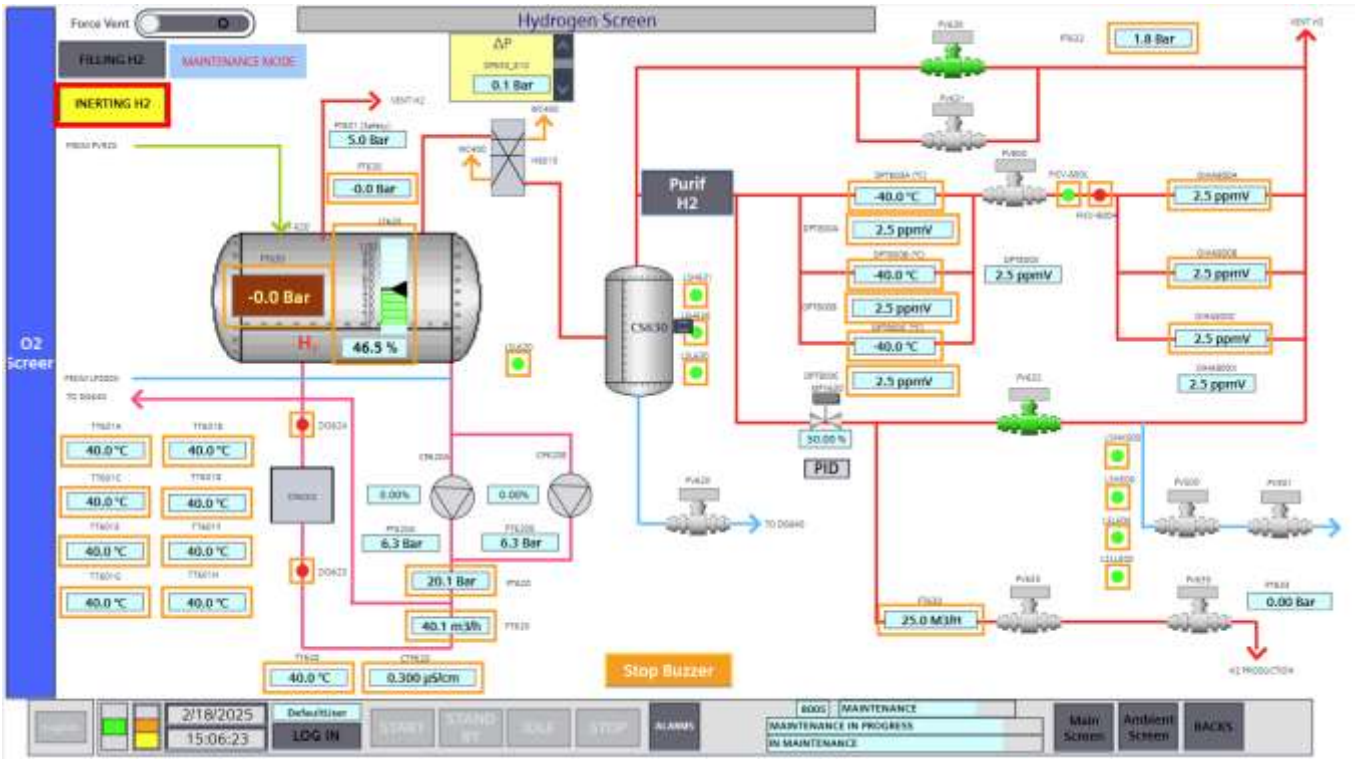


Figure 8. Hydrogen screen on HMI

2. When inerting is complete, check that the pressure measure by PT is at ~ 0 barg.

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3. Close the downstream block valve on the BBV associated and remove the vent port plug (drain). Then, open the bleed/vent valve.
4. Once the remaining gas on the PT has been released, connect the pressure source to the vent plug using the suitable fittings.
5. Pressurize the PT by pumping on the Pressure calibrator.
6. Compare the value of the pressure sent with the pressure calibrator to the pressure reflected on the PT. If the pressure is not the same, refer to the Pressure Transmitter manual (c.f. Operating Instructions Cerabar PMP71B).
7. If the pressure is the same, remove the pressure calibrator and return the BBV at its original condition (block valve open and bleed closed).
8. If necessary, replace any sensor.

Time required: 2 hours

Periodicity: 12 months

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6. C63-R2-CAP-005 - Control of the deviation of conductivity sensors

Objective	Validation criteria
• Check if there is a deviation on the conductivity sensor.	• The sensor's deviation does not exceed 0.2 µS/cm
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x hermetic container or reservoir filled with pure water. • Ultra-pure water supplied by the WTP-300. • Padlock keys for hand valves (if applicable). • 1 x flexible hose for draining. • 1 x Collecting tank for draining.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	• Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**" 3. Log in to "**Maintenance**" mode.	
Operation description	
1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1). 2. Once the inerting is completed, isolate the conductivity sensors. For CT/P-600 (oxygen side):	

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1. Close valves **HV-622** and **HV-623.**
2. Connect the flexible hose to the **HV-622D** to prepare for draining the section and filling the designated collection tank for disposal.
3. Open the drain valve **HV-622D** to purge the line section where the conductivity sensor is placed. Close it when it finishes draining and replace the respective padlock on it.

For CT-P-620 (hydrogen side):

1. Close valves **HV-604** and **HV-603A**.
2. Connect the flexible hose to the **HV-603D** to prepare for draining the section and filling the designated collection tank for disposal.
3. Open the drain valve **HV-603D** to purge the line section where the conductivity sensor is placed. Close it when it finishes draining and replace the respective padlock on it.
4. Disconnect the power supply to the conductivity sensor on the local display of the Endress Liquiline. Please refer to the Technical Information Liquiline M CM42.
5. Disconnect electrically the conductivity sensor (**CT/P-600** or **CT/P-620**) and then proceed to unscrew it.

Prepare a pure water sample for the calibration:

1. Rinse the hermetic container with pure water (by opening **HV-303DA** or **HV-303DB**).
2. After three rinses, fill the sealable container with pure water. Close the pure water drain valve used and replace the respective padlock.
3. Note the conductivity value for this sample, displayed on the oxygen view (see **QIA-1B4** transmitter display Figure 9 reference point #1).

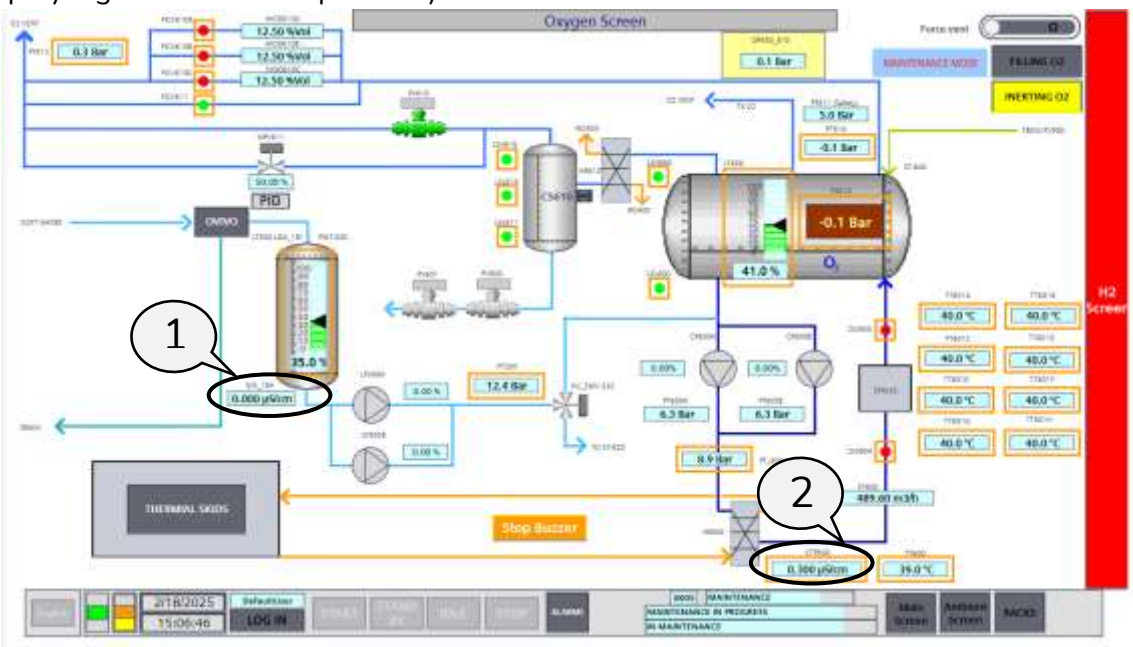


Figure 9. Conductivity sensor display on HMI oxygen view

4. Rinse the conductivity sensor three times with pure water and then energise the transmitter (cf. Technical Information Liquiline M CM42). Check on the HMI that there is feedback from the conductivity sensor being tested (Figure 9 reference point #2 or Figure 10, reference point #1).

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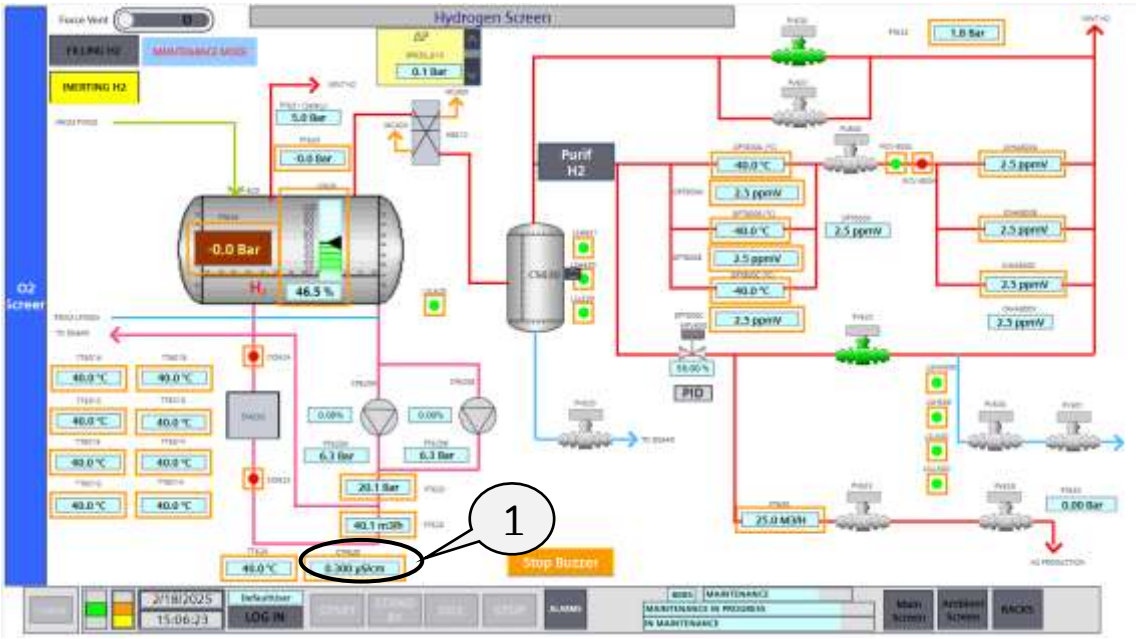


Figure 10. Conductivity sensor display on HMI hydrogen view

5. Test the conductivity sensor in the pure water recollected on the sealable container. Wait until the value displayed stabilizes on the HMI (Figure 9 reference point #2 or Figure 10, reference point #1).
6. By comparing both measures (value displayed by the **QIA-1B4** and the **CT/P-600** or **CT/P-620**), determine if the sensor is deviating. Follow procedures **R2-PROC-002** (Section 23) for an electrical check of the deviating sensor.

<u>Contact Elogen if a sensor needs to be replaced.</u>

7. Disconnect the power supply to the conductivity sensor on the local display of the Endress Liquiline and screw it back on its original position in the piping.
8. Connect electrically the sensor, check that there is feedback on the HMI (Figure 9 reference point #2 or Figure 10, reference point #1).
9. Position the hand valves in their standard operating configuration as specified by P&ID (C63-PID-001). Proceed to open **HV-622** followed by **HV-623**, or **HV-604** followed by **HV-603A**, if the verification is made for the oxygen side. Secure the respective padlocks on the hand valves in their designated positions.
10. Refill the system with pure water following the procedures: **R1-COM-600** and **R1-COM-620**.

Required time: 8 hours

Periodicity: 12 months

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7. C63-R2-CAP-610 - Calibration of hydrogen in oxygen sensor

Objective	Validation criteria
• To calibrate the Hydrogen in Oxygen detector	• Calibration has been performed in accordance with this procedure and the value displayed by the transmitter is 2% when testing with the calibration gas.
Required personnel	**Required materials and consumables**
1 technician	• 1 x flexible to connect the cylinder to the calibration valve • 1 x new measuring cell (if necessary) • 1 x pure oxygen cylinder • 1 x 2% H2 in O2 cylinder
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical risk:** Risk associated with the handling of hydrogen. Check the Material Safety Data (C63-SDS-001). **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to maintenance mode.	
Operation description	

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Zeroing the HIODs

1. Close the valve HV-615.
2. Connect a pure oxygen cylinder to the valve HV-616 and open the valve.
3. Check that the PRV-610 regulate the pressure at 0.5barg and that the FICV-610A/B/C indicate 1NL/h
4. According to the supplier manual, set the HIOD-610A/B/C at 0% H2 in O2.
5. Close the valve HV-616 and disconnect the cylinder.

Calibration at 2% H2 in O2.

1. Connect the 2% H2 in O2 cylinder to the valve HV-616 and open the valve.
2. Check that the PRV-610 regulate the pressure at 0.5barg and that the FICV-610A/B/C indicate 1NL/h
3. According to the supplier manual, set the HIOD-610A/B/C at 0% H2 in O2.
4. Close the valve HV-616 and disconnect the cylinder.
5. Close the valve HV-615.

Time required: 30 minutes

Periodicity: 6 months

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8. C63-R2-CAP-800 - Dew point transmitter replacement

Objective	Validation criteria
Replacing the Dew Point Transmitter (**DPT-800A/B/C**)	• New Dew Point Transmitter installed and running • No leaks
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x Dew Point Transmitter spare and its user manual • 1 x PTFE tape roll • 1 x nitrogen cylinder • 1 x pressure reducer • 1 x hose • Adjustable Wrench. • Leak detector (leak detection solution).
Potential risks (Safety and Environment)	**Prevention and protection measures**
Chemical risk: (refer to Safety Data Sheet C63-SDS-001 – Hydrogen) **Thermal Risk:** Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "Maintenance" mode.	
Operation description	
1. Inert the electrolyser by pressing Inert H_2 on the HMI (Figure 11).	

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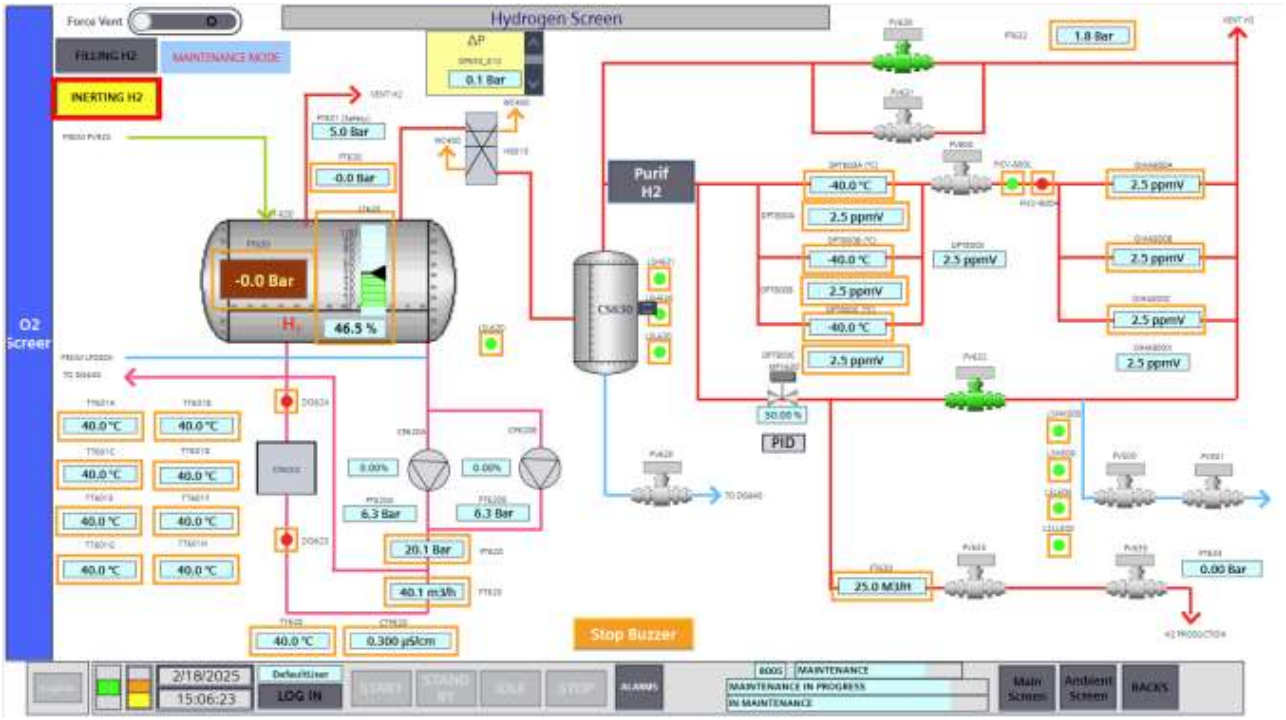


Figure 11. Hydrogen screen on HMI

2. Once inerting is complete, switch off 400 Vac power supply as described in **C63-R2-DEC-001**.
3. Electrically disconnect the **DPT-800A/B/C** sensor.
4. Check that **PG-800** indicates 0 barg and **FICV-800** indicates 0 L/min, otherwise wait until these values are at 0.
5. Disassemble the Dew Point Transmitter in accordance with the procedure outlined in the sensor's user manual.
6. Install the new Dew Point Transmitter in accordance with the procedure outlined in the sensor's user manual. Ensure that Teflon tape is applied to the thread.
7. Reconnect electrically the transmitter as described in the sensor's user manual.
8. Apply the bubble solution to the fittings surrounding the **DPT-800A/B/C** and then restart the hydrogen production to check any leaks.
9. Let the system to achieve the nominal pressure and observe the presence of bubbles around the fittings.
10. If leakage, return to step 3.
11. Verify the operational status of the newly replaced Dew Point Transmitter.

Time required: 2 hours

Periodicity: 12 months.

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9. C63-R2-COM-004 - Protection system to avoid freezing

Objective	Validation criteria
• Safeguard the system in the event of frost and power failure	• Absence water in loops 300, 600 and 620 • Stack disassembled and stored in water in a controlled atmosphere
Required personnel	**Required materials and consumables**
• 1 x technician.	• Adjustable Wrench. • Immersion pump • Blind flanges (for each stack: 4x 2'') • Valve lockout padlock • 1 x Voltage Absence Tester (VAT) • 1 x empty container
Potential risks (Safety and Environment)	**Prevention and protection measures**
Chemical Risk: The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen. **Thermal Risk:** Risk of burns or damage related to high temperatures or hot surfaces during operation. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. Risk of pressure build-up when disconnecting connections and starting up. **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date)
Prerequisites	

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1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X).
2. The status displayed on the HMI should be "**STOP**".
3. Stacks must be depolarized. Check for absence of voltage (0V).

   Reminder: Fatal risk

4. Install the immersion pump in a suitable location to remove water from the stacks. Plug the pump into one of the sockets provided. Do not start the pump.
5. Prepare pure water supply (via **HV-300DA** and **HV-300DB** purge valves).

Operation description

Purge loop 620

1. Remove the plug and connect a flexible hose to the following valves: **HV-620DA**, **HV-620DB**, **HV-621D**, **HV-622D**, **HV-640D.**
2. Unlock and open the valves mentioned in the previous point and drain the remaining liquid in the loop 620.
3. Close all drain valves opened in the previous step, then place their plugs.
4. Dispose of wastewater in accordance with offshore platform regulations.

Purge de la boucle 600

1. Remove the plug and connect a flexible hose to the following valves: **HV-600D**, **HV-600DA**, **HV-600DB**, **HV-601D**, **HV-601D**, **HV-602DA** and **HV-603D.**
2. Unlock and open the valves mentioned in the previous point and drain the remaining liquid in the loop 600.
3. Close all drain valves opened in the previous step, then place their plugs.
4. Dispose of wastewater in accordance with offshore platform regulations.

Purge loop 300

1. Remove the plug and connect a flexible hose to the following valves: **HV-300D**, **HV-300DA**, **HV-300DB**, **HV-303DA** and **HV-303DB**.
2. Unlock and open the valves mentioned in the previous point and drain the remaining liquid in the loop 300.
3. Close all drain valves opened in the previous step, then place their plugs.
4. Dispose of wastewater in accordance with offshore platform regulations.

Purge Y filters (F-600, F-610 and F-620)

1. Prepare a container under the filter (or drain it directly into the drip tray).
2. Open the filter cover.

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3. Drain.
4. Check filters for foreign matter or damage.
5. Replace filter cover.
6. If necessary, pump the water out of the drip tray using an immersion pump.

Container

1. If there is water on the floor of the containers, please refer to C63-R1-COM-003

Bringing the system up to standard

See **R1-COM-600** and **R1-COM-620**.

Time required: 4 hours

Periodicity: when necessary (during prolonged shutdowns of the electrolyser and/or in extreme conditions with temperatures below -20°C)

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10. C63-R2-CTN-001 - Cleaning of the container's ventilation grids

Objective	Validation criteria
• Ensure the structural integrity and cleanliness of the container's ventilation grids.	• There is no evidence of deterioration on the ventilation grids. • They have been cleaned in accordance with the recommendations outlined in this procedure.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Screwdriver. • New filter cartridge, if replacement is required. Please refer to ventilation grid's technical specifications. • Cleaning tools: High-pressure hoses, compressed air or vacuum cleaner.
Potential risks (Safety and Environment)	**Prevention and protection measures**
• **Exposure to contaminants:** possible release of mold, dust and other harmful particles accumulated on the ventilation grids. This release could cause health risk such as respiratory issues and allergic reactions. • **Fire and explosion risk:** as the ventilation grid is used to evacuate the possible leaks of hydrogen in the container, cleaning these systems without proper precautions can increase the risk of fire or explosion.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "**Maintenance**" mode.	
Operation description	

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1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).
2. Switch off 400 Vac power supply as described in **C63-R2-DEC-001**.
3. From outside the container, unscrew the filter grids. And take out the filter cartridge.
4. Inspect the condition of the filter grid and replace it if it shows signs of corrosion or damage.
5. Clean the filter case and the cartridge with compressed air.
6. If the filter cartridge is clogged, replace it with a new one.
7. Install the cartridge in its housing and securely fasten the grid back into place.
8. store the 400 VAC power supply. Please refer to network lockout procedure **C63-R2-DEC-001**.

Time required: 1 hour.

Periodicity: 24 months.

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11. C63-R2-CTN-004 - Maintenance of vents

Objective	Validation criteria
• Ensure the optimal performance and safety of the venting system.	• There is no evidence of deterioration on the vents. • The pressure readings from the pressure transmitters on the oxygen and hydrogen vents are below 0.5 barg.
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 adjustable wrench. • 1 cherry picker (aerial work platform). • Grounding straps. • 1 Multimeter. • Pure water for cleaning.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Mechanical risks: Injuries from cuts, impacts, crushes, or entrapments due to the use of tools and machinery. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical risk:** exposure to hydrogen or oxygen present in the venting pipelines. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen. **Work at high risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • Working at high permit and certification of the training to use the cherry picker.
Prerequisites	
1. Ensure the availability of a cherry picker to facilitate work at elevated heights around the venting systems. 2. The venting system must remain accessible throughout the maintenance operation. 3. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – **TT-601X**). 4. Log in to "**Maintenance**" mode.	
Operation description	

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1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).
2. Check on the Oxygen and/or Hydrogen view on the HMI, the reading of the **PT-612** (if checking the oxygen vent) and/or **PT-632** (if checking the hydrogen vent). The pressure must not exceed 0,5 barg. If this threshold is surpassed, it will indicate a potential obstruction in the vent.
3. Perform a visual inspection of the vent to identify any cracks or damages on the fittings, welds, supports, and other components.
4. Inspect and verify that the grounding is correct. The resistance must not exceed 25 ohms.
5. Check the grounding cables and their integrity. Replace the cables if necessary.
6. If it is possible, unscrew the vent head and remove the mesh/grid. Clean it with pure water. Once cleaned, reinstall it.

Time required: 1 hour.

Periodicity: 12 months or upon activation of the High oxygen/hydrogen vent pressure H – PT-612/PT-632 alarm.

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12. C63-R2-CTN-005 - Drainage System Maintenance

Objective	Validation criteria
• Ensure the optimal performance and safety of the draining system.	• There is no evidence of deterioration on the vents. • The drainage system is free form obstructions.
Required personnel	**Required materials and consumables**
• 1 x technician.	• High-pressure hoses. • Brushes. • Spare parts: filters, gaskets (if required). • Pipe inspection tools[3]: cameras, flashlights.
Potential risks (Safety and Environment)	**Prevention and protection measures**
• **Environmental Risks:** Improper handling of waste and contaminants can lead to environmental pollution.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "**Maintenance**" mode.	
Operation description	
1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1). 2. Conduct periodic inspections to detect accumulations of debris, sludge, or materials that may obstruct the flow. 3. Use high-pressure water to remove accumulated debris from the surface of drains and gutters. 4. Ensure that filters are not saturated or damaged and replace them if necessary. 5. Check that the valves present on the hydrogen vent drain (**PV-500** and **PV-501**) are functioning correctly and perform internal cleanings according to the manufacturer's specifications. 6. Inspect the condition of grates, filters, and other components, and replace them if they show signs of corrosion or damage. **Time required:** 4 hours. **Periodicity:** 12 months.	

[3] Certified for ATEX compliance when operating in ATEX-designated zones.

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13. C63-R2-CTN-006 - Maintenance of restriction orifice

Objective	Validation criteria
• To check the condition of the restrictive orifices	• The restriction orifices are cleaned and free of clogs
Required personnel	**Required materials and consumables**
1 x technician.	• Adequate wrenches for flanges • Pure water
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. <u>Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C.</u> **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date)
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to maintenance mode.	
Operation description	
This procedure refers to the RO-600, RO-610, RO-620, RO-630, RO-501, and the orifices included in the FT-900 and FT-920.	

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To dismantle an orifice:

1. Check that the orifice is cooled down and not under pressure
2. Isolate the orifice with valves upstream and downstream, it can be an automatic valve or a manual valve.
3. Dismantle the flanges by loosening the bolts, then remove the restrictive orifice.
4. Check that the orifice is cleaned and not plugged.
5. If necessary, clean the orifice with pure water.
6. Check the gaskets and replace them if necessary.
7. Put back the restrictive orifice and tighten the bolts.
8. On start up, check the absence of leak.

Time required: 30 minutes per restrictive orifices

Periodicity: 6 months

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14. C63-R2-CTN-007 – Maintenance nitrogen check valves

Objective	Validation criteria
• Check the condition of the nitrogen check valves **CV-900/901/920/921**	• The check valves are cleaned and free of clogs
Required personnel	**Required materials and consumables**
• 1 x technician.	• Adequate wrenches for flanges • Pure water • 1 x PTFE tape roll
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. <u>Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C.</u> **Chemical risk:** Risk associated with the handling of nitrogen. Please refer to the Material Safety Data (C63-SDS-003). **Anoxia risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". **3.** Activate Maintenance mode on the control panel, then identify yourself on the HMI.	
Operation description	
4. Disassemble the check valve to be verified. 5. Check that the seat is clean, free of debris, and that the seals are in good condition. 6. Clean the check valve with pure water and reinstall it. 7. If the compliant condition cannot be reestablished through cleaning with pure water, it is necessary to replace the valve with a new one. The same procedure can be applied to the check valve CV-800.	

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Time required: 30 minutes per check valve.

Periodicity: 6 months, or upon the observation of issues during inerting and pressurization with nitrogen.

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15. C63- R2-ELE-003 - Tightening of electrical connections for Stack's cell voltage monitors (PCA).

Objective	Validation criteria
• Verify electrical lug clamping of cell voltage monitor connections.	• The cabling of the cell voltage monitor is compliant with best practices of wiring. • The lug clamping connected to each cell in the stacks ensures a secure attachment of the cable.
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x Voltage Absence Tester (VAT). • Wire stripper. • New lugs (if required).
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "**Maintenance**" mode.	
Operation description	

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1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).
2. Switch off 400Vac power supply as described in C63-R2-DEC-001.
3. Verify that the stacks are depolarized. Confirm the absence of voltage using the VAT (0V).
4. Ensure that all lugs are securely connected to each cell in the stacks. These connections are susceptible to vibrations and unintended movements.
5. If a lug is not compliant and is easily removed from the cell, reinstall the cable lug.
6. Verify the integrity of the cabling on the monitoring device and the compliance regarding the best practice of wiring. Figure 12 provides an example of wiring best practice. In the scenario depicted on the left, the cable terminals lack protection, leading to non-compliant operation of both the device and the associated process. Conversely, the scenario on the right illustrates the proper method for wiring the device.

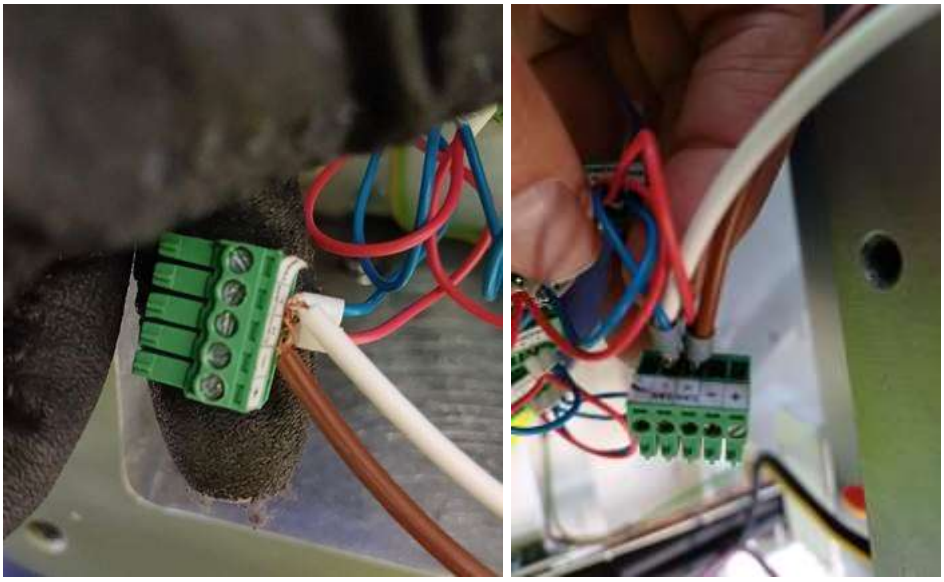


Figure 12. Example of cabling in a cell monitor

Reisntalling a cable lug.

1. Remove the insulation from the cable, place the lug and crimp it.
2. Verify that the lug is tightly attach to the cable.
3. The imprint marking must be aligned with the head of the lug.

Time required: 8 hours

Periodicity: 6 months. Or upon detection of a significant discrepancy between two consecutive cells in a stack.

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16. C63-R2-FLE-001- Inspection and replacement of flexible hoses

Objective	Validation criteria
• Inspection of flexible hoses • Replacement of flexible hoses	• Flexible hoses changed / examined • There are no leaks around the hose's fittings.
Required personnel	**Required materials and consumables**
• 1 x technician	• Flexible Hoses, according to the technical specifications of flexible hoses, and stacks and collector dimensions (DN50 PN40). • Adjustable Wrench. • Padlock keys for hand valves. • Hose Removal Pliers. • 1 x flexible hose for draining. • 1 x Collecting tank for draining.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Anoxia risk** **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date)
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to "**Maintenance**" mode.	
Operation description	

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1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).

Flexible hoses inspection

1. Check the flexible hose around its connections.
2. Check if the hose is damaged or frayed: signs of rupture, swelling, or significant twisting.
3. Check for leaks around the hose.
4. If the flexible hose is damaged, it must be replaced.

Time required: 4 hours

Periodicity: 12 months

Flexible hoses replacement

1. Isolate the flexible hose by closing upstream and downstream closest valves. For hydrogen side: **HV-623** and **HV-624**; for oxygen side: **HV-604** and **HV-605**.
2. Drain the isolated section by opening the drain valves: **HV-623D** if the concerned hose is placed on hydrogen side or **HV-602D** if it is placed on oxygen side.
3. Once the section is completely drained, disconnect the damaged hose using the adjustable wrench and the hose removal pliers.
4. Remove the whiplash protection system.
5. Install the new hose in accordance with ASME standards. Each hose must be stamped with its label, operating pressure, manufacturing date, and assembler's identifier.

Note: Each flexible has specific characteristics such as diameter, length, connection.

6. Reinstall the whiplash protection system.
7. Return all hand valves to their normal positions (Lock open for **HV-623**, **HV-624**, **HV-604** and **HV-605**. Lock close for **HV-623D** and **HV-602D**).
8. Top up the water on oxygen and/or hydrogen side, following the procedures **R1-COM-600**, **R1-COM-620**.
9. Start the circulation pumps (**CP-600A/B** and **CP-620A/B**) and check if there are leaks around the hose replaced.
10. If a leak is detected, stop the pumps, wait for the pressure to decrease (<0.5 barg) and repeat steps from 1 to 4 (Flexible hoses replacement section).
11. Check that the gasket is well placed and verify the torque. If the new joint appears worn or has a manufacturing defect, replace it and reinstall the hose.
12. Repeat steps from 6 to 8.

Time required: 8 hours

Periodicity: 5 years or upon the first indication of early deterioration.

Note: Upon draining the stacks, proceed with the maintenance activity without interruption. The membranes of the stacks must not remain dry for a period exceeding the stipulated time requirement.

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17. C63-R2-FIL-600 - Cleaning the strainer filter on the oxygen loop

Objective	Validation criteria
• To check the condition and cleanliness of the inline filter on the 600 loop (**F-600**).	• The filter has been opened, check and replaced if necessary.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Adequate wrenches to open the filter. • 1 new basket (if necessary). • 1 new gasket (if necessary). • Drain lines.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Chemical Risk:** The presence of oxygen. Please refer to Safety Data Sheet C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to maintenance mode.	
Operation description	

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Opening of the filter

1. Close the valves **HV-604** and **HV-603A**.
2. Connect a line to the valve **HV-603D** to collect the drain water and open the valve. Open the vent **HV-604V**.
3. Once the pipe is empty of water, open the filter flange according to the user manual.
4. Check the condition of the basket and replace it if it is damaged.
5. If necessary, clean the basket with pure water.

Reinstatement of the filter

1. Reinstall the basket in the filter.
2. Check the good condition of the gasket and close the filter flange.
3. Close the vent **HV-604V**, the drain **HV-603D**, and disconnect the drain line.
4. To fill the pipe with water, first open the valve **HV-603A**, then the valve **HV-604**.
5. Check the water level in the **ST-600** and make up the level if necessary.
6. Start the pump **CP-600** and check the absence of leak.

Time required: 30 minutes

Periodicity: 6 months

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18. C63-R2-FIL-620 - Cleaning the strainer filter on the hydrogen loop

Objective	Validation criteria
• To check the condition and cleanliness of the filter on the loop 620 (**F-620**).	• The filter has been opened, check and replaced if necessary.
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x water vacuum cleaner • 1 x filter basket (DN100 0.076mm) • Pure water • Brush • Valve padlock key • Water vacuum cleaner
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Anoxia risk** **Chemical Risk:** The presence of hydrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Activate Maintenance mode on the control panel, then identify yourself on the HMI.	
Operation description	
Opening of the filter 1. Close the valves **HV-622** and **HV-623**. 2. Connect a flexible hose to the valve **HV-622D** to collect the drain water. Unlock and open the valve.	

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3. Once the pipe is empty of water, open the filter flange according to the user manual (User_manual_Spirax_Sarco_FIG36).
4. Check the condition of the basket and replace if it is damaged.
5. If necessary, clean the basket with pure water.

Reinstatement of the filter

1. Reinstall the basket in the filter.
2. Check the good condition of the gasket and close the filter flange.
3. Close the drain **HV-622D** and disconnect the drain line.
4. Open the valve **HV-622** then open the valve **HV-623**.
5. Check the water level in the **ST-620** and make up the level if necessary.
6. Start the pump **CP-620** and check the absence of leak.

Time required: 30 minutes

Periodicity: 6 months

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19. C63-R2-FIL-800 - Cleaning or replacing the hydrogen purification outlet filter

Objective	Validation criteria
Clean or replace filter 66 (c.f. 20230443 DEDR-500_36 P&I Diagram Offshore)	• Cleaned or changed filter
Required personnel	**Required materials and consumables**
• 1 x technician.	• Flat wrenches, socket wrenches • 51.230.5S, 2 micron / Viton seal o'ring (Filter 66) Aquagas • P&ID Aquagas
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Anoxia risk** **Chemical Risk:** The presence of hydrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Activate Maintenance mode on the control panel, then identify yourself on the HMI.	
Operation description	

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1. Start by depressurizing and inerting the HPU according to the following procedure (C63-R2-HPU-700).
2. Open filter 66 on the hydrogen purification unit.
3. Clean basket or replace if necessary.
4. Refit basket and filter with new gasket.
5. For other HPU filters (**64-F1.1**, **64-F1.2**, **64-F2.1**, **64-F2.2, 61-F1.1** and **61-F1.2**), simple cleaning is sufficient. Check that the HPU is depressurized before servicing the filters.
6. Inert the HPU before restart the electrolyser, please refer to **C63-R2-HPU-700**
7. Return the electrolyser to automatic mode.

Time required: 2 hours

Periodicity: 12 months

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20. C63-R2-HPU-700 - Inerting of the hydrogen purification unit

Objective	Validation criteria
• To inert the purification unit to make it safe for maintenance.	• The purification unit has been inerted with nitrogen.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Nitrogen supply to the electrolyser available
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Chemical Risk:** The presence of hydrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to maintenance mode.	
Operation description	
1. Make sure to be log in the maintenance mode on the HMI. 2. Manually open the valve **PV-632**, and open at 100% the valve **MPV-630**. 3. On the purification unit, open the valve 64-V5. Open the valve 64-V4.4, this will close the valve 64-V4.3. Open the valve 64-V4.1, this will close the valve 64-V4.2.	

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4. Open the valve **PV-920**.
5. Check the presence of nitrogen flow on the **FT-920,** set the flow at 1044L/h.
6. Inert the unit for 3 hours and 40 minutes.
7. Once the inerting is completed, close the **PV-920**, and wait for the pressure to decrease and be under 0.1barg.
8. Close the valves **PV-632** and **MPV-630**.
9. The purification unit is then safe for maintenance.

Time required: 30 minutes

Periodicity: When necessary

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21. C63-R2-HVAC-001 - Maintenance of HVAC system

Objective	Validation criteria
• Refer to Paumier documentation	• Refer to Paumier documentation
Required personnel	**Required materials and consumables**
• 1 x technician.	
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical Risk:** Please refer to Safety Data Sheet C63-SDS-007 – MPG 40%.	• Wear PPE (Personal Protective Equipment).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**". 3. Log in to maintenance mode.	
Operation description	

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For the maintenance of the HVAC system, refer to the supplier documentation:

O&M:

P.0608871.L.02.405_HVAC - Operating and maintenance manual for AHU

P.0608871.L.02.406_HVAC - Operating and maintenance manual for Chiller

P.0608871.L.02.407_HVAC - Operating and maintenance manual for Damper

P.0608871.L.02.408_HVAC - Operating and maintenance manual for Fan Coil Units (FCUs)

P.0608871.L.02.409_HVAC - Operating and maintenance manual for hydraulic system

P.0608871.L.02.410_HVAC - Operating and maintenance manual for pumps

P.0608871.L.02.411_HVAC - Operating and maintenance manual for Drycooler

Maintenance planning:

P.0608871.L.02.402_Maintenance Table

Time required: As per supplier documentation

Periodicity: As per supplier documentation

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22. C63-R2-INS-001 - External inspection of pressure vessels

Objective	Validation criteria
• External inspection of pressure equipment	• Completed inspection report
Required personnel	**Required materials and consumables**
• 1 person	• Ultrasonic thickness gauge • Periodic inspection report for pressure equipment
Potential risks (Safety and Environment)	**Prevention and protection measures**
Anoxia risk **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen. **Pressure risk**	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – **TT-601X**). 2. The status displayed on the HMI should be "**STOP**"	
Operation description	
Follow the PED procedure. Check equipment for thickness and deformation. Any equipment connected to it (valves, gates, etc.) must be inspected. **Time required:** 30 minutes per instrument **Periodicity:** When necessary	

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23. C63-R2-PROC-002 - Electrical verification of the proper functioning of an analog sensor

Objective	Validation criteria
• To check the functioning of an analog transmitter	• The transmitter function properly and react to the measured value.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Pressure source • Drain lines • Mix of water and ice • Multimeter
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**" 3. Log in to maintenance mode.	

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Operation description
Pressure transmitter 1. Check that the transmitter is powered on and that the screen on the transmitter is showing the measured value. 2. On the Endress-Hauser instruments, it is possible to enter a simulation mode to force the current output to the HMI. 3. According to the user manual, enter the simulation mode, and force a value of current, check that the value displayed on the HMI is coherent. 4. To verify the deviation of the pressure sensor, please refer to **C63-R2-CAP-004**. **Level transmitter** 1. Check that the transmitter is powered on and that the screen on the transmitter is showing the measured value. 2. On the Endress-Hauser instruments, it is possible to enter a simulation mode to force the current output to the HMI. 3. According to the user manual, enter the simulation mode, and force a value of current, check that the value displayed on the HMI is coherent. 4. Reinstate the level transmitter. 5. If possible, drain the tank connected to the level transmitter through a drain valve. 6. Check that the level transmitter reacts accordingly. **Temperature transmitter** 1. There is no screen on the temperature transmitter. 2. Check that the transmitter is powered on by measuring the voltage on the transmitter. 3. Dismantle the probe and put it in a mix of liquid water and ice. Check the reading on the HMI, it should indicate 0°C. 4. It is also possible to disconnect the probe, put it in ice and water and measure directly the electrical resistance, it should be 100 Ohm. 5. Reinstate the probe and the transmitter. 6. To verify the deviation of the temperature sensor, please refer to C63-R2-CAP-003. **Flow transmitter** 1. Check that the transmitter is powered on and that the screen on the transmitter is showing the measured value.

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2. On the Endress-Hauser instruments, it is possible to enter a simulation mode to force the current output to the HMI.
3. According to the user manual, enter the simulation mode, and force a value of current, check that the value displayed on the HMI is coherent.
4. Reinstate the level transmitter.

Conductivity transmitter

1. Check that the transmitter is powered on and that the screen on the transmitter is showing the measured value.
2. On the Endress-Hauser instruments, it is possible to enter a simulation mode to force the current output to the HMI.
3. According to the user manual, enter the simulation mode, and force a value of current, check that the value displayed on the HMI is coherent.
4. Reinstate the level transmitter.
5. To check the deviation of the conductivity sensor, refer to the procedure C63-R2-CAP-005.

Time required: 30 minutes per instrument

Periodicity: When necessary

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24. C63-R2-PROC-003 - Electrical check of solenoid valve operation

Objective	Validation criteria
• Validate the electrical operation of a solenoid valve	• Presence of power supply to solenoid valve when activated • ATEX sealing
Required personnel	**Required materials and consumables**
• 1 x technician.	• 1 x multimeter • Metal screwdriver • Solenoid valve technical documentation
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• The operator performing this operation must have electrical clearance. • Wear PPE (Personal Protective Equipment) • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – **TT-601X**). 2. The status displayed on the HMI should be "**STOP**" 3. Log in to "**Maintenance**" mode.	
Operation description	

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1. Remove the upper part of the solenoid valve to gain access to its connections.
2. Activate the solenoid valve via the HMI.

Note: Activating does not necessarily mean opening the valve, as some are normally open.

3. See P&ID (FO: Fail Opened and FC: Fail Closed). Activating a Fail Opened solenoid valve will cause it to close.
4. Check that power is supplied to the appropriate terminals (see manual).
5. Bring a metal screwdriver close to the solenoid valve.
6. If the screwdriver is magnetized, the solenoid valve is operating correctly. If not, replace solenoid valve.

Time required: 10 minutes per valve

Periodicity: 12 months

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25. C63- R2-PROC-005 - Electrical check of a flow switch

Objective	Validation criteria
• Check the electrical operation of a flow switch.	• The electrical supply is detected on the sensor. Presence of a signal on the controller when the sensor is activated.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Multimeter. • Screwdriver.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**" 3. Log in to "**Maintenance**" mode.	
Operation description	
1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively. 2. Check the integrity of the case coating.	

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3. Check for any deformation of the case.
4. Open the lid.
5. Spot the contacts and keep a graphic register of the current connections.
6. Disconnect the contacts.
7. Check the presence of the power supply on the dedicated connection terminals. Please refer to the H250 M40 Handbook, Chapter 4 Electrical connections.

Triggering the switch

1. Please refer to Chapter 6.1 of the User Manual (H250 M40 Handbook) to trigger the alarm by simulating a 4 mA signal followed by a 20 mA signal. Upon completion of the test, ensure that the device is in measuring mode, by monitoring the flowrate variations during normal operation of the unit, particularly during the start and stop sequences.
2. If the alarm is not triggered, conduct a check of the electrical connections between the device and the electrical cabinet. Refer to the flow switch's user manual to check the proper setting of the contact pointer.
3. Close the lid making sure the seal is put back or changed if necessary.

Required time: 1 hour.

Periodicity: 12 months.

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26. C63-R2-PSV-001 - Pressure safety valve replacement

Objective	Validation criteria
• To change the pressure safety valve.	• The pressure safety has been replaced.
Required personnel	**Required materials and consumables**
• 1 x technician.	• Adequate wrenches • New safety valve
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. <u>Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C.</u> **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – **TT-601X**). 2. The status displayed on the HMI should be "**STOP**" **3.** Log in to "**Maintenance**" mode.	
Operation description	
This procedure refers to the PSV-610/630/631/640. **Replacement of a safety valve.**	

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1. Check that the inerting has been done on the **ST-600/620**. For the **DG-640**, the inerting has to be done manually.
2. Open the valves **HV-642/940/941**. Set the nitrogen flow à 1066NL/h, and inert the **DG-640** for 3.5 hours.
3. For the PSV-631, the inerting of the HPU must be done manually. Refer to the procedure **C63-R2-HPU-700**
4. Dismantle the safety valve and replace it.
5. On start up, check the safety valve for leaks.

Time required: 30 per valve

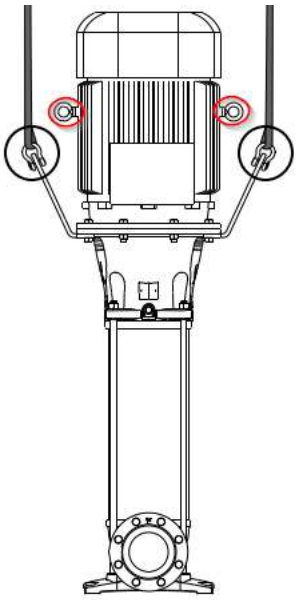
Periodicity: When necessary

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27. C63-R2-PUM-001 - Oxygen circulation pump maintenance (CP-600A/B)

Objective	Validation criteria
• Carry out maintenance work on the **CP-600A/B** pumps	• Successful maintenance actions • No leaks
Required personnel	**Required materials and consumables**
• 2 x technicians.	• 1 **CP-600** pump spare (optional) • 2 x DN100 flange gaskets • 1 x Voltage Absence Tester (VAT) • 1 x adjustable wrench • 1 x screwdriver • Manual valve padlock key • 1 x HBM 2-tonne folding workshop crane (capacity: 200 kg min, dimensions to be respected as specified in the procedure) • 1 x 200 kg lifting sling. Successful maintenance actions • 1 x flexible hose • 1 x Collecting tank
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Physical risk (handling)** **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.

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Prerequisites
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – **TT-601X**). 2. Log in to maintenance mode. 3. Switch off 400Vac power supply as described in C63-R2-DEC-001.
Operation description
Drain the line 1. Isolate the pump to be drained by unlocking and closing valves **HV-600A/B** and **HV-601A/B**. 2. Remove the drain plug containing the valves **HV-600DA/DB**, connect the flexible hose. 3. Drain the water up to the collector tank by opening the valves **HV-600DA/DB**. 4. Wait until the water has finished draining. Dispose of water in accordance with customer regulations. **For a pump exchange** 1. Check that there is no voltage at the pump terminals using the VAT. 2. Disconnect pump power supply cables. 3. Unscrew pump connection flanges. 4. Remove the pump: a. Sling the pump using the eyebolts on the pump (see Figure 13).  *Figure 13. Eyebolts of the pump* b. Bring the workshop crane overhanging the single container door. c. Attach the sling to the workshop crane, lift the pump and remove it from the container. 5. Install the new pump in the same way as the old one was removed and send it to the supplier for repair.

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6. Connect the pump fluidically by reconnecting the hoses to the pump flanges. If signs of wear are observed on the flange gasket, it should be replaced with a new one.
7. Wire the pump electrically. Be careful to respect the phase order.
8. Depending on the pump to be changed, close the valve **HV-600DA or HV-600DB**.
9. Open the valves **HV-600A/B** and **HV-601A/B** to start the pump.
10. If necessary, top up water in **ST-600** tank as per procedure C63-R1-COM-600.
11. Prime pump (unless self-priming)
12. Check that the pump is rotating in the right direction by checking the direction of rotation on the pump body. Vent the pump by opening the vent valve on the pump.



Figure 14. Direction of rotation

13. Start the electrolyser. Wait for the circuit to build up pressure and temperature
14. Check for leaks. In the event of a leak, switch off the 400 Vac power supply. Start again from the beginning of this procedure to dismantle and check the pump.
15. Clean the area.

To be considered:

- Pay attention to bearing noise.
- Check temperatures in the bearing area.
- Check pump for leaks.
- Keep written records of inspections.
- If necessary, carry out preventive maintenance in accordance with the manufacturer's recommendations, or replace the pump with another one and return the removed one to the manufacturer for maintenance.

For more details or any other intervention refer to **Grundfos Instructions -** CRN - GRUNDFOS - O&M - CP600

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Time required: 8 hours.

Periodicity: 5 years or according to customer recommendation.

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28. C63-R2-PUM-002 - Hydrogen circulation pump maintenance (CP-620A/B)

Objective	Validation criteria
• Conduct maintenance on the **CP-620A/B** pumps	• Maintenance conducted according to this procedure. • There are no detectable leaks in the vicinity of the pump.
Required personnel	**Required materials and consumables**
• 2 x technicians	• 1 **CP-620** pump spare (optional) • 2 x DN80 flange gaskets • 1 x Voltage Absence Tester (VAT) • 1 x adjustable wrench • 1 x screwdriver • Padlock keys for hand valves (if applicable). • 1 x HBM 2-tonne folding workshop crane (capacity: 200 kg min, dimensions to be respected as specified in the procedure) • 1 x 200 kg lifting sling. • 1 x flexible hose • 1 x Collecting tank
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Physical risk (handling)** **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.

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Prerequisites

1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X).
2. The status displayed on the HMI should be "**STOP**".
3. Log in to "**Maintenance**" mode.

Operation description

1. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).
2. Switch off the 400Vac power supply as described in C63-R2-DEC-001.

Drain the line

1. Isolate the pump to be drained by unlocking and closing valves **HV-620A/B** and **HV-621A/B**.
2. Remove the drain plug from the valves **HV-620DA/DB** and connect the flexible hose. Direct it towards the collector tank to ensure proper drainage of water.
3. Drain the water up to the collector tank by opening the valves **HV-620DA/DB**.
4. Wait until the water has finished draining. Dispose of water in accordance with customer regulations.

For a pump exchange

1. Check that there is no voltage at the pump terminals using the VAT.
2. Disconnect pump power supply cables.
3. Unscrew pump connection flanges.
4. Remove the pump:
   a. Sling the pump according to the operating instructions given by the fabricant (cf. Original operating instructions Centrifugal pumps Type LEM).
   b. Bring the workshop crane overhanging the single container door.
   c. Attach the sling to the workshop crane, lift the pump and remove it from the container.
5. Install the new pump in the same way as the old one was removed and send it to the supplier for repair.
6. Connect the pump fluidically by reconnecting the hoses to the pump flanges. If signs of wear are observed on the flange gasket, it should be replaced with a new one.
7. Wire the pump electrically. Be careful to respect the phase order.

Warning: Please refer to the operating instructions given by the fabricant, particularly the chapter 6.5. Electrical installation, to get informed about the electrical hazards.

8. Depending on the pump to be changed, close the valve **HV-620DA or HV-620DB**.
9. Open the valves **HV-620A/B** and **HV-621A/B** to start the pump.
10. Switch on the 400Vac power supply as described in C63-R2-DEC-001
11. If necessary, top up water in **ST-620** tank as per procedure C63-R1-COM-620.
12. Prime pump (unless self-priming).

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13. Check that the pump is rotating in the right direction by checking the direction of rotation on the pump body. Vent the pump by opening the vent valve on the pump.

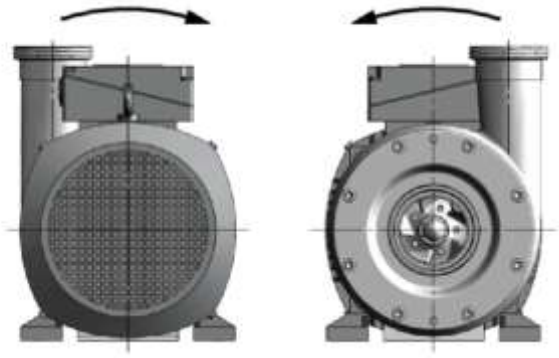


Figure 15. Direction of rotation CP-620A/B

14. Start the electrolyser. Wait for the circuit to build up pressure and temperature
15. Check for leaks. In the event of a leak, switch off 400 Vac power supply as described in **C63-R2-DEC-001**. Start again from the beginning of this procedure to dismantle and check the pump.
16. Clean the area.

To be considered after procedure has been conducted:

- Monitor the bearing noise closely.
- Check temperatures in the bearing area.
- Check pump for leaks.
- Keep written records of inspections.
- If necessary, carry out preventive maintenance in accordance with the manufacturer's recommendations, or replace the pump with another one and return the removed one to the manufacturer for maintenance.

For more details or any other intervention refer to Original operating instructions Centrifugal pumps Type LEM

Time required: 8 hours.

Periodicity: 5 years or according to customer recommendation.

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29. C63-R2-PUM-003 - Maintenance of the lift pump (LP-300)

Objective	Validation criteria
• To dismantle and replace the **LP-300**	• The pump has been replaced and commissioned.
Required personnel	**Required materials and consumables**
• 2 x technicians	• Adequate wrenches • Crane • New pump
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Physical risk (handling)** **Chemical Risk:** The presence of hydrogen and oxygen poses a significant risk if not properly inerted with nitrogen. Please refer to Safety Data Sheet C63-SDS-001 – Hydrogen and C63-SDS-002 – Oxygen.	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date). • The operator performing this operation must have electrical clearance.
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – **TT-601X**). 2. The status displayed on the HMI should be "**STOP**" 3. Log in to "**Maintenance**" mode.	
Operation description	

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Removal of the lift pump

1. Open the circuit breaker supplying the VFD of the pump and lock it out.
2. Check the absence of voltage on the pump and disconnect the power cables.
3. Close the valves **HV-301A/B**, **HV-302A/B**.
4. Remove the plugs on the valves **HV-300DA/DB** and connect a line to collect the drained water. Open the valves, then open the vents on the pumps. Refer to the technical documentation of the supplier to locate the vent valve.
5. Once the pump is empty of water, remove the bolts between the pump and the pipe upstream and downstream.
6. Remove the bolts between the pump and the frame.
7. Attach the crane to the lifting points on the pump. To locate the lifting points, refer to the supplier documentation.
8. Lift the pump and remove it from the container.
9. Send it back to the supplier for maintenance.

Installation of a new pump

1. Attach the crane to the lifting points on the pump. To locate the lifting points, refer to the supplier documentation.
2. Lift the pump and install it on the previous pump location
3. Pay attention to the flow direction and install the inlet towards the valves **HV-301A/B**.
4. Install the bolts between the pump and the pipes upstream and downstream.
5. Install the bolts between the pump and the frame.
6. Connect the power cables, paying attention to the order of the phases.
7. Remove the lock on the circuit breaker and close it.
8. Close the valves **HV-300DA/DB**, remove the drain lines and put back the plugs.
9. Open the valves **HV-301A/B**, **HV-302A/B**.
10. Bump start the pump and check the sense of rotation.
11. If the rotation is not correct, lock the circuit breaker, inverse two phases on the pump, close the circuit breaker and redo the rotation check.
12. Start the pump at 55% of speed and check the flow to the **ST-600/620** with the level transmitters **LT-600/620**.

Time required: 4 hours

Periodicity: When necessary

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30. C63-R2-SSFH-600 - Resin change on the oxygen water loop

Objective	Validation criteria
• To replace the resin in the FH.	• The resin has been replaced and the filter cleaned. • There are no leaks around the FH fittings. • The conductivity measured by the **CT/P-600** is below 0,1 µS/cm.
Required personnel	**Required materials and consumables**
• 1 x technician.	• 2 x Adjustable Wrenches. • 1x Torque wrench • Resin IRN160 Amberlite • Cleaning brush • Flange gaskets (cf. Pressure vessel detailed drawings C0063-FOR-DWG-MP-001_FH-600). • Padlock keys for hand valves (if applicable). • 1 x Collecting tank. • 1 x vacuum cleaner adapted for Amberlite.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. <u>Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C.</u> **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Physical risk** (handling). **Chemical risk:** Risk associated with the handling of IRN160 Amberlite (see C63-SDS-010 - IRN160)	• Wear PPE (Personal Protective Equipment). • Personal gas monitor for each operator (calibration and ATEX certificate up to date).
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X).	

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2. The status displayed on the HMI should be "**STOP**".
3. Log in to "**Maintenance**" mode.

Operation description

4. Inert the unit via the HMI. On the Oxygen and Hydrogen via "**Inerting O2**" and "**Inerting H2**" buttons, respectively (Figure 3 and Figure 4 reference point #1).

Removal of resin

1. Remove the padlocks placed on the hand valves at the upstream and downstream of the FH, **HV-602A** and **HV-604**, respectively. Then close them.
2. Remove the plug on the drain valve **HV-602DA** and connect a flexible hose to collect the drained water to the collecting tank. Open the drain valve.
3. Remove the plug on the vent valves **HV-603V** and **HV-604V**, then open it.
4. Once the section is completely drained, remove the spool section **RS-603A**.
5. Open the **FH-600** by lifting the top flange and remove the top tray with the nozzles.

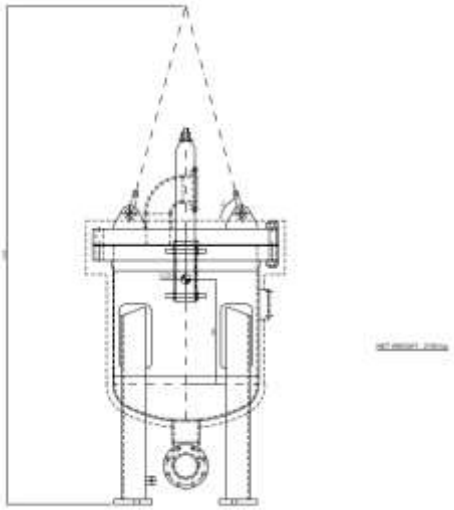


Figure 16. FH-600 lifting drawing

6. With an adequate vacuum cleaner, remove the old resin.

Check of filter strainer

1. Open the **F-600** filter and verify that it is free of resin.
2. In case of presence of resin in the filter, investigate the cause of leak in the FH.
3. Upon resolving the issue, please ensure the filter is thoroughly cleaned and properly closed **F-600**.

Installation of new resin

1. Then deposit the new resin on the **FH-600**. The remaining distance between the top of the resin and the top tray should be around 4cm.
2. Inspect the gasket of the top tray and replace it if necessary. Put back the top tray in the **FH-600**.
3. Inspect the gasket of the FH and replace it if necessary.

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4. Put back the top flange, reinstall the bolts and tighten them with a torque wrench. Refer to the bolt tightening procedure to close the FH.
5. Close the valve **HV-602DA**, disconnect the drain line and reinstall the plug.
6. Close the valves **HV-603V** and **HV-604V** and reinstall the plug.
7. Open the valve **HV-602A**, then the valve **HV-604**.
8. Lock the valves in their normal position with the respective padlocks.
9. Check the water level in the **ST-600**, if the level is below the low-level threshold, top up the level with pure water following the procedure R1-COM-600.
10. Start one of the pumps **CP-600A/B** and check the **FH-600** and the **F-600** for any leak.
11. Check the conductivity measured on the **CT/P-600**. It should be below 0,1 µS/cm.
12. Check the flow measured on the **FT-600**, it should be above the low flow threshold (80 m^3/h).

Time required: 4 hours

Periodicity: 6 months

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31. C63-R2-SSFH-620 - Resin change on the hydrogen water loop

Objective	Validation criteria
• To replace the resin in the FH	• The resin has been replaced and the filter cleaned
Required personnel	**Required materials and consumables**
• 1 x technician.	• 2 x Adjustable Wrenches. • 1x Torque wrench • Resin IRN160 Amberlite • Cleaning brush • Flange gaskets (cf. Pressure vessel detailed drawings C0063-FOR-DWG-MP-001_FH-620). • Padlock keys for hand valves (if applicable). • 1 x Collecting tank. • 1 x vacuum cleaner adapted for Amberlite.
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Physical risk** (handling). **Chemical risk:** Risk associated with the handling of IRN160 Amberlite (see C63-SDS-010 - IRN160)	5. Wear PPE (Personal Protective Equipment)
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be "**STOP**".	

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3. Log in to maintenance mode.

Operation description

Removal of resin

1. Close the valves **HV-621A/B**, **HV-623**, and **PV-640**.
2. Remove the plus on the valve **HV-621D** and connect a line to collect the drained water. Open the valve, then remove the plus on the valve **HV-622V** and open the valve.
3. Once the pipe is empty of water, remove the removable spool **RS-622**.
4. Open the **FH-620** by lifting the top flange and remove the top tray with nozzles.
5. With an adequate vacuum cleaner, remove the old resin.

Check of filter

1. Open the filter **F-620** and check the absence of resin in the filter.
2. **In case of presence of resin in the filter, investigate the cause of leak in the FH.**
3. Once the problem is resolved, clean and close the filter **F-620**.

Installation of new resin

1. Then install the new resin on the **FH-620**. The remaining distance between the top of the resin and the top tray should be around 4cm.
2. Inspect the gasket of the top tray and replace it if necessary. Put back the top tray in the **FH-620**.
3. Inspect the gasket of the FH and replace it if necessary.
4. Put back the top flange, reinstall the bolts and tighten them with a torque wrench. Refer to the bolt tightening procedure to close the FH.
5. Close the valve **HV-621D**, disconnect the drain line and reinstall the plug.
6. Close the valve **HV-622V** and reinstall the plug.
7. Open the valves **HV-621A/B**, then the valve **HV-623**.
8. Lock the valves in position with padlocks.
9. Check the water level in the **ST-620**, if the level is below the low-level threshold, make up the level with pure water.
10. Start a **CP-620** and check the **FH-620** and the **F-620** for leak.
11. Check the conductivity measured on the **CT/P-620**. It should be below 0,1 µS/cm.
12. Check the flow measured on the **FT-620**, it should be above the low flow threshold (30m3/h).

Time required: 4 hours

Periodicity: 6 months

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32. C63-R2-WTP-001- Maintenance of WTP

Objective	Validation criteria
• To perform the maintenance of the water treatment package	• Refer to the supplier manual
Required personnel	**Required materials and consumables**
• 1 x technician.	• Refer to supplier manual
Potential risks (Safety and Environment)	**Prevention and protection measures**
Thermal Risk: Risk of burns or damage related to high temperatures or hot surfaces during operation. Even with the unit stopped and depressurized, the hydrogen purification unit is kept under hydrogen pressure and could be at temperatures up to 180 °C. **Electrical risk:** Risk associated with handling electrical equipment, including the hazards of electric shocks or short circuits. **Anoxia risk** **Physical risk (handling)** **Chemical Risk:** Refer to the supplier documentation	• Wear PPE (Personal Protective Equipment)
Prerequisites	
1. Make sure the electrolyser is stopped, depressurised and cold (Stacks temperature under 40 °C – TT-601X). 2. The status displayed on the HMI should be “STOP”. **3.** Log in to maintenance mode.	
Operation description	

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For the maintenance of the water treatment package, refer to the O&M supplier manual from Ovivo:

IOM Manual Crosswind Project – Ovivo

Time required: Refer to supplier manual

Periodicity: 6 months

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Installation, Commissioning, Operation and Maintenance Manual Dryer Type DEDR 500/36



Customer	ELOGEN	
Customer Purchase Order No.	PO 0006223	
Aquagas Project No.	A-23/24 140	
Country of destination	Netherlands	Offshore
Project manager:	Christian Jaspers christian.jaspers@aquagas.se	

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1. Introduction

The gas Deoxo (DE) and Dryer (DR), is designed to purify compressed hydrogen gas through catalytic purification (removal of O2) and subsequent drying by adsorption (removal of H2O).

It´s of outmost importance to carefully read through this complete Operation and Maintenance Manual before commissioning, operating, maintenance or repair on the DEDR.

The DEDR is only intended for the hydrogen gas at specified conditions.
Particles or substances contained in the incoming gas will accumulate in the DE bed, DR bed or in the outlet filter. Gas containing oil or potassium hydroxide (KOH) will lead to poisoning of the Deoxo catalyst and will result in reduced lifetime or bad product gas quality. It´s therefore important that the operator ensures that the composition of the feed gas is conforming to the specification.

AQUAGAS supplies the Control Logic and instructions for operating the DEDR.
The PLC and its programming will be provided by the Customer.
The interfaces are the inlets to the electrical enclosures or Junction Boxes where the Customer connects the control cables in order to be able to control contactors and solenoid valves and to receive signals from the DEDR transmitters. See the Wiring Diagram.

The DEDR has been designed for indoors installation inside an air-conditioned container at an ambient temperature between +0°C and +40°C. Customer will ensure appropriate ventilation of the container to avoid the risks of hydrogen or nitrogen accumulation in case of leakage.

Power supply is provided and installed by the Customer.

When commissioning, operating, maintenance or repair on AQUAGAS equipment, the mechanics are expected to use safe engineering practices and observe all relevant local safety regulations.

Maintenance and repair work shall only be carried out by adequately trained personnel, if required, under supervision of someone qualified for the job.

- Use only correct tools for maintenance and repair. As the area is classified as a hazardous zone, all tools needs to be certified for use in hazardous zone.
- Purge with inert gas (i.e., nitrogen) before opening the system to the atmosphere.
- Before removing any pressurised component, effectively isolate the DEDR from all sources of pressure and relieve the entire system from pressure. Do not rely on non-return valves to isolate the pressure system.
- After the unit has been opened against the atmosphere it must be purged with inert gas before it is filled with hydrogen gas.
- Never weld on, or in any way modify, pressure vessels.

WARNING: When handling inert gas (i.e., nitrogen) secure that the working area is well ventilated and free of leakage to secure the oxygen level (~20%) in the air. Breathing air containing less than 6% oxygen produces convulsions, then apnoea (cessation of breathing), followed by cardiac standstill. These symptoms occur immediately.

2. Design

2.1 Inlet data:

Media:	Hydrogen
Media flow:	500 Nm³/h
Media temperature:	+7°C
Inlet O2 content normal/ design:	< 500 ppm(v)
Inlet H2O content:	Saturated at inlet temperature
Operation range:	10-100%
Operating pressure:	31,1 bar(g)
Inlet oil content:	< 0,01 mg/Nm3
Inlet Potassium hydroxide content:	< 0,01 mg/Nm3

2.2 Outlet data:

Outlet O2 content:	< 5 ppmv (*Note 2.2.1)*
Outlet H2O content:	< 5 ppmv *(Note 2.2.1*
Outlet particle filter:	2 micron
H2 Temperature:	< +40°C
Pressure drop:	< 0,3 bar
Condensate:	approx. 7 kg/24 hours

Note 2.2.1: Measured by Customer at operating pressure.

2.3 Design data:

Design pressure:	36 bar(g)
Design temperature press. vessels:	-20/+270°C
Ambient temperature:	+0 to +40°C
Freezing protection (<1°C):	Not included
Regeneration gas:	Closed loop, no gas losses
Regeneration gas temperature:	~180°C
Dimensions: (LxWxH):	1687 x 1000 x 2300 mm
Weight (in operation) :	~1540 kg
Sound pressure level @ 1m distance:	<82 dB(A)
Cooling water piping design pressure:	>9 bar (g)
Installation:	Indoors

2.4 Operation data:

Cycle time:	6 hours
Heating:	4 hours
Cooling:	2 hours

2.5 Electrical data:

Installed power Deoxo heater:	3 kW
Electrical supply Deoxo heater::	230V, 1 ph, 50 Hz
Installed power Dryer Reg. heater:	6 kW
Electrical supply Dryer Reg. heater:	400V, 3 ph, 50 Hz
Electrical power instruments:	<10 W
Installed supply instruments:	24 V DC

2.6 Consumables:

Catalyst type:	Anco DSL2, approx. 54 kg
Desiccant type:	BASF Sorbead type WS, approx. 30 kg per tower

2.7 Customer utility supply data:

Pilot air / nitrogen pressure:	5-8 bar(g)
Pilot air consumption:	2.5 LPM average, 10 LPM peak
Pilot air quality:	Class 3 acc. ISO 8573 (Dewpoint < -20°C)
Cooling water consumption:	approx. 1,6 m^3/h @ ΔT=10°C
Cooling water inlet temperature:	< 6,8 °C
Cooling water pressure:	3-6 bar(g)

2.8 Interconnections:

Process gas in:	Flange RF 1” class 300, A105, ASME B16.5
Process gas out:	Flange RF 1” class 300, 316L, ASME B16.5
Cooling Water in/out:	Flange RF 1” class 150, A105, ASME B16.5
Condensate drain:	Hy-Lok tube connector Ø 8 mm, 316L
Instrument air:	Ø 6 mm connection for plastic hose
PSV Cooling Water:	G 1/2 ” female threaded connection, brass
H2 vent line (connected to PSV):	Flange RF 1” class 300, A105, ASME B16.5

2.9 Paint system specification

Classification:	ISO-12944-2, C3	
Preparation:	Sandblasted SA 2,5	
Primer:	Temacoat GPL-S	(mini. 70 micron)
Intermediate:	Temacoat GPL-S	(mini. 70 micron)
Top:	Temadur 50	(mini. 60 micron)
Colour:	RAL 7011 (Grey)	
Stainless steel:	pickling of weld seams, no painting	

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3. Certifications

According to EU Codes & Standards:

3.1 Pressure equipment certification:

DR & DE pressure vessels:	PED Category IV, Module G
Heater pipe:	PED Category III, Module G
Heat exchanger coolers:	PED Category I, Module A
Outlet filer:	PED Category SEP
Piping:	PED Category SEP
Welding procedure:	SS-EN 15614
Welding qualification:	SS-EN ISO 9606
Design & approval:	2014/68/EU PED

If no control system is in scope of the delivery, manufacturer cannot categorize the unit as a PED assembly. This must be done by Customer or user.

3.2 Electrical equipment certification

Temperature class:	T1
Protection for heaters:	ATEX Ex db eb IIC *Note 3.2.1*
Protection instruments :	ATEX Ex ia / d IIC
Zone classification:	Zone 2

Note 3.2.1: The heater head is divided into 2 units, the lower parts with the electrical connections for the heater rods and instruments are EX d, upper part with connection for power supply and signals is EX e.

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4. Preservation and Installation

At delivery the gas DEDR unit is supplied completely mounted ready to be taken into operation. Catalyst and drying desiccant are filled. Please note, that after the catalyst has been filled the unit is not allowed to be operated/pressurized with compressed air.
The unit should always be kept in an upright vertical position.
Please review document *HANDLING INSTRUCTIONS* for appropriate handling before proceeding with installation.

4.1 Preservation:

- The DEDR is designed for indoor installation, and it should be stored in a dry warehouse with an ambient temperature that does not exceed +45°C.
- If the DEDR is to be stored or mothballed for a longer time, it should be sealed, purged, and filled with 0,2 bar(g) inert gas i.e. nitrogen inside.

4.2 Installation:

- Only use the dedicated lifting lugs for positioning the unit at its place. Lifting with a forklift truck is preferred, but the use of a crane is possible for final positioning.
- It is recommended to have minimum space (> 1 meter) in front and at the sides of the unit in order to simplify service and filter element replacement.
- When placed inside a container, the roof should be dismountable so as to have a free overhead access the top of the unit. This is necessary to remove the regeneration heater or access the top flanges of the towers for refilling the catalyst or desiccant materials.
- The Deoxo-Dryer shall be bolted to the floor and wall of the container. It is recommended to use M12 bolts for steel structure or M12x120 mm expander screws for concrete. Fixation to the back wall with M12 bolts is also recommended to avoid tipping over during movements of the container.
- Do not place the unit where it is exposed to vibrations (i.e., close to a compressor).
- Connect the process gas and cooling water piping to the DEDR inlet and outlet connections. Connect the condensation water outlet to the drain disposal grid.
  Connect the flexible instrument air hose to the first solenoid valve.
  Install the discharge line connected to the Cooling Water pressure safety valve PSV-64.3.
  Connect the H2 vent line flange (N10) coming from pressure safety valves PSV-64.1 and PSV-64.2 to hydrogen venting line.
- Blow any welding wastes and other impurities from the upstream and downstream piping before connecting the unit.
- Connect the DEDR to the main power supply via an isolation switch.
- If the H2 gas from the compressor contains oil drops or oil vapour, a de-oiling filter should be installed upstream of the Deoxidiser.
  Note: the de-oiling filter should be checked and drained minimum once per day!
- Downstream of the DEDR, a pressure maintaining valve shall be installed in the product gas line to avoid vacuum or too high gas velocity through the DEDR.
- No forces or loads may be transferred to the interconnecting points of the unit. Flanges and other connections are neutral points.
  Support or modify the upstream or downstream connecting lines if required.

5. Commissioning of the Deoxo-Dryer

5.1 Pre-check

- Check that the DEDR is properly installed as per above recommendations.
- Check the DEDR sequence by manual operation of the solenoid valves.
- Check the valve limit switches.
- Check that all valves are in the correct position.
- Check that all Hy-Lok connections have the correct torque (green markings are aligned).
- Check the set points of temperature transmitters and temperature switches.
- Check the positioner of valve of flow regulating valve 64-V6.
- Check cooling water flow, temperature, and pressure.
- Check instrument air or nitrogen flow and pressure.
- Check that valves 61-V2, 64-V15 and 64-V16 are open. Put a lock (not included) on them.

The above test shall be made with and without pressure.

5.2 Check software and wiring

Without pressure on the system, shut-off fuses for regeneration heater (all fuses except control voltage).

Once all signals connected, use the HMI/PLC (Customer scope) to step through all sequences, with extra attention to the supplied Control Logic description, to secure that the wiring is correct, and the sequences are working OK without any alarms.
Pay extra attention to valves that might open and create a high-pressure peak.
If anything is abnormal, please contact AQUAGAS for advice.

5.3 Leak test

Pressurize with air or nitrogen at design pressure, check for leaks with bubble spray.
If leakage with a Hylok coupling, retighten until maximum finger tight + ¼ turn with spanner and green markings are aligned. Use Hylok gap inspection tool for checking the torque, if available. Do not overtorque !

5.4 Flush with inert gas and process gas

Flush with nitrogen to remove the air.
Beware of choking danger = good ventilation required.
Function test all components and sensors + check signal transmission and alarm functions with the PLC. The first part of the commissioning can be done with nitrogen.

Before final start-up, the unit performance must be adjusted and tested with hydrogen.
Flush with hydrogen to remove nitrogen.
The heaters perform differently with hydrogen (faster heating up of the gas) as with nitrogen. The flow behaviour of hydrogen and nitrogen is different, so the ejector performance during the cooling phase will be different, and the flow regulation through valve 64-V14 and needle valve 64-V14.1 cannot be adjusted as final with nitrogen.
The final commissioning step must be done with hydrogen.

NOTE: Even if it was leak tight in AQUAGAS workshop, the unit has probably been traveling by road and sea or air. Vibrations etc. can make couplings leak.

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5.5 Start of Deoxo-Dryer

- If the DEDR has been opened against the atmosphere, it must be purged with inert gas before feeding the hydrogen. Before starting it is important to ensure that inert gas is available. All connections must have been checked against leakages.
- Make sure that main and instruments electrical power are available.
- Open cooling water to the coolers.
- Open the compressed hydrogen gas intake valve slowly. Check that the pressure maintaining valve (Customer scope) is working. Wait until the working pressure has been reached.
- Check for leakages.

NOTE: The Dryer is sensitive to high gas flow velocities since this might cause lifting of the catalyst and desiccant beads. It is therefore very important that an empty gas system always is filled very slowly. It is recommendable to install a pressure maintaining valve in the discharge pipe downstream of the DEDR.

5.6 Flow control - Positioner

The dryer is equipped with a positioner for the adjustment of the regeneration flow. The flow and temperature are important to optimize the dryer performance, energy consumption and lifetime.

Functional background

The gas inlet flow is divided in two streams: one going to the heater for regeneration and the other going to the active adsorbing tower. During the regeneration phase, independently of the flow rate, ~25% of the full flow capacity shall always be distributed to the heater and the rest of the flow shall be distributed to the adsorbing tower.
This is controlled by positioner FC-64.1.

The positioner is pre-set at delivery according to below:
Zero point: 25%
Span: 50%



5.6.1 Step 1, Control of settings and functions

This is to check the heater/positioner setting and the communication between PLC system and dryer.

- Check that PLC control have a linear output signal 0-100% = 4-20mA.

- Check positioner without pilot pressure:
  04-20 mA: Positioner indicates 100% open.

- With pilot pressure:
  4 mA: Positioner indicates 0% open.
  8 mA: Positioner indicates ~10% open.
  12 mA: Positioner indicates ~25% open
  16 mA: Positioner indicates ~50% open.
  20 mA: Positioner indicates ~75% open.

5.6.2 Step 2, Adjust valve 64-V14 and needle valve 64-V14.1
This is to adjust the distribution at full flow and to optimize the energy balance.

- Start the dryer in heating sequence at 100% of hydrogen nominal flow capacity.

- Check that positioner FC-64.1 indicates ~75% open.

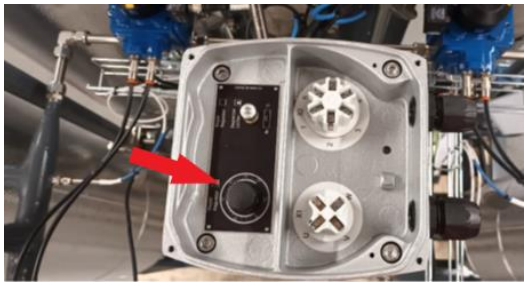
- Adjust the by-pass needle valve 64-V14.1: count the turns from fully open to fully close and set it at 50% open.

- Partly close valve 64-V14 to about 50%.
  Wait 15 minutes and read the regeneration temperature (DR-TT-64-6 or DR-TT-64-8 depending on which tower is in regeneration sequence).

  If the temperature is below 155°C, partly close valve 64-V14 step by step until 155-160°C is reached. Wait 10-15 minutes between every step. You can also use by-pass needle valve 64-V14.1 for fine tuning,

  If the temperature is above 165°C, partly open valve 64-V14 step by step until 160-165°C is reached. Wait 10-15 minutes between every adjustment. Use the by-pass needle valve 64-V14.1 for fine tuning.

If 155-160°C cannot be reached, increase the heater set point by 25°C and restart step 2.



Note: the initial setting of the heater temperature in done in our workshop at 280°C. Adjustments can be done inside JB3 by turning the button -see picture.

- Check the heater on vs off time.
  This can be monitored by the PLC software.

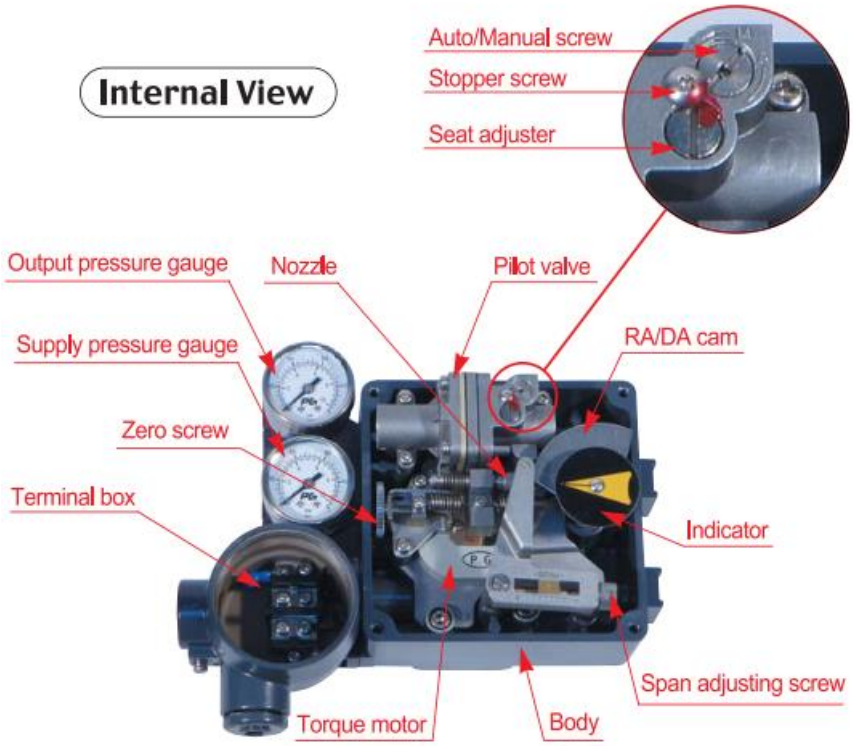
  If the heater is on 75% - 95% of the time proceed to step 4.

If the heater is on for more than 95% of the heating time the flow is slightly too high. Partly close valve 64-V14 step by step until it is on for 75 – 95% of the time. Wait 10-15 minutes between every adjustment.
Use the by-pass needle valve for fine tuning.

If the heater is on for less than 75% of the heating time the flow is slightly too low. Partly open valve 64-V14 step by step until it is on for 75 – 95% of the time. Wait 10-15 minutes between every adjustment.
Use the by-pass needle valve for fine tuning.

5.6.3 Step 3, Adjust the span

This is to adjust the distribution at intermediate flow and to optimize the energy balance.



- Start the dryer in heating sequence at 75% of hydrogen nominal flow capacity.
- Check that positioner indicates ~50% open.
- Wait 15 minutes and read the regeneration temperature (TT-64.6 or TT-64.8 depending on which tower is in regeneration sequence).

  If the temperature is below 155°C, remove the cover of the positioner and slightly increase the span until 155-160°C is reached. Wait 10-15 minutes between every adjustment.

  If the temperature is above 165°C, remove the cover of the positioner and slightly decrease the span until 160-165°C is reached. Wait 10-15 minutes between every adjustment.

5.6.4 Step 4, Control of operation 25-100% capacity

Start the dryer in heating sequence at 25% of hydrogen nominal flow capacity and let it run for 15 minutes, ramp up the flow step by step every 15 minutes to 50%, 75% and 100%. Check that the gas temperature at temperature transmitters DR-TT-64-6 or DR-TT-64-8 depending on which dryer vessel is under regeneration. It should be 160°C - 180°C for all flow rates. If not, please contact Aquagas for assistance.

5.7 Setup of pressurized condensation system

The deoxo-dryer is pre-set for a condensation water drainage system at an operating process gas pressure of approx. 8-36 bar.
The pressure is measured at PT 64.1 and is controlled by a Pbar factor.
Please see the Control Logic Condensate sub-program.
For instance, if your normal working pressure is 40 bar(g), you will start with a Pbar factor of 0,5 x 40 = 20 bar(g), and then adjust in order to find the correct P bar factor.

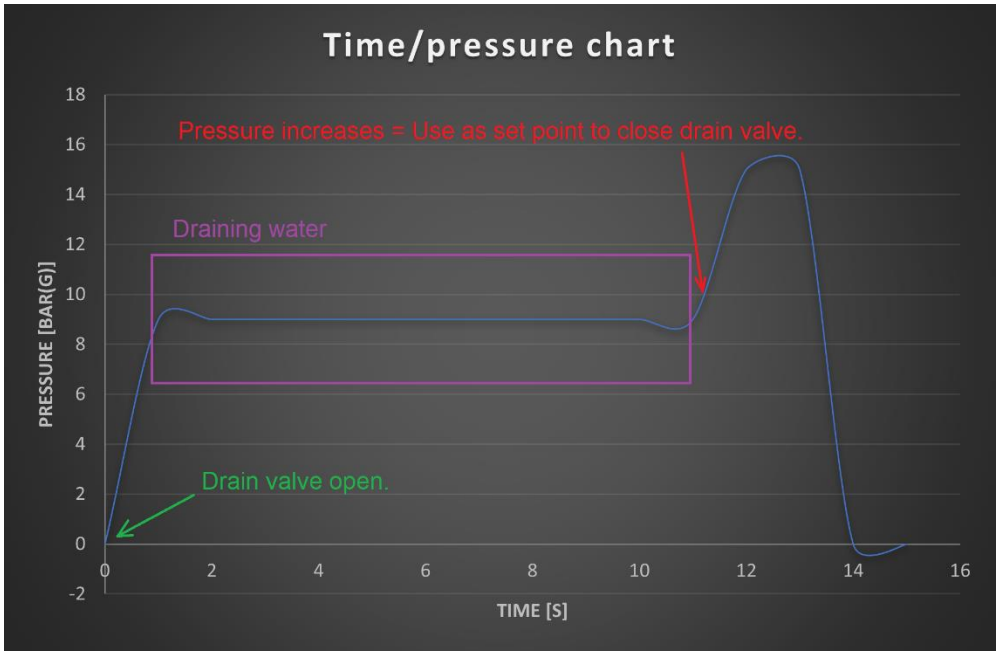
If the Pbar factor is not reached within the timer setting (see Condensate sub-program), the customer PLC gets a condensate alarm PSA 64.1 L. This means that the system is clogged or the Pbar factor is set too high. Reduce by a factor of 0,1. Repeat with a smaller difference if needed.

If the drain valve closes directly after it has opened but there remains water to be drained, the Pbar factor is set too low. Increase a factor of 0,1.
Repeat with a smaller difference if needed.
To check if there is remaining water to be drained, you can activate solenoid valve 64-V12 and check how much water is coming out.

If the drain valve does not close even if there is no water to be drained, the Pbar factor is set too high. Decrease a factor of 0,1.
Repeat with smaller difference if needed.

A way to find the correct setting is to monitor the PT 64.1 with a Pbar factor at 1. After depressurizing your system, fill the vessel to be drained with 0,5 litre of water. To do this, connect a hose onto 61-V1 or 64-V10 or 64-V11, fill in the water, close the valve. Repressurize and do the time/pressure chart. Monitor the pressure during draining and look for the red market set point below to determine the Pbar factor.

Below is a graph from a lower pressure condensation system to explain the concept.



As this is hydrogen and high pressure, please check that the first draining sequence, begins within approx. 15 minutes after start. Most important is not to get a time out at the start. Only perform this procedure in a ventilated place as a risk of hydrogen leak is possible.

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6. Operation

6.1 Operation of the DEDR unit

The DEDR unit is designed for continuous removal of oxygen and moisture from compressed hydrogen. The Deoxo and adsorption Dryer with internal coolers is working in a closed loop under pressure without any gas losses.

The DEDR unit is a skid-mounted assembly that consists of a pre-cooler, a Deoxo vessel, two Dryer vessels, one regeneration heater, one main cooler composed of two vessels, a condensate system, an outlet particle filter, with interconnecting piping, valves and instruments. The ejector allows for a reversed flow during the cooling of the tower under regeneration without a blower or any rotating equipment.

6.1.1 Operation of the DE (Deoxo)

The gas stream flows to the Deoxo (DE) where O2 reacts with H2 through a catalytic reaction to produce water: $2H_2 + O_2 \Rightarrow 2H_2O$.
To secure that no water will condensate in the deoxo reactor, the vessel is heated with a trace heater.

The Deoxo is pre-filled with catalysts type DSL2 of ANCO. If replacement is required, the catalyst is filled through the top connection and emptying take place through the bottom connection on the DE vessel.

6.1.2 Operation of the DR (Dryer)

The gas Dryer has two drying towers A and B containing desiccant. This desiccant material is kept in place with strainers at the top and bottom connections. The adsorption desiccant consists of drying beads with 2-5 mm diameter, which are capable to adsorb moisture up to 40 % of their own weight. The drying beads have a large number of pores with a certain pore diameter. It is on this internal surface area that the adsorption of moisture takes place. Drying beads can adsorb moisture and be reactivated thousands of times without changing form or shape. The Dryer is pre-filled with desiccant type Sorbead WS of BASF. If a replacement is required, desiccants are filled through the top connections and emptying takes place through the bottom connections of the DR vessels.

The gas stream flows into the dryer (DR) through the main cooler 64-T1A or 64-T1B into tower A or into tower B. One vessel is in adsorption mode and the other in regeneration/stand-by mode. The distribution of the gas flow between the active tower and the tower to be regenerated is controlled with the positioner of 64-V6control valve.

During the heating sequence of regeneration, a fraction of approximately 25% of the gas flow will be heated up in the regeneration heater and flushed through the tower to be regenerated from the top to the bottom. The moisture trapped on the desiccant will be desorbed by the hot gas thus regenerating this adsorber tower. The regeneration gas will be cooled via the cooler and mixed with the main gas flow. This total flow will again be cooled and enter the bottom of the active tower where the condensate water will be collected and drained into athe condensate circuit and then dispensed to the customer drainage system.

It should be noted that the "condensate traps" in the lower part of the Deoxo and Dryer A / B towers must be emptied continuously so that water does not accumulate, which would

cause the active materials to be flooded. Accordingly, the valves 61-V2, 64-V15 and 64-V16 must always be open during operation.

The process gas outlets of the Dryer towers are located at the top and work with a combination of four valves 64-V4.1/ -V4.2/ -V4.3/ -V4.4 that send the gas either through the outlet filter 66 to the customer product line or send it to the Dryer tower to be regenerated.

Before the heater HE 64.1 is a valve 64-V5 that is coupled with DR-AV-64-6. After this valve, the manual valves 64-V14 and 64-V14.1 are used for adjusting the regeneration stream.

After the regeneration with hot gas, the adsorbent bed needs to be cooled down to the optimal adsorption temperature. This cooling is performed by opening valve 64-V7 and closing valve 64-V5. The venturi effect in the 64-T4 ejector is used to reverse the gas flow in the tower being regenerated. The cold feed gas now is flowing from bottom to top through the hot desiccant bed that needs to be cooled down, until the desired temperature is reached. When this stage is reached, the regeneration is completed, and the tower is ready to go into the adsorption phase again.

WARNING: During regeneration the heater pipe and the tower under regeneration are hot. The same is valid for the pipe from the hot tower to the cooler during cooling. Do not touch any unprotected surfaces during these two stages.

6.2 Operation control of the DEDR unit

Please refer to the unit's Control Logic instructions and P&ID for better understanding.

The Customer will program the PLC considering the setting points in the Control Logic and alarms and proceed as follows:

- Read operation of DEDR to get an overview of the operation.
- Add all instruments according to DEDR Input and Output signals list.
- Add DEDR Control Logic Main program.
- Add DR Sub program, sequence 1 to 4.
- Add Condensate system Sub program.
- Add the Safety Switch-off sub program.
- Add all alarms according to DEDR Alarm list.
  Please note that some alarms are active during the complete operation, some alarms are active during one or several sequences, to be considered in the PLC. Some alarms are set according to the Main program, the Dryer Sub program, sequence 1 to 4 and Condensate system Sub program, and Safety Switch-off

The gas Dryer, with its valve positions as in the P&I Diagram shows the dryer tower 64A in adsorption and dryer tower 64B under regeneration. This corresponds to the Dryer control sequence 1 of 4. This position has been reached since the PLC has opened instrument air through the solenoid valve 64-V1, which operates the valves 64-V4.1 and 64-V4.4. Changeover of drying towers will take place automatically.

The gas automatic valves are operated with double acting or spring return pneumatic actuators and the movements are controlled by signals to the solenoid valves from the PLC. The positions of the valves are checked by electrical limit switches.

Please note:

- Wherever in the program the dryer has stopped, it shall restart in the same sequence/position as it was stopped.
- If the heater sequence has been on for more than 15 minutes, it is not allowed to manually switch over the cooling sequence before the tower is completely cooled down. This in order to protect the downstream/discharge equipment from high temperatures.

The DEDR cycle will have the control sequences described hereafter.

WARNING: It is not allowed to switch over towers manually before the cooling cycle is completed as this may render warm compressed hydrogen (~180°C) streaming into the primary hydrogen network.

6.2.1 DEDR Main program

The heat tracing of the Deoxo- vessel is regulated with the temperature transmitter TT 60.1 and protected against high surface temperatures with the temperature transmitters TT 60.2 and TT 60.3. During the catalytic cleaning reaction, the gas temperature will rise depending on the amount of oxygen in the feed gas.
The max temperature increase is 160°C for 1% oxygen in the hydrogen.

If the oxygen concentration exceeds the maximum value, the temperature transmitter TT 61.1 shall give an alarm and later switch off the gas flow through the unit, in order to protect the gas Dryer from a too high inlet temperature.

Deoxidizer

Saturated hydrogen + oxygen
Saturated hydrogen

To remove potential oxygen in the hydrogen, hydrogen and oxygen reacts in a continuous catalytic reaction into water:
$2H_2 + O_2 => 2H_2O$

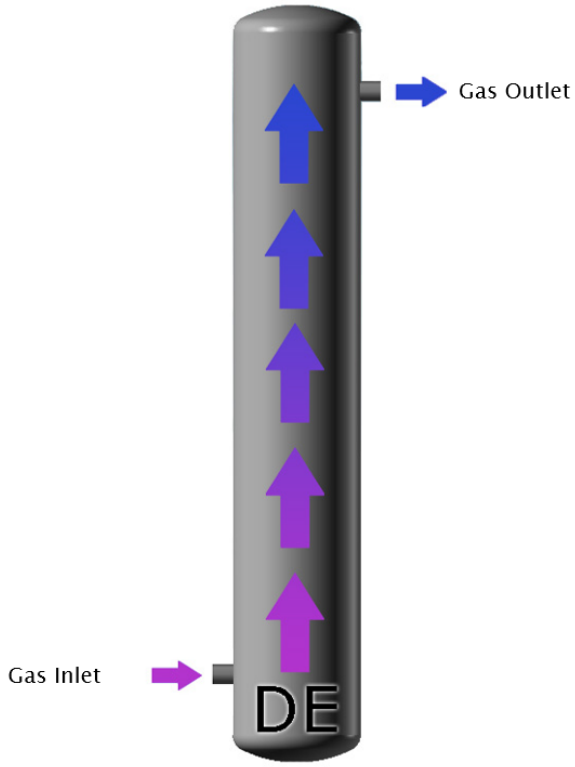
To prevent condensation in the deoxidizer a trace heater is installed on the deoxidizer vessel to increase the gas temperature 10–15°C.

The deoxidizer remove up to 1% of oxygen down to 1–5 ppmv.

Each 0.1% oxygen in hydrogen result in a temperature increase of 16°C. This corresponds to the energy needed to convert water into hydrogen + oxygen.

The catalysts consists of 2–5 mm aluminum oxide spheres coated with 0.2 weight% palladium.

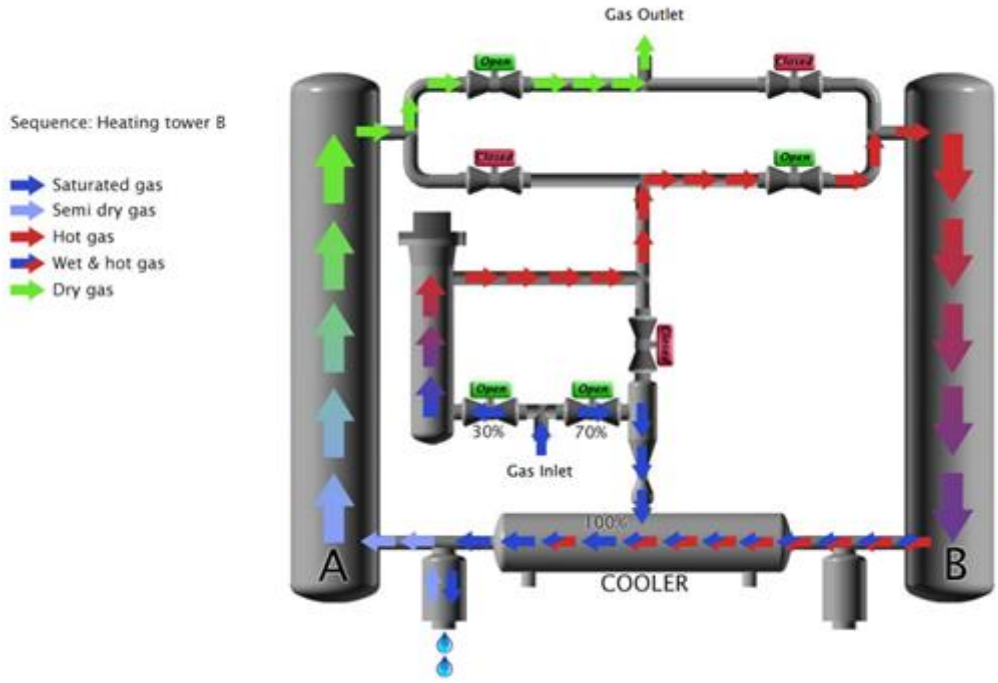
Guaranteed lifetime of the catalyst is 2 years, expected lifetime is +5 years. Poisoning from oil or KOH will reduce the lifetime.



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6.2.2 Dryer control sequence 1 of 4

Sequence 1) Switching over to Dryer tower A and heating tower B.



Picture 6.2.2 Simplified schematic of Dryer sequence 1.

Via a signal from the PLC, solenoid valve 64-V1 is activated and instrument air will open valves 64-V4.1 and 64-V4.4. Solenoid valves 64-V2 is deactivated and valves 64-V4.2 and 64-V4.3 are closed. In this position, tower Dryer A is in adsorption mode and tower Dryer B in regeneration mode.
When the valves are in correct position the electrical limit switches GS 64.1.1 and GS 64.1.4 are activated and GS 64.1.2 and GS 64.1.3 are inactive. These signals will be given to the PLC and indicate adsorption in tower Dryer A and regeneration in tower Dryer B. If the limit switches are not activated as specified above in this sequence, an alarm for not correct switching over of the Dryer sequence shall be given.

Instrument air, via solenoid valve 64-V8 will open valve 64-V5 and partly close valve 64-V6. As the valve 64-V3 is inactive the cooling valve 64-V7 is closed.
Under the condition that the Dryer switching over position is correct as per above and that the electrical limit switch GS 64.1.4 is activated and GS 64.1.3 is inactive, the regeneration heater can be switched on. The set positions of the electrical limit switches as per above indicate that the heating phase of the regeneration has started. If any of the electrical limit switches are not correctly activated, an alarm for regeneration failure shall be given by the PLC.

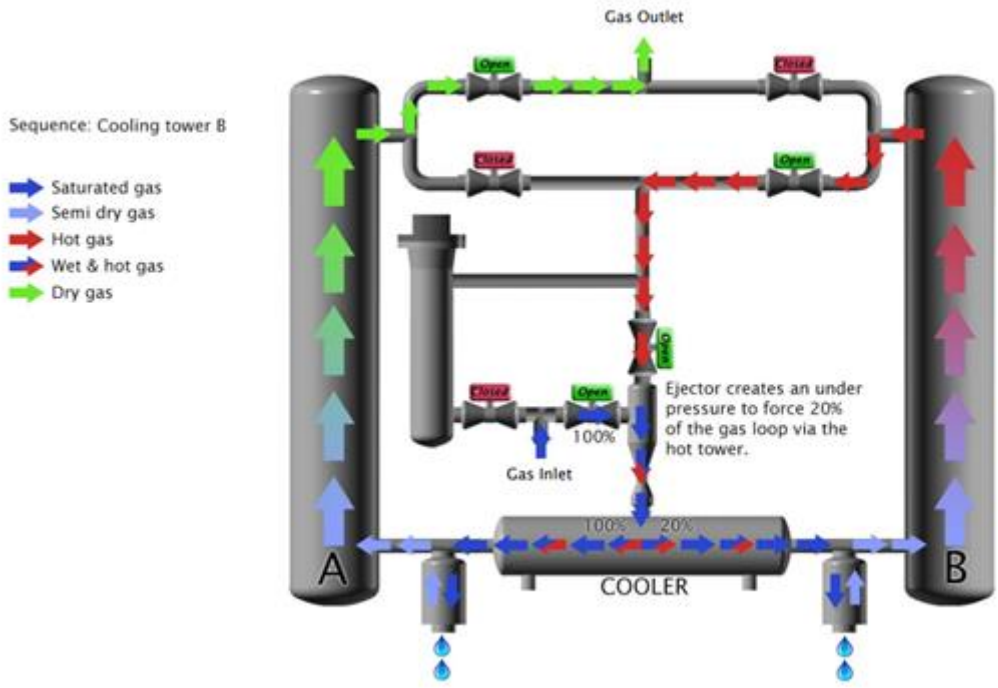
During the regeneration sequence the positioner FC-64.1 will adjust the valve 64-V6 in a partly to fully closed position depending on H2 feed gas flow through the Dryer. It is controlled via a 4-20 mA signal from the electrolyser and will be fully closed (0-10%) in the range 4-8 mA and regulated between 25-75% in the range 12-20 mA. For more info, see part 5.6.

In the heater head there is a temperature control TS 64.1 placed in the power supply line controlling the heater temperature. If the surface temperature is too high the heater will be switched off by TS 64.2 and the PLC will give an alarm signal for overheating. After the heater, there is an additional temperature safety switch TS64.3 that secures against overheating of the regeneration gas.

The first step of the regeneration phase is to check that the correct regeneration temperature has been reached. This is done by checking the tower B top temperature transmitter TT 64.8 after 30 min. If the regeneration temperature has not been reached after 30 min, this means that either the heater is not functioning or that the gas flow is insufficient and will give an alarm for regeneration failure.

If the temperature is correct the next step will be to check when correct bottom temperature has been reached. This is done by the temperature transmitter TT 64.7. If the temperature has not been reached after 3 hours the program will give an alarm for regeneration failure.
If the temperature is reached within the 4 hours the program will go to sequence 2.

6.2.3 Dryer control sequence 2 of 4
Sequence 2) Adsorption tower 64A and cooling tower 64B

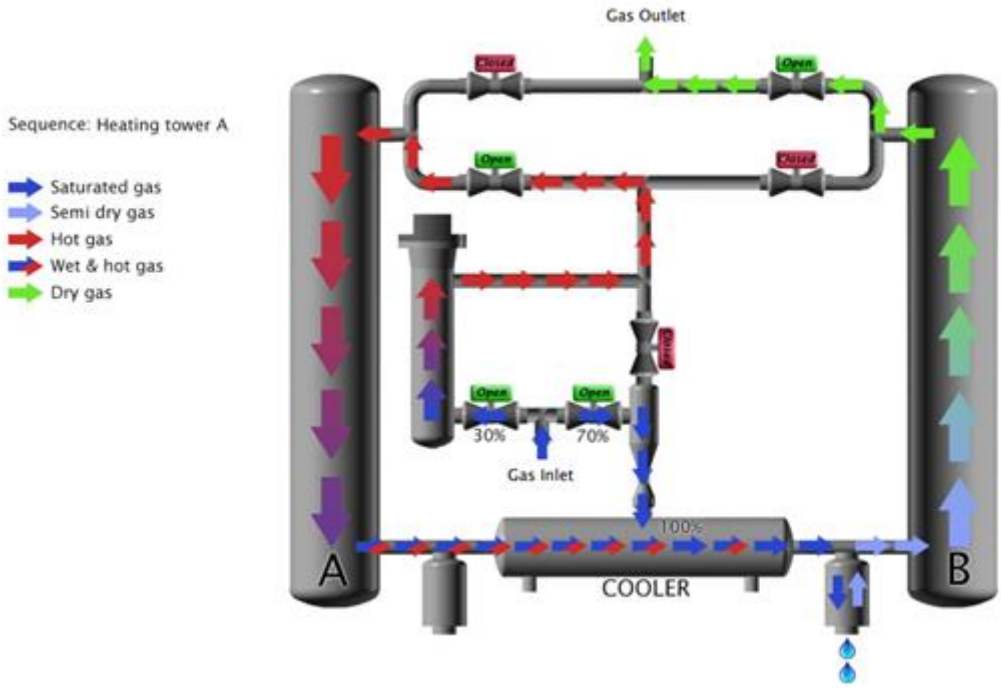


Picture 6.2.3 Simplified schematic of Dryer sequence 2.

Solenoid valve 64-V8 is switched off which closes valve 64-V5; and solenoid valve 64-V3 is activated, so valve 64-V7 will open. In these valve positions the electrical limit switch GS 64.3 is activated and GS 64.2 is inactive and indicating the correct cooling phase. If any of the above limit switches are not in correct position an alarm signal for cooling failure shall be given.

The first step in the cooling phase is to check that the bottom temperature measured by TT 64.7 decreases to the set point in order to prove correct cooling. This is checked after 0.5 hours. If the max time is reached and the temperature still is too high an alarm for cooling failure will be given.
The next step is to check the top temperature is cooled down by measuring TT 64.8.
If the top temperature is not reached before 5.9 hours an alarm for cooling failure will be given.
If the top temperature is reached the program will close the valve 64-V7 and remain in this position until 5.9 hours have elapsed. The solenoid valve 64-V3 will be closed and depressurised in order to avoid that instrument air pressure remains in the system and prevent movements of valves with double acting actuators in the next step. Now the program will go to sequence 3.

6.2.4 Dryer control sequence 3 of 4
Sequence 3) Switching over to adsorption tower 64B and regeneration tower 64A.



Picture 6.2.4 Simplified schematic of Dryer sequence 3.

Via a signal from the PLC the solenoid valve 64-V2 is activated and instrument air will open the control valves 64-V4.2 and 64-V4.3, resulting in a switch-over of the tower Dryers.
Now tower Dryer B is in adsorption mode and tower Dryer A in regeneration.
When the valves are in correct position the electrical limit switches GS 64.1.2 and GS 64.1.3 are activated and GS 64.1.1and GS 64.1.4 are inactive.
If the limit switches are not activated as specified above in this sequence, an alarm for not correct switching over of the Dryer sequence shall be given.

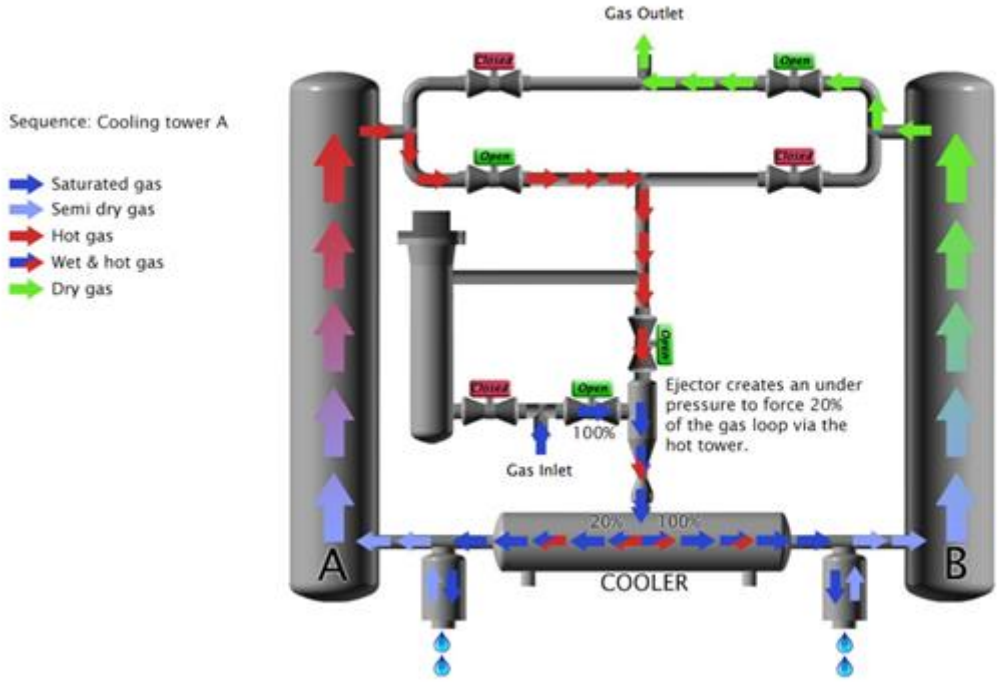
Instrument air, via solenoid valve 64-V8 will open valve 64-V5 and partly close valve 64-V6.
As the solenoid valve 64-V3 is inactive the cooling valve 64-V7 is closed.

Under the condition that the Dryer switching over position is correct as per above and that the electrical limit switch GS 64.2 is activated and GS 64.3 is inactive, the regeneration heater can be switched on.
The set positions of the electrical limit switches as per above indicates the heating phase of the reactivation period. If any of the electrical limit switches are not correctly activated an alarm for regeneration failure shall be given.

Further this step will follow similarly as step 1 with the difference that the transmitters for the tower Dryer A will be active instead of the transmitters for tower Dryer B.

6.2.5 Dryer control sequence 4 of 4

Sequence 4) Adsorption tower 64B and cooling tower 64A



Picture 6.2.5 Simplified schematic of Dryer sequence 4.

Same as under sequence 2 above but with valves and sensors for Dyer vessel A.

NOTE: Wherever the sequence is stopped the dryer shall restart in the same position as it was stopped.

NOTE: If the heater sequence has been on for more than 15 min, it is not allowed to manually switch over to the adsorbing sequence before the regenerating tower is completely cooled down. This in order to protect the discharge equipment from high temperatures.

6.3 Function of condensation water removal system

The condensate drainage is controlled by a Sub-program in the PLC performing the consecutive purging of the condensate from the Deoxo reactor and from the active Dryer Tower (A or B, as the case may be). The purging sequences are time-based and operated by activating or deactivating the solenoid valves 64-V12 and 64-V17.

When solenoid valve 64-V17 is activated, the 3-way valve 64-V31 is in position for purging the Deoxo reactor – when 64-V17 is deactivated, it is the active Dryer vessel that is being purged. The 3-way valve 64-V31 shall alternatively be switched to empty the condensate of the Deoxo vessel during 15 minutes, and thereafter switch to emptying the active Dryer vessels during 15 minutes. The switch-over is time based.
Depending on practical experiences these timings and set points can be adjusted.

The 3-way valve 64-V13 shall always be open to the active dryer tower that is in adsorption mode, because this is where the condensate accumulates during that phase.

A monitoring is performed by checking the pressure at PT 64.1 after the purge valve 64-T2. When the pressure increases above 50% of the process gas operating pressure, the condensate water at the bottom of the vessel being purged has been emptied, and the purge valve 64-T2 will immediately close. And a switch-over to the next vessel is performed. If the pressure measured at PT 64.1 continues to rise even after 64-T2 has been closed, it can be assumed that 64-T2 is defect or leaking. Triggering of PSA 64.1 HH will lead to shut down of the plant.

When the switch-over pressure conditions at PT 64.1 conditions have not been reached within the pre-set timing, an alarm sequence is started and signalized to the PLC. This alarm means that the amount of condensate water collected in the concerned vessel is exceeding the normal operating conditions. There is a risk of flooding the catalyst or desiccant material, which would severely affect the performance.

Activation of the PSA 64.1 LL alarm shall lead to either have the PLC perform a shut-down of the unit or to reduce the gas flow and check the drainage results again.

If the condensate drainage is insufficient, it is necessary to check the condensate filters for plugging. Before checking any of the condensate filters the plant must be stopped and valves 61-V2, 64-V15 and 64-V16 must be closed. First a pressure equalisation must be done by opening progressively valve 61-V3 or 64-V32 or 64-V33. After cleaning the filters, close and reopen the respective valves slowly to build up pressure again.

7. Maintenance

7.1 Daily under operation

- Check that the hydrogen supply pressure and temperature are correct.
- Check that the hydrogen product temperature and dew point are correct.
- Check that the instrument air/nitrogen pressure and dew point are correct.
- Check that cooling water is at normal pressure and temperature in/out
- Check that the tower under regeneration gets hot when heater on and during cooling that the temperature is below + 40°C before changing over towers.
- Check every shift that the condense traps are functioning and that valves 61-V2, 64-V15and 64-V16are fully open.
- Check that the coolers are working and give the right outlet temperature.

7.2 Monthly

- Check that the working pressure is according to specification.
- Check that the condense traps are functioning and that there is maximum 1 litres of water in each deoxo and dryer vessel.
- Check PLC charts to detect any negative trends i.e. degradation of dew point.

7.3 Annually

- Check all Deoxo-Dryer components.
- Replace worn out parts.
- Measure the heater current consumption.
- Check the set value of regulating thermostats and switches.
- Check, clean or replace particle filter if required.
- Clean condensate filters.
- Check the dew point measurement for trend.
- Check the level and condition of catalyst and desiccant in each tower.
  Add up with new material if required.
  Note: replace the elastagraph gaskets after each opening
- Report results in written protocol.

7.2 During Stop of Deoxo-Dryer

- If the electrolyser is stopped and the gas flow is stopped, the Dryer sequence shall be stopped in order to ensure correct regeneration and cooling.
- Shut off the valves for hydrogen
- Switch off the main and control power
- Close the cooling water flow
- If the Dryer shall be opened. Release the DEDR from pressure and purge it with N2. Be sure that no pressure remains in the system before opening.
- Completely empty condensate circuit if the temperature at site will go below 0°C and heat tracing is stopped.
  Cooling water is supposed to be protected against freezing with Glycol or equivalent.
- If the heater is stopped due to TSA 64.2 HH of heater temperature mechanical switch TS 64.2 which has been cut out, it needs to be reset manually in the regeneration heater head.
  NOTE: This is controlled and monitored by the PLC, if you get any alarm from the PLC control system you shall make actions to avoid it to happen again.
  If you need support, please contact AQUAGAS.

7.4 Change of catalyst and desiccant

Performance of catalyst and desiccant materials should not be affected the first 2 years of operation. But over time, a reduction due to mechanical degradation will occur. An indication is the increase of dust in the particle filter and condensate strainers. Add-up of new material may be necessary to maintain an optimal performance of the DEDR.
It is advisable to replace the catalyst and desiccant materials every 5 years of operation.
Please proceed as follows:

- Stop the unit, purge with nitrogen and depressurize the complete DEDR unit.
- Remove the condensate water from the bottom of the vessels.
- Place a recipient or vacuum cleaner and open the dedicated emptying flange or plug at the bottom of the vessel.
- Open the dedicated flange or plug at the top of the vessel.
- Empty the vessel from the catalyst or desiccant.
- Close the bottom flange or plug.
- Fill the correct volume and type of catalyst.
  Fill desiccant up to 20mm of top nozzle outlet.
- Optionally, connect a vacuum cleaner to the vessel's bottom condensate drain valve and suck out remaining dust. Close the condensate drain valve again and plug.
- Close the top flange/plug.
- Purge with nitrogen, pressurize and restart the DEDR unit.

NOTE: Never use an injector or mechanical device to fill catalyst or desiccant as this might shatter the beads mechanically. The beads should be fed into the towers by gravity using a funnel. A slight under-pressure through connecting a vacuum cleaner to the bottom condensate drain connection of the tower can be used to support the filling process.

NOTE: Before filling the Deoxo DE vessel with new catalyst material, it must be ensured that any remaining hydrogen is vented, and that the vessel is correctly purged. Otherwise, there is a risk that contact with organic and flammable substances can be causes of fire or explosion.

NOTE: Dust from handling desiccant in connection with servicing may be irritating to noses or throats. Use breathing protection when needed.

8. Trouble shooting

Symptom	Possible causes	Corrective action
Poor dew point.	Condensate water accumulated in vessels	Check drain system
	Temperature of inlet gas too high	Check/clean coolers
	Working pressure too low	Check pressure drop in unit
	Poor regeneration	Check the heater element
	Incorrect valve adjustment. Valve leaking	Check function of regeneration valves 64-V5 and 64-V6
	Poor or reduced desiccant	Replace desiccant
	Dryer fails to shift	see below
Dryer fails to shift	Instrument air/nitrogen missing or pressure too low.	Check air pressure. Clean air filter
	Automatic valves do not open / close correctly.	Check solenoid valves. Check valves function.
Deoxo temp too low	Trace Heater failure	Check trace heater and replace
	Too high gas flow	Check and adjust H2 supply.
Reg. temp too low	Heater element failure	Check heater and repair/replace
	Too high regeneration flow	Adjust regulation valve 64-V14
Poor cooling	Cooling valve is not opening	Check function of valve 64-V7
	Plugged injector	Check and clean the injector 64-T4
	Cooling water failure.	Check C.W. supply conditions
Low pressure at PT 64.1	Plugged condensate strainers or orifice.	Check and clean condensate circuit
	Manual valves 61-V2, 64-V15or 64-V16 closed or partially closed.	Check that these valves are in fully open position.
Too high pressure at PT 64.1	Valve 64-T2 leaking or not closing properly.	Replace valve 64-T2.

C0063-FOR-LST-QA-001
Recommended list for Start-up and comnsumables, Spare part list and special tools
(Phase 2)
C63- CrossWind Project

REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
00	*Issue for Review*	*21-OCT-2024*	*D. CRESCIMBENI*	*M. CHIARUCCI*	*L. MAIOLI*

Elogen Project Document Number	**C0063-FOR-LST-QA-001**
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REVISION LIST

REV.	DESCRIPTION
00	*Issue for Review*

HOLD RECORD

REV. ITEM	REV. DESCRIPTION

NOTES

1) For spare parts not listed in this document, please note that no spare parts for commissioning & start up have been suggested by Vendors

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Spare Part List for Piping

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
2	1/2" HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2	HUTCHINSON			STAINLESS STEEL T304 + 7DF2075	2	2	2		
3	1/2" HUTCHINSON BONDED SEAL GASKET, BS EN 10088-2	HUTCHINSON			STAINLESS STEEL T316 + 7DF2075	5	5	5		
4	1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
5	1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
6	3/4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	4	4	4		
7	3/4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	2	2	2		
8	1 1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	1	1	1		
9	1 1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
10	1 1/2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
11	1" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	2	2		
12	1" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	4	4	4		
13	1" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	8	8	8		
14	2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	5	5	5		
15	2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
16	2" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	6	6	6		
17	3" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	3	3	3		
18	3" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
19	4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	2	2		
20	4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
21	4" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL300	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
22	6" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 304 SS, RUBBER FKM (VITON GLT)	2	2	2		
23	6" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	3	3	3		
24	8" KEMPCHEN RUBBER STEEL GASKET, PROFILE WL, W.S. 179, CL150	KEMPCHEN			SUPPORT RING 316 SS, RUBBER FKM (VITON GLT)	1	1	1		
25	1/2" 60 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
26	1/2" 65 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				22	22	22		

Spare Part List for Piping

27	1/2" 70 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				7	7	7		
28	5/8" 80 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				2	2	2		
29	5/8" 85 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				18	18	18		
30	5/8" 90 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				2	2	2		
31	5/8" 95 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				24	24	24		
32	5/8" 130 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
33	5/8" 150 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				3	3	3		
34	3/4" 105 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				16	16	16		
35	3/4" 110 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
36	3/4" 130 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				1	1	1		
37	3/4" 165 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8 CL.2/ASTM A194 Gr.8	PRESS BOLT SRL				2	2	2		
38	1/2" 60 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				10	10	10		
39	1/2" 65 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				19	19	19		
40	1/2" 70 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
41	1/2" 105 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
42	5/8" 75 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				8	8	8		
43	5/8" 80 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				26	26	26		
44	5/8" 85 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				13	13	13		
45	5/8" 90 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				47	47	47		
46	5/8" 95 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				10	10	10		
47	5/8" 120 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
48	5/8" 140 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				1	1	1		
49	5/8" 160 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				1	1	1		
50	3/4" 95 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				4	4	4		
51	3/4" 105 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				6	6	6		
52	3/4" 110 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				8	8	8		
53	3/4" 115 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				20	20	20		
54	3/4" 125 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				5	5	5		
55	3/4" 165 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				6	6	6		
56	3/4" 180 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				1	1	1		

Spare Part List for Piping

57	3/4" 195 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		
58	3/4" 210 STUD BOLT + 2 HEAVY HEX NUTS, THREAD UNC, ASME B16.5 ASTM A320 Gr.B8M CL.2/ASTM A194 Gr.8M	PRESS BOLT SRL				2	2	2		

Spare Part List for Vessels

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
1	STUD BOLTS 1 1/2" X 285 + 2 NUTS 1 1/2"	HYDROBOLT	B8G8ALL2XN1.500X285	24J033-001 POS. 6	B8 CL.1 / GR. 8 CL. 1	3	3	3		
2	24" GASKETS 300# RF 6 THK	KLINGER	RUBBER STEEL GASKET Inner 620 Outer 772mm	24J033-001 POS. 5	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
3	STUD BOLTS 1 1/2" X 300 + 2 NUTS 1 1/2"	HYDROBOLT	B8G8ALL2XN1.500X300	24J033-011 POS. 6	B8 CL.1 / GR. 8 CL. 1	4	4	4		
4	36" GASKETS 150# RF 6 THK	KLINGER	RUBBER STEEL GASKET Inner 900 Outer 984mm	24J033-011 POS. 5	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
5	STUD BOLTS 3/4" X 115 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X115	24J033-021 POS. "P"	B8 CL.1 / GR. 8 CL. 1	1	1	1		
6	3" GASKETS 300# RF 6 THK	KLINGER	RUBBER STEEL GASKET DN:3 PN 300	24J033-021 POS. "P"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
7	STUD BOLTS 3/4" X 130 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X130	24J033-021 POS. "H1-H2"	B8 CL.1 / GR. 8 CL. 1	3	3	3		
8	6" GASKETS 300# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 300	24J033-021 POS. "H1-H2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
9	STUD BOLTS 3/4" X 105 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X105	24J033-031 POS. "P"	B8 CL.1 / GR. 8 CL. 1	1	1	1		
10	6" GASKETS 150# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 150	24J033-031 POS. "P"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
11	STUD BOLTS 1" X 145 + 2 NUTS 1"	HYDROBOLT	B8G8ALL2XN1.000X145	24J033-031 POS. "M"	B8 CL.1 / GR. 8 CL. 1	1	1	1		
12	16" GASKETS 150# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:16 PN 150	24J033-031 POS. "M"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
13	STUD BOLTS 3/4" X 130 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X130	24J033-041 POS. "O2"	B8 CL.1 / GR. 8 CL. 1	2	2	2		
14	6" GASKETS 300# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 300	24J033-041 POS. "O2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
15	STUD BOLTS 3/4" X 130 + 2 NUTS 3/4"	HYDROBOLT	B8G8ALL2XN0.750X130	24J033-051 POS. "H1-H2"	B8 CL.1 / GR. 8 CL. 1	3	3	3		
16	6" GASKETS 300# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:6 PN 300	24J033-051 POS. "H1-H2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
17	STUD BOLTS 7/8" X 125 + 2 NUTS 7/8"	HYDROBOLT	B8G8ALL2XN0.875X125	24J033-061 POS. "O2"	B8 CL.1 / GR. 8 CL. 1	2	2	2		
18	10" GASKETS 150# RF 4 THK	KLINGER	RUBBER STEEL GASKET DN:10 PN 150	24J033-061 POS. "O2"	KEMPCHEN - 316L + EPDM 70ShoreA ELL/W270	1	1	1		
19										
20										
21										
22										
23										
24										
25										
26										
27										

Spare Part List for Electrical parts

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
1	Coupling relay PSR-PS21-1NO-1NC-24DC-SC	PHOENIX CONTACT	2700357	C0063-FOR-DGM-EL-003	N/A	1	1	1		
2	Luminaire LifEx-ME-0630-CCT	CORTEM	-	C0063-FOR-LAY-EL-002	N/A	3	3	3		
3	Luminaire LifEx-ME-0630N-CCT	CORTEM	-	C0063-FOR-LAY-EL-002	N/A	3	3	3		
4	Luminaire LifEx-ME-1260-CCT	CORTEM	-	C0063-FOR-LAY-EL-002	N/A	1	1	1		

elogen	Electrolyzer Package	Document Code	C0063-FOR-LST-QA-001
FORES ENGINEERING	Recommended list for Start-up and consumables, Spare parts list and special tools	Revision	Rev.00
	C63- CrossWind Project	Page Number	9 of 9

Spare Part List for Tubing and Instruments

ITEM	DESCRIPTION	MANUFACTURER	CODE NUMBER	REFERENCE DRAWING	MATERIAL	SPARE PARTS FOR START UP		TOT QTY	UNIT PRICE (Euro)	TOTAL PRICE (Euro)
						RECOMMENDED BY SUPPLIER	ORDERED QTY			
1	BULKHEAD 1/4" O.D. 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	2	2	2		
2	UNION STRAIGHT 1/4" OD 1/4" OD DF 316	SWAGELOK			316 Stainless Steel	6	6	6		
3	STRAIGHT 1/4" NPT-M 1/2" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
4	UNION TEE 1/2" OD 1/2" OD 1/2" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
5	STRAIGHT 1/2" BSPP-F 1/2" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
6	STRAIGHT 1/2" NPT-M 1/2" O.D. DF 316	SWAGELOK			316 Stainless Steel	5	5	5		
7	UNION STRAIGHT 1/2" OD 1/2" OD DF 316	SWAGELOK			316 Stainless Steel	2	2	2		
8	DROP SIZE TEE 1" 1" 1/2" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
9	ELBOW 3/4" NPT-M 3/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
10	STRAIGHT 3/4" BSPP-M 3/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
11	STRAIGHT 1/8" NPT-M 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	6	6	6		
12	STRAIGHT 1/8" BSPP-M 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	3	3	3		
13	UNION STRAIGHT 3/4" OD 3/4" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
14	COMPRESSION FITTING FERRULE	SWAGELOK			316 Stainless Steel	8	8	8		
15	RS FITTING GASKET 1/4"	SWAGELOK			fluorocarbon FKM	1	1	1		
16	RG FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	1	1	1		
17	RS FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	2	2	2		
18	RP FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	1	1	1		
19	RS FITTING GASKET 3/4"	SWAGELOK			fluorocarbon FKM	1	1	1		
20	RS FITTING GASKET 1/8"	SWAGELOK			fluorocarbon FKM	1	1	1		
21	STRAIGHT 3/4" NPT-F 3/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
22	MALE CONNECTOR 1/2" OD x 3/4" BW	SWAGELOK			316 Stainless Steel	1	1	1		
23	UNION TEE 1/4" OD 1/4" OD 1/4" OD DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
24	STRAIGHT 1/2" NPT-M 1/4" O.D. DF 316	SWAGELOK			316 Stainless Steel	1	1	1		
25	UNION REDUCTION 1/4"OD x 1/2" OD	SWAGELOK			316 Stainless Steel	1	1	1		
26	FITTING GASKET 1/4"	SWAGELOK			fluorocarbon FKM	1	1	1		
27	FITTING GASKET 1/2"	SWAGELOK			fluorocarbon FKM	2	2	2		
28	FITTING GASKET 1/8"	SWAGELOK			fluorocarbon FKM	2	2	2		
29	FITTING GASKET 3/8"	SWAGELOK			fluorocarbon FKM	2	2	2		

C63-PLO-003

Spare parts list 2 years operation (Phase 2)

With indicative price list

C63- CrossWind Project

001	*1st Issuance (Ph1)*	*03/02/2025*	*ABO*	*VFE*	*IDI*
REV.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
Elogen Project Document Number			C63-PLO-003		
Elogen Project Document Name			Spare parts list 2 years operation		
Elogen Document File Name			C63-PLO-003		

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
Loop 200 & 400 Paumier package											
Frigo chiller P.0608871.L.02.103	Frigo chiller P.0608871.L.02.103 repère 1	Oil level switch	2	34796201	1	1	6	299,2	299,2		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Oil temperature sensor	2	34703203	1	1	6	110,5	110,5		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Pressure sensor HP	3	34731919	1	1	6	86,7	86,7		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Pressure sensor LP	3	34731920	1	1	6	86,7	86,7		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 1	Oil heater	3	34321309 (400V)	1	1	6	105,4	105,4		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 4	Pressure switch HP/LP	3	KP17	1	1	5	129,2	129,2		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 7	Vibration eliminators HP	2	EVCYAC 13 MMS	1	1	4	132,6	132,6		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 8	Temperature transmitter LP	2	ALTM2-I	1	1	5	142,8	142,8		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 15	Liquid indicator	2	VCYLS 21	1	1	4	63,75	63,75		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 17	Temperature Transmitter	1	QAZ21-682/101	1	1	5	98,6	98,6		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 17	Pressure transmitter	1	CPS-1/9-4/20	1	1	5	183,6	183,6		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 17	Regulator	1	RWR462-10	1	1	5	623,9	623,9		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 20	Pressure transmitter	1	060G2049	1	1	6	261,8	261,8		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 21	Low pressure bottle	2	LCY 3621	1	1	4	1292	1292		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 22	Vibration eliminators LP	2	EVCYAC 21 MMS	1	1	4	204	204		Estimative Price Ex Works
	Frigo chiller P.0608871.L.02.103 repère 24	Pressure transmitter	1	060G2049	1	1	6	261,8	261,8		Estimative Price Ex Works
Chilled water circuit P.0608871.L.02.104	Chilled water circuit P.0608871.L.02.104 repère 1	Safety valve	2	32220	1	1	4	25,5	25,5		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 5	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 10	Pressure gauges	3	8191006	1	1	4	52,7	52,7		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 12	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 15	Pressure transmitter	2	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 22	Pressure transmitter	2	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 25	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 33	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 34	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 42	Antifreeze thermostat	1	KP71-060L 111366	1	1	6	79,9	79,9		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 43	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 44	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 60	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Chilled water circuit P.0608871.L.02.104 repère 101	Safety valve	2	32220	1	1	4	25,5	25,5		Estimative Price Ex Works
Condensation circuit P.0608871.L.02.104	Condensation circuit P.0608871.L.02.104 repère 105	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 112	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 115	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 122	Pressure transmitter	1	SHD-I-6 1301-2112-0550-120	1	1	5	204	204		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 126	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 141	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 149	Flowswitch	1	SA5000	1	1	3	319,6	319,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 154	Temperature sensor	1	TM65I-100MM + TH-08-VA-100	1	1	5	132,6	132,6		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 176/177	Fan	1	M1106706	1	1	8	3874	3874		Estimative Price Ex Works
		Electric box	2	M3206157	1	1	8	5938	5938		Estimative Price Ex Works
	Condensation circuit P.0608871.L.02.104 repère 206	Flowswitch	1	SA5000	1	1	3	319,60 €	319,60 €		Estimative Price Ex Works
FCU Type H8 P.0608871.L.02.201	FCU 201/202/203/204 repère 8	Fan	1		8	2	6	153,00 €	306,00 €		Estimative Price Ex Works
		Cooling battery	2		4	1	10	552,50 €	552,50 €		Estimative Price Ex Works
		Electrical heating	2		9	1	10	91,80 €	91,80 €		Estimative Price Ex Works
Aéraulic circuit P.0608871.L.02.003-1	AHU 100	Fan	1	D09/FU	1	1	8	2 762,50 €	2 762,50 €		Estimative Price Ex Works
		Cooling battery	2	Cu-Cu-FeZn P3012AR-9R-26T-800A-2,5Pa 15C 1 1/2	1	1	10	1 987,70 €	1 987,70 €		Estimative Price Ex Works
		Thermostat	2	KP77	1	1	6	79,90 €	79,90 €		Estimative Price Ex Works
		Electrical heating	2	1TAK9A359016	1	1	10	102,00 €	102,00 €		Estimative Price Ex Works
	TT 101	Temperature sensor A10 - Hydrogen Process Container - ATEX	2	SCH-TFR-2G	1	1	5	294,10 €	294,10 €		Estimative Price Ex Works
	TT 103	Temperature sensor E01 - AHU Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	TT 201	Temperature sensor B01 - Rectifier Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	TT 203	Temperature sensor A01 - Stack Room	2	AFTF-I	1	1	5	266,90 €	266,90 €		Estimative Price Ex Works
	TT 205	Temperature sensor A03+A02 - H2 Process Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	TT 206	Temperature sensor C01 - Water Treatment package	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 101	Humidity sensor A10 - Hydrogen Process Container - ATEX	2	SCH-FFR-2G	1	1	5	1 303,90 €	1 303,90 €		Estimative Price Ex Works
	HY 103	Humidity sensor E01 - AHU Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 201	Humidity sensor B01 - Rectifier Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 203	Humidity sensor A01 - Stack Room	2	AFTF-I	1	1	5	266,90 €	266,90 €		Estimative Price Ex Works
	HY 205	Humidity sensor A03+A02 - H2 Process Room	2	AFTF-I	1	1	5				Estimative Price Ex Works
	HY 206	Humidity sensor C01 - Water Treatment package	2	AFTF-I	1	1	5				Estimative Price Ex Works
	PT 101	Pressure transmitter A10 - Hydrogen Process Container - ATEX	2	SCH-Ex-Cos-P-250	1	1	5	1 917,50 €	1 917,50 €		Estimative Price Ex Works
	PT 103	Pressure transmitter E01 - AHU Room	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	PT 201	Pressure transmitter B01 - Rectifier Room	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	PT 203	Pressure transmitter A01 - Stack Room	2	PREMASGARD 1121-I	1	1	5	193,80 €	193,80 €		Estimative Price Ex Works
	PT 205	Pressure transmitter A03+A02 - H2 Process Room	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	PT 206	Pressure transmitter C01 - Water Treatment package	2	PREMASGARD 1121-I	1	1	5				Estimative Price Ex Works
	CT 102	Regulation damper A10 - Hydrogen Process Container - ATEX	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 104	Regulation damper E01 - AHU Room	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 202	Regulation damper B01 - Rectifier Room	2	GLS150	1	1	12	547,40 €	547,40 €		Estimative Price Ex Works
	CT 204	Regulation damper A01 - Stack Room	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 208	Regulation damper A03+A02 - H2 Process Room	2	GLS150	1	1	12				Estimative Price Ex Works
	CT 207	Draught damper C01 - Water Treatment package	2	GLS150	1	1	12				Estimative Price Ex Works
Wall Heater	Wall heater E01 - HVAC Room		2		1	1	3				Estimative Price Ex Works
	Wall heater B01 - Rectifier Room + control cabinet		2		1	1	3				Estimative Price Ex Works
	Wall heater A01 - FCU Stack Room		2		1	1	3	110,50 €	110,50 €		Estimative Price Ex Works
	Wall heater A03+A02 - O2/H2 Process		2		1	1	3				Estimative Price Ex Works
	Wall heater C01 - Water Treat. Pack		2		1	1	3				Estimative Price Ex Works
Drive		Fan assembly	3	130B1017	1	1	10	127,50 €	127,50 €	35 (450x270x230)	Estimative Price Ex Works
		Internal fan	3	134B7134	1	1	10	64,60 €	64,60 €		Estimative Price Ex Works
		External fan	3	134B7132	1	1	10	141,10 €	141,10 €		Estimative Price Ex Works
		Fan assembly	3	130B1017	1	1	10	127,50 €	127,50 €	35 (450x270x230)	Estimative Price Ex Works
		VLT Control panel	3	130B1107	1	1	10	222,70 €	222,70 €		Estimative Price Ex Works
Chiller electrical wiring PAU001 + PAU002 P.0608871.L.02.302		PRIMARY CUTTING POWER SUPPLY, INPUT: THREE-PHASE, OUTPUT: 24VDC 5A	2	2903153	2	1	6	165,85 €	165,85 €		Estimative Price Ex Works
		PRE-EQUIPPED RELAY MODULE WITH PUSH-IN CONNECTION, 2 NC, 24VDC	2	2903334	14	1	6	12,33 €	12,33 €		Estimative Price Ex Works
		PUSH-IN RELAY MODULE, SEMI-CONDUCTOR RELAY INPUT VOLTAGE: 24VDC	2	2905295	8	1	6	29,31 €	29,31 €		Estimative Price Ex Works
		LED LAMP T5 ECO WITH SWITCH, 120/230 VAC, 5W	2	NSYLAMT5LD1	2	1	6	89,88 €	89,88 €		Estimative Price Ex Works
		ROTARY SWITCH WITH BLACK HANDLE, ROUND, 2 FIXED POSITIONS, 1NO, D22	2	XB5AD21	2	1	6	11,46 €	11,46 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, GREEN, D22	2	XB5AVB3	2	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, RED, D22	2	XB5AVB4	2	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		HARMONY XB5, 3-PHASE PRESENCE INDICATOR, RED/GREEN/YELLOW LED, 400VAC	2	XB5EV57K4	2	1	6	91,02 €	91,02 €		Estimative Price Ex Works
		PUSHBUTTON HEAD Ø 40mm - PUSH-TURN - Ø22 - RED	2	XB5AS8445	2	1	6	21,59 €	21,59 €		Estimative Price Ex Works
		AC-3 CONTACTOR 3kW/400V, 3P 1NO, CONTROL: 24VDC	2	3RT2015-1BB41	2	1	6	27,91 €	27,91 €		Estimative Price Ex Works
		CONTACTOR, 3P, 30kW/400V, 1NO+1NC, 230VAC 50/60 Hz, S2	2	3RT2037-1AL20	4	1	6	178,84 €	178,84 €		Estimative Price Ex Works
		AUXILIARY CONTACT FOR LATER INSTALLATION, 2NO FOR LS CIRCUIT BREAKER P=7	2	5ST3011	6	1	6	22,27 €	22,27 €		Estimative Price Ex Works
		INSTA CONTACTOR 400-230VAC, 20A, 2NO - 24VAC/DC	2	5TT5000-2	2	1	6	54,62 €	54,62 €		Estimative Price Ex Works
		SIMATIC HMI, KTP900 BASIC, BASIC PANEL, TOUCH/KEYPAD, 9" TFT SCREEN, 655	2	6AV2123-2JB03-0AX0	2	1	6	1 580,64 €	1 580,64 €		Estimative Price Ex Works
		SIMATIC S7-1200, CPU 1214C COMPACT DEVICE, 24VDC, 14DI/10DO, 2AI 0-1	2	6ES7214-1AG40-0XB0	2	1	6	516,49 €	516,49 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1223, I/O MODULE 8DI/8DO	2	6ES7223-1BH32-0XB0	2	1	6	236,98 €	236,98 €		Estimative Price Ex Works

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
		SIMATIC S7-1200, SM 1231, ANALOG INPUT MODULE 4AI x 13bit, 0-20mA	2	6ES7231-4HD32-0XB0	2	1	6	306,26 €	306,26 €		Estimative Price Ex Works
		SIMATIC S7-1200, CM 1241, RS422/485 COMMUNICATION MODULE	2	6ES7241-1CH32-0XB0	2	1	6	173,77 €	173,77 €		Estimative Price Ex Works
		SIMATIC MEMORY CARD 4MB	2	6ES7954-8LC04-0AA0	2	1	6	71,01 €	71,01 €		Estimative Price Ex Works
		AUXILIARY CONTACT T 1NO+1NC FOR SIRCO	2	22990031	2	1	6	34,26 €	34,26 €		Estimative Price Ex Works
HVAC electrical cabinet PAU003 P.0608871.L.02.303		AXIOLINE SMART ELEMENTS, ANALOG INPUT MODULE, 4AI, 4-20mA, CONNECTOR	2	1088062	5	1	6	229,91 €	229,91 €		Estimative Price Ex Works
		AXIOLINE SMART ELEMENTS, ANALOG INPUT MODULE, 4AI, 0-10V, CONNECTOR A	2	1088104	2	1	6	229,91 €	229,91 €		Estimative Price Ex Works
		AXIOLINE SMART ELEMENTS, ANALOG OUTPUT MODULE, 4AO, 0-10V, CONNECTOR	2	1088126	3	1	6	248,23 €	248,23 €		Estimative Price Ex Works
		AXIOLINE F, MODULE CARRIER, 4 SLOTS FOR AXIOLINE SMART ELEMENTS	2	1088135	3	1	6	98,29 €	98,29 €		Estimative Price Ex Works
		PRIMARY CUTTING POWER SUPPLY, INPUT: THREE-PHASE, OUTPUT: 24VDC 20A	2	2903155	1	1	6	318,53 €	318,53 €		Estimative Price Ex Works
		PRE-EQUIPPED RELAY MODULE WITH PUSH-IN CONNECTION, 4 NC, 24VDC	2	2903308	2	1	6	14,72 €	14,72 €		Estimative Price Ex Works
		PRE-EQUIPPED RELAY MODULE WITH PUSH-IN CONNECTION, 2 NC, 24VDC	2	2905291	24	1	6	15,03 €	15,03 €		Estimative Price Ex Works
		DOOR CONTACT NO+NC 10A 500V	2	NSYINLCRN	1	1	6	48,62 €	48,62 €		Estimative Price Ex Works
		LED LAMP T5 ECO WITH SWITCH, 120/230 VAC, 10W	2	NSYLAMT5LD2	1	1	6	132,11 €	132,11 €		Estimative Price Ex Works
		ROTARY SWITCH WITH BLACK HANDLE, ROUND, 2 FIXED POSITIONS, 1NO, D22	2	XB5AD21	3	1	6	11,46 €	11,46 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, GREEN, D22	2	XB5AVB3	3	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		INDICATOR LIGHT WITH INTEGRATED LED, 24VAC/DC, ROUND, RED, D22	2	XB5AVB4	5	1	6	10,54 €	10,54 €		Estimative Price Ex Works
		HARMONY XB5, 3-PHASE PRESENCE INDICATOR, RED/GREEN/YELLOW LED, 400VAC	2	XB5EV57K4	1	1	6	91,02 €	91,02 €		Estimative Price Ex Works
		PUSHBUTTON HEAD Ø 40mm - PUSH-TURN - Ø22 - RED	2	XB5AS8445	1	1	6	21,59 €	21,59 €		Estimative Price Ex Works
		CONTACTOR, 3P, 7.5kW/400V, 1NO+1NC, 24VDC, SIZE S0 SCREW MOUNTED	2	3RT2025-1BB40	1	1	6	78,49 €	78,49 €		Estimative Price Ex Works
		CONTACTOR, 3P, 11kW/400V, 1NO+1NC, 24VDC, SIZE S0 SCREW MOUNTED	2	3RT2026-1BB40	1	1	6	93,64 €	93,64 €		Estimative Price Ex Works
		AUXILIARY CONTACT FOR LATER INSTALLATION, 2NO FOR LS CIRCUIT BREAKER P=7	2	5ST3011	25	1	6	22,27 €	22,27 €		Estimative Price Ex Works
		INSTA CONTACTOR 400-230VAC, 20A, 2NO - 24VAC/DC	2	5TT5000-2	12	1	6	54,62 €	54,62 €		Estimative Price Ex Works
		AUXILIARY CONTACTS WITH 2NO CONTACTS, 230/400VAC FOR 5TT5	2	5TT5910-0	12	1	6	38,28 €	38,28 €		Estimative Price Ex Works
		SIMATIC HMI, KTP1200 BASIC, BASIC PANEL, TOUCH/KEYPAD, 12" TFT SCREEN,	2	6AV2123-2MB03-0AX0	1	1	6	1 735,62 €	1 735,62 €		Estimative Price Ex Works
		SIMATIC S7-1200, CPU 1214C COMPACT DEVICE, 24VDC, 14DI/10DO, 2AI 0-1	2	6ES7214-1AG40-0XB0	1	1	6	516,49 €	516,49 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1223, I/O MODULE 16DI/16DO TRANSISTOR 0.5A, 24VD	2	6ES7223-1BL32-0XB0	3	1	6	374,31 €	374,31 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1231, ANALOG INPUT MODULE 8AI, +/-2.5/5/10V, 0/4-20m	2	6ES7231-4HF32-0XB0	2	1	6	497,06 €	497,06 €		Estimative Price Ex Works
		SIMATIC S7-1200, SM 1232, ANALOG OUTPUT MODULE 4AO, +/-10V, 0(4)-20mA	2	6ES7232-4HD32-0XB0	2	1	6	306,26 €	306,26 €		Estimative Price Ex Works
		AUXILIARY CONTACT - FIRST	2	26990031	1	1	6	34,26 €	34,26 €		Estimative Price Ex Works
		AUXILIARY CONTACT - SECOND	2	26990032	1	1	6	24,14 €	24,14 €		Estimative Price Ex Works
Loop 300 Ovivo package	Rotary vane pump	Rotary vane pump 100 l/h, SS with accessories without motor	1	907911	1	1	6	647,13 €	647,13 €	(est 300mm x 200mm x 200mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	UV lamp	UV lamp 170	1	727461	1	2	6	2 612,54 €	5 225,09 €	2 litre (est 1 metre long) (50 mm x 50mm x 1000mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	RO element	RO element ESPA1-4040	1	410016	1	5	6	18 874,94 €	94 374,72 €	10 litres (est 100mm x 100mm x 1000mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Vacuum pump	Vacuum pump type 70 3600l/h, 230V, 100W	1	405547	1	1	6	1 018,70 €	1 018,70 €	5 litres (est 200mm x 200mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Centrifugal pump	Centrifugal pump V420 1.4301/EPDM / PN25 3x400V / 50 Hz, 3 kW	1	405639	1	1	6	3 313,57 €	3 313,57 €	50 litres (250mm x 250mm x 800mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Centrifugal pump	Centrifugal pump M205 1.4404/EPDM 3x400V/50 Hz, 0,55 kW 1,5A Rp1 PN10	1	405644	1	1	6	2 133,15 €	2 133,15 €	15 litres (500mm x 250mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Switch contact	Switch contact MAX for flowmeter DN10,15,20	1	526019	1	1	6	131,83 €	131,83 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	2/2-way solenoid valve	2/2-way solenoid valve 24VDC Stainless steel, positively controlled 0-16bar 3/4"i Viton, NC	1	528099	1	1	6	659,14 €	659,14 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	2/2 ways solenoid valve	2/2 ways solenoid valve 24VDC stainless steel, servo 0,3-20 bar 1/2"i Viton NC inside: V2A	1	528127	1	1	6	348,72 €	348,72 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Solenoid valve	Solenoid valve2/2, 1/2"i, NC 24VDC, brass/EPDM 0-12bar, direct	1	528128	1	1	6	240,11 €	240,11 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Solenoid valve	Solenoid valve SS 1/2" f 0-10 bar, 24V DC, NC, FKM forced pilot	1	529171	1	1	6	275,63 €	275,63 €	0.5 litre (est 50mm x 50mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure gauge	Pressure gauge 0-6 bar G1/4"B hinten, Glyzerine SS, ø 63 mm	1	534128	1	1	6	76,69 €	76,69 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure gauge	Pressure gauge 0-10 bar G1/4"B hinten, Glyzerine SS, ø 63 mm	1	534131	1	1	6	76,69 €	76,69 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure gauge	Pressure gauge 0-6 bar G1/4" B unten, Glyzerine SS, ø 50 mm	1	534137	1	1	6	64,71 €	64,71 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Frequency converter	Frequency converter 0,55 kW 3AC 380-480V Power Module IP55/UL	1	625391	1	1	6	790,68 €	790,68 €	10 litres (est 450mm x 150mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Frequency converter	Frequency converter 4 kW 3AC380 -480V Power Module IP55/UL	1	625401	1	1	6	1 503,97 €	1 503,97 €	10 litres (est 450mm x 150mm x 150mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Flow sensor with display	Flow sensor with display 2...40 l/min IO-Link -10..90ºC 12 bar G 1/2 DN10	1	737961	1	1	6	671,10 €	671,10 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Flow sensor with display	Flow sensor with display 1...20 l/min IO-Link -10..90ºC 12 bar G 1/2 DN8	1	741807	1	1	6	617,17 €	617,17 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure sensor	Pressure sensor with IO-Link -1-25 bar, IO-Link G 1/4" AG, V4A, -40-90ºC	1	741708	1	1	6	269,64 €	269,64 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure sensor	Pressure sensor with IO-Link -1-10 bar, IO-Link G 1/4" AG, V4A, -40-90 ºC	1	741709	1	1	6	269,64 €	269,64 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Pressure sensor	Pressure sensor front-flush -125-2500 mbar, IO-Link 4-20mA, G 1/2" AG, V4A	1	741710	1	1	6	772,97 €	772,97 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Conductivity sensor	Conductivity sensor IO-Link 0,04-1000µS/cm, 4...20mA G 1/2" AG, V4A, 25...100ºC	1	742408	1	1	6	1 797,60 €	1 797,60 €	0.2 litre (80mm x 80mm x 25mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Motor control	Motor control needle valve kv0,2, G 1/2", 24VAC/DC	1	744651	1	1	10	2 942,07 €	2 942,07 €	2 litres (80mm x 50mm x 50mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
	Motor control	Motor control needle valve kv0,6, G 1/2", 24VAC/DC	1	744652	1	1	10	2 942,07 €	2 942,07 €	2 litres (80mm x 50mm x 50mm)	Estimative Price Ex Works converted from £ to €. No Custom Tax / VAT considered
Loop 600	CP-600A/B	Centrifugal pump 90.37 m3/h H2O + O2 cl150 degreased	1	PMP-1014	2	1	8	10 513,50 €	10 513,50 €		Estimative Price Ex Works
	FT-600	Flow transmitter 100 m3/h H2O+O2 Atex sil degreased	1	CPT-1414	1	1	16	2 983,62 €	2 983,62 €		Estimative Price Ex Works
	LSH-600 - LSL-600-LSL-611	Level switch DN25 class150 200mm Atex degreased sil	1	CPR-1049	3	1	3	832,50 €	832,50 €		Estimative Price Ex Works
	CT/P-600	CoDNuctivity aDN temperature transmitter Atex degreased	1	CPT-1803	2	1	7	3 122,46 €	3 122,46 €		Estimative Price Ex Works
	TT-601A/B/C/D/E/F/G/H	Temperature transmitter -20/80 deg 1/2" nptm Atex degreased	1	CPT-2015	8	3	8	296,81 €	890,42 €		Estimative Price Ex Works
	SV-601,SV-610,SV-630,SV-635,SV-641,SV-800,SV-900,SV-920	Solenoid valve nc Atex sil	1	VAN-7610	8	3	2	152,22 €	456,66 €		Estimative Price Ex Works
	PT-600-PT-610-612-PT-900	Pressure transmitter 16 barg O2 Atex sil degreased	2	CPT-1106	4	2	2	919,26 €	1 838,53 €		Estimative Price Ex Works
	PT-600A/B	Pressure transmitter 16 barg O2 Atex sil degreased	2	CPT-1013	2	1	2	967,40 €	967,40 €		Estimative Price Ex Works
	PV-600	Pneumatic valve nc KV 20 DN15 PN40 H2O Atex	2	VAN-8121	4	2	5	384,69 €	769,38 €		Estimative Price Ex Works
	PV-601	Pneumatic valve nc KV 3.9 DN15 cl150 Atex degreased	2	VAN-8117	1	1	6	324,44 €	324,44 €		Estimative Price Ex Works
	CV-600	Check valve poppet 1/2" od cf 0.03bar degreased	2	CAR-3033	1	1	2	199,31 €	199,31 €		Estimative Price Ex Works
	CV-601A/B	Check valve double bat DN 150 cl150	2	CAR-3015	1	1	6	3 307,13 €	3 307,13 €		Estimative Price Ex Works
	F-600	M200 dégraissée O2 pour FIG3616 DN150	3	1663680-X	1	1	6	1 021,25 €	1 021,25 €		Estimative Price Ex Works
	HV-600 - HV-600A/B - HV-601A/B - HV-602A -HV-603A	Butterfly valve DN 150 H2O+O2 cl150/PN16 Atex sil degreased	3	VAN-2420	7	2	2	1 438,24 €	2 876,49 €		Estimative Price Ex Works
	HV-600D/DA/DB- HV-601D-HV-602D/HV-602DA- HV-603D - HV-603V HV-604V-HV-606D-HV-606V-HV-619D-HV-620D-HV-620DA-HV-620DB-HV-621D-HV-622D-HV-622V-HV-622VA-HV-623D-HV-625V-HV-626D-HV-640D- HV-902-HV-911-HV-922-HV-942	Ball valve DN15 PN63 butt weld KV 31 degreased	3	VAN-5255	27	6	4	148,80 €	892,81 €		Estimative Price Ex Works
	HV-604	Butterfly valve with switch DN150 cl150 Atex sil degreased	3	VAN-2445	1	1	2	2 198,73 €	2 198,73 €		Estimative Price Ex Works
	HV-605	Butterfly valve with switch DN200 cl150 Atex sil degreased	3	VAN-2446	1	1	4	2 967,00 €	2 967,00 €		Estimative Price Ex Works
Loop 610	HIOD-610A/B/C	Hydrogen in oxygen detector 0-100% lie Atex sil with xcell ULTIMA X5000 - XCELL - H2	1	CPT-1531	3	3	3	1 986,60 €	5 959,80 €		Estimative Price Ex Works
	FICV-610A//B	Variable area flowmeter 18-170 nl/h Atex sil degreased	1	CPT-1450	3	2	8	1 223,24 €	2 446,49 €		Estimative Price Ex Works
	FICV-611	Variable area flowmeter+limit switch 360-2600 nl/h Atex degreased	1	CPT-1453	1	1	8	1 407,50 €	1 407,50 €		Estimative Price Ex Works
	LSH-610	Level switch DN25 cl150 200mm Atex degreased	1	CPR-1048	1	1	3	796,13 €	796,13 €		Estimative Price Ex Works
	LSL-610-LSH-630-LSH-631-LSL-630-LSH-640-LSL-640	Level switch DN25 class300 200mm Atex degreased	1	CPR-1050	6	2	3	992,88 €	1 985,76 €		Estimative Price Ex Works
	PSV-610	Pressure safety valve 13 barg O2 Atex degreased	1	SOU-2405	1	1	16	577,30 €	577,30 €		Estimative Price Ex Works
	PV-610-PV-630	Pneumatic valve no KV 7.2 DN20 CL300 Atex sil degreased	2	VAN-8112	2	2	6	606,68 €	1 213,35 €		Estimative Price Ex Works
	MPV-611	Motorised proportional valve KV 2.5 O2 DN50 CL300 Atex degreased	2	VRE-1011	1	1	6	5 453,48 €	5 453,48 €		Estimative Price Ex Works
	CV-611-CV-800-CV-930	Check valve poppet 1/4" od cf 0.07bar degreased	2	CAR-3032	3	2	2	98,04 €	196,08 €		Estimative Price Ex Works
	HV-610-HV-630-HV-642	Hand valve 1/2" od O2 degreased	3	VAN-1006	3	1	2	297,02 €	297,02 €		Estimative Price Ex Works
Loop 620	CP-620A/B	Centrifugal pump 31.9 m3/h H2O + H2 CL300 Atex degreased	1	PMP-1108	2	1	12	9 925,48 €	9 925,48 €		Estimative Price Ex Works
	LSL-620-LSL-641	Level switch DN25 class300 200mm Atex degreased sil	1	CPR-1051	2	1	3	1 029,24 €	1 029,24 €		Estimative Price Ex Works
	PT-620-PT-630-PT-910-PT-920	Pressure transmitter 40 barg H2/N2 Atex	2	CPT-1107	4	2	3	992,86 €	1 985,72 €		Estimative Price Ex Works
	PT-620A/B-PT-631-PT-633	Pressure transmitter 40 barg H2/N2 Atex sil	2	CPT-1105	4	2	2	0,00 €	0,00 €		Estimative Price Ex Works
	TT-621B	Temperature transmitter 0/120 deg Atex	1	CPT-2014	1	1	5	0,00 €	0,00 €		Estimative Price Ex Works
	CV-621A/B	Check valve double bat DN 100 CL300	2	CAR-3019	2	1	6	1 546,71 €	1 546,71 €		Estimative Price Ex Works
	HV-620,HV-620A,HV-620B,HV-621A,HV-621B,HV-622	Hand valve DN 100 H2O+H2 CL300 Atex degreased	3	VAN-2437	6	3	10	3 226,10 €	9 678,29 €		Estimative Price Ex Works
	HV-623	Hand valve with switch DN100 CL300 Atex sil degreased	3	VAN-2447	1	1	2	2 431,65 €	2 431,65 €		Estimative Price Ex Works
	HV-624	Hand valve with switch DN150 CL300 Atex sil degreased	3	VAN-2448	1	1	4	6 023,23 €	6 023,23 €		Estimative Price Ex Works
	F-620	Strainer M200 dégraissée O2 pour FIG36 DN100	3	1660680-X	1	1	6	886,88 €	886,88 €		Estimative Price Ex Works
	FT-630	Flow transmitter 750 nm3/h h2 atex degreased	1	CPT-1102	1	1	8	5 501,64 €	5 501,64 €		Estimative Price Ex Works
	PSV-630,PSV-631	Pressure safety valve 36 barg 6mm h2 atex degreased	1	SOU-2303	2	2	4	889,27 €	1 778,54 €		Estimative Price Ex Works
	PV-631,PV-900,PV-901,PV-920,PV-921	Pneumatic valve nc kv 8.5 DN20 cl300 atex sil degreased	2	VAN-8110	5	2	6	617,43 €	1 234,85 €		Estimative Price Ex Works

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
Loop 630	PV-632	Pneumatic valve no kv 11 DN25 cl300 atex degreased	2	VAN-8113	1	1	6	724,60 €	724,60 €		Estimative Price Ex Works
	PV-633,PV-635	Pneumatic valve nc kv 12 DN25 cl300 atex sil degreased	2	VAN-8111	2	1	6	724,60 €	724,60 €		Estimative Price Ex Works
	MPV-611	Motorised proportional valve KV 2.5 O2 DN50 CL300 Atex degreased	2	VRE-1100	1	1	6	4 848,25 €	4 848,25 €		Estimative Price Ex Works
	CV-630,CV-632	Check valve disc DN 25 pn40 degreased	2	CAR-3005	2	2	6	160,82 €	321,64 €		Estimative Price Ex Works
	HV-633,HV-940,HV-941	Hand valve DN 25 H2O+H2 cl300 Atex degreased	3	VAN-2433	3	1	10	706,30 €	706,30 €		Estimative Price Ex Works
Loop 640	FSH-640	Flow switch high right to left DN25 cl300 atex sil degreased	1	CPR-1101	1	1	8	2 454,23 €	2 454,23 €		Estimative Price Ex Works
	PSV-640	Pressure safety valve 36 barg 10mm h2o atex degreased	1	SOU-2455	1	1	4	827,38 €	827,38 €		Estimative Price Ex Works
	PV-640	Pneumatic valve nf + actuator d80 + actuator cover d80	2	VAN-8012	1	1	8	1 056,10 €	1 056,10 €		Estimative Price Ex Works
	PV-641	Pneumatic valve nc kv 170 DN40 cl300 h2 atex sil degreased	2	VAN-8306	1	1	4	1 086,96 €	1 086,96 €		Estimative Price Ex Works
	PRV-640	PRESSURE REDUCING VALVE DN40 CL300 CV 3.79 H2O+H2 DEGREASED	3	DET-1105	1	1	4	3 268,00 €	3 268,00 €		Estimative Price Ex Works
Loop 700	**Instruments**										
	TT 60.1, TT 60.2, TT 60.3	Temperature SensorFor surface contact Type PT100 Range 0-300°C	3	PT100 90.2550 Ref. 00380207	3	1	4	164,00 €	164,00 €		Estimative Price Ex Works
	TT 61.1, TT 64.5, TT 64.6, TT 64.7, TT 64.8 T	Temperature SensorFor Thermowell Type PT100 Range 0-300°C	3	PT100 90.2150 Ref.00415733	5	1	4	179,00 €	179,00 €		Estimative Price Ex Works
	TT 60.1, TT 60.2, TT 60.3, TT 61.1, TT 64.5, TT 64.6, TT 64.7, TT 64.8	Temperature Transmitter + Clip Analog signal : 4-20 mA	3	5333D + 8421	8	1	4	196,00 €	196,00 €		Estimative Price Ex Works
	GS 64.1.1, GS 64.1.2, GS 64.1.3, GS 64.1.4GS 64.2, GS 64.3, GS 64-T2	Sensor Electrical limit switch	3	SRBG-C1-N-20N-ZCM12-EX5	8	1	4	133,00 €	133,00 €		Estimative Price Ex Works
	GS 64.1.1, GS 64.1.2, GS 64.1.3, GS 64.1.4GS 64.2, GS 64.3, GS 64-T2	Indicator Electrical limit switch	3	SASF-S2-BF-A3	7	1	4	16,00 €	16,00 €		Estimative Price Ex Works
	PT 64.1	Pressure transmitter Analog signal : 4-20 mA	3	2088G3S22B2K1Q4	7	1	TBD	1 207,00 €	1 207,00 €		Estimative Price Ex Works
	PI 64.1	Pressure indicator gauge	3	WIKA 2940 Ø63mm ATEXRange: 0-60 bar(g)	1	1	5	206,00 €	206,00 €		Estimative Price Ex Works
	TS 64.3	Temperature switchSetting: <200 °C	3	ML1H-H454S-EXISensor temp. Range -18 ... +260 °C	1	1	6	1 188,00 €	1 188,00 €		Estimative Price Ex Works
	TS 64.4	Temperature switchSetting: <60 °C	3	ML1H-H203S-EXISensor temp. Range -73 ... +121 °C	1	1	6	1 188,00 €	1 188,00 €		Estimative Price Ex Works
	Solenoid valves										
	64-V1, 64-V2, 64-V3, 64-V8, 64-V12, 64-V17	Solenoid valve	1	MFH-3-1/8-EX	6	1	4	116,00 €	116,00 €		Estimative Price Ex Works
	64-V1, 64-V2, 64-V3, 64-V8, 64-V12, 64-V17	Solenoid coil	1	VACF-B-K1-1-5-Ex4 M	6	1	4	129,00 €	129,00 €		Estimative Price Ex Works
	Flow control										
	FC 64.1	Electro Pneumatic PositionerAnalog signal : 4-20 mA	3	EPR-IN2SN4NTR,Exia IIC T6	1	1	5	830,00 €	830,00 €		Estimative Price Ex Works
	Heater elements										
	HE 61.1	Deoxo trace heater	3	HAQ2N660, 3 kW , 230 V	1	1	TBD	1 800,00 €	1 800,00 €		Estimative Price Ex Works
	Automatic Valves										
	64-V4.1, 64-V4.2, 64-V5, 64-V6, 64-V14	2-way ball valve	1	A44-6666RT BWJ DN20 PCTFE/Viton	5	1	3	660,00 €	660,00 €		Estimative Price Ex Works
	64-V4.1, 64-V4.2, 64-V5, 64-V6, 64-V14	Maintenance kit for 2-way ball valve	1	A44-ARK44-RV DN20 PCTFE/Viton	5	5	3	72,00 €	360,00 €		Estimative Price Ex Works
	64-V4.3, 64-V4.4, 64-V7	2-way valve (high temperature)	1	A44-6666PV BWJ DN20 Fluorofill/Viton		1	3	884,00 €	884,00 €		Estimative Price Ex Works
	64-V4.3, 64-V4.4, 64-V7	Maintenance kit Polyfill/Vitonfor 2-way ball valve	1	A44-ARK44-PV DN20 Polyfill/Viton	3	3	3	144,00 €	432,00 €		Estimative Price Ex Works
	64-V4.1, 64-V4.2, 64-V4.3, 64-V4.4	Pneumatic Actuator Double Acting	2	APM2DA	3	1	3	344,00 €	344,00 €		Estimative Price Ex Works
	64-V5, 64-V7	Pneumatic Actuator Spring Loaded (Normally Closed)	2	APM2SR (NC)	2	1	3	472,00 €	472,00 €		Estimative Price Ex Works
	64-V6	Pneumatic Actuator Spring Loaded (Normally Open)	2	APM2SR (NO)	1	1	3	472,00 €	472,00 €		Estimative Price Ex Works
	64-V31, 64-V13	3-way valve for 8 mm tube	1	SAH1B3S-H-8M-PK-M-WH, Series 105	2	1	4	285,00 €	285,00 €		Estimative Price Ex Works
	64-T2	2-way valve for 8 mm tube	1	SAH1B-H-8M-PK-M-WH, Series 105	1	1	4	207,00 €	207,00 €		Estimative Price Ex Works
	64-V31, 64-V13, 64-T2	Pneumatic Actuator Spring Loaded (NC)	2	C15-SR-1B2 EX IIC	3	1	4	295,00 €	295,00 €		Estimative Price Ex Works
	Manual Valves										
	61-V1, 61-V2,64-V10, 64-V11, 64-V15, 64-V16	2-way ball valve	1	A44-6666RV BWJ DN20 PCTFE/Viton	6	1	3	660,00 €	660,00 €		Estimative Price Ex Works
	61-V1, 61-V2,64-V10, 64-V11, 64-V15, 64-V16	Maintenance kit for 2-way ball valve	1	A44-ARK44-RT DN20 PCTFE/Viton	6	6	3	72,00 €	432,00 €		Estimative Price Ex Works
	61-V3, 64-V32, 64-V-33	Plug valve for 8 mm tube	1	P1V-H-8M-S316, Series P	3	1	2	95,00 €	95,00 €		Estimative Price Ex Works
	64-V9	Plug valve for 6 mm tube	1	P1V-H-6M-S316, Series P	1	1	2	87,00 €	87,00 €		Estimative Price Ex Works
	64-V14.1	Needle valve for 8 mm tube	1	NV2H-8M-R , Series NV	1	1	4	98,00 €	98,00 €		Estimative Price Ex Works
	Orifices										
	R Ø1.0 mm	Calibrated orifice tube	1	Orifice tube R Ø1.0 mm	1	1	2	35,00 €	35,00 €		Estimative Price Ex Works
	R Ø1.2 mm	Calibrated orifice tube	1	Orifice tube R Ø1.2 mm	1	1	2	35,00 €	35,00 €		Estimative Price Ex Works
	Filter										
	61-F1.1	Condensate Y-strainer	3	Insert for Y611 - 0124/08-3/4" - 1 mm	1	3	2	76,00 €	228,00 €		Estimative Price Ex Works
	61-F1.2	Condensate filter	3	Insert for HyLok FTH-8M-50 modif.0,5mm	1	3	2	40,00 €	120,00 €		Estimative Price Ex Works
	Pressure Safety Valves										
	PSV-64.1, PSV-64.2	Pressure safety valve	3	461tGFO-8m/f-08/15 PTFE36 bar(g) setting	2	1	6	1 736,00 €	1 736,00 €		Estimative Price Ex Works
	PSV-64.3	Pressure safety valve	3	861tGFO-15m/f-15/15 PTFE6 bar(g) setting	1	1	6	992,00 €	992,00 €		Estimative Price Ex Works
Loop 800	OIHA800A/B/C	OXY.IQ-131-00	1	CPT-1700	3	3		3 722,62 €	11 167,85 €		Estimative Price Ex Works
	FICV-800	Variable area flowmeter + 2 limit switch 370nl/h atex	1	CPT-1460	1	1	4	1 823,20 €	1 823,20 €		Estimative Price Ex Works
	PRV-800	PRESSURE REDUCING VALVE CV 0.02 H2 ATEX DEGREASED	3	DET-1106	1	1	4	1 023,40 €	1 023,40 €		Estimative Price Ex Works
	3WV-800	Three way valve 1/4" cf h2 atex	2	VAN-2105	1	1	4	201,11 €	201,11 €		Estimative Price Ex Works
Loop 900	FT-900,FT-920	Flow transmitter dif pressure 500MBAR atex degreased sil	1	CPT-1435	2	1	5	4 067,34 €	4 067,34 €		Estimative Price Ex Works
	FT-901,FT-921	Flow transmitter dif pressure 500MBAR atex degreased	1	CPT-1436	2	1	5	3 971,08 €	3 971,08 €		Estimative Price Ex Works
	FI-940	Flow indicator DN15 atex (1" 300lb)	1	CPT-1017	1	1	4	1 625,40 €	1 625,40 €		Estimative Price Ex Works
	PSV-900	Pressure safety valve 10 barg 18mm n2 atex degreased	1	SOU-1304	1	1	16	1 037,50 €	1 037,50 €		Estimative Price Ex Works
	CV-900-CV-920	Check valve disc DN 40 pn40 degreased	2	CAR-3007	2	2	4	408,50 €	817,00 €		Estimative Price Ex Works
	CV-901, CV-921	Check valve piston DN40 bspH2O/N2 atex degreased	2	CAR-3027	2	2	4	140,61 €	281,22 €		Estimative Price Ex Works
	CV-931	Check valve piston DN15 bspH2O/N2 atex degreased	2	CAR-3023	1	1	2	131,33 €	131,33 €		Estimative Price Ex Works
	HV-900,HV-920	Hand valve DN 15 h2o+o2 cl150 atex degreased	3	VAN-2405	2	1	10	451,52 €	451,52 €		Estimative Price Ex Works
	HV-901	Hand valve DN 40 h2o+o2 cl150 atex degreased	3	VAN-2409	1	1	16	814,85 €	814,85 €		Estimative Price Ex Works
	HV-910	Hand valve DN 25 h2o+o2 cl150 atex degreased	3	VAN-2407	1	1	5	642,87 €	642,87 €		Estimative Price Ex Works
	HV-921	Hand valve DN 40 h2o+h2 cl300 atex degreased	3	VAN-2434	1	1	16	1 102,95 €	1 102,95 €		Estimative Price Ex Works
	HV-930	Hand valve 1/4" od o2 degreased	3	VAN-1005	1	1	12	171,57 €	171,57 €		Estimative Price Ex Works
	HV-931	Hand valve 1/4" od h2	3	VAN-2440	1	1	2	148,89 €	148,89 €		Estimative Price Ex Works
	MV-900, MV-901 MV-920, MV-921 ,MV-941	Globe valve DN15 nitrogen eq percentage	3	VAN-6125	5	2	2	436,16 €	872,32 €		Estimative Price Ex Works
Container Electrolyser	AHD-1000/1001/1002/1003/1004	X5000 (10214104) + Fiber Sealing (10178579) + Cable Gland (10102516)	1	CPT-1530	5	2	4	1 854,38 €	3 708,75 €		Estimative Price Ex Works
	PCA-001-002-003-004-005-006-007-008	CELL VOLTAGE MONITORING	1	AEE-1405	8	3	4	2 626,23 €	7 878,68 €		Estimative Price Ex Works
	WLD-001/002/003/004/005/006	OPTISWITCH 6600 C IP 67-69K (VGPA411130000)	1	CPT-3102	6	2	8	263,38 €	526,75 €		Estimative Price Ex Works
TRANSFORMER & RECTIFIERS	TRANSFORMER & RECTIFIERS	AC/DC power module AD5W740J	1	1000397250	8	1	36	12 500,00 €	12 500,00 €	200 Kg	Estimative Price Ex Works
		AD5000 control box	1	1000397423	2	1	16	4 000,00 €	4 000,00 €	<5Kg	Estimative Price Ex Works
		MODULE STO	1	1000275441	2	1	16	450,00 €	450,00 €	<1Kg	Estimative Price Ex Works
		SPDM	1	1000397448	2	1	16	4 600,00 €	4 600,00 €	5,00 €	Estimative Price Ex Works
		SPDM SYNCHRO TRANSFOMER	1	1000403581	2	1	16	240,00 €	240,00 €	7,00 €	Estimative Price Ex Works
		AC line filter			2	1	12	3 950,00 €	3 950,00 €	250,00 €	Estimative Price Ex Works
		Reactor	1	1000401335	4	1					Estimative Price Ex Works
		Capacitor	1	1000360998	6	1					Estimative Price Ex Works
		Set of fuses			1	1	8	560,00 €	560,00 €	<5Kg	Estimative Price Ex Works
		FUSES HPC SIZE 14X51 - 2AgG	1	60520002	4	1					Estimative Price Ex Works
		FUSIBLE UR 690V 14X51 32A	1	170L1432	6	1					Estimative Price Ex Works
		FUSIBLES NH gPV 1000VDC - 25A	1	373210	4	2					Estimative Price Ex Works
		Lot for control part including :			1	1	16	6 290,00 €	6 290,00 €	<5Kg	Estimative Price Ex Works
		PLC DTBOX	1	1000392861	1	1					Estimative Price Ex Works
		ET200SP PN remote I/O coupler	1	6ES7 155-6AA01-0BN0	1	1					Estimative Price Ex Works
		ET200SP AI 8xI 2-/4-wire BA	1	6ES7 134-6GF00-0AA1	1	1					Estimative Price Ex Works
		ET200SP DI 8x24VDC HF	1	6ES7 131-6BF00-0CA0	11	1					Estimative Price Ex Works
		ET200SP DO 8x24VDC/0,5A HF	1	6ES7132-6BF01-0BA0	5	1					Estimative Price Ex Works
		Switch SCALANCE XB008	1	6GK5008-0BA10-1AB2	2	1					Estimative Price Ex Works
		Interface relay	1	8921120000	22	2					Estimative Price Ex Works
		PN/PN Coupler	1	6ES7158-3AD10 -0XA0	1	1					Estimative Price Ex Works
		ET200SP AO 4XU/I	1	6ES7 135-6HD00-0BA1	1	1	6	260,00 €	260,00 €		Estimative Price Ex Works
		Lot for Cooling System part including :		(Pump, PT, TT)	1	1	16	1 150,00 €	1 150,00 €		Estimative Price Ex Works
		Pump 1,1kW	4	Medana L.1002-2-V-E-10T	2	1				12,00 €	Estimative Price Ex Works
		Pressure transmitter 0-6b - 4-20mA	1	PT5415	2	1				<1,5Kg	Estimative Price Ex Works
		Temperature transmitter PT100 - 4-20mA	1	TA2417	2	1				<1,5Kg	Estimative Price Ex Works

Loops	Equipments	Equipment description	Criticity High criticity 1, Medium criticity 2, Low criticity 3	Spare ref	Qty installed	Recommanded QTY	Lead time (week)	Estimative Unit price (Euro) Ex-W supplier premises	Estimated Total Price (Euro)	Volume	Notes
Automatic Cards	Module ETOR(DI) DI16 X24 VDC ST	6ES7131-6BF00-0CAO	1	_	7	1	2	82,78 €	82,78 €		Estimative Price Ex Works
	Module STOR(DQ) DQ 8X2 4V DC/0.5 A HF	6ES7132-6BF00-0CAO	1	_	3	1	2	70,95 €	70,95 €		Estimative Price Ex Works
	Module EANA(AI) 'AI 8XI 2-/4 Wire basic	6ES7134-6GF00-0AA1	1	_	4	1	2	220,38 €	220,38 €		Estimative Price Ex Works
	Module SANA(AQ) 'AQ 4XU/I ST	6ES7132-6HD00-0BA1	1	_	1	1	2	166,63 €	166,63 €		Estimative Price Ex Works
	Module SETOR(F-DI) F-DI 8X24 VDC HF	6ES7136-6BA0A-0CAO	1	_	3	1	2	215,00 €	215,00 €		Estimative Price Ex Works
	Module SEANA(F-DQ) F-DQ 8X24VDC/0.5A PP HF	6ES7136-6DC00-0CAO	1	_	3	1	2	279,50 €	279,50 €		Estimative Price Ex Works